NWS Operational Advisory Team (NOAT) Yearly Guidance Memorandum for the Science and Demonstration Executive Board (SDEB) – FY15

Charge

Develop guidance for the Science and Demonstration Executive Board (SDEB) to ensure GOES-R and JPSS science development and demonstration activities are more likely to be aligned with NWS operational priorities.

Membership

- Gregory Patrick (Southern Region)
- Jeffrey Craven (Central Region)
- Ken Johnson (Eastern Region)
- Andy Edman (Western Region)
- Carven Scott (Alaska Region) - Chair
- Bill Ward (Pacific Region) – Deputy Chair
- Jim Yoe (NCEP)

Overarching NWS Science and Technology Themes

- Convective initiation/Warn on Forecast
- Best State of the Atmosphere (e.g., 3-d analysis)
- Next Generation Forecast System
- Decision Support Information Systems
- Integration of Social Science into the forecast process
- Risk Reduction as a Core Validation Activity

NWS Weather-Ready Nation (WRN)

NOAA's Next Generation Strategic Plan establishes a long-term goal of a Weather-Ready Nation, as part of a broader vision of resilient ecosystems, communities, and economies. NOAA's Weather-Ready Nation is about building community resilience in the face of increasing vulnerability to extreme weather and water events. In the end, emergency managers, first responders, government officials, businesses, and the public will be empowered to make faster, smarter decisions to save lives and protect livelihoods.

To achieve the vision of a Weather-Ready Nation (WRN), the agency has developed a WRN Roadmap that lays the foundation for future NWS services. With today's increasingly complex environmental, societal, technological, and economic challenges, the NWS must continually remain agile and flexible to achieve its mission to meet society's changing needs.

The NOAT uses the WRN Roadmap as guidance in formulating priorities. The Roadmap is based upon the NWS Strategic Plan (i.e., where the NWS wants to be). The NWS Strategic Plan identifies four pillars:

1. Services Plan - How the NWS meets customer needs
2. Workforce Plan – Who will make everything happen
3. Science and Technology (S&T) Plan – Enables services
4. Business Plan – How the NWS operates

The direction to, and guidance from, the NOAT is aligned with pillars 1 and 3.

Proving Ground Demonstration Product Definitions and Categories

JPSS:

- Sensor and Environmental Data Records - JPSS/SNPP ground segment generates 61 operational products. Each product has been prioritized by the Low-earth orbit Operational Requirements Working Group (LORWG) as having critical impact to NWS operations (priority 1 and 2) with a subset designated as Key Performance Parameters, Supplemental High (priority 3), and Supplemental Low (priority 4).

GOES-R :

For reference it is useful to recall the baseline product definitions as well as those products defined as Option 2, or Future GOES-R Capability:

- Baseline Product Set (currently funded for operational implementation at launch) – These products have been identified as the highest priority to be operationally

demonstrated. The NWS priority is to demonstrate either warning-related baseline products, or warning applications from this product set.

- Future Capability (Formerly Option-2) Product Set – These lower priority products were removed from the “at-launch” implementation, and are now funded by the Program Science Office for implementation sometime after launch.

Most if not all of the baseline and Option 2 GOES-R products support the broader categories the NOAT has shared in prior discussions. These categories are generally captured within the WRN Science and Technology themes outlined in the previous section, and advance the NOAT priorities described below.

NOAT Priorities

The NOAT has defined priorities in broader categories of requirements that are not tied to specific products. These broader requirements are listed below:

1. Convective Initiation – The objective is to engage the numerical weather prediction community to better capture impacts of convection on the initial state of the atmosphere and to improve model performance in forecasting convection. This is the NOAT’s top priority.

2. Fused Products– Demonstration of satellite and WSR-88D integration; Use of Himawari 8 data sets to prepare for GOES-R launch; LEO-GEO fusion using cloud feature-tracking algorithms (meaningful in the high latitudes).

3. Related to 2…Fusion of NWP and satellite information through the use of synthetic imagery into the forecast process.

4. Qualitative and quantitative understanding of the role of satellite data as it is used to initialize and verify NWP models. This relates to the role of data assimilation as a comprehensive and objective mechanism for fusing data of disparate types, including satellite data; confidence that the same best science is applied to satellite data whether for "freestanding" or fused/assimilated products.

5. Icing Threat plus Cloud Properties (cloud ice water path, cloud layers heights, cloud liquid water, cloud type). Note: these are all interrelated – cloud properties are integral to this and other efforts. Also, there should be specific guidance to pursue integrated NWP-centric approaches.

6. SO2/Volcanic emissions

7. Land Surface Model Related (emissivity, vegetation index, vegetation fraction)

8. Precipitation (probability of rainfall, rainfall potential, QPE)

9. Cryosphere – this works for the Great Lakes as well as the AR.

10. Flood and Standing Water (at full resolution) – Already being fleshed out in JPSS at APRFC and CPRFC.

11. Other Future Capability Products not specifically noted. This includes tropopause folding, turbulence prediction, enhanced V overshooting top detection, visibility, and all others not covered above.

Although demonstration of products should meet these priorities, NOAT accepts the demonstration of non-baseline products as acceptable if short-term value to operations is expected.

Further Guidance from the NOAT

1. Understand the forecast process: Potential PI's are strongly encouraged to take time to understand how a forecaster performs their job before submitting a proposal. Coordinate with a Weather Forecast Office to gain insight into the challenges. The PI needs to see how a forecaster uses the prototype satellite information in an operational setting. Develop a vision as to how the completed project would assist a forecaster in the performance of their tasks (would the product provide improved Situational Awareness, or is it a Decision Support tool?).

2. Training: Any proposed demonstration project within the Proving Ground (PG) should have an end-to-end training plan specified that describes the specific training needs of the project to include:
   - Type of training (e.g., one on one, remote presentation, live or recorded, etc.)
   - Collaborative partners that will work with the PIs to develop the training (e.g., NWS Training Division, cooperative institute, etc.)
   - Funding and resources required to develop and deliver the training

   In addition, the NOAT believes that training will need to be developed and delivered for two stages:
   - Stage 1 – training that targets forecasters participating in the Proving Ground project
   - Stage 2 – training targeted towards NWS forecasters that is required for operational implementation of the product as the result of a successful PG demonstration

3. Path to Operations: At the end of a successful demonstration project, the PIs should provide the following information to the NOAT and SDEB for implementation in operations:
   - Proposed operational support structure for production of the product (e.g., NESDIS, NCEP, local application, etc.)
   - Requirements to baseline the product in AWIPS (e.g., plugins, etc.)
   - Dissemination resources required to integrate product to the field (e.g., dataset size, bandwidth, SBN, etc.)
   - Resources required for further development and delivery of national training

4. Integration: Given diminishing budgets combined with the explosion of data within the operational offices, the NOAT recommends proposals that stress thoughtful integration, or fusion with data from other observational data sources, or capabilities (e.g., WSR-88D, GEO-LEO, NWP, etc.). Data fusion is defined within the WRN Roadmap as the "process of synthesizing raw data from multiple sources to generate more meaningful information that is of greater value than any single data source." The NOAT is especially interested in exploring additional opportunities to use synthesized imagery within the Proving Grounds.

5. Strategic Vision: A number of concepts within the WRN are strategic. Potential PI's need to realize some of these ideas involve a "moving target" (e.g., next generation forecast and warning system, integrated observational system, etc.). The NOAT encourages the PI's to try to "lead the target" to impact long-term operations, as opposed to pursuing product development focused on current operations that may not have a long life cycle due to changes in NWS technology, infrastructure, and services.