

**Appendix A: NWS SCIENCE & OPERATIONS OFFICER (SOO) JOB AID**  
(Final Version, 12/16/02)

**I. Why a SOO Job Aid?**

The National Oceanic and Atmospheric Administration's (NOAA) National Weather Service (NWS) Science and Operations Officer (SOO) Program was initiated in 1990 as a critical component of the NWS Modernization. The position description (PD) for the SOO clearly describes the expected roles of this position. First, the SOO is expected to serve as the senior scientific advisor to the NWS Weather Forecast Office (WFO) Meteorologist-In-Charge (MIC) or NWS National Centers for Environmental Prediction (NCEP) Service Center Director with a primary focus on the assurance of the technical and scientific integrity of all hydrometeorological products and services. (For the sake of brevity in this document, the term "MIC" will be understood to also include NCEP Service Center Directors, while the term "WFO" will be understood to also include NCEP Service Centers. NCEP Service Center Directors should tailor the guidance provided in this document to their specialized needs and responsibilities.)

Next, the SOO is fully responsible for initiating, planning, coordinating, and overseeing the transfer of new and emerging scientific technologies and techniques from the research community to the operational forecast and warning environment. Finally, the SOO is expected to participate fully in office operations by working forecast shifts approximately 25% of the time.

However, a recent examination of how SOOs are actually allocating their time on the job revealed noteworthy variations with respect to the PD, as well as variations from one WFO to the next. The variations are due to several factors, including:

- Varying workload requirements based on local weather, topography, and user needs.
- Varying levels of (and opportunities for) local WFO collaborative activities.
- Time differentials in the implementation of applications programs.
- Varying Regional requirements.
- Seasonal variations in workload impacts.
- Differences in staffing profiles, as well as the need to accommodate vacancies.

In the larger picture, SOO duties have necessarily shifted since the original job description was written. On one hand, this is due to the introduction of new NWS hardware, software, and training technologies. Examples include use of and development of procedures on the Advanced Weather Interactive Processing System (AWIPS) Display 2 Dimensions (D2D), the Interactive Forecast Preparation System (IFPS) and the Weather Event Simulator (WES). These are all activities which are now claiming a significant portion of the SOOs' time. On the other hand, Information Technology (IT) implementation and maintenance duties are now better suited to other office staff (e.g., the IT Officer) to enable the SOOs to devote greater emphasis to science and training activities. In any event, there is agreement within the SOO community with the following statement:

*The diversity within the SOO program has proven to be one of its strengths!*

With the statement above as a foundation, the purpose of this Job Aid is to validate observed differences in SOO duties from one WFO to the next, while still providing broad guidelines SOOs and MICs can use to plan how SOOs will allocate their time to meet the requirements of the SOO position. It also provides helpful references to support SOOs in accomplishing their goals. This SOO Job Aid was written by a small team of SOOs and a Regional Science Officer, and was facilitated by the NWS Office of Climate, Water and Weather Services (OCWWS) Training Division. It has been ratified by the NWS Regional Directors and the NCEP Director; as well as the Directors of OCWWS, and the Office of Science and Technology.

## **II. The SOO Position - Prescribed Duties and Observed Variations**

SOOs are expected to lead their WFOs in the following areas:

- a. Serving as the principal science advisor to the MIC.
- b. Assuring the technical integrity of all hydrometeorological products and services provided by the WFO.
- c. Initiating, planning, coordinating, and overseeing the transfer of research results into the operational environment.
- d. Assessing staff training needed to enhance operations and services provided by the office.
- e. Developing plans, strategies, methods, and materials to meet these training needs.
- f. Delivering/implementing training on a local basis.
- g. Ensuring the provision of appropriate training documentation and certification.
- h. Integrating new training technology into operations.
- i. Maintaining operational skill by performing the function of Senior Forecaster on shift approximately 25% of the time.
- j. Contributing to the national science and training program via team participation, sharing of training modules, and participation in regional and national workshops.
- k. Acting as MIC when necessary.
- l. Accomplishing all of the above items as they apply to Center Weather Service Units (CWSU) and Weather Service Offices (WSOs) under the responsibility of the WFO management.

There is a variation among offices in terms of how much time SOOs are able to devote to each of the above activities. In view of these variations, but with the overall goals of the SOO Program in mind, Section III outlines the overall roles of the SOO, while Section IV provides more specific suggestions as to how SOOs should aim to allocate their time. Individual office and regional requirements should dictate the level of variance around these suggested goals, and SOOs should

work directly with their MICs to establish a specific understanding for their individual offices. Section V contains a listing of SOO tips and resources.

### **III. Roles of the SOO in the WFO**

The SOO is responsible for the scientific integrity of the products produced at the WFO, as well as the processes utilized to produce them. The SOO directly supports achievement of national performance goals. Thus, the SOO serves as both “Science Officer” and as “Operations Officer”. There are additional responsibilities SOOs must perform, including roles as “Senior Forecaster”, “Science Program Manager” and “Office Supervisor”. All of these roles are described in this section.

#### *The SOO as ‘Science Officer’*

As the Science Officer in the WFO, the SOO leads office training, applied scientific research, and professional development. The goal of these efforts is to transfer scientific findings to the operational environment, thereby improving products and services. Also, the SOO leads the local effort to maintain the staff’s scientific knowledge, and the ability to apply this knowledge during warning and forecast efforts.

The SOO acts as the office “science expert”. In order to maintain currency, the SOO attends train-the-trainer symposia and scientific conferences, and leads local studies designed to address local forecasting challenges. Knowledge gained via training and/or applied studies is then transferred to the local office staff.

Part of the SOO’s job is to maintain contact with the academic and research communities, discuss operational warning and forecast problems with them, and facilitate as much as possible the involvement of the office staff in collaborative applied research efforts. These efforts include ‘Cooperative’ and ‘Partners’ projects sponsored by the NWS/Cooperative Program for Operational Meteorology, Education, and Training (COMET). Collaboration and science sharing with other WFOs, regional and national headquarters (as appropriate), is also strongly encouraged. Further, regular review of scientific journals, research reports, and papers presented at regional and national conferences is important for maintaining scientific currency and professional development. Membership and active participation in scientific and technical societies is also encouraged. In all these regards, the SOO should lead their staff by example.

#### *The SOO as ‘Operations Officer’*

The SOO and Warning Coordination Meteorologist (WCM) are vital members of the office management team. Collectively, they contribute to meeting the office operational goals. However, for a variety of reasons, the difference in their respective roles can

occasionally lose clarity.

Generally, when it comes to the individual thought processes leading to a warning and/or forecast decision, the SOO should play a primary role in ensuring science and technology are coupled with the best conceptual models to produce the best products and services. The essence of this role includes an analysis of situational awareness during the warning process and of failure modes. On the other hand, the WCM should deal primarily with operational readiness and with the consequences after decisions have been made (e.g., adherence to operational policies, proper product dissemination, product clarity, effectiveness of the product to customers).

In reality, every office situation is different and varies by talents and personalities. It is very important for the MIC to devise a local strategy which ensures the relative roles of the SOO and WCM are clear. Experience has proven it is equally critical for the staff to understand the differing job roles between the SOO and WCM to ensure the integrity and consistency of the local management team.

As Operations Officer, the SOO also has responsibility for scientifically preparing the forecast staff for upcoming 'seasons.' This usually includes an in-depth review of both appropriate science and operational procedures as foundations for decision-making. Further, this preparation requires execution of pre-season exercises, utilization of the WES with appropriate training scenarios, and decisions about additional training which may be required. The SOO also works with the MIC to evaluate staff performance in these areas.

Following significant weather events in the County Warning and Forecast Area (CWFA), the SOO should lead scientific assessment of performance. This should include review of:

1. The evolution of the meteorology,
2. The decision-making process of the forecast staff, and
3. The verification of warnings, watches and/or critical forecasts.

The WES can serve as an important tool for replaying events as part of such reviews, and appropriate events can be developed into WES scenarios for future training use.

In order to accomplish the varied tasks in both science and operations, the SOO coordinates training efforts at the WFO (and CWSU and WSO, as necessary), and must develop a comprehensive knowledge of appropriate training strategies and resources for both scientific and operational topics. While the SOO will carry out some training personally, he or she should accomplish much of the training utilizing focal points or subject matter experts invited from other WFOs, NCEP, or universities. Coordination with the regional Scientific Services Division (SSD) or NCEP Service Center Director can facilitate access to the latter grouping.

## Other Roles

In addition to the roles described above, the SOO also fulfills those of “Senior Forecaster”, “Science Program Manager” and “Office Supervisor”.

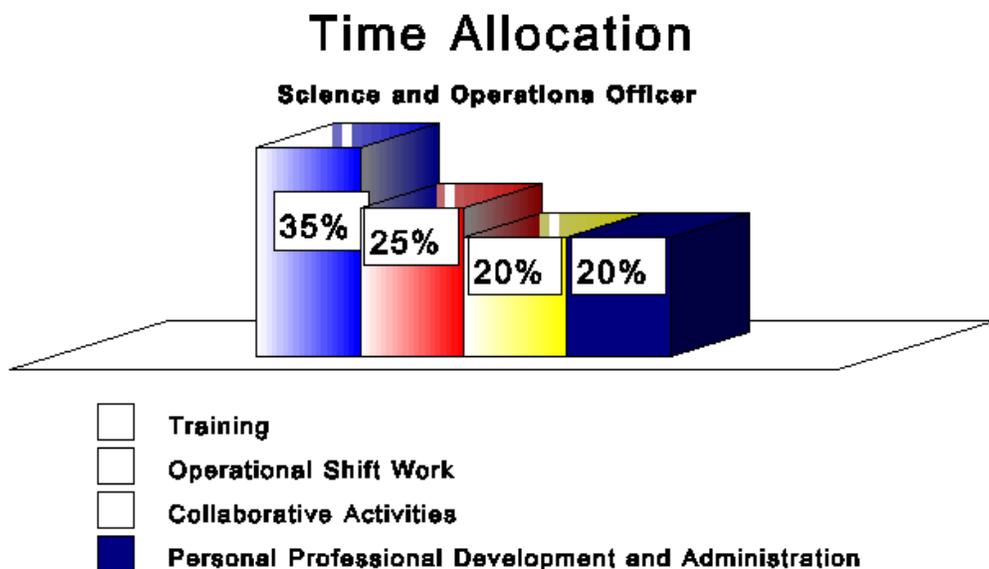
For the purpose of maintaining operational currency, the SOO works shifts as a Senior Forecaster. In this role, the SOO will be able to remain "connected" to operations and to the application of science to forecast problems. Working shifts provides the SOO with insight on potential areas for operational improvement and the opportunity to infuse science into operations.

As Science Program Manager, the SOO works with the entire staff to develop local techniques for applying scientific concepts into operations via the tools available to forecasters (primarily AWIPS). Once this infusion is accomplished, evaluation of new techniques can be accomplished, and their direct impact on warnings and forecasts (and, thus, on attainment of NWS performance goals) can be identified.

In support of the expectation for the SOO to act as MIC, (i.e., office supervisor), the SOO must be provided with the opportunity for appropriate supervisory, management and leadership training. Interpersonal skills, coaching abilities, and team practices are all essential to the success of the SOO program. NWS training management staff and the regional members to the National Strategic Training and Education Plan (NSTEP) team will work together with the SOO community to develop requirements for SOO management and leadership training.

## IV. Suggested SOO Time Allocation

Figure 1 (on the next page) suggests how SOOs may decide to allocate their time:



## **1. Training (35%)**

It is strongly recommended SOOs spend at least a third of their total time in the development, delivery, and facilitation of staff training (with 35% presented as a guideline). This does not include SOO Personal Professional Development [PPD] which is discussed below. The NWS is a science-based service organization. An important way to improve office performance is to continually strive to increase staff knowledge of the local area, and to hone their local forecast and warning techniques (and/or skills).

SOOs are responsible for ensuring each forecaster is proficient in each of the major office programs. These proficiencies should be tracked via seasonal exercises. Deficiencies should be noted and rectified through appropriate training avenues in an expeditious manner. Needed training activities should include (but not be restricted to) the completion of COMET web modules, relevant teletraining sessions, and/or independent study.

The WES Procedural Directive states each employee is required to successfully complete two simulations for each of two significant weather seasons. Simulations to be completed will be selected jointly after consultation with the MIC.

The SOO Science and Training Resource Center (STRC) should be utilized to access the available library of existing, SOO-developed training materials for use with their staff. SOOs may modify these materials as needed to avoid fully duplicating training which is already available (e.g., winter weather forecasting, warning decision making and so forth). All SOOs are strongly urged to share electronic presentations they develop with the rest of the NWS by submitting them to COMET for inclusion in the STRC. The most important qualification for inclusion is a demonstrated focus towards improving NWS operations.

SOOs will work with their MICs to oversee proper use and administration of the NWS Learning Management System (LMS) at the local level. The NWS LMS will provide the facility for SOOs to keep track of training records and evaluate training progress of staff at their office. It will also allow for scheduling of in-residence, teletraining, and local courses offered for NWS staff.

## **2. Operational Shift Work (25%)**

It is necessary for SOOs to maintain the operational connection to their staff, and to be able to make recommendations to the MIC for future changes and improvements in the operational arena. In order for SOOs to effectively accomplish these goals, SOOs should strive to devote approximately 25% of their total time to shift work. This percentage will vary from office to office according to local priorities and staffing considerations.

There may be cases where the degree of SOO shift work interferes with accomplishment of the other critical elements outlined in this document. In such cases, the SOO should discuss resolution of this issue with his/her MIC and regional SSD. This will facilitate discussion at both the regional and national levels as to how best remedy any deficiencies in performing the other critical elements which arise due to excessive SOO shift work.

### **3. Collaborative Activities (20%)**

SOOs should facilitate and oversee collaborative activities such as applied scientific research with universities and/or NOAA laboratories through COMET, and through the NWS Collaborative Science, Technology, and Applied Research (CSTAR) program. Involvement of office staff is necessary to enhance individual professional development and to promote the sharing of newer ideas, research results and/or technologies. Results should be directly infused into the improvement of the forecast and warning services provided by the NWS. It is recognized the amount of collaboration individual SOOs can perform will depend on many factors, not the least of which is whether or not an office is collocated with (or near) a university.

SOOs should share the results of locally developed training and applied science, and COMET collaborative projects, with other SOOs. This may be accomplished through the use of the Internet (e-mail, SOO Science and Training Resource Center (STRC), web sites), visiting scientist programs, office visits, and regional or national conferences.

### **4. Personal Professional Development (PPD) and Administration (20%)**

A strong PPD Program helps ensure SOOs are equipped to provide high quality training to operational staff, as well as to effectively integrate new science and technology into operations. SOOs should budget their time away from the office for PPD consistent with local office needs and limitations.

SOOs must strive to remain scientifically current. This may be accomplished through routine review of articles, technical documents, attendance at professional seminars, workshops, and/or meetings.

Due to the interrelationship between technology and operations, SOOs should continue to work closely on these issues with the ITO, Electronics Systems Analyst (ESA), MIC, and others as required. Examples of technology for which coordination is required include IFPS Grid Forecast Editor, the Workstation ETA, WES, BUFKIT, AWIPS Volume Browser, AWIPS Product Maker, and AWIPS D2D procedures.

As alluded to in Section III, SOOs also require training on management, leadership, and on how to maximize the benefits of training. This training will include (but not

necessarily be restricted to):

- Attendance at the NWS Training Center's (NWSTC) Management & Supervision course or Field Operations Management Course.
- Attendance at NWSTC's Executive Leadership Seminar (ELS).
- Participation in NWS-specific training to be developed for all staff on effective interpersonal communications.

Participation in initiatives designed to raise awareness on how to design/provide effective training, as well as on how to accurately evaluate the effectiveness of training.

SOOs must also attend to various day-to-day administrative duties ranging from responding to e-mail to acting as MIC. It is important SOOs master skills which allow them to effectively manage their administrative duties so as to minimize the impact on their other responsibilities.

SOOs should work with their MIC to formulate their Individual Development Plans (IDP) and should play a major role in the development of annual office training plans. However, the MIC should be generally responsible for the oversight of IDP development and maintenance for all other staff within the office. The SOO may assist with staff IDPs at the request of the MIC.

## **V. SOO Tips and Resources**

Regional and national support for the diverse needs of the SOO are available via:

- Routine regional SOO coordination calls.
- Office visits by their regional SSDs.
- Regional and national SOO workshops.
- Sharing of information via the SOO STRC.
- Regional and national SOO e-mail lists, and regional staff notes.

It is suggested SOOs keep careful records of all training activities in the office through the NWS LMS. It is further suggested SOOs prepare a "SOO Web Page" with quick reference materials for operational staff, as well as a training and information resource for the office. This may be part of the SOO's office intranet page.

Please use this document as a guide to ensure your smooth transition as a SOO, whether you are a long time NWS employee or new to the NWS! The following are several resources critical to the role of the SOO as the scientific and operational leader of the WFO:

National Weather Service Training Portal:

<http://www.nwstc.noaa.gov/nwstrn/>

Professional Development Series:

<http://www.nwstc.noaa.gov/nwstrn/d.ntp/pds.html>

SOO Science and Training and Resource Center:

<http://www.comet.ucar.edu/stre/>

AMS on-line journal access:

<http://ams.allenpress.com/amsonline>

Meteorology Training and Education (MetEd):

<http://www.meted.ucar.edu/index3.htm>

Warning Decision Training Branch:

<http://www.wdtb.noaa.gov/>

VISIT Teletraining:

<http://www.cira.colostate.edu/ramm/visit/ecal.asp>

Individual Development Plans:

<http://www.nwstc.noaa.gov/nwstrn/d.ntp/idp-info.html>

SOO Resource Handbook:

<http://meted.ucar.edu/resource/soo/soobook.htm>

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