



International Civil Aviation Organization

**WORKING PAPER**

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**ASSEMBLY — 41ST SESSION**

**EXECUTIVE COMMITTEE**

**Agenda Item 23: Innovation in Aviation**

**ROADMAP FOR BUILDING SMART CIVIL AVIATION**

(Presented by China)

**EXECUTIVE SUMMARY**

The building of smart civil aviation is a key driving force and the main goal for China to promote the innovation-driven development strategy, expand new space for the development of the industry, and enhance the quality and efficiency of the safety in the new era. In order to strengthen the top-level design of smart civil aviation and instruct relevant units in the industry to build smart civil aviation, and the *Roadmap for Building Smart Civil Aviation* has been developed.

*Strategic Objectives:*

This working paper relates to all Strategic Objectives.

*Financial implications:*

No additional resources are required.

*References:*

<sup>1</sup> English and Chinese versions provided by China.

## 1. INTRODUCTION

1.1 Smart civil aviation is a new pattern that aims to realize digital processing, intelligent response and smart support for all enablers, processes and scenarios of civil aviation, with the goal of making China become a civil aviation power, by applying the latest progress in the new round of technological revolution and industrial transformation, as well as innovating the operation, service and regulation of civil aviation.



## 2. ROADMAP FOR BUILDING SMART CIVIL AVIATION

2.1 General Framework: by taking reform innovation as core drivers, adhering to the people-centered principle, and taking smart transport, smart ATM, smart airports, and smart governance as key points, efforts will be made to accelerate the development of civil aviation industry from pursuing speed and scale to paying more attention to quality and benefit, from traditional factor-driven to innovation-driven model, and from service-oriented to collaborative development among different sectors. In this way, a new pattern for comprehensive development will be established so as to better meet people's needs for a better life.

2.2 General Objective: By 2025, results will be made in digital transformation, with facial recognition in air travel and a single platform regulation being preliminarily realized. The digital transformation will be vigorously promoted to apply the intelligent equipment on a large scale; significantly improve the air travel experience, with the efficiency of security check being increased by 30 per cent compared with that of 2020, and the flight regularity being maintained above 80 per cent; advance the digitalization and the differentiated services of air logistics; largely enhance the operation efficiency, with a total of 17 million flights per year being supported; further strengthen the sustainable development, with the aviation carbon emissions per unit turnover being reduced by 5 per cent, as well as make governance capacity more efficient, with the severe and major accident rate of transport flight per one million hours being less than 0.11.

2.3 By 2030, key breakthroughs will be achieved in the application of intelligent equipment, with facial recognition in air travel, one waybill used throughout air logistics, one time security check during customs clearance, a single network operation and a single platform regulation being basically realized, therefore, making the level of digitalization, networking and intelligentization higher. Besides,

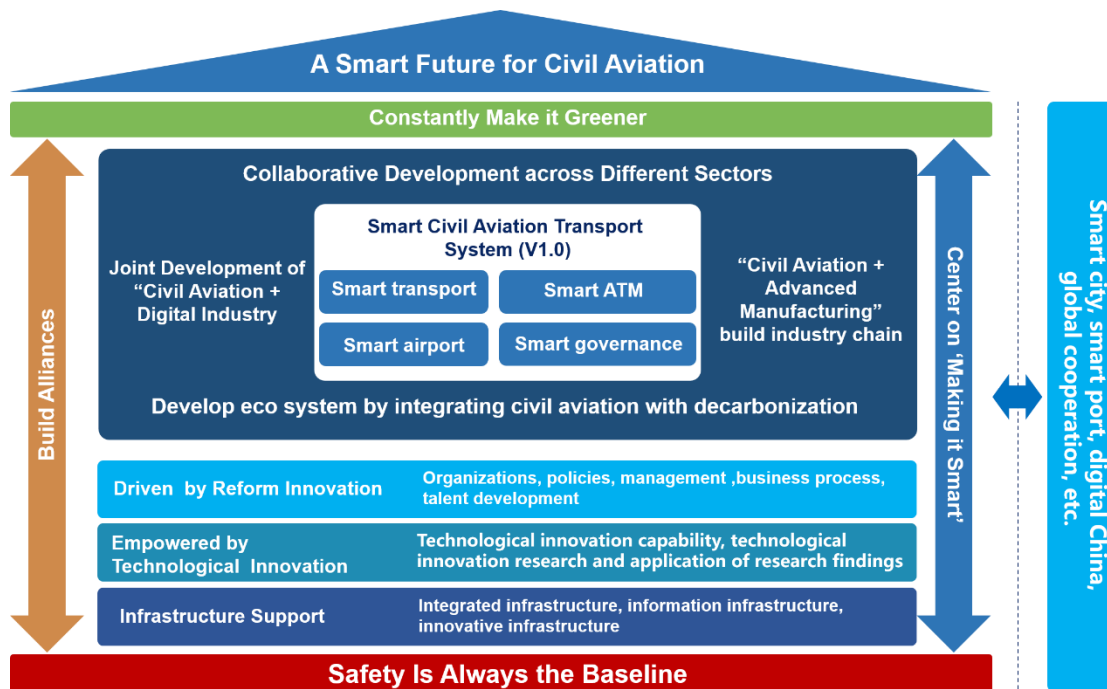
efforts will be made to support a total of 23 million flights per year, keep the flight regularity above 80 per cent, and significantly reduce the aviation carbon emissions per unit of turnover.

2.4 By 2035, smart integration will be used across all enablers, processes and scenarios, with facial recognition, one waybill used throughout air logistics, one time security check during customs clearance, a single network operation and a single platform regulation being fully realized. Besides, efforts will be made to support a total of 30 million flights per year, and keep the flight punctuality rate above 85 per cent.

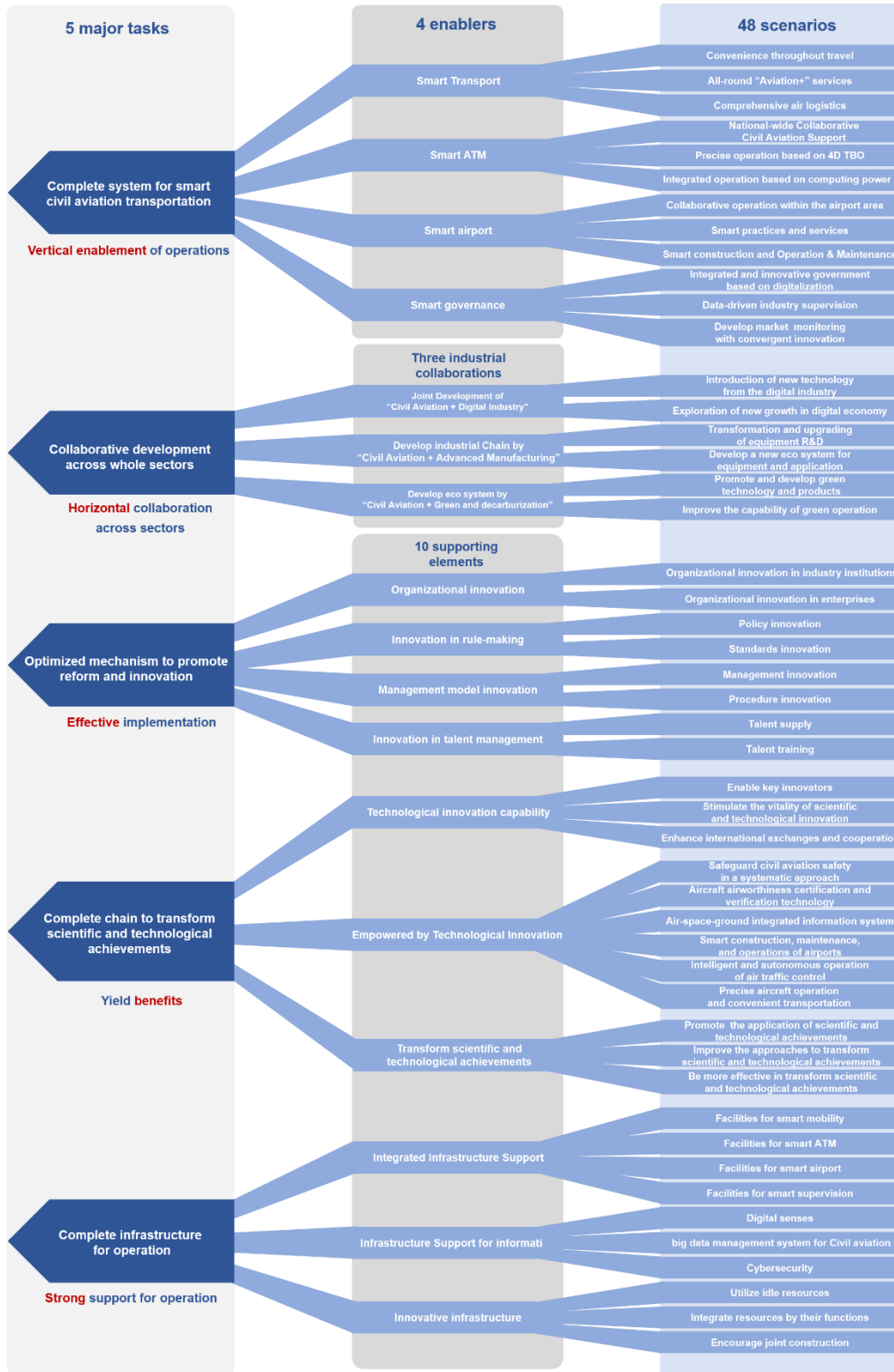
## 2.5 Overall Program

### Overall Architecture

2.5.1 Smart civil aviation, by taking smart construction as its main task, enhancing the bottom line of safety, expanding the upper limit of green development, and building the industrial alliance, lays emphasis on smart transport, smart ATM, smart airport and smart governance to strengthen reform, technological innovation and basic support, to promote collaborative development between smart air transport and other industries, so as to realize the vision of developing a smart future for civil aviation.

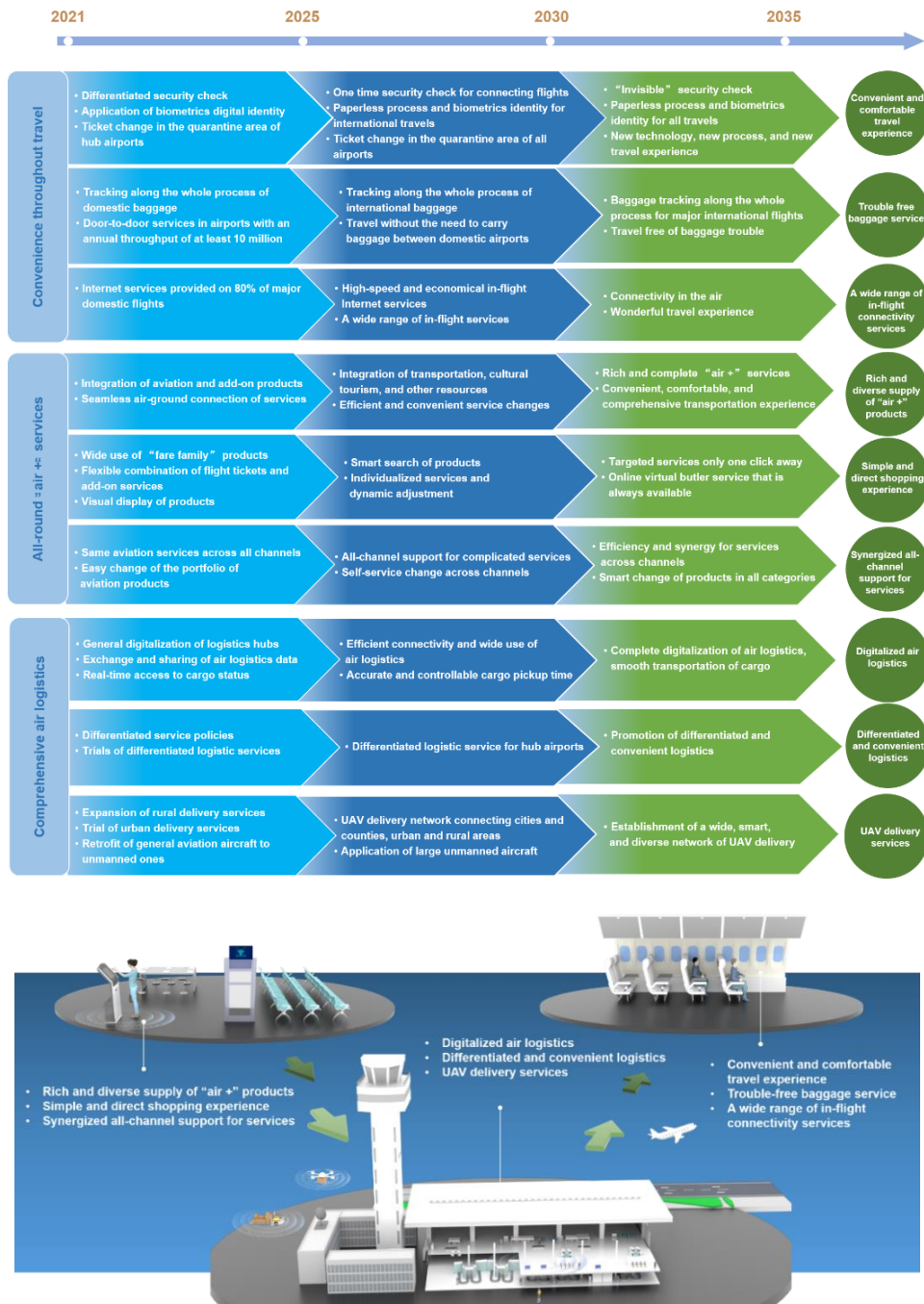


Overall Design

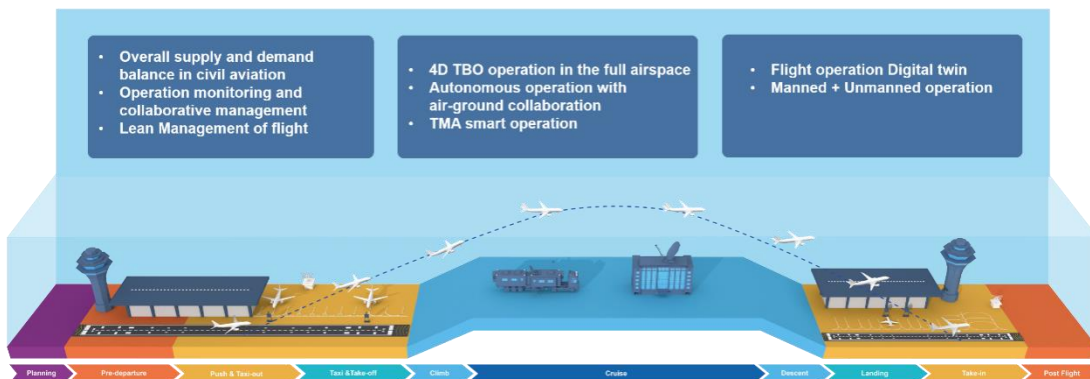
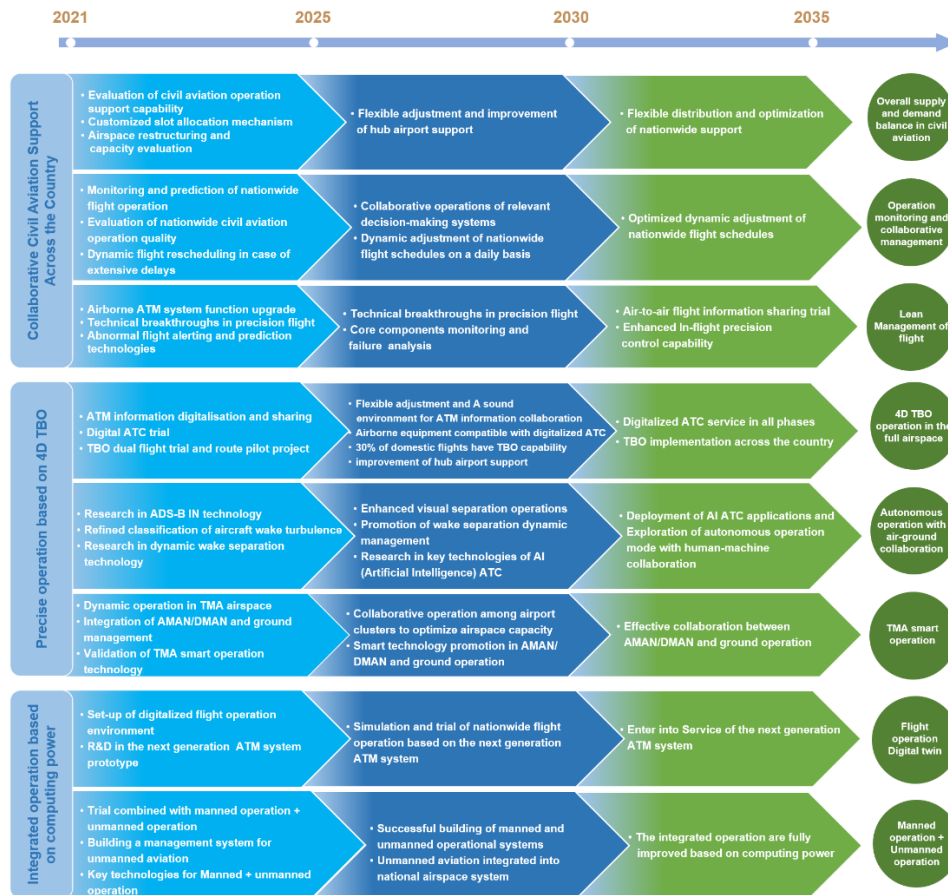


## 2.6 The System for Smart Civil Aviation Transportation

2.6.1 Smart Transport: for the purpose of shortening the whole travel time of passengers and promoting the quality and efficiency of air logistics while reducing its cost, a convenient and comfortable travel service ecology system and an efficient air logistics service system will be built, with the whole process of pre-travel, in-travel and in-flight and the whole process of air logistics being focused on.

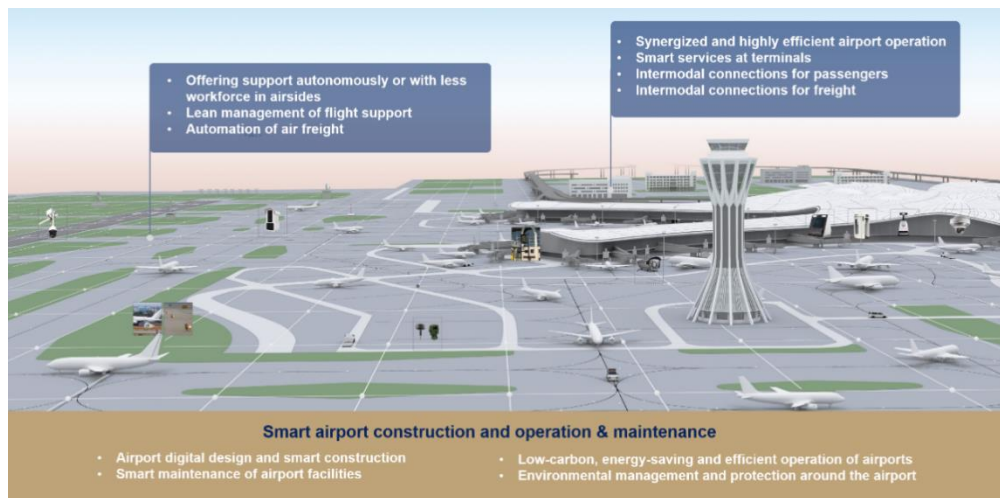
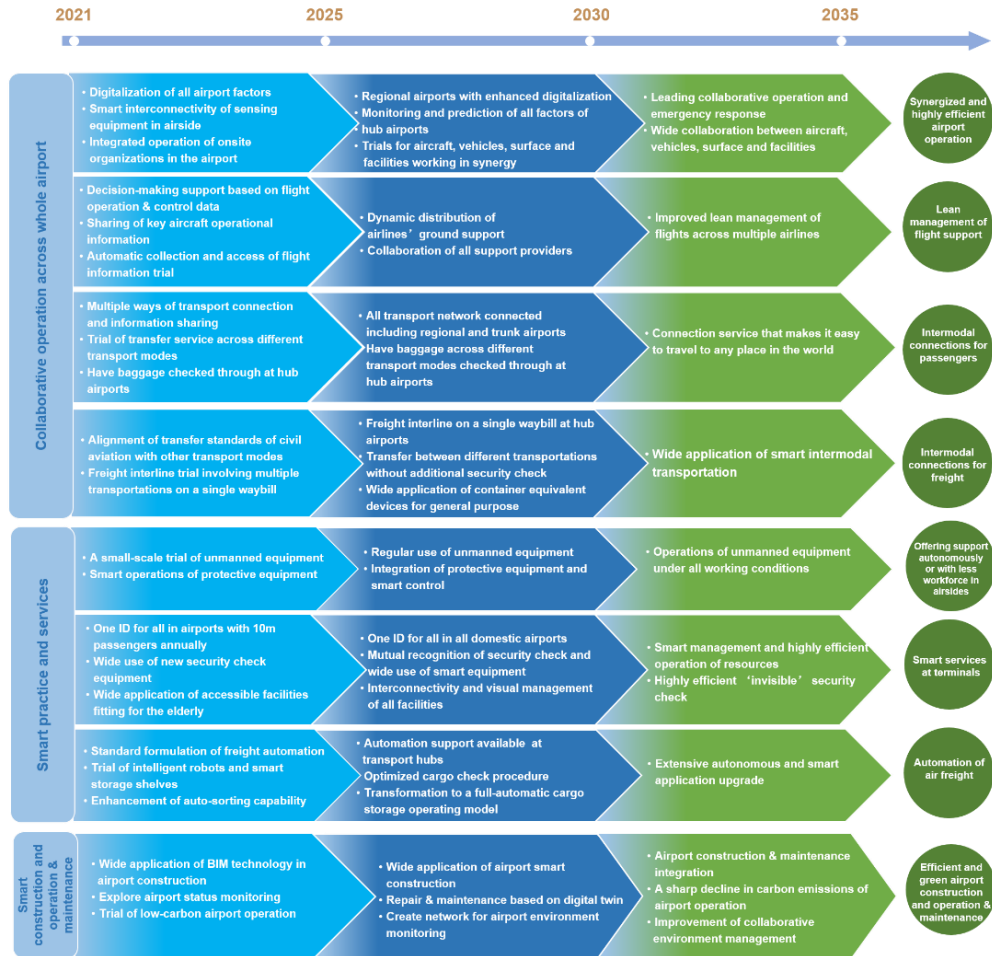


2.6.2 Smart ATM: a new generation of ATM system that focuses on such four areas as continuous safety, high efficiency, advanced intelligence and good collaboration will be developed so as to achieve the air traffic operation featuring wide area coverage, deep network interconnection, data integration empowerment, intelligent and collaborative response, and smart and efficient operation, thus, making the air traffic operation and the air traffic service more elaborate and smarter.

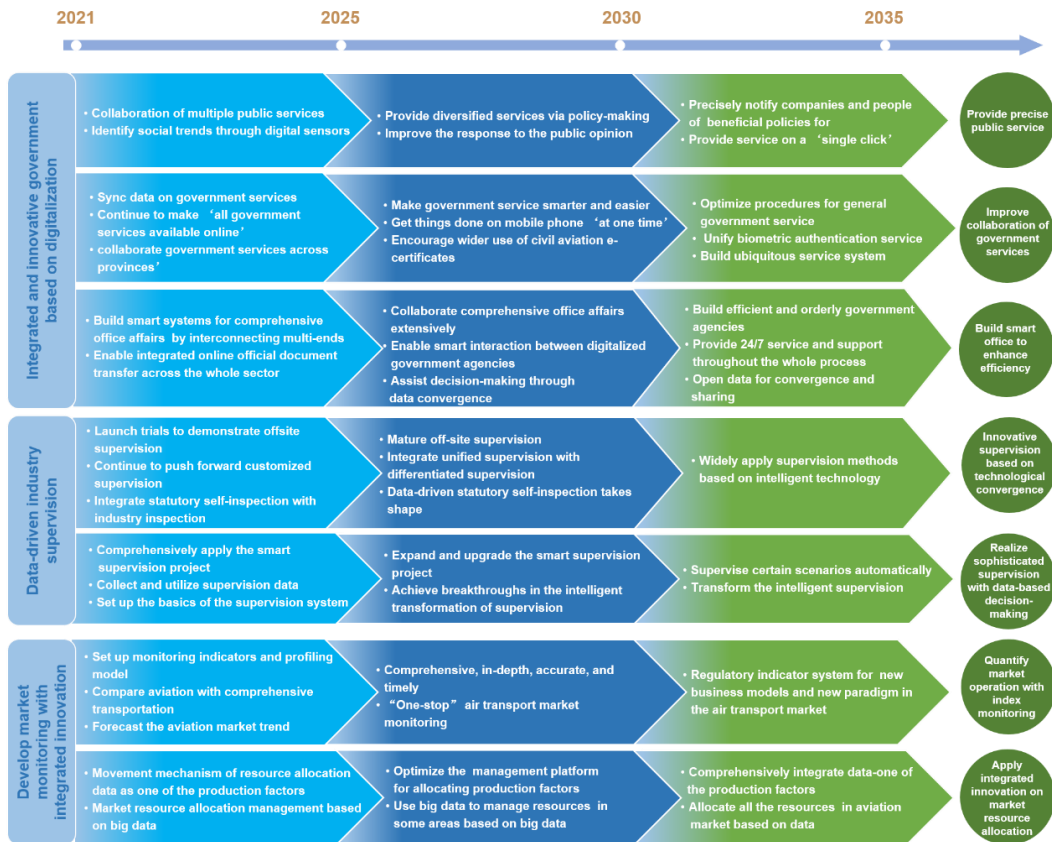


2.6.3 Smart Airport: the construction of safe, green, intelligent and humanistic airport will be promoted by strengthening the service provided by airport in terms of flight, passengers as well as cargo

and mail, and promote the airport development in collaborative operation, people-centered services and intelligent operation as well as digital construction and maintenance, so as to enhance the support capability, service level and operation efficiency of airport.



2.6.4 Smart Governance: by focusing on the management of safety organization and the industry governance efficiency, efforts will be made to push forward the construction of digital government, improve the integrated government services, and establish a data-driven industry governance system and a market operation regulation system with integrative innovation, thus, enhancing the quality of industry governance.



- Provide precise public service
- Improve collaboration of government services
- Build smart office to enhance efficiency

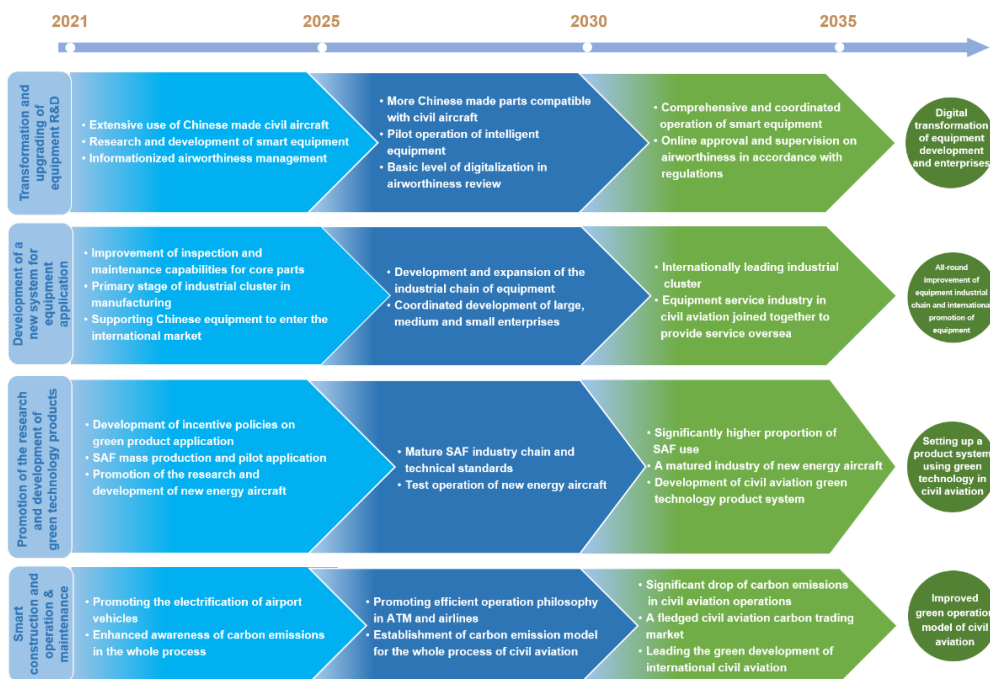
- Innovative supervision based on technological convergence
- Realize sophisticated supervision with data-based decision-making

- Quantify market operation with index monitoring
- Apply integrated innovation on market resource allocation

## 2.7 Collaborative Development among Different Sectors

2.7.1 The community of “Civil Aviation + Digital Industry”: will be built to meet the development needs of civil aviation, by promoting the comprehensive participation and integration of digital industry, and applying new technologies of digital industry, so as to empower the high-quality development of civil aviation, and explore the growth point of digital economy.

2.7.2 The industry chain of “Civil Aviation + Advanced Manufacturing”: aims to promote the deep integration of information technology and industrialization, improve the quality of industrial manufacturing, promote the intelligent process of civil aviation equipment, and create a whole industry chain from development to maintenance, so as to realize the integrated development between civil aviation and advanced manufacturing.



## 2.8 Major Projects

2.8.1 The Project of Strengthening Foundation for Smart Civil Aviation Safety: aims to strengthen research on situational awareness, risk assessment and risk warning technology so as to build a system for smart management of civil aviation safety. Also, the project for smart regulation will be built to upgrade the regulation services.

2.8.2 The Smart Air Transport System Project: aims to strengthen researches on management and process innovation to implement the following projects, such as the project for smart and convenient air travel, the project of improving the quality and efficiency of smart air logistics, the project of “aircraft-vehicle-runway/taxiway-facility” smart collaboration, the cooperative operation system for China’s civil aviation, the project of reducing control separation and the demonstration project of refined operation based on four-dimensional trajectory.

2.8.3 The Project of Building Big Data System for Civil Aviation: aims to strengthen researches on the data governance theory and key technologies in civil aviation, establish and improve the system for big data management policy, promote the sharing, exchange and convergence of data among multiple sectors, regions and levels, strengthen network security, and map out to build a classified and hierarchical system for big data management of civil aviation.

2.8.4 The Project of Future Civil Aviation Technology: aims to speed up making breakthroughs in core technologies in terms of safety management, airworthiness certification, operation support, green and low-carbon development, and governance services in civil aviation, as well as in a new generation of ATM system prototype.

2.8.5 The Project of Smart Civil Aviation Industry Collaboration: aims to explore the mode of collaborative research and development among equipment manufacturing enterprises, the scientific research institutions and relevant civil aviation units, establish a mechanism to apply the advanced industrial technologies to various scenarios in civil aviation, strengthen technical research and intelligent upgrading of product, smooth the whole industrial chain of equipment development, operation and maintenance, and implement the project of smart civil aviation industry collaboration.

2.8.6 The Demonstration Project of Smart Civil Aviation Policy System: aims to strengthen the soft science research on smart civil aviation, carry out researches on smart regulation, build a policy system that is compatible with smart civil aviation, enhance policy supply, optimize the development environment for building smart civil aviation, and promote the pilot, demonstration and application of new business mode and new model in civil aviation.

2.8.7 The Project of Technology-driven Green Transformation: aims to establish a market mechanism for reducing aviation carbon emission in line with national conditions and the development stage of the industry, actively participate in the building of the national carbon market, explore the collaborative research and development mechanism for green core technologies, promote the research and development, production, certification and evaluation of sustainable aviation fuels, strengthen the perception and monitoring capabilities of carbon emission, and implement the project of green transformation of civil aviation.

2.8.8 The Project of Promoting the *Roadmap for Building Smart Civil Aviation*: aims to establish a mechanism for promoting the *Roadmap for Building Smart Civil Aviation*, formulate the annual plan for implementing each special group based on various fields, build the framework system for evaluation indexes of smart civil aviation, establish a plan for the implementation and tracking evaluation of the *Roadmap for Building Smart Civil Aviation*, and carry out the project for advance the *Roadmap for Building Smart Civil Aviation*.

3. **CONCLUSION**

3.1 The *Roadmap for Building Smart Civil Aviation* has been published, which defines the top-level design of the construction of smart civil aviation. The ICAO and its member states are invited to pay attention to this working paper.

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