

# Innovation dynamics in Aeronautics and Space

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# Key characteristics of Aeronautics and Space

- Strong linkages between sub-sectors: interaction, overlap and parallels
- Space represents only 6% of Space and Aeronautics employment and turnover.
- High tech manufacturing with very long technology and product development times.
- High R&D intensity: 85% active in R&D, 13% of turnover in R&D
- Spillovers to other sectors & integrating technologies from other sectors
- Defence is important market segment: 40% in aeronautics; 60% in space
- Three countries provide 80% of added value: UK, France, Germany; other players: Italy, Spain, Sweden, Belgium and NL
- Competition from USA, increasingly from Canada, Japan, Brazil, China, India and Russia

# *Innovation trends in Aeronautics and Space*

- From 'Higher, Faster, Farther' to 'Better, Faster, Cheaper'
- Horizontal consolidation & broad and deep supplier base : changes in innovation process & new roles for system integrators and assemblers
- Green aeronautics: Energy efficiency
- Incremental innovations are leading
- Service integration: maintenance, downstream services
- Central role of government as sponsor, customer and regulator

# Drivers of innovation and change

- Growth in air travel
- Smaller, more distributed air travel
- Green aeronautics
- Safety & security standards and legislation
- Societal challenges driving downstream services in space
- Public procurement by institutional (military) actors
- Dual use
- IT developments and avionics
- Artificial intelligence: increasing autonomy, enabling self-organising
- New materials and nanotechnology
- Alternative propulsions and fuels

# Innovation challenges in Aeronautics and Space

- Lack of engineers, low job mobility
- Lack of vertical networking in new downstream space sectors
- Continuation of public investments in long term, 'risky' research
- Fragmented markets and research activities
- Difficult financing of innovation in commercial sector
- Tension between safety and environmental regulation
- Costs of access to space as commercial barrier
- Unresolved liability issues in space
- Access to space data and space infrastructure

# Policy issues in Aeronautics and Space

- Lower barriers for market adoption of new environmental technologies:
  - introduce market mechanisms, such as emission trading system
  - introduce prize rewards to open up innovation to multiple actors and low costs solutions
  - speed up certification process
- Develop legal framework for commercialisation of space
- Stimulate downstream services in space:
  - Introduce platforms to bring together industry, science, regulators from different sectors to set standards, develop new business models
  - Introduce data access policies to stimulate use and development of downstream services
- Stimulate European PhD students in engineering; allow recruiting overseas talent educated in Europe
- Improve effectiveness of research: limit fragmentation
- Support financing of innovation with tailored policy schemes