75TH MORSS
US Naval Academy
Annapolis, Maryland
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Through Multiple Disciplines, Analytical Power

712CD

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Headquarters U. S. Air Force

Integrity - Service - Excellence

Operational Thread Development

U.S. AIR FORCE

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Version 5, 2 May 2007

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Overview

- Benefit
- Purpose
- Definitions
- Thread Integration Framework
- Thread Development

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Benefit

- **Standardized approach**
  - **Facilitates cross-team collaboration**
  - **Consistent terminology usage**
  - **Improves experiment design**
  - **Supports joint and service capability-based assessment framework**
- **Analysis support**
  - **Core analysts will assist in application of this approach**
- **Phased approach**
  - **Manageable workload for CDTs**
  - **Clearly identified milestones for thread development products**

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Purpose of Operational Threads

- Facilitate examining a potential improvement to a deficient capability
  - The contribution of one or more initiatives or improved infrastructure either through
    - a new process or modification to an existing process
    - a new organizational construct
    - a new system or system-level (i.e., “machine-to-machine”) exchange between databases, applications, or hardware
- Allow us to influence player activity (by tailoring scenario events) to ensure we are able to demonstrate capability goals
- Provide operational context and therefore relevance
  - When reporting results (of initiatives, capability goals, anything else)

Identify the contribution of initiatives to operationally significant activities and processes (i.e., operational threads)

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Basic Definitions

- **Capability: The ability to achieve a desired effect under specified standards and conditions through combinations of means and ways to perform a set of tasks (CJCSI 3170.01E, Joint Capabilities Integration and Development System). Inherent to a capability are the organizations and people, processes, and technical means used to accomplish a military task or mission. Standard US Air Force capabilities are found in the Master Capability Library.**
- **Task: A discrete event or action—not specific to a single unit, weapon system, or individual—that enables a mission or function to be accomplished—by individuals or organizations (AF Doctrine Center glossary.) Standard C2 tasks are found in the C2 Task List developed by the C2 Capability Assessment Team.**

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Basic Definitions

- **Initiative: Any potential solution—across the DOTMLPF spectrum—for addressing a recognized warfighting need or capability gap. Initiatives result from the JEFX initiative selection process.**
- **Innovation: Any deviation from an operational or systems baseline; approved by Configuration Control Board (CCB)**
- **Capability Gaps: The inability to achieve a desired effect under specified standards and conditions through combinations of means and ways to perform a set of tasks (CJCSI 3170.01E). For JEFX, this term is synonymous with capability "deficiency". Capability gaps are chosen by CDTs based on the experiment focus areas and capability goal statements. CDTs must be selective in choosing capability gaps; time and resource limitations often prevent us from achieving all aspects of a broadly stated capability goal**

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Operational Thread Definition

- **Definition: A series of operational tasks that relate initiatives and/or improved infrastructure systems to one or more C2 processes**

- **Characteristics**
  - **A design feature of the experiment; used by Capability Development Teams to assess capability goals**
  - **Should be represented by an operational architecture and supporting systems views; facilitates transition within the Joint Capabilities Integration and Development System (JCIDS) (OV-6C)**
  - **Observable and measurable; defines specifically what the assessment team will examine**

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Scenario & Vignettes

- **Scenario will define level of war (MTW, SSC, etc) and Area of Responsibility (AOR)**
  - **Also includes all associated materials (IPB, databases, background material, etc)**
  - ***You* define scenario requirements for the Execution IPT**
- **Scenario vignettes will be used to sequence threads during execution**
  - **Associated with Master Scenario Events List (MSEL) development**
  - **Vignettes are specific sequences of adversary activity within the scenario**
  - **Designed to elicit an expected response from blue forces (i.e., operational thread)**

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Operational Thread Required Elements

- **Name & Identifier:** Uniquely identifies the thread (e.g., "01A: Joint Air Estimate Process"). Will also distinguish between "operational" and "technical" and among monitor-assess-plan-execute
- **Description:** Description of the capability deficiency or gap this operational thread will examine. Describe any *variations* of this thread that will occur.
- **Operational Tasks:** Related C2 & ISR tasks and player activities
- **Measures**: Characterize the performance of tasks and overall effectiveness of the operational thread
  - Success: Capability gaps; broad (e.g., shared awareness)
  - Effectiveness: Operational threads (e.g., time for F2T2EA)
  - Performance: Tasks; specific (e.g., accuracy, timeliness, completeness)
- **Initiatives:** Initiatives (and innovations) that contribute to the thread (i.e., potential "solutions")

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Operational Thread Integration

- **A conceptual framework allows us to understand the interrelationship among operational threads**
  - **May not incorporate all threads or all capability gaps**
  - **May be based on joint or service doctrine or Tactics, Techniques and Procedures (TTP)**
  - **For example: Joint Air Tasking Cycle or Joint Air Estimate Process**

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JEFX 06
Joint Air Tasking Cycle

- Joint Air Tasking Cycle selected as operational thread integration framework for JEFX 06
- Based on Joint Doctrine (JP 3-30)
- Operational thread developed within each of the 6 phases of this cycle
- Provided a recognizable structure for associating threads to each other

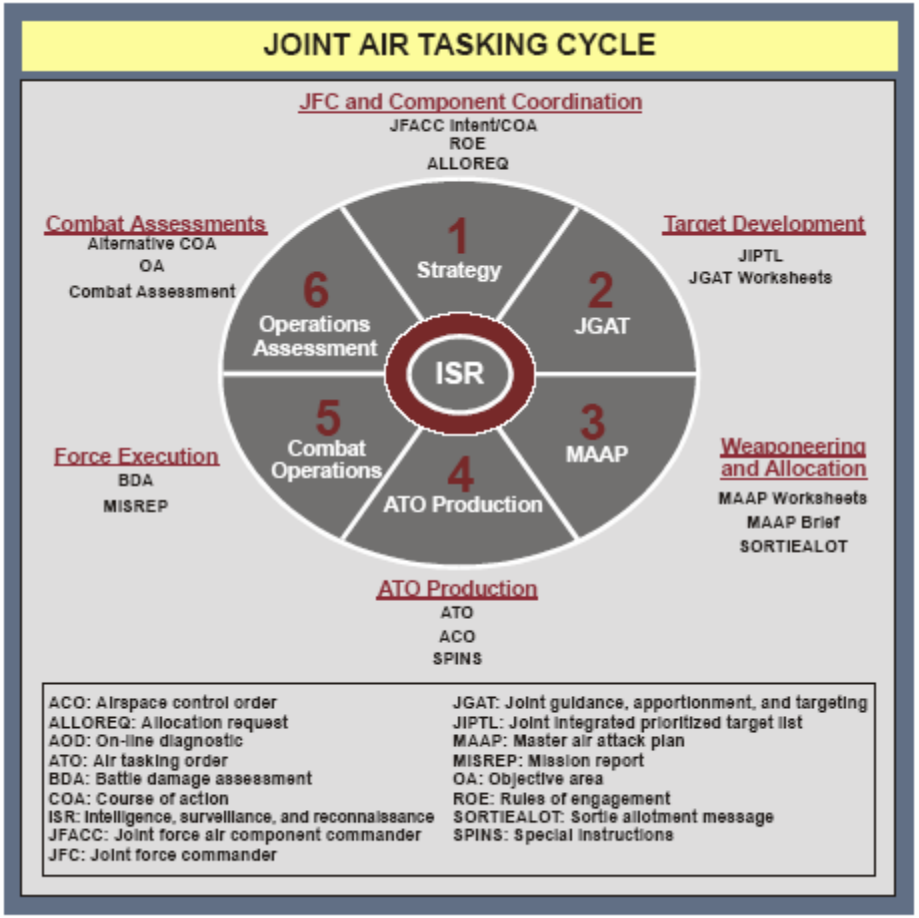
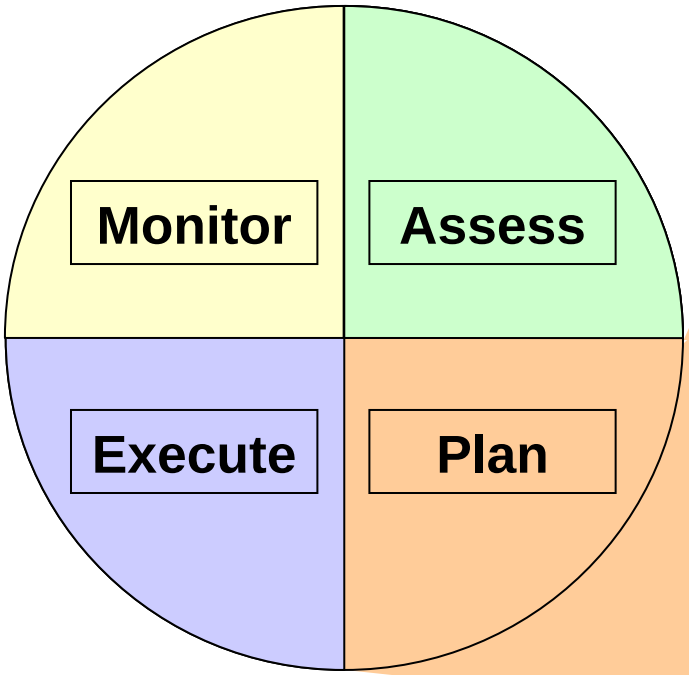


Figure III-13. Joint Air Tasking Cycle

JEFX 08
Monitor-Assess-Plan-Execute

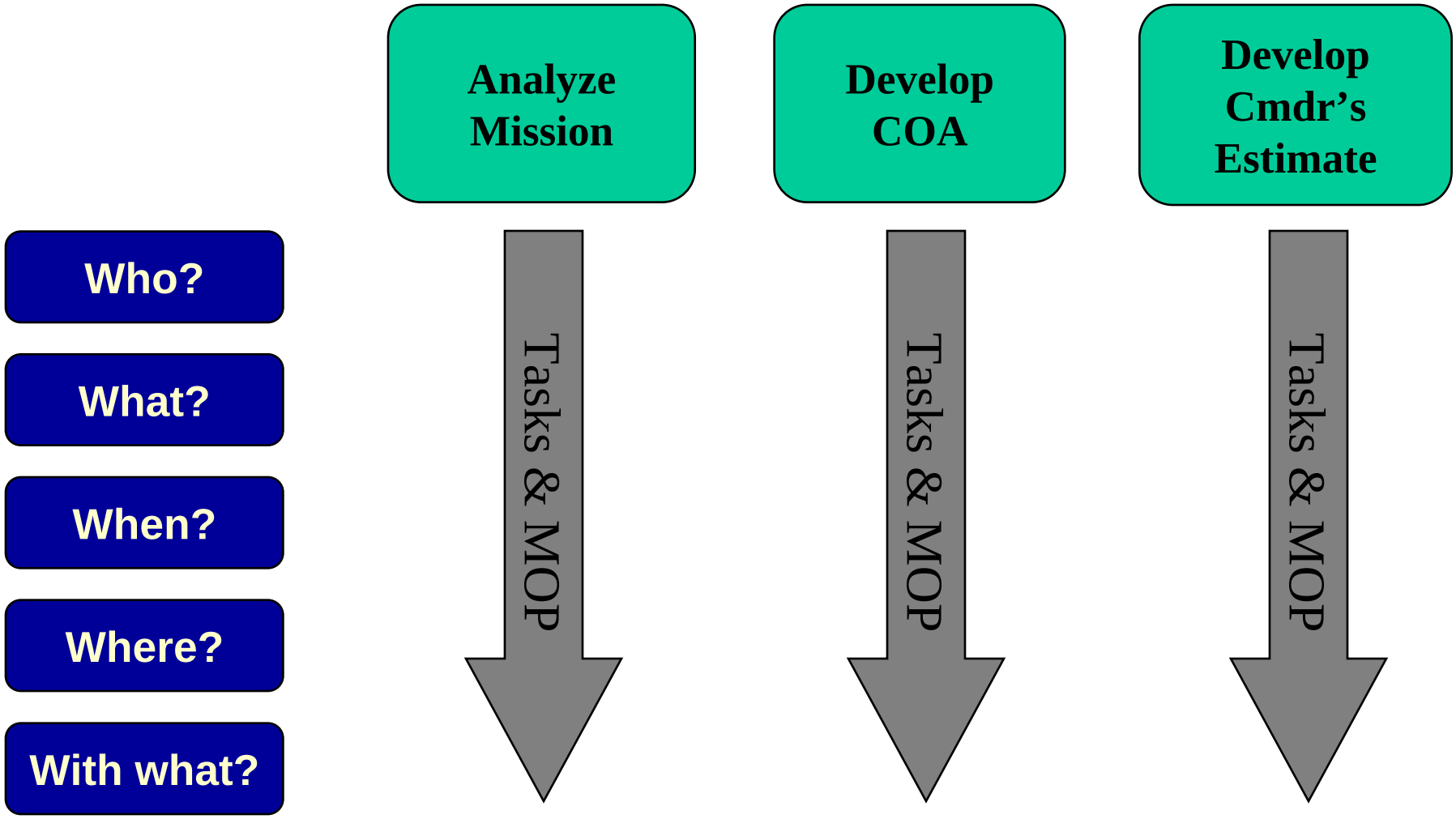
JEFX 08 Operational Thread Framework



Example Ops Thread

- **Time Sensitive Planning Process**
- **Measures: Ability of new collaborative tools to improve SA in a distributed planning environment**
- **Tasks: Analyze Mission, Develop COA, Develop Cmdr's Estimate**
  - **Sub-Tasks for each**

JEFX 08
Example Operational Thread



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How do I get started?

- Review capability gaps
  - Ensure shared understanding within your CDT
  - Revise/clarify MOS as required
  - Forms basis for developing threads
- Identify “broken” processes, insufficient systems and dysfunctional organizational structures
  - Requires input from operational community
  - Serve as baseline (“as is” situation)
  - Processes are candidates for operational threads
  - Should reflect capability gaps
  - Picture is worth 1000 words
- Determine best allocation of workload
  - Requires knowledge of team member skills & experience
  - Task appropriate sub-groups to develop threads and serve as thread managers
  - Example: one sub-team per gap

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How do I get started?

- Formulate propositions for the initiatives
  - What gaps, specifically, does each initiative contribute to?
  - How do those initiatives contribute? What is important to measure?
  - What processes identified above do the initiatives support?
  - Qualify your propositions as needed
- Break down processes into steps (i.e., tasks)
  - Example: Time Sensitive Planning
  - Add details over time
  - Eventually need measures for these tasks
  - Where does the process start and end (for our purposes)?
- Identify method to cross-check with other CDTs
  - Will become more important as we proceed
  - Must identify relationship among threads (MAPE)
  - Will probably involve a regular inter-CDT meeting

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Additional considerations

- Planning or execution? (Temporal focus)
- Inter-theater or intra-theater? (Geographic focus)
- Where do initiatives fit into this thread?
  - How do they support operational tasks?
- What measures are relevant?
  - Example: Network Centric Operations Conceptual Framework
- What variations of this thread must occur?
  - Under what conditions must each trial occur?
- What scenario supports this thread?
  - Real-world or fictitious?
  - What scenario vignettes are required?

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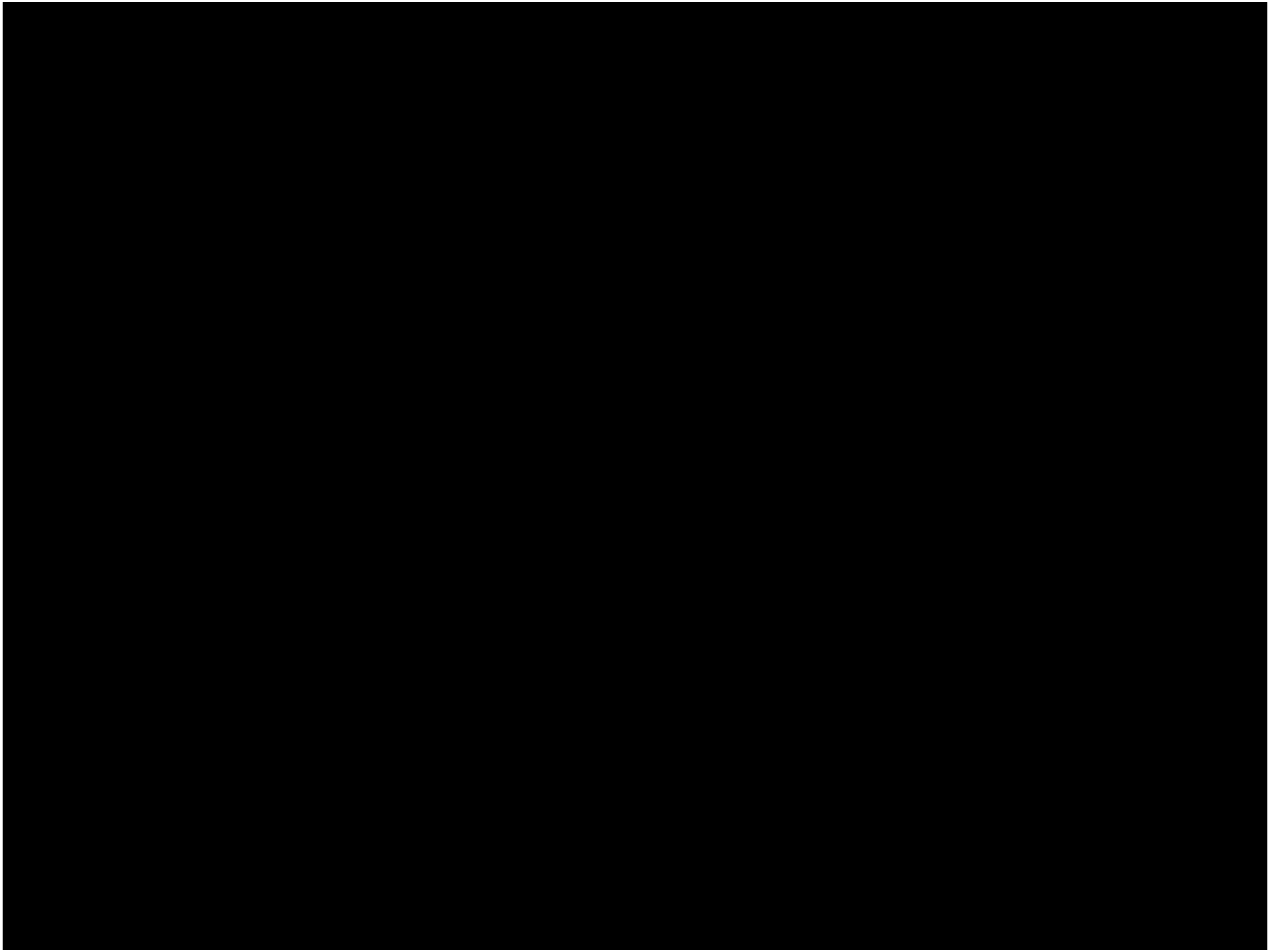
Additional considerations

- What level of command does this thread address (Strategic, Operational, or Tactical)?
  - Or does this thread examine sharing of information between levels?
- What phase of the thread integration framework does this thread address (Monitor, Assess, Plan, or Execute)?
  - Or does this thread examine the transition from one phase to another?
- What, if any, live assets are required?
- Will foreign nationals participate in this thread?
  - Or, is there a portion of this thread that is “US only”?
- Operational threads should be prioritized
- Expectation: 5-8 operational threads *per CDT*



Backups

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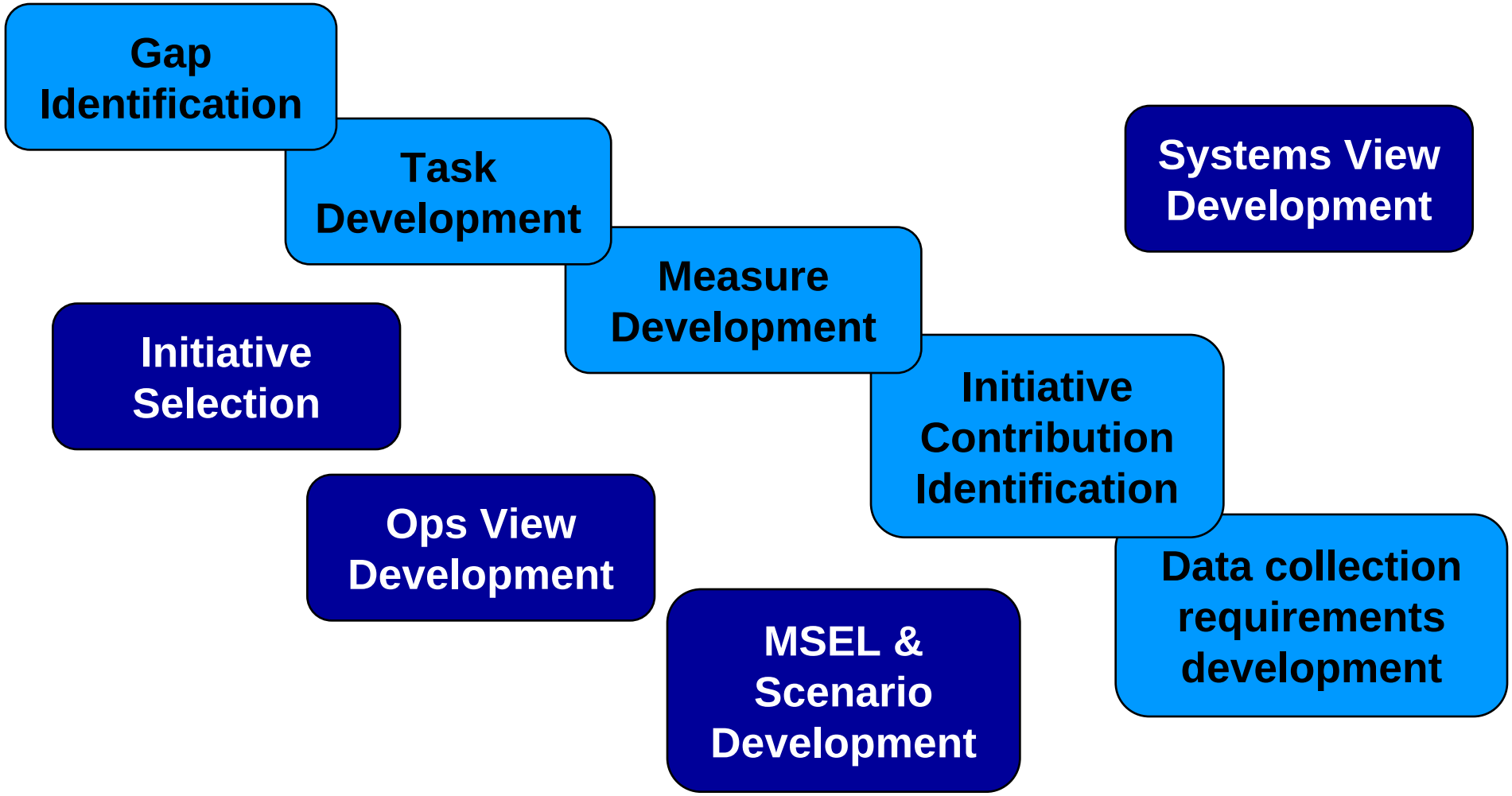
Operational Thread Design Phased Approach



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Gap Identification

- **Identify the specific capability gap or deficiency in sufficient detail to …**
  - **Facilitate call for initiatives**
  - **Determine measures of success that are associated with each gap**
- **Focus of CDC**
  - **Should be complete; reflected in the sub-capability goal statements and documentation**
  - **Adding or revising capability gaps at this point affects all follow-on activities**

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Task Development

- Identify a series of operational tasks (i.e., an operational thread) that allow examination of each capability gap
  - Begin at a high level (e.g., 1. Find, 2. Fix, 3. Track, 4. Target, 5. Engage, 6. Assess)
  - Add details and supporting activities over time, as required
  - Player-operator participation is essential
- Reference the Master Capabilities Library, Functional Area Assessment, AOC functional decomposition, AFOTTP, functional area CONOPS & CONEMPS
- Most difficult step—but the most critical

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Measure Development

- **Identify measures for each task**
  - **Measures of performance for each task and measures of effectiveness for each operational thread**
- **Refine measures of success**
  - **Developed at CDC**
  - **Characterize success in achieving capability goals**

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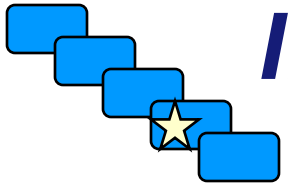
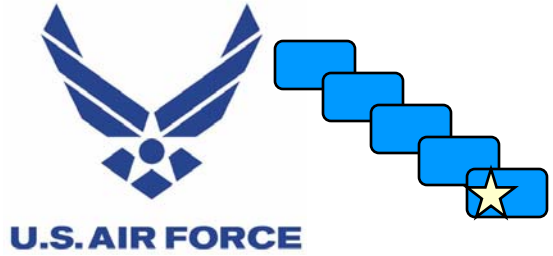


Initiative Contribution Identification

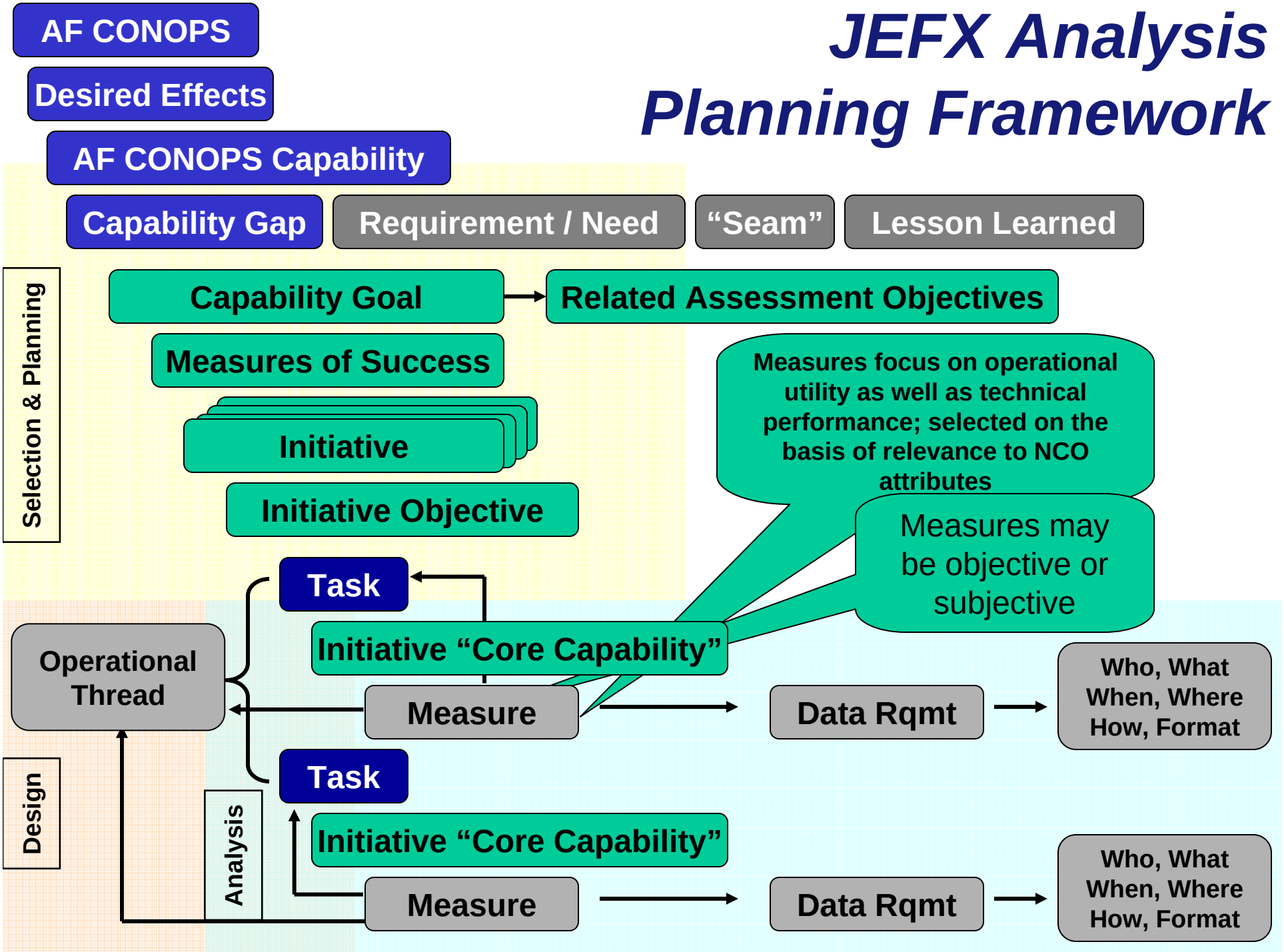
- **Identify the contribution each initiative will make to the operational tasks**
  - **Could lead to additional measures**
  - **Initiatives may contribute to many operational threads and associated tasks**



Data Collection Requirements Development

- **Identify the data that must be collected during thread execution**
  - **Based on measures identified for each operational thread**
  - **Specified as Data Collection Requirements (DCRs) in operational thread toolset**
- **Managed by Assessment IPT**
  - **Data Collection Cell (DCC) is responsible for collecting all data**

JEFX Analysis Planning Framework



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Developing Measures Definitions

- **Attribute: Some aspect of an event, situation, person or object considered important to understanding the subject under study (DODCCRP Experimentation Code of Best Practices). Examples include range of a weapon system, time required to complete a decision cycle or number of nodes in a network.**
- **Measure: A standard by which some attribute of interest (e.g.; extent, dimensions, or quantity) is recorded. Examples include pounds, miles per hour, or minutes and seconds.**
- **Metric: The application of a measure to two or more cases or situations. Metrics help explain variation in the dependent variable across a range of values for the independent variables.**
- **Indicator: An indirect or "proxy" measure when direct measurement is not possible.**

- **Example**
  - **Operational Thread: Detection of target types during TCT**
  - **Attribute: Likelihood of detection**
  - **Measure: Percentage of detections**
  - **Metric: Relative probability of detection across the interesting range of conditions (target type, sensor array, weather)**

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Developing Measures
Levels of Measurement

- **Nominal Measurement: Assignment of observations to categories, when the categories have no natural order. Examples include gender and nationality.**
- **Ordinal Measurement: Categories have a natural order, but the distance between them has no meaning. Examples include threat levels (low, medium, high) or level of training (novice, journeyman, expert).**
- **Interval Measurement: Distances between points on a scale are meaningful, but they are anchored arbitrarily (i.e., zero has no empiral meaning). Example includes temperature or IQ.**
- **Ratio Measurement: Equal level intervals and a meaningful anchor point. This is the preferred level of measurement, if possible. Examples include time to complete a task, weapons range, or years of experience.**

Avoid falling into the trap of over-precision