CARATS
Collaborative Action for Renovation of Air Transport Systems

Shoichi Kosugi
Special Assistant to the Director
ATS Systems Planning Division
ATS Department
Overview

What is CARATS?
Background
Worldwide activities
Objectives
Direction of Renovation
Actions for Realizing the Vision
What is CARATS?

► We need Changes to Intelligent Air Traffic Systems.
► It requires the collaborative works with various aviation stakeholders to reform Japan’s air traffic system decisively and strategically for the future.
Background

- The environment surrounding the country’s international economic and social activities is changing dramatically and becoming more complex: neighboring Asian states are enjoying rapid economic growth, and globalization is progressing.

- On the other hand, measures to counter global warming are attracting worldwide attention, and Japan is determined to positively address this issue.

- Japan needs to draw up and carry out a growth strategy, capitalizing on its strengths in order to sustain its economic growth and enhance its international position.

- Air service is a fundamental economic and social infrastructure that allows more people and goods to move more freely and efficiently than ever, and supports Japan’s growth strategy for economic and social progress and for enhancing the national living standard. It is becoming increasingly important to increase the quantity of domestic and international air service while improving its convenience and environmental friendliness.
Background (continued)

In the current ATM system, which is based on Air Traffic Control of sectorized airspace and predetermined routes in principle, routes and sectors are operated flexibly corresponding to air traffic flow through airspace management (ASM), albeit with restrictions. Where the air traffic volume is likely to exceed the air traffic control capacity, ATM operation has coped by managing the flow of air traffic such as instructing ground delays or alternative routes.

However, these procedures have limitations and are becoming increasingly difficult to maintain an efficient and orderly flow, due to the unavoidable concentration of traffic in specific airspaces and routes and continuous delays.
Background (continued)

With Air Traffic Control conducted for each sectors by short-term route prediction based on information of present positions of aircraft, it is becoming difficult to fully optimize flight routes and flying times over the entire flight from departure to arrival. As the air traffic volume has increased, the number of flow control procedures and delays have risen year by year, making it difficult to ensure convenience for passengers and efficient operation of flight with the current method.

Another issue is that meteorological information is not fully used for predicting air traffic volume and airspace capacity. Further, with flexible use of airspaces and flight routes being limited to specific sectors and/or airspaces, airspace cannot be fully used, which makes it hard to increase the air traffic control capacity.
Characteristics of air traffic of Japan

The number of flights, including overflights, are predicted to increase by 50% by 2027.

![Graph showing the growth of air traffic in Japan from 1985 to 2027. The graph compares actual and predicted data for domestic, international, and overflight traffic.]
Air Traffic Growth in the world

- Amid an anticipated global increase in air traffic demand, especially in the Asia-Pacific region with economic progress of neighboring states.

Predicted Demand of International Air Traffic Volume

(The growth rate within Asia is higher than within North America and within Europe, and the growth rate between Asia and North America and between Asia and Europe is higher than that between North America and Europe.)
International long-term plans

In the U.S. and Europe, long-term visions to meet local needs have been formulated based upon the ICAO Global ATM Operational Concept (NextGen in the U.S., SESAR in Europe). To realize seamless air traffic in the Asia-Pacific region where demand is expected to increase rapidly, it is necessary to establish a future air traffic system in collaboration with the U.S., Europe and other states, while securing international interoperability.
Objectives of the Future Air Traffic System

(1) Increasing Safety
(2) Responding to the Increase in Air Traffic Volume
(3) Improving User Convenience
(4) Increasing Operational Efficiency
(5) Improving Productivity of Air Traffic Services
(6) Responding to environmental issues
(7) Enhancing the International Presence of Japan in the Aviation Field
## Detailed objectives

<table>
<thead>
<tr>
<th>Item</th>
<th>Numerical target</th>
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<tbody>
<tr>
<td>Enhancing safety</td>
<td>Increase safety level by 5 times</td>
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<tr>
<td>Responding to the increase in air traffic volume</td>
<td>Double the air traffic control capacity in congested airspace</td>
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<td>Improving user convenience</td>
<td>Improve service level (punctuality and reduction of flight time) by 10%</td>
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<tr>
<td>Increasing operational efficiency</td>
<td>Reduce fuel consumption per flight by 10%</td>
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<tr>
<td>Improving productivity of air traffic services</td>
<td>Improve productivity of air traffic services by 50% or more</td>
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<tr>
<td>Responding to environmental issues</td>
<td>Reduce CO2 emissions per flight by 10%</td>
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<tr>
<td>Enhancing the international presence of Japan in the aviation field</td>
<td>(Qualitative target. The number of international conferences in Japan, international cooperation projects, etc may be the index.)</td>
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Direction of Renovation

rail (1) Realizing Trajectory-based Operation (TBO)
rail (2) Improving Predictability
rail (3) Promoting Performance-based Operation (PBO)
rail (4) Realizing Satellite-based Navigation for All Flight Phases
rail (5) Enhancing Situational Awareness on the Ground and in the Air
rail (6) Making Maximum Use of the Capability of Human Beings and Machines
rail (7) Full information-sharing and Collaborative Decision-Making
rail (8) Realizing High-density Operation in Congested Airports and Airspace
Trajectory-based Operation (TBO)

- We will shift from the current ATM operation, which focuses on ATC based on airspace sectors and air traffic flow management by adjusting departure time, to ATM operation along 4-DT (4-Dimensional Trajectory), which considers the whole of our FIR as one airspace, manages the entire flight trajectory from departure to arrival of all aircraft concerned in an integrated manner, and introduces time-based management in all phase of flight.

- This operation allows the flexible flights desired by operators, while addressing policy issues such as increased air traffic capacity at congested airports, crowded airspace, and reduction of CO2 emissions by adjusting trajectories strategically and cooperatively prior to departure.
Operational change

Image of coordinated and staged adjustment
From airspace-based ATM operation to trajectory-based ATM operation
Actions for Realizing the Vision

1. Establishing a Road Map
2. Role-sharing and Collaboration among Parties
3. Promoting an Effective and Stable Project
Establishing a Road Map

In order to systematically establish the future air traffic system based on a long-term vision, we must first draw up a detailed road map with the cooperation of the parties concerned. The short-term measures should be carried out step by step, then research and development systematically carried out on the long-term measures. The road map will be revised as necessary to flexibly cope with changes in circumstances. A system for materializing the long-term vision smoothly and effectively will be drawn up with the cooperation of industry, academia, and the government.

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<tr>
<th></th>
<th>2009FY</th>
<th>2010FY</th>
<th>Implementation phase (2011-2025FY)</th>
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</thead>
<tbody>
<tr>
<td>Long-term vision</td>
<td>Formulation</td>
<td></td>
<td></td>
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<tr>
<td>Road map</td>
<td>Preparation</td>
<td></td>
<td>Revised as necessary</td>
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<tr>
<td>Short-term measures</td>
<td></td>
<td></td>
<td>Implementation</td>
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<tr>
<td>Long-term measures</td>
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<td>Research and development</td>
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*Image of establishing the air traffic system in the future*
Promoting an Effective and Stable Project

Research and development of the air traffic system will take a long time and must be implemented systematically, and it is also necessary to consider how to secure stable funding. To improve system efficiency within limited resources, it is important to analyze cost-effectiveness before implementing measures, taking into consideration the effectiveness of the system to be introduced and the possible scaling down of existing systems. It is also necessary to cope flexibly with changes in circumstances that may arise.
Further Information

The full document of CARATS is available in the following website;
http://www.mlit.go.jp/koku/koku_CARATS.html

Thank you for your attention.