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Project to Develop Guidance Material to Enhance the Resiliency of Air Navigation Services for the Caribbean Region

Guidance Material
Contingency Planning and Response for Air Navigation Services

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GUIDANCE MATERIAL:
Contingency Planning and Response for Air Navigation Services

Content

Introduction

The purpose of this Guide is to provide guidance for managing unforeseen situations that may impact the ability of States or Air Navigation Service Providers (ANSPs) to sustain safe, orderly, and efficient operations. Contingencies can include various events, from technical failures and natural disasters to the loss of key personnel, each posing potential risks to the continuity and quality of air navigation services.

The Guide outlines strategies to strengthen system resilience, communication protocols, and criteria for implementing operational and recovery measures. It also emphasizes the importance of bilateral agreements and protocol socialization, fostering a coordinated, effective response to maintain the safe flow of air traffic, even under challenging conditions.

Contingency

A contingency is an unforeseen event or situation that may impact a State's ability to deliver air navigation services (ANS) safely, orderly, and efficiently. Contingencies can encompass a range of incidents, including communication system failures, loss of key personnel, technical issues, natural disasters, or any other circumstance that disrupts the continuity or quality of air navigation services.

The CAR Region ATM Contingency Plan assigns the following hierarchy of contingency plans:

1. **Level 1**, for internal State plans dealing with internal/national coordination actions for ANSPs;
2. **Level 2**, for coordinated (interstate) contingency plans involving two or more States; and
3. **Level 3**, to detail contingency arrangements in the event of partial or total disruption of Air Traffic Services (ATS) designed to provide alternative routes, in most cases using existing airways, which will allow aircraft operators to fly through or avoid the airspace.

It also categorizes contingencies as follows:

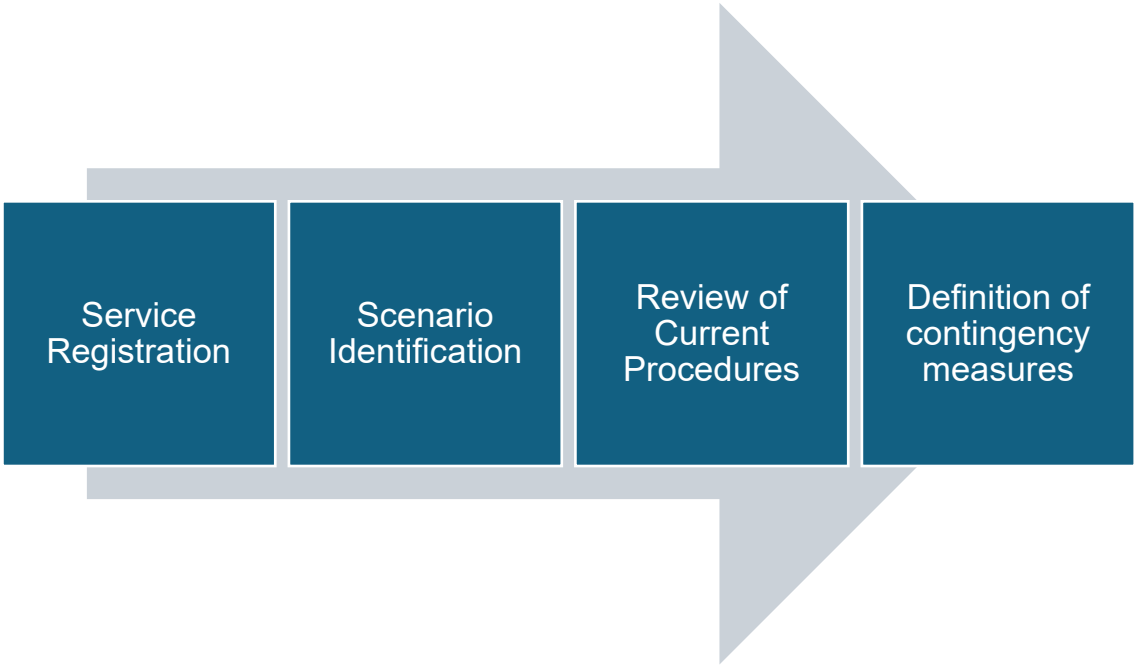
4. **Category A**: Safe airspace, but restricted or without ATS, due to causal events such as strikes, pandemic, earthquake, nuclear emergency affecting ATS provision, or ATM system failure or degradation;
5. **Category B**: Unsafe airspace, due to causal events such as volcanic ash cloud, nuclear emergency, or military activity; and
6. **Category C**: Unavailable airspace, due to causal events such as pandemic, national security—typically a political decision.

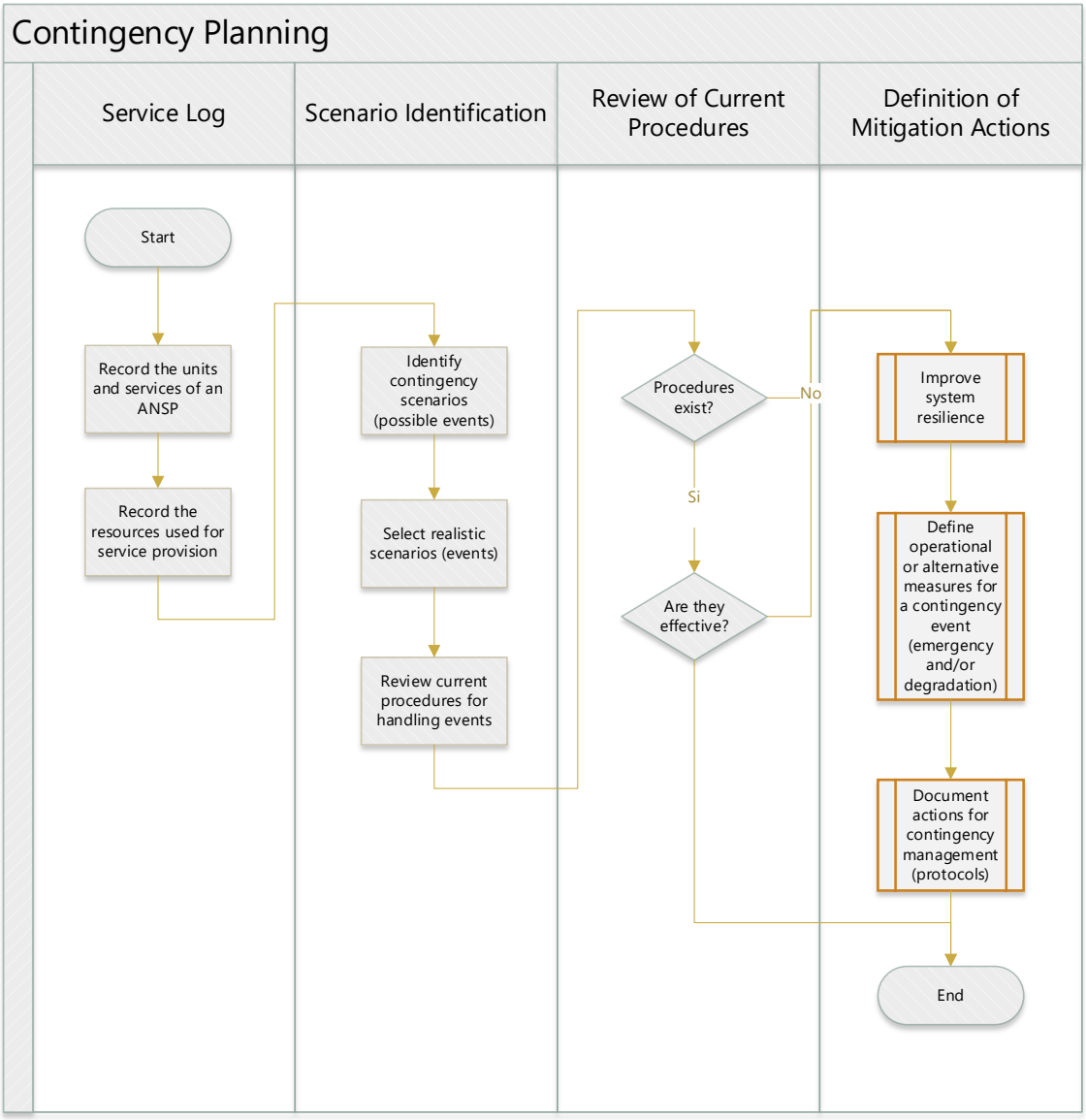
Contingency Planning

The purpose of contingency planning is to ensure the safety and continuity of ANS in situations where unforeseen events may affect the ability of a service provider or a State to operate safely and normally. Contingency plans aim to establish clear procedures, options/alternatives, and resources to respond effectively to disruptions, minimizing the impact on safety and air traffic flow.

This planning allows for the maintenance of essential services during interruptions by implementing operational, communication, and coordination measures with other entities, and, where possible, initiating a rapid recovery process to restore services to their normal level.

Below are the key activities and a diagram outlining steps to identify possible contingency scenarios and define the actions or measures required to mitigate their impact on safety and ensure service continuity.




Contingency Planning
Service Log
Scenario Identification
Review of Current Procedures
Definition of Mitigation Actions
Start
Record the units and services of an ANSP
Record the resources used for service provision
Identify contingency scenarios (possible events)
Select realistic scenarios (events)
Review current procedures for handling events
Procedures exist?
No
Si
Are they effective?
Improve system resilience
Define operational or alternative measures for a contingency event (emergency and/or degradation)
Document actions for contingency management (protocols)
End

Record the services provided by the supplier

Contingency planning should cover all units, services, and functions of ANS, whether provided directly or sourced externally.

The first step for an ANSP is to comprehensively identify the services and functions it delivers. For example, at the "service" level, an ANSP may offer ATS (en-route, approach, and tower services), which at the "functional" level involves the provision of systems like VCS, surveillance, FDPS, among others.

Similarly, ANSPs should list all service and product providers whose failure could impact the delivery of air navigation services and functions:

1) List ANS units (e.g., ACC, APP, TWR, AIS, SAR).
2) For each unit, specify the services (e.g., ATS, AIS) and functions (e.g., communication, navigation, surveillance, data processing) provided.
3) For each unit, list external providers: a) Providers of air navigation products and services that support the unit (e.g., AIS, MET, CNS). b) Other non-ANS-related providers (e.g., IT, power supply).

Additionally, an inventory should be conducted to identify any additional resources required to meet contingency needs.

Scenario Identification

Event Identification and Impact Assessment on "Normal Operations"

For each ANS unit within an ANSP, the second step is to list events and assess their impact on "normal operations." This includes both events that do not affect normal operations and those that may cause the loss or interruption of air navigation services and/or supplied services or products.

Events That Do Not Disrupt Normal Operations

Some events may occur during the "normal operations" phase without causing interruptions. These events are often identified through formal safety or security assessments of the ATS system/service.

These safety assessments analyze the consequences of failures in ANS, and their findings are reflected in operations manuals, where both operational and technical staff are instructed on actions to take in response to certain failures. Some of these failures do not affect normal operations due to their nature or because the ANS architecture is designed to tolerate them.

Some of these events are formally documented in the operations manual, even if they are not backed by a safety assessment. Alternatively, they may be communicated through training following an incident or via informational notices to share lessons learned.

Therefore, one task for ANSPs is to review whether they have sufficient data to compile a list of events that do not disrupt normal operations. This "list" does not necessarily need to be exhaustive, but the information should be formally documented and available to relevant personnel.

Examples of events that typically do not trigger emergency procedures or degraded modes (i.e., considered part of "normal operations") include:

- Loss of visual information in a sector: the sector has multiple surveillance monitors and at least two ATCOs, both with surveillance screens.
- Loss of a radar site, if the remaining number of radars meets or exceeds the minimum required to operate a sector "normally."
- Replacement of an ATCO (e.g., due to illness) by another licensed ATCO in the sector.
- Combining existing sectors (without creating new sectors).
- Maintenance on equipment with redundancy levels that allow normal operations to continue (for example, when there are three levels of redundancy and only two are needed to operate in "normal mode," the third level allows such interventions without interruptions).

Events that disrupt Normal Operations

Other events may cause the loss or interruption of ANS or functions.

Process and criteria for identifying events that disrupt "normal operations"

These events can be identified through "brainstorming" sessions involving technical and operational staff (including ATS and SMS) from an ANSP. Identification can be supported by records, databases or event histories, such as:

1) Event/incident log (if available);
2) Benchmarking (exchange of information with other ANSPs);
3) Systematic analysis.

Events can be classified into categories, such as:

1) ATS and CNS related events;
2) ANSP infrastructure or facility events (fires, power outages, IT);
3) Environmental events (floods, earthquakes, explosions in chemical facilities);
4) Events affecting the workforce (food contamination, poisoning, strikes, pandemics);
5) Security events (terrorism, sabotage, cyberattacks);
6) Air threats (hijacking, air strikes, accidents).

It is not possible to establish a single, universal list for all ANSPs. Therefore, these guidelines are limited to describing a process and criteria for defining the relevant events.

This list is not intended to be used directly; it must be evaluated to determine its relevance in the specific operational context. The guidelines (process and criteria) must be applied by each ANSP so that they can draw up their own comprehensive list of events.

Selection of "Realistic Events"

This step involves filtering "events that disrupt normal operations" to identify which of them are "realistic"; that is, those with a sufficiently significant likelihood of occurring to be considered in contingency planning.

The method is primarily based on the "Risk Assessment Method" and can be supplemented with data logs of recorded events/incidents (both technical and operational, if available) and/or the experience of technical and operational staff.

To determine which events are realistic, the following inclusion and exclusion criteria can be used:

- Inclusion Criteria: Events should be considered "realistic" when:
    - The regulations require that its consequences be mitigated. For example, in the case of "false fire alarms", if a national regulation requires sprinklers in the operating room, it is necessary to implement a procedure (such as the use of dry pipes) to manage such false alarms.
    - There is evidence that they have occurred previously, that is, they are registered in event databases.
    - They have been experimented with by other ANSPs in similar operating environments.

    - They are equivalent to another "realistic event" or are linked through a chain of events.

- Exclusion Criteria: Events should be excluded when:
    - They are highly unlikely to occur and there are no means of mitigation, direct or indirect, to address them. In this case, the risk is considered negligible and accepted.

      Example: the impact of a meteorite on an air traffic control center (if it were a large meteorite, it would be assumed that it would significantly affect the area, including nearby personnel and control centers). They are unlikely to occur (although the means of mitigation are not known), and the risk is accepted as negligible.

      Example: an earthquake of magnitude greater than a certain level in an area with no significant seismic history. The event is associated with or equivalent to another event that has already been deemed unrealistic.

It is important to document any decision to exclude an event from the "realistic" list.

The result of this step is to obtain, for each ANS unit, a consolidated list of events that could realistically cause a loss or interruption of services or functions.

Review of Current Procedures

The third step is to check whether adequate contingency plans are in place for each "realistic event". From here, all identified events will be referred to simply as "events".

An adequate contingency plan involves the availability of one or more specific plans to manage the consequences of an evaluated "event".

ANSPs can find themselves in two situations: there are contingency plans to manage the consequences of certain events, or these plans do not exist.

Contingency Plans are in place to manage the event

Where "contingency measures" are in place, it is necessary to assess their effectiveness in terms of safety, capacity and, where relevant, environmental impact, to confirm their feasibility and effectiveness.

The contingency measures of an ANSP are usually detailed in the following documents:

- **Operational Procedures Manual:** This document sets out the procedures for the provision of services that an ANSP offers to users operating in a specific airspace. It provides an operational framework for managing contingency situations in a unit, such as volcanic activity, hazardous weather conditions, and other exceptional circumstances, to protect safety and ensure operational continuity at critical times.

- **Air Traffic Flow Management Manual:** This document contains the terms, measures, techniques, and programs of a unit's ATFM, aimed at facilitating the safe, efficient, continuous, and orderly flow of air traffic in all phases of flight, tailored to the needs of all users and the characteristics of each airspace area.

- **Occupational Health and Safety Manual:** This document sets out standards, procedures, and guidelines to protect the physical and mental well-being of employees and promote a safe work environment. It helps identify, assess, and control occupational risks specific to an ANSP, ensuring compliance with legal requirements and the implementation of practices that minimize accidents, injuries, and occupational illnesses.

- **Operational Letters of Agreement:** This document outlines and establishes the operational procedures for coordinating and providing air traffic control services to aircraft within controlled airspaces under the responsibility of two or more ANSPs. It includes procedures and provisions for contingency situations related to automation, ground and air-ground communication failures, surveillance system failures, and other emergency situations.

- **Internal contingency plans:** This refers to the contingency plans previously prepared by an ANSP.

If contingency measures are not feasible or effective, they must be adjusted or redesigned to meet the established requirements, which may involve multiple modifications.

There is no Contingency Plan to manage the event

If no contingency measures are in place, an ANSP must develop new contingency strategies and/or contingency procedures to manage the consequences of the event. The development of new contingency measures will be explained later.

Definition of Contingency Measures

Improve system resilience

The implementation of actions to enhance system resilience should be considered from the design phase and in compliance with regulatory requirements. Improving the resilience of ANS infrastructure once it is already operational is feasible and, in many cases, essential; however, executing these actions in a unit that operates 24/7 requires meticulous execution and proper management of the risks involved during implementation.

Nevertheless, regardless of the level of resilience achieved in the system, it is necessary to develop "contingency measures" to manage situations where the "backup" systems fail. This improvement process should be continuous.

Define operational or alternative measures for a contingency event (emergency and/or degradation)

Although the contingency scenarios of an ANSP are diverse and may vary between different ANSPs, the consequences are usually similar and may partially or totally affect the provision of air traffic services.

ATFM Measures

In the event of a partial outage, the contingency action may include staying on the affected unit and providing ATS services using the remaining capacity of the affected unit ("Degraded Operating Modes"). In addition, the affected unit can implement planned strategies for a total outage, if the situation requires it.

ATFM measures are techniques used to manage air traffic demand based on the capacity of the system. These initiatives regulate the flow of air traffic and, although they are effective in managing demand in contingency situations, they can affect airspace users. Therefore, they should be applied only when necessary to maintain the operational safety and efficiency of the ATM system, minimizing as much as possible its impact on flight operations.

Below are some ATFM measures applicable during a contingency:

1. Ground Delay Programme (GDP).
2. Ground stop (GSt).
3. Minutes in trail (MINIT) and miles in trail (MIT).
4. Minimum Output Intervals (MDI).
5. Re-route.
6. Re-routing scenarios catalogue.

The activation of these measures creates an imbalance between demand and capacity that cannot be resolved by optimizing capacity at a specific aerodrome or airspace. Smaller-scale imbalances are typically managed tactically by ATC. The advance notice period from the detection of an issue will determine the measure to be selected.

For more details on ATFM measures, their selection, and application, refer to ICAO Doc 9971, *Air Traffic Flow Management (ATFM) Manual Part*.

Strategies for the treatment of a Contingency

In the event of a total service interruption, applicable strategies for the affected unit may include ATFM measures and/or relocating staff to an alternate site nearby or within the same location as the affected unit. Generally, these strategies can be classified as "alternate airspace" or "alternate location" and include:

- Colocated/shared/joint facilities
- Centralized facilities
- Common/shared systems (International) - (Contingency Centers/other Centers in Adjacent States)
- ATS delegation
- Hybrid models

It is important to note that the strategies mentioned are not mutually exclusive, and it may be necessary to use multiple strategies or combinations to meet ANSP needs. Additionally, depending on the type of "failed unit" (i.e., ACC, TMA, APP, and TWR), different strategies may be considered for managing a contingency.

The choice of approaches should be discussed in the context of the Operational Concept and will depend on various local factors, including the scope and complexity of service provision, State and user requirements, the adopted technical infrastructure, among others.

Co-located/shared/joint facilities and Multi-use facilities

This is a common strategy among ANSPs to optimize resources and avoid inactive infrastructure during periods of normal operation. Although often used jointly, not all dual-use facilities are colocated. Some ANSPs develop national centers at training sites near major control centers, while in other cases, military facilities colocated with civilian facilities are used under prior agreements.

Some observations:

- Contingency facilities can be set up on the same sites as primary centres, repurposing areas as training or testing suites.
- Obsolete systems can serve as a backup, being kept under "care and maintenance" for use in the event of major system failures, providing additional safety in emergency operations.
- Some older systems can only be used for low-traffic operations and require additional training for the personnel in charge.

Centralized facilities

It refers to the creation of a single national centre covering all ATM service operations within a State, as distinct from international strategies dealt with in the Common Systems. Although it shares similarities with colocation and multiple use strategies, they are not mutually exclusive. An example of its application is an ANSP that establishes a centralized

contingency facility in its training school, which has economic advantages by allowing the dual use of simulation and training.

This strategy requires careful planning, starting with identifying a strategic location based not only on technical criteria, but also on national infrastructure, geography and political considerations. The transition to a centralized facility could create uncertainty among employees at other facilities, so socialization may be necessary. The centralized installation will likely need to be supplemented with additional support, such as mobile towers, and the use of common ANSP systems.

Some observations:

- Some infrastructures, such as training suites and simulators, can be used for both primary operations and contingencies, depending on their reassignment.
- Initial planning should consider the sharing of resources (equipment, channels, data) within an ANSP and ensure that these can be freed up and brought online in contingency situations.
- Dual-use facilities, such as workstations, are used for training or simulation when there are no emergencies but should be available to support recovery operations if necessary.

Common/Shared Systems (International) - (Contingency Centres/Other Centres in Adjacent States)

Several States in the same region may share a common but dedicated contingency facility. This can be a self-contained facility built for that purpose or, alternatively, an arrangement in which an existing facility in a designated State acts as the contingency facility for all participating States. Alternatively, ANSPs agree among themselves on combinations of pairs or clusters based on common/shared systems to meet their contingency needs, although the data and sectorization are likely to be different.

Some observations:

- A political, managerial, and technical consensus must first be established, formalized in an international agreement.
- Ideally, there should be minimal differences in systems (e.g., HMI) between potential support units/shared sites and the primary system that is failing.
- Support units/shared sites must be reconfigurable to handle traffic flow within a minimal timeframe following any disruption.
- Surveillance and communication infrastructure should be connected to a shared contingency control facility.
- Flight planning data and other relevant information must also be transferable.
- Coordination is needed among internal support staff within ANSPs and subcontracted organizations that may be used to maintain common systems across different states.
- A staff relocation strategy will be necessary.
- Extended relocation/detachment of staff may raise social issues, which should be anticipated through social dialogue with unions.

- Regulatory or state authority approval is needed for procedures and practices that affect the airspace of the failing unit.
- This is especially relevant if controllers implementing these procedures are operating within the borders of another member state.
- Licensing and training issues should be clarified in advance.
- Other participating ANSPs/states should be informed once a support unit or shared center is activated.
- It will also be important to plan for the return of personnel to the failed unit once "normal operations" are ready to resume.
- Contingency plans should address scenarios where issues arise during transfer, preventing the original unit from resuming operations. In such cases, sufficient staff must remain at the shared location to recover from failure and resume services.

ATS Delegation

Air Traffic Services (ATS) Delegation allows neighboring units or countries to take on part of the workload of a failing unit under an agreement (such as a Letter of Agreement - LoA). This strategy requires detailed planning and a political, technical, and managerial consensus formalized in an international agreement. Contingency arrangements must be tested to ensure they can be applied when necessary.

There are two main types of delegation: vertical takeover, where the support unit controls airspace above or below a specific flight level, and horizontal takeover, where the support unit manages specific volumes of airspace, such as FIR/UIR sectors. Additionally, issues such as controller licensing, workload redistribution, and procedures to minimize overflight disruption must be addressed.

Although ATS delegation is feasible, it is a complex option that requires resolving multiple technical, operational, and regulatory issues.

Some observations:

- Greater emphasis should be placed on testing contingency provisions in the LoA to ensure that they can be implemented when necessary.
- All aircraft should be notified, as previous incidents have shown that in contingency situations, due to stress and high workloads, all traffic may not be informed of the situation.
- Detailed discussions are needed to confirm any changes in routes and loads, for example, a simplified route structure and reduced levels of traffic.

Hybrid Models

It is possible to identify mixed approaches to contingency. In practice, hybrid strategies are the most common among ANSPs.

Document contingency management actions (protocols)

Contingency measures should be documented in a clear and structured way to facilitate quick understanding and ensure effective execution. It is important to start each measure with a brief description of the specific scenario it is intended for and the main objective of the action, such as “maintain safety and service continuity.”

Steps should be detailed in chronological order, using imperative verbs to give clear and direct instructions, like “Inform neighboring ANSPs” or “Activate the backup system.” Each action should include the roles and responsibilities of those who must carry it out, identifying the people or units involved. Additionally, methods for communication and coordination with internal and external parties should be detailed, including alternative means in case the main systems are inactive.

To ensure the proper implementation of the measure, it is useful to include the necessary resources, such as backup equipment or alternative locations. Finally, each measure should specify the completion criteria, i.e., indicators that demonstrate the contingency has been successfully managed and normal operation can be restored.

For a better description of contingency measures in an air traffic service plan, it is useful to incorporate a matrix that organizes and clarifies the key elements of each measure. A contingency matrix allows for a structured presentation of scenarios, actions, responsibilities, resources, and completion criteria, facilitating quick reference and ensuring each aspect is effectively covered.

Contingency Matrix Structure

Each row in the array represents a specific contingency scenario, and the columns can be arranged as follows:

Contingency Scenario	Objective	Actions	Responsible	Resources Needed	Completion Criteria
Failure of terrestrial communications	Ensure continuity of communications service	1. Activate backup communication. 2. Notify ANSP neighbors	Head of Communications, Controllers	Backup Communication Devices	Surveillance system restored and tested
Volcanic activity in nearby airspace	Divert traffic and minimize risk to aircraft	1. Issue temporary closure NOTAMs. 2. Divert traffic to safe routes	Operations Manager, Controllers	Resources for NOTAM issuance, diversion routes	Aircraft away from the affected area and safe resumption of traffic

Elements Explained

1. **Contingency Scenario:** Describes the type of contingency (e.g., communications failure, volcanic activity, surveillance failure) in a concise manner, to facilitate quick identification of the situation.
2. **Objective:** Briefly explain the purpose of the measure in relation to the contingency, such as "maintaining the safety of air traffic".
3. **Actions:** List in sequential order the specific actions to follow to manage the scenario. Each step should be in a concise format, using imperative verbs, and should follow a logical sequence that makes it easy to apply.
4. **Responsible:** Identify who is responsible for each action, using specific positions or units, which ensures clarity in the functions of each team member.
5. **Necessary Resources:** List the equipment, backup systems, or any other resources that are essential to implement the actions effectively. This allows staff to prepare in advance for contingencies.
6. **Completion Criteria:** Defines the specific indicators that indicate that the contingency has been successfully managed and can return to normal operation. This may include testing systems, restoring services, or confirming airspace safety.

Benefits of the Matrix

The use of a matrix in the contingency plan allows for quick access to information, minimizing search time during a critical situation and helping teams act with accuracy and coordination. Additionally, the matrix facilitates staff training, as it provides a clear visual guide that covers every aspect of the contingency in one place.

Bilateral Contingency Agreements between Units

In the field of air navigation, contingency agreements are essential instruments that facilitate the continuity and safety of air traffic services during emergency situations. These agreements define specific procedures and responsibilities between different air control entities, such as national civil aviation services and regional air navigation organizations. Their purpose is to coordinate actions in cases of technical failures, operational limitations, or unforeseen circumstances, allowing operations to continue safely even when normal operating conditions are disrupted.

Creating contingency agreements not only establishes a clear framework for cooperation and communication among the parties involved but also helps anticipate the risks associated with air traffic control system inactivity, especially in situations where traffic flow cannot be interrupted. Through these agreements, entities can allocate resources and roles effectively, allowing one organization to temporarily manage another’s airspace without compromising sovereignty or operational safety.

Considerations for the establishment of contingency agreements

Here are some considerations for the establishment of these agreements:

Definition of the Object of the Agreement

The first step in drafting a bilateral agreement is to clearly define its purpose. This should specify the primary reasons for the agreement, such as the provision and/or delegation of ATS, technical cooperation, other air navigation services, or measures to manage air traffic contingencies. Establishing a precise objective helps both parties understand the scope of the agreement and aligns expectations and goals.

General Principles

It is essential to detail the specific responsibilities of each party, allowing both to clearly understand their obligations and rights. This may include service delegation, equipment maintenance, or traffic flow coordination. This is especially important in contingency agreements, where each organization's roles must be clearly defined to address technical failures or emergencies. This ensures that both parties can respond effectively and promptly to any eventuality that arises.

Specific Responsibilities

It is essential to detail the specific responsibilities of each party, allowing both to clearly understand their obligations and rights. This may include service delegation, equipment maintenance, or traffic flow coordination. This is especially important in contingency agreements, where the roles of each organization must be clearly defined to address technical failures or emergencies. This ensures that both parties can respond effectively and promptly to any eventuality that arises.

Appointment of Coordinators

Appointing specific coordinators from each organization is crucial for the effective implementation of the agreement. These coordinators will serve as primary points of contact, facilitating communication and ensuring smooth management of activities. In contingency situations, these coordinators will be responsible for acting swiftly and efficiently to maintain service continuity. Assigning these roles enables structured coordination and promotes agile and effective collaboration between the parties.

Conditions for Assistance

It is important for the agreement to include the specific conditions of any assistance to be provided, such as costs, necessary resources, and expectations regarding time and quality standards. Defining these aspects ensures that each party understands its responsibilities and can meet the expected quality standards. Additionally, specifying the resources each party will contribute enables proper planning for their use and ensures a structured approach in providing technical assistance.

Applicable Law

It is essential to define the legal framework under which the agreement will be governed. In the case of international agreements, it is common for international law to apply and for specific treaties to which both parties are subject to be respected. This provides a clear legal basis for implementing the agreement and ensures that the actions of both parties

remain within a recognized legal framework. Additionally, it allows for the anticipation and resolution of any jurisdictional conflicts that may arise during the execution of the agreement.

Contingency Procedures

Contingency procedures are an critical part of bilateral agreements, especially in the aeronautical field. These procedures set out the steps to be taken in the event of emergencies or service interruptions, ensuring that both parties can continue to operate safely and effectively. This type of planning ensures that both organizations are prepared to respond quickly to unforeseen situations.

Modifications and Confidentiality

To ensure the flexibility of the agreement, it is recommended to include clauses that allow for modifications. These clauses should detail the process for agreeing on and implementing changes, as well as the individuals or bodies responsible for approving them. Additionally, confidentiality of information is crucial, as it ensures that shared data and information are not disclosed without authorization, thereby protecting the integrity of both parties and any sensitive information exchanged.

Term and Termination

Specifying the duration of the agreement, as well as the conditions for its renewal or termination, provides clarity as to the continuity of the relationship. Including a notice process for termination of the agreement allows both parties to make operational adjustments well in advance. This ensures that the terms of collaboration are clearly set out from the outset and that both parties can plan appropriately for the future.

Signatures and Validation

The agreement is signed by legally authorized representatives of both parties, which gives it validity and legal force. It is also helpful to define the specific steps for the agreement to come into effect, such as validation of the terms and formal ratification. This ensures that the agreement not only has a solid legal foundation but is also supported by a rigorous approval process, enabling an orderly and effective implementation.

ATS Contingency Addendum to a Letter of Operational Agreement

An additional option for documenting these agreements is by creating an addendum to an existing ATS letter of agreement between the units involved. This addendum formalizes specific contingency procedures and conditions and can be adapted to address specific situations or extensions of the original agreements. By adding a detailed structure on how operations will be managed in case of an emergency, the addendum complements existing letters of agreement and ensures that all parties understand their roles and responsibilities in the safe and coordinated management of airspace under contingency conditions.

See Annex 1 of this document: Guidance for Preparing an ATS Contingency Addendum to a Letter of Operational Agreement.

Publication, Training and Socialization of Contingency Agreements

For contingency agreements to be effective, it is essential that they are properly published and communicated to all stakeholders. The formal publication of these agreements and their addenda allows air traffic control authorities, as well as other aviation organizations, to be aware of the procedures and understand the specific conditions for emergency management. Additionally, it is recommended that these agreements be accessible on official platforms or repositories, making them readily available for consultation at any time.

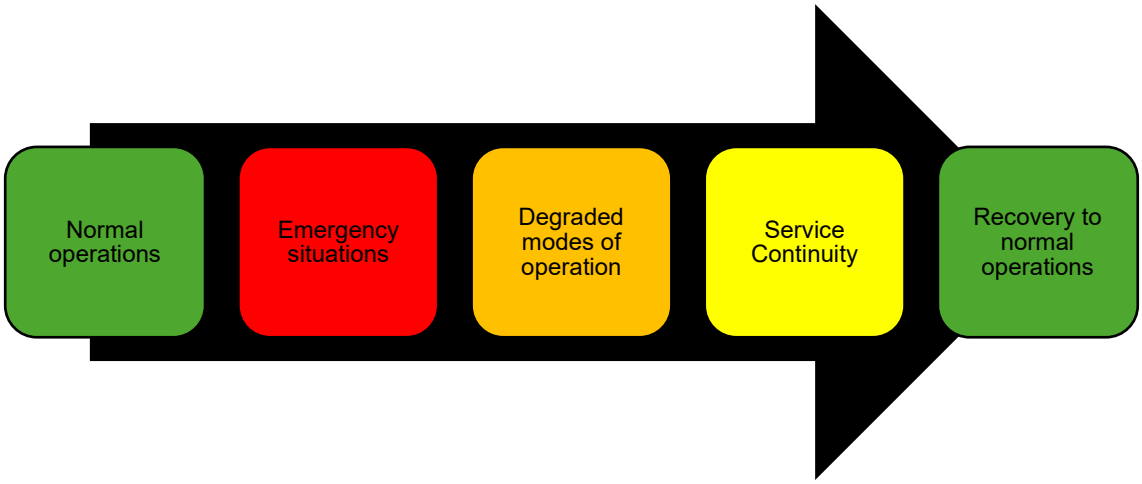
Training of personnel involved in implementing these agreements is another key aspect. Air traffic controllers, technicians, and operational managers should receive regular training on the protocols and procedures stipulated in the contingency agreements. This ensures that all team members understand their roles and can respond swiftly and in coordination during any emergency. Training should include simulations and practical exercises to prepare teams for handling complex scenarios and ensure adherence to established protocols.

Communicating these agreements among units and with other stakeholders, such as adjacent units and international aviation organizations, is essential to promote coordination and mutual understanding of roles and responsibilities. This communication can be achieved through coordination meetings, workshops, or forums where the agreements are reviewed and discussed. Keeping all involved entities informed and ensuring they understand the contingency procedures is necessary for an efficient and safe response in emergency situations.

Acting during a Contingency

Life cycle of a Contingency

The Life Cycle of a Contingency may consist of five phases, below is a description of each phase:



- **Normal Operations**: Represents the base state and is not classified as a contingency mode but is included to provide context and continuity in the cycle.

- **Emergency Situations**: These are situations that arise from unexpected or sudden catastrophic events, which can create potentially unsafe conditions and/or partial or total interruption of ANS. These situations require an immediate response to mitigate the adverse impact and, when possible, initiate recovery actions.

- **Degraded Modes of Operation:** When the system cannot operate at full capacity, it enters a degraded mode that maintains certain services, though with limited capabilities. This reduced level of service may be triggered by situations such as equipment interruption or malfunction, staff shortages, or procedures that become inadequate due to the collateral effect of one or more deficient internal or external elements.

- **Continuity of Service:** Service Continuity is the availability of suitable arrangements that enable the rapid activation of alternative air navigation services with an agreed service quality when a prolonged disruption in normal provision is anticipated. It is also characterized by the ability to contain the impact and duration of the disruption on critical ANS services and by the ability to restore, with due priority, a defined level of service.

  In this mode, the organization implements backup measures to ensure the continuity of essential services while working to restore normal operations.

- **Recovery to Normal Operations:** Last phase before returning to normal, focused on the complete restoration of all services and capabilities.

This cycle should not necessarily be interpreted as a rigid sequence of operational modes. Depending on the cause or type of disruption, the operational modes may not follow a linear order.

For example, a system—whether technological, personnel, or procedural—that operates in "Normal" mode may move directly to an "Emergency" situation without transitioning through an intermediate state. This abrupt shift occurs when the situation demands an immediate response.

In other cases, a system may first deteriorate to a "Degraded Mode of Operation" and later progress to an "Emergency" situation if conditions continue to worsen or the situation remains uncontrolled.

Additionally, an "Emergency" situation may, in turn, be followed by a "Service Continuity" mode, in which measures are implemented to stabilize and maintain critical services while working toward full recovery.

Finally, in certain circumstances, it may be necessary to move directly from "Normal" operation mode to "Service Continuity" mode when a prolonged disruption is anticipated, requiring the activation of alternative services without escalating to a full emergency situation.

This flexible approach allows the response to adapt to the nature and severity of each situation.

Roles and Responsibilities

An ANSP should clearly define and document the roles and responsibilities of key personnel in contingency situations, establishing a multidisciplinary team that coordinates and executes all activities necessary for timely decision-making. This team will be referred to as a "contingency committee" in this guide, although it may be called by different names in different organizations.

Contingency Committee

- **Leadership**: The committee should be led by the executive responsible for the ANSP, who will have the authority to make decisions on behalf of the organization, manage financial and human resources, and ensure the implementation of operational safety measures. He/she is also responsible for incident and accident response.
- **Composition**: The committee must have one or more authorized representatives from the operational, technical, administrative, and communications (PoC) areas, designated by the committee leader, who will assume their responsibilities from the activation of the contingency plan to its deactivation.

Committee Leader Responsibilities

The committee leader will be responsible for:

1. Activating, direct and deactivate the ATS Contingency Plan.
2. Assess the contingency situation and plan the appropriate course of action.
3. Analyze and approve the operational, technical, and administrative contingency measures that will be applied before, during, and after the contingency.
4. Create specialized contingency teams in specific areas.
5. Guarantee safety conditions for the members of the contingency teams.
6. Supervise the work of the contingency team and the Contingency Coordination and Information Center.
7. Coordinate the institutional aspects related to the contingency.

Responsibilities by Area

In contingency situations, each key area assumes specific functions to ensure the continuity and safety of the air navigation service. The following are the main responsibilities of committee members according to their area of work.

Head of the Operational Area

1. Execute immediate actions during a contingency.
2. Analyze the situation and recommend operational strategies to maintain continuity of service, which could include temporary degradation of service.
3. Ensure that approved operational strategies are executed, including the necessary logistics.
4. Supervise operational personnel during the execution of activities.
5. Guarantee adequate safety conditions for operational personnel throughout the contingency.
6. Inform the leader and the committee about the execution of the agreed operational activities.
7. Assess the situation and recommend cancellation when appropriate.

Head of the Technical Area

1. Analyze the contingency situation and recommend technical actions necessary to ensure the continuity of the service, even if it may imply a temporary reduction of the service.
2. In the event of systems failure, allocate resources (financial, personnel and equipment) and manage logistics to restore communications, surveillance and/or aeronautical navigation services.
3. Supervise the technical staff in charge of technical activities.

4. Guarantee adequate safety conditions for technical personnel throughout the contingency.
5. Reporting to the leader and committee on progress in the implementation of technical activities.

Responsible for Administrative Activities

1. Make budget estimates to implement the recommended operational and technical actions.
2. Facilitate and expedite the financial resources necessary to execute the approved actions.
3. Support the logistics required to execute operational and technical actions.
4. Document all coordination actions carried out by the committee during the contingency.

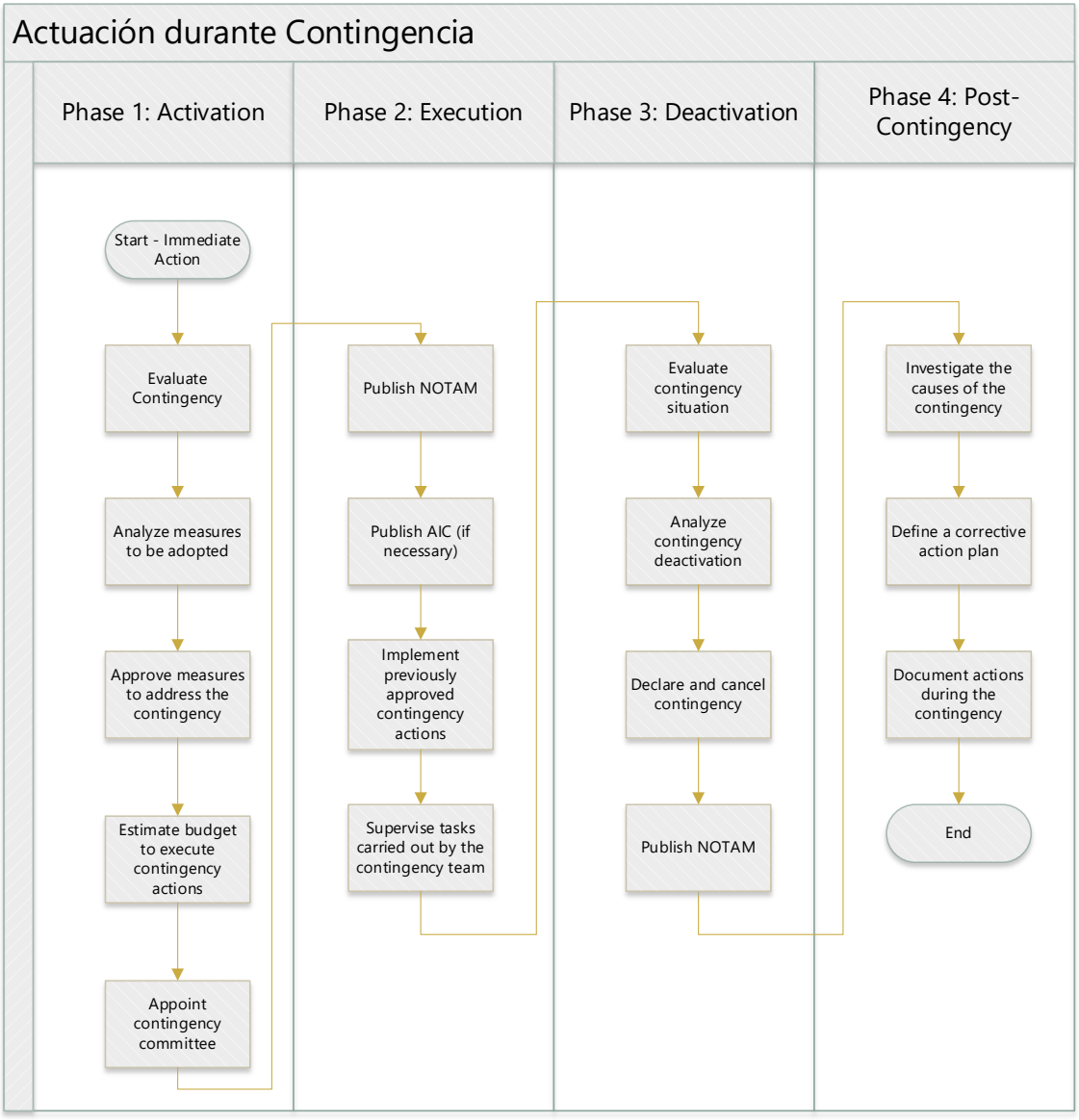
Communications Manager

1. Coordinate with the adjacent ATS units the contingency measures adopted.
2. Maintain continuous communication with users, aeronautical authorities, ATS, AIS and collateral SAR units, FAA, international organizations (ICAO, IATA, IFALPA, etc.), and state military forces for the duration of the contingency.
3. Exchange updated information with adjacent States on the contingency situation.
4. Coordinate the issuance of the corresponding NOTAMs, at least 12 hours in advance if the situation is foreseeable.
5. Inform international organizations and ATS units about the contingency situation and its evolution as soon as possible.

Note: *On some occasions, the person in charge of the operational area assumes the communication activities.*

Phases of a Contingency

The action of an ANSP can be divided into different phases. Below is a flowchart illustrating the phases and some of the activities that need to be carried out:



Phases should not be considered as a strict sequence of actions. Depending on the cause, type, or duration of the contingency, some phases or activities may not be applicable or may not follow a linear order. In addition, the activities of each phase must be adjusted to the particularities of each ANSP and/or State.

ANNEXES

ANNEX 1- Guidance for Preparing an ATS Contingency Addendum to a Letter of Operational Agreement

1) Aim and Purpose of the Addendum

- Description of Purpose: Defines the objective of the addendum, which may be the establishment of temporary procedures for the coordination of air traffic in contingency situations (technical or operational failures, fortuitous cases or force majeure).
- Scope of the Addendum: Clarifies the scope of the Addendum, specifying that it complements a previous operational letter of agreement, and defines the relationship between the two documents.

Example:

"The purpose of this letter of agreement is to establish Temporary Procedures between the authorities of [Name of civil aviation entity] and [Name of air navigation services organization] to coordinate transit in emergency situations."

2) Validity of the Addendum

- Specifies the effective date and the procedure for renewal or cancellation. It indicates whether the signature of both parties is required for validation and whether a notification is required for cancellation.

3) Administrative Agreements

- Designation of managers: Both entities designate those responsible for air navigation services to coordinate the implementation of the addendum.
- Formal Authorization: Describes the authorization granted to the personnel of the other entity to provide services in a delegated airspace.
- Publication of Notifications: Includes the requirements to issue NOTAMs or circulars that communicate details such as:
    - Contingency Point of Contact
    - Minimum services
    - Airspace and delegated services
    - Service Hours and Contingency Routes
    - Air traffic management measures (ATFM)

Example:

"The Civil Aviation Department of [Country] shall formally and legally authorize ATS personnel of [Organization] to provide air traffic services in the delegated space."

4) Responsibilities of Each Party in the Contingency

- Local Entity (e.g., Airport Control Tower): Lists responsibilities in traffic management, transmission of flight plans, and coordination of outbound traffic.
- Delegated entity (e.g., PPP, ACC): Describes the delegated entity's responsibilities for the coordination of incoming and outgoing traffic, and authorizations to enter the an specific airspace.

Example:

"[ANSP] Approach shall ensure that all transits bound for [airspace] are properly cleared to enter the upper airspace and shall be responsible for transmitting flight plans."

5) Operating Procedures in Contingencies

- Separation and Spacing: Establishes the separation between aircraft during the contingency, based on previous coordination and the availability of communication systems.
- Zero ATC Contingency: Defines the transfer points and procedures to be followed in the event of total inoperability (Zero ATC) of one of the entities, including the contacts and action steps established in previous operational letters of agreement.

6) Support Appendices

- Appendix A: Points of Contact: Include a list of key contacts to ensure prompt and effective communication between entities in the event of an emergency. The list should include the names, telephone numbers and emails of those responsible.
- Appendix B: Contingency Routes: Defines the alternative routes and flight procedures to be followed in the event of a contingency to ensure the continuity and safety of air traffic.

7) Signatures and Validation

- It includes a section for the signature of the directors or managers of both entities, which formalizes the agreement and the commitment to comply with the provisions contained in the addendum.

Example of Signatures:

"Signed on [date], by [Name and title of representative of organization] of [Organization A] and [Name and title of representative of organization] of [Organization B]."

Additional Tips:

- Clarity and Accuracy: Avoid ambiguities in wording so that every procedure and responsibility is clear and understandable.
- Supporting Documentation: Include references to specific procedures or contingency manuals on which the established actions are based.
- Continuous Update: The addendum should be reviewed periodically to update contacts and procedures based on changes in infrastructure and regulations.