

**BY THE ORDER OF THE COMMANDER
NORTH AMERICAN AEROSPACE
DEFENSE COMMAND (NORAD) AND
UNITED STATES NORTHERN COMMAND
(USNORTHCOM)**

**NORAD AND USNORTHCOM
INSTRUCTION 90-171**

7 JUNE 2010

Special Management

**NORAD AND USNORTHCOM
EXPERIMENTATION**



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RELEASABILITY: There are no releasability restrictions on this publication.

OPR: N-NC/J84

Certified by: N-NC/CS (Maj Gen Howard N. Thompson)

Pages: 11

This instruction establishes procedures for implementing the experimentation program within North American Aerospace Defense Command (NORAD) and the United States Northern Command (USNORTHCOM) in accordance with the references listed in **Attachment 1**. It details the procedures (experimentation proposal identification, submission, integration, coordination, and assessment) and staff responsibilities related to the NORAD and USNORTHCOM experimentation process (**Attachment 2**). This instruction applies to all NORAD and USNORTHCOM Headquarters staff, regions, subordinate commands, components, and any persons or entities working in the capacity of the Headquarters. It does not apply to National Guard and/or Reserve units that are not assigned, allocated, or apportioned to NORAD and USNORTHCOM. Send recommendations to change, add, or delete information in this instruction to the Office of Primary Responsibility (OPR) using the AF IMT 847, **Recommendation for Change of Publication**; route AF IMT 847s from the field through the appropriate functional's chain of command. This publication may be supplemented at any level, but all direct supplements must be routed to the OPR of this publication for coordination prior to certification and approval. Maintain and dispose of records created as a result of prescribed processes in accordance with the Joint Staff Disposition Schedule, Chairman of the Joint Chiefs of Staff (CJCS) Manual (CJCSM) 5760.01, **Joint Staff and Command Records Management Manual: Volume I (Procedures) and Volume II (Disposition Schedule)**.

1. Overview.

1.1. References, Acronyms or Abbreviations, and Terms. See **Attachment 1**.

1.2. NORAD and USNORTHCOM Missions. NORAD's formal mission statement is: "*in close collaboration with homeland defense, security, and law enforcement partners, prevent air attacks*

against North America, safeguard the sovereign airspaces of the United States and Canada by responding to unknown, unwanted, and unauthorized air activity approaching and operating within these airspaces, and provide aerospace and maritime warning for North America.” And USNORTHCOM’s is “USNORTHCOM anticipates and conducts Homeland Defense and Civil Support operations within the assigned area of responsibility to defend, protect, and secure the United State and its interests.”

1.3. Experimentation Vision. Rigorous, robust, and relevant internal and external experimentation improves command decisions related to missions, capabilities and concepts of operations.

1.4. Experimentation Objective. NORAD and USNORTHCOM experimentation is conducted to enhance the Commands’ abilities to accomplish their missions, contribute to transformation, and evaluate new concepts. As appropriate, plans and results are provided to United States Joint Forces Command (USJFCOM), the Department of Defense (DOD), interagency community partners, and Canadian and other multinational partners so they may leverage results to the extent they are relevant.

1.5. Experimentation Goals. The primary goal is to develop and sustain innovation by providing insights and recommendations to help shape NORAD and USNORTHCOM missions and required capabilities across the full spectrum of doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF). Specific experimentation goals supporting directorates, special staff, subordinate commands and components include:

- 1.5.1. Improve mission accomplishment through innovation and transformation.
- 1.5.2. Improve mission-related decisions.
- 1.5.3. Improve concepts of operation.
- 1.5.4. Integrate experimentation results into the Commands’ capabilities requirements processes.

2. Experimentation Description and Program.

2.1. The Code of Best Practice (COBP) for Experimentation refers to an experiment as “*a test made ‘to determine the efficacy of something previously untried,’ ‘to examine the validity of an hypothesis,’ or ‘to demonstrate a known truth’.*”

2.2. In general, experimentation is a type of analysis best suited to comparing alternatives, either materiel (e.g., alternative hardware/software approaches) or non-materiel (e.g., alternative concepts or tactics, techniques, and procedures).

2.3. Experiments can be conducted individually or in a related series of several experiments known as “campaigns of experimentation.” The COBP defines experimentation campaigns as “a series of related activities that explore and mature knowledge about a concept of interest” and as “organized ways of testing innovations that allow refinement and support increased understanding over time.”

2.4. Experiments may be generally distinguished by three factors: type, venue, and scope.

- 2.4.1. Type. The COBP distinguishes among three major types of experimentation: *discovery experiments*, which introduce new systems, concepts, organizational structures, technologies, or other elements to determine if they provide military utility; *hypothesis testing*, which builds

knowledge or refines our understanding by seeking to falsify specific hypotheses using an “if...then” statement; and *demonstration experiments* that use established technologies in a defined setting to show a technology can be efficiently and effectively employed under specific conditions.

2.4.2. Venue. Experimentation can be conducted in many venues. Typical venues include Symposia, Seminars, and Workshops; Modeling and Simulation (M&S); Joint Capability Technology Demonstrations (JCTD); Exercises; and Wargames. While experimentation can be conducted within an exercise – provided the experimentation does not jeopardize the exercise objectives – it is important to distinguish the two. Exercises are aimed at training forces or evaluating established procedures. Experiments are focused on data collection to explore alternatives through discovery, hypothesis testing, or demonstration.

2.4.3. Scope. Regardless of type or venue, experiments also vary in scope and scale. Due to resource requirements and availability, purpose, time lines, and other considerations, most experimentation in the Commands is narrowly focused and executed on a relatively small scale in what is known as a Limited Objective Experiment (LOE). Larger scale experimentation is normally conducted in concert with USJFCOM/J9 and/or one or more other external organizations.

2.5. NORAD and USNORTHCOM experimentation is conducted internally and externally. The process steps and purpose are described in detail at **Attachment 2.**

2.5.1. Internal experimentation is focused on addressing specific Command concepts, capabilities, missions, and plans. The intent is to directly contribute to Command mission accomplishment, typically relying on in-house resources to lead analysis design and direct the execution.

2.5.2. External experimentation efforts are geared toward collaboration with other Combatant Commands and Services on efforts of mutual interest. The bulk of those are affected through participation in the Joint Concept Development and Experimentation (JCD&E) Enterprise, which is led and coordinated by USJFCOM/J9. Other efforts involve bilateral or multilateral collaboration with individual Combatant Commands, the National Guard Bureau, Services, and other organizations. The intent is to directly and indirectly contribute to mission accomplishment of the Commands and DOD as a whole, leveraging in-house and other resources where possible and appropriate.

3. Identification of Experimentation Requirements.

3.1. The processes for identification of experimentation requirements vary depending on focus (internal or external) and timing (deliberate or popup).

3.1.1. The primary means of identifying experimentation requirements is via the annual Comprehensive Joint Assessment (CJA) in the form of what are termed “Warfighter Challenges” (WFCs). The submission guidance varies slightly from year to year but typically includes a broad statement of the experimentation requirement accompanied by up to three experimentation questions that focus on specific aspects of the requirement that experimentation may help address. Accompanying the statement and questions are several supporting data elements such as linkage to Joint Capability Areas (JCAs); linkage to strategic guidance; time frame (near, 0-2 years; mid, 2-7 years; or far, 8-20 years); level (tactical, operational, strategic); and others.

3.1.2. Internal experimentation requirements are derived from a number of sources. The aforementioned CJA submission is one. Another is an annual call for mission-specific experimentation requirements that is distributed via the Commands' Task Management Tool (TMT). Unlike the CJA, the TMT data call asks primarily for the mission gap or requirement that might be addressed by experimentation, and then relies on direct communication between experimentation POCs and the submitting subject matter experts (SMEs) to glean the specific goals and necessary supporting data.

3.1.3. In addition to the deliberate processes described above, experimentation requirements may be identified out-of-cycle as circumstances warrant. For external requirements (usually joint), they are developed in the same manner as required by the CJA, but are submitted directly to USJFCOM/J9. For internal requirements, they are submitted via direct communication with the Commands' experimentation POCs by whatever means are most appropriate.

4. Role and Responsibilities.

4.1. Organizational Relationships.

4.1.1. N-NC/J8 leads, coordinates, and supports experimentation related to NORAD and USNORTHCOM mission areas, coordinating with appropriate Command Directorates, the USJFCOM Joint Concept Development and Experimentation Directorate (J9), the Joint Staff Operational Plans and Joint Force Development Directorate (J7), the Office of the Under Secretary of Defense, Acquisition, Technology, and Logistics (OUSD/AT&L), and other organizations as appropriate. For experimentation requirements within the headquarters, N-NC/J8, in coordination with appropriate directorates, components, subordinate organizations, and other staff, considers mission requirements, constraints (e.g., time), resource availability, and other factors as appropriate to determine whether to accept and execute an experiment. When N-NC/J8 is not able to support the experiment, their staff will work with the requirement owner to find an alternate approach as appropriate. Such alternate approaches may, for example, be delaying execution, identifying another organization to lead the work (e.g., USJFCOM, NORAD and USNORTHCOM component or subordinate, contractor), or executing with a reduced scope.

4.1.2. Success of the experimentation program requires direct liaison between NORAD and USNORTHCOM staff and DOD and non-DOD agencies and activities. Such direct liaison is authorized.

4.2. All NORAD and USNORTHCOM Staff, Regions, Components, and Subordinate Organizations.

4.2.1. All NORAD and USNORTHCOM directorates, staff, regions, components, and subordinate organizations will carefully evaluate experimentation results to determine their value in supporting the Commands' missions and military utility. For experimentation to have value, it is important that validated results be incorporated into plans, programs, exercises, and operations, as appropriate.

4.2.2. All NORAD and USNORTHCOM directorates, regions, components, and subordinate organizations are encouraged to submit experimentation proposals in accordance with this instruction. The organization proposing the experiment is assigned as the lead agency, and will incorporate the validated concepts into planning, documentation, and execution as appropriate.

4.2.3. As experiments evolve, staff, directorates, components, and/or subordinate organizations may be asked to provide additional support, depending on the event and level of integration. N-NC/J8 will provide process integration support for these efforts in conjunction with the NORAD and USNORTHCOM organization providing subject matter leadership and execution.

4.3. NORAD and USNORTHCOM Staff.

4.3.1. N-NC/J6, Directorate of Command Control Systems, provides guidance and coordination for necessary C4 capabilities and related infrastructure. J6 will assist with installation, testing, integration, and certification of hardware and software necessary for experimentation, and will assist with implementation and sustainment of successful experimentation results contingent on sponsoring Directorate validation and appropriate resourcing.

4.3.2. N-NC/J7, Directorate of Training and Exercise, oversees NORAD and USNORTHCOM exercises that provide opportunities to include experimentation concepts and actions. Experimentation will not be conducted as part of exercises in any instance where doing so might jeopardize the training or evaluation objectives of the exercise. When experimentation in an exercise is appropriate and warranted, J7 will coordinate with affected directorates and facilitate inclusion of experiment objectives into the Joint Master Scenario Events List (JMSEL). J7 will also include validated concepts and technologies in future exercises for training and evaluation.

4.3.3. N-NC/J8, Directorate of Programs, Resources, and Analysis, oversees and executes the experimentation program on behalf of the Commander, and keeps the Commands informed of changes to aid understanding and participation. The Director will execute functional responsibility for developing and submitting NORAD and USNORTHCOM experimentation proposals to DOD and non-DOD agencies through the annual CJCS Comprehensive Joint Assessment (CJA) and other mechanisms. Additionally, J8 will solicit experimentation input from directorates, special staff, and components; act as a process integrator; coordinate experimentation related issues and communication between the Command staffs and external organizations; provide experimentation advice and training; design and execute experiments; and be responsible for reviewing and maintaining the Commands' Experimentation Strategy document, which describes priorities and levels of effort to be applied against competing experimentation program requirements (e.g., internal experimentation efforts; participation in external experimentation; participation in Joint Concept Development and Experimentation Enterprise efforts, etc.).

4.3.4. N-NC/IC, Interagency Coordination Directorate, will facilitate integration and synchronization of experimentation activities with interagency community partners as necessary to ensure mutual understanding and unity of effort, as well as to assist in leveraging mutually beneficial resources and results.

4.4. NORAD and USNORTHCOM Components and Supporting Commanders.

4.4.1. NORAD and/or USNORTHCOM components and supporting commanders are instrumental in defining force requirements for experimentation events. Components and supporting commanders also provide perspectives on concept and hypothesis formulation, prioritization of efforts and resources, process refinement, and on conclusions drawn from

experiment results. Depending on the experimentation activity and level of involvement, components may be asked to be the sponsor, project lead, or both. Responsibilities depend on the specific role, as described in this instruction.

4.5. NORAD and USNORTHCOM Subordinate Commands, Regions, Joint Task Forces, and Standing Joint Force Headquarters.

4.5.1. NORAD Regions and USNORTHCOM subordinate commands, Joint Task Forces and Standing Joint Force Headquarters operate similarly to NORAD and USNORTHCOM components by providing SMEs for experimentation ideas or serving as project lead in experimentation activities.

4.6. Functional Responsibilities – Sponsor, Project Lead, Subject Matter Expert (SME).

4.6.1. The staff office that submitted the mission requirement being supported by the experimentation is the “sponsor” and should appoint a POC to work with analysts during planning and execution. With N-NC/J8 guidance and assistance as needed, sponsors are primarily responsible for communicating the requirements to the analysts, championing their proposal, working with analysts to articulate the purpose and objective(s) for the experiment, and transitioning results into DOTMLPF actions as appropriate.

4.6.2. The lead analyst for the experiment is usually designated as the “project lead” and is responsible for leading the design, planning, execution, analysis, and reporting. Project leads will normally be provided by N-NC/J8, but may be from any headquarters, region, component, or subordinate staff office depending on the mission requirement equities, constraints, and resources.

4.6.3. “Subject Matter Experts” (SMEs) are appointed by branch chiefs or higher, and act as the directorate’s knowledge base, voice, and representative for experimentation proposals within their organization. SMEs participate as necessary to provide advice and recommendations for a specific proposal or experimentation activities in general. Once an experimentation proposal is accepted for execution, SMEs participate in the experiment and/or coordinate other SME participation as necessary, and provide periodic progress reports and briefings to appropriate organizations and senior staff.

5. Resourcing.

5.1. Resourcing of NORAD and USNORTHCOM Experimentation.

5.1.1. The baseline premise of NORAD and USNORTHCOM experimentation is to employ resources at a minimum level to successfully accomplish the experiment.

5.1.2. Most experimentation conducted internal to the Commands will be limited in scope and size and will accordingly not be resource-intensive. Costs are typically similar to those associated with any such event, such as routine travel and per diem. Certain experiments may require additional overhead such as paying participant/speakers’ travel costs, purchasing supplies and office equipment, obtaining software licenses, and the like. Normally, such costs are covered by the organization initiating or directing the experiment. Occasionally, funding is specifically available to support experiments. In such cases, funds will be made available to sponsoring or participating organizations and individuals, as appropriate, to either fully or partially cover costs.

5.1.3. Since experimentation costs can vary widely, sponsors must develop a cost estimate

prior to conducting an experiment. The cost estimate should include not only the monetary costs, but also personnel and time. The estimate serves to help determine the availability of resources, evaluate the value of the experiment against resource commitments and competing priorities, and to identify whether it is necessary to advocate for additional internal or external resources. N-NC/J8 will assist in developing the cost estimates, and will lead the advocacy for additional resources as necessary and appropriate.

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Attachment 1**GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION*****References***

Chairman of the Joint Chiefs of Staff Memorandum, *Joint Experimentation Guidance for FY 2006 and FY 2007*, 9 January 2006

Chairman Joint Chief of Staff Instruction 3180.01, *Joint Requirements Oversight Council (JROC) Programmatic Processes for Joint Experimentation and Joint Resources Change Recommendations*, 25 March 2003

Joint Concept Development and Experimentation Campaign Plan, *FY 2010-2011, United States Joint Forces Command*, 1 October 2009

NORAD and USNORTHCOM FY07-08 Commander's Training Guidance, Commander, NORAD and USNORTHCOM, 4 March 2006

Code of Best Practice for Experimentation, July 2002

Supporting Information

Code of Best Practice: Campaigns of Experimentation, March 2005, February 2006

Guide for Understanding and Implementing Defense Experimentation (GUIDEx), February 2006

The Logic of Warfighting Experiments, August 2006

Acronyms

CJA—Comprehensive Joint Assessment

CJCS—Chairman of the Joint Chiefs of Staff

CJCSI—Chairman of the Joint Chiefs of Staff Instruction

CJCSM—Chairman of the Joint Chiefs of Staff Manual

COBP—Code of Best Practice

DOD—Department of Defense

DOTMLPF—Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, and Facilities

IC—Interagency Coordination

JCA—Joint Capability Area

JCD&E—Joint Concept Development and Experimentation

JCTD—Joint Capability Technology Demonstration

LOE—Limited Objective Experiment

M&S—Modeling and Simulation

JMSEL—Joint Master Scenario Events List

NORAD—North American Aerospace Defense Command

OPR—Office of Primary Responsibility

OUSD/AT&L—Office of the Under Secretary of Defense/Advanced Technology and Logistics

SME—Subject Matter Expert

TMT—Task Management Tool (formerly TMS, Task Management System)

USJFCOM—United States Joint Forces Command

USNORTHCOM—United States Northern Command

WFC—Warfighter Challenge [joint experimentation requirement]

Terms

Analysis—An examination of a problem, its elements, and their relationships in order to understand and express the results in terms of usable and relevant information. (CJCSM 3010.02)

Exercise—A military maneuver or simulated wartime operation involving planning, preparation, and execution. It is carried out for the purpose of training and evaluation. (JP 1-02, “Exercise”)

Experiment—A process to explore the effects of manipulating a variable; an analytical activity to determine the efficacy of something previously untried, examine the validity of a hypothesis, or demonstrate a known or believed truth within a specific context. (CJCSM 3010.02)

Experiment Campaign—A design approach that integrates a sequence of related experiments, studies and/or analytical activities designed to advance the understanding of the problem under examination. (CJCSM 3010.02)

Hypothesis—A tentative assumption made in order to draw out and test its logical or empirical consequences (Merriam-Webster). An assertion, proposition or statement about relations or constraints whose truth-value is as yet unknown, but in principle is determinable by tests involving generally empirical but also logical evidence. Hypotheses can be formulated as “if-then” statements: “If A (proposed solution), then B (effect: problem overcome).” (CJCSM 3010.02)

Limited Objective Experiment—A single, narrowly scoped, analytically focused event employing one or more experimentation methods (either stand-alone or as part of an experiment campaign) to focus on a specific aspect of a larger problem. (CJCSM 3010.02)

Joint Capability Technology Demonstration (JCTD)—A demonstration of the military utility of a significant new technology and an assessment to clearly establish operational utility and system integrity. (CJCSI 3170.01G)

Rigor—The inherent application of precise and demanding standards and techniques (CJCSM 3010.02)

Warfighter Challenge (WFC)—An articulation of a joint force problem to be considered for examination through JCD&E. WFCs are normally submitted by the Combatant Commands and Services annually via the CJA. (CJCSM 3010.02)

Wargame—A simulation, by whatever means, of a military operation involving two or more opposing forces using rules, data, and procedures designed to depict an actual or assumed real life situation. (JP 1-02, “War Game”)

Attachment 2

EXPERIMENTATION PROCESS.

A2.1. Overview. Experimentation is inherently an analytic event. As a result, experimentation in the Commands is conducted in accordance with the scientific method. **Figure 1** outlines the process as it applies to experimentation. The following paragraphs describe the steps in more detail, but combine some of steps in the diagram for ease of reading and understanding.

Figure 1: Experimentation Process Overview.

FUNCTIONS	STEPS	QUESTIONS
INTENT	DETERMINE PURPOSE, OBJECTIVES, EEAs	Why is the experiment needed? What decision is being supported?
DATA	ID NEEDED DATA ID METHODOLOGY	What data are needed to answer the questions? Which data are available? Which are not? How <i>might</i> I collect the required data?
ENVIRONMENT	ID EXPERIMENT CONDITIONS ID RISKS AND MITIGATION	How does the experiment environment affect data collection? What could go wrong, and how can the risk be mitigated?
DESIGN	DESIGN VENUES & DATA COLLECTION PLAN	How – <i>exactly</i> – will data be collected, and how will they be analyzed relative to the objectives?
PREPARATION	PREPARE	What do the facilitators, participants, analysts, observers, and support staff need to know to maximize their contributions?
EXECUTION	EXECUTE	Are required data being collected? Does the plan need to be adjusted?
ANALYSIS	ANALYZE DOCUMENT RESULTS	What do the data mean in terms of the purpose and objectives? Has the analysis provided information relevant to the decision?

A2.2. Identification of Requirements and Purpose. Once a HQ, Region, Component, or Subordinate staff office identifies a mission requirement or gap as part of the internal or external data calls, N-NC/J84 analysts will work with the submitter to determine the purpose of the experiment, specifically in terms of how an experiment might help address the mission requirement or gap. The analysts will work with the decision maker (i.e., “customer”) to understand and articulate the purpose of the experiment, and to understand and articulate any specific objectives. The analyst will then work to deconstruct the problem statement and objectives into distinct and manageable parts.

A2.3. Analysis/Experimentation Planning. The next steps are executed by the assigned N-NC/J84 analysts, and are typically transparent to the sponsoring staff. The analyst will rigorously apply the scientific method, first identifying what data would be needed to address the issues, which are already available (e.g., from literature, lessons learned), and what the gap is. Next, the analyst will identify which methods/events will be used to collect the data, and will develop a sequence, time line, and flow for the events. In developing the design, the analyst identifies and considers how the experiment conditions (e.g., time available, facilities, participant expertise, etc.) might affect the data collection, and makes adjustments accordingly. Inherent to this process is identification of risks to the analysis (i.e., what might go wrong) and means to mitigate those risks. With those considerations in mind, the

analyst will apply the specific detail to each of the data collection methods. Typical steps in this phase would be design of surveys, developing read ahead materials, developing training materials, drafting slides for the execution, and so on.

A2.3.1. Throughout the design process, the N-NC/J84 analysts will communicate frequently with the sponsoring staff office to build confidence, keep all concerned apprised of status, and ensure the design is consistent with the sponsor's intent and remains within known constraints. As a result, sponsoring staff offices must ensure appropriate POCs are available to meet with the analysts and conduct the necessary coordination.

A2.4. Preparation. Prior to execution, several preparatory steps will be in order. In almost all cases, the analyst will conduct training for facilitators and/or other personnel involved in leading and executing the experiment. Depending on the design, facility, and other considerations, preparatory steps may also include a rehearsal, facility walk-through, room setup, information technology checks, etc.

A2.5. Execution. During execution, analysts collect data via the various mechanisms they designed. Depending on purpose, objectives, constraints, and other factors, the events may include surveys, literature searches, interviews, seminars, workshops, and others. The analysts – working closely with the sponsors – will continuously assess whether the data are being collected as envisioned, and dynamically adjust the execution as necessary.

A2.6. Analysis and Reporting. Analysis occurs at every step from design through execution and beyond, but the bulk occurs when all data have been collected. The analysts employ appropriate analysis techniques to determine what the data mean (both individually and synergistically) in context of the experiment's objectives. The analysts then document the results in an analysis report, and deliver it to the sponsor as the final product. Report distribution is at the sponsor's discretion except as required by USJFCOM/J9 for annual reporting.