

Continuity of Operations Leadership Series for Government

Integrating Continuity of Operations (COOP) into the Enterprise Architecture

Operations Pillar



Table of Contents

Operations	1
Operations Management	1
Business Operations	1
Government Operations.....	2
Mission and Functions	2
Core (Mission Oriented).....	3
Support (Mission Oriented).....	3
Central (General)	3
Organizational Structure	4
Bureaucracy	4
Functional Structure.....	4
Matrix Structure.....	5
Divisional Structure.....	6
Mixed Structure	6
Organizational Hierarchy	6
Process Analysis	7
Structured Process Analysis	8
Structured Analysis and Design Technique (SADT)	8
IDEFO.....	9
Process Tailoring.....	9
Decision Analysis	9
Decision Types.....	10
Conclusion	10
About Juniper Networks	11

Table of Tables

Typical Government Products and Services	2
Organizational Information Systems	7
IDEF Methods	8

Table of Figures

Functional Structure	5
Matrix Structure	5
Divisional Structure	6
Organizational Hierarchy.....	7
ICOM.....	8
Decomposed Task A	9



Operations

All organizations perform operations to achieve specific functional outcomes. These operations are accomplished through a set of processes and decisions. Operations are ongoing activities of an organization and may be defined as cyclical, support, mission or project specific. An organization's operations can be fluid and may evolve over time. Its processes and decisions can be documented and defined or they can be ad-hoc. In any case, these processes and decisions are typically hierarchical in nature and can be identified and decomposed through rigorous analysis. In planning for Continuity of Operations (COOP), it is important for an organization to understand its operational processes and decisions and to appreciate which of those operational elements relate to its essential functions.

Mission-related operations need to be tied to strategy and should clearly define how they are supporting the organization's long-term objectives. Common organizational support functions will automatically support organizational mission due to the fact that they provide for the fundamental elements of people and resources.

COOP may be a situation where operations change dramatically in their scope and scale for a short or extended duration.

Operations Management

Managing operations is considerably different than program or project management. While programs will likely need to continue moving forward during COOP, many of the programmatic efforts can be permitted to stall for a period of time. However, most operational flows of work cannot be stalled.

The decision to permit efforts to stall will likely be based on the risk associated with delay. Delaying a program milestone for a short period of time may have a negligible impact, especially if scheduled risk mitigation techniques have been considered. Failure to maintain support functions, such as pay or mission functions, may have severe impacts.

Operational management normally consists of tasks associated with:

- Promulgating organizational strategy and mission throughout the organization
- Planning and structuring operational processes
- Generating and maintaining an efficient flow of work
- Employing and utilizing available resources and facilities
- Organizing resources to ensure effective production and of goods and services
- Prioritizing customer, employee and organizational requirements
- Maintaining and monitoring staffing levels; Knowledge, Skill and Abilities (KSA), expectations; and motivation to fulfill organizational requirements
- Measuring performance, efficiency and effectiveness

Business Operations

Business operations are those activities involved in the running of a business for a variety of purposes, depending on the reason for the business' existence. A business may exist to generate a profit, produce value for stakeholders, provide a non-profit service or influence a process. Many people are under the impression that all governments are not efficient. However, most government operations are constantly attempting to improve the way they do business. In fact, some government operations are self sufficient in that they generate a service for a fee that pays for their existence.

Profit-oriented organizations are concerned with harvesting value from assets owned by a business. Most government organizations will be more service oriented, especially if their service is critical to national survival and the well-being of citizens. In this regard, a service-oriented organization may approach COOP planning in a completely different way than a profit-oriented organization. Service-oriented organizations

need to be concerned with continuance of the process of providing the service, whereas profit-oriented organizations may intentionally stop a production process or service if the cost of providing the service outweighs the profit. In this respect, profit- and service-oriented organizations may plan for COOP in an inverse fashion.

Generally speaking, profit-oriented business operations will focus on three management necessities, each of which is dependent upon the other, that are geared toward maximizing value produce from assets.

- Generate recurring income
- Increase the value of the business
- Secure the income and value of the business

An organization’s business model will describe how these three management necessities are achieved. In essence the execution of the business model is business operations.

Government Operations

As stated before, there are government organizations that utilize a profit-oriented business model in the delivery of products and services. Most government organizations, however, are service oriented and execute plans for providing services in the most efficient manner. These services can be intragovernment or customer-facing services. Information Technology (IT)-related legislation and policy over the past decade have been clearly geared toward improving government efficiency through the use of IT. These efforts have included the incorporation of CIOs, enterprise architecture, egovernment, and so on.

Products	Services
Buildings	Communications
Electrical Infrastructure	Defense
Roads, Bridges and Tunnels	Emergency Services
Security Systems	Entitlements
Sewers	Financing
Software	Firefighting
Space Systems	Law Enforcement
Water Infrastructure	Postal Services
Weapon Systems	Transportation

Table 1: Typical Government Products and Services

Overall, government operations are defined by acts of law and implemented and refined through executive enactment and policy. A critical element of all government operations is oversight. Nearly every government operation has some form of feedback system and oversight authority that ensures that the operation is executed appropriately and legally. This oversight always applies to operations that involve money and contracts, but can extend to every aspect of government operations. The reason, of course, is that government operations are typically responses to some high-order legal or executive requirement.

Mission and Functions

Many government functions will be similar to their industry counterparts. Naturally, basic organizational functions such as human resources, finance and accounting are accomplished regardless of the mission. In most cases, mission will be the differentiator between government and industry as well as between various government entities.

Organizations are often structured by functional area. Information systems utilized for each function, at an operational level, may be unique. As an example, the function of finance and accounting will likely have dedicated information systems.

One view of organizational functions is to categorize them based on their role with regards to the mission of the organization. One such categorization would be core, support and central functions.

Core (Mission Oriented)

Core mission functions are those activities that are derived directly from law and higher authority. A core function typically defines the organization and is directly stated in the strategy and mission statements. Core functions are not outsourced or accomplished outside the organization, and organizational leadership effectiveness is typically measured by how well core functions are accomplished. It is a safe bet that most, if not all, core functions will be COOP essential. Core functions may include:

- Executive Leadership and Management
- Strategy and Policy
- Decision Processing
- Specific Mission Activities
- Technology and Engineering

Support (Mission Oriented)

Support functions are derived from core mission functions. The difference between core and support functions is that support functions are typically crosscutting. A support function does not actually accomplish the mission, but provides the necessary capabilities so that the mission can continue. As an example, training and education may be necessary to provide a specific capability to individuals and teams so that they can fulfill a high-order mission. The war-fighting mission of the U.S. Army is well understood. The training of personnel to fulfill the army's mission, while vital, does not itself fulfill the mission. If the mission were eliminated, then the support function would no longer be needed. Mission support functions can be general in nature or very specific. Using the army example, basic training provides qualified individuals for active duty in the army. Additional training is typically needed to provide individuals the necessary skills to participate in the specialty for which they will be responsible.

Support functions will generally be accomplished in-house because of their importance to the mission. However, it is not uncommon for selected support functions to be outsourced. It is likely that most support functions will be COOP essential. However, the importance to COOP will be dependent upon the time frame and saliency of the support role. Continuing with the army example, mission-specific training may be capable of being temporarily suspended or transferred to on-the-job training during COOP operations.

- Information Systems and Communications (Mission Specific)
- Contracting and Procurement (Mission Specific)
- Knowledge Management
- Training and Education (Mission Related)
- Quality Assurance and Safety

Central (General)

Central functions are the normal care and feeding efforts of an organization. These functions are generic in nature and will not be directly related to a specific mission. While mission functions do depend on central functions, the central functions would exist regardless of the mission to be accomplished. In other words, central functions are almost always necessary. Central functions can usually be outsourced without having a direct impact on the mission. They can be assumed by other organizations that have similar functions. This is a central theme of the U.S. Government's Line of Business (LoB) effort. Examples of central functions include:

- Personnel
- Finance, Accounting and Payroll
- Information Systems and Communications (General)
- Contracting and Procurement (General)
- Knowledge Management
- Central Training
- Legal

In many cases it may be difficult to differentiate between support and central functions because typically, central functions do play a support role. However, the differentiation is not in the overall nature of the function, but in the subfunctions performed by central function organizations. For instance, the CIO organization may be responsible for mission-related operations and may also run the organization's IT shop responsible for LAN and communications services. The difference between the two has to be considered carefully, because LAN services do provide support to mission personnel, but the LAN service would be provided regardless of the mission. Therefore, support functions exist because of the mission, whereas central functions would exist regardless of the type and nature of the mission.

By carefully evaluating an organization's major functions and categorizing them as core, support and central, it may be easier to identify those functions that will be necessary to plan for during COOP. As stated earlier, each of the COOP-related functions will need to be evaluated as to how it will be accomplished under varying circumstances. One important aspect of COOP, however, is that COOP planning will normally require the creation of new functions that will only be performed during a COOP event.

Organizational Structure

Most government organizations are bureaucratic in nature because of the need for formal control. During COOP, a government organization will remain bureaucratic, but may need to have predefined areas of flexibility.

Bureaucracy

Bureaucracy is a typical form of government organizational structure. It is a structure and a set of regulations established to control the activity of large organizations. It characteristically has hierarchy, formal division of responsibility, and standardized procedures and policies.

Contrary to popular belief, bureaucracy is not a phenomenon that just occurs or a structure that is specifically designed to impede progress. On the contrary, bureaucracy is intentionally created to establish checks and balances in the organizational processes and decisions and to ensure there will be accountability for actions and outcomes. Because government organizations are rarely measured by stock price or profit, they need to function in accordance with defined standards and measured against expected outcomes. Since an organization's efforts in COOP planning may require redesigning a bureaucratic process for coping with extreme circumstances, these processes may need to be less rigid.

While most government organizations are bureaucratic in nature, hierarchical structures differ from organization to organization. In fact, government organizations may be regularly restructured, especially as leadership positions change. In this regard, organizational structure has a standardized procedural aspect as well as a structural aspect. It is not unusual for the structural aspect of the organization to change while the procedural aspect stays the same or changes more slowly. This procedural aspect of government organizations is typically tied to legal and policy issues as well as organizational culture.

Functional Structure

An organization with a functional structure will fashion itself in accordance with its core, support and central functions. In these types of organizations, it is typical to see finance and accounting, contracting, engineering, and human resource shops. These functional sub-organizations serve the functional needs of the entire organization. Organizations that utilize a functional structure typically have well-defined missions that do not change often and the suborganizations become extremely adept at performing their particular portion of the organization's processes. While these functional units are typically economically efficient, they often lack flexibility. They also establish a cultural form that is difficult to change, which can make communications with other functional areas difficult.

From a COOP perspective, functional structures can be advantageous if the function must be fully retained. If not, functional organizations may have difficulty operating in an ad-hoc environment and adjusting to more fluid communications with other functional areas.

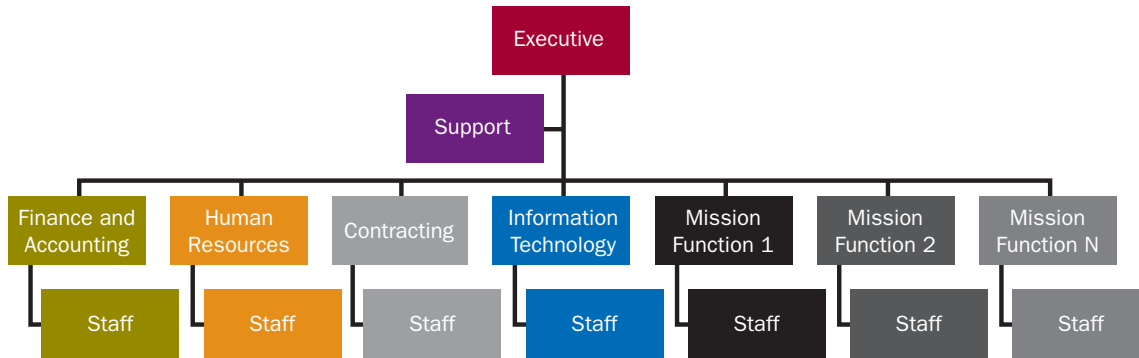


Figure 1: Functional Structure

Matrix Structure

A matrix structure overlays multiple functional entities into an arrangement that permits a single organizational element, such as a program or project, to utilize a portion of the resources of the organization’s functional elements. There is usually a functional structure to the organization that permits a program or mission thread to utilize and share functional resources to accomplish general and specific goals. The matrices may combine functional, programmatic, geographic, product or divisional elements in various combinations to meet mission objectives. Employees are typically assigned to cross-functional teams, yet they also belong to a permanent functional unit (for example, engineering, human resources, and so on) to which they report and return when no longer needed by the teams. These types of organizations can be confusing and can result in resource struggles, especially when authority over resources is unclear.

Matrixed organizations can be well suited for COOP environments because of their flexibility. Another advantage of matrices is that portions of a functional organization can be integrated into COOP teams. These teams can be highly effective because teaming is a normal mode of operations. Caution should be exercised, however, because of the possibility of resource conflicts.

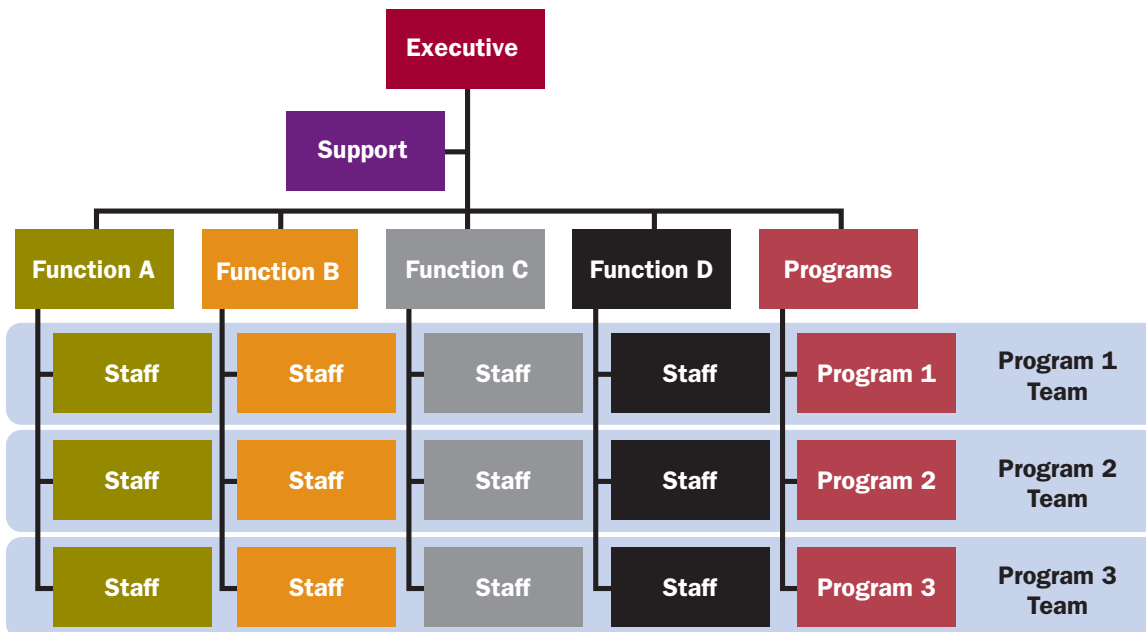


Figure 2: Matrix Structure

Divisional Structure

Divisional structures are a form of organization that separates itself into self-managed units, each of which has the functional elements to make it relatively self-sufficient. This structure is typical in organizations that arrange based on mission function and where the mission outweighs most other concerns. Organizations may also choose a divisional structure when there are multiple units that are segregated by geographic distance or some other factor. Division-based organizations usually have a central point of control such as a headquarters that manages the overall organization, integrates the various divisions, and performs some of the central and support functions. Divisional organizations can be highly effective, but since central functions need to be replicated, there can be inefficiencies.

Divisional organization structures can be effective for COOP events, especially when a division performs an essential function and is able to stay intact during the event. Additionally, COOP planning may permit one division to accept the functions of another division if it becomes unviable during a disaster.

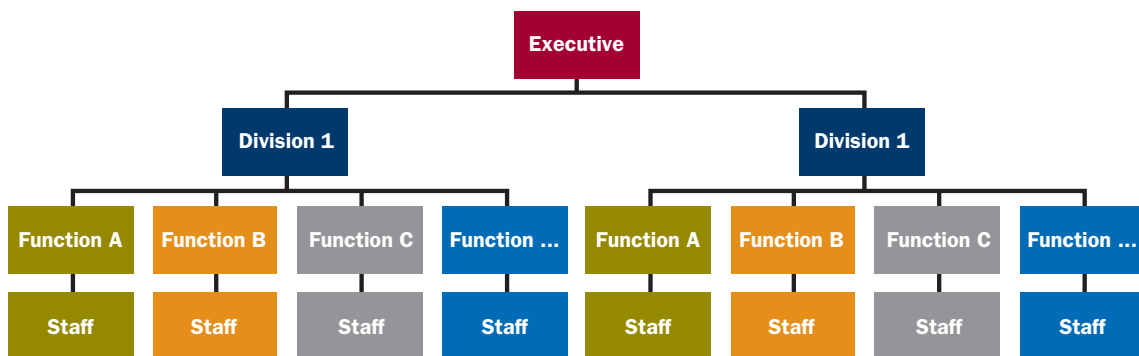


Figure 3: Divisional Structure

Mixed Structure

It would be ideal if an organization's structure could be easily categorized as functional, matrixed or divisional, but the reality is that most organizations have some of the characteristics of all three structures. By necessity, most organizations separate concerns and organize based on leadership experience or organizational culture. It is typical in government organizations to have a structure, managed by headquarters, where each division is organized by function, matrix or a mixed structure.

Since a mixed structure is typical, COOP planning must account for this and must consider the operational impacts of integrating suborganizations into functioning entities that will be effective during COOP.

Organizational Hierarchy

Since information systems are critical to organizations, it is necessary to consider not only organizational function and structure, but hierarchical authority and roles as well. Typically, an organization will be arranged based on levels of authority and roles from executive to support levels. An example of organizational hierarchy is provided in Figure 4.

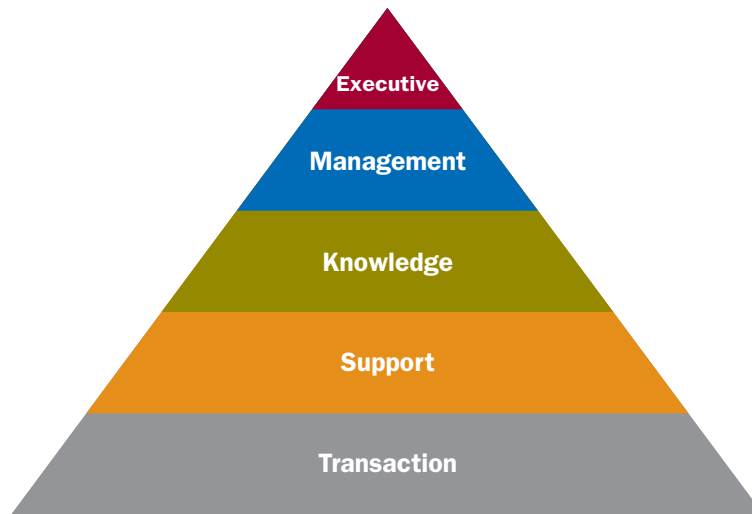


Figure 4: Organizational Hierarchy

It is common to use an organizational hierarchy to explain the roles of various types of information systems needed to provide automation, storage, knowledge work and decision processing in an organization. For instance, Table 2 shows a list of some of the information systems that may exist at each layer of the organization.

Level	Information System
Executive	Executive Support Systems (ESS)
Management	Management Information Systems (MIS) Decision Support Systems (DSS)
Knowledge	Knowledge Management Systems (KMS) Computer-Aided Design (CAD)
Support	Office Automation Systems (OAS) Web-Based Systems (WBS) General and Special Applications
Transaction	Back-Office Systems (BOS) Transaction Processing Systems (TPS)

Table 2: Organizational Information Systems

The role of an organization's information systems is to provide a fluid and streamlined flow of information to support processes and decisions and to protect that information from individuals and organizations that should not have access to it. It is vital that an organization fully understand its information system model and structure for COOP operations planning. The organization needs to understand which information systems have a role during COOP and how to best provide that information system role.

Process Analysis

It was stated that an organization's true nature can be defined by its processes and the decisions that must be made. Most of an organization's functions can be decomposed into these two fundamental elements. In order to understand what an organization does, it is important to understand process analysis. In most instances, process analysis is used to help improve process, but for COOP planning, it should be used to better understand the operational profile of an organization and to understand what elements of an organization's processes need to be operated during a COOP situation.

Structured Process Analysis

A typical approach to analyzing processes is to model them using structured methodologies and tools. It is difficult to analyze how a process works by looking at an organizational chart, because the chart does not represent the flow of information or the necessary interactions needed to accomplish tasks. There are a variety of process modeling and analysis techniques and these techniques can usually be used for analyzing systems being designed, such as software. This is true because software is, for all intents and purposes, a process. One form of structured analysis that can be used for process analysis is Structured Analysis and Design Technique (SADT) and its related modeling environment known as ICAM Definition Languages (IDEF).

Structured Analysis and Design Technique (SADT)

SADT is a form of process analysis that is based on systems theory. It is an abstract modeling technique that uses activity data models. Organizations and systems are similar in that they have processes. SADT was developed to aid in the definition and design of systems and used the ICOM, a construct. ICOM means Input, Constraint, Output and Mechanism. Simply put, all functions or tasks have one or more of these interfaces.

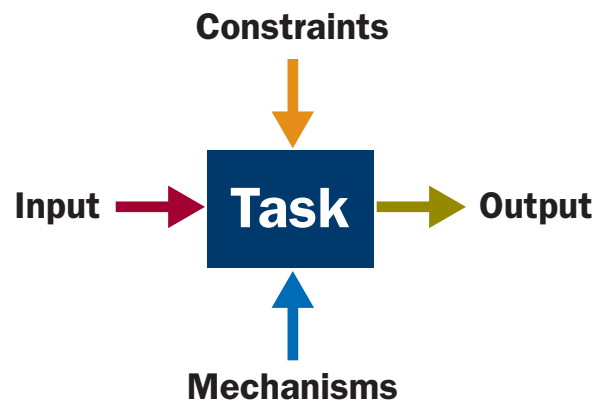


Figure 5: ICOM

The ICOM Definition Language, which is well known as a process modeling technique, was developed from the SADT ICOM construct. There are a variety of IDEF methods, of which Table 3 shows some.

IDEF Method	Model
IDEF0	Function Modeling
IDEF1	Information Modeling
IDEF1X	Data Modeling
IDEF2	Simulation Model Design
IDEF3	Process Description Capture
IDEF4	Object-Oriented Design

Table 3: IDEF Methods

There are 16 IDEF methods in all, but methods 5 through 14 have not been developed in depth. The most useful IDEF method for operational process analysis is IDEF0, although IDEF1 and IDEF1X are highly useful for understanding organizational information systems.

IDEFO

IDEFO, as a functional model, is ideal for modeling the activities, tasks and decisions of an organizational process in a hierarchical format. An IDEFO model can help an organization understand and analyze a process and help facilitate communications between process actors and analysts. Most importantly, process analysis via IDEFO goes beyond just understanding the tasks involved in a process. It also provides valuable information regarding the inputs and outputs and the flow of resources through the process. Additionally, the modeling technique provides insight into the constraints and mechanisms of the process and its tasks. A task constraint will be an external parameter such as policy or time that constrains the task in some way. A mechanism is a method or tool that is needed to help accomplish the task.

IDEFO is a well-known approach to functional analysis and the National Institute of Standards and Technology (NIST) has standardized IDEFO in Federal Information Processing Standards (FIPS) Publication 183. IDEFO is also a standard flowcharting method available in desktop applications such as Microsoft Visio.

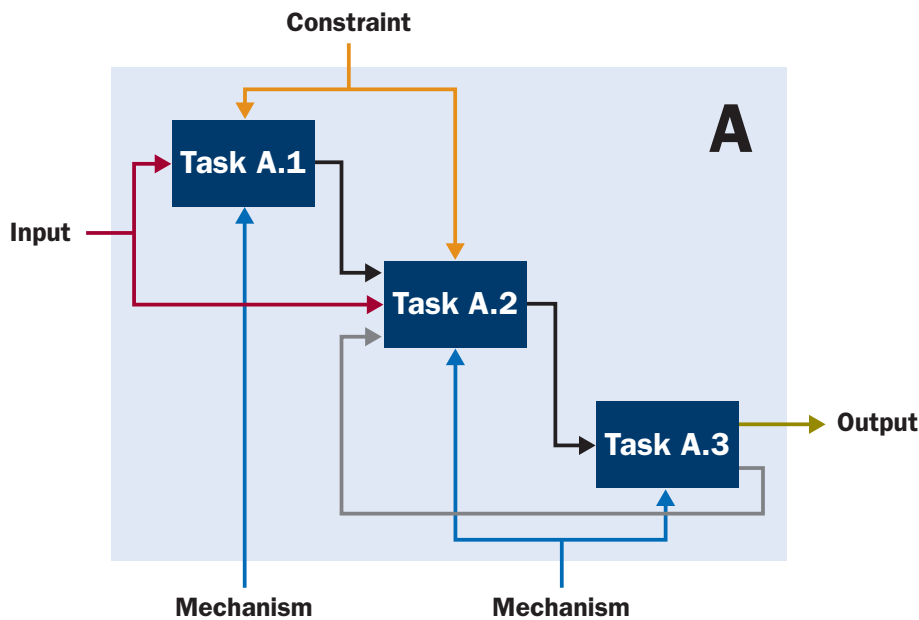


Figure 6: Decomposed Task A

Process Tailoring

Regardless of the methodology or technique used to model or define an organization's operational processes, it is important to understand what the processes are. Once understood, processes can be adjusted or tailored for different situations, such as COOP operations. It may be necessary to redefine processes for emergencies and to merge multiple processes into single processes. The biggest advantage of process analysis and tailoring will be a better understanding of how operations occur and preparation for alternative events. Modeling can be a valuable approach to informing key personnel prior to an event or in getting people up to speed when an event begins.

Decision Analysis

Organizational decisions and decision processes are vitally important to operations. Decision analysis is a formal discipline and includes many procedures, methods and tools for identifying, representing and assessing all aspects of decision making and prescribing recommended courses of action. Decision analysis is difficult because it often deals with situational awareness and insight by the decision maker, both of which are difficult to assess.

As a minimum, an organization should delineate the decisions that need to be made to ensure that essential functions and their associated processes can be performed effectively. It is also important to articulate who has the authority to make specific types of decisions.

Decision Types

Organizational decisions are typically categorized as structured, semi-structured and unstructured decisions, depending on a decision's fundamental basis and the amount of data, information and experience required in making the decision. An example of a structured decision is providing access to a facility based on the existence of a legitimate badge. A semi-structured decision may involve a manager evaluating live data and using experience to decide upon an action. An unstructured decision would be a senior executive deciding upon alternative strategies for an organization.

In most cases, the less structured a decision is, the more it will rely on experience and critical thinking. Organizations can enhance decision making by creating decisions that are more structured and clearly defining those decisions that require more experience or knowledge.

For COOP planning at an operational level, it is first important to identify what decisions need to be made with regards to essential functions and then to develop mechanisms to enhance the performance of those decisions during a crisis. Practicing the making of decisions under stress, during demonstrations or during COOP exercises can give leaders the critical experience they need to perform under the pressures of a severe COOP situation.

Conclusion

The elements of an organization's operations are the processes that the organization accomplishes and the decisions it makes. Operations are function oriented in that an organization derives processes and tasks necessary to accomplish its stated mission. Naturally, these processes and tasks have to consider the entire organization and not just the component that performs the specific mission. Strategy is the deployment of organizational resources to accomplish the mission. Operations are the actions that utilize those resources to produce an outcome.

Operations include all of an organization's activities and functions. These functions can be considered core, support and central. Core functions are those functions enacted that are mission specific. Support functions are derived from and help sustain the core functions. Central functions are those activities that would exist regardless of the organizational mission. This delineation is critical when determining which functions must continue to operate during COOP. The core functions and many of the support functions will become essential functions.

Organizations accomplish processes in different ways and organize into structures to help facilitate accomplishing processes in an efficient manner. These organizational structures can be functional, matrixed, divisional or a mixture of different types. In almost all instances, government organizations will be bureaucratic in nature because of the ultimate public interest in structure and accountability.

Regardless of how an organization is structured, it will depend on information systems in order to perform its processes and make decisions. Organizations are typically hierarchical and a variety of information systems are deployed and interact to support processes. These information systems range from executive support and management information systems to office automation and transaction processing systems.

To better understand how to prepare for COOP, organizations will likely need to perform some type of process analysis. One important aspect of this analysis will be to understand how processes are performed and what their dependencies are. It would serve no purpose to transition a process to COOP to later find that it cannot operate because critical information is unavailable. As processes are analyzed and understood, they may require reengineering to ensure that they can be performed during a COOP event.

In a similar fashion to process analysis, an organization should thoroughly understand its decisions and decision processes. In order to make decisions in a timely manner, an organization will need to prepare leaders and provide them with the critical information necessary to be effective. Otherwise, COOP decisions will be made in the blind.

Operations are the combined elements of process and decision. Organizations preparing for COOP must consider both to identify which processes and decision elements must be in place for successful COOP activity.

About Juniper Networks

Juniper Networks, Inc. is the leader in high-performance networking. Juniper offers a high-performance network infrastructure that creates a responsive and trusted environment for accelerating the deployment of services and applications over a single network. This fuels high-performance businesses. Additional information can be found at www.juniper.net.

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