

Continuity of Operations Leadership Series for Government

Integrating Continuity of Operations (COOP) into the Enterprise Architecture

Foundational Document



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Introduction

Continuity of operations (COOP) has become a critical element not only of the U.S. Government's homeland security effort since 9/11, but of every federal, state and local agency that provides critical services. But don't believe that COOP is a new concept formed out of the ashes of 9/11; in fact, COOP has been a consideration in government for well over 50 years and more recently became a major policy issue during the 1990s.

What was once a daily issue reserved for U.S. Government leaders has now become a fundamental element of all government agencies, especially if their activities directly impact the well-being of citizens or national security. The primary challenge agencies face is making COOP an integral part of their operations rather than considering COOP as a separate operational process or a "bolt on" solution to their current enterprise operations. The ultimate goal is to make COOP so ingrained that all critical operational activities account for it in their upfront planning and development cycles, as well as in their operational phases.

The target audience for this document includes federal, state and local agencies that provide essential services, no matter the circumstances, and those that need to incorporate COOP concepts into their organization. While this document is primarily intended for the staffs of the Chief Information Officer and other individuals involved in developing IT strategies and tying them to agency policies and mission, it is also meant to assist the efforts of operational and support staff, as well as system designers, integrators, and technologists. Technical and non-technical personnel alike will find this document valuable in understanding the process necessary to create a comprehensive plan for COOP that fits into the agency's enterprise architecture and enhances its ability to achieve its core missions.

The goal of this document and the Continuity of Operations Leadership Series for Government is to provide a clear framework for planning and implementing COOP as part of a government organization's structure and to provide a clear path to developing the necessary strategies, policies, concepts of operations and systems that can provide continuity in a cost effective and streamlined fashion. The principles presented are based on the well-founded concepts of enterprise architecture and clearly demonstrate how agencies can make use of COOP functionality not only in times of crises, but also as part of their daily routine. The bottom line is that COOP should not be an add-on, but should be part of an organization's embedded policies, processes, and systems, from the point of contemplation to execution.

This report is considered the foundational document of Continuity of Operations Leadership Series for Government and will provide readers with:

- the policy and business drivers for COOP
- the critical components of an effective COOP program,
- a guide to meeting the requirements and mandates for COOP
- the knowledge necessary to support essential missions during critical events and emergencies,
- systematic, process-oriented approaches to integrating COOP into their enterprise architecture, and
- an approach to maintaining and enhancing current Information Systems.

The Definition of COOP

Although the exact meaning and definition of COOP can vary widely among organizations and individuals, it is critical to establish a common understanding of what COOP means. The most comprehensive and far reaching definition of COOP to date is included in Federal Preparedness Circular (FPC) 65, dated June 15, 2004, which defines COOP as:

“The activities of individual departments and agencies and their sub-components to ensure that their essential functions are performed. This includes plans and procedures that:

- delineate essential functions;
- specify succession to office and the emergency delegation of authority;
- provide for the safekeeping of vital records and databases;
- identify alternate operating facilities;
- provide for interoperable communications; and
- validate the capability through tests, training, and exercises.”

The circular goes on to state “COOP planning facilitates the performance of department/agency essential functions during any emergency or situation that may disrupt normal operations.”

National Security and Homeland Security Presidential Directive Twenty (HPSD-20), National Continuity Policy, published on May 9, 2007 provides that:

“Continuity of Operations,’ or ‘COOP,’ means an effort within individual executive departments and agencies to ensure that Primary Mission-Essential Functions continue to be performed during a wide range of emergencies, including localized acts of nature, accidents, and technological or attack-related emergencies.”

The critical aspects of this definition are concepts of essential functions and the ability to perform those functions during any situation that may disrupt them. This is a tall order, and all agencies must consider their operational strategies under various adverse conditions. In the past, most of the adverse conditions considered may have included known natural threats, but may have failed to consider adverse man-made situations. While COOP is not a new idea, especially during times of conflict, its scope has increased considerably over the past six years.

Introduction to the Continuity of Operations Leadership Series for Government

The COOP Leadership Series provides insight into the nature of COOP and its relationship to the various aspects of existing organizational processes and decisions. The objective is not to create a new method for solving COOP issues, but to show that existing, well-founded, systemic processes can be used to meet the challenges of COOP. In essence, COOP represents another layer of requirements that an organization must embrace as part of its overall enterprise architecture. The need for COOP is not just a matter of the current international environment, but a result of good planning and good business practice. The objective of the COOP Leadership Series is to aid government leaders, planners and implementers in developing a robust enterprise architecture that can be used to create an operational environment that not only supports mission critical activities under emergency situations, but also provides incremental capabilities as a course of normal business.

There is no single prescription an agency can take to resolve their COOP requirement. COOP must be a mindset that is part of every planning effort, including organizational processes and decisions. All hardware, software, or process-based systems require a strategic, architectural understanding. Concepts and strategies evolve into policy and eventually into operations and systems that require integration with other systems and technological capabilities that exist or need to be created. COOP is a process-based business system that has a foundation in national strategy and therefore can be thought of in terms of historic system development. COOP can also be considered a government-wide Line of Business (LoB) because it is based on a common need. Since every organization will need to perform some form of COOP planning and many federal agencies will need to interoperate in some fashion, especially central agencies, a LoB may provide significant advantages for ensuring government-wide preparation.

How the Series Will Be Presented

The core concept that should be learned from this document is the notion that COOP is not an afterthought or an added feature to the Information Systems and IT infrastructure of an organization. COOP must be imbedded into the enterprise architecture (EA), and its requirements must be considered across the spectrum of systems. A secondary concept that should be understood is that many of the COOP requirements and solutions mirror those necessary in achieving the more mobile and collaborative workforce that agencies are actively seeking. The first issue of the Leadership Series will provide the foundation to understand how COOP fits into the various levels of the EA.

This foundational document establishes the underlying concepts of COOP and introduces its constructs as the “Pillars of COOP.” Each pillar is explored to provide a high-level understanding such that existing architecture, operational, system, and integration processes can be related to COOP planning and execution.

The COOP Leadership Series for Government will include six supplements each dedicated to one of the Pillars of COOP, and will provide more details about:

- strategy development,
- existing COOP policy and organizationally derived governance, policy, and procedures,
- operational profiles and threat analysis,
- systems development,
- integration and interoperations, and
- technology evaluation and transition.

A COOP Process

COOP, like enterprise architecture, is directly related to organizational process and its primary objective is to sustain critical functions or processes and to safeguard information while maintaining interoperations with other organizations. In order to accomplish this objective, existing organizational processes used to develop strategy, architecture, concepts of operations, and systems need to be utilized rather than invented anew. However, the existing processes need to be seeded with new requirements that foster solutions to meet the needs of COOP. Thus, the process for establishing COOP within an organization utilizes existing processes with possible scenarios elaborated. Figure 1, COOP Planning Process shows the general hierarchy of COOP plan development.

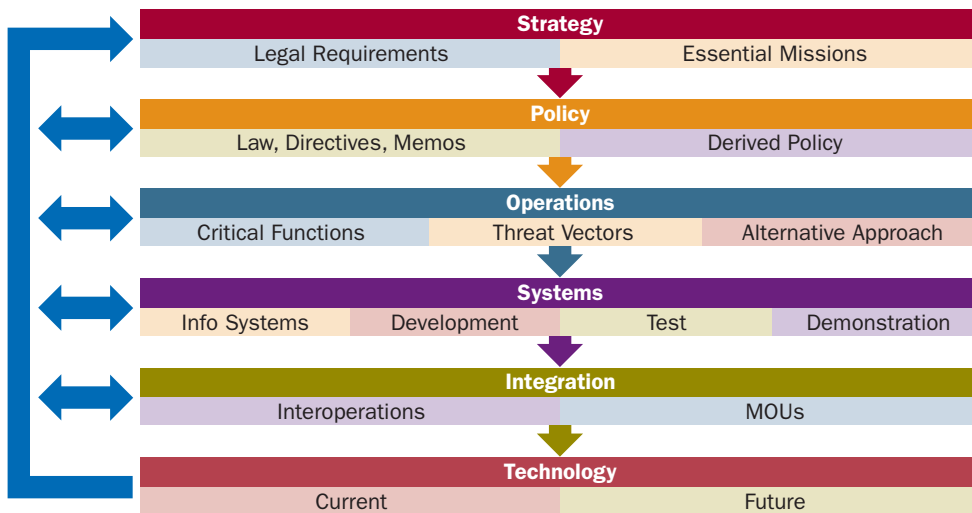


Figure 1: COOP Planning Process

An Organizational Process Approach

All organizations can be viewed as having processes and containing decision events. Organizational processes can range from well-defined, systemic processes to undefined, ad-hoc processes. In either case, a process has decision points that permit it to continue or change to an alternative course of action. In a theoretical sense, organizations can be viewed as large, complex processes, with multiple alternative paths, that are strung together to accomplish higher-level goals. Decisions are the points where processes are enacted, stopped, or adapted to accomplish an objective.

Taken this way, an organization is very much like a factory that builds and assembles pieces of a product or service. Program management is the effort of identifying and organizing these process elements such that they can be enacted by people, IT systems or other effective means. COOP activities must be imbedded into organizational processes and decisions in order to account for unknown or emergency situations. Under certain circumstances, COOP activities will be initiated such that an organization's critical activities can continue to accomplish the mission, even under adverse conditions.

Organizational functions are the processes and decisions that the organization enacts, and those that need to be addressed for COOP are defined as essential functions. It is necessary, therefore, to develop an approach to identifying essential functions. This is done by first developing a coherent organizational strategy that defines missions and goals.

Strategy to Operational Execution

Organizational strategy is at the core of COOP. Before considering a COOP strategy or plan, an organization needs to fully understand its business strategy and objectives as well as the means by which these objectives will be accomplished. These strategies should not initially consider adverse circumstances. The goal here is to develop well-defined strategic objectives for the organization. Once the strategic objectives are understood, the organization should prioritize the strategies based on their relationship to organizational missions, sustainability, and growth. Because some strategies will be "reach goals," it may be necessary to develop some form of importance ranking.

The organization's business strategy is translated into executable operational functions. These activities will be operational concepts that are defined as processes and decisions. A described process will reveal the necessary inputs, outputs, constraints, and mechanisms or enablers needed to enact the process and should provide an understanding of the entrance and exit criteria for a process and related tasks. Once understood, these process elements can be used to determine specific requirements for operational information needs and can begin to define the IT system that needs to exist for process enactment.

Intertwined in the definition of operational processes are the control elements that keep the operational processes in check. These control elements are typically referred to as governance and policy. As an organization's operational processes are defined or refined, as the case may be, governance criteria and policy will need to be reviewed and adjusted accordingly.

Process Refinement

Processes and process analysis are sometimes ignored by organizations because they are typically transparent. Managers are often assigned tasks to accomplish, and they direct the efforts of others in an ad-hoc fashion as necessary to accomplish the task. While this approach may be the status quo, it will negatively impact COOP planning and preparation because the processes are ill-defined and backup processes will be difficult to characterize. At a minimum, an organization should identify its critical processes and clearly define them. Process definition provides guidance and task-based procedures for accomplishing organization functions, regardless of who is enacting the effort. Finally, as processes and functions are enacted, experience and lessons learned should be used to improve and refine those functions.

Gap Analysis

Organizations will need to assess the gap between where they are today and where they need to be (in alternative COOP environments) in order to understand the changes that must be enacted to prepare for COOP. The defined deltas should be integrated into the COOP plan along with a plan of action and milestones for bridging the gaps with policy, operational profiles, systems, integration approaches, and available and future technologies.

Part of the process definition effort will be the development of alternative processes needed to operate under a variety of circumstances, as defined by a COOP risk assessment. Imagine a company that performs all of its accounting using semi-automated, computer-based applications. If the organization were forced to operate in a paper-based environment, would the financial organization be able to readily adapt and perform the accounting in a dual-entry journal? In such a case, the organization would need COOP processes and training in order to operate in a paper-only environment.

An Ongoing Effort

By its nature, COOP is not a plan for a single, defined event. Rather, it is a plan for multiple, possible events with numerous contingencies. It may need to include a stochastic model to assess and rank disaster scenarios. Based on the ranking or associated risk assessment, resources and actions needed for alternative futures can be more easily defined. Besides being a plan, COOP is a process that needs to be an ongoing effort to hone and refine the organization to function in multiple, alternative, contingency or emergency environments.

COOP Drivers

COOP is a critical aspect of emergency preparedness, and its primary goal is the sustainment of essential mission functions regardless of changes in the operating environment. From the perspective of the national government, COOP is a key element of the government's ability to maintain economic security, public safety, public confidence, and national security.

The overall driver for COOP is the need for the government to operate continuously, even during incidents of national significance, whether natural or man-made. Likewise, every government agency has a level of responsibility to develop COOP procedures and provide necessary functions during varied and often ill-defined situations.

Existing COOP Policy

Federal policy is quite clear on what is expected from agencies. Federal Preparedness Circular (FPC) 65 provides a wealth of information about the requirements for and the important aspects of agency COOP capability. This document clearly defines COOP and the national policy.

"It is the policy of the United States to have in place a comprehensive and effective program to ensure continuity of essential Federal functions under all circumstances."

The circular goes on to state that:

"All Federal agencies, regardless of location, shall have in place a viable COOP capability to ensure continued performance of essential functions from alternate operating sites during any emergency or situation that may disrupt normal operations."

To have a viable COOP capability, proper planning and implementation is necessary. However, in most cases, leaders do not need to turn to unproven methods to develop COOP capabilities.

COOP Objectives

The objectives of a viable COOP plan are to ensure continued operation of critical functions even during times of crisis. Although specific objectives may vary based on type of government agency, FPC 65 provides objectives that are applicable to a wide range of organizations, thus

- ensuring the performance of an agency's essential functions/operations;
- reducing loss of life, minimizing damage and losses;
- providing for effective succession to office with accompanying authorities as necessary;
- reducing or mitigating disruptions to operations;
- having alternate facilities from which to continue to perform their essential functions;
- protecting essential facilities, equipment, vital records, and other assets;
- achieving a timely and orderly recovery from an emergency and reconstitution of normal operations; and
- ensuring and validating COOP readiness through a dynamic, integrated test, training, and exercise program.

At a minimum, the planning requirements for COOP include:

- implementation with or without warning;
- operational capabilities within 12 hours of COOP activation;
- sustaining operations up to 30 days;
- regularly testing, training, and exercising of personnel, equipment, systems, processes, and procedures;

- risk analysis of current alternate operating facilities;
- location of alternate operating facilities for maximum effectiveness and consideration of distinct, redundant capabilities;
- optimal use of existing agency field infrastructures and consider telecommuting, work-at-home, virtual offices, and joint or shared facilities; and
- deployment of a multi-year strategy and program management plan.

The nature of the COOP program management plan and what it must include is plainly delineated in the circular.

Dual Use Technology

In most cases, organizations will find that proper development and implementation of COOP processes and functionality leads to potentially significant increases in everyday organizational capabilities. Many COOP-based implementations will include the following categories that also provide incremental value-added functionality to an organization's standard operating procedure. In fact, COOP capabilities are significantly more reliable and cost effective when implemented as a normal course of business.

- **Mobile Workforce Capabilities:** This capability is essential for organizations not only to recover from extreme natural or man-made disasters, but it is also operationally beneficial across an agency in everyday settings. Mobile capabilities, when properly implemented, can help agency staff during less critical times such as working while on travel, and on snow or sick days or even during periods of heavy traffic.
- **Increased Security:** Security planning for COOP leads to more comprehensive security models that not only focus on enclave-based security architectures, but also drive down to a node-base security level. These models increase an organization's overall security posture and reduce agency risk on a daily basis.
- **Organizational Flexibility:** Physically moving personnel normally results in significant costs from both a computing and telecommunications perspective. In a COOP environment that is based on network-centric capabilities, the enterprise's IT infrastructure should automatically modify physical and logical associations to personnel and other assets as a typical course of business and during emergency situations.

Benefits of COOP

Proper COOP planning is ultimately a benefit to the organization, even if an emergency situation does not actually exercise the organization's COOP capability. FPC 65 states:

“COOP planning is simply a ‘good business practice’—part of the fundamental mission of agencies as responsible and reliable public institutions.”

The processes of developing and refining enterprise architecture to support COOP will necessarily help organizations identify areas for improvement and ultimately will aid them in becoming more efficient. As an example, simply identifying “essential functions” and prioritizing them will aid the organization in properly allocating resources and driving toward greater efficiencies. Refining policy to account for COOP activity will help identify policy gaps and redundant or mutually exclusive policies. Evaluating alternative operational scenarios will lead to a better understanding of how organizational missions are accomplished and will improve efficiency. Finally, COOP planning will lead to system requirements and system implementations that will be more flexible. Although organizations may never experience an actual emergency, preparation for various scenarios will likely result in improved performance when other types of operational problems arise.

The bottom line is that emergencies do occur, and the changing nature, broad spectrum of threats and the potential for natural or man-made disasters are real. Preparedness is a must, and it can usually be accomplished without reinventing the organization and by simply rethinking existing approaches.

COOP Framework

COOP should be considered an operational requirement that stems from organizational strategy. Essentially, it means that the organization must continue to “operate” under various unknown conditions. Before contemplating the potential or probable operating conditions or potential risks the organization may face, the organization must first fully understand its strategy and governance (policy) approach. Based on the areas of strategy and policy, threat vectors can be contemplated and analyzed so that alternative operational scenarios can be derived. These operational scenarios will provide the requirements for systems, integration and interoperations of systems, which include people and facilities, and the technological needs to make the systems a reality. This top-down approach will help ensure that the organization is focusing on essential functions.

Conversely, the organization needs to perform a regular bottom-up analysis based on future technologies so that the impact of these technologies can be understood. It is critical to understand how new technologies can impact organizational strategy, policy, operations, systems, and integration. As an example, how might advances in security and cryptography change the nature of operational profiles with better mobility for classified assets? Or, how can storage area networks (SAN) or information warehousing change survivability of information and knowledge?

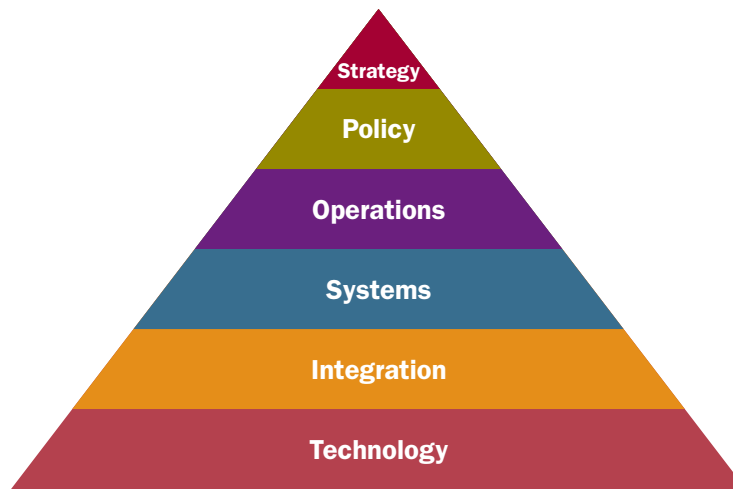


Figure 2: COOP Framework

To accomplish the goals set forth for COOP, each of the elements of COOP can be considered a pillar. An organization’s missions and essential functions require all of the pillars to be successful. Again, the pillars can and should be addressed as a process of definition and refinement, but there is an iterative component. Each of the pillars depends on the other pillars as well. All of the pillars must be viable for essential functions to be successfully accomplished during various operational scenarios.

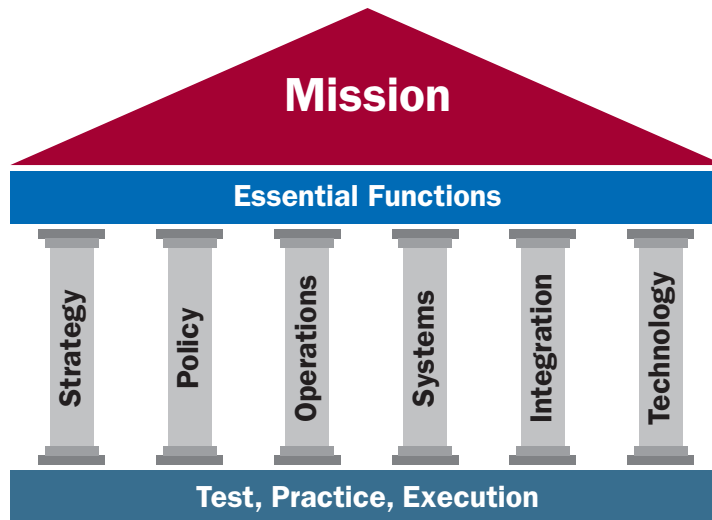


Figure 3: The Pillars of COOP

The foundation of organizational COOP capabilities is test, practice, and execution. A COOP plan must be verified before it is executed in order for it to be refined so that the people, components, facilities, and information can be confirmed demonstrated to operate as expected. Proper testing and practice will reveal cracks in the pillars that can be patched before a disaster strikes.

COOP Pillars

The COOP pillars define the specific elements that need to exist to thoroughly define COOP capability. These pillars are the same elements that should already exist in the government organization and should be directly mapped to an organization's enterprise architecture. The objective is to utilize the existing architecture as much as possible and modify it to account for COOP requirements. In this regard, it is necessary to evaluate the organization's existing architecture and to identify the missing elements that are needed for COOP. This permits COOP to be an integral part of the organization's processes and decisions by incrementally developing COOP capabilities in each of the pillar areas. In essence, an organization should repair its existing pillars, when possible, rather than chisel new ones.

Pillar I: Strategy

Strategy, the first pillar of an organization and organizational effectiveness, must be defined, before any consideration is given to continuity of operations. Without strategy, an organization cannot know what its operations should be and therefore will have no understanding of how to continue with developing COOP capabilities. Organizational strategy has more to do with answering, "What is to be accomplished?" than "How should an action be accomplished?" Therefore, strategy is the guide for organizational action. An organization's strategy should, at a minimum, consider these critical questions:

1. Who are the key stakeholders of the organization and whom does it serve?
2. What is the primary mission of the organization; what activities should it perform, and what activities should be outsourced?
3. Where does or should the organization operate and function?
4. When does the organization function; when do critical activities and decision need to be made?
5. Why does the organization exist; why is the organization or its function important?
6. How should the organization accomplish its primary missions?
7. How well should the organization perform; how should it be measured?

In answering these questions, organizational leadership will be able to articulate why the organization exists and how it will proceed in accomplishing its objectives. To document the strategy, the organization needs a strategic plan that defines the elements of strategy and can be promulgated throughout the organization.

Strategic Planning

The strategic plan should consist of a clear discussion of the strategy questions. The strategic elements should be clarified and organizations should develop a clear understanding of the scope of their endeavor. Without a clearly articulated strategic plan, organizations may become preoccupied with immediate issues and lose sight of their primary objectives. A strategic plan must address these elements and should:

1. Serve as a decision framework.
2. Provide clarity with respect to accomplishment of mandated, delegated responsibility, e.g., laws, directives, policy, etc.
3. Serve as a platform for explaining the organization's role to others and to inform, motivate, and involve its stakeholders.
4. Provide a basis for more detailed planning at the operational and other levels of enactment.
5. Provide guidance on the functional endeavors of the organization.
6. Serve as a basis for functional success criteria and assist in performance monitoring.

Strategic plans should not be viewed as static. As conditions and the environment change, so must the strategic plan. As will be discussed in later sections, new operational conditions, systems and technologies must be taken into account at the strategic level and may impact the nature and scope of the organization's strategy.

Other COOP pillars will utilize the strategic plan as a guidance document. When planning is accomplished or resources expended for organizational efforts that do not align with the organizational strategies, these resources have likely been wasted. Therefore, activities should be evaluated to ensure that they support strategic objectives and essential functions such that resources are applied appropriately. The prioritization of strategies will become a significant part of the COOP planning effort.

Capital Expenditure

Most organizations measure their utilization and commitment to information technologies through the use of capital expenditure controls. The idea here is that more capital investment in IT is somehow better than less expenditure. From a strategic view, capital expenditures should be aligned with strategy but not as a measured commitment. Allocating more dollars to IT problems rarely results in sustained improvement. Capital expenditures should be defined through an iterative process with other enterprise architecture views, including business process, operations, systems, etc. The key is to develop a capital profile based on requirements that stem from strategy execution. For COOP efforts, strategy and operations need to be considered simultaneously such that operational needs and changes can be addressed at the strategic level. This consideration will facilitate the allocation of strategic assets for day-to-day operations and prepositioning them for COOP. As an example, a SAN may be developed for COOP, but could be utilized for current operations such as data warehousing and knowledge management.

Infrastructure Alignment

One critical aspect of strategy is efficient operations, wherever they may occur. To have efficiency, organizations should align their IT infrastructure to their business strategy and operations. A properly developed strategic plan should provide guidance and requirements to the operational profile of an organization. Without guidance, information technology operational and systems solutions may form into dreaded "stovepipes," each vying for competing resources. In such cases, various programs and projects will spring up that can accomplish similar tasks, but none of them will be flexible enough to respond to crises. The best solutions are those that can provide the required capabilities and that are robust enough to survive in multiple environments. The strategic plan should provide guidance, which will be more accurately articulated in policy, on the responsibility of the functional efforts within an organization.

One caveat, however, is that a strategic plan should not provide solutions; rather, it should provide functional requirements. The objective here is to delineate what needs to be accomplished by the organization and not how it is to be performed from a systems solution perspective. It is possible, however, that a strategic planning effort will derive a solution that is in the best interest of the organization for political, economic, or socio-technical reasons and therefore should be articulated in the strategic plan.

Data/Information/Knowledge Protection & Backup

The differences between data, information, and knowledge are not always well understood. Organizations need to establish guidelines from a strategic perspective on what their definitions are within the context of the organization and how such data and information should be treated. Likewise, it is necessary to establish strategic guidelines for classified versus unclassified data and information as well as the scope and nature of intellectual property. Intellectual property can be a critical asset and a model should be established that clearly articulates development, ownership, responsibility, value, and protection. The strategic effort should leave the specifics of data, information, and knowledge handling to policy, but higher-level guidelines need to be established in strategy. Again, this will be the functional nature of data, information and knowledge, but it will not be the specific how-to guidelines. As a general rule:

- Data are normally thought of as raw facts such as numbers, characters, images or other outputs represented as symbols.
- Information is normally thought of as regressed, processed, manipulated and/or organized data that are understandable and interpretable by people.
- Generally, knowledge involves the acquisition of actionable information and complex cognitive processes such as perception, learning, and reasoning.

In order to be properly prepared for COOP, organizations need to evaluate what data, information, and knowledge needs to be available to the operational elements of an essential function. From a high-level, a data model should be established for the organization that describes where data, information, and knowledge exist or are backed up; how they are stored, retrieved, accessed, modified, etc; and the authority required to accomplish these tasks. Again, data, information, and knowledge need to be secured, backed-up, retrievable, and available.

Pillar II: Policy

Policy establishes the “governance” for an organization’s operational activities. It is, in essence, the constraints placed on organizational elements, leaders, and personnel in the enactment of the business processes and decision-making efforts. While policy is actually an operational consideration, it is separated from operations as a COOP pillar because it requires considerable attention to be accomplished correctly.

Policy needs to provide an organizational view of relevant laws, directives, memoranda, etc. that are levied on the organization from higher authority. Additionally, policy needs to be derived from a process that addresses the specific functions of the organization. Essential functions need to have policies that define the operational guidelines required during COOP. As an example, a derived policy may relate to procurement and acquisition such that materials and supplies can be acquired faster with fewer constraints. In such a case, in order to execute procurement and expenditure decisions rapidly, individuals would need authority which may not be accounted for during normal operations.

Two areas that are often overlooked from a COOP perspective are delegations of authority and orders of succession. With regard to delegations of authority, FPC 65 states:

“To ensure rapid response to any emergency situation requiring COOP plan implementation, agencies should pre-delegate authorities for making policy determinations and other decisions at headquarters, field levels, and other organizational locations, as appropriate. Clearly established delegations of authority are vital to ensuring all agency personnel know who has authority to make key decisions in a COOP situation.”

Additionally, FPC 65 addresses order of succession for key position, with the following:

“Agencies are responsible for establishing, promulgating, and maintaining orders of succession to key positions. Such orders of succession are an essential part of an agency’s COOP plan to ensure agency personnel know who has authority and responsibility if agency leadership is incapacitated or unavailable in a COOP situation.”

While organizations may have appropriate delegation of authority and orders of succession, promulgating this information must be accomplished as part of the COOP plan.

Instruments

One of the most significant elements of governance and policy that organizations often overlook is Policy Architecture (PA). PA implies that an organization’s policies are fashioned based on a high-order framework, such that policies form a cohesive governance framework. Without a PA, organizations can expect lower-level policies to diverge and be in conflict with higher-level policy intentions. Policies are often interpreted by well-meaning managers and applied with different levels of rigor. Imagine a security policy that requires proper identification to enter a facility. Should the policy explicitly state that a specific badge must be presented to gain entrance? Or can a guard permit entrance to an employee that the guard recognizes? During COOP, does the policy remain the same, such that all employees can gain entrance, or some subset of employees? Additionally, are sub-organizations permitted to create new policies for the use of formal badges for other purposes, such as mail retrieval, lab access, classified area access, etc?

Policy Architecture should be established as the highest-order policy instrument and should be used to provide policy governance and responsibility. It should address who is responsible for a policy, and how often it should be reviewed, and what the policy’s scope and measurements are. The PA should also define the various types of policy instruments available to policy developers and their interpretation by managers and employees. For instance, is a directive more important than a policy memo? How long is a policy memo valid?

The types of policy instruments may include:

- directives,
- memoranda,
- regulations,
- standards,
- guidelines,
- procedures, and
- budgets.

The PA should also define the various types of policies that will exist within the organization, such as human resources, security, budget, financial execution, contracting, COOP, etc.

Formulation

Policy is not formulated in the organization’s policy shop without careful consideration. Policy should act as a framework that supports balanced and effective governance. It must pass muster with legal, engineering, operations, and support functional areas. Essentially, all policy should be formulated in a manner that supports the stakeholders of the organization, including its customers.

The Policy Architecture should establish a policy formulation process which clearly defines how certain types of policy instruments and categories should progress through approval channels. As COOP policies are defined, who in the organization should be responsible for reviewing and approving the policy and who should be responsible for spreading the information throughout the organization? The worst case scenario usually has a single office defining and approving policy and then posting the policy on an internal web site without directly informing the policy’s constituents.



Figure 4: Policy Architecture Construct

A critical part of policy formulation is evaluation. Policies should use evaluation criteria such as:

- effectiveness,
- efficiency,
- flexibility,
- equitability,
- measurability,
- institutional constraints, and
- community acceptance.

Implementation

In the case of COOP enactment, formulated policy will need to address when COOP procedures are enacted, by what authority, how managers and employees are informed of the COOP situation, and their roles in reaction to it.

Policy implementation relates to how governance is carried out and how its effectiveness is measured. COOP policies may need to exist in a state of variability, such that different disaster or crisis conditions result in the enactment of different policies. This policy approach is akin to a state-transition approach such that different, pre-defined conditions can result in different policies being invoked.

Similar in nature to the variable policy approach is the need to establish guidelines for defining policy on-the-fly during COOP activity. It is hard to imagine a crisis situation in which new policy tools are not needed based on changing conditions.

Priorities

Policies need to be prioritized based on the COOP issue and situation. A predefined priority will be valuable in a pre-COOP environment. For instance, what will be the priority differences between relocation during a minor disaster, such as a flooded building, versus a major disaster, such as a hurricane? Policies will most likely require reprioritization once a COOP situation is encountered. The concept of policy priorities is very much like policy variability during COOP. Priority of policy is a critical matter that should not be ignored. If all policies are defined as equal, conditions will most likely arise where two policies conflict with each other. This situation could result in confusion or no action at all.

Measurement

The last, but certainly not least, important element of policy is its measurement. Policies are created and enacted to form a standard response and/or behavior. If the intended response to a policy is understood, then that response must be measured in order to understand the effectiveness of the policy and to determine policy adjustments that are required.

Pillar III: Operations

The basic assumption that COOP is not part of daily organization operations is fundamentally false. Starting with strategy and policy, COOP must be integrated into operational systems where possible and practiced as a routine. An organization that is prepared for COOP on an operational-level will enact some portion of COOP on a daily basis. For instance, organizations can be more prepared for COOP through the normal practice of telework at all levels of the organization. If the director of an organization functions everyday from his or her office, how will he/she cope with working from a hotel room where information, support, or technology is not readily available or significantly different? By performing elements of the COOP operational procedures, leaders and employees become familiar with what is expected of them during COOP. Homeland Security Presidential Directive Twenty (HPSD-20) clearly states that:

“Continuity requirements shall be incorporated into daily operations of all executive departments and agencies.”

Operational Scope

Much like the strategic level, the operational level of an organization can be directly mapped to Enterprise Architecture. When developing or analyzing an organization’s operational profile, questions that need to be addressed include:

1. Who are the operational process actors?
2. What are the responsibilities of the operational elements?
3. Where are the operational activities performed?
4. When are the operational activities performed and under what circumstances?
5. Why are the operational activities performed?
6. How are the operational activities activated, accomplished, and terminated?
7. How well should the operational activities be performed and how are they measured?

The operational profile of an organization helps in the understanding of what the organization does from a functional point of view. It is concerned with what is being done, and when and where it is to be accomplished. This understanding is critical to COOP planning because these functions and activities may need to be remapped in order to respond to different situations.

Planning

As stated earlier, one cannot develop an organizational strategy or policy architecture for COOP without understanding the operational realities of the organization. To properly plan for COOP, the organization must develop a model of the various threats that exist to the organization’s ability to continue operations and then rank the threats based on some stochastic model.

Given that every threat will have numerous variables, it may be necessary to develop a multi-attribute model to look beyond the possible threats down to the individual attributes of the threats. For instance, if a hurricane were a possible threat, what elements of a hurricane make it a threat to operations? Could that threat be further divided into its component parts, such that the organization is prepared to respond to power outages, flooding, communications disruptions, etc. and then use those components to develop responses such that multiple scenarios could be addressed? In this case, the organization could build a set of responses to different elements of the threats and respond to a localized storm, a tornado, a simple power outage, or a full-blown hurricane.

Planning for COOP is not just writing a plan, but thinking through all of the organizational needs, processes, and elements. The planning should be pushed down into organizational processes so that all planning efforts and operational systems can account for COOP. In this sense, planning will begin to take form based on organizational strategy and operational profiles in an iterative fashion. Once organizational systems are understood and developed or modified, then the planning process will need to be iteratively updated.

Operations require process and decision to take place and therefore must rely on data, information, and knowledge. Organizations must understand the scope of the data, information, and knowledge that must be available during COOP operations so that processes can continue and decisions can be made in a timely manner. It is also necessary to understand the depth of skills needed, rather than just the authority required. A critical element of planning is to understand the capabilities of the organization's personnel and determining what skills are needed rather than what positions are needed.

Readiness/Preparation

Once planning is underway, preparation should begin to turn organizational planning "theory," into reality. The ability to execute a plan of action requires some familiarity on the part of participants. The more practice that is made available, the more likely it is that an action will become more routine and can be accomplished in a timely manner without significant problems. As an example, it would be easy to plan to have all critical personnel transport themselves to a new location within 24 hours of a disaster. But if the disaster disables a key mode of transportation, such as a Metrorail, and 70% of the workforce was stranded, how is the plan to be accomplished? Therefore, readiness and preparation may discover alternative approaches to solve unforeseen problems.

Preparation is not a one time deal. All organizations experience turnover, and there is normally a constant state of flux as people leave or enter the organization. As this occurs, practice for critical activities is vital to ensure that the organization is acting as a team.

FPC 65 clearly states the requirements for testing, training, and exercising COOP capabilities:

"Testing, training, and exercising of COOP capabilities are essential to assessing, demonstrating and improving the ability of agencies to execute their COOP plans and programs. Tests and exercises serve to assess, validate, or identify for a subsequent corrective action program, specific aspects of COOP plans, policies, procedures, systems, and facilities used in response to an emergency situation. Training familiarizes COOP personnel with the procedures and tasks they must perform in executing COOP plans."

The circular mandates that agencies plan, conduct, and document periodic tests, training, and exercises to demonstrate that the plan can be carried out and to identify deficiencies.

According to FPC 65, the objective of a Test, Training, & Exercise (TT&E) program is to:

- assess and validate COOP plans, policies, and procedures;
- ensure familiarity with alert, notification, and deployment procedures;
- test the alert, notification and deployment procedures and systems;
- ensure COOP personnel are sufficiently trained to carry out agency essential functions;
- train agency COOP personnel to ensure currency of knowledge and integration of skills;
- exercise procedures by deploying designated personnel and equipment to the alternate operating facilities;
- ensure that backup data and records are sufficient, complete, and current;
- test and validate equipment to ensure both internal and external interoperability;
- ensure agency personnel understand the procedures to phase out COOP operations and transition to normal activities (reconstitution);
- conduct refresher orientation for COOP personnel;
- document completed COOP training and identify training requirements; and develop a Multi-Year TT&E Plan.

Hierarchical Integration & Management

Based on planning, operational activities and actions need to be integrated across all functional areas and through all levels of the organization. Normally, organizations prepare for events with the groups in which they reside. During fire drills, each group may be assigned a “safe” location to which they evacuate and then take roll to ensure everyone is safe. However, once the fire drill occurs, does each group know where other groups are located? Could the evacuated crowd continue to perform normal operations if they had the necessary equipment, data, information, etc? The likelihood is slim, since they did not evacuate as a team, but as groups.

COOP requires a different approach. The entire integrated team that must work together to accomplish the organization’s mission during COOP should practice COOP scenarios together, and may choose to accomplish that practice as a normal operating procedure. That may mean that on certain days, leadership teleworks at the same time so they can test their coordination. Many possibilities exist for integrating a COOP team.

Activation Criteria

It must be very clear what the criteria will be for activating COOP procedures. A system of activation should be established to respond to different types of situations. Segregation of COOP responses or elements, each with differing activation criteria, may be necessary. Earlier it was stated that COOP plans should be based on variable threats. Likewise, the COOP responses should be variable as well. As such, each of the response levels will require different criteria for activation. These criteria must be clearly stated in the plan and articulated to personnel so they fully understand their role in activation and response.

Once a COOP situation is over, there must be a clear method for reconstitution of the organization. Part of the COOP plan will be the notification method and the procedures for termination of COOP and a return to normal operations.

Pillar IV: Systems

Today’s organizations rely on a variety of systems. In fact, based on the concepts of Enterprise Resource Planning (ERP), Supply Chains, and Service Oriented Architectures, organizations are really made up of a system of systems. Systems represent the physical reality of an organization’s operational activities.

The systems involved in COOP need to be clearly defined. Operational systems that provide day-to-day support for operations may be part of COOP or may need to be augmented in order to support COOP properly. Most importantly, COOP strategy, policy, and operations need to establish a set of “design-to” requirements for the organization’s systems that are to be procured, developed, deployed, and operated. By incorporating COOP requirements into the system development effort, it is more likely that the organization’s systems will be prepared to provide COOP capabilities when needed.

One of the most important systems concepts is the need to validate requirements and then later to verify that the requirements were met. In essence, validation is the confirmation that the right system is being built, and verification is the confirmation that the system was built correctly.

Systems Life Cycle

The systems life cycle is a concept that is well understood by the development community. From a system lifecycle perspective, the concept that needs to be understood for COOP systems is that these systems must be designed, built, or procured to meet the needs of the entire life cycle of the COOP operation. Better yet, typical operational systems will be more effective if their requirements address the entire life cycle of their normal operations as well as the COOP life cycle. The development of a COOP related system should consider, at a minimum, the state of the system during COOP deployment, COOP operations and support, and reconstitution.

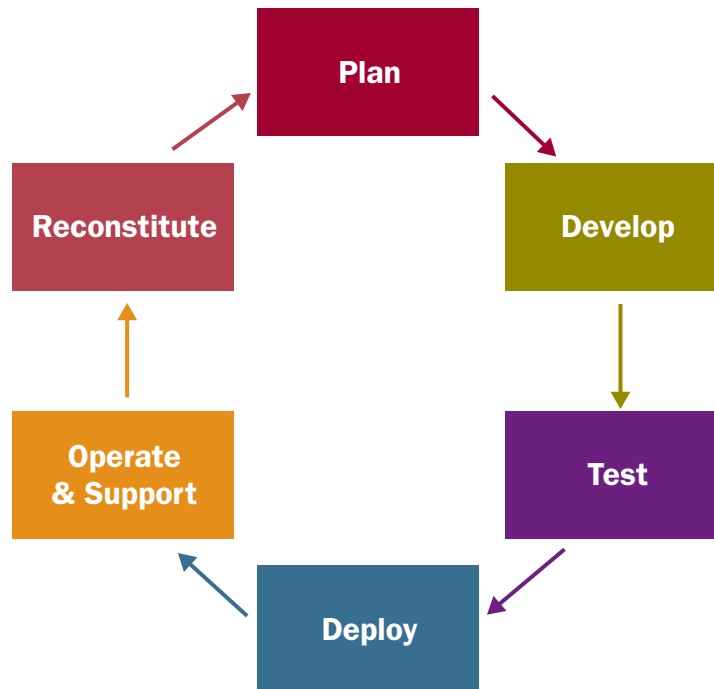


Figure 5: COOP System Life Cycle

Systems Engineering

Systems engineering is a process for translating the needs of COOP stakeholders into goals and derived requirements, integrating the various technical and managerial disciplines, and various system solutions into a system definition that accomplishes the organization's mission in a cost effective manner. It is systems engineering that makes the distinction between system solutions and policy solutions.

Systems engineering is a systemic process that is used for more than physical system development. As a matter of course, systems engineering can be used to define any system. The word system should be viewed as a generic term for hardware-based systems as well as organizational processes. To be clear, a systems engineering process should be used to fully describe a COOP process for various types of threats.

Systems engineering is often confused by many as an “engineering only” process. In fact, systems engineering is both a managerial and technical process.

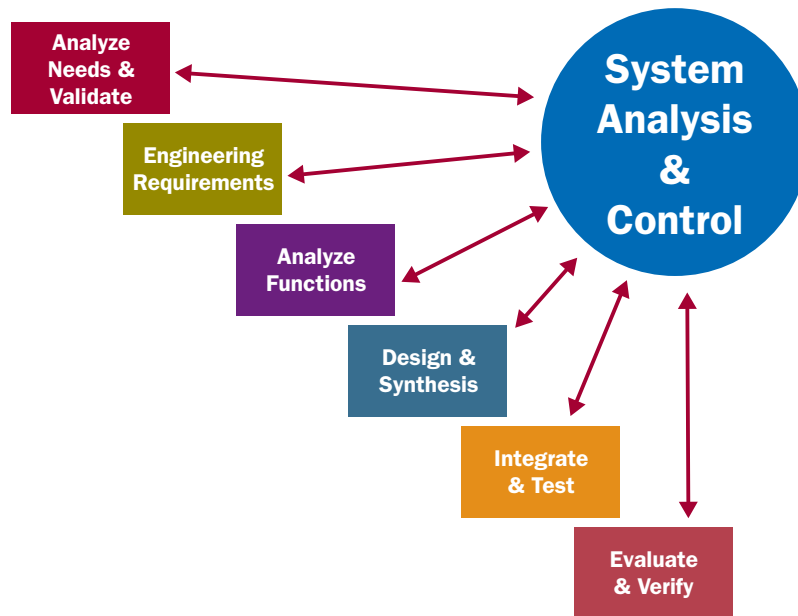


Figure 6: Systems Engineering Process

The primary functions of systems engineering include:

- **Systems Analysis & Control (Management)**
Systems Analysis and Control is a project or program management activity responsible for running the system development effort, establishing the system functional and physical architecture, maintaining the system baseline, performing configuration control, and maintaining system development control through reviews and other means.
- **Requirements Analysis and Engineering**
Requirements analysis and engineering is the development of stakeholder or constituent goal requirements and the necessary derived requirements. This element of systems engineering ensures that the requirements are valid, consistent, accurate, and mutually consistent.
- **Resource Allocation**
Resource allocation is the distribution of available system development resources, including cost, schedule, and performance parameters and constraints to the system's sub-systems and elements.
- **Design & Synthesis**
The synthesis activity is the effort to develop a best solution. It is the actual "design" process that results in an optimal system, given the environment and constraints.
- **Integration & Test**
Integration and Test is the activity of integrating the various pieces of the system to ensure that they work together. It is also the formal procedure of testing the individual elements of a system and testing the system as a whole.
- **Validation & Verification**
Validation and verification is the process of ensuring that the developed solution does, in fact, meet the requirements and needs as defined during the requirements analysis phase.

As stated earlier, the systems engineering process can be used to define a physical system or a process. In either case it is the requirements phase that determines the ultimate outcome of the process. The key element for COOP is to ensure that as systems and processes are developed, the appropriate COOP requirements are incorporated, and the development process is systemic.

System (Functional & Physical Architecture)

The key aspects of systems are defined as the products that will be used, the processes that will be utilized and the people that will make it all happen. In order to ensure that a COOP solution can be enacted, it is critical that the full scope of COOP be realized before it is required. To accomplish this, the organization should identify all of the elements needed, through a systemic process, whether those elements are internal or external to the organization. The first step in defining the external elements of the organization's COOP system is to develop a context diagram, which helps to identify the organization's external interfaces.

Further definition of the COOP process requires that the organization define and examine its complete system view in the context of performing its missions. The system view provides a clear understanding of the elements that should be considered, including:

System Component	System Element
People	Managers
	Personnel
	Contractors
	Consultants
Products	Hardware
	Software
	Facilities
	Data
	Training
Processes	Services
	Maintenance
	Support

Table 1: System Components and Elements

As these elements of the COOP system become defined, it is necessary to first develop a functional architecture of COOP systems, sub-systems, and processes. This effort should result in a functional model, similar in nature to a work breakdown structure, data flow diagram, or some other form of representation. The function model is then followed by a physical architecture that defines what systems, including hardware, software, processes, etc., will accomplish the functional elements.

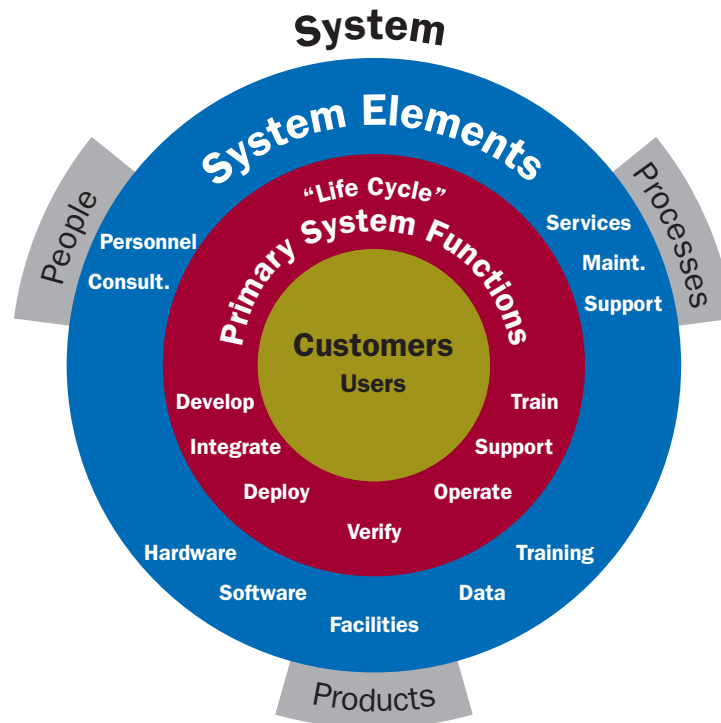


Figure 7: The Systems View

Pillar V: Integration

All of the pieces of the COOP picture do not stand alone. They must work together. The COOP elements must be integrated from a planning, solutions, and implementation perspective. Also, some functional areas are, by their nature, integrated services that need to be addressed using an “Aspect Engineering” approach. Aspect engineering simply means that a particular aspect of a solution must be applied across multiple systems and personnel in order to be effective. For instance, security is an aspect that must be implemented in new systems and existing, legacy systems alike. Security must be considered at every layer of the communications and networking stacks, and must be addressed by all personnel involved in COOP. In this way, security is pervasive.

FPC 65 addresses interoperable communication:

“The ability of an agency to execute its essential functions at its alternate operating facilities is dependent upon the identification, availability, and redundancy of critical communications and information technology (IT) systems to support connectivity between key government leadership, internal elements, other agencies, critical customers, and the public (e.g. secure and non-secure phone, video conferencing, fax, and messaging capabilities, etc.) during crises, disasters, or wartime conditions.”

As part of COOP planning, organizations must consider the key concepts that need to be understood to ensure infrastructure protection and survivability, especially with respect to intellectual property, knowledge, and information. COOP need not be merely a response to the results of a crisis or disaster. It can be the preparation for and prevention of a disaster.

Information Security

Information security is a significant integration issue for any organization that must deal with critical, personnel, or classified information and has a requirement to transfer operations to pre-planned, remote, or mobile locations. The challenge is to develop solutions that permit backup and storage of critical information so that it is not only protected under various types of situations, but so that it can also be retrieved and utilized by authorized personnel. Classified information is difficult to handle under COOP conditions that require mobility or ad-hoc communications and will normally require a pre-defined work location. It is important for organizations to consider how information security will be handled. Will secure information be centralized or dispersed and how will personnel access and protect it?

Intra/Inter-Organizations

COOP planning may be an “organizational” mandate, but can an organization in COOP mode really operate independently of all other organizations? From an intra-organizational perspective, each part of an organization must understand how it will get “care and feeding” from centralized functions, and it must understand how it will interact with other elements of the organization, whether they are centrally located or dispersed. From an inter-organizational perspective, an organization must understand how it will interact with others outside of its organizational umbrella.

Internally, organizations will provide care and feeding, such as financial services, contracting, human resources, etc. These functions may need to continue during COOP so they must be part of an organization’s integrated plan. It may be necessary to review and modify other intra-organizational plans to ensure that interactions will be able to occur in an effective manner. In these types of situations, it will most likely be necessary that the broader organization establish a COOP action committee or working group to facilitate the development of an integrated plan and to establish the necessary memoranda of understanding. The most critical issue is to fully understand what services will and will not be available during COOP operations from other organizations.

Intra- and inter-organizational activities must be considered across the spectrum of organizational types. The organizations needed during COOP may include either those with which an entity interacts during normal operations or a subset/superset of those entities. These organizations may include:

- federal departments and agencies,
- state governments,
- local and municipal governments,
- industry,
- international organizations, and
- coalition partners

Pillar VI: Technology

Systems that support COOP will depend on a variety of technologies that should be standardized as much as possible. When most people think of technologies for COOP, they most likely begin to contemplate the scope of available technologies to meet specific needs. Specific technological solutions cannot be easily addressed because every COOP situation will be different, and technological solutions will need to be clearly defined based on organizational need.

Technology is often a confusing term because many people think of electronic devices as opposed to solutions that help us do things more efficiently. Technology cannot be defined as mechanical, electrical, or any other specific discipline. Technology is simply a set of solutions that make things possible or easier than they would otherwise be. In this sense, technology can be equipment, software, processes, etc.

The most important aspect of technology for COOP is the need for standard criteria and standards that make COOP planning, preparation, execution, and recovery easier. Technology also needs to address integration capabilities so that stovepipes can be avoided and interoperability enhanced.

Standard Criteria

Organizations need to develop standard criteria for the technology they intend to utilize during COOP. In a sense, this is the standardization of solutions so that there will be interoperability and savings for procurement and maintenance of COOP systems. The broader the scope of the common criteria, the more effective solutions will be in terms of interoperability and cost savings. Caution is in order, however, because common solutions should be thoroughly tested to ensure that they are safe from common failure modes. Such an occurrence could bring operations to a halt if all solutions are based on the same vulnerable technology.

Interoperations & Interfaces

Standards are needed for interoperations between organizational elements and interfaces between devices, software, and processes. These elements must consider all aspects of an organization's activities and behaviors and may include finance, human resources, news, food, material, etc.

Interfaces may be abstracted at first and then refined over time. One example is the development of a COOP communications plan that includes an Internet Protocol addressing plan as well as the client server systems that are permitted to communicate and or control connectivity via authentication and encryption. Further definition may include specific passwords, application extensions, etc.

Specifications

Specifications are needed to ensure that new systems, sub-systems, or components developed or procured for COOP meet particular criteria. These specifications can be reduced to very stringent criteria that can be evaluated, tested, and verified. It may be desirable to create organizational standards, as part of a technical architecture, which are utilized for normal operations and to simply modify those standards as required for COOP related procurements and developments.

Conclusion

COOP is a critical part of any federal, state, or local government organization's business strategy. From a federal perspective, COOP is mandated by national policy and from a state and local perspective, it is just sound policy. Beyond that mandate, COOP is good business practice and supports the national objectives of economic security, public safety, public confidence, and national security. It is, and should be, a reality of everyday government operations.

This paper demonstrates that COOP is not new and does not require new approaches for developing relevant plans and capabilities. Organizations can utilize existing planning, development, and operational methodologies for defining their COOP needs and for developing and institutionalizing COOP.

COOP has been clearly defined in Federal Preparedness Circular 65 and further clarified by National Security and Homeland Security Presidential Directive Twenty (HPSD-20), National Continuity Policy. The requirements for a successful COOP effort are clearly articulated. This paper shows how to contemplate and think about COOP within the context of current policy. COOP must be considered at all levels of the organization, starting with business strategy and policy, defining essential functions and deriving operational procedures for alternative scenarios. Finally, COOP solutions must be designed-in, tested and exercised, and articulated to leaders, participants, and stakeholders.

This paper has defined the pillars of COOP which include strategy, policy, operations, systems, integration, and technology. As follow-on to this foundational document, each of the pillars will be further defined, and specific approaches and methodologies will be introduced and examined. These pillar reports, along with this paper, should be valuable resources in helping a government organization develop its Continuity of Operations plans.

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