

## Future Cabin for the Asian Market - FUCAM

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### Abstract

The paper gives an overview on the main results of the European – Japanese Innovation Project FUCAM, a “Horizon 2020” **collaborative project**, started 1/02/2016, running **36 Months**.

Project partners Europe: Airbus, Aalto University, Bertrandt, Cranfield University, EASN, Mormedi, Stelia; Japan: Jamco)

The main objective of the FUCAM (Future Cabin for the Asian Market) project is to develop a conceptual cabin design for the aircraft of the future (after 2025) tailored to the Asian market, and different from the worldwide standard cabin of today. The FUCAM project analysed the operator and user requirements of airlines and passengers in the Asian markets of Japan, China and South-East Asia. In parallel, FUCAM established a panorama of innovative cabin technologies emerging in Europe and Japan. Based on these inputs, a cabin scenario was composed providing innovative concepts for high density seat layouts and dedicated seat solutions on the main deck, combined with extra offers on the lower deck.

To meet cultural specificities of Asian travellers in terms of comfort and also to meet operator requirements in terms of seat density, specially designed business class seats were developed. Derived from Japanese living room chairs, which have a lower relax seat position and use less space than regular business class seats, the design allow for a better use of valuable cabin floor space and thus positively influence affordability of business class travelling. For economy class, a versatile, compact and light-weight seat bench concept was designed that can be used by single passengers, families or provide comfort to people of stature. This element will positively influence affordability as well. Both solutions can use the standard interfaces, so there is no need of any modifications regarding aircraft integration.

The main deck solutions are complemented with very modular passenger offers on the lower deck, the ‘Air-lounge’ concept. The concept comprises a fixed installation on lower deck, with seating possibilities, separate gender lavatories and possibly vending machines. The fixed installation can be combined with additional con-

tainer based modules to increase the passenger capacity of the lounge area and provide catering and experience features for retail, relax, work or gaming.

Various scenarios for using the lower deck space have been developed. The retail module for instance, aims to facilitate on-board brand engagement and shopping. Going beyond current offers of in-flight beverage and drink purchases, it offers the opportunity to connect with the brand through an immersive experience, as well as browse and pre-order from a vast selection of goods and services (e.g., clothing, shoes, taxi, car rentals, hotels or other accommodation, baggage service, spa treatments), to be delivered at the destination airport, hotel, or elsewhere during one's further trip. The 'Airlounge' passenger experience can become a real game changer for airlines in terms of revenue and diversification especially for the fast and growing Asian market

*The FUCAM project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 690674.*

**Keywords:** Cabin Concept, Asian markets, aircraft seat, aircraft systems, connectivity

## 1 Introduction

The Asia Pacific region is the fastest growing air transport market in terms of aircraft deliveries and seat capacity growth. It will be the biggest driver of air travel demand by 2036, supplying more than half of the 7.8 billion travellers expected to fly in the next 20 years according to the International Air Transport Association [1].

To develop the cabin concepts addressing these markets, a multi-method approach was used to uncover and analyse market trends and user requirements from the airlines' and passengers' perspectives along with cultural factors in Japan and China. The concepts developed for future aircraft (after 2025) differ from the worldwide standard cabin of today and are tailored to the needs of the Asian market.

Further input for the design development was a systematic scouting and analysis of relevant novel and emerging technologies originating from a variety of industries.

Iterative rounds of out-of-the box concept ideation and reflection on the identified drivers were done.

The FUCAM concepts provide innovative seating layouts and dedicated seat solutions on main deck in combination with extra offers on the lower deck. The lower deck facilities use the existing cargo space in a modular way and provide a fixed installation with lowered floor (full standing height), where restrooms and an interior concept called 'Airlounge' is installed. Additional standard container based 'experience modules' can be installed and easily exchanged to adapt the lower deck experience.

## 2 The FUCAM cabin

FUCAM involved several comprehensive studies and surveys for acquiring the passengers' requirements and profiles and a further in-depth study on air transport trends, key airports, overview on airlines, challenges in the development of the air transport market, and key routes.

A series of user involvement activities accompanied by desktop research to identify trends, cultural factors and preferences relevant for cabin design have been complemented so as to enhance the user and market understanding. Furthermore, a comprehensive database of relevant latest, emerging and soon-to-emerge technologies for potential application within FUCAM cabin concepts, counting 353 items, has been compiled.

A down-selection of technologies that are most beneficial in scope of the FUCAM project has been performed in accordance with the needs of modern Asian customers as identified by partners, and the preferences of project stakeholders as identified using internal and external expertise.

The basis for the approach to assess the identified technology against the proposed FUCAM cabin concepts has been established following a comprehensive review of existing Technology Assessment methods, having identified around 40 Technology Assessment specific criteria.

Developing the integration approach for the future cabin concepts included the assessment of the concepts in terms of general feasibility, the elicitation of the requirements to achieve this feasibility, as well as the development of concepts for installation, customization and systems integration.

Finally, the functional verification and validation of the developed concepts regarding the functional requirements was also performed.

## ***2.1 Selected passenger & operator insights***

Below you will find some example of passenger and operator insights driving the development of the concepts

### **Passenger in Japan:**

- Emphasis on comfort; seats, technology, pleasant environment achieved with personal items. Maintaining a good feeling and atmosphere
- High awareness of quality, the feeling of quality from small details and going the extra mile
- Not disturbing others; Japanese concept of *Meiwaku* has a strong effect in behavior
- Personalization and customization are important, and a way of expressing oneself
- Curiosity and openness to new experiences and information paired with planning and preparation
- Collectivity, traveling as shared experience

### **Passenger in China**

- Growing number of people who are new to air travel, strong and clear indications needed to support activities and preferred behavior
- Experiences are important, there is a willingness to pay for them
- Not afraid to express their thoughts and feedback explicitly and publicly
- Bringing a large amount of bags, food and other personal items on board
- Ability to create a feeling of personal space within limited physical space and separation from others

### **Operator/Airline**

- Important passenger groups: millennials, non-Japanese travelers in Japan (internal market decreasing), elderly people, business travel (even if decreasing) and leisure travel

- Customizing one's travel experience one potential source for ancillary revenue
- Trends affecting air travel: inclusive design (elderly passengers), more holidays (more leisure travel), customizing services and cabin experience (technology and data)
- Potential for differentiation and better brand visibility considered as important elements in future cabin design, with consideration on ease of maintenance and general cost-savings in operations
- Quick modification of the seating ratio (business + economy), as well as seasonal change of interior atmosphere favored

## 2.2 Cabin Concepts

The concepts include seating solutions for Business Class and Economy Class on main deck complemented by lower deck facilities using the existing cargo space. The lower deck consists of a fixed installation with lowered floor, where restrooms and an 'Airlounge' is installed and a flexible installation where standard cargo container based 'experience modules' can be installed and easily exchanged.



**Fig. 1.** Concepts overview

- **Business Seat Concept main deck**



For the Business class area on main deck, seats derived from Japanese living room chairs were designed. These seats have a very low relax seat position with a large meal and cocktail table that enables simultaneous multiple activities with a sense of quality and privacy. Passenger can work, eat, relax or take a nap thanks to the interchangeable hard and soft seat cushions.



**Fig. 2.** Business Seat Concept

The seat is optimized for short-mid haul flights and can be fitted to wide and narrow body aircraft without modifications. In terms of aircraft integration, this element does not require any specific engineering efforts. The usual seat interfaces will be unchanged and provided

### Passenger benefit

- A comfortable “nest” with a sense of quality and privacy
- Multi-usability for activities such as work, eat, relax nap
- Relaxing seat reclining positions
- Large meal table and cocktail table surface enables simultaneous multiple activities
- Interchangeable hard and soft seat cushions

### Operator benefit

- Optimized for short-mid haul flights
- High density layouts - Enough space to stretch legs without compromising seat density
- Fitted to seat tracks
- Wide and narrow body aircrafts
- Simple in structure which can be made low cost
- Services at flexible timing to not disturb passengers at un-wanting times
- Easy operation

- **Super Economy Seat Concept main deck**

For the Economy Class area on main deck, a versatile compact and light-weight bench style seat was developed. The seat can be used by single passengers, families or provide comfort to people of stature. A variable design allows that the seat may be occupied by three adult persons or two persons of size or even a family with two small children.

This concept provides increased seat pitch with measures to prevent decreasing the level of comfort.



**Fig. 3.** Super Economy Seat Concept

Accordingly, the seat design allows easy brand customization or pay per use services offered by the airline (for example in seat gaming). Besides the additional revenues this will also help airlines to raise their brand perception by entering into powerful partnerships with iconic brands.

The super economy seat also makes the most of in-seat stowage space and facilitates BYOD (Bring your own device) which is a growing trend with passengers while also saving money for the airlines.

Particularly de-regulated aviation markets ask for more diversity of travel class offers. Enabling affordable travel experiences for emerging markets.

**‘Airlounge’ – Lower Deck “The third place experience”**

The ‘Airlounge’ Concept comprises a fixed installation on lower deck with lavatories, seating possibilities and possibly vending machines. The installation includes a staircase to access the lower deck on a lateral position. The stairs are designed and located in a way that the required space is minimized on main and lower deck. The space below the stairs is used for seating and or vending machines as well.

The fixed installation provides full standing height and is designed to build a convenient experience for relax and as transition space to the lavatories. The lavatories are designed as separate gender lavatories, improving the comfort and designed for Asian preferences. The fixed installation can be combined with additional variable and easily to exchangeable container modules to increase the passenger capacity of the Airlounge and provide additional offers for the passengers. Concepts including the interior design and business scenarios are defined for catering and experience features for retail, relax, work, and gaming

The ‘Airlounge’ could be offered to business and/ or economy class passengers that will be located around the stairs for easy access.



**Fig. 3.** Airlounge Concept

The advantages are:

**Passenger benefits**

- ✓ Enhanced flight experience
- ✓ Facilitate multiple activities; relax, eat, socialize
- ✓ Gender separated and comfortable lavatories
- ✓ Lowered floor to provide full standing height
- ✓ Builds the comfortable transition space to access experience modules

**Operator benefit**

- ✓ Especially on medium range routes in Asia where the cargo capacity is not fully needed, the concept allows the Airline to enhance the customer experience and generate extra revenues
- ✓ Can be offered to economy class passengers that will be located around the stairs for easy access – defining an economy+ class where passengers pay a higher ticket price. Alternatively the access to this space can be charged extra/time for all passengers.
- ✓ Extra offer for business class passengers
- ✓ No loss on seat count (lower deck lavatories compensate space)

• **Immersive Retail Experience Modules**

The Retail Module is offered to facilitate on-board brand engagement and shopping. Going beyond current offers of in-flight beverage and drink purchases, it offers the opportunity to connect with the brand through an immersive experience as well as browse and pre-order from a vast selection of

goods and services (clothing, shoes, taxi, car rentals, hotels or other accommodation, baggage service, spa treatments), to be delivered at the destination airport, hotel, or elsewhere during one's further trip.

Retail Module facilitates added benefits from co-branding between the airline and a particular goods supplier, to offer the passenger access to the exclusive content that directly or indirectly promotes the sale of these goods, allowing for an increase of ancillary revenues



**Fig. 4.** Immersive Experience Retail Module

The advantages are:

**Passenger benefit**

- ✓ Facilitates on-board brand engagement and shopping beyond current offers of in-flight beverage and drink purchases
- ✓ New entertainment; with more activities and leisure options during flight
- ✓ Convenience of on board sales; time saving for leisure and business trips
- ✓ Access to exclusive & personalized products; only available on flights.
- ✓ New experiences on plane; from the discovery of a new space to new retail concepts.

**Operator benefit**

- ✓ Retail Module facilitates added benefits coming from co-branding between the airline and a particular goods supplier, to offer the passenger access to exclusive content that directly or indirectly promotes the sale of these goods and allows creating direct revenues from a larger amount of ancillary revenues.
- ✓ Opportunities for strategic partnerships; for brand equity and operational synergies.
- ✓ Diversification of services, away from a commodity provider to integrated service provider
- ✓ All modules use standard container. Flaps are integrated for easy maintenance/cleaning or refill outside the aircraft
- ✓ Simple installation, min extra weight, min cost, quick module exchange
- ✓ All modules use standard container, easy maintenance/cleaning or refill outside the aircraft

**3 Conclusion**

The shown concepts were developed for a future aircraft cabin for the Asian market, providing means for passenger seating and extra spaces on lower deck that can help to improve the comfort in the future. Even by having high density seating layouts, mandatory for an economical efficient operation of an aircraft, the FUCAM concepts are developed to maximize the comfort for the passengers, taking into account economical, technical and regulatory requirements and constraints of aircraft operations.

The Passenger experience can become a real game changer for airlines in terms of revenue and diversification especially for the fast growing Asian market.



**Fig. 4.** FUCAM mock up

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