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## ARM Climate Research Facility Radar Operations Plan

May 2012



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# **ARM Climate Research Facility Radar Operations Plan**

May 2012

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## Acronyms and Abbreviations

AMF	ARM Mobile Facilities
ARM	Atmospheric Radiation Measurement (Climate Research Facility)
ATSC	Atmospheric Technology Services Company
BOM	Bureau of Meteorology
CCDB	Common Calibration Database
CM&PM	Corrective Maintenance & Preventative Maintenance Database
DMF	Data Management Facility (ARM)
DQ	data quality
DQO	Data Quality Office (ARM)
DQPR	Data Quality Problem Report
DQR	Data Quality Report
DSE	Data System Engineering
NSA	North Slope of Alaska
OSS	Operations Status System
SGP	Southern Great Plains
SO	Site Operations
TWP	Tropical Western Pacific

## Definitions

**Contract Technical Support:** The Radar Support Contractor service managed by Argonne National Laboratory via a task-ordering contract to ATSC. The contract covers radar support for the Southern Great Plains and the ARM Mobile Facilities (depending on geography). The North Slope of Alaska utilized local expertise for radar service. Technical support for the tropics (and AMF depending on geography) is provided via BOM through Los Alamos National Laboratory.

**Corrective Maintenance & Preventative Maintenance Database:** The tools used at each research site to manage CM&PM events. Notable predefined events will automatically be linked to OSS and DQPR.

**Data Management Facility:** Provides routine remote monitoring of data flow availability from research sites.

**Data Quality Problem Report:** Located at <http://www.arm.gov/data/quality>. A DQPR may be entered by the DQO, Instrument Mentors, Site Scientists, Site Operators and their staff, Data Management staff, or Contract Technical Support to document and communicate radar performance issues. It defines the action required to resolve issues and documents the problem resolution process until closure.

**Data Quality Report:** Located at <http://www.arm.gov/data/quality>. DQRs are entered by Mentors or DQ Office staff to document radar measurement quality impacted by system performance, maintenance, repair, or environmental conditions. A DQR establishes the closure criteria for a related DQPR.

**Data System Engineering:** Provides routine remote monitoring of computing and networking performance to ensure data product delivery and remote access to radars.

**Instrument Mentors:** Engineering and technical leads and points of contact for ARM radars.

**Operations Status System:** <http://oss.arm.gov> is used to track the performance of systems and components across the program. The OSS includes the CCDB to document system and component calibration specific information. Notable predefined events from CM&PM applications will be automatically linked to OSS and DQPR.

**Radar Group:** An ad hoc group that includes Instrument Mentors, Contract Technical Support, and Site Operations with the objective of improving the overall measurement, service, and maintenance performance of ARM radars.

**Radar Status Website:** <http://radar.arm.gov> is available to review the current operational status and real-time data images of ARM radars.

**Radar Science Working Group:** Consists of precipitation and cloud radar scientists, radar meteorologists, interested radar data users, and Mentors. This group defines, refines, and recommends standard operational and scanning modes for radars at each research site. This group also makes recommendations on additional or unmet radar measurement needs.

**Site Operations:** Provides on-site operation, monitoring, and maintenance of radars as defined by Mentors.

**Site Scientists:** Conduct the scientific review of measurement and data quality and provide input to Operations, Mentors, and the Data Quality Office on issues related to measurement performance and the scientific utility of measurements.

**Vendor Service:** Provides remote and on-site maintenance and repairs of radars as defined and tasked by Mentors and contracted via Operations. Only the Contracting Officer Technical Representative (COTR) can authorize vendor tasks and services.

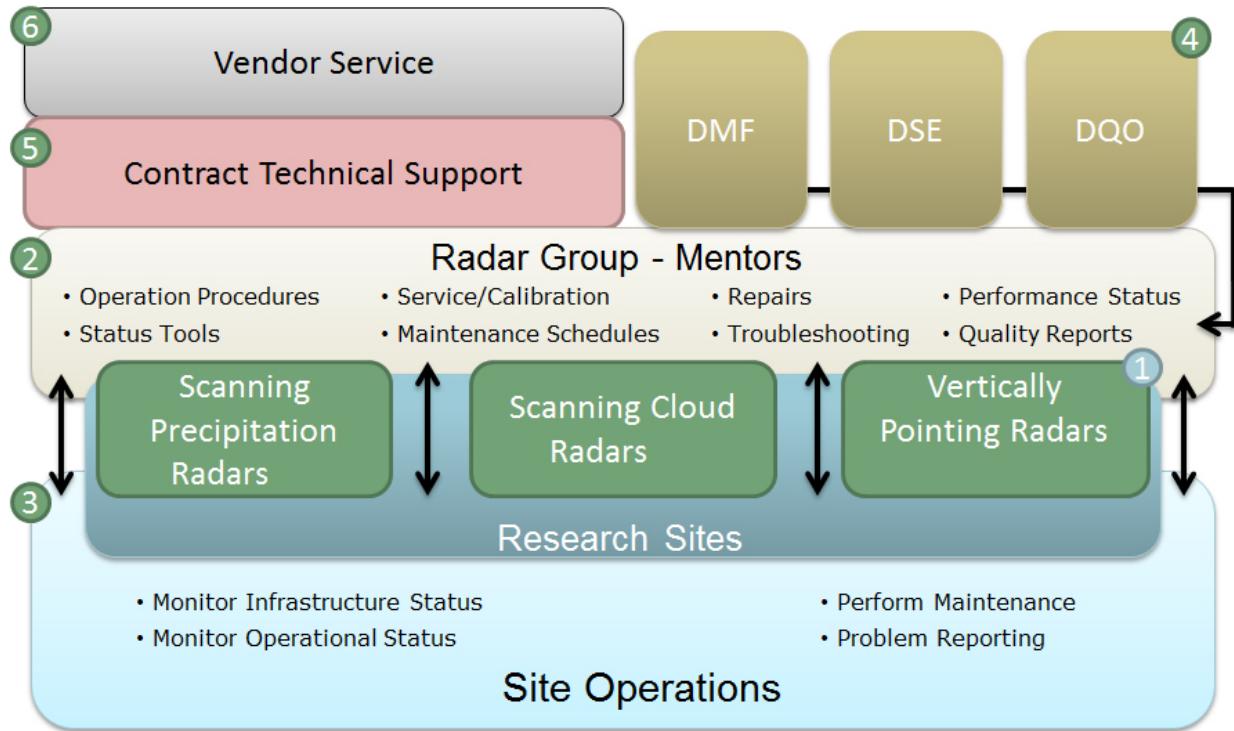
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## 1.0 Introduction and High-Level Roles



**Figure 1.** ARM Radar Operations. Numbers in the figure identify the different “blocks” involved in radar operations.

ARM operates a family of radars at as part of its fixed and mobile research sites (Block 1).  
*Note: This plan does not include radar wind profilers.*



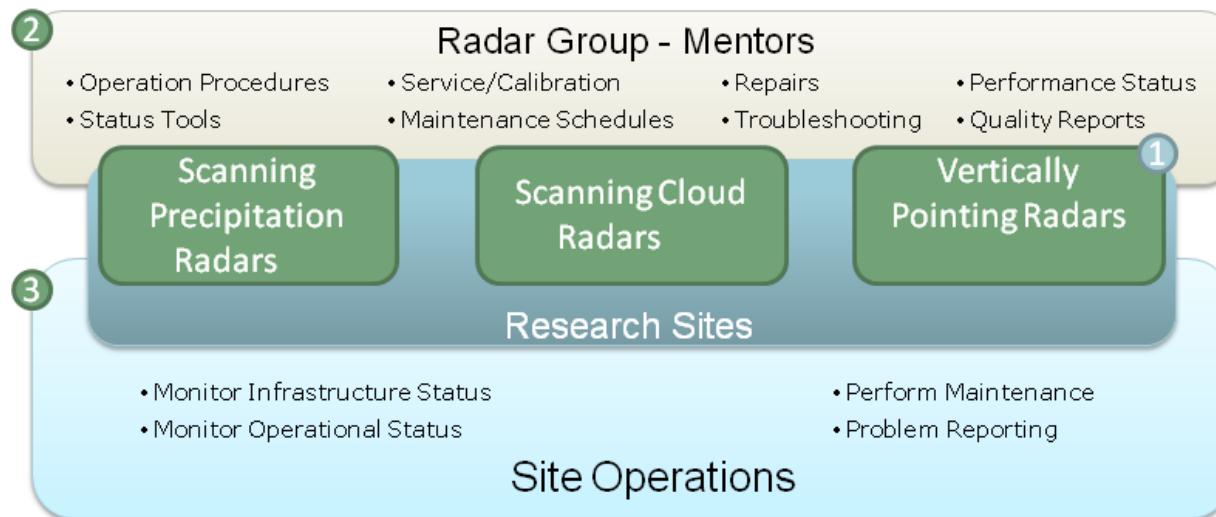
Mentors are responsible for topics in Block 2 related to ARM’s radars and research sites.

- Mentors define and communicate monitoring, maintenance, sparing strategy, and reporting rules to site operations
- Mentors load operational modes and radar configuration into the radars
- In most cases, Mentors initiate radar operation
- Mentors may perform radar maintenance that is beyond the capability of Site Operations

- Mentors communicate scanning sequences for each radar site and locale
- Instrument Mentor monitoring processes can trigger DQPR Actions.

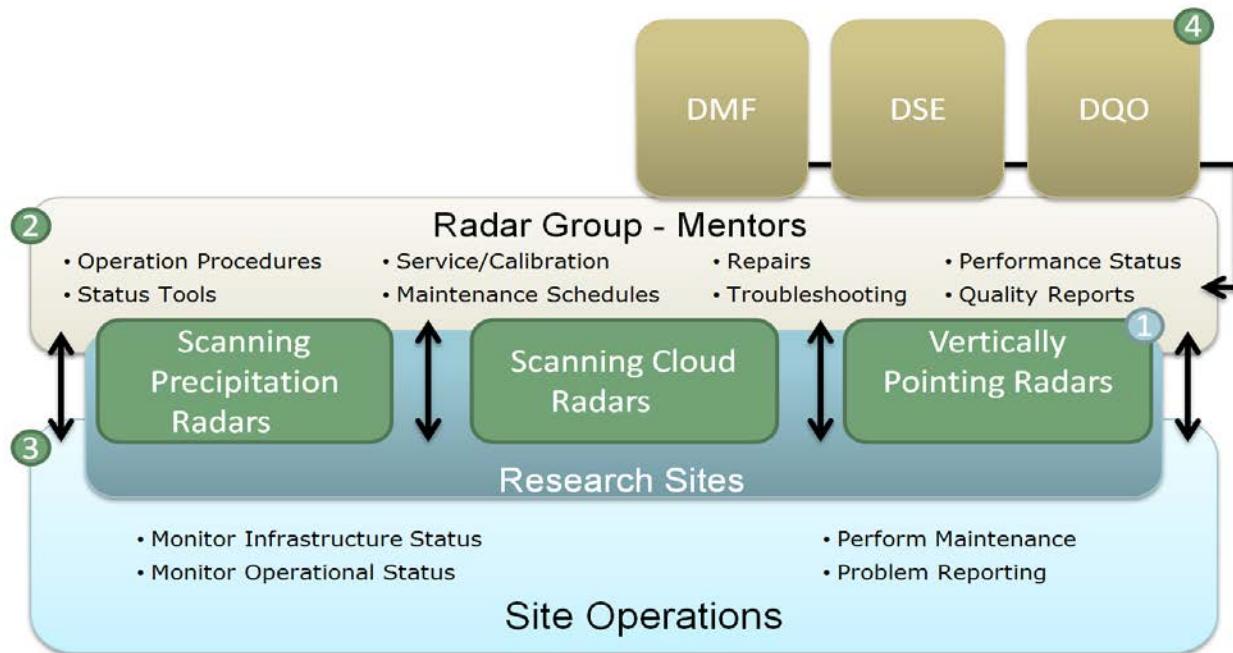


Site Operations performs functions identified in Block 3.

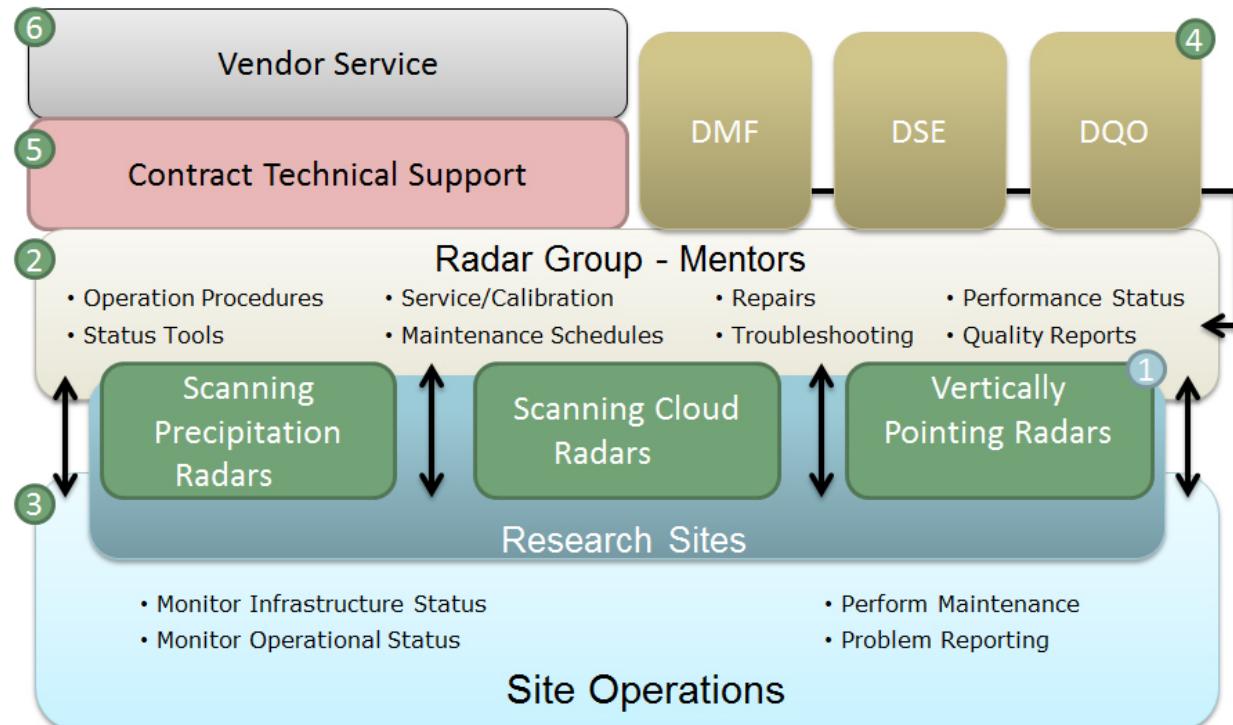


Communications are a key component of radar operations. Radar issues can be communicated from Site Operations to Mentors or from Mentors to Site Operations. Also, as shown in Block 4:

- DMF monitoring processes can trigger DQPR Actions by providing a timely description of an event to the Mentor or DQ Office
- Data System Engineering (DSE) monitoring processes can trigger DQPR Actions by providing a timely description of event to the Mentor or DQ Office
- Data Quality Office monitoring processes can trigger DQPR Actions
- DQPRs are used to provide issue definition and resolution tracking. *Note: When communicating with Vendors, please keep the COTR and Mentors in the loop.*



Mentors manage and communicate the actions necessary to resolve issues directly to Site Operations (Block 3), via Contract Technical Support (Block 5), or via Vendor Service (Block 6).



## 2.0 Roles and Responsibilities

### Instrument Mentors provide:

- Monitoring tools
- Operational procedures
- Maintenance/service procedures
- Spares strategy
- Calibration procedures
- Calibration documentation in OSS
- System(s) performance reviews on a weekly (remote tools) basis
- Manage troubleshooting and repairs
- Confirm tasking with Operations, Technical Support, and Vendors
- Identify and document problems and repairs via DQPR
- Close DQPRs via the DQR process
- Refine operational methodologies
- Maintain scanning strategy documents and mediate revisions
- Maintenance and updates to <http://radar.arm.gov>.

### Site Operations

- Identify and communicate problems to Mentors through DQPRs
- Perform repairs and maintenance as directed by Mentors. *Note: When communicating with Vendors, please keep the COTR and Mentors in the loop*
- Record CM and PM events
- Monitor operational status daily (on site).

### Data System and Networking

- Timely identification and communication of computing and network-related problems to Mentors, Operations, and DQ Office for DQPRs
- Perform repairs, reboots, and maintenance as directed by Mentors
- Monitor operational status daily (remote tools)
- Time service/synchronization
- Provide secure remote connections to radars for monitoring, configuration, and maintenance.

### **Data Quality Office**

- Identify and document problems via DQPR
- Review System(s) performance weekly (DMF data).

### **Data Management Facility**

- Timely identification and communication of product delivery problems to Mentors, Operations, and DQ Office for DQPRs
- Review System(s) performance weekly (DMF data).

### **Contract Radar Technical Support**

- Provide problem information to the COTR and Operations, who have the responsibility to enter DQPRs
- Perform repairs and maintenance as directed by Mentors
- Calibration documentation in OSS
- Monitor operational status daily (remote tools).

### **Vendors**

- Perform remote or on-site repairs and maintenance as directed by Mentors via maintenance agreements or contract actions.

## **3.0 Process**

1. Problem Identification (DQPR) is initiated by:
  - Mentors, during routine monitoring
  - Mentors, during directed Vendor non-routine monitoring
  - Mentors, during analysis of Radar, “Built-in test equipment”
  - Mentors, from communications with Site Operations
  - Data System Engineering, during daily review of collection and ingest status
  - DQO, during routine data analysis
  - DMF, during daily review of product delivery status
  - Radar Support Contractor, during Mentor-directed routine maintenance or calibration, by reporting issues to the COTR and Operations.
2. Problem Communication (Figure 2)

All problems identified with radars that require action are communicated for resolution using the DQPR process. The Mentor is responsible for managing problems through to final resolution and documentation.

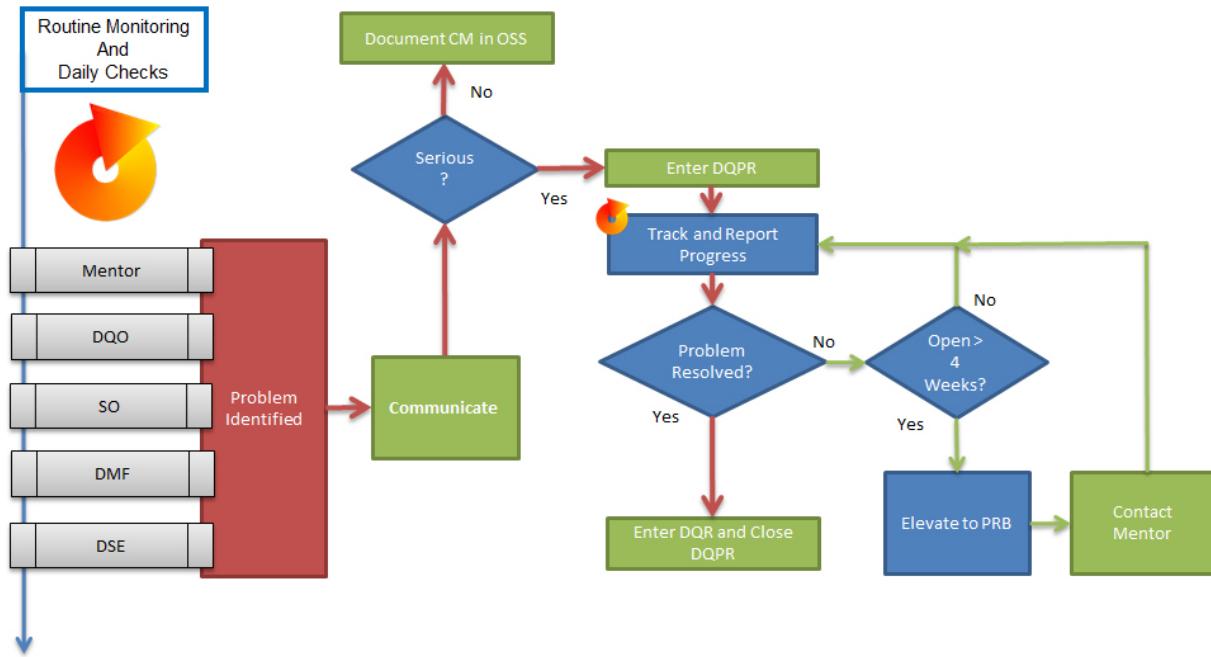
DQRs are completed as necessary to close the DQPR. *When communicating with Vendors, please keep the COTR and Mentors in the loop.*

3. Troubleshooting and Documentation of Radar Problems (Figure 3)

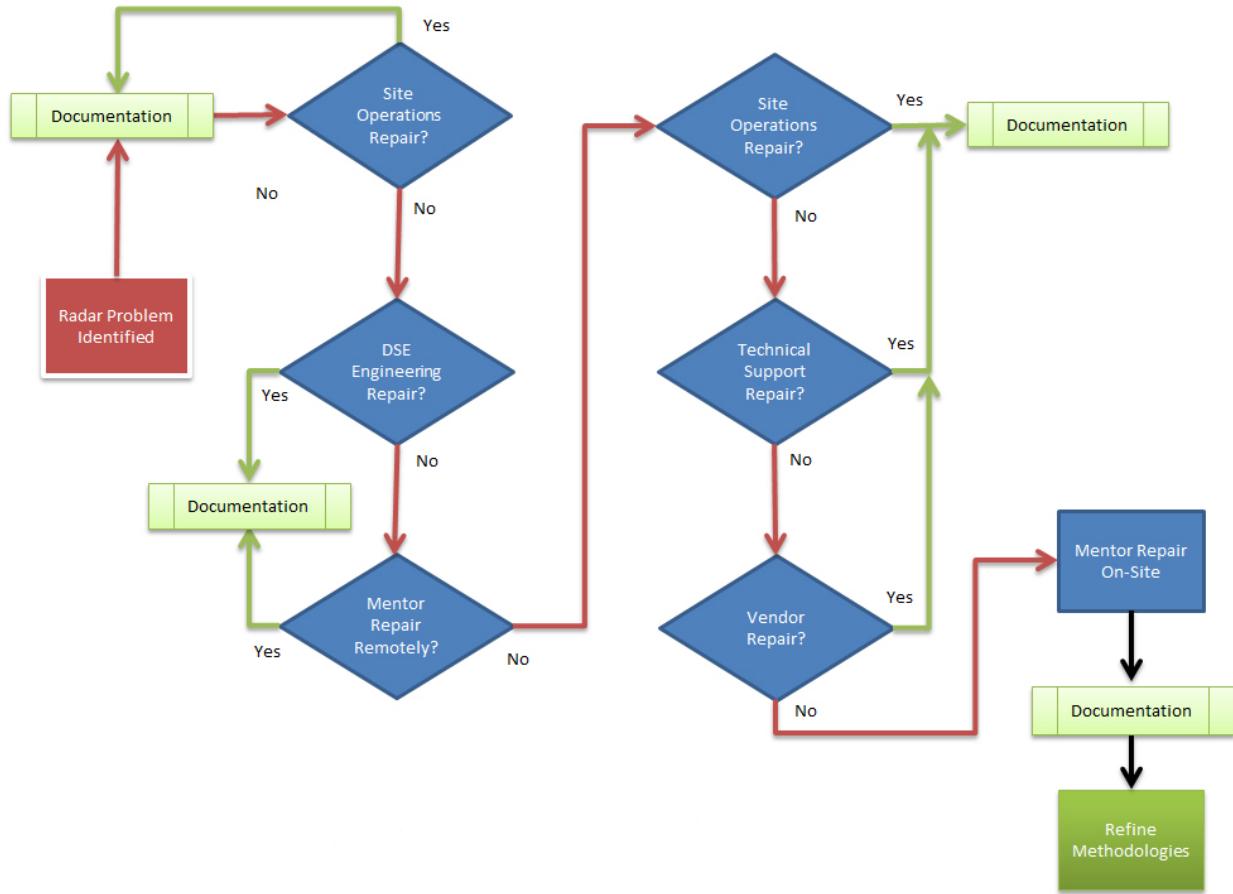
- First, can Site Operations fix the problem (related to pre-defined and approved repair sequences)? If so, notify Mentors and document maintenance in CM database.
- Or, can DSE fix problem? If so, notify Mentors and document maintenance in CM database. If the repair includes the radar computer, please notify the Mentor.
- If Site Operations or DSE are unable to resolve the problem, can the Mentor fix it remotely?
  - If Yes, the Mentor solves problem and completes documentation.
  - If No, the Mentor assesses if local Operations group can help (i.e., reboot, power cycle, etc.). If problem is solved, complete documentation<sub>1</sub>.
  - If Operations is not able to solve problem, the Mentor assesses if the Contracted Radar Technical Support group can help. If so, the technicians are dispatched, and the Mentor monitors the status. If successful the Maintenance is documented<sub>1</sub>.
  - If the Contracted Radar Technical Support group is not able to correct the problem, the Mentor assesses if vendor support or a Mentor visit is needed. For vendor support the respective Site Operations manager is contacted to place the necessary contract. Vendor completes a Site Access Request and repairs the radar; Mentor verifies proper operation, and the maintenance or repair is documented<sub>1</sub>. All CM work must be documented and provided to the COTR and Operations, who have the responsibility for entering CMs into appropriate databases.
  - If Mentor travel is required, a Site Access Request is completed, and the Mentor travels to the site and repairs the radar. Maintenance and repair are documented<sub>1</sub>.

Note:<sub>1</sub> *The documentation of maintenance (corrective or preventative) will be recorded in the research site Corrective Maintenance and Preventative Maintenance database. Notable predefined CM&PM events will be automatically linked to OSS and DQPR. An update to a DQPR or entry of a DQR may also be required to satisfy the documentation requirement.*

4. Revise or update maintenance procedures, monitoring processes, or methodologies as required.



**Figure 2.** Documentation and communication flow chart.



**Figure 3.** Radar repair flow chart.



[www.arm.gov](http://www.arm.gov)



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