



## THE PROJECT

**The Air Cargo technology Roadmap project focuses on the future role of air freight and the definition of a technology roadmap for future cargo aircraft responding to end user requirements and environmental needs. In order to improve seamless flow of goods, inter-and co-modality approaches will be considered within the SESAR operational concept. Main issues of the CargoMap (CSA-SA) project are:**

- Analysis of current situation versus the demand with the involvement of the stakeholders in Europe among all actors (manufacturers, research establishments, regulators, airspace users, infrastructure providers, airport managers)
- Expected future bottlenecks/challenges in air freight transport and the identification of the corresponding requirements. The requirements will identify the technology needs and regulatory issues to be addressed
- Synopsis and evaluation of possible improvements related to future business models
- Definition of a technology roadmap to fill the technology/regulatory/operative gaps in order to fulfil the requirements considering the current capabilities

The project investigates what new challenges and opportunities exist for new air cargo operations in the future, responding to societal challenges and the concept of seamless multimodal transport chains. Based on business models for such new types of air cargo operations, the need for novel dedicated air cargo planes will be derived and the technologies that will be needed to create these novel airplanes will be identified in a roadmap.

This is a totally new approach within the Framework Programme. Whilst identifying novel technologies, only

those specific to air cargo operations will be shown in the roadmap, assuming that generic technologies in aviation will take place. The roadmap will identify current and planned research and missing elements to enable a new generation of air cargo aircraft to be realised.

**For more information please visit:**

[www.cargomap.eu](http://www.cargomap.eu)

**Project details:**

Project full title: Air Cargo Technology Road Map  
Project acronym: CargoMap  
Call identifier: GA No. FP7-284551  
Area: AAT.2011.7-18.: Assessing the role and needs of air freight in air transport  
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**Participants:**

SLOT - Slot Consulting Ltd. (The coordinator) (Hungary)  
ADC - Ad Cuenta B.V. (The Netherlands)  
CIRA - Centro Italiano Ricerche Aerospaziali SCPA (Italy)  
DLR - German Aerospace Center (Germany)  
GRUP - Gruppo Clas (Italy)  
ILOT - Institute of Aviation (Poland)  
TUOD - Delft University of Technology (The Netherlands)

**Consortium**

The effectiveness of the consortium is built on the diversity and the complementarity of the project partners. The consortium members were selected with the aim of representing the European air cargo transportation community as carefully as possible. The competences of the partners complete one another in a way that forms a strong and reliable team.



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## ABOUT CARGOMAP

### Spill-over effects of the future aircraft technologies:

- It is expected that aeronautical developments will continue to be aimed at decreasing fuel consumption and emissions (e.g. reducing drag and weight), improve safety through new on board systems and avionics, etc.
- These developments will also be applicable for new cargo aircraft.

### Why focus RTD on air cargo aircraft technologies?

#### Pilotless flying

- Pilotless flying for commercial operations should be developed by 2035;
- Unlike military UAS - which use restricted airspace - the commercial operations should make use of normal airspace;
- Pilotless vehicles could be flown by an operator on the ground or be fully autonomous with on board sense and avoid capabilities;
- Safety targets of one accident per 10 million flights need to be achieved (military target at 1 per 10 thousand flights);
- Pilotless flight should be certifiable and any liability issues should be resolved;
- If pilotless flight is allowed, aircraft do no longer need a pressurized cabin;
- This would enable low cost alternative aircraft configurations;
- Aircraft weight and complexity can be substantially reduced, saving weight, fuel and cost.

#### Novel air containers (The air box)

- Current aircraft containers are not compatible with containers used in surface transport;
- New cargo aircraft should be designed to handle new lightweight air containers that will fit into the standard 20 feet containers used by other transport modes for seamless transport;
- Some types of air cargo will need pressurized and temperature regulated containers;
- These novel multi-modal light weight containers still need to be developed;
- The alternative is to use one or more composite pressurized cylinders to create a partly pressured cabin as proposed by, among others, TUDelft.

#### VTOL

- Future air cargo aircraft will need new advanced VTOL/STOL propulsion solutions that will be cost effective and environmentally friendly;
- New concepts are needed.

### Future aircraft configurations

Cargomap identified a number of possible future aircraft configurations and selected the preferred solutions based on a qualitative assessment to understand technology needs:

- Long haul aircraft configurations
- Medium haul aircraft configurations
- Regional cargo aircraft configurations
- Urban delivery aircraft configurations

#### Preferred solutions of long haul aircraft configurations

In view of time versus cost and frequency parameters Cargomap concluded that the most attractive configurations are:

- Blended Wing-Body pilotless, unpressurized subsonic aircraft;
- Formation flight capable morphing aircraft.

#### Preferred solutions medium haul aircraft configurations

In view of time versus cost parameters and the cost versus trucking Cargomap concluded that the most attractive configurations are:

- The small regional cargo aircraft (4-10 ton);
- The medium airlifter;
- Advanced VTOL.

#### Regional cargo aircraft configurations

- Could make use of MAGLEV strips located near distribution centers;
- Would use Gabriel project results for take-off and landing. ([gabriel-project.eu](http://gabriel-project.eu))

#### Urban transport configurations

- Cargomap identified a small UAS as parcel delivery vehicle;
- Could also deliver small packages (medicine) at remote locations.

### Environmental issues

During the selection process the environmental element was also assessed. This relates to one of the priorities of the EU transport policy, that is sustainability. The analysis showed that the preferred concepts were also the most environmentally friendly ones. Based on this conclusion the conceptual analysis recommended some issues for the technology roadmap:

- Technologies for unmanned aircraft,
- Air container development,
- Advanced configuration studies,
- Morphing technologies,
- Quiet VTOL technology,
- Small UAS development and implementation of urban concept.



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