

The UK National Aeronautics Technology Strategy



Ray Kingcombe

Head of Technology

Aerospace, Marine & Defence Unit

Department for Business, Innovation & Skills (BIS)

Aerospace Industry in the UK

- UK aerospace industry is a manufacturing crown jewel:
 - Second biggest in world after US.
 - 17% Global Market Share.
 - Over 100,000 direct jobs (36% degree or equivalent)
 - Supports a further c130,000 indirect jobs
 - Annual turnover of £21.2bn



Aerospace Industry in the UK (2)

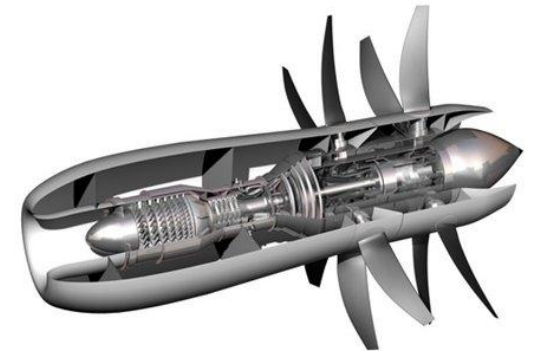
- UK Strategy based around being the global centre of excellence for wings, engines, landing gear, fuel systems, and avionics.
- UK industry has significant involvement on major civil and military programmes:
 - Airbus (e.g. A320, A330/340, A380 *and now* A350XWB, A400M, A320NEO)
 - Bombardier C (e.g. Series)
 - Boeing (e.g. B787)
 - Eurofighter
 - Joint Strike Fighter.



Aerospace Threats & Opportunities

Opportunities:

- \$2.6 Trillion market for New Single Aisle.
- A320NEO (2016?)
- A350 XWB new variants and production ramp-up.
- Civil rotorcraft
- New markets: China, Japan
- UAVs/Autonomy

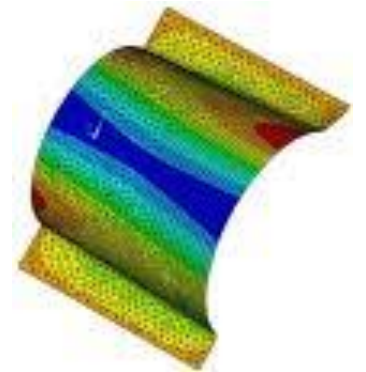


Threats:

- Increasing global competition for high value manufacturing work.

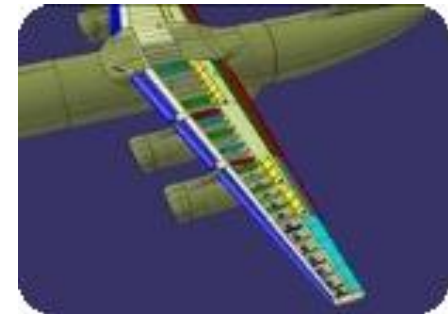
Challenges:

- Changes in technology:
 - Composites
 - Open rotor engines



Aerospace Programme Characteristics

- Characteristics:
 - Long in-service life-30 years.
 - Customers demand substantial operating and cost improvements between generations.
 - Environmental regulations
 - Scale and complexity. Development costs for new civil airliner c£10billion.
- Implications
 - Limited windows to get on new programmes
 - Major technology changes between generations.
 - Need to maintain differentiated capabilities
 - Importance of scale and stability



Aerospace Technology in the UK

VISION:

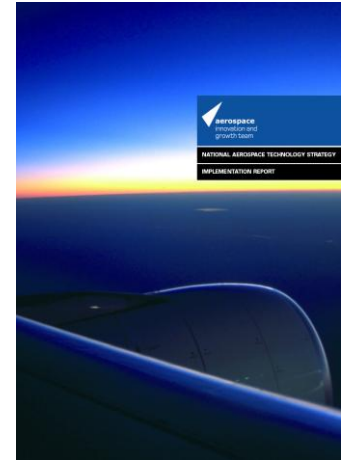
By 2022 the UK will offer a global Aerospace Industry the world's most innovative and productive location, leading to sustainable growth for all its stakeholders.

- Having proven world-class technological capability is an essential enabler.
- National stakeholder group, with reporting line to Ministers, formed to sustain a level of focused Aerospace applied research and validation/ demonstration sufficient to maintain and enhance the UK's position in the global Aerospace market.
- Hence National Aerospace Technology Strategy (NATS) formed in a partnership of government, industry & academia for a market led, jointly funded R&T programme.

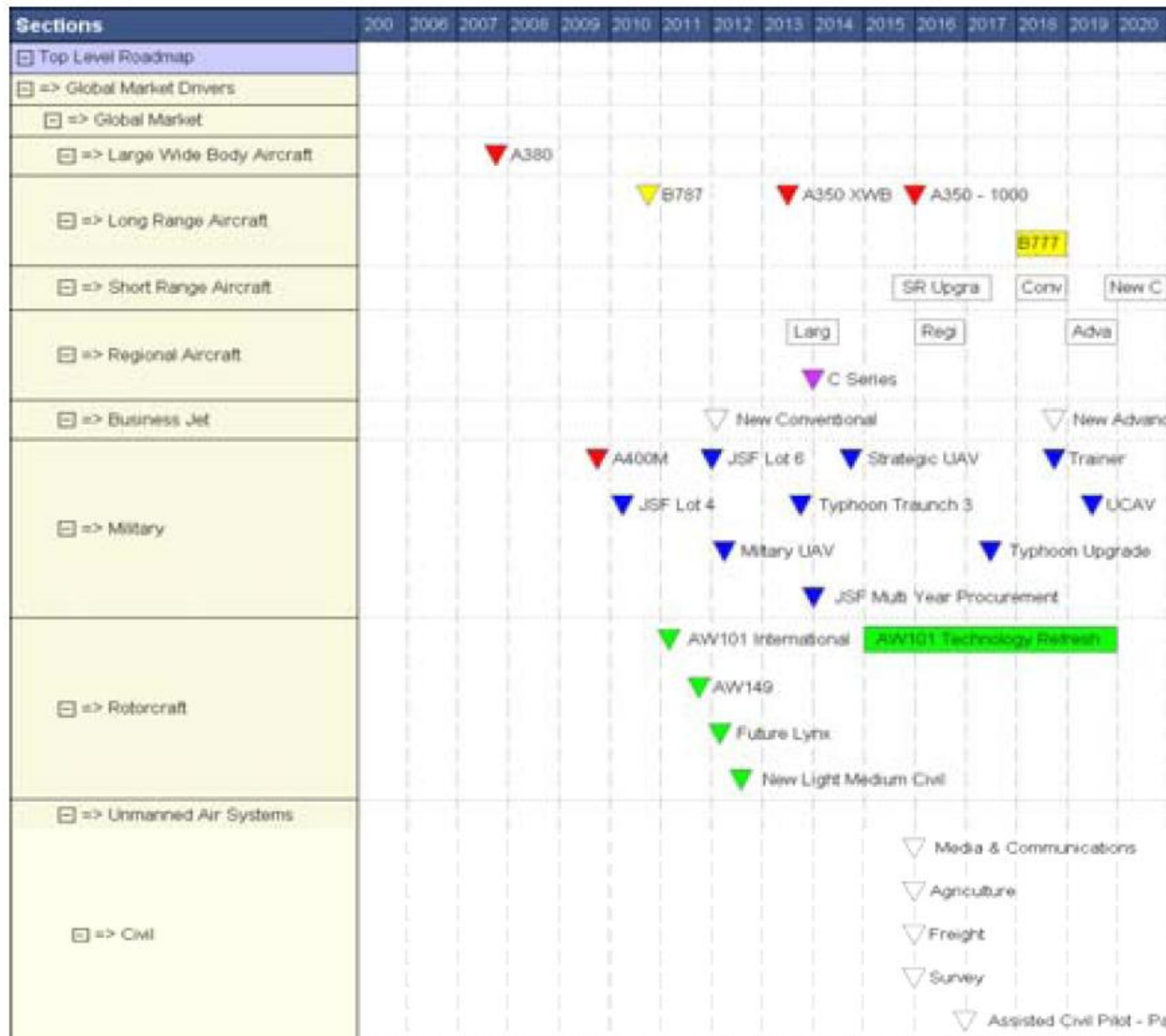


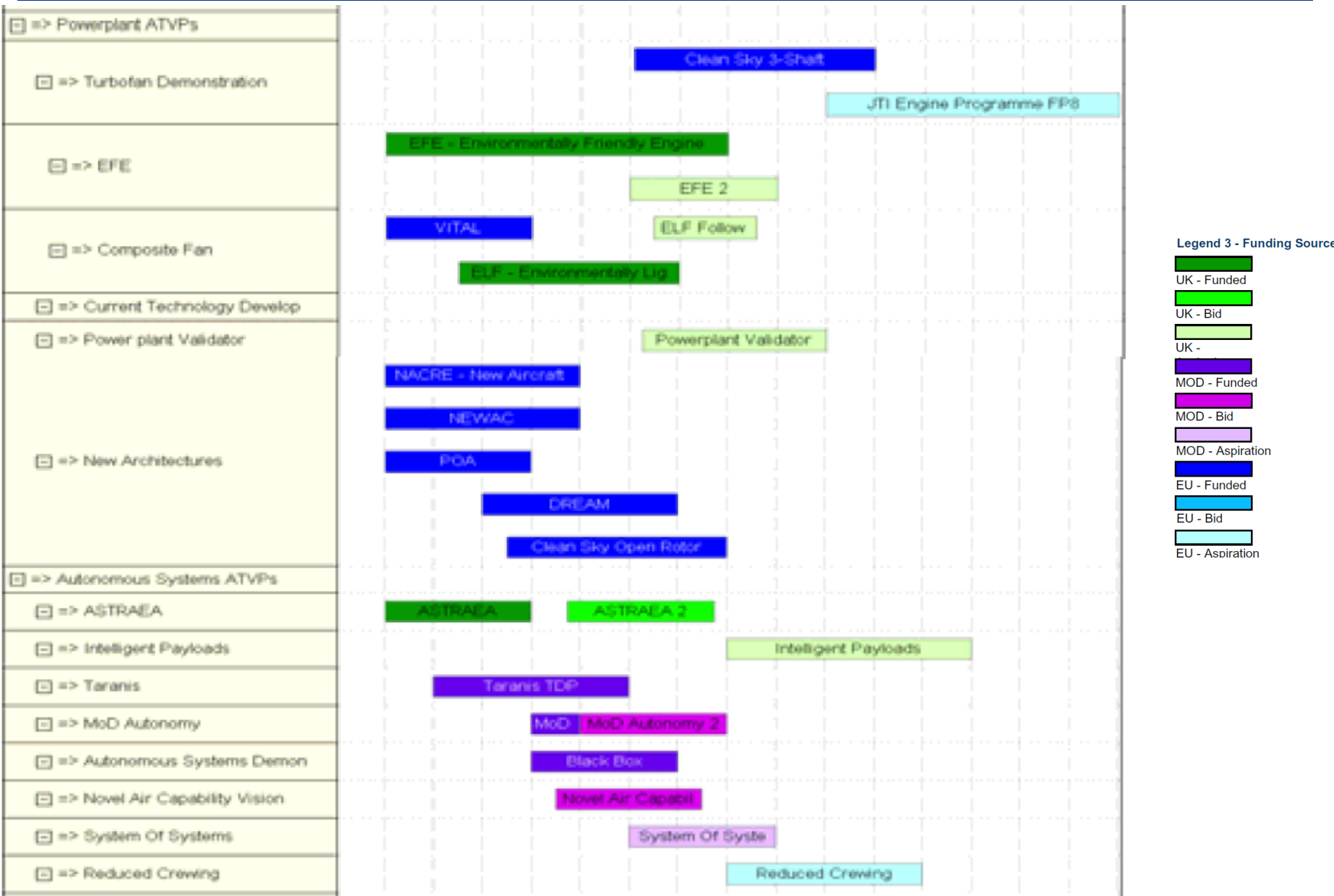
National Aerospace Technology Strategy (NATS)

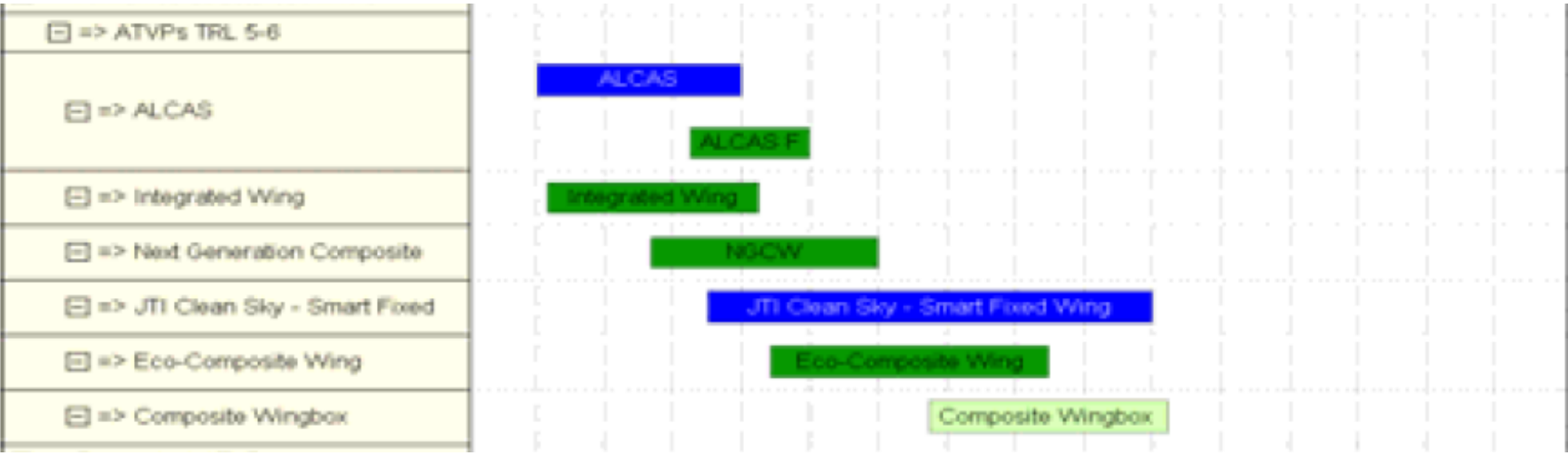
- NATS identified civil & military technology themes where the UK aerospace companies were innovative global aerospace leaders or could become such:
 - Airframes (particularly wings)
 - Engines
 - Equipment (e.g. landing gear, fuel systems, aircraft power systems, control systems, ...)
 - Rotorcraft
 - Autonomous Systems
- The objective of NATS is to embed technology throughout the supply chain as a basis for future product development.
- The NATS aims to add coherence to Military and Civil Aerospace programmes
- Overall government investment in NATS stands at over £400M in the first 6 years - 2004 to date



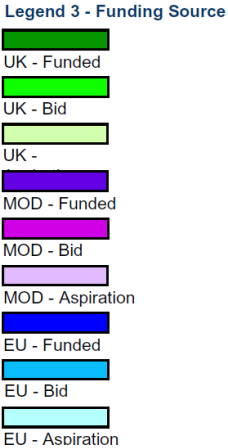
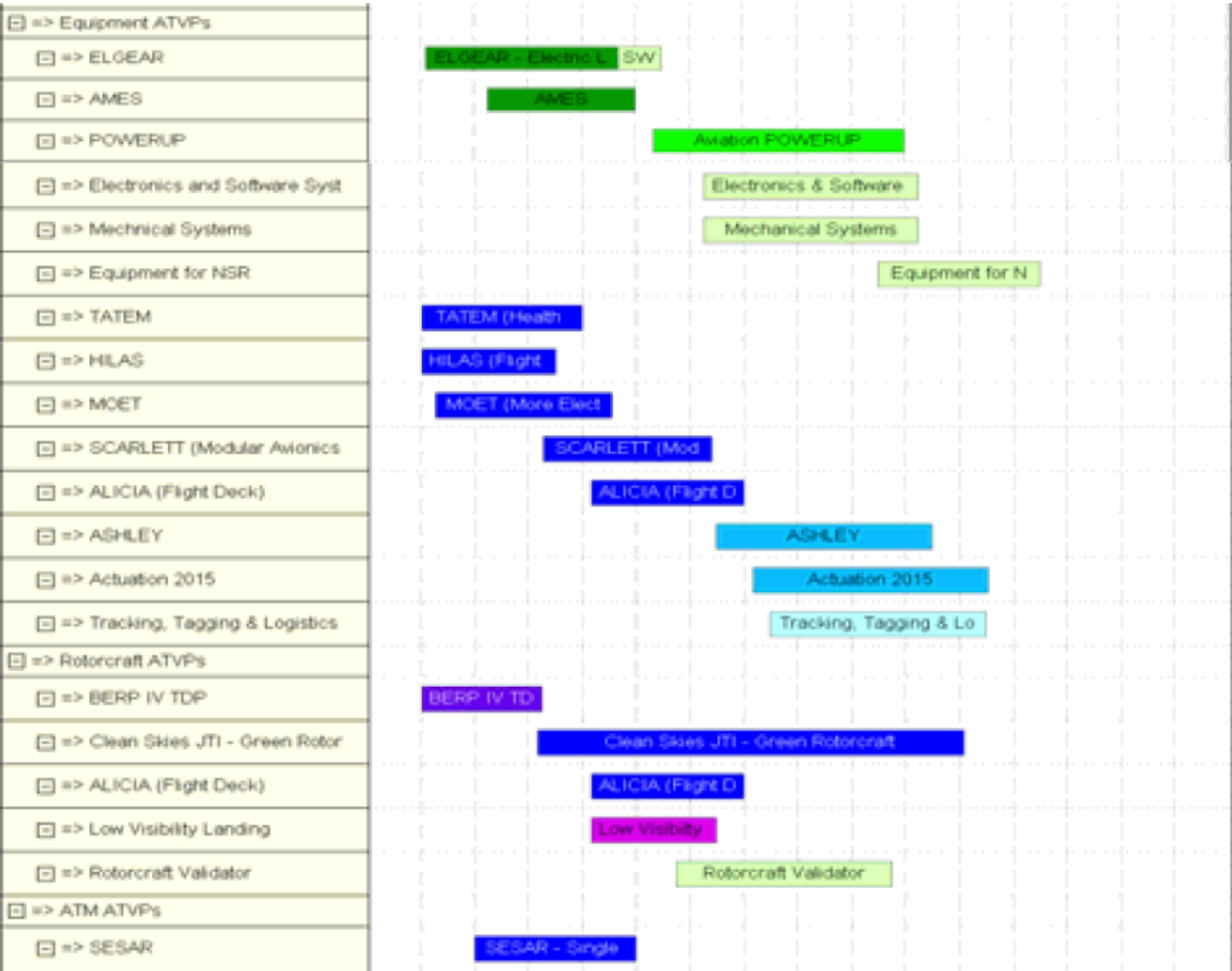
NATS Technology Roadmap: Market



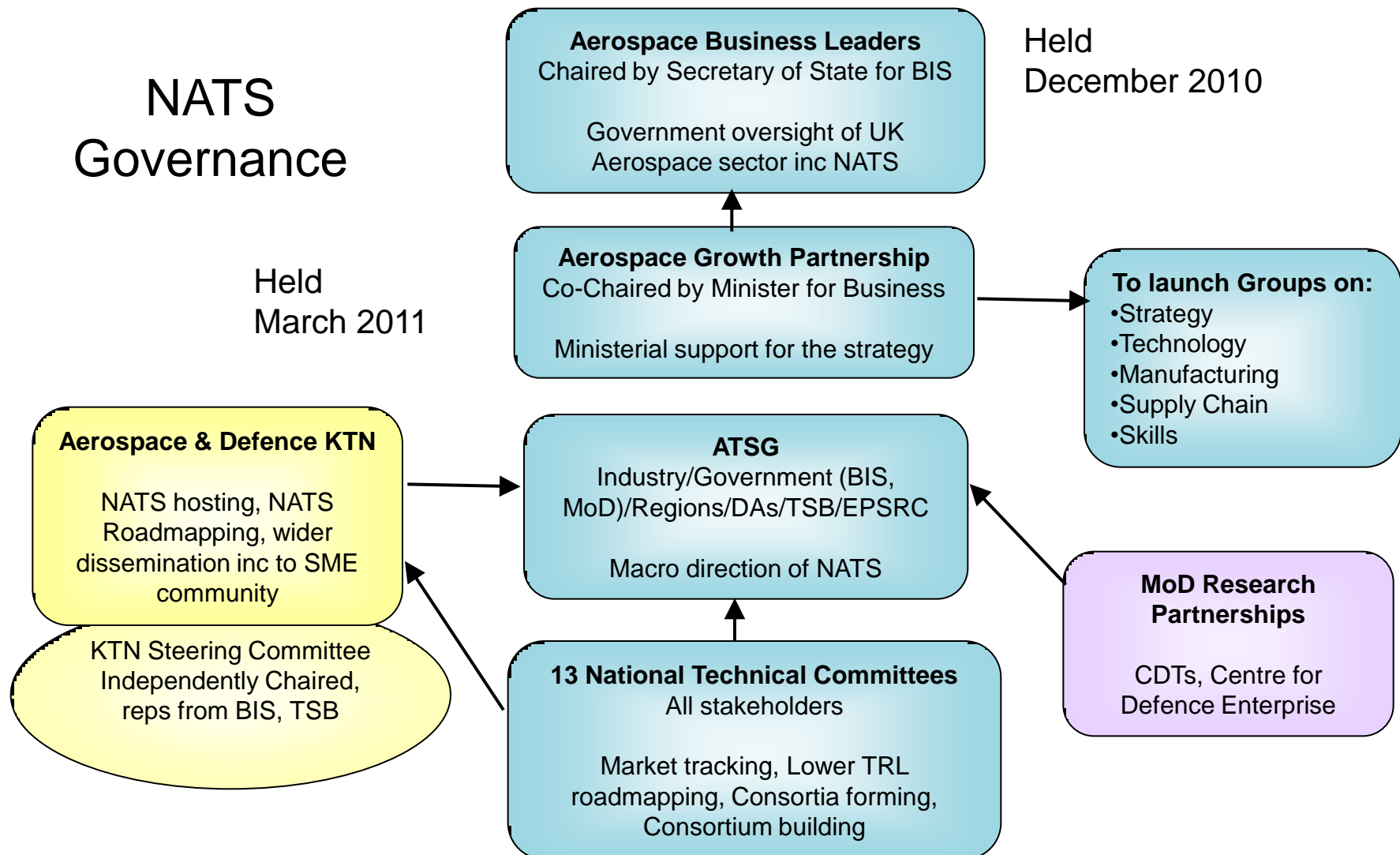




- Legend 3 - Funding Source
- UK - Funded
 - UK - Bid
 - UK -
 - MOD - Funded
 - MOD - Bid
 - MOD - Aspiration
 - EU - Funded
 - EU - Bid
 - EU - Aspiration



National Aerospace Technology Strategy (NATS) Governance

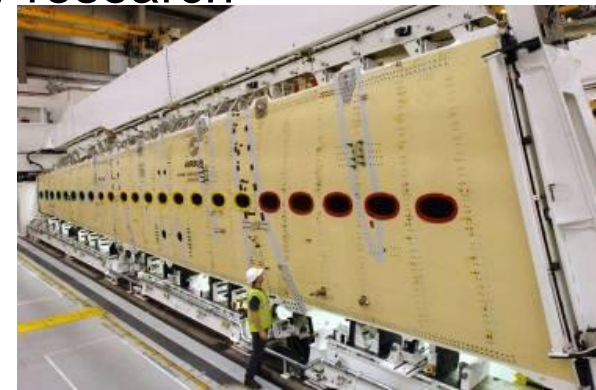


What Has Been Achieved So Far:

- Achieved significant advances in validated technology in all areas (e.g. composites technology, combustion/emissions technology including major test rigs, etc. Retained No2 spot in world)
- Established a partnership between Technology Strategy Board, English Regional Development Agencies and Devolved Administrations in Wales, Scotland & Northern Ireland with UK companies
- Coherence in use of UK and EU funding
- Significant investment by industry & government in NATS.

Current Issues

- Multiple funding sources for large projects makes funding process complex
- Affordability of the programme - continued access to funding
- Initiatives ongoing to better coordinate low maturity research
- Erosion of Infrastructure needs to be addressed
- Progress mainly through large validation projects which validate and demonstrate technology developed in a range of applied research programmes



Future Outlook and Process for Large Projects

- Refreshed Strategy through Aerospace Growth Partnership
- Groups in :
 - Strategy
 - Technology
 - Manufacturing Capabilities
 - Supply chain Competitiveness
 - Skills Base
- Opportunities
 - Technology and Innovation Centres (TICs)
 - Regional Growth Fund (RGF)

Conclusion

- Significant market potential requiring technological capability
- Need continued support for aerospace R&T to enhance UK capability in world-class areas
 - Rotorcraft
 - Equipment
 - Engines
 - Airframes/Wings
- TSB as 'hub' for funding sources in partnership with industry
- Coordinated and coherent programme in UK and in Europe
- Large projects deliver major systems integration and validation benefits for the primes and supply chain.



Back Up Slides

Drivers & Progress in each theme area 1/5

- **Airframes (particularly wings)**
- To make UK the Centre of Excellence in wings, pylon, landing gear and fuel systems – key for UK in Airbus
- To support UK airframe suppliers in new technologies for design, integration & manufacture enhancing their performance and competitiveness.
- Involves structures, flight physics and systems design
- Large UK projects:
 - Integrated Wing,
 - Next Generation Composite Wing
 - Smart Active Wing of the Future



Drivers & Progress in each theme area 2/5

- **Engines**
- To maintain large civil aero-engine capability, addressing market & environmental drivers
- Involves integrated propulsion systems, core engine technologies, low pressure components for advanced turbofans and open rotors
- Large UK projects:
 - SAMULET
 - Environmental Lightweight Fan (ELF)
 - Environmentally Friendly Engine (EFE)
 - SILOET
 - (Open Rotor)



Drivers & Progress in each theme area 3/5

- **Equipment**
- To support a wide range of equipment suppliers in the UK (Messier-Dowty, Goodrich, GE Aviation, Thales, ...)
- Involves optimising design and integration, minimising through-life cost, operation in harsh environments
- Large UK projects:
 - ELGEAR,
 - HealthMap
 - (Power Up)



Drivers & Progress in each theme area 4/5

- **Rotorcraft**
- To enlarge the civil helicopter industrial activity in the UK through technological leadership in key areas (rotors and health and usage monitoring)
- Involves reduced through-life cost, reliability and availability, performance & payload and environmental impact
- Large UK projects:
 - REACTS
 - RTVP



Drivers & Progress in each theme area 5/5

- **Autonomous Air Systems**
- To enable UK leadership in access to a civil market for autonomous air vehicles
- Open the market for such civil operation of autonomous air vehicles
- Involves sense & avoid, secure command & control autonomous decision making, vehicle health management and prognosis, human machine interfaces
- Large UK projects:
 - ASTRAEA 1 & ASTRAEA 2

