

***NATIONAL WEATHER SERVICE POLICY DIRECTIVE 80-3
APRIL 8, 2004***

***Science and Technology
SYSTEMS ENGINEERING***

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OPR: W/OST3 (D. Jones)

Certified by: W/OST (J. Hayes)

Type of Issuance: Initial

SUMMARY OF REVISIONS: None.

1. Systems engineering is applied to any system or major program or project and to any life cycle phase during which design and technical program tasks are defined, evaluated or changed. The National Oceanic Atmospheric Administration's National Weather Service (NWS) requires systems engineering functions to support the enterprise architecture for both existing and future mission critical systems.

2. The objective of this directive is to establish the requirement and framework for systems engineering of mission critical systems. Systems engineering is an interdisciplinary approach and means to enable the realization of successful systems¹. Systems engineering uses the following framework:

- a. Systems engineering supports system acquisition, program management, operations, and maintenance of mission critical systems to ensure systems are designed, built operated, and maintained such that they function as needed in a cost-effective way, considering performance, cost, schedule, and risk.
- b. System functional and performance requirements will be developed from operational requirements as defined through the NWS Policy Directive 10-1, Operations and Services Improvement Process.
- c. Tradeoffs between effectiveness and cost will include consideration of alternative architecture designs. Necessary functional disciplines will be applied to ensure sustainable and supportable systems meet mission, performance and quality requirements.
- d. Systems engineering processes will include the evaluation of proposed designs to support system and operational requirements.
- e. Systems will be developed consistent with requirements, designs, and

¹ INCOSE, *Systems Engineering Handbook: A "How To" Guide for all Engineers*, Appendices, Version 2.0, July 2000.

operational, maintenance, and logistics concepts.

- f. System baselines will be coordinated with, and evaluated by, combined engineering and program management functions to ensure operational requirements and appropriate tradeoffs of cost, schedule, and risk meet system objectives.
- g. Developed systems will be integrated into the enterprise architecture and will be verified and validated to comply with system objectives.
- h. Risk management, traceability of requirements through test, effectiveness measure (metrics), configuration management, quality assurance, and logistics support analyses will be used in the system design process.
- i. Alternative methods will be considered for acquisition, deployment, operation, and support of systems.

3. This directive establishes the following authorities and responsibilities:

3.1 The Office of Science and Technology will establish national policies and procedures for systems engineering.

3.2 Each Office and Region is responsible for ensuring systems engineering is conducted in accordance with this policy.

4. This policy directive is supported by the references and glossary of terms listed in Attachment 1.

Signed by _____ March 25, 2004
Brigadier General David L. Johnson, USAF (Ret.) Date
Assistant Administrator for Weather Services

Attachment 1

REFERENCES AND GLOSSARY OF TERMS

References

NWS Policy Directive 10-1, *Operations and Services Improvement Process*
NWS Policy Directive 10-30, *User Needs and Scientific/Technologic Opportunities*
NWS Policy Directive 10-31, *Operational Requirements Validation*
NWS Policy Directive 30-1, *Systems Deployment, Maintenance, and Assessment*
NWS Policy Directive 80-1, *Acquisition Program Management*
NWS Policy Directive 80-4, *Science and Technology Planning and Programming*
NWS Policy Directive 80-5, *Science Review and Approval*
NWS Policy Directive 80-6, *Research and Analysis for Improving Operations and Services*
NWS Policy Directive 80-8, *Development For Improving Operations and Services*

Glossary

Enterprise. The aggregate of all functional elements, equipment, and processes which together accomplish a common mission.

Enterprise Architecture. A strategic representation of an organization, which defines its mission and business practices, and the information and technology necessary to perform its mission and support its business practices.

Mission Critical System. A system that is essential in the performance of a mission objective that if lost, would cause failure to meet or support the mission objective.

System. A system is an integrated composite of people, products, and processes that provide a capability to satisfy a stated need or objective.

System Architecture. The arrangement of elements and subsystems and the allocation of functions to them to meet system requirements.

System Engineer. An engineer trained and experienced in the field of system engineering.

System Engineering Processes. A logical, systematic set of processes selectively used to accomplish system engineering tasks.

System Requirements. All necessary functional requirements of a system in terms of technical performance and mission requirements, including verification provisions to assure that all requirements are achieved. Essential physical constraints are included.