**Operational Concept (OpsCon) Template**

**1. Introduction**

* **Purpose**: State the purpose of this document—to describe in detail how the system will be operated to achieve its mission, translating high-level operational concepts into actionable engineering specifications.
* **Scope**: Define the boundaries of the operational concept, specifying the system of interest, the operational environment, and the phases of operation covered.

**2. Background and Context**

* **Problem Statement/Opportunity**: Briefly reiterate the strategic problem or opportunity that the system addresses, as established in earlier concept documents.
* **Mission Objectives**: Summarize the overarching mission objectives and the rationale for the system's existence, often linked to Measures of Effectiveness (MoEs). This directly connects to the **Mission Concept**.
* **Stakeholder Needs Overview**: Provide a high-level summary of the primary needs and expectations of relevant stakeholders (users, operators, maintainers, etc.) that the system must address.

**3. Detailed Operational Workflows and Scenarios**

* **Operational Workflows**: Specify **step-by-step workflows** of how the system will be used, including typical, degraded, and failure modes. This includes:
  + **Nominal Operations**: Description of the most common and expected operational sequences.
  + **Off-Nominal/Degraded Modes**: How the system operates during malfunctions, contingencies, or degraded performance situations.
  + **Emergency Procedures**: Steps taken during critical failures or emergencies.
* **Operational Scenarios/Use Cases**: Provide **detailed use cases** for a range of operational conditions, illustrating how the system and its users interact. These scenarios should provide the context for functional and performance requirements.
* **Operational Modes**: Describe different configurations or states the system may need (e.g., test, training, operational, emergency, maintenance, disposal modes) and how transitions occur between them.

**4. System Capabilities and Functions (Detailed Operational Perspective)**

* **Capabilities and Functionality**: Describe the specific capabilities and functions the system will provide from an operational viewpoint, including any special capabilities needed for verification, validation, or decommissioning.
* **Critical Performance Objectives**: Define quantitative and qualitative performance criteria and objectives relevant to system operation (e.g., response times, throughput, accuracy, reliability).
* **Resource Requirements**: Identify the necessary personnel (staffing levels, skill sets), equipment, facilities, and procedures needed for successful operation and maintenance.

**5. Operational Environment and System Interfaces**

* **Operational Environment**: Detail the environment in which the system will operate, including physical aspects (e.g., Arctic Ocean, satellite orbit), cyber aspects (e.g., secure data transmission protocols), and regulatory aspects (e.g., international climate data-sharing agreements).
* **External Systems and Interfaces**: Identify and describe all major interfaces with external systems, human users, and environments. This includes how mission data (engineering, scientific, metadata) is captured, returned, processed, made available, and archived, as well as end-to-end communication strategies and command/data architectures.
* **System Context**: Describe the relationships between the System of Interest (SoI) and direct or influencing external systems.

**6. Lifecycle Support and Evolution Considerations**

* **Support Strategy**: Describe how the system will be supported after fielding, including operational planning, commanding, maintenance, repair, replacement, sparing philosophy, and future upgrades. This links to the **Sustainment Concept**.
* **Disposal Considerations**: Address high-level environmental impacts (e.g., orbital debris, hazardous waste) or legal obligations related to the system's eventual disposal, from an operational readiness perspective. This links to the **Disposal Concept**.
* **Training Implications**: Outline the training needs for operators and maintainers, directly influenced by the detailed operational procedures described. This links to the **Training Concept**.

**7. Assumptions, Constraints, and Operational Risks**

* **Assumptions**: State the underlying assumptions about the operational environment, external systems, or user behaviors.
* **Operational Constraints**: Document known operational, technical, regulatory, or ethical constraints that affect how the system will be used.
* **Operational Risks**: Identify potential risks related to the system's intended use by its users in its environment, including safety and security threats, misuse cases, or loss scenarios, and outline preliminary mitigation strategies. This integrates with the **Risk Management Concept**.

**8. Validation Criteria**

* **Criteria for Validation**: Provide clear criteria for the ultimate validation of the system, ensuring that the delivered system meets its intended purpose when operated in its environment by intended users, based on stakeholder expectations.

**9. Traceability and References**

* **Traceability**: Map detailed operational concepts and scenarios to derived system requirements and architectural elements.
* **References**: List source documents, standards, and related artifacts that informed the OpsCon.

**Recommended Representations**

* **Narrative Text**: For detailed explanations of scenarios, operational workflows, and the rationale behind operational decisions.
* **Tables**: For summarizing performance expectations, resource requirements, constraints, and identified risks.
* **Diagrams**: **Visualizations are crucial** for communicating complex operational flows and system interactions. Useful diagrams include:
  + **Activity Diagrams** or **Functional Flow Block Diagrams (FFBDs)**: To show major processes, functions, and operational sequences in detail.
  + **Use Case Diagrams**: To illustrate user interactions with the system in various operational scenarios.
  + **State Machine Diagrams**: To capture different operational modes and how the system transitions between them.
  + **Internal Block Diagrams (IBDs)**: To show how structural elements interface and information flows between components within the system.
  + **Operational Viewpoint (OV) Diagrams** (from DoDAF):
    - **OV-1 (High-Level Operational Concept Graphic)**: Provides a **pictorial and textual overview of missions or scenarios**, aiding communication, especially with high-level decision-makers and non-technical audiences. It highlights key nodes, relationships, and interactions. The accompanying text is vital for clarifying visual elements and providing necessary architectural data and intent.
    - **OV-2 (Operational Resource Flow Description)**: Elaborates on capability requirements and resource flows (information, funding, personnel, materiel) between operational activities and locations.
    - **OV-5a (Operational Activity Decomposition Tree) and OV-5b (Operational Activity Model)**: Describe operational activities (tasks), their relationships, inputs, outputs, and exchanged resources, representing "what work is required".

**Integration with Other Systems Engineering Artifacts**

The OpsCon is a central artifact that **translates the high-level vision into actionable engineering specifications**. It is deeply integrated throughout the system lifecycle:

* **Mission Concept**: The **Mission Concept establishes the "why"** (strategic objectives, capabilities, end-to-end outcomes). The OpsCon details *how* the system will operate to achieve these mission goals.
* **Concept of Operations (ConOps)**: The **ConOps is developed earlier (Pre-Phase A)**, focusing on the "what" or organizational strategy. The **OpsCon is developed later (baselined at PDR)**, providing a more detailed, user-oriented description of "how" the system will be used technically. The ConOps feeds into and evolves with the OpsCon.
* **Stakeholder Concept / Needs**: OpsCon captures detailed user-oriented operational needs, directly reflecting the expectations identified in the **Stakeholder Concept**.
* **System Concept**: The OpsCon contributes to the overall understanding of system goals and stimulates the development of requirements and architecture based on the high-level system vision.
* **Requirements Specifications**: OpsCon is a **primary source for deriving detailed user and system requirements**, defining operational requirement values and ensuring requirements are testable and traceable to user needs.
* **System Architecture Concept**: OpsCon provides the operational context and functional baseline for developing the system's architecture, including functional and physical architectures. It informs system design decisions.
* **Development Concept**: While the OpsCon defines *how* the system needs to function operationally, the **Development Concept** outlines *how* the system will be engineered and built to meet those operational needs.
* **Test and Evaluation Concept**: OpsCon establishes criteria for system validation and guides test planning, especially for operational testing, ensuring the system accomplishes its intended purpose in its operational environment.
* **Risk Management Concept**: Operational risks related to the system's intended use are identified and managed in conjunction with the **Risk Management Concept**.
* **Training Concept**: The OpsCon directly influences training needs, as it describes how users will interact with the system and what knowledge and skills are required.
* **Deployment Concept**: OpsCon informs the transition of the system into its operational environment, which is detailed in the **Deployment Concept**.
* **Sustainment Concept**: OpsCon provides the operational context for the long-term support and maintenance strategies outlined in the **Sustainment Concept**.

**Special Considerations and Best Practices**

* **Timing**: The OpsCon is developed later in the lifecycle than the ConOps, typically **baselined at the Preliminary Design Review (PDR)**.
* **User-Oriented**: It is written from the perspective of the users and operators, detailing their interactions with the system.
* **Clarity and Consistency**: The document should be structured for easy reference by engineers and developers, with consistent terminology.
* **Model-Based Systems Engineering (MBSE)**: SysML diagrams (like use cases, activity diagrams, state machines, and internal block diagrams) and DoDAF views (like OV-1, OV-2, OV-5) are highly effective for capturing and communicating OpsCon details.
* **Human Systems Integration (HSI)**: HSI considerations are critical and should directly influence the OpsCon, ensuring human factors and organizational aspects are addressed from the viewpoint of human operators and other personnel.
* **Evolutionary Nature**: The OpsCon is not static; it is developed and refined through an iterative and recursive process as understanding of the system solution matures and expectations change.