



ICAO

UNITING AVIATION

E-GAP

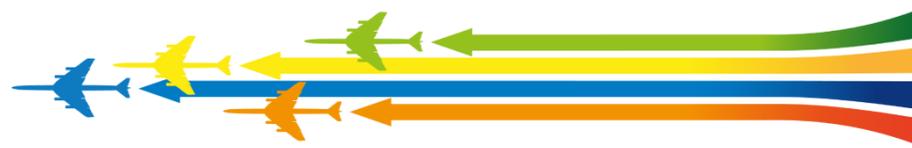


ICAO Global Aviation Partnerships on Emissions Reductions (E-GAP)

Multiplying Environmental Action

Eco-innovation, preparing the future

Olivier Husse



Air traffic growth requires to reduce environmental impact of aircraft

➤ What are the technology targets to reduce emissions and noise from aviation?



Flightpath 2050



-75% CO₂

-90% NO_x

-65% noise

Reference year: 2000

Advisory Council for Aeronautic Research in Europe





We leverage both **incremental and breakthrough innovations** to reach aviation eco-efficiency targets

Current state of the art
Airbus aircraft family



Incremental
Developments



New technologies & architectures

New concepts

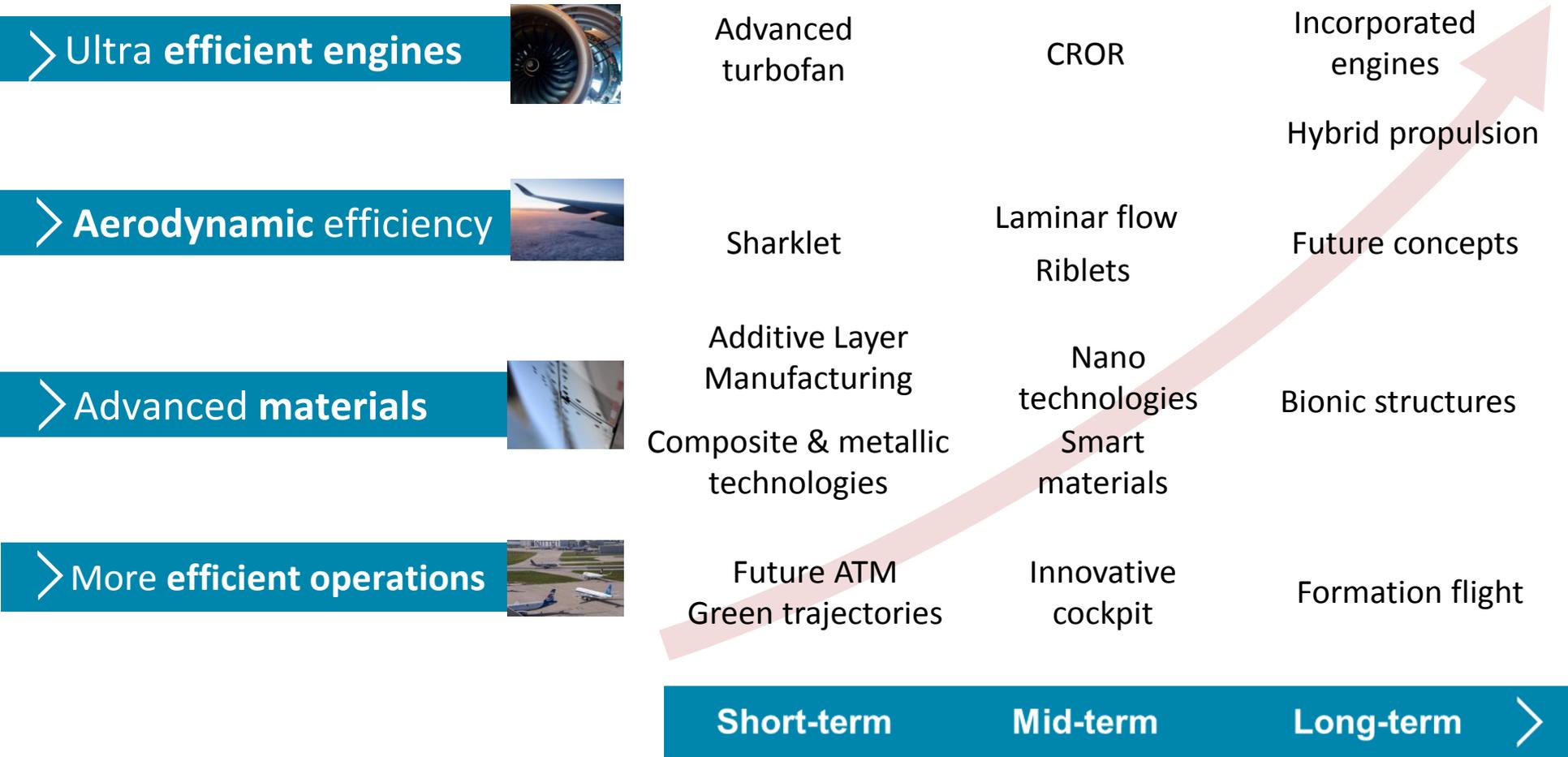


Airbus R&D

Over **2 bn€**
each year to enhance
aircraft efficiency



We will further enhance aircraft eco-efficiency with **new technologies**



Lighter
Stronger
Cheaper

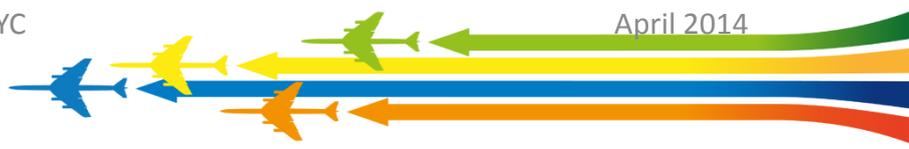
High performance,
more complex parts

Up to 50% weight reduction
can be manufactured
First revenue flight with 3D metallic parts in 2016

95% less raw material waste
Mass production by 2018
Improved fuel burn
Reduced CO₂ emissions

30 tons will be printed every month
Spare parts

On demand manufacturing
Reduced need for large stocks
Reduced manufacturing tool
Plastic, metallic, multi-material
ALM: Additive Layer Manufacturing
parts can be produced



3D Printing Technology & Airbus: A Potential Game-Changer for Design & Manufacturing

8 Main Domains of 3D Printing Exploration

<p>Prototyping</p> 	<p>Tooling</p> 	<p>Flying Parts</p> 	<p>Spare Parts</p> 
<p>On Demand Production</p> 	<p>Methods & Tools</p> 	<p>Skills & Competences</p> 	<p>R&D</p> 



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Working for the **passengers of the future**



Eco-innovation by Airbus

- Be eco-efficient throughout aircraft lifecycle
- Continuously improve in-service aircraft
- Develop cutting-edge new aircraft technologies
- Contribute to smart operations

on both incremental developments & new concepts

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ICAO Global Aviation Partnerships on Emissions Reductions (E-GAP) Seminar
ICAO Headquarters, Montréal, 16 to 17 September 2015

ENV2015



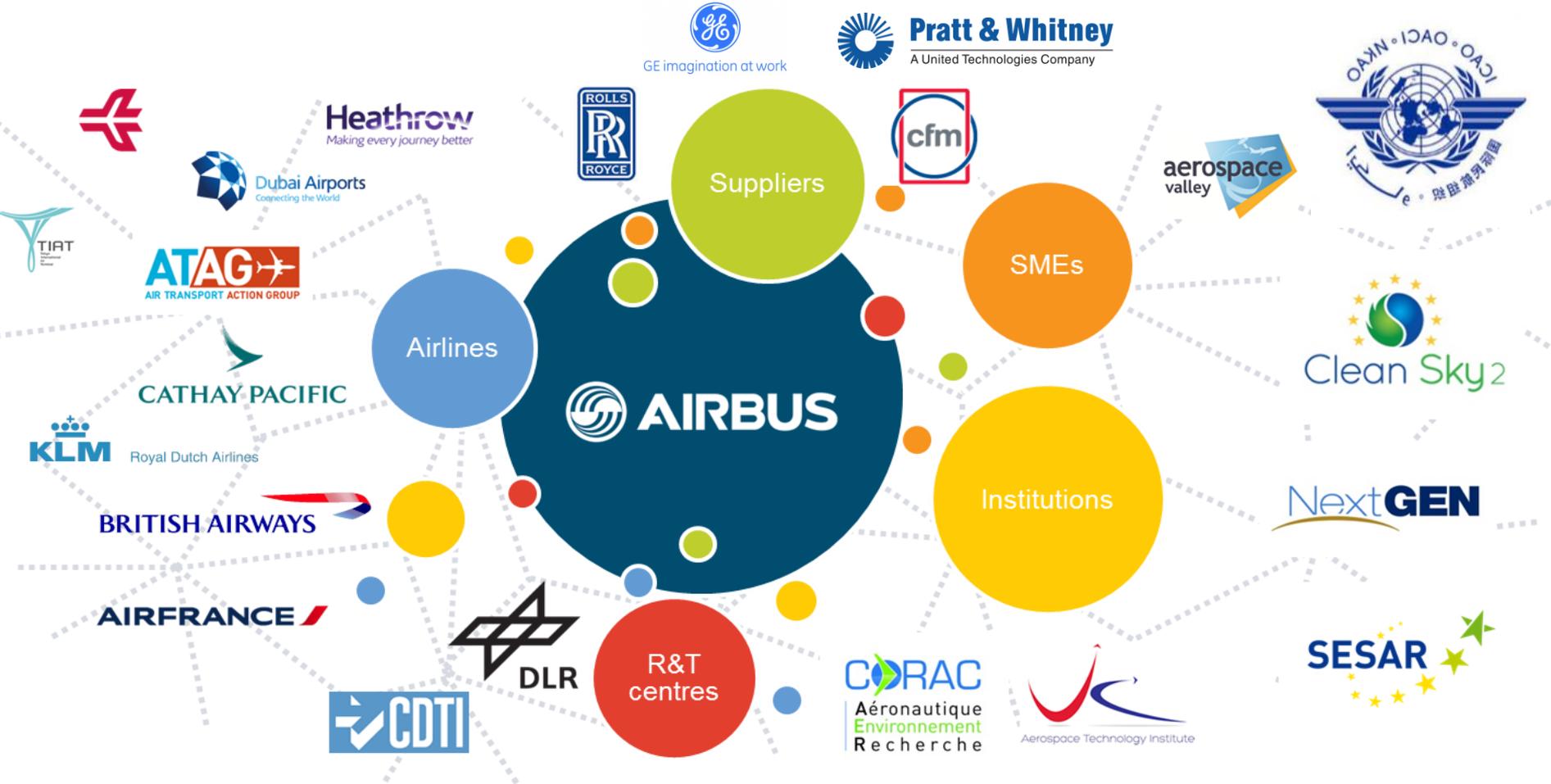
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Eco-innovation relies on strong co-industry partnerships

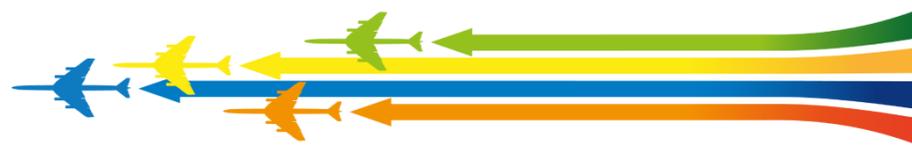




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Backup



Additive Layer Manufacturing addresses main industrial and environmental challenges

REDUCED MANUF. TOOL

- Full digital E2E value chain
- Lower tool industrial set-up lead-time
- Speed shop / Missing Parts / (Lean) FTI

ON DEMAND MANUFACTURING

- Lower cost for low runners / complex parts
- Lower e2e process lead-time
- Better material yield
- Reduced transportation / improved footprint

HIGH PERFORMANCE PARTS

- Function integration
- Lower weight through topological optimisation
- Multi-materials / multi-functions

REDUCED ENVIRONMENTAL IMPACT

- Less energy
- Less waste
- Less CO2 emissions

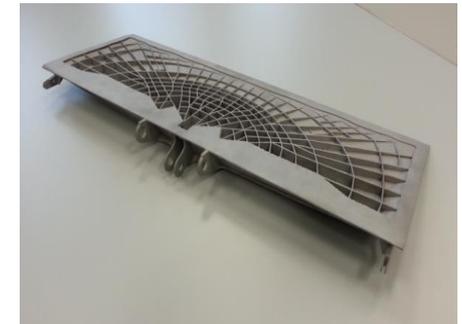
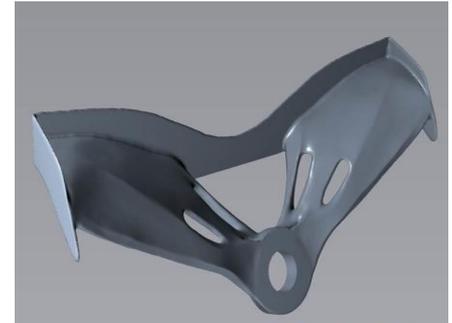


Taking benefit of **ALM** – Additive Layer Manufacturing – 3D Printing!

Expected Benefits

Up to **50%** potential weight saving

Only **5%** waste material vs. 95% with current machining



1st Flying spare parts for cabin

A350 cabin brackets

