Strategic Innovation Programme Aeronautics

www.innovair.org

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Med stöd från:
VINNOVA
Energimyndigheten
formas
STRATEGISKA INNOVATIONS-PROGRAM

Background

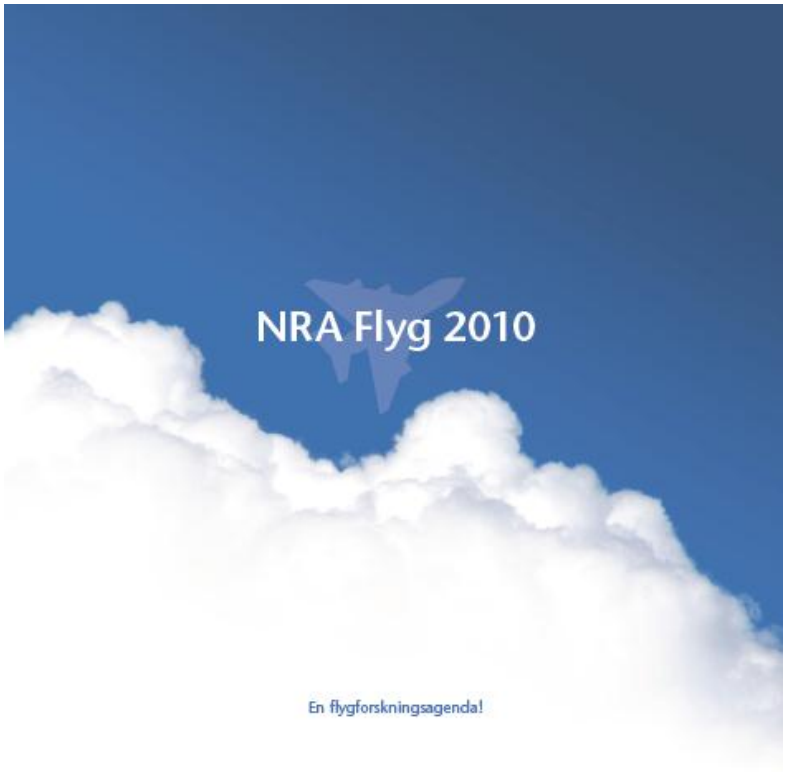
- National Research Agenda Flyg (meaning Aeronautics) 2010 produced as first common strategy for all Swedish actors http://www.nraflyg.se/
- Swedish Funding Agencies (Vinnova et al) launched in 2012 a programme to produce National Research and Innovation Agendas similar to above
- NRIA Flyg 2013 produced between all actors (Armed Forces, Defence Materiel Administration, Swedish Defence Research Agency, Saab, GKN (former Volvo Aero), Swerea SICOMP, SME:s and Universities

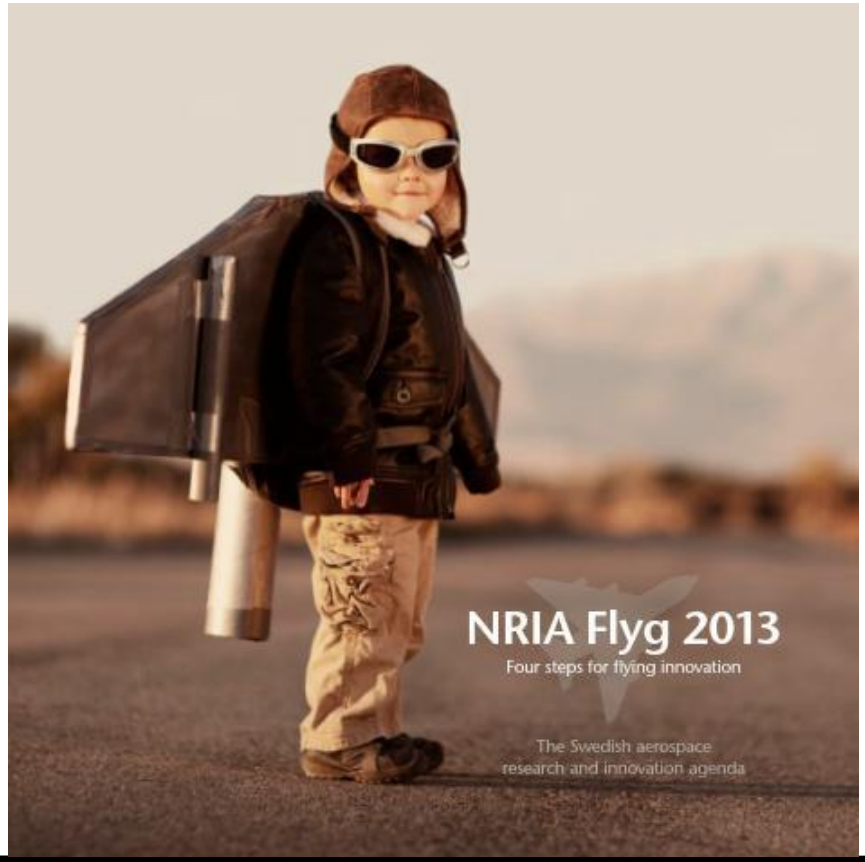
  http://www.nriaflyg.se/
- Funding agencies then launched a call for Strategic Innovation Areas with aim to fund some 15-20 for up to 10 years (500 MSEK/year)
- Aeronautics became a Strategic Innovation Programme with five other areas in the first call 2013.
- Thereafter another five areas have become Strategic Innovation Programmes.

Current Swedish Strategic Innovation Programmes

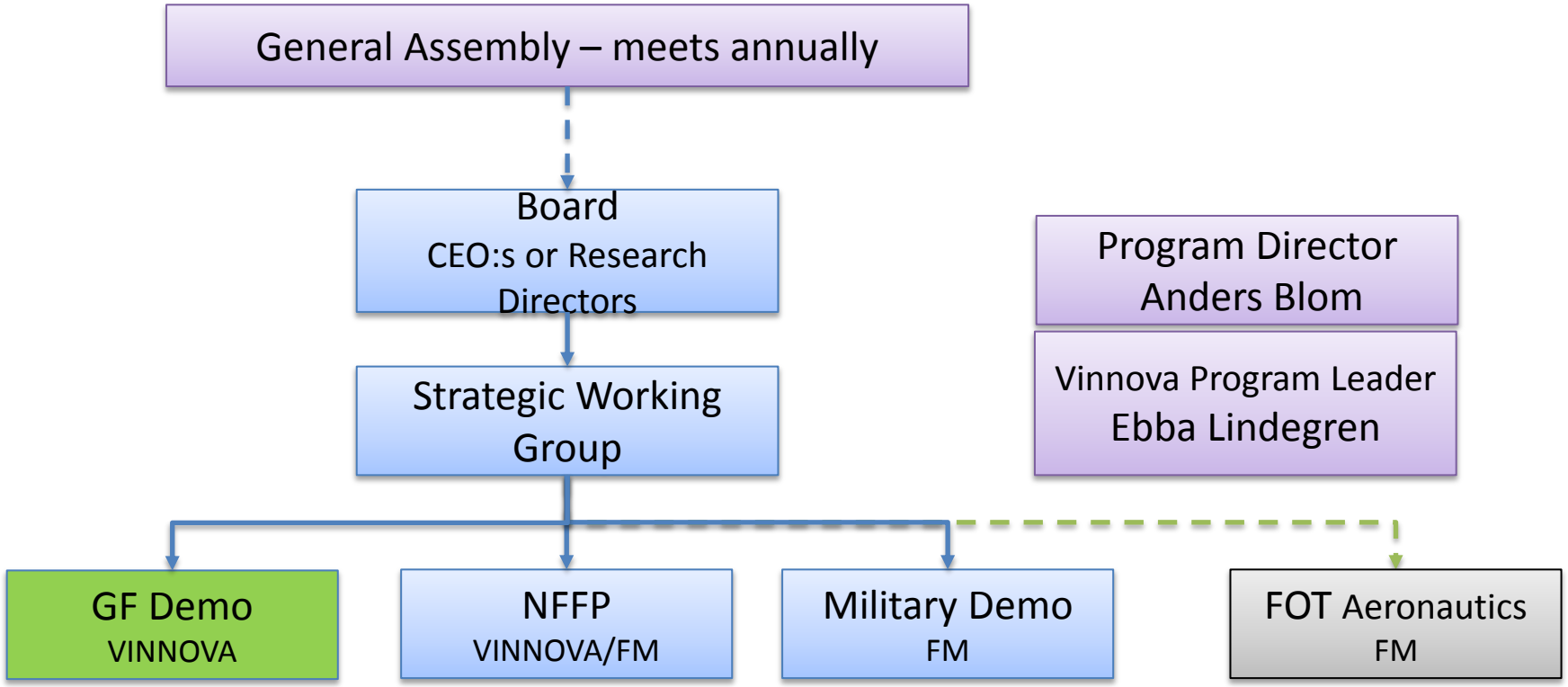
- Innovair – Aeronautics
- Grafen
- ICT Electronic Components and Systems
- Internet of Things
- Bio innovation – new bio-based materials, products, and services
- Life Sciences – human diseases
- Mining and Metals Production
- Lighter – Light Weight Technology
- Process Industrial IT and Automation
- Production Technologies
- Metallic Materials

National Research and Innovation Agendas - Aeronautics





INNOVAIR Strategiskt Innovationsprogram Flyg



Joint actors also obtain funding through triple use, energy, materials, and other research programmes by various national funding agencies

NRIA Flyg 2013

National Research and Innovation Agenda Aeronautics 2013

Agenda for Swedish aerospace research and innovation ➔ 2020, 2035, 2050

Two target groups:

- politicians/officials
- players within the Swedish aerospace technology area

Produced by:

•universities/colleges/institutes (Chalmers, KTH, LiU, HV, BTH, Swedish Defence Research Agency, and Swerea)

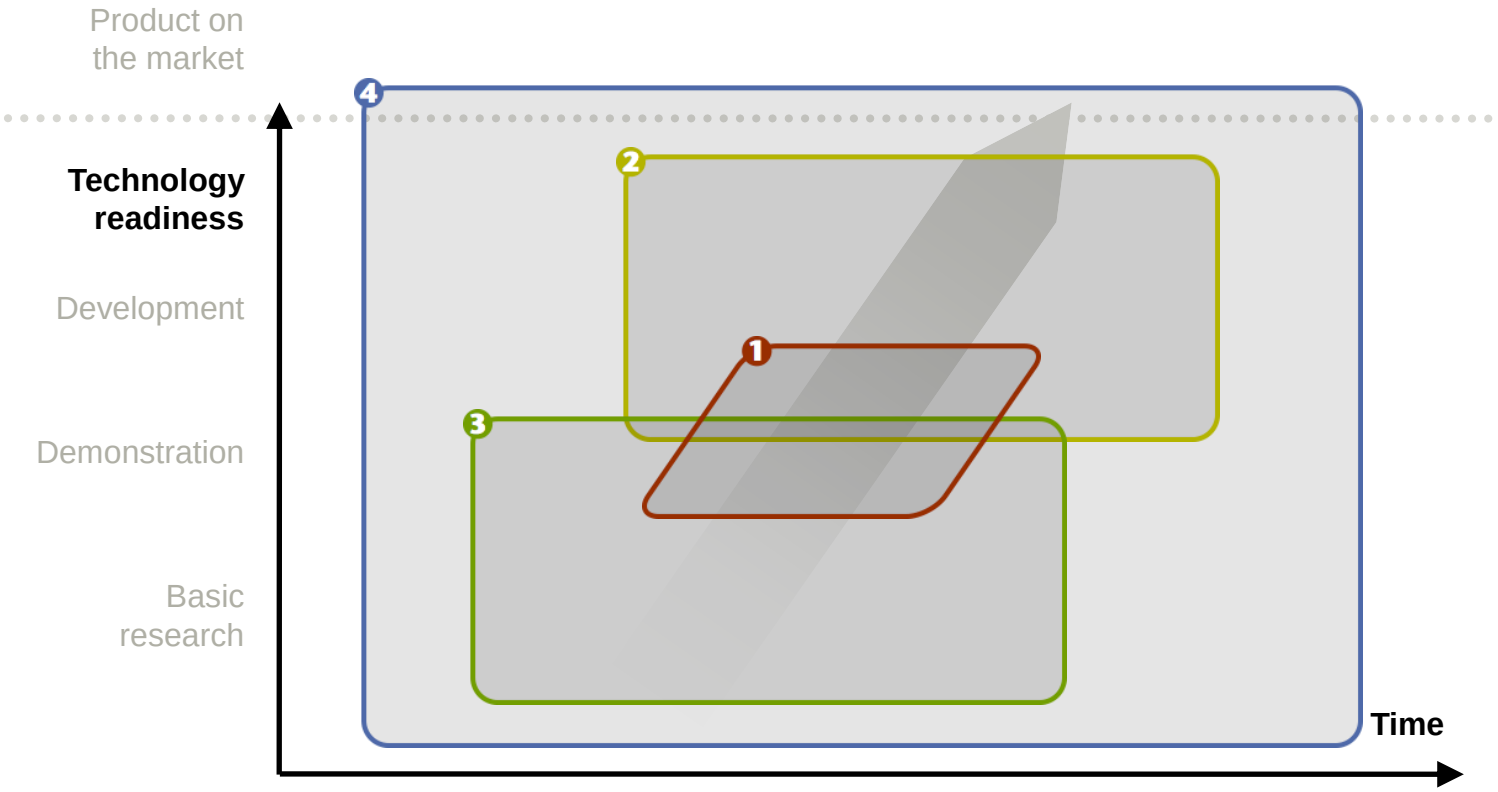
•companies (Saab, GKN Aerospace, small and medium sized enterprises)

•professional and industrial organisations (Swedish Aerospace Industries, Teknikföretagen)

•authorities (Defence Materiel Administration, Armed Forces)

Under process management by Föreningen Svenskt Flyg

Strategy for near term activities



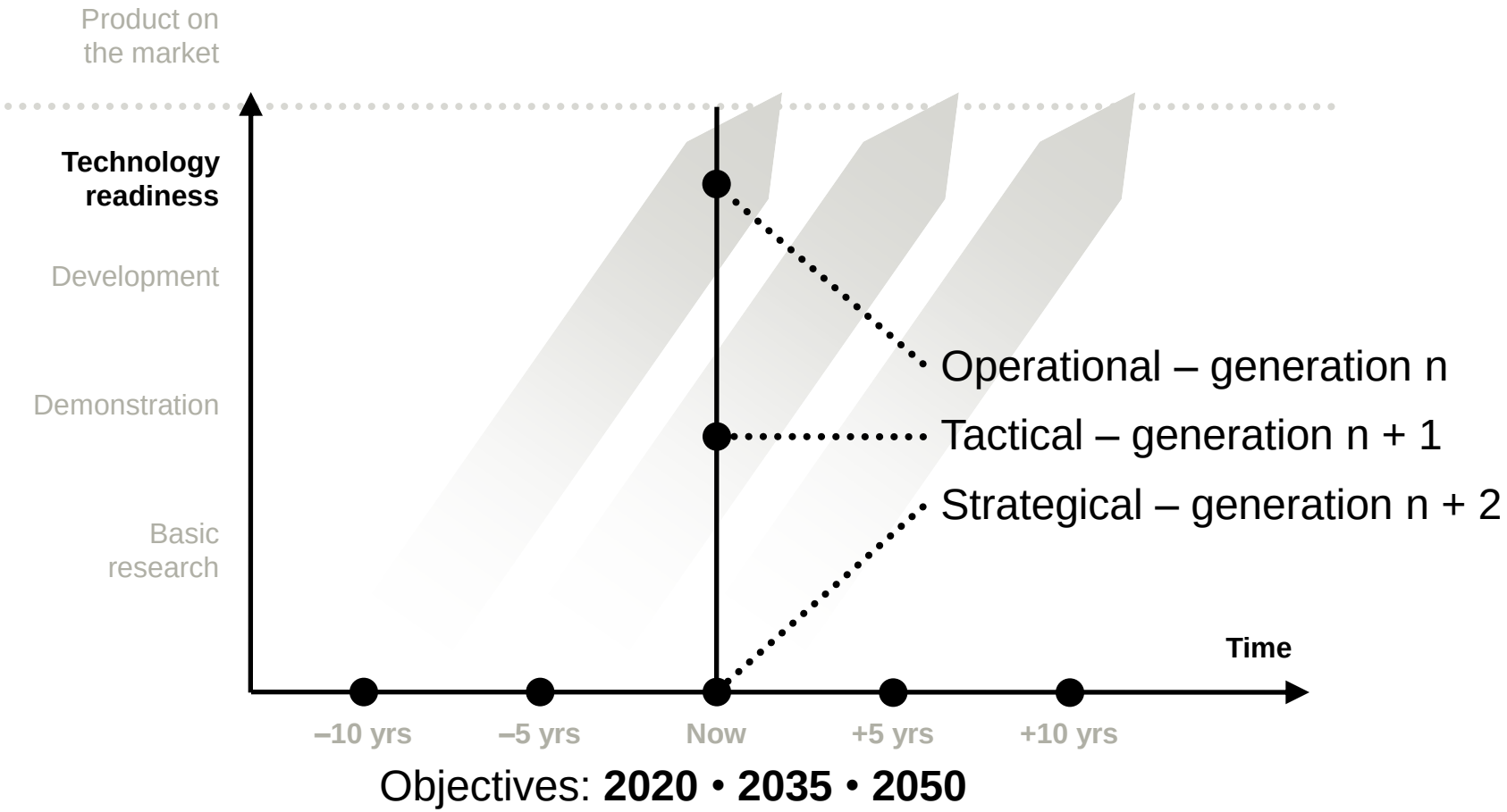
On what should we focus Swedish aerospace research and development?

How do we bring about the best possible conditions for domestic production?

How can academia best work to encourage innovation?

How do we secure consensus for and governance of the Swedish aerospace sector?

TRL and the Slanting Wave



Objectives: **2020 • 2035 • 2050**

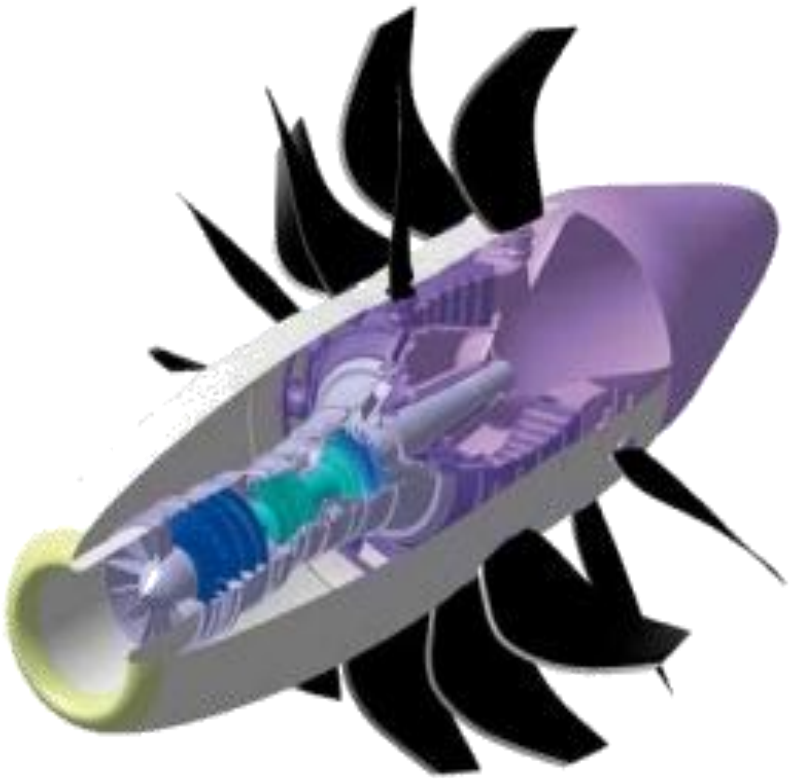
Results of NFFP

- Competence increase at U&I and Industry
- Created business positions through EU demonstrator program in FP7
  - VAC (now GKN) has obtained large long term orders for components to all engines in aircraft with over 70 passengers (ca 3 billion SEK/year for 30 years)
  - Saab has orders on components for Airbus and Boeing larger aircraft

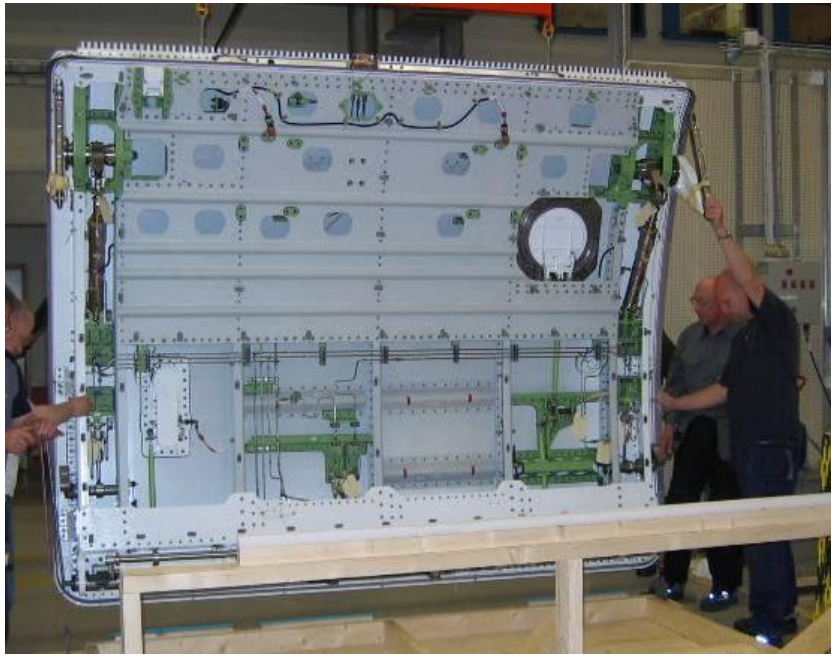
Results of FLUD

Flygtekniskt utvecklings- och demonstrationsprogram (Aeronautical Development- and Demonstration Programme)

- Increased Swedish participation in int. demonstrators (Clean-Sky)
- Future Green Aircraft
- VAC example
  - Lower weight, less emissions
  - 120 billion SEK (during engine life times)
  - SME – Permanova exported Laser Welding Equipment
- Programme Positively Evaluated 2010



Focus of GF Demo



- On-going Demonstrations
- Effect logic
  - Green and Growth
  - TRL 3-5
  - Locomotive for SME/univ
  - International demonstrators as in Clean Sky – business logic

Research and Innovation Strategy

”Principle of Slanting Wave”

Product application

GENx 2009 30 BSEK | GP7000 2009 2 BSEK | PW1000G 2013 50 BSEK | Trent XWB 2013 40 BSEK | PW1000G 2015 40 BSEK | PW1000G 2017 17 BSEK

Development program

New Engine Option

Green Aircraft & Engine

TRL 9

Verified Technology

International program

JTI ”Clean Sky” | JTI ”Clean Sky 2”

FLUD | GF Demo | SWE Demo

Antle/Clean | VITAL | DREAM | Lemcotec

MMFSC | NEWAC | ENOVAL | MERLIN

TRL 6

Demon-strators

National program

Triple use

NFFP 3 | NFFP 4 | NFFP 5 | NFFP 6 | NFFP 7

Basic Technology | Basic Technology | Basic Technology | Basic Technology

TRL 3

Technology

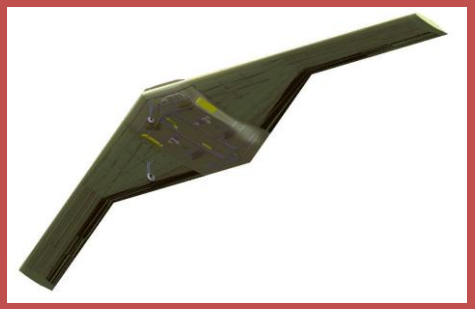
2005 | 2010 | 2015 | Time

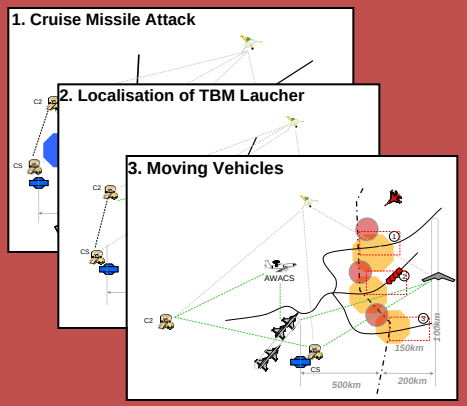
Military FoT (Research and Technology) - Aeronautics

- Run by FM (Armed Forces) having a steering committee with participants from FM, FMV (Defence Materiel Administration), and FOI (Swedish Defence Research Agency)
- Largest topic of all FM FoT activities
- Activity consists of a research part that FM orders directly from FOI regarding basic aeronautics such as aerodynamics, structures and materials technology, flight mechanics, and purely military activity like signature reduction (radar and IR)
- The other part is coordinated by FMV and includes cooperation between industry and FOI within various IPT:s (Integrated Project Teams) for conceptual studies, the above mentioned areas, propulsion, electronics etc.
- Activities partly performed within international cooperation (EU, EDA (European Defence Agency), ETAP (European Technology Acquisition Programme)

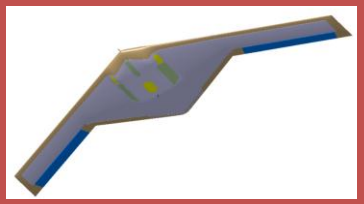
LO (Low Observability) ISR (Intelligence, Surveillance, Reconnaissance)Demonstration Opportunities

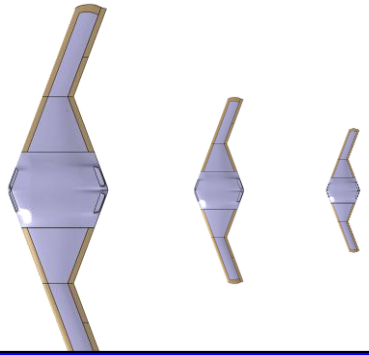
LO ISR Capability





Demonstrator LO ISR





Selection of important and challenging demonstrations

Demonstration possibilities
ISR Sensors and LO integration
ISR Data fusion & Analysis
Low signature
Flying wing
Laminar flow
Autonomy and decision support
Integration manned and unmanned
Operations and missions

Current activities

- External communication – press releases and high level articles in public media
- Military demonstrators: Gripen E+, US Trainer with Boeing, ISR RPAS (Remotely Piloted Aeronautical Systems)
- R&D cooperation with Brazil, following Gripen export
- R&D cooperation with UK, Germany, France, USA
- H2020 national strategy including domestic civil demonstrator programme
- Secure funding for NFFP7 and GF Demo2
- Positioning for next national R&D-strategy 2016
- Special focus on SME participation
- 2015 – expand Innovair network internationally

Cooperation with Brazil

- Brazil is already an important country for Swedish Industry (over 200 Swedish companies have a turnover of some 50 billion USD)
- Existing strategic partnership on governmental level in; political discussion and cooperation in multilateral fora; trade and investments; bioenergy and biofuels; defence; climate negotiations and sustainable development; science, innovation, and high technology; and cultural exchange and education
- The Gripen programme makes Brazil an even more important strategic partner for Sweden for the long term foreseeable future – certainly in aeronautics, but also in general terms

Future joint activities

- Establish joint academic and institutional cooperation between Innovair (and the involved partners) and Brazilian actors
- Initiate within some six months at least a few joint research programmes, both to formalise contacts and to evaluate any obstacles (mobility of personnel, foreign living, funding and costs, tax issues, medical and insurance issues etc.)
- Make a joint priority of future cooperation within a number of technical fields
- Search for specific national funding in both countries for upcoming joint innovation programmes
- Start at low to medium TRL but plan for future joint demonstration possibilities, eventually leading to future common products

Summary

- Innovair is the result of long term Swedish triple helix activities in the aeronautical field
- National Research and Innovation Agendas updated regularly by actors from academia, government, and industry
- Academic excellence is maintained through open calls and external evaluations of research programmes, both national and international
- Industrial relevance is maintained by focusing the technical content in calls and by acting as project leaders
- TRL and the Slanting Wave concept used to structure the complete innovation system
- Dual and triple use provide added value to society
- In development of Gripen E/F and future aeronautical systems Brazil will be an important partner
- Bilateral innovation programmes at all TRL levels will ultimately benefit both countries