ICAO CAPACITY & EFFICIENCY

Module 4
Project for Formulation and Management of the Volume III of the Regional Air Navigation Plan – CAR/SAM ANP

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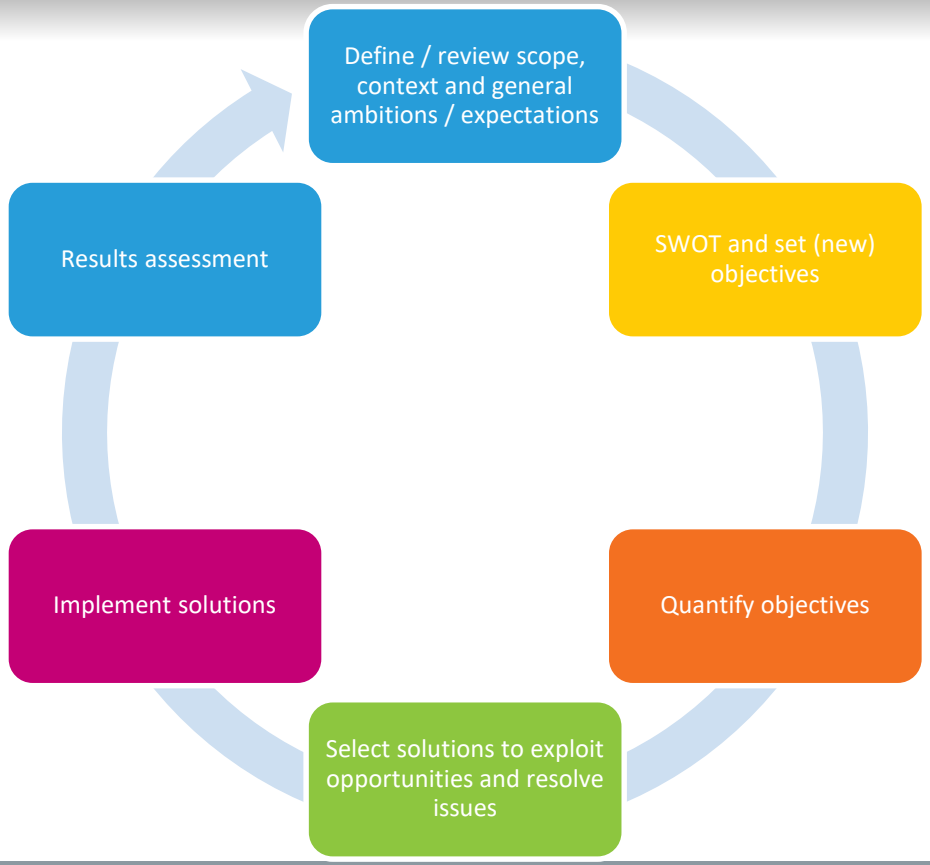
Objetives

Following the six steps of the performance based approach:

- Define/examine scope, context and general ambitions/expectations;
- Perform SWOT analysis and set (new) objectives;
- Set targets, quantify objectives; and
- Identify solutions

To be incorporated in the CAR/SAM ANP Volume III.


Define / review scope, context and general ambitions / expectations
SWOT and set (new) objectives
Quantify objectives
Select solutions to exploit opportunities and resolve issues
Implement solutions
Results assessment

Performance Based Approach: Step by Step

- Step 1: Define/review scope, context and general ambitions/expectations
  - Step 1.1: Define scope
  - Step 1.2: Define context
  - Step 1.3: Identify ambitions and expectation

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Example – Step 1.1

Organization X is the air navigation service provider (ANSP) in flight information region (FIR) YYYY. The organization will be establishing a capacity management process as part of an ongoing performance-based approach. The initial scope is defined as follows:

• Time period: traffic forecasting and issue analysis will be done for a 15-year time horizon. The planning period (selection of solutions) will be initially limited to a 5-year horizon (to support development of the business plan).

• Key performance areas: the main focus of the planning process will be on ATM capacity.

• Geographically: the planning process will plan and implement ATM capacity in FIR YYYY, but only en-route airspace is considered. Terminal control area (TMA) capacity and airport capacity are initially not included. Airport expansion planning (e.g. construction of new airports, runways, terminals) does not fall within the scope.

• Traffic: the scope includes domestic, international and overflying traffic. However, the scope of the planning process is limited to instrument flight rules (IFR) traffic. Capacity management for visual flight rules (VFR) traffic is initially not included.

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Example – Step 1.2

- The capacity planning process for FIR YYYY fits within the regional planning process (ICAO region ZZZ), which looks after the network effect. Organization X is responsible for avoiding that FIR YYYY becomes the capacity bottleneck in region ZZZ. Regional planning is also responsible for managing the VHF frequency allocation plan.
- The geographical context includes neighbouring airspace, as well as the TMAs and airports within FIR YYYY (because they were excluded from the scope).
- The main external driver for capacity planning is the expected traffic growth. The magnitude of growth and the expected changes in traffic patterns are documented in a medium- and long-term traffic forecast. Physical airport capacity is a potential external constraint..

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Example – Step 1.3

- The general expectation of the ATM community with regard to capacity is that the air navigation system in FIR YYYY will meet airspace user demand at peak times and locations by minimizing restrictions on traffic flow.
- To respond to future growth, capacity must increase, along with corresponding increases in efficiency, flexibility, and predictability while ensuring that there are no adverse impacts on safety or the environment.
- The air navigation system must be resilient to service disruption, and the resulting temporary loss of capacity.

Performance Based Approach: Step by Step

- Step 2: Identify opportunities, issues and set (new) objectives
  - Step 2.1: Develop a list of present and future opportunities and issues that require performance management attention
  - Step 2.2: Focus efforts by defining and prioritizing performance objectives as needed

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Example – Step 2.1

La organización X ha llevado a cabo un análisis SWOT en el sistema de navegación aérea en la FIR YYYY. Las conclusiones se han resumido como sigue:

- Puntos fuertes: actualmente no hay escasez de personal.
- Puntos débiles:
  - En la parte septentrional de la FIR:
    - Actualmente no hay cobertura radar. Los servicios ATC se proporcionan en esa zona utilizando control de procedimientos. Actualmente, esto es suficiente para ocuparse de los niveles de tránsito en la zona, pero dentro de algunos años el control de procedimientos y la falta de supervisión se transformarán en los factores de bloqueo.
  - En la parte meridional de la FIR los problemas previstos son:
    - la carga del trabajo de los controladores puede constituir un factor de bloqueo
    - la densidad del tránsito ya es muy elevada, y la escasez de frecuencias puede en última instancia impedir al ANSP dividir sectores para aumentar la capacidad
    - el gran número de aeronaves simultáneamente presentes en el espacio aéreo también conducirá a un deterioro de la performance de vigilancia (se superarán los límites de capacidad del SSR)
    - para dentro de diez años se prevé una ola de jubilaciones de controladores, lo que conduciría a una escasez de personal.
- Oportunidades: la tecnología ADS-B ha madurado y constituye potencialmente una solución rentable al problema de la vigilancia en la parte septentrional de la FIR.
- Amenazas: en los años venideros, podría tener lugar varios sucesos que podrían provocar cambios en las pautas de tráfico en los vuelos intercontinentales. Esto podría conducir a una fuerte caída en el volumen del tránsito de sobrevuelo. Existen riesgos de que esto podría suceder después de haber aumentado la capacidad. Dado que el proveedor de servicios obtiene una parte considerable de los ingresos por derechos de usuario, este riesgo crea un clima desfavorable para las inversiones.

Performance Based Approach: Step by Step

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Ejemplo – Paso 2.2

Según se señaló en el Paso 1.1, el alcance del nuevo proceso de gestión de rendimiento se definió para abarcar la capacidad ATM en ruta para vuelos IFR.

- **Concentración en la gestión de rendimiento:** un área de concentración se define dentro de la KPA capacidad: capacidad ATM en ruta para vuelos IFR.
- **Mejoras específicas:** el crecimiento del tráfico conducirá a un mayor caudal en el espacio aéreo, pero también a un mayor número de aeronaves simultáneamente presentes en el espacio aéreo. Considerando los resultados del análisis SWOT, el proveedor de servicios decide que es necesario establecer dos objetivos de rendimiento separados:
  - Objetivo 1: aumentar el caudal en ruta que puede gestionarse durante los períodos de tiempo de mucho tránsito típicos.
  - Objetivo 2: aumentar el número de aeronaves que pueden ocupar simultáneamente el espacio aéreo en ruta.

Performance Based Approach: Step by Step

- Step 3: Quantify objectives
  - Step 3.1: Define how progress in achieving performance objectives will be measured and which data are required to do so
  - Step 3.2: Define the desired speed of progress in terms of baseline and target performance

Performance Based Approach: Step by Step

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Example – Step 3.1

The service provider has chosen to use the following indicators:

- To measure objective 1:
  - Throughput demand as a number of IFR movements per hour. Defined as the number of IFR flights requiring entry to the airspace volume during a given one hour period.
  - Throughput capacity as a number of IFR movements per hour. Defined as the number of IFR flights which may enter the airspace without causing excessive ATC staff workload, and therefore without impeding safety.
  - Number of sectors. Defined as the number of sectors that are open in an airspace volume (FIR or part thereof) during typical busy hours.
- To measure objective 2:
  - PIAC demand as a peak instantaneous aircraft count (PIAC). Defined as the number of IFR flights simultaneously present in the airspace at a given moment in time.
  - PIAC capacity as a peak instantaneous aircraft count (PIAC). Defined as the number of IFR flights which can be simultaneously present in the airspace volume at a given moment in time, without causing system overload (e.g. surveillance, flight data processing).

Performance Based Approach: Step by Step

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Example – Step 3.2

Baseline: today's performance has been determined to be::

- Northern part of the FIR:
  - Northern part of the FIR:
  - Number of sectors: 5
  - The sectors have a capacity of 15 movements/hour, with a typical busy hour demand of 10 movements/hour
  - PIAC capacity of the sector group is 40 aircraft, with a typical busy hour PIAC demand of 25 aircraft

The traffic growth forecast for the next 15 years is:.

- Northern part of the FIR: traffic density is expected to triple (x3)

Target setting: it is decided to adopt the future typical busy hour demand as the capacity target. This results in the following capacity targets (absolute values: baseline demand multiplied by growth factor):

- Northern part of the FIR:
  - Sector capacity: 10 × 3 = 30 movements/hour
  - PIAC sector group capacity: 25 × 3 = 75 aircraft

The capacity gap (for the "do nothing" scenario) is the difference between the target and the baseline performance

- Northern part of the FIR:
  - Sector capacity gap: 30 – 15 = 15 movements/hour
  - PIAC sector group capacity gap: 75 – 40 = 35 aircraft

In terms of relative values (gap divided by baseline), the required capacity increase is:

- Northern part of the FIR:
  - Sector capacity: 15/15 = 100% increase
  - PIAC capacity: 30/40 = 75% increase

Performance Based Approach: Step by Step

- Step 4: Select solutions to exploit opportunities and resolve issues
  - Step 4.1: Select the decisive factors to reach the target performance
  - Step 4.2: Identify solutions to exploit opportunities and mitigate the effects of the selected drivers and blocking factors
  - Step 4.3: Select a sufficient set of solutions

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Example – Step 4.1

- Analysis of drivers: after collaborative checking of the forecasting assumptions and models, there is a shared belief between the service provider of FIR YYYY, the neighbouring ANSPs and the regional planners that traffic will indeed grow as forecasted.
- At present, in both the northern and southern parts of the FIR, there is some spare capacity.
- After analysis of the data, it is decided that::
  - no capacity increases are required for the next five years.
- Then:
  - procedural control will be the dominant blocking factor in the northern part of the FIR.
  - This will have to be addressed as a matter of priority;
  - controller workload may become an issue; and
  - degradation of surveillance performance (SSR capacity limits exceeded) will be the next blocking factor affecting capacity in the southern part of the FIR.
- The following issues are classified as lower priority, because their limiting effect on capacity enhancements lies much further into the future::
  - frequency shortage; and
  - staff shortage due to air traffic controller retirements..
- Assessment of the investment risk associated with a possible drop in the volume of overflying traffic:
  - probability assessment: at present, analyses of future demand, route structures and airspace availability in neighbouring countries seem to indicate that the probability of traffic flow re-routing is rather low for the next ten years; and
  - severity assessment: the effect of a drop in the volume of overflying traffic could be lessened by finding more cost-effective ways of increasing capacity..
- Opportunity analysis: after analysing how other regions have implemented ADS-B, the service provider is confident that ADS-B is a viable alternative to other surveillance technologies.

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Example – Step 4.2

The issues which were identified as having to be mitigated as a matter of priority are:

- capacity limits associated with procedural control in the northern part of the FIR;
- controller workload in the southern part of the FIR; and
- the SSR capacity limits in the southern part of the FIR.

Candidate solutions (in terms of operational improvements and enablers) have been identified by the service provider as:

- moving from procedural control to radar control (required enabler: surveillance coverage);
- sector splitting (horizontal and vertical);
- replacement of SSR technology by a system with higher PIAC capability; and
- choice of surveillance technologies:
  - • SSR;
  - • Mode-S radar; and
  - • ADS-B.

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Example – Step 4.3

Different solutions are chosen for the northern and southern parts of the FIR. This is due to the fact that the targets as well as the baseline system are different. The description below explains the rationale behind the decisions.

Operational improvements selected for the northern part of the FIR:

- Since the target for sector capacity is 30 movements/hour, which is equal to the baseline capacity of the sectors in the southern part of the FIR, sector splitting is not necessary. The number of sectors will remain unchanged, but their capacity will be increased by 100 per cent, and this will be achieved by moving from “procedural” control to “radar” control. The choice of supporting surveillance technology is described in the section “enablers”.

Selection of enablers:

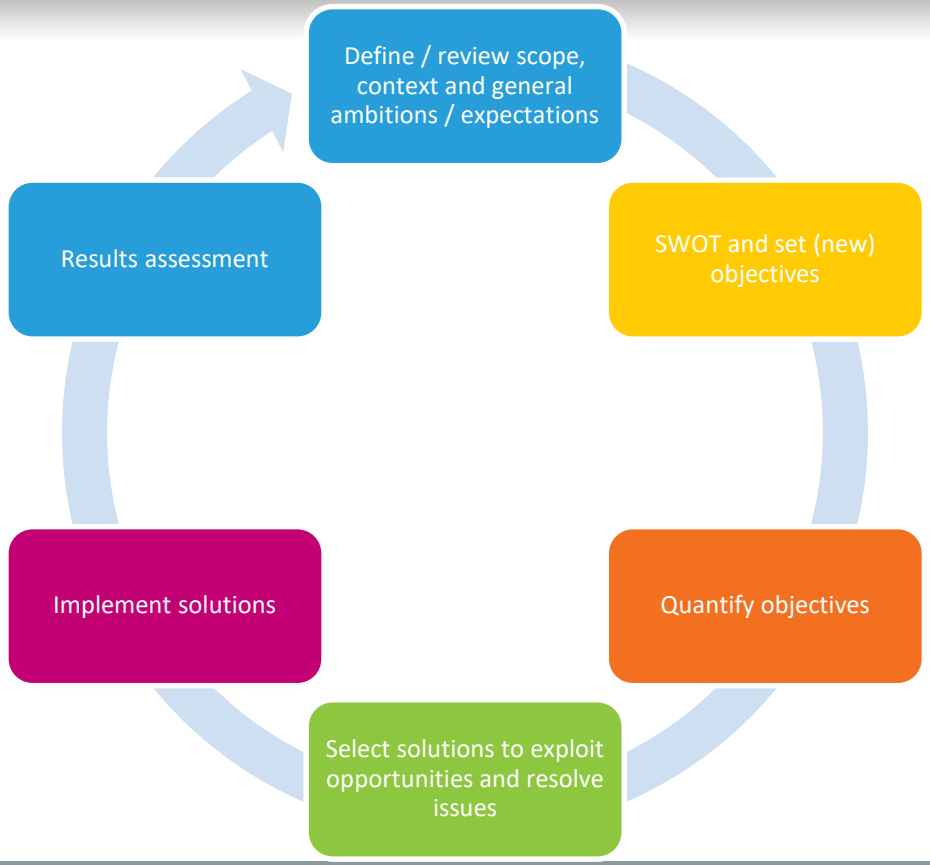
- Sector splitting requires the installation of three more controller workstations. Computer system/software changes are not necessary: the flight data processing and tracking systems have sufficient spare capacity.
- There is no need for recruitment of additional controllers: it is determined that the extra human resource requirement can be accommodated through more efficient rostering.
- Surveillance coverage is required in the northern part of the FIR. Options: SSR, Mode-S radar, and ADS-B.
- Therefore, the shortlist of options for the entire FIR is Mode-S radar and ADS-B. After more detailed evaluation, the service provider decides to select ADS-B. Under the given circumstances, it is a more cost-effective solution with sufficient potential for long-term capacity.

Performance Based Approach: Step by Step

- Step 5: Implement solutions
- Step 5 is the execution phase of the performance management process. This is where the changes and improvements that were decided upon during the previous step are organized into detailed plans, implemented, and begin delivering benefits.
  - Depending on the nature and magnitude of the change, this could mean:
    - — In the case of small-scale changes or day-to-day management:
      - assigning management responsibility for the implementation to an individual;
      - assigning responsibility and accountability for reaching a performance target to an individual or organization;
    - — In the case of major or multi-year changes:
      - refining the road map of selected solutions into a detailed implementation plan, followed by the launching of implementation projects.
      - Ensure that each individual implementation project is operated in accordance with the performance-based approach. This means launching and executing the performance management process at the level of individual projects. Each project derives its scope, context and expectations (see Step 1 of the process) from the overall implementation plan..

Performance Based Approach: Step by Step

- Step 6: Assess achievement of objectives
  - For the purpose of organizing performance monitoring and review, the task can be broken down into five separate activities:
    1. data collection;
    2. data publication;
    3. data analysis;
    4. formulation of conclusions; and
    5. formulation of recommendations..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Questions?

Answers


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