Presented by

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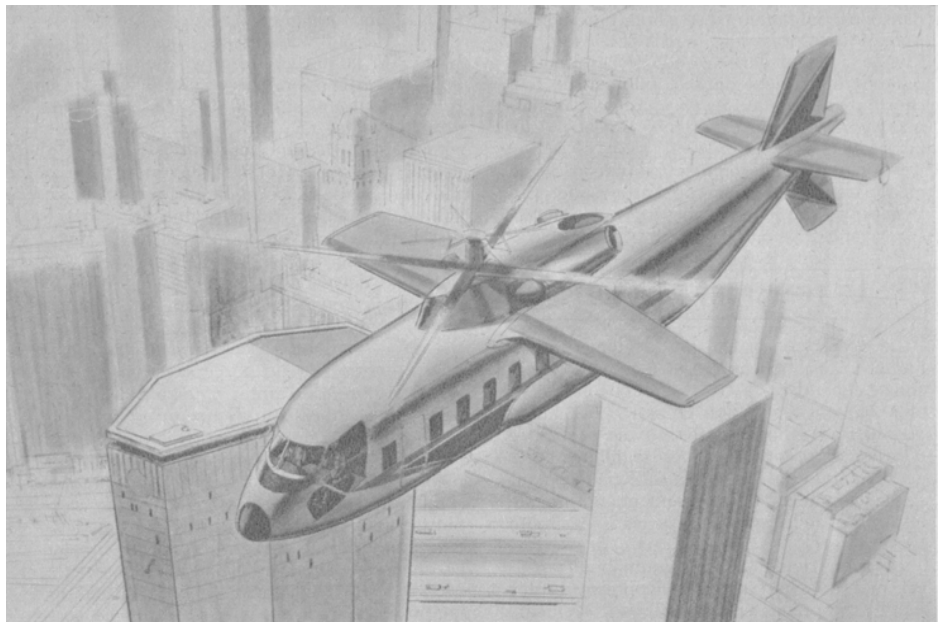
Vice-President Research & Technology

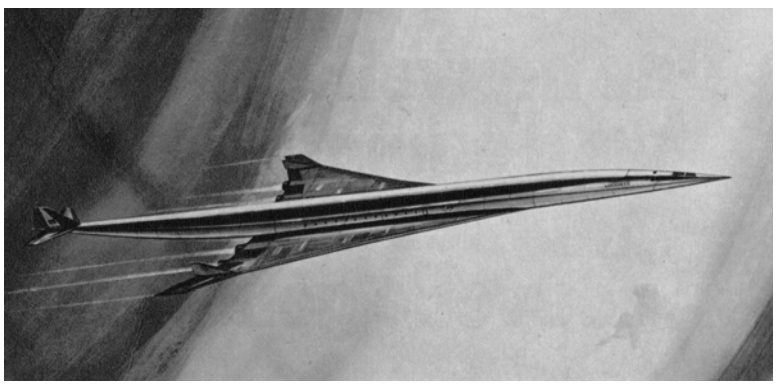
Future Partnerships for Airbus and Universities

What did people think in 1970?

Many thought in 2000 we would see:

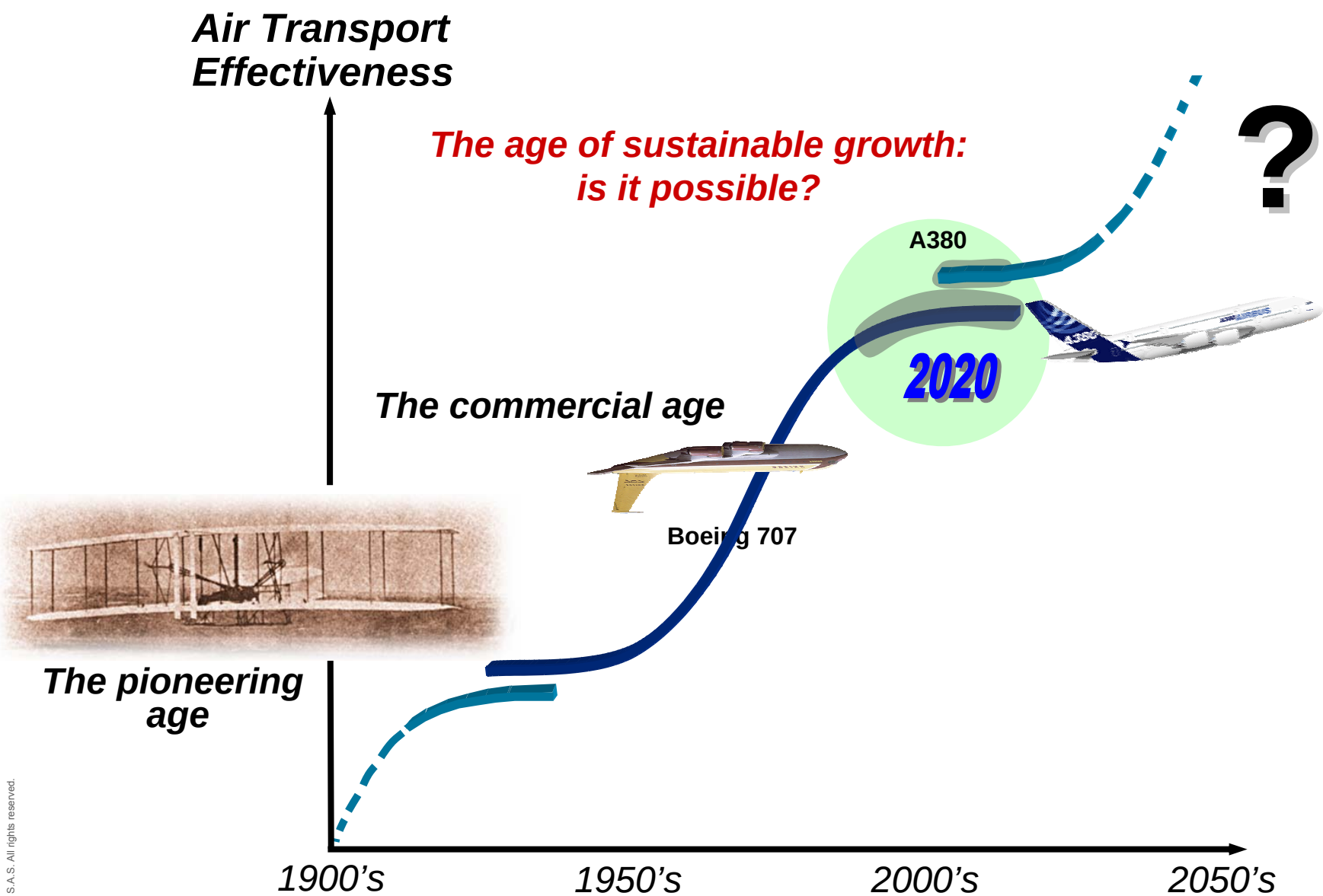
- Size will go beyond 1000 seats
- Propulsion to be either Hydrogen or Nuclear



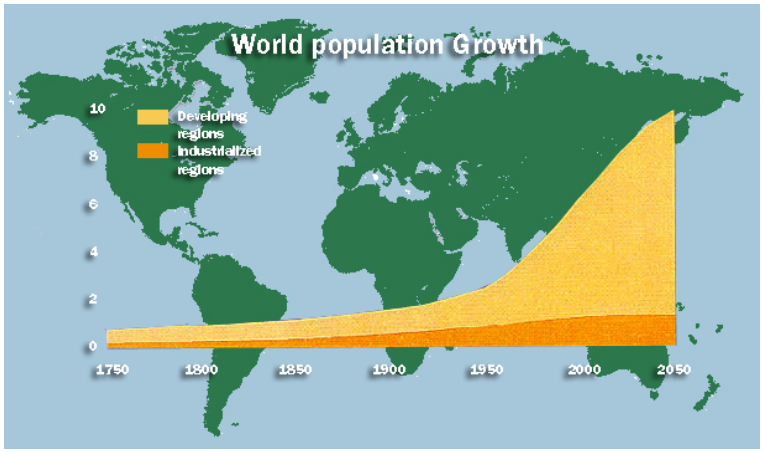


- VTOL aircraft will dominate Short and Medium Range
- Supersonic & Hypersonic For Long Range

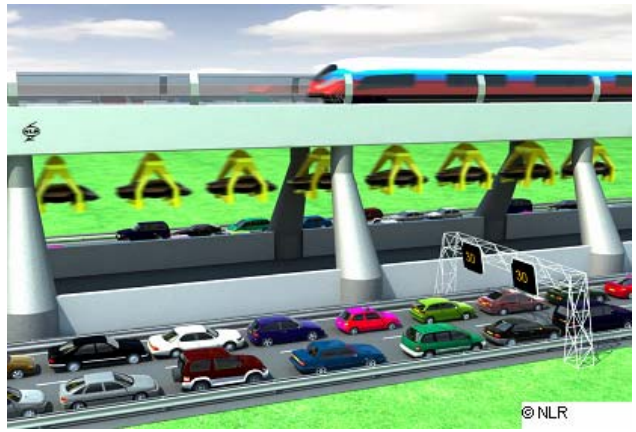
Evolution vs Revolution



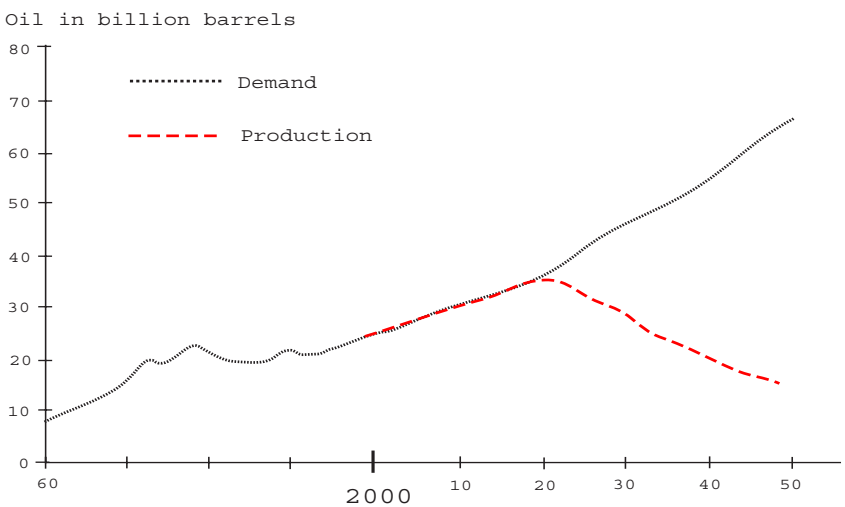
Future challenges of air transport



Further population growth & availability of ressources



New transportation & communication methods



European Aeronautics Vision 2020

Challenges *and associated goals*

- **Quality and Affordability**
  - *Reduced passenger charges*
  - *Increased passenger choice*
  - *Transformed freight operations*
  - *Reduced time to market by 50%*
- **The environment**
  - *Reduction of CO2 by 50%*
  - *Reduction of NOx by 80%*
  - *Reduce perceived external noise by 50%*
  - *….*
- **Safety**
  - *Reduction of accidents rate by 80%*
  - *Drastic reduction in human error and its consequences*
- **The Efficiency of the Air Transport System**
  - *3X capacity increase*
  - *99% of flights within 15' of schedule*
  - *Less than 15' in airport before short flights*
- **Security**
  - *Airborne - zero hazard from hostile action*
  - *Airport - zero access by unauthorised persons or products*
  - *Air navigation - No misuse. Safe control of hijacked aircraft*

…addresses the full scope of customer expectations

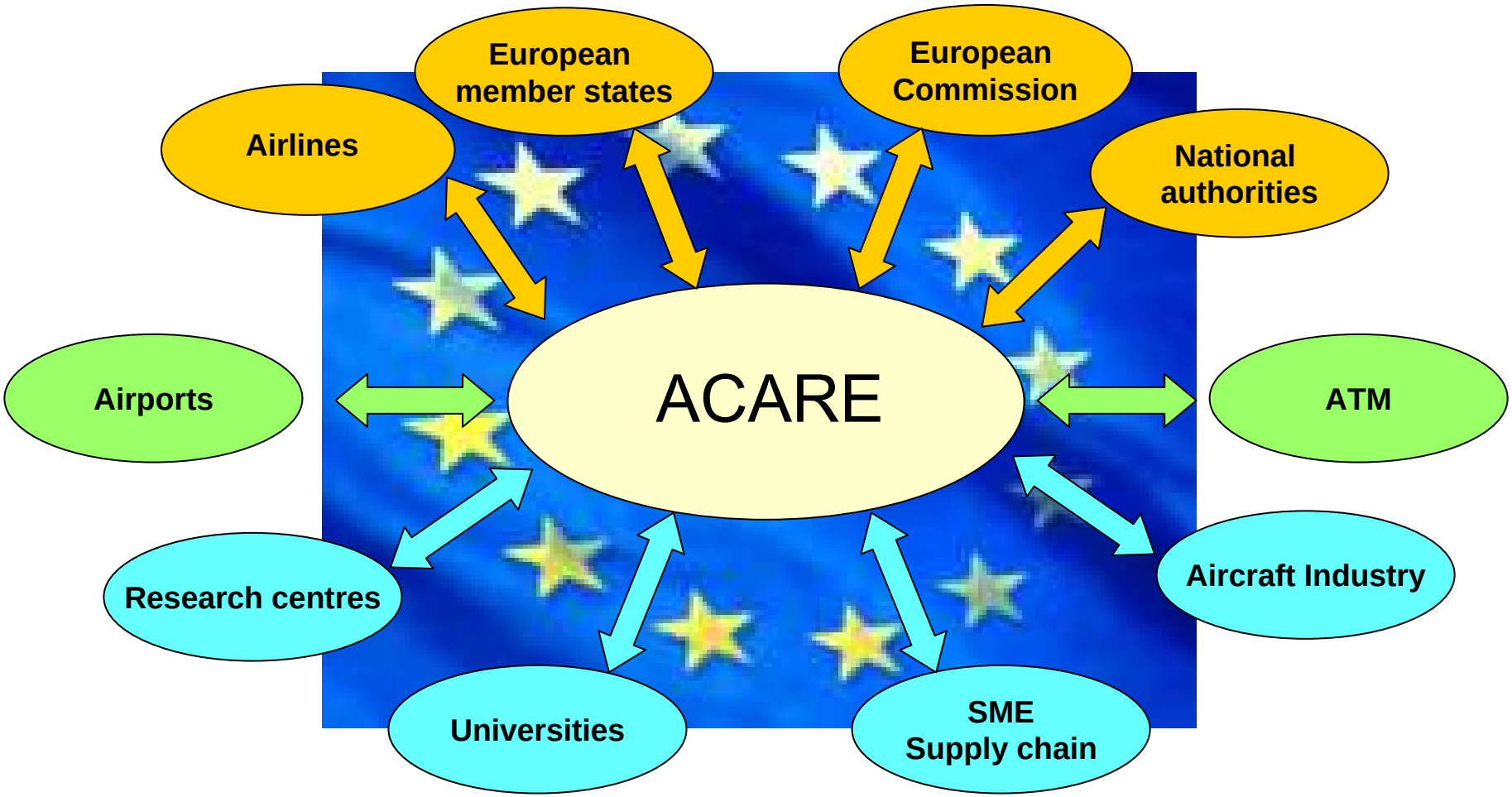
Group of Personalities

Pedro Argüelles, John Lumsden, Manfred Bischoff, Denis Ranque, Philippe Busquin, Soren Rasmussen, B.A.C. Droste, Paul Reutlinger, Sir Richard Evans, Sir Ralph Robins, Walter Kroll, Helena Terho, Jean-Luc Lagardère, Arne Wittlov, Alberto Lina

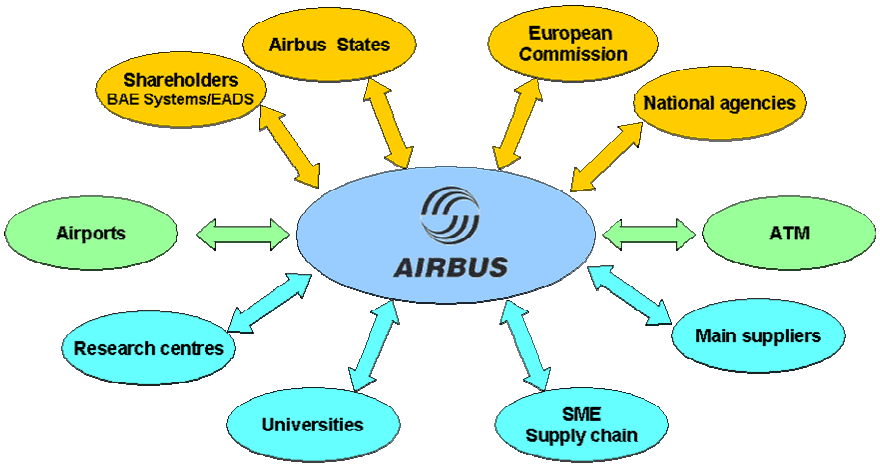
January 2001

AIRBUS

ACARE and its stakeholders

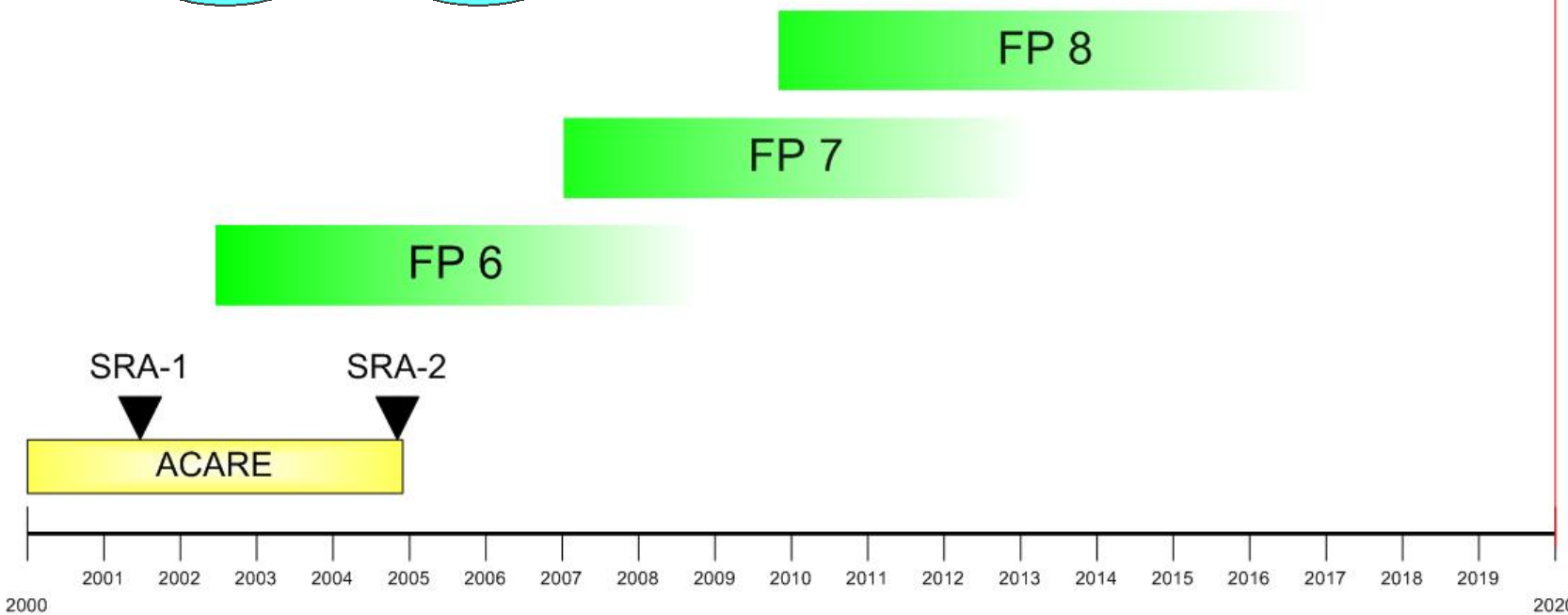


ACARE and the European Framework Programmes



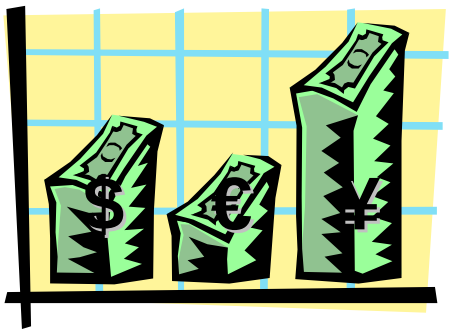
Goals to be met by 2020:

- 50% CO2 reduction
- 80% NOx reduction
- Reduce perceived noise by half
- Reduced time to market by 50%
- Reduction of accidents rate by 80%



Strategic Research Agenda 2 (SRA-2)

5 High level target concepts for Air Transport Systems:



Ultra cost-efficient

Air Transport System

Ultra time efficient

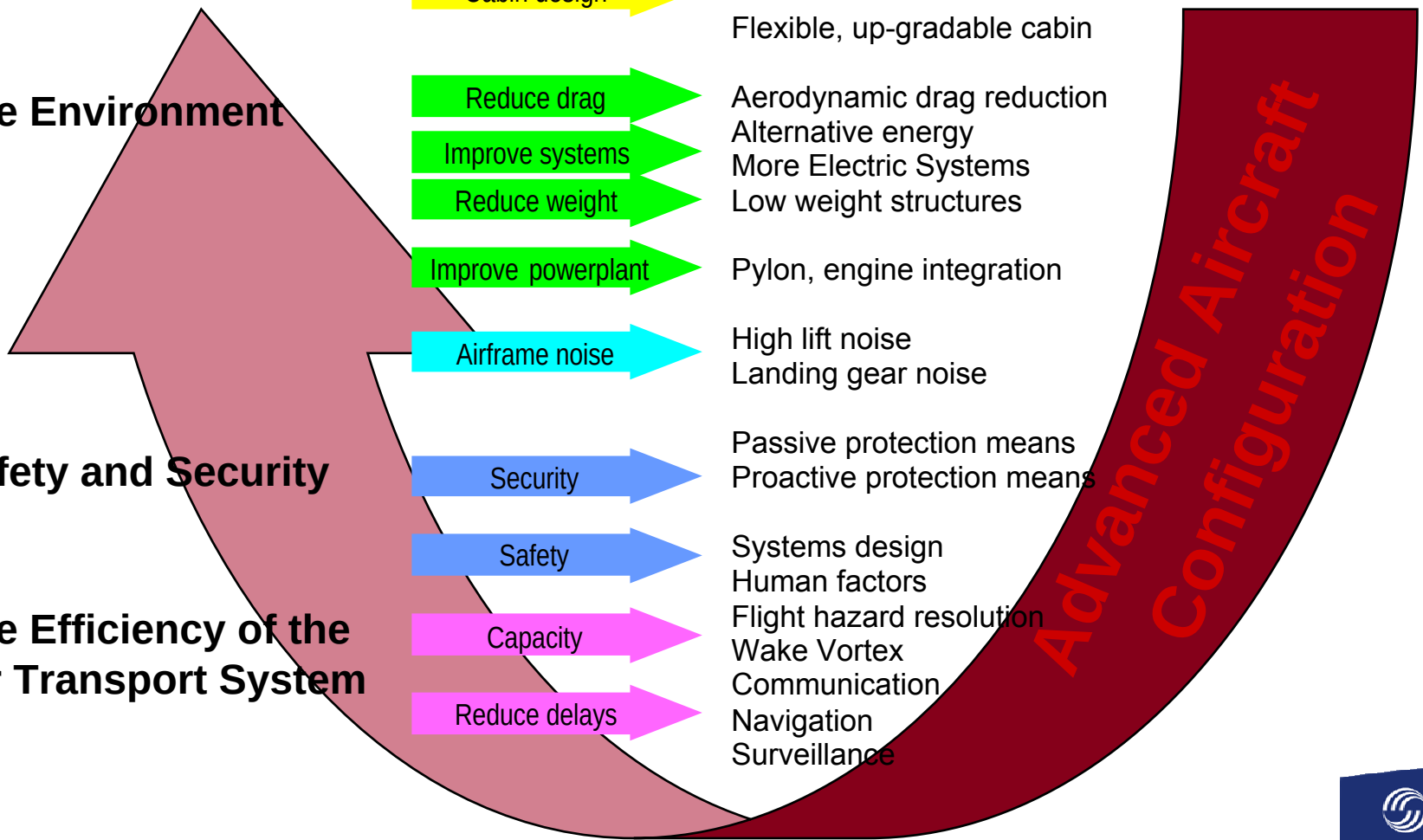
Ultra green

Ultrasecure

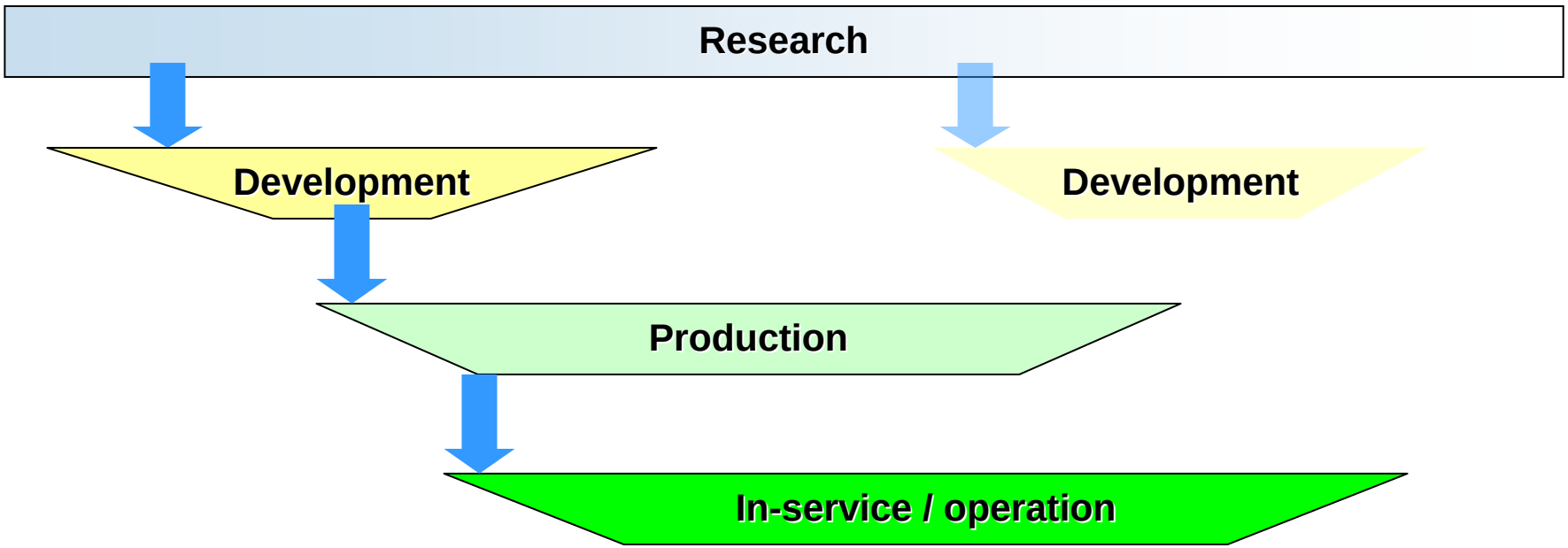
Highly customized

How will Airbus implement the vision?

Challenges of Vision 2020	Challenges for AIRBUS
• **Quality and Affordability**	Lower cost: Low cost manufacturing and assembly Cabin design: Design methods and tools; KBE Flexible, up-gradable cabin
• **The Environment**	Reduce drag: Aerodynamic drag reduction Improve systems: Alternative energy More Electric Systems Reduce weight: Low weight structures Improve powerplant: Pylon, engine integration Airframe noise: High lift noise Landing gear noise
• **Safety and Security**	Security: Passive protection means Proactive protection means Safety: Systems design Human factors
• **The Efficiency of the Air Transport System**	Capacity: Flight hazard resolution Wake Vortex Communication Reduce delays: Navigation Surveillance

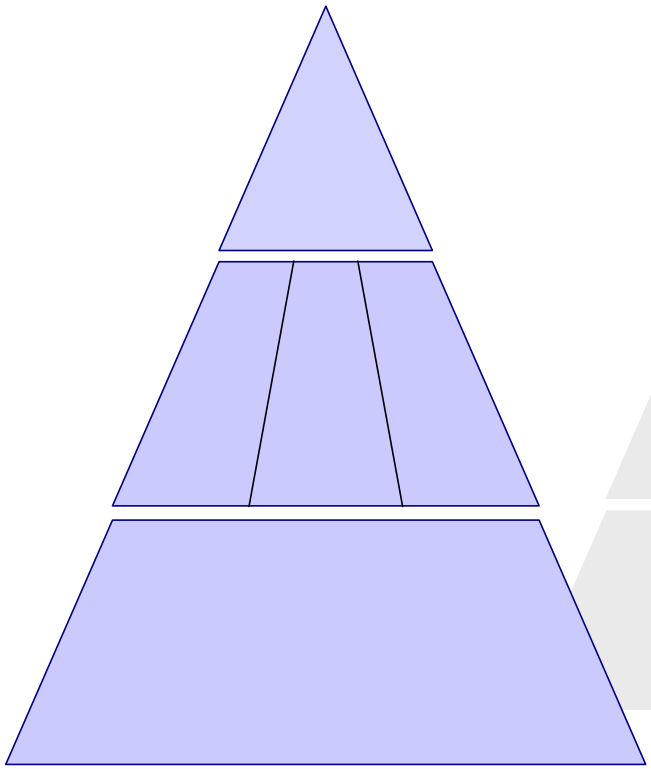


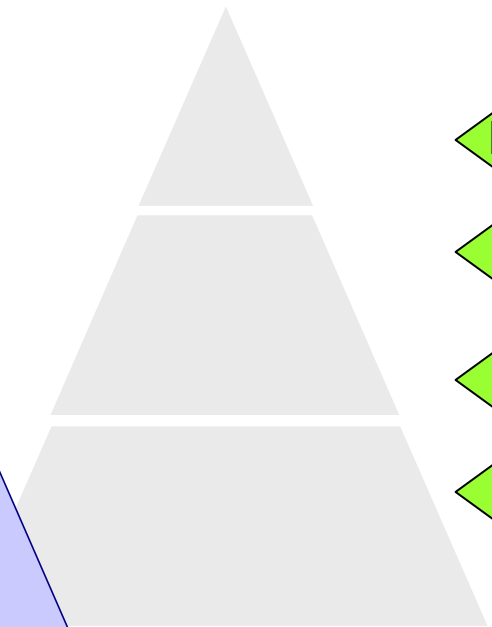
~5-10 ~5 20-40 years 25 years



Aeronautics has a long term cycle

Airframe manufacturers network in R&T



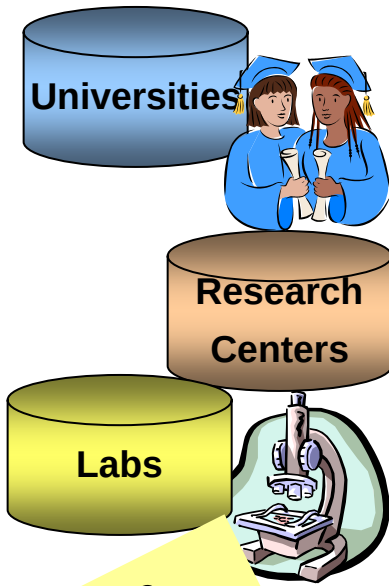


Flight Physics

Structures

Systems

Etc..

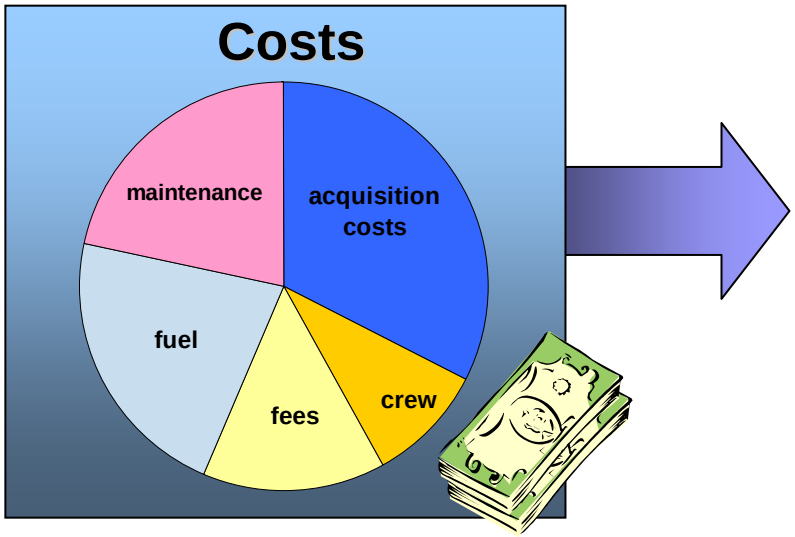


airframe integrator

Education
Competence & skills to support business

AIRBUS

SRA-2 Technology list



Taxonomy area	Technology
Flight Physics	• Flow control • Adaptive winglets • Noise shielding through aircraft configuration • etc..
Aerostructures	• New materials • Highly automated manufacturing & assembly • etc..
Propulsion	• Contra-rotating fan engine • etc..
Human factors	• Autonomous flight operations • etc..
Innovative concepts	• Environmental friendly rotorcraft • High aspect ratio / low sweep configuration • etc..
Integrated design	• System simulation • Fault tolerant systems • etc..

Partnerships: The Concept

Approach:

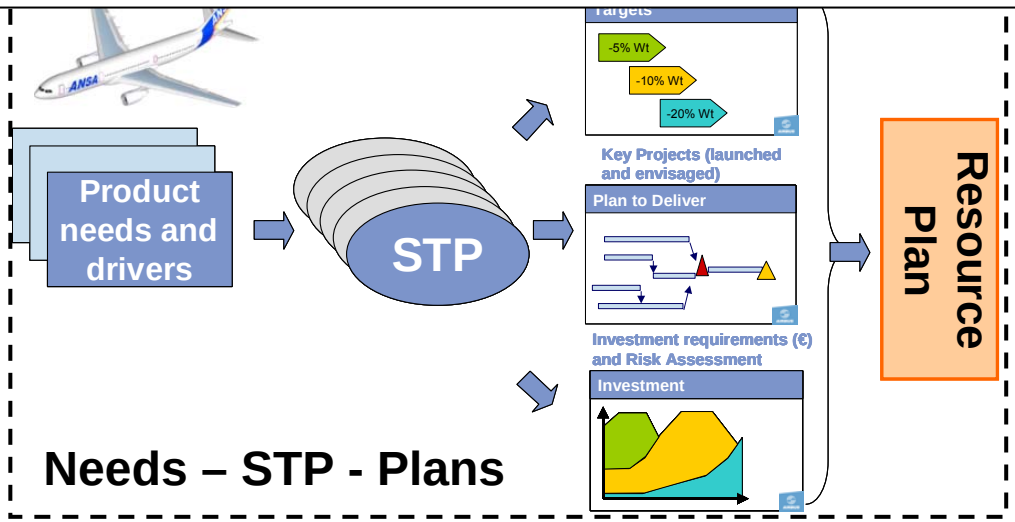
- Operating on a global scale:
  - European Union, Russia, USA, Australia, India, China ….
- Aligned with Airbus Technology needs
- Integrated managed partnerships
- Wide Research Networks

Delivering:

- Access to technology and expertise
- Improved focus and effectiveness
- Access and leverage of resources
- Direction and focus for our partners

Europe

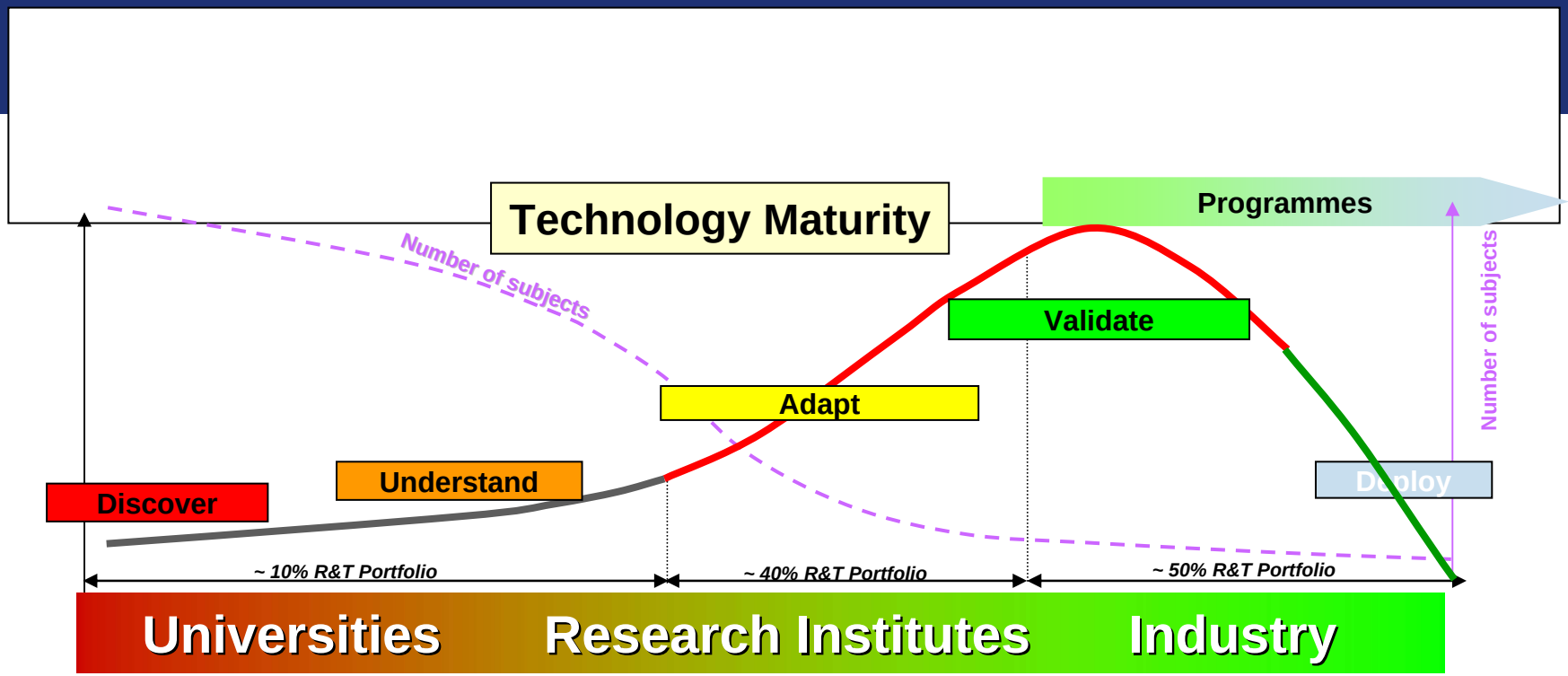
and wider



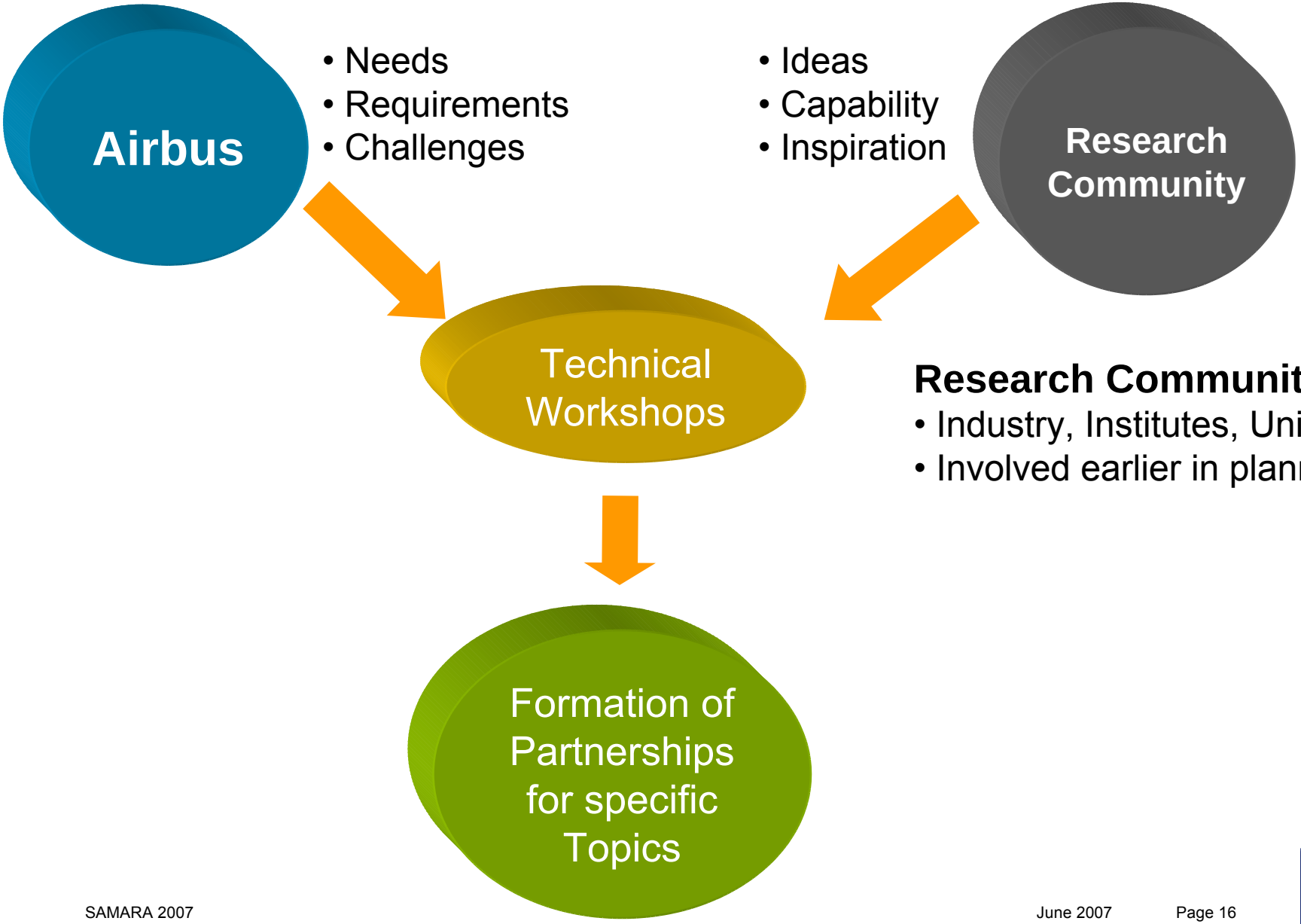
Projects

Conversion of Plans into Action - the steps

- Airbus "**needs**" and Partner "**capabilities**" matching
- Partner selection for specific technical topics
- Definition of Work-packages
- Identification of funding routes
- Preparation and submission of Proposals
- Contract negotiations
- Project Launch

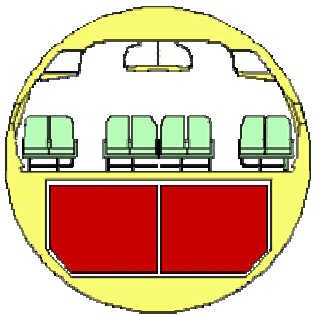
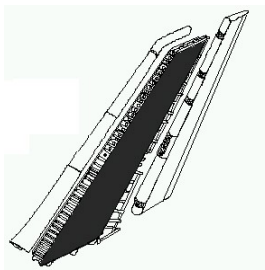
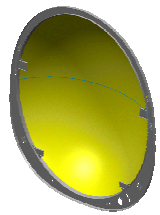


- **Universities**
  - Basic research, generally far from application
- **Research Institutes**
  - Applied research, adapting basic research to industrial needs
- **Industrial Companies**
  - Validating technologies for specific component applications



Research Community
- Industry, Institutes, Univs
- Involved earlier in planning

Technology as driver for success

A300	A310	A320	A330/A340	A380
 twin-engine, twin-aisle a/c	 2 man-cockpit	 Sidestick controller	 All new advanced technology wing	 CFRP centre wing box
 CFRP vertical fin	 Second generation digital auto flight system	 CFRP bulkhead	 Variable Frequency generator	





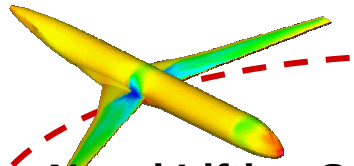
1970 | 1980 | 1990 | 2000

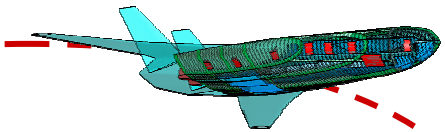
A300B2 | A310-200 | A320-200 | A340-300 | A330-300 | A340-600 | A380

Preparing the future: NACRE

1st of April 2005 saw the launch of the 4 year EU FP6 funded research programme NACRE (**N**ew **A**ircraft **C**oncepts **Re**search) under Airbus lead together with 35 European partners.

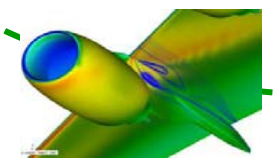
New Aircraft Concepts to foster technological innovation

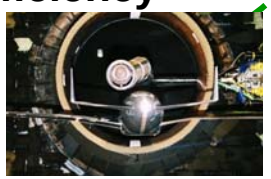


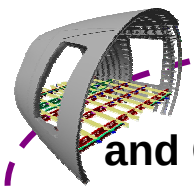


Novel Lifting Surfaces and Control for improved structure and aerodynamic efficiency through an integrated approach

Novel Powerplant Installation: challenging configurations for ambitious goals on environment protection and cost-efficiency







Novel Fuselage and Cabin to develop passenger centered concepts and cost-efficient technologies

AIRBUS

- Partnerships – The concept
- Partner Involvement in the R&T process
- From Plans to Action
- Partner Matching Process
- Funding Instruments
- Contractual Principles: IPR, Publicity
- Proposal Bidding Process
- Next Steps

- **Airbus Direct Contracts, 100% or Co-funded**
  - 100% Airbus funded, following a bidding process.
  - Co-funded with together with Research Partner(s) and Risk Sharing Industrial Partners

- **European Union Funding**
  - Classical instruments such as Framework programmes
  - New Instruments (FP 7, JTI)

- **National and Regional Funding**
  - Via local Networks
  - According to local rules and opportunities

Proposals will be requested from selected Partners.

- Partners will be involved based on the following criteria:
  - Technical Excellence
  - Confidence in Partner Capabilities
  - Project Management ability
  - Facilities, capacity, flexibility
  - Funding and Cost Base
  - Previous Experience

Please Note: Confidence between Parties takes time to grow, however, the process will be open to new Partners.

Project 100% Funded by Airbus

- Airbus owns Foreground IP.
- Airbus granted rights to Background IP needed to exploit Foreground IP.
- Airbus will endeavour to provide Foreground IP user rights to its Partners for their own Research purposes.
- **Patents**
  - All patenting costs borne by Airbus subject to agreement.
  - Airbus is giving an incentive for each patent filed

Project is Co-Funded by Airbus

- Foreground IP ownership to be defined by the Parties within the Research Project contract.
- Rights to Foreground IP and Background IP granted by the Parties for commercial. exploitation taking into account parties' contributions and business interests.
- **Patents**
  - Any Foreground IP suitable for protection will be drawn to the attention of the Parties and necessary action will be taken.

Confidentiality

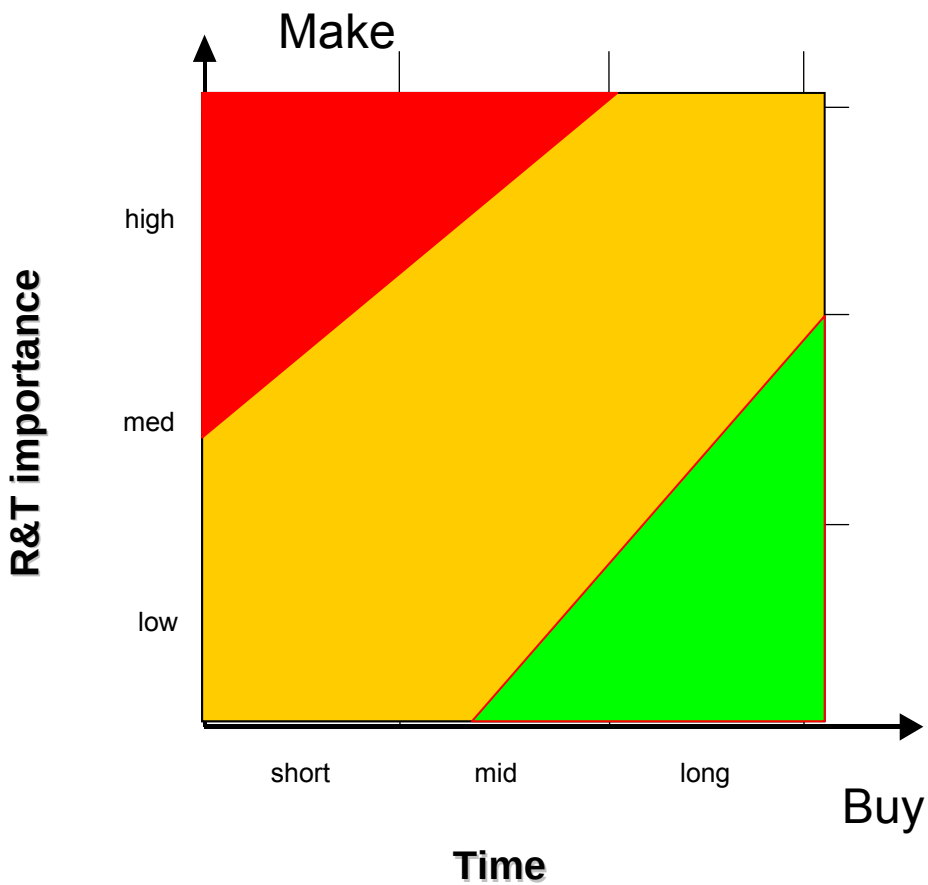
- **When Co-funded:** The Parties must not release any information relating to the R&T activity without the prior written consent of the Parties in accordance with the co-funding contractual rules.
- **When 100% funded by Airbus:** The Partners must not release any information relating to the R&T activity without the prior written consent of Airbus.

Publicity

In general, Airbus, wishes to attract good publicity for its innovative activities and standard procedures exist for rapidly checking and approving publicity material that R&T Partners may wish to issue. Of course, there are cases where good ideas must remain confidential.

Make or Buy Policy

- Based on R&T criticality defined through
  - Time horizon for delivering of results
  - Importance of R&T (technical advantage, as seen by Airbus today)
- Co-located teams may be mandatory depending on criticality



AIRBUS

AN EADS JOINT COMPANY
WITH BAE SYSTEMS