**Concept of Operations (ConOps) Template**

**1. Introduction**

* **Purpose**: Briefly state the purpose of this document—to provide a high-level, integrated description of how the system will be used, what it will achieve, and the environment in which it will operate. It aims to clarify system goals and foster common understanding among all stakeholders.
* **Scope**: Define the boundaries of the operational concept, specifying the system of interest, the operational domain, and what aspects of its use are covered.

**2. Background and Context**

* **Problem Statement/Opportunity**: Describe the strategic problem or opportunity that the system addresses, providing the rationale for its development.
* **Mission/Business Objectives**: Summarize the overarching mission goals or business drivers motivating the system's operation, often tied to Measures of Effectiveness (MoEs). This is typically informed by the **Mission Concept**.

**3. Stakeholder Needs and Roles**

* **Stakeholder Identification**: **Identify all relevant stakeholders** (e.g., users, operators, maintainers, sponsors, regulatory bodies, affected public).
* **Stakeholder Needs and Expectations**: Summarize their **primary needs, expectations, and desired outcomes** from the system. This forms the basis for later requirements.
* **Roles and Responsibilities**: Clarify the role each stakeholder plays in the system's operation and how they interact with it.

**4. Operational Overview**

* **High-Level Operational Concept**: Present the overall high-level idea of how the system will be used, explaining the rationale for this approach.
* **Major Operational Phases and Timelines**: Outline the primary phases of operation and their high-level sequencing or timelines.
* **Operational Scenarios/Use Cases**: **Describe real-world scenarios or use cases** that show how the system will be used in day-to-day operations. Include:
  + **Nominal Conditions**: Typical, expected operations.
  + **Off-Nominal Conditions**: Important malfunctions, degraded modes, or contingency situations.
* **Modes of Operation**: Identify different configurations or states the system may need (e.g., test, training, operational, emergency).

**5. System Capabilities and Functions (High-Level)**

* **Capabilities**: Describe the major capabilities the system will provide throughout its lifecycle. This focuses on **"what the system will do (not how it will do it) and why (rationale)"**.
* **Critical Performance Objectives**: Define high-level performance objectives, which can be qualitative or quantitative, related to mission achievement.

**6. Operational Environment and Interfaces**

* **Operational Environment**: Describe the context in which the system will operate, including physical environment (e.g., Arctic Ocean, satellite orbit), cyber aspects (e.g., secure data transmission), and regulatory environment (e.g., data-sharing agreements).
* **External Systems and Interfaces**: Identify and describe major interfaces with external systems, human users, or environments. This serves as a basis for identifying external and internal interfaces early in project formulation.
* **Resources**: Outline the personnel, equipment, facilities, and procedures needed for operation.

**7. Lifecycle Considerations (High-Level Integration)**

* **Support Considerations**: Describe how the system will be supported after fielding, including operational planning, maintenance, and future upgrades. This links to the **Support Concept**.
* **Disposal Implications**: Address any high-level environmental impacts (e.g., orbital debris, hazardous waste) or legal obligations related to the system's eventual disposal. This links to the **Disposal Concept**.

**8. Assumptions, Constraints, and Risks**

* **Assumptions**: State the basic assumptions underpinning the concept.
* **Constraints**: Document known operational, technical, regulatory, or ethical constraints.
* **Operational Risks**: Identify potential operational risks, including safety and security threats, misuse cases, or loss scenarios, and outline preliminary mitigation strategies. This integrates with the **Risk Management Concept**.

**9. Validation Criteria**

* **Criteria for Validation**: Provide criteria for the ultimate validation of the system, ensuring that the delivered system meets its intended purpose based on stakeholder expectations.

**10. Traceability and References**

* **Traceability**: (Optional, but recommended) Map high-level operational concepts and scenarios to stakeholder needs and initial capabilities.
* **References**: List source documents, standards, and related artifacts that informed the ConOps.

**Recommended Representations**

* **Narrative Text**: For detailed explanations of scenarios, stakeholder roles, environment, and rationale.
* **Tables**: For summarizing stakeholder needs, capabilities, constraints, and identified risks.
* **Diagrams**: **Visualizations are crucial** for communicating complex information and fostering common understanding. Useful diagrams include:
  + **Use Case (uc) diagrams**: To illustrate user interactions and operational scenarios.
  + **Block Definition Diagrams (bdd)**: For system context and high-level structural elements.
  + **Functional Flowcharts / Activity Diagrams**: To show major processes, functions, and operational sequences.
  + **State Machine Diagrams**: To capture different modes of operation and how the system transitions between them.
  + **High-Level Operational Concept Graphic (OV-1)**: An OV-1 diagram is highly recommended, as it **provides a pictorial and textual overview of missions or scenarios**, aiding communication among various stakeholders, especially high-level decision-makers and non-technical audiences. It highlights key nodes, relationships, and interactions, making complex operational environments easily understandable. The accompanying text is vital to clarify visual elements and provide necessary architectural data and intent.

**Integration with Other Systems Engineering Artifacts**

The ConOps is a central artifact that builds upon and informs many others throughout the system lifecycle:

* **Mission Concept**: The ConOps is **directly guided by the Mission Concept**, which establishes the overarching mission objectives and scenarios. The Mission Concept defines the "why," which informs the ConOps' "what" users need.
* **System Concept**: The ConOps helps to understand system goals and stimulates the development of requirements and architecture related to user elements based on the high-level system vision.
* **Stakeholder Concept**: The ConOps is a key tool for capturing and integrating stakeholder expectations and needs. Human Systems Integration (HSI) directly influences the ConOps by considering human operators and organizational aspects through scenario-based design.
* **Operational Concept (OpsCon)**: The ConOps is developed earlier (typically Pre-Phase A), focusing on organizational strategy and high-level operational concepts. The **OpsCon is a more detailed, user-oriented document** developed later (baselined at PDR) that describes *how* the system will be used technically. The ConOps feeds into and evolves with the OpsCon.
* **Requirements Specifications**: The ConOps is a primary source for deriving user requirements and defining operational requirement values, ensuring requirements are testable and traceable to stakeholder needs.
* **System Architecture Concept**: The ConOps provides the context and initial functional baseline for developing the system's architecture, including functional and physical architectures.
* **Acquisition Concept**: The ConOps ensures that operational needs are addressed in the procurement strategy defined by the Acquisition Concept.
* **Development Concept**: While the ConOps defines "what" the system needs to achieve operationally, the Development Concept outlines "how" the system will be engineered and built to meet those operational needs.
* **Test and Evaluation Concept**: The ConOps establishes criteria for system validation and guides test planning, especially for operational testing, ensuring the system accomplishes its intended purpose.
* **Risk Management Concept**: Operational risks are identified and managed in conjunction with the Risk Management Concept.
* **Training Concept**: The ConOps directly influences training needs, as it describes how users will interact with the system.

**12. Special Considerations and Best Practices**

* **Early Development**: The ConOps is developed early in the Business or Mission Analysis process (Pre-Phase A) to define the strategic problem/opportunity.
* **User-Focused and Non-Technical**: It should be written in accessible language, avoiding excessive jargon, to be understandable by all stakeholders.
* **Iterative Refinement**: The ConOps is developed and refined through an iterative and recursive process as understanding of the system solution matures and expectations change.
* **Scenario-Based Design**: Use real-world scenarios to illustrate how the system will function in practice. These can include nominal, off-nominal, and degraded modes.
* **Visual Aids**: Utilize diagrams and flowcharts to clarify processes and interactions, significantly improving communication. The OV-1 graphic, in particular, is highlighted for its effectiveness in this regard.
* **Stakeholder Engagement**: Involve decision-makers, users, and engineers early and continuously to capture diverse perspectives and ensure buy-in.
* **Human Systems Integration (HSI)**: HSI considerations should directly influence the ConOps, ensuring human factors and organizational aspects are addressed.