Air Traffic Management

A Strategic Plan for Australia

VOLUME 1: Optimising Safety, Efficiency, Capacity and the Environment

ASTRA

2003

Australian ATM Strategic Plan

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Endorsement

This Australian Air Traffic Management (ATM) Strategic Plan (the Plan) introduces strategies to achieve a long term (15 years plus) ATM desirable future, referred to as the 'ATM Target Operational ConceptATM Target Operational Concept'. The Plan is the highest level of ATM strategic guidance for use in developing implementation initiatives/project proposals and prioritising ATM resource allocation.

Endorsement of the Plan infers agreement to the vision, mission, goals, key ATM strategies and commitment to participate in the cooperative planning process. Endorsement of the Plan does not infer commitment to the ATM initiatives listed in Chapter 3, or agreement to proceed to implement specific projects.

Given the dynamic nature of the air traffic environment, the Plan will be regularly updated to reflect the changing situation and to include the contributions of additional stakeholders.

The stakeholders whose Logo's appear below have endorsed the Plan

AIRSERVICES AUSTRALIA

Australian Defence Force

AUSTRALIAN AIRPORTS ASSOCIATION
THE ONE VOICE FOR ALL AUSTRALIAN AIRPORTS

CIVIL AVIATION SAFETY AUTHORITY AUSTRALIA

Australian Region of the Guild of Air Pilots and Air Navigators

DOTARS
AUSTRALIA
DEPARTMENT OF TRANSPORT AND REGIONAL SERVICES

RAPAC

The stakeholders whose logo appears below are new participants in the Australian ATM Strategic Planning Process.

Australian Search and Rescue

Executive Summary

The Australian Air Traffic Management (ATM) Strategic Plan reflects the results of a continued collaborative effort by Australian ATM stakeholders, driven by an appreciation of the many interdependencies within the ATM system. Collaboration in the establishment of an ATM strategic management framework has already realised benefits including knowledge dissemination, effective working relationships and a shared ATM vision.

The ATM strategic management framework consists of a strategic planning process and cooperative organisational structures to apply the process. The framework is in line with the global trend of establishing strategic alliances, where two or more organisations recognise the mutual benefit of acting cooperatively to achieve a shared vision.

The Plan highlights Australia's commitment to the implementation of the International Civil Aviation Organization's (ICAO's) global plan for future Air Traffic Management. The ATM strategic management framework will ensure Australia remains at the forefront in exploiting the substantial benefits of Communication Navigation Surveillance/Air Traffic Management (CNS/ATM) and the associated new technologies, consistent with ICAO concepts.

The Plan identifies strategies to achieve a long term (15 years plus) desirable future, referred to as the ‘ATM Target Operational Concept’. Endorsement of the Plan infers agreement to the vision, mission, goals, key ATM strategies and commitment to participate in the cooperative planning process within the framework. Endorsement of the Plan does not imply commitment to the ATM initiatives listed in Chapter 3, or agreement to proceed to implement specific projects.

The development of the Australian ATM Strategic Plan is an evolutionary process. The Plan will be regularly reviewed and updated to ensure it remains relevant to the national ATM strategic planning vision, mission and goals as well as to individual stakeholder's strategic planning objectives. This Edition describes the planning process and presents more refined strategies detailed in Volume 2 and 3 of the Plan.

Fundamental to the Plan are six ATM system goals of safety, economy, operational efficiency, environment, national security and national coverage. These goals are critical to the measurement of the performance of the current ATM system and for measuring progress towards achieving the ATM Target Operational Concept.

Seven key strategies are defined to achieve the ATM Target Operational Concept:

- Implement User Preferred Trajectories;
- Develop and implement a new Concept for Conflict Management;
- Implement Flexible Use Airspace;
- Develop National Demand/Capacity Balancing;
- Develop a Decision Support Information Network;
- Develop an ATM Performance Measurement and Reporting System; and
- Develop a Security definition and assurance model.

These strategies provide a focus for ATM stakeholders to proceed cooperatively to the subsequent stages of developing initiatives and to project definition and implementation.

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CHAPTER 1:
Introduction

Vision

Australia will be a World Leader in Air Traffic Management.

Mission

To ensure a safe, economic and efficient Air Traffic Management (ATM) System that accommodates demand, is globally interoperable, environmentally sustainable and satisfies national interests including defence and security.

Acknowledgement

ASTRA acknowledges the valuable contribution made by Stephen Pearce of Airservices Australia, in developing the First Edition of the Australian ATM Strategic Plan.

Stephen was tragically killed in a car accident on 8 September 2001.

Stephen's commitment to the ATM planning process in the role of ATM Strategic Planning Coordinator was outstanding. His expertise and knowledge is greatly missed by the Group.

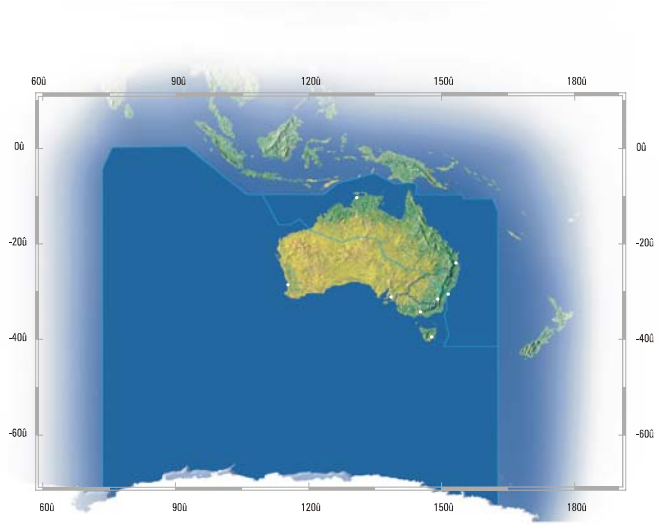
1.1 Introduction

1.1.1 Background

Integrated air traffic management is provided to facilitate the safe, orderly and efficient operation of aircraft within the Australian Flight Information Regions (FIRs), currently comprising approximately 11 percent of the world's airspace.

The International Civil Aviation Organization (ICAO) defines Air Traffic Management (ATM) as:

'*The dynamic, integrated management of air traffic and airspace, safely, economically and efficiently through the provision of facilities and seamless services in collaboration with all parties.'*



1.1.2 The ATM System

Australian ATM is a holistic system that collectively integrates people, information, technology, facilities and services; on the ground, in the air and in space.

The ATM community includes airlines, airports, air traffic service providers, regulators, governments, defence and other stakeholders. The interdependency between stakeholders' interests in the ATM system promotes a collaborative strategic planning approach.

1.1.3 Why have a National ATM Strategy?

A national ATM strategy facilitates a coordinated approach by ATM stakeholders. This benefits aviation safety, environmental compliance, operational and economic efficiency, regional service objectives and national security. Significantly, an ATM strategy will help to align future ATM service delivery priorities with stakeholder's investment commitments.

1.1.4 Australian ATM Strategic Management Framework

An Australian Strategic Management Framework[1] has been established to facilitate ATM stakeholder's cooperation to develop the future ATM system. A major deliverable of the framework is the regular update of the Australian ATM Strategic Plan (the Plan). The success of the strategic management framework is dependent on executive level commitment from all key stakeholders.

The strategic management framework consists of:

- a strategic management process and methodology;
- senior representatives of ATM stakeholder organisations;
- The Australian Strategic Air Traffic Management Group (ASTRA) to provide broad guidance, direction and coordinate resources for ATM strategic management activities; and
- an Australian ATM Strategic Planning Forum.

An effective strategic management framework will ensure there is:

- broad agreement by stakeholders on the major ATM service delivery issues including cost and charges;
- broad agreement on the investment priorities to address ATM capability gaps;
- development of sustainable safety and business cases to support optimum ATM investment decisions;
- simultaneous and integrated planning, development and implementation effort by all relevant ATM stakeholders, under agreed contractual arrangements, if required, to ensure the timely delivery of ATM improvements;
- collaboration and alignment on ATM strategic planning, financing and implementation within each stakeholder organisation; and
- innovative ATM planning and implementation, consistent with Australia's on-going commitment to ICAO.

1. **Detailed in Volume 1, Chapter 2 of the Plan**

1.2 Air Traffic Management Strategic Direction

1.2.1 ATM Target Operational Concept

1.2.1.1 Overview

The ATM Target Operational Concept[2] is fundamental to the Australian ATM Strategic Plan in that it identifies an ideal ATM system for the future. Central to the concept is User Preferred Trajectories (UPTs). UPTs allow users to optimise flight trajectories in three spatial dimensions, plus time, consistent with their business or individual priorities.

The main operational features of the ATM Target Operational Concept are:

- all airspace users are known to the system (i.e. user to user and/or user to ATM service provider);
- the provision of autonomous and third party ATM, mandated by regulation or provided on request;
- the management of flights from inception until arrival at the destination parking position;
- the extension of the principles of uniformity and seamless service by the promotion of a homogenous environment;
- a focus on collaborative decision-making involving aircraft operations management, flight crew and ATM service provider;
- demand/capacity balancing through strategic and tactical management throughout the ATM system;
- dynamic risk management to replace fixed aircraft separation standards;
- the management of UPTs to facilitate user preferences; and
- the evolution of the universal application of air traffic control to intervention by exception.

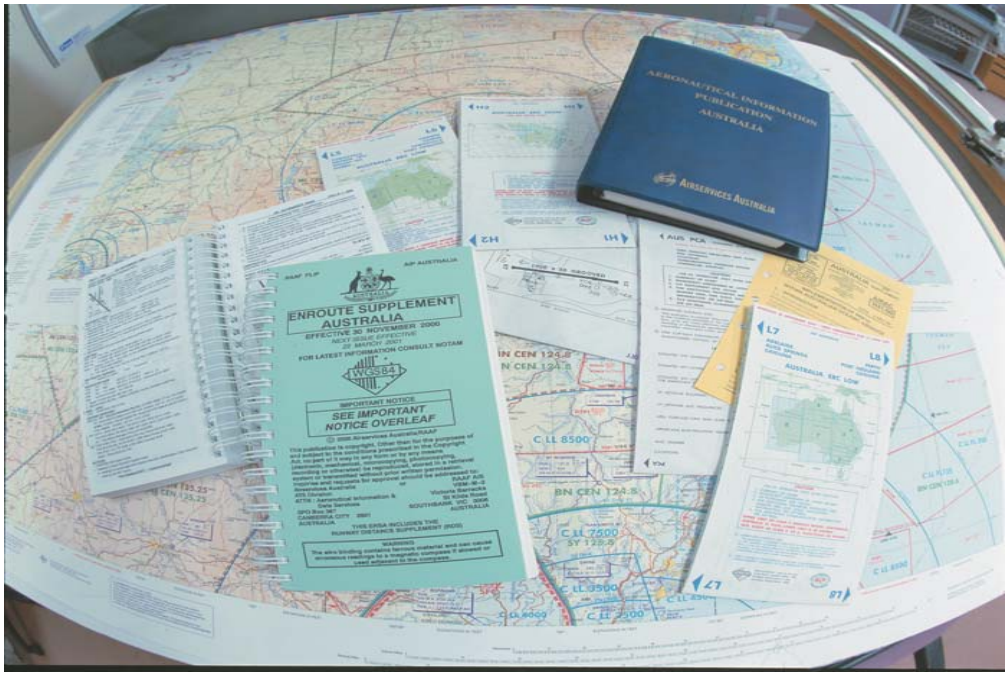
The ATM system will have a capability to dynamically optimise flight trajectories, taking into account traffic complexity, weather, and physical environmental constraints. The capability implies the introduction of significantly higher levels of automation, information integration and dynamic system management than are in use today.

2. **Detailed in Volume 2**

The future services envisaged in the ATM Target Operational Concept are defined in Table 1.1.

Table 1.1: Future ATM Services

Future Service	Description
Conflict Management	Is provided to mitigate the risk of aircraft collision.
Demand/Capacity Balancing	Is provided to maximise the system capacity.
In-flight Emergency Response	Is provided to maximise the safety of aircraft passengers, crews and other members of the public affected by airspace users in emergency situations.
Decision Information Network	Is based on the provision of strategic and tactical operational data.



1.2.2 ATM System Goals

1.2.2.1 Overview

The following system goals are critical to the measurement of the performance of the current ATM system. These goals are also used for measuring progress towards achieving the ATM Target Operational Concept (TOC) and to categorise the key result areas for overall ATM system performance measurement.

- **Safety**

  Safety remains the highest priority in aviation, and ATM plays an important part in ensuring overall aviation safety. Uniform safety standards and risk and safety management practices will be applied systematically to the Australian FIRs and associated ATM network. The key components of such practices are policy, accountability, user and system requirements, procedures and measurement of success.

  Within the total aviation safety system approach, an ATM safety regulatory regime will be established via the Aviation Safety Regulator, the functions of which shall be separated from service provision.

  ATM safety performance indicators will be established, implemented and monitored.

- **Economy**

  ATM activities and services will be economically sustainable for users. The direct and indirect ATM related unit costs, which includes service provision, delays, flight efficiency and equipage costs, should decrease in the future. Economic performance can be quantified; performance indicators will be established, implemented and monitored.

- **Operational Efficiency**

  All airspace users and service providers will have the maximum possible freedom to optimise their operations within the scope of their other system goals.

- **Environment**

  The environmental impact of aircraft noise and gaseous emissions will be taken into account when assessing ongoing ATM effectiveness and when defining operational ATM improvements. The implementation and application of CNS/ATM measures associated with improvements should provide environmental benefits wherever possible. Performance measurement emphasis is on continual improvement as opposed to absolute target levels.

- **National Security**

  The development of the ATM system supports national security requirements and has assumed greater significance following recent world events, particularly those relating to terrorism. The Government's commitment to developing its detection and response capabilities in relation to terrorism, border control, and military threats or incursions, must be accommodated in the design and management of future ATM systems.

  Change management in relation to ATM requires a robust planning and monitoring framework. Within this process, appropriate diligence must be applied and demonstrated to ensure compliance with National Security imperatives as well as the security and integrity of the ATM system itself.

- **National Coverage**

  The future impact of the Australian ATM Strategic Plan will be far reaching. The Plan will influence the nature of services available to air operators from the populated eastern seaboard of Australia to the remote regions in the far north, centre and west. The air traffic service needs of air operators in all areas of Australia will be adequately addressed in strategies, programs and projects developed through the ATM Strategic Planning process.

CHAPTER 2:
ATM Strategic Management Framework

2.1 Introduction

2.1.1 Background

Recognition of the interdependencies in the planning process required to shape the future development of the Australian ATM system encouraged key stakeholders to seek the establishment of a more collaborative ATM planning and project implementation framework. The establishment of an effective strategic management framework that facilitated Australian ATM innovation has a significant influence on the development of future ICAO standards and procedures.

Stakeholders demonstrated their support for the establishment of an Australian ATM strategic management framework by allocating dedicated resources to the task.

The inaugural meeting of ATM stakeholders at Bungendore, NSW, on 2-3 December 1999, established the core group of the framework. Subsequently, ATM stakeholders have worked together to refine the Australian ATM Strategic Management Framework and develop the Australian ATM Strategic Plan. The original planning group has evolved to provide a strategic management role and is now formally known as ASTRA.

2.2 Strategic Management Framework

2.2.1 Purpose

ASTRA facilitates a systematic and collaborative approach by all ATM stakeholders to ATM planning and implementation.

The purpose of the management framework is to ensure the following:

- Simultaneous and integrated ATM planning, development and implementation effort by all relevant ATM stakeholders, under agreed contractual arrangements, if required, to ensure the timely delivery of ATM services and the achievement of ATM system goals.
- Broad agreement on the ATM investment priorities to address ATM capability gaps.
- Broad agreement by stakeholders on the major ATM service delivery issues including cost and charges.
- Sustainable safety and business cases developed to support optimum ATM investment and implementation decisions.
- Trans-business/trans-programme functional collaboration and alignment on ATM strategic planning, financing and implementation within each stakeholder organisation.
- ATM planning and implementation in the Australian FIRs which is innovative and consistent with Australia's on-going commitment to ICAO.

2.2.2 Framework Structure

The ATM strategic management framework comprises the key ATM stakeholders (ASTRA) and Working Groups which facilitate broader communications with other ATM stakeholders. The structure of the framework is shown in Figure 2.1

Figure 2.1 ATM Strategic Management Framework

2.2.3 Stakeholder Senior Executive Level Involvement

Final decisions on projects will be agreed between the senior executives of stakeholders involved. This includes decisions on timely commitment of resources and funding arrangements.

2.2.4 Australian Strategic Air Traffic Management Group (ASTRA)

ASTRA is the core group of the framework as it progresses and coordinates all ATM planning and development. ASTRA consists of planning, analytical, technical, financial and operational specialists provided by ATM stakeholders. ASTRA establishes specialised working groups to advance specific concepts as the strategic plan evolves. Airservices Australia provides the secretariat for ASTRA.

ASTRA is responsible for the following:

- the ATM Target Operational Concept;
- identification of the ATM operational concept changes;
- analysis of the gaps between ATM operational concept changes to determine required ATM services and service levels;
- refinement of key ATM strategies;
- analysis of ATM strategies and the subsequent identification and development of ATM capability options for existing and future ATM services and support functions;
- management of the Australian ATM Strategic Plan, including regular review and update;
- development of proposals for major ATM investment and R&D projects, including project business cases;
- monitoring and reporting on the progress of ATM implementation projects;
- provision of specialist knowledge to ATM stakeholder executives, business centres and project teams;
- initial identification of financial resource requirements for ATM project implementation;
- establishment of an ATM information network; and
- facilitation of the Australian ATM Strategic Planning Forum.

The Australian ATM Strategic Plan and the programme/project priority list will be presented to executives within the relevant ATM stakeholder organisations for endorsement/approval.

ATM stakeholders might wish to discuss commercially sensitive project issues, in which case these discussions will be held between appropriate parties independent of ASTRA.

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2.2.5 Australian ATM Strategic Planning Forum.

The Australian ATM Strategic Planning Forum is an open forum established to facilitate regular communication with all ATM stakeholders and airspace users. The forum will facilitate:

- communication of information on the Plan;
- open discussion on the Plan and implementation issues; and
- feedback from ATM stakeholders not directly involved in the strategic management process.

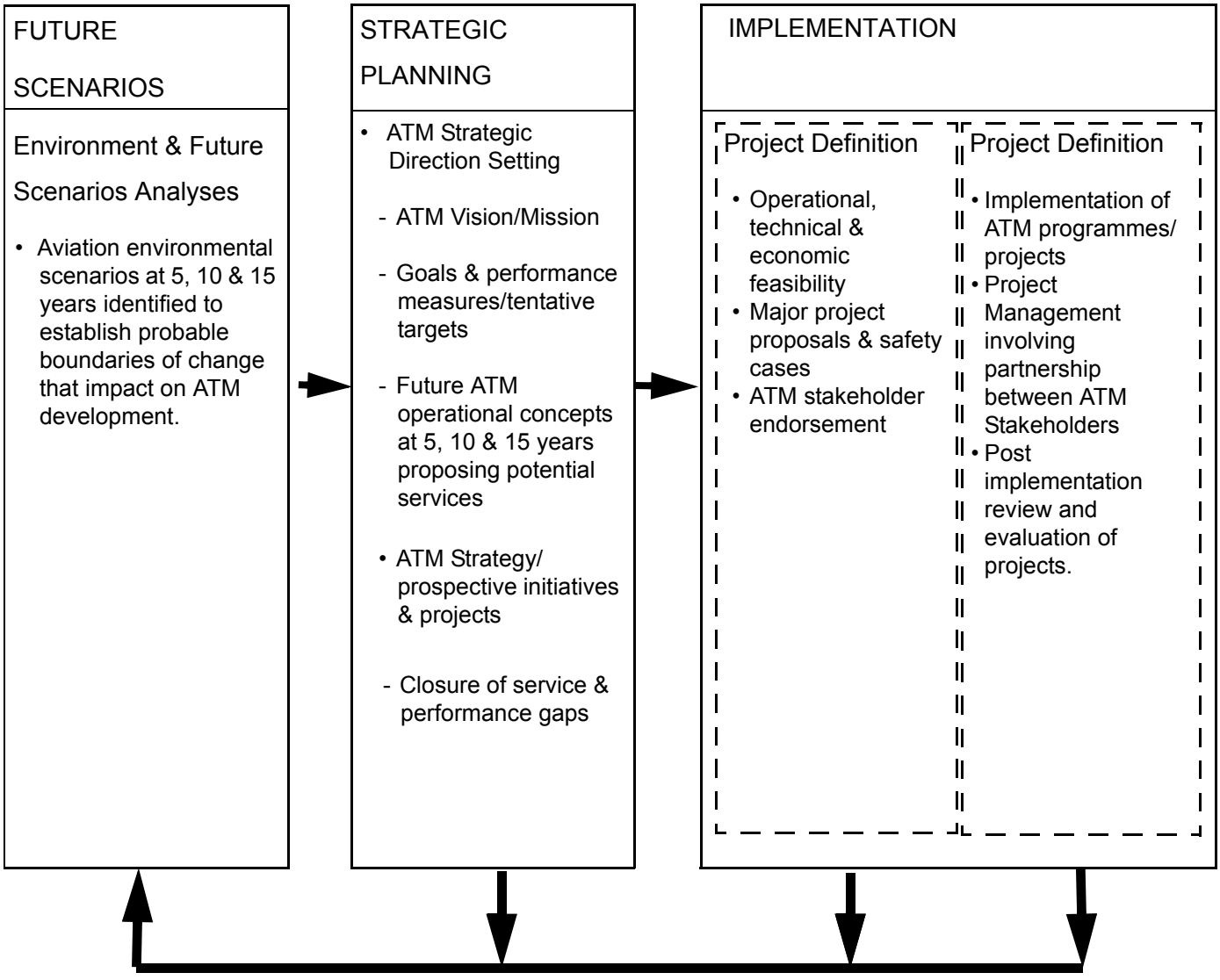
The first planning forum was held in March 2002 and the second in September 2003.

2.3 Strategic Management Process

2.3.1 General

The ATM strategic management process involves strategic thinking, analysis, planning and implementation related to improvements and introduction of new ATM services over the long term. The process aims to achieve optimal outcomes for all of the ATM community.

Figure 2.2: ATM Strategic Management Process



2.3.2 Conceptual Model

A conceptual model for the ATM strategic management process is shown in Figure 2.3. This figure shows how:

- the ATM Target Operational Concept and related future ATM services are derived from a range of future scenarios;
- the ATM services evolve to realise the target concept;
- for each five year period a range of capability options are developed; and
- from the capability options, the priority programmes and projects are identified.

2.3.3 Future Scenarios

The ATM strategic management process starts with understanding and developing aviation industry scenarios over several periods (5, 10 and 15 years) to establish the probable boundaries of change for the ATM operational environment. This work begins with an environmental scan.

2.3.3.1 Environmental Scan

Environmental scanning is the gathering of all information and data for the purpose of strategic planning. This includes gathering and analysing information from internal and external sources including customers' needs and expectations, technology developments, marketplace dynamics, demographics, politics, and social trends.

2.3.3.2 External Environment

The external environmental scan consists of an assessment of the political, social, economic, regulatory and technological environments that will impact on the future of ATM in Australia.

2.3.3.3 Internal Environment

The internal environmental scan consists of all ATM stakeholders looking within their respective organisations to assess their strengths, weaknesses, opportunities and threats (SWOT). It also involves a broader SWOT analysis of the ATM system.

2.3.3.4 Scenario Planning

Scenario planning is an enhancement to the traditional environmental scanning and is employed to foster thinking outside the square and the establishment of stretch goals. With scenario planning, the forecasts of several scans are merged to create a possible future scenario.

2.3.4 Strategic Planning

Strategic planning involves the discernment of '**what**' needs to be done in terms of required services and service levels and '**how**' these services are to be delivered using existing and new capabilities.

ATM strategic planning consists of:

- ATM strategic direction setting, which identifies high level, user-oriented ATM system goals and performance indicators;
- identifies the potential value adding services, and service changes, at different stages over the next 15+ years;
- the development of strategies and prospective initiatives required to deliver these performance outcomes and services improvements/changes;
- preliminary analysis which identifies capability options for each initiative; and
- the determination of prospective priority projects through rough order of magnitude (ROM) analysis.

2.3.5 Implementation

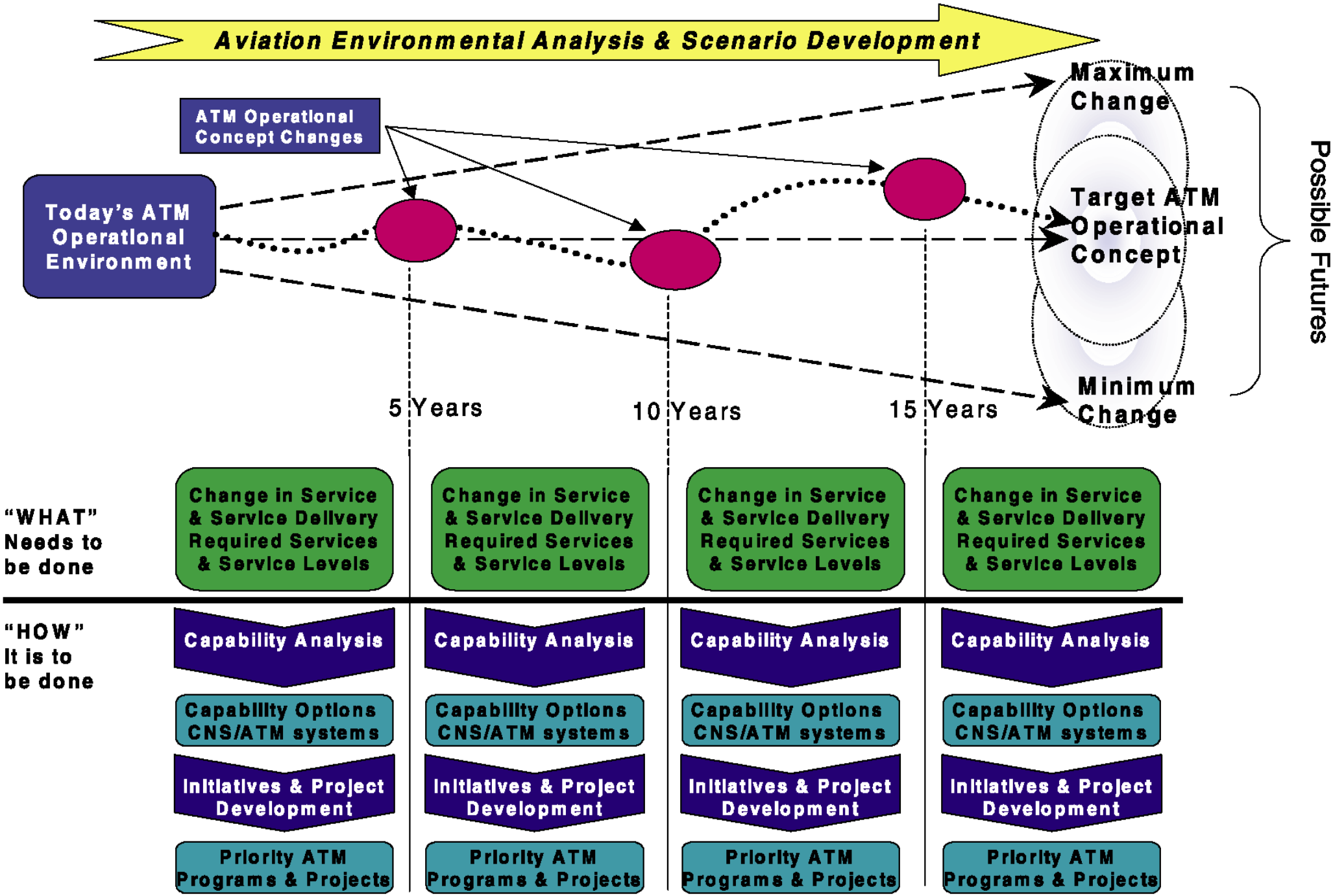
Strategic implementation involves the discernment of what is required to introduce new capabilities and services in a safe and timely manner. Project definition and implementation are two principle components of the process and are defined as follows;

Project Definition - The process which evaluates the operational, technical and economic feasibility of capability options in detail, before project proposals (including safety cases) are presented for ATM stakeholder endorsement. Project definition is the precursor to strategic implementation for projects that have been endorsed.

Project Implementation - The process which involves integrated project management and partnership arrangements between ATM stakeholders involved in the project(s).

Figure 2.3

Figure 3: ATM Strategic Management Conceptual Model



2.4 Programme & Project Implementation

2.4.1 General

If stakeholders are to achieve maximum benefits from ATM strategic planning, the project implementation process must be streamlined and innovative. The implementation process must strike a balance between providing standardised and consistent project policy/planning guidance and allowing project teams flexibility on specific aspects of project implementation.

2.4.2 ATM Programme/Project Prioritisation

Programme/project prioritisation is achieved through a multi-stage rough order of magnitude (ROM) process building on the strategic implementation maps detailed in Volume 2, Chapter 3 of the Plan. The basic stages of the process are as follows:

- An assessment of the strategic impact of the identified initiatives to determine the significant steps toward achieving the associated ATM strategy.
- Stakeholder identification of the initiatives that are deemed to be of primary importance to their business.
- An assessment of the relationship between each initiative and other ATM strategies. This assessment identifies initiatives that contribute to the achievement of more than one ATM strategy.
- An assessment of interdependencies between initiatives based on the identification of common capability options. This assessment serves to rationalise the capability options (CNS/ATM systems) and identifies potential programme/project interrelationships.

2.4.3 Cost Benefit Analysis

A standard cost-benefit analysis methodology, endorsed by all stakeholders, will be used in developing programme/project proposals. A project cost-benefit analysis may be developed for consideration from both a combined stakeholder and individual stakeholder view.

Business case development should be guided by a disciplined cost-benefit analysis process that is available to all stakeholders. The business case should be based on a generic cost-benefit analysis template supported by a 'benefits summary' showing the influence of various factors on achieving benefits expressed in net present value (NPV) terms.

2.4.4 Safety Process

Flight safety is a fundamental and paramount expectation of the ATM system. The management of safety advocated by this Plan reflects world trends in practice, standards and research.

The levels of safety applied to aviation are generally higher than other industries and reflect lower community tolerance and acceptance of error, particularly in relation to single events involving massive loss of life.

To meet the air safety regulator's safety requirements, project development under the ATM strategic management process must ensure, that when proposing changes to the airways system beyond currently approved operational boundaries, safety must be substantiated by following the System Safety Approach (SSA) with its inherent Safety Case (SC).

System Safety Approach

The SSA is defined as "A systematic and explicit approach defining all activities and resources (people, organisations, policies, procedures, time spans, milestones, etc.) devoted to the management of safety. This approach starts before the fact, is documented, planned and explicitly supported by documented organisational policies and procedures endorsed by the highest executive levels. The SSA uses systems theory, systems engineering and management tools to manage risk formally, in an integrated manner across all organisational levels, across all disciplines and all system life cycle phases" (ICAO ATMCP 2003).

The SC is defined as 'both the argument and the document that contend [that] the level of safety attained will satisfy the safety requirements'. It intelligently and coherently argues the degree of safety achieved at any point of a system's life-cycle by making rational and coherent reference to the documented results of the SSA.

It should be noted that SSA is not a Safety Management System (SMS). SSA refers to the multi-organisational-disciplinary life-cycle management of safety based on risk management. On the other hand, SMS is the name usually given to the way an organisation manages safety - it may, or may not, be based on SSA and there is currently no worldwide standard for a SMS.

The SSA is taken for two reasons:

- Firstly, because safety is not a property of individual system components, but rather of the system itself, defined as the combination of people, procedures, technologies (hardware-software) and data, working together to perform a function in a particular environment.
- Secondly, because safety should be built into a system right from the beginning and along all phases of a system's life: operational requirements, design, implementation and operation.

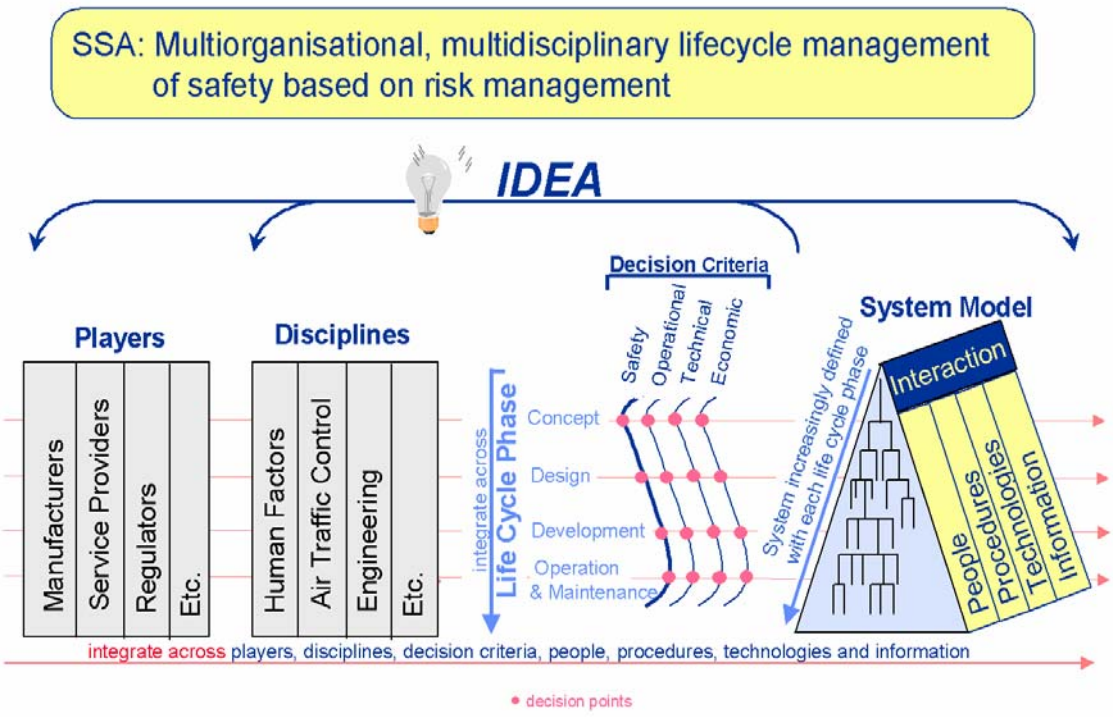
Safety Regulatory Change

Safety regulatory change must be substantiated by following the best regulatory practice and process established by the Commonwealth's Office of Regulation Review and integrated into the air safety regulator's rule making process. The process requires that:

- the problem be carefully defined;
- several regulatory options be compared in light of the advantages and the disadvantages (not only economical) which would be imposed directly or indirectly on all parties;
- the rationale for the proposed action be explicitly stated; and
- all parties be widely and publicly consulted before submitting the proposed change to the Minister and Parliament.

The most effective manner of satisfying the air safety regulator's requirements is by explicitly incorporating them as early as possible in the strategic implementation process. Figure 2.4 shows that the SSA provides for timely and appropriate scrutiny from the beginning and through all phases of a system's life. Furthermore, since the fundamental needs of the regulator do not change, it avoids the pitfalls of proceeding too far into development without appropriate clearance.

Figure 2.4: Safety Risk Management Process



SSA assures that appropriate safety management techniques are used at every decision point and traceability of such decisions

2.4.5 Regulation

The implementation of new ATM systems must be facilitated by the air safety regulator's timely development and promulgation of standards as well as provision of supporting operational and advisory material to users.

The work to be undertaken by the air safety regulator during project implementation may include:

- new regulations,
- new procedures,
- certification,
- advisory material, and
- training.

2.4.5.1 Regulations, Procedures and Advisory Material

Aspects of ATM system development in Australia will require standards and new regulations. It is estimated that the development of a new regulation takes approximately 18 months to complete. These activities involve input from organisations outside the air safety regulator, such as the Attorney General's Department and the Department of Transport and Regional Services (DOTARS). New procedures and advisory material (if required) will be developed in conjunction with the regulations.

2.4.6 Certification

Certification refers to approval by a regulator of a new type of ground or airborne system. Certification occurs at the request of a manufacturer or service provider and is conducted on a case by case basis. These are two separate processes, which may be conducted in parallel. If certification of both a ground and an airborne system is required and implementation is to be as smooth as possible, the two processes will be developed and coordinated to ensure that both end-products are compatible.

The most efficient means of achieving aircraft certification in Australia for those systems which are designed by any of the air safety regulator recognised nations, would be to wait for the certification by those nations. Once this is achieved the systems may be utilised in Australia without the air safety regulator's input. This applies for both modifications and new aircraft. The timing depends upon the nations responsible for the systems. As one of the key nations is the United States of America whose Federal Aviation Administration (FAA) has an abundance of resources and experience, it is unlikely that Australia's air safety regulator has the ability to facilitate implementation of the systems before the FAA.

If, on the other hand, the air safety regulator is requested to certify a new system (ground or

airborne), which has not been previously certified overseas, the situation becomes more complex. It is difficult to estimate the time required by the air safety regulator to provide the certification, however it is reasonable to say that the air safety regulator's role in implementation may well be a limiting factor.

2.4.7 Programme/Project Consideration & Endorsement

In addition to an agreed set of key ATM strategies, the endorsed Australian ATM Strategic Plan (the Plan) provides an initial set of potential ATM initiatives for further analysis. The ATM initiatives will be used by ASTRA to develop an ATM strategic implementation proposal (i.e. as part of a 5 year ATM rolling programme) for consideration by executives of all key stakeholders. The proposal will contain a list of potential programmes/projects, in priority order, supported by summary information (aim, scope, strategic importance, schedule) for each programme/ project.

Stakeholder responses to the draft ATM programme/project proposal will be used by ASTRA to refine the ATM priority list and to obtain resources for agreed programme/project proposals.

ASTRA will coordinate the development of agreed project proposals for relevant stakeholder consideration. Project proposals should include:

- aim, scope, business case, risk management, legal, deliverable description and schedule details;
- project management team details noting that the key roles will be played by stakeholders with the major interest in the project outcome;
- a description of the resources required and a breakdown of individual stakeholder resource commitments to the project; and
- a description of linkages to relevant R&D programmes.

2.4.7.1 Legal Issues

The following material provides guidance for the legal aspects of project implementation. While proposing legal regime options for project implementation it identifies the need to assess the legal aspects on a project by project basis.

2.4.7.2 Formal governance arrangement for joint projects

It is envisaged that some future ATM projects will be joint projects in the full meaning of the term, i.e. projects that involve a substantial financial contribution from more than one stakeholder organisation and are jointly managed. The most appropriate arrangement to link organisations for a specific task of this nature might be a formal contract (especially in the event that significant sums of money or public/private partnerships are involved). In other cases co-operative working arrangements may be delivered by a Memorandum of Understanding (MOU) between participating stakeholders.

2.4.7.3 Measures to control exposure to financial risk

Another consideration in relation to joint ATM projects involving significant financial commitments from more than one stakeholder is the financial risk arising from the joint nature of the proposal. The financial implication of any change initiative should be fully examined by participating stakeholders before project endorsement.

2.4.8 Communication & Information Access

All programme/project information, including scope, performance, schedule, non disclosure agreements, milestones and progress reports, is to be made available to all authorised stakeholders, on a need to know basis.

2.4.9 Project Monitoring & Reporting

It is anticipated that individual ATM stakeholder organisations will have their own internal arrangements for programme/project monitoring and reporting.

In addition to the internal ATM stakeholder programme/project monitoring and reporting, programme/project managers will provide a progress report to the ASTRA on a quarterly basis. This reporting will be used to:

- monitor the progress of ATM developments against the Plan; and
- as an input to strategic planning.

2.4.10 Project Management Procedures

To support the programmes/projects identified by ASTRA, stakeholders have agreed that standard project management practices will be applied.

CHAPTER 3:
ATM Initiatives


Breitling
ACADEMY

3.1 ATM Strategies

3.1.1 General

In developing this Plan, one key ATM strategy: Implement User Preferred Trajectories; and six supporting strategies have been identified. These strategies define the ATM development necessary to achieve the ATM Target Operational Concept, the need to measure the performance of ATM developments and a methodology to ensure the security and integrity of the ATM System.

The seven ATM strategies are as follows:

Implement User Preferred Trajectories — to allow a user to optimise their flight trajectory (in four dimensions — i.e. three dimensions plus time) against their business or individual priorities.

Develop and implement a new concept for Conflict Management — in support of UPTs, which will replace the current rigid separation standards.

Implement Flexible Use Airspace — to maximise the use of airspace to support civil and military operations without rigid airspace segregation.

Develop National Demand/Capacity Balancing — to optimise air traffic flow throughout Australian airspace.

Develop a Decision Information Network — to establish an integrated aviation information network to provide timely and high quality operational information to all users.

Develop an ATM Performance Measurement and Reporting System — to provide the means to measure and report the efficiency and effectiveness of the ATM system, and to provide performance data to develop and refine strategies.

Develop a National Security Assurance Model — to ensure compliance with national security imperatives, as well as the security of the ATM System itself.

3.1.2 Strategic Implementation Maps

The maps contained in Volume 2, Chapter 3 of the Plan identify initiatives that will be used to determine the priority ATM programmes/projects. They are evolutionary maps and will be updated as ATM planning proceeds. The initiatives and elements within these maps are initial determinations which will be refined. More analysis and definition will be undertaken to identify specific programs and projects.

3.1.3 Use of the Maps

Priority Programme/Projects List - The maps and supporting briefs are to be used as input to a multi-stage rough order of magnitude (ROM) process to determine the ATM programme/project priority list.

Communication, Navigation and Surveillance Plan - Assessment of the capability options identified in the maps along with the associated time frames have provided the basis for the development of the communications, navigation, and surveillance plan[1].

1. **CNS Plan outlined in Volume 3**

3.2 Strategy 1- User Preferred Trajectories

3.2.1 Background

UPTs have been defined as the key strategy of the Australian ATM Strategic Plan allowing users to optimise a flight trajectory in all four dimensions (3D + time) consistent with business or individual priorities. The primary focus is on enhancing the ATM system from a user perspective. It concentrates on developing an architecture and operating environment that increases both operational efficiency and cost effectiveness, with sensitivity to environmental aspects, within the overall tenet of the primacy of safety.

A UPT begins when an aircraft is established at the gate for the purpose of the flight until the aircraft has arrived at the destination arrival gate. UPTs therefore include en-route, terminal area (TMA) and ground phases of the trajectory.

3.2.2 Transition

To migrate from the current ATM System baseline to the future ATM system in support of UPTs, a five-stage implementation[2] is proposed. Complementary to these five stages is the extension of UPTs to ground and terminal area operations.

The system capabilities to support UPTs have been identified by the various ATM System components. The components are defined as Service Provider, Airspace User and Aerodrome/ TMA. Each component has specific deliverables - however they are inter-linked and inter-dependent, requiring significant co-ordination and collaboration to achieve the full implementation of UPTs. The master map shown on page 39 depicts the main initiatives and elements required to achieve UPTs. These initiative and elements are detailed in Volume 2, Chapter 3 of the Plan.

3.2.3 Benefits

The implementation of UPTs will provide specific benefits to industry with better utilisation of airspace and airport capacity, through both tactical management and strategic planning. Airspace becomes a resource for all users. It will provide a framework in support of the ATM Target Operational Concept and will:

- improve operational efficiency for industry by optimising flight paths utilising on-board and ground based equipment;
- enhance safety by increasing randomisation of flight paths;
- reduce environmental impact;

2. **Detailed in Volume 2, Chapter 3 of the Plan**

- reduce workload for ATCs and Pilots;
- allow airspace users to structure their flights to achieve:
  - -reduced flight time;
  - -reduced fuel usage;
  - -reduced emissions;
  - -improved distribution of traffic load; and
  - -aircraft maintenance savings.
- enable dynamic resizing and reshaping airspace volumes;
- allow operational flexibility in the use of system tools;
- permit greater Australian Defence Force (ADF) freedom of operations;
- reduce apron and taxiway congestion;
- enhance runway capacity; and
- enhance capacity of terminal airspace volumes.

3.3 Supporting Strategies

3.3.1 Strategy 2 - Conflict Management

To support the future ATM system conflict management must be provided to mitigate the risk of collision to an aircraft along its trajectory through the ATM system.

Conflict avoidance is achieved through collision risk management which limits the risk of collision between aircraft and hazards to acceptable levels. Two streams of work are required to transition to dynamic Risk Management – in support of UPTs. The first stream concentrates on improving the current system and the second stream on R&D in support of future conflict management.

3.3.2 Strategy 3 - Flexible Use Airspace

The fundamental principle of Flexible Use Airspace (FUA) is that airspace should not be designated as purely civil or military, but rather considered as a continuum in which all user requirements should be accommodated to the greatest possible extent. FUA has been identified as an enabling activity to support the implementation of User Preferred Routes/User Preferred Trajectory (UPRs/UPTs).

Research of FUA activities conducted to date recognises the link between FUA, UPRs/UPTs and collaborative trajectory planning. This requires pilots, airline operations/navigation planning personnel, controllers and other traffic managers to have a shared model of airspace planning intent.

The introduction of FUA will enhance the management of aircraft by an ATM system that is able to recognise and attempt to achieve the UPT, whether that trajectory is in accordance with published air routes or not. FUA will enable better access to airspace by both civil and military aircraft. The use of airspace segmentation and FUA would also provide a roam free capability for military aircraft.

3.3.3 Strategy 4 - Demand/Capacity Balancing

To achieve the desired optimisation of the future ATM system, one of the strategies identified is to continue developing demand/capacity balancing to optimise air traffic flow throughout Australian airspace. Two phases have been determined for introducing demand/capacity balancing to support the future ATM system. Phase 1 focuses on operational performance Measurement and phase 2 focuses on system optimisation.

3.3.4 Strategy 5 - Decision Information Network

The current ATM information network consists of various systems to support individual business functions. This strategy aims to provide a more holistic view of these systems to better meet customer's information needs. The implementation maps detailed in Volume 2, Chapter 3 define the various components and the key enabling activities to develop a Decision Information Network (DIN). The DIN is based on the strategic and tactical provision of quality assured and timely operational data in support of current and future ATM operations.

The DIN will provide data collection and integration and ensure data quality and integrity, to provide an information rich planning and operating environment. It involves the best integration of reference, operational data, and the management, sharing and distribution of that data.

3.3.5 Strategy 6 - ATM System Performance Measurement & Reporting System

ASTRA has formulated a programme to progress the ATM Performance Management strategy. The aim of the programme is to develop an ATM Performance Measurement and Reporting System (APMRS), based on the Balanced Scorecard (BSC) approach, to:

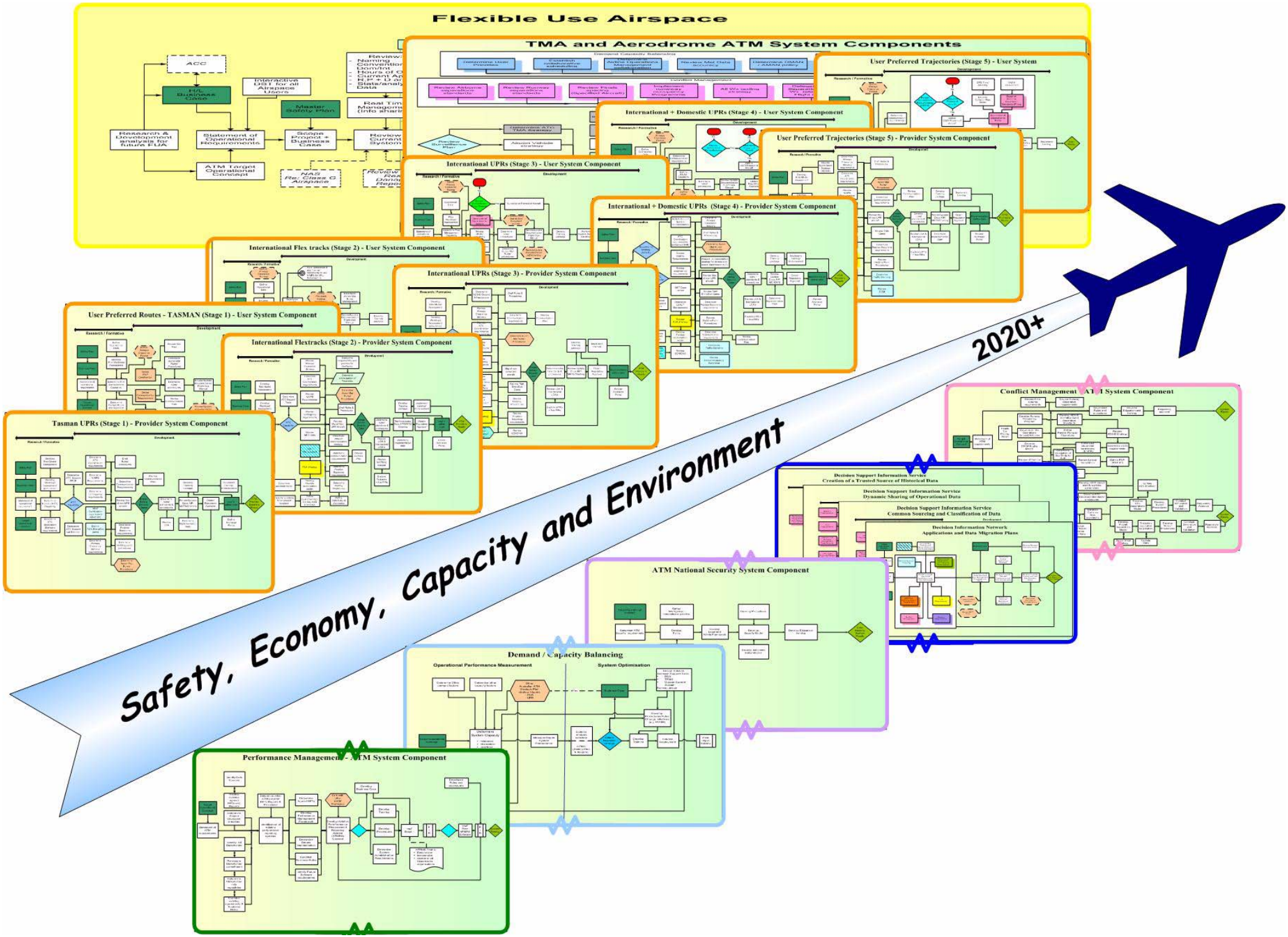
- measure and report the efficiency and effectiveness of the ATM system; and
- provide performance information to develop and implement strategies either, collectively or through individual stakeholder organisations, to address ATM system performance issues.

The programme will include several projects. The first project will develop a performance measurement and reporting system, consistent with the overall programme goal, using the current measurable KPIs defined in Chapter 4. Further projects will develop systems to measure existing KPIs and develop new KPIs as appropriate.

3.3.6 Strategy 7- National Security Assurance Model

The development of the ATM system to support national security requirements has assumed greater significance following recent world events, particularly those relating to terrorism. As a result the Plan has identified a new strategy to address this issue. The key enabling activities[3] have been identified to develop a National Security Assurance Model - to ensure compliance with National Security imperatives as well as the security and integrity of the ATM system itself.

3. **Detailed in Volume 2, Chapter 3**


Flexible Use Airspace
TMA and Aerodrome ATM System Components
User Preferred Trajectories (Stage 5) - User System
International + Domestic UPRs (Stage 4) - User System Component
User Preferred Trajectories (Stage 5) - Provider System Component
International UPRs (Stage 3) - User System Component
International + Domestic UPRs (Stage 4) - Provider System Component
International Flex tracks (Stage 2) - User System Component
International UPRs (Stage 3) - Provider System Component
User Preferred Routes - TASMAN (Stage 1) - User System Component
International Flextracks (Stage 2) - Provider System Component
Tasman UPRs (Stage 1) - Provider System Component
2020+
Safety, Economy, Capacity and Environment
Conflict Management ATM System Component
Decision Support Information Service
Creation of a Trusted Source of Historical Data
Decision Support Information Service
Dynamic Sharing of Operational Data
Decision Support Information Service
Common Sourcing and Classification of Data
Decision Information Network
Applications and Data Migration Plans
ATM National Security System Component
Demand / Capacity Balancing
Operational Performance Measurement
System Optimisation
Performance Management - ATM System Component


ROYAL AUSTRALIAN AIR FORCE

CHAPTER 4:
ATM Performance Management

4.1 ATM Performance Measurement

4.1.1 Overview

The Plan defines six system goals which are critical to the measurement of the performance of the ATM system. The system goals are safety, economy, operational efficiency, environment, national security and national coverage. These system goals are linked and interdependent. Therefore, performance is measured and managed across several dimensions, not just operational efficiency and economy, creating a balanced view of performance of the entire ATM system. Key Performance Indicators (KPIs) shown in Table 4.1, have been assigned for each system goal to measure the performance of the ATM system as a whole.

4.1.2 Key Performance Indicators & Analysis

KPI data for each system goal will be captured from various sources and stakeholder organisations and entered into an ATM Performance Management Reporting System (APMRS) The APMRS context diagram is shown in Figure 4.1.

The output will be a report which will be known as the ATM Industry Balanced Scorecard (BSC) Report. The value of performance information lies in the analysis of the data that has been entered into the system, therefore, an assessment of performance relative to set targets needs to be conducted. This analysis will include commentary on under performing KPIs. The system will inform stakeholders of overall performance issues and respond in a timely and informed manner to queries on performance reports from stakeholders.

Key Performance Indicator data for the APMRS will be provided by various stakeholder organisations within the Australian aviation industry. Some stakeholder organisation Performance Management Systems will have KPIs in common with the APMRS. In addition, KPIs and benchmarks from organisations within the international aviation industry can be introduced, where appropriate, into stakeholder systems and the APMRS subject to stakeholder requirements and their endorsement.

The system will require regular review to ensure KPIs remain relevant and targets remain challenging but attainable. Therefore, there is a need to assess and where necessary revise KPIs and targets at least annually as part of the Australian ATM strategic planning process.

Figure 4.1 Australian ATM Performance Management and Reporting System - Context Diagram

4.1.3 Performance Management Framework

A Performance Management Framework will be put in place to ensure the sustainability and efficiency of the APMRS.

The success of the APMRS is totally dependent on stakeholder agreement and commitment to provide the required data. In addition, stakeholder ownership of the 'system' and commitment to the 'mutual benefit of the system' is extremely important.

The Performance Management Framework outlines the roles, accountabilities, timelines, processes and systems required to maintain the APMRS. The major elements of this framework including roles and accountabilities are represented diagrammatically below.

Figure 4.2 Performance Management Framework

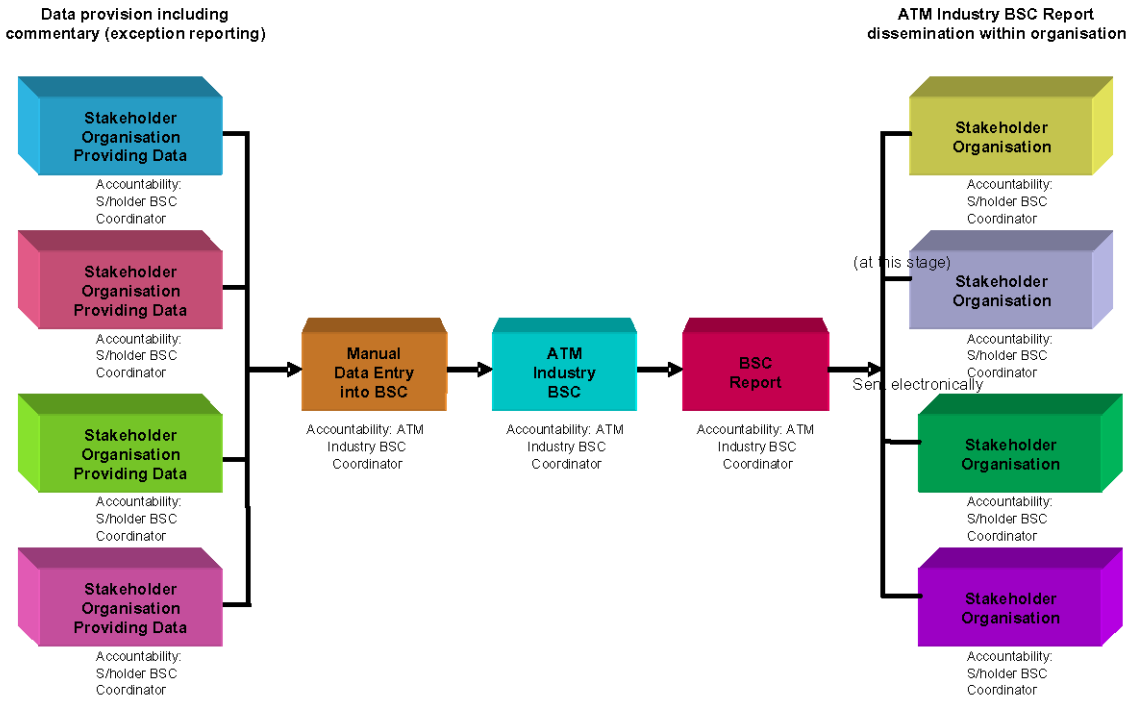


Table 4.1 : Performance Measure[a]

ATM System Goal	Performance Measurement	Target
Safety	• Aircraft accidents attributed to the ATM System.	• Zero accidents
	• The number of air safety incidents in which aircraft come in very close proximity.	• No Increase in number of occurrences despite raising traffic levels
	• The number of 'A' class air safety incidents attributed to the ATM system	• No increase in the number of 'A' class incidents attributed to ATM despite raising traffic levels
Economy	• Dollar cost per aircraft movement (subject to further work and analysis)	•
Operational Efficiency	• User Preferred Trajectories	
	- variation between the user preferred trajectory and ATM system delivered trajectory (vertical, lateral and longitudinal components)	• Baseline to be measured
	- the average difference between the actual ATM system entry time and the user preferred ATM system entry time, per annum (average entry delay)	• Baseline to be measured
	- the average difference between the actual ATM system exit time and the user preferred ATM system exit time, per annum (average exit delay)	• Baseline to be measured
	- average ATM system induced delay[b], (expressed as the average entry delay minus the average entry delay	• Baseline to be measured
	• Capacity Management [cdef] Strategic	
	- user demand/unconstrained capacity (%)	• Baseline to be measured
	- user demand/declared capacity (%)	• 95% of capacity, 90% of the time

Table 3 (continued): Performance Measure[a]

ATM System Goal	Performance Measurement	Target
Operational Efficiency (conitnued)	Tactical - capacity delivered/user demand (%) (limited to declared capacity)	 • 95% of capacity, 90% of the time
Environment	• Kilograms of CO_2 per Revenue Tonne Kilometre	• Baseline to be measured
National Security	• ATM system security - % of ATM system at required level of threat protection • ATM knowledge about flights - % of desired knowledge about flights • ATM system security responsiveness - amount of delay to security response activities	 • Zero percent of ATM system below required level of threat protection • 100% of desired ATM knowledge about flights • Minimal delay to security response activities
National Coverage	• The geographic coverage for minimum communications required by operations at 5,000 and 10,000 feet - square kilometers of Australian sovereign airspace and percentage of coverage - square kilometres of Australian FIR and percentage of coverage • The number of accidents and incidents per year where a lack of, or inadequate infrastructure was a contributing factor	 • 100% geographic coverage for this category of communications across Australian sovereign airsapce • 100% geographic coverage for this category of communications across Australian FIR • Zero accidents or incidents in this category

a. Indicative at this stage as all performance measures, related definitions and targets will be reviewed as part of the implemenation program/project definition development.
b. This KPI will have greater application in analysing the performance of specific components of the system (e.g. volumes or facilities)
c. Unit of time will normally be a 15min rolling time period
d. Initially implemented at aerodromes - Brisbane, Melbourne and Sydney. Later to inlcude airspace volumes.
e. Data available daily, weekly and monthly etc.
f. Delay measurements are required to be combined with capacity measurements or more holistic evaluation.
g. To be compiled internally

References

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Glossary of Acronyms

A

ADF	Australian Defence Force
ASTRA	The Australian Strategic Air Traffic Management Group
ATC	Air Traffic Controller
ATMCP	Air Traffic Management Concept Panel

B

BSC	Balance Scorecard

C

CASA	Civil Aviation Safety Authority
CNS/ATM	Communications, Navigation, Surveillance & Air Traffic Management
CO2	Carbon Dioxide

D

DIN	Decision Information Network
DOTARS	Department of Transport & Regional Services

F

FAA	Federal Aviaiton Administration
FIR	Flight Information Region
FUA	Flexible Use Airspace

I

ICAO	International Civil Aviation Organization

N

NPV	Net Present Value

R

R&D	Reseach and Development
ROM	Rough Order of Magnitude

S

SC	Safety Case
SMS	Safety Management System
SSA	System Safety Approach
SWOT	Strengths, Weaknesses, Opportunities & Threats

T

TMA	Terminal Area
TOC	ATM Target Operational Concept

U

UPT	User Preferred Trajectory

Glossary of Terms

Symbols

'A' Class Air Safety Incidents	An incident, that irrespective of aircraft proximity issues, is judged to have posed a significant threat to the safe operation of the ATM system.

A

Air Safety Incidents	An occurence, other than an accident, associated with the operation of an aircraft which affects or could affect the safety of operations.[49]
ATM Operational Concept	A description of the manner in which the ATM operational architecture delivers services and benefits to users.
ATM service provider	An organisation responsible and authorised to provide ATM service(s).
ATM system	The collective integration of humans, information, technology, facilities and services, on the ground, in the air and in space used to effect ATM.

C

Capacity	The power of receiving or containing. Possibility of doing something. A measure of performance. Quality of being susceptible to certain treatment.

E

Efficiency	How well an activity or operation is performed (output for a given input) - how well resources are used.
Environment	The aggregate of surrounding things, conditions or influences. The situation such as the work environment or the operating environment involving a specified factor or factors.

G

Goal	The aim or end. The terminal point in a race or activity. That towards which effort is directed.

O

Objective	The aim or end. The terminal point in a race or activity. That towards which effort is directed.

P

Programme	A collective of two or more related projects.

S

Strategic Management	Identifying, choosing & implementing the most effective means of ensuring long-term compatibility between skills & resources of an organisation & the competitive, economic & social environments within which it operates.