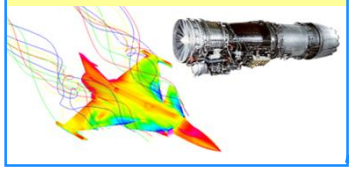
Research in Aeronautics and Defence at Swedish Universities

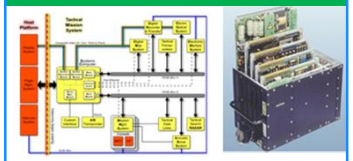
Petter Krus

Engineering capabilities/Research Areas

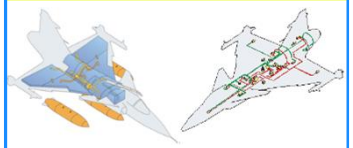
Aeronautical Engineering



Computer Systems



Vehicle Systems



Human-Machine Interaction

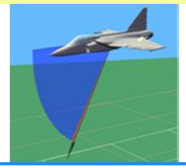
Tactical System

Maintenance Systems

Systems Integration

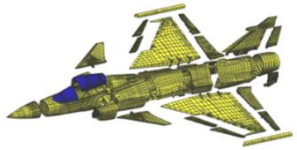
- Systems of Systems Integration
- Operational Analysis
- Concept Design
- Overall Design and Architecture
- Survivability
- Safety & Reliability
- ILS, Availability and Maintainability

Flight Test and Verification

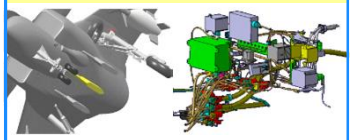


Weapons Integration

Structural Technology



Airframe Design



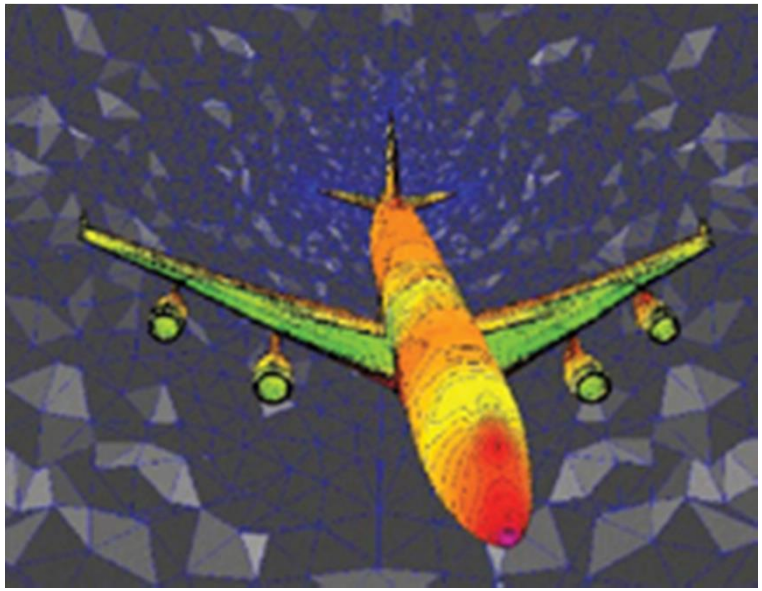
Production Systems

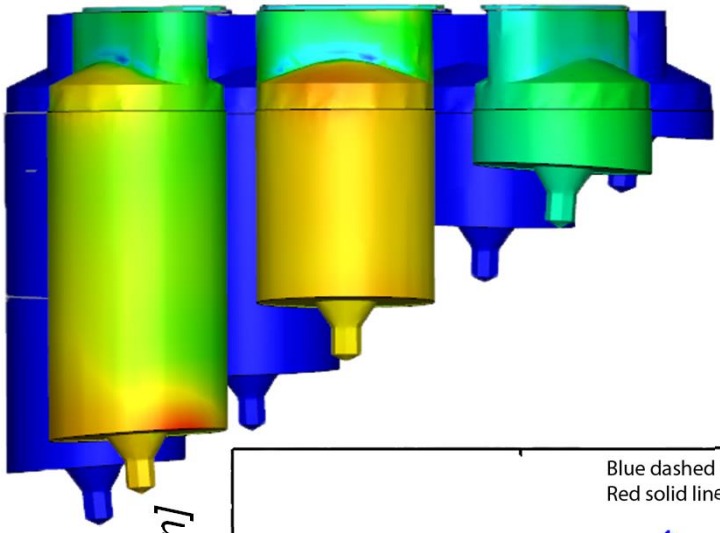
Support Systems and Simulators

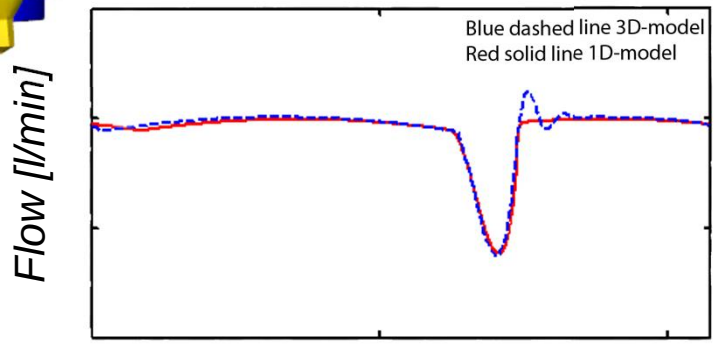
Engineering Methods & Tools

3D Flow Simulations

- Same technology and methods can be used in e.g. flow simulations of hydraulic pumps

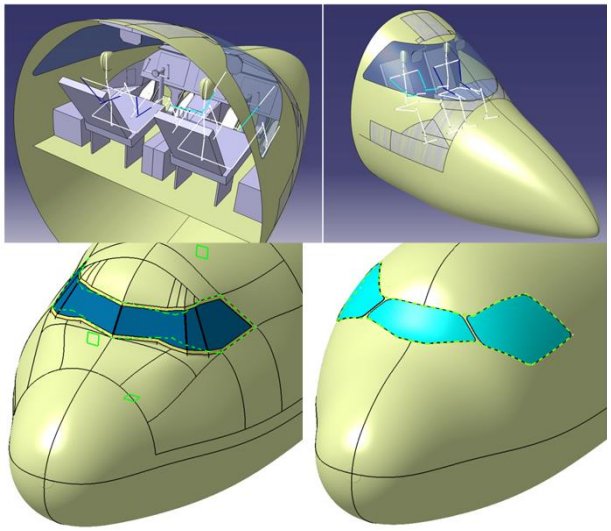


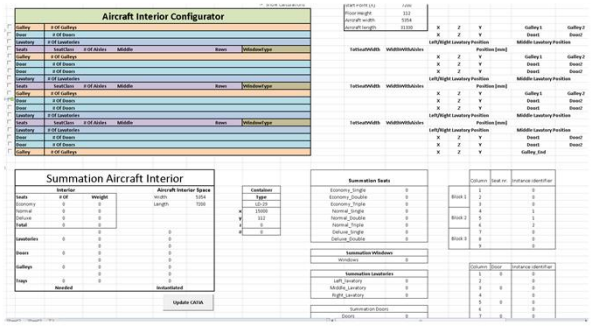


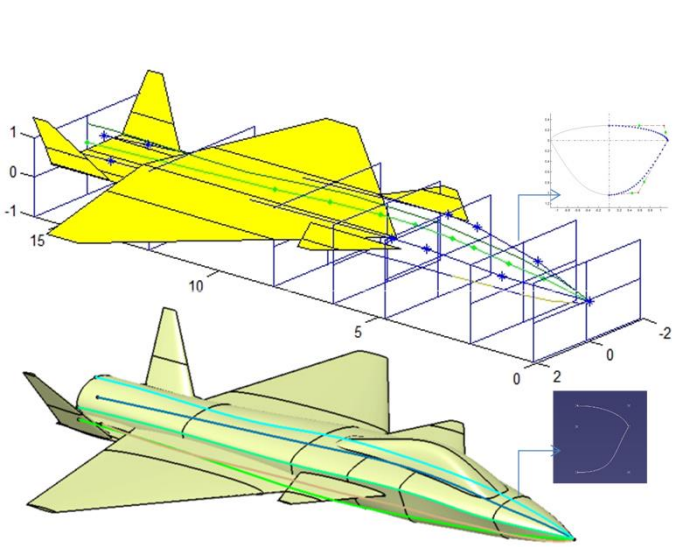


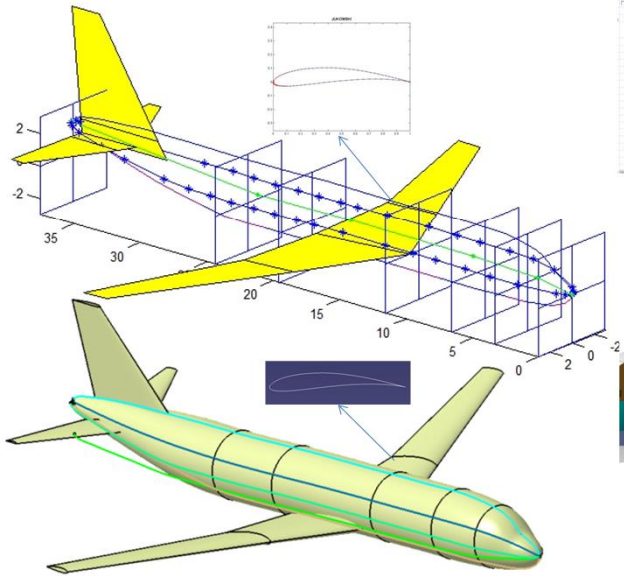
Knowledge Based Engineering in Aircraft Design

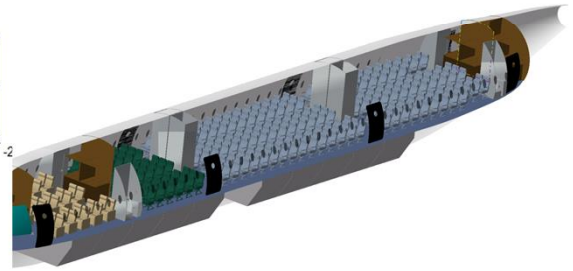
- Same tools and methods can be applied in other areas of design (vehicles, industrial robotics etc.)





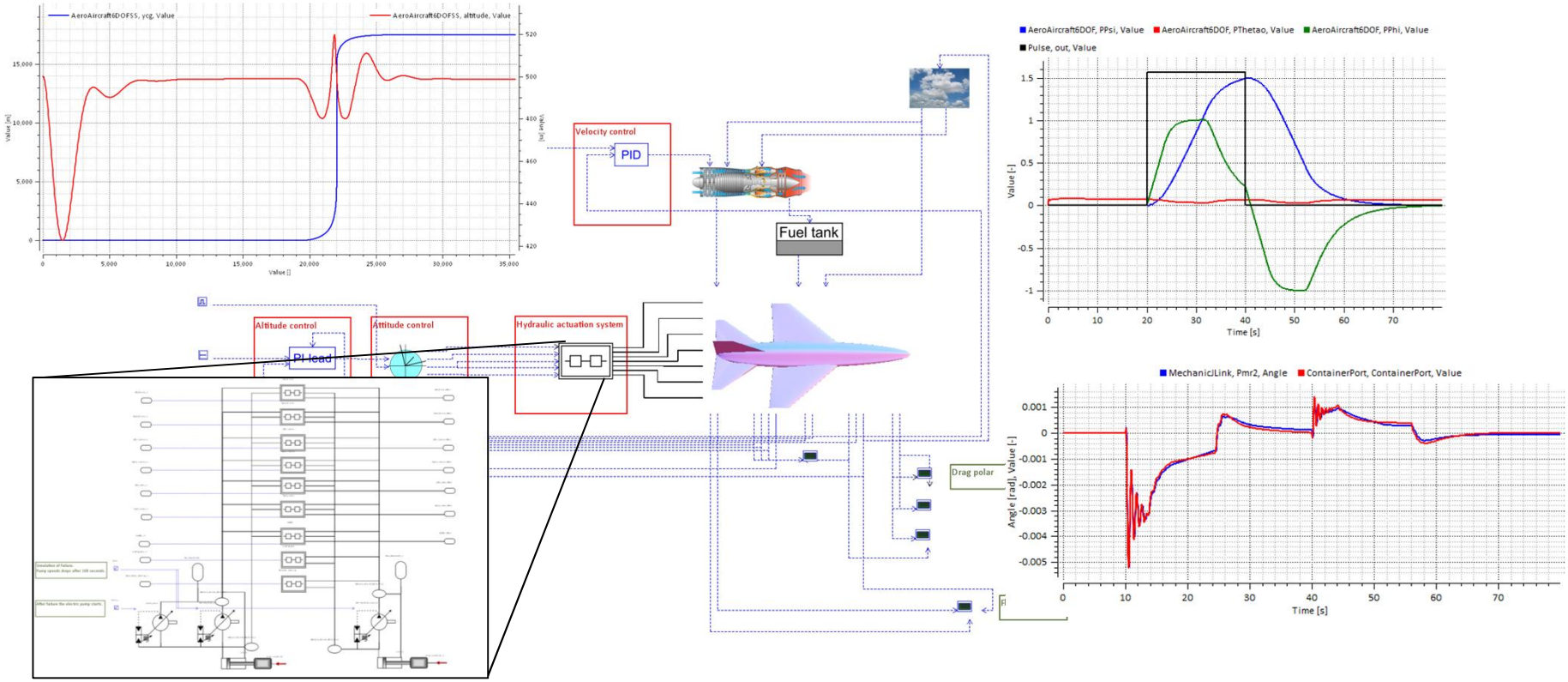






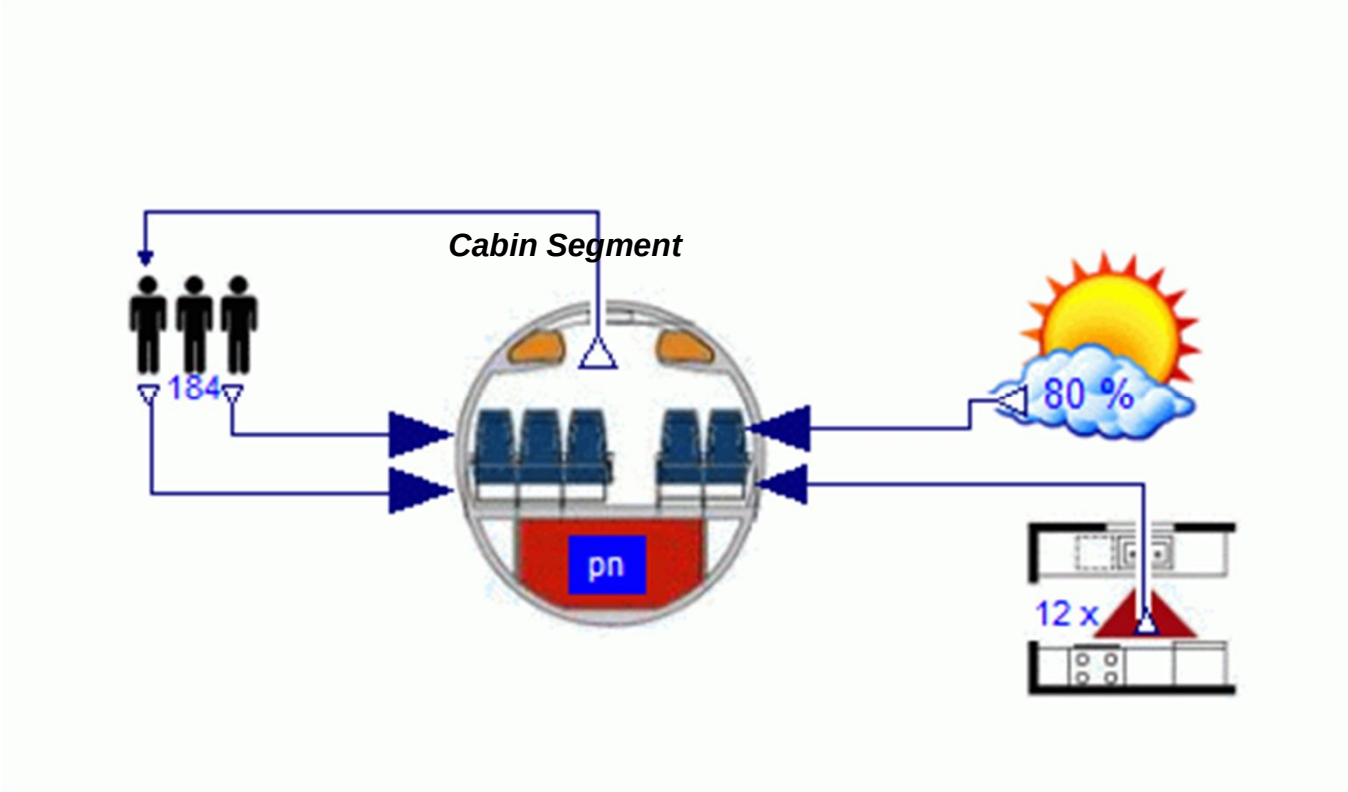
System Simulation for Aircraft System

- System simulation is a central tool in all system development.

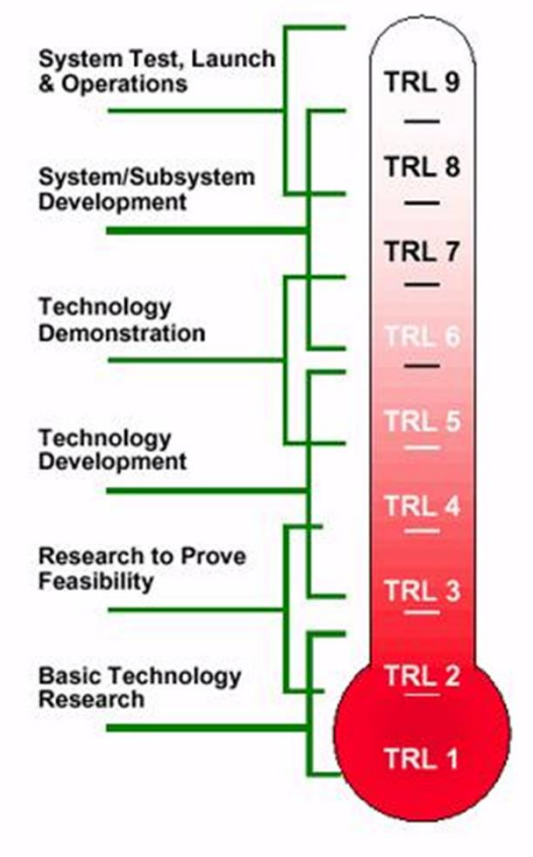


Climate System for Aircraft Cabin

- Same technology and methods can be applied in vehicles and buildings

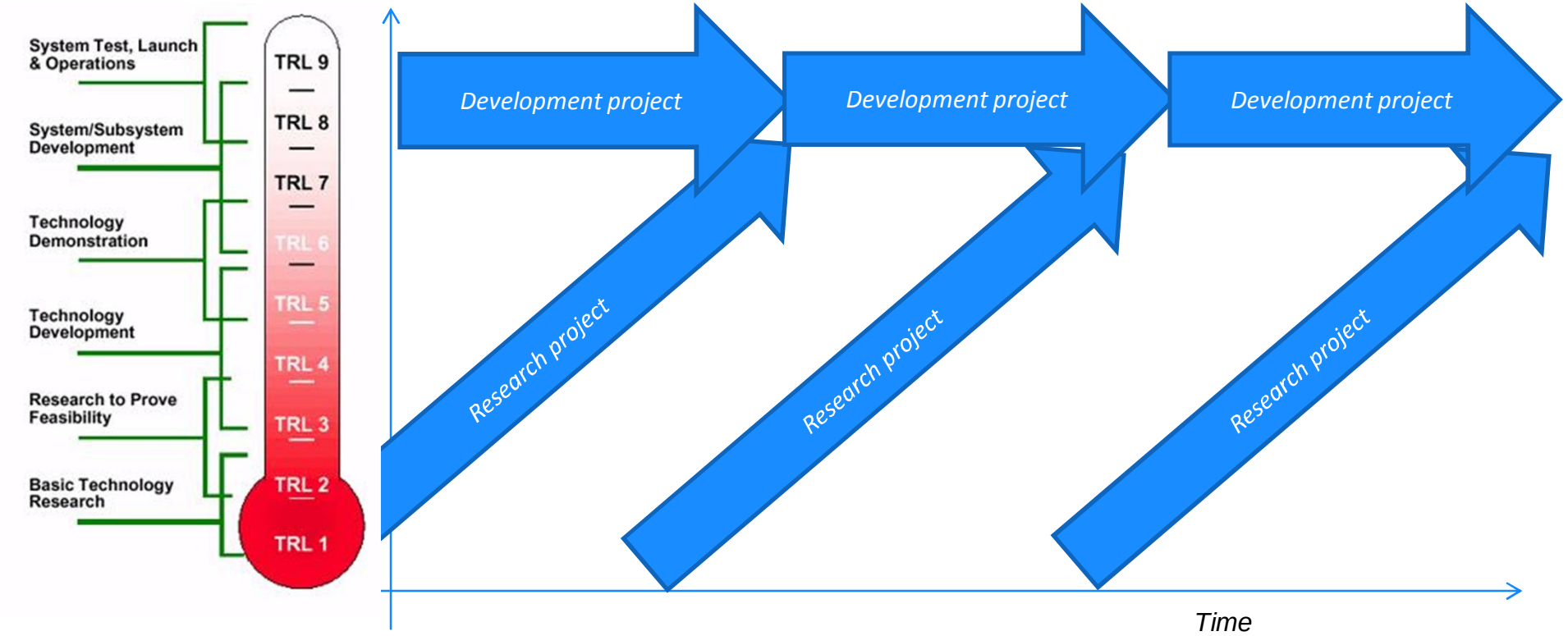


Technical Rediness Level

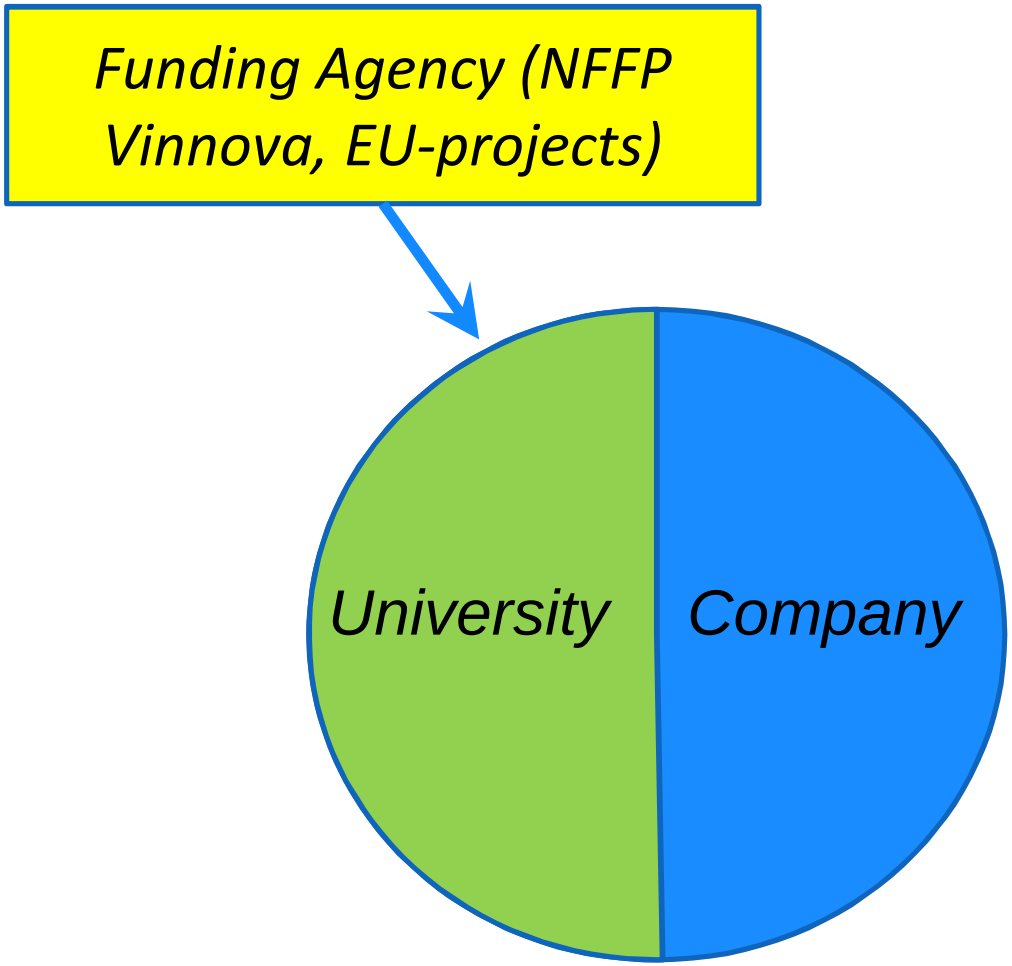


- Technology Readiness Level (TRL) is a measure used to assess the maturity of evolving technologies prior to incorporating that technology into a system or subsystem.
- Universities belong on the lower end of the scale
- Industry belong to the upper levels
- There must be an overlap

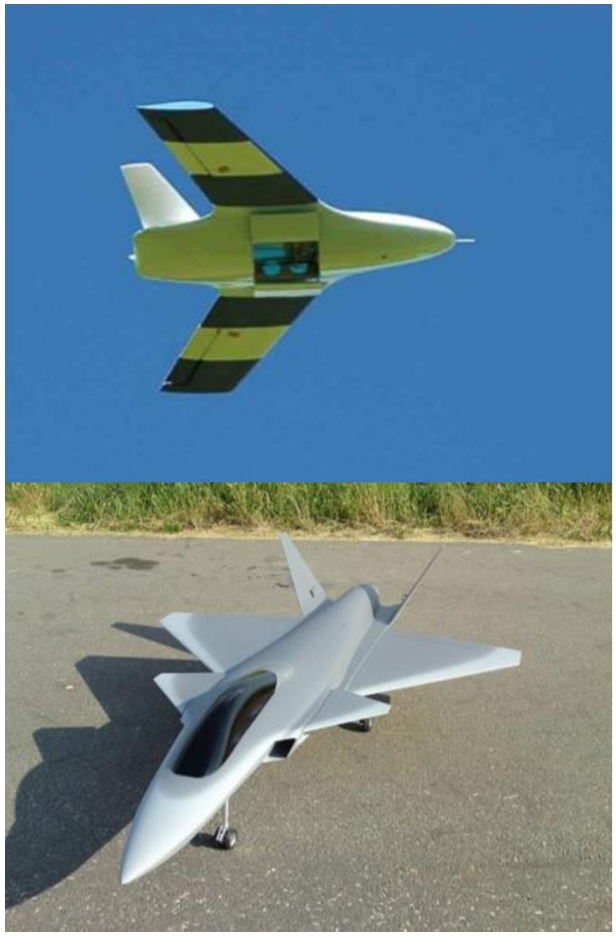
Research and Product Developement



Financing models

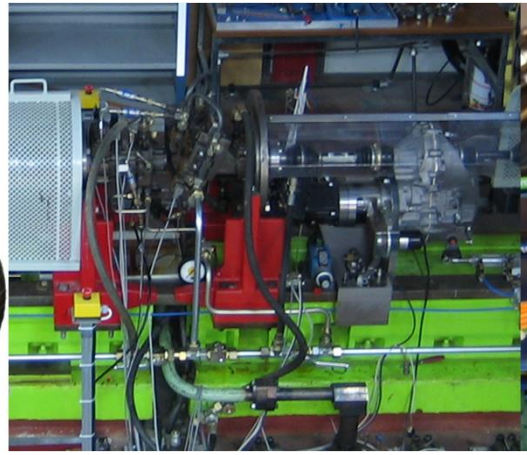


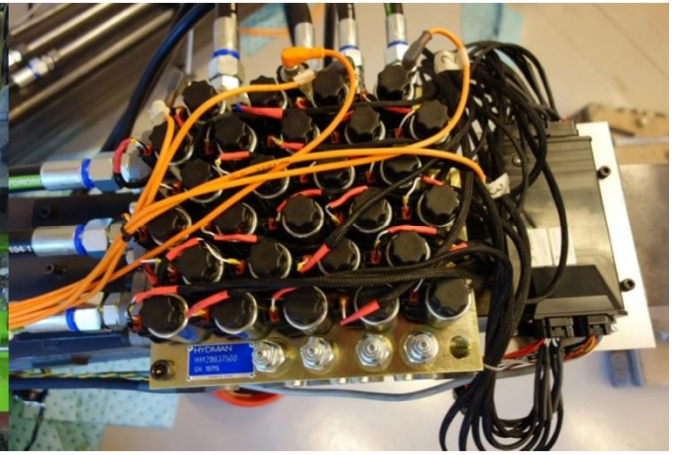
- Joint application university/company
- Joint funding agency/company
- Company is contributing with in-kind.
- Ensures industrial relevance



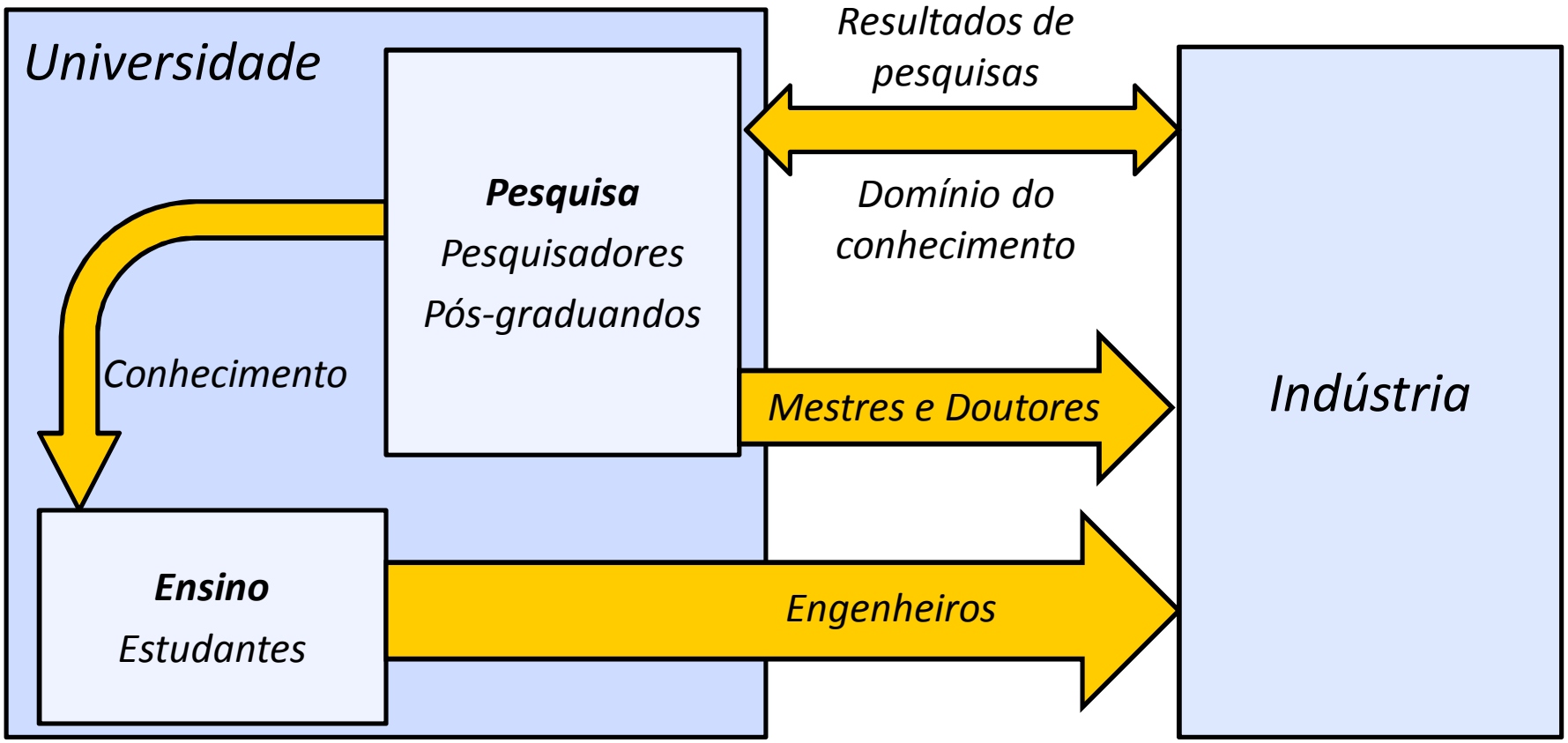
Demonstrators to fill the gap TRL-gap

- Advanced demonstrators and test riggs at companies can be utilised also for academic research
- University demonstrators can in many cases be very cost effective since they can have a high utilisation by both researchers and students.
- Demonstrators are excellent vehicles to train students to become engineers





Pesquisa Aplicada para Geração de Engenheiros de Excelência



Long Term University Research Collaboration

- The Gripen deal can be seen as an enabler for a wider research collaboration in spill over areas, to benefit of universities and other industries, both in Brazil and in Sweden.
- Sustainable research collaboration needs to have some symmetry.

Long Term University Research Collaboration

- Sustainable research collaboration needs mutual respect, and a realization that all parties can benefit from each other.
- It needs as much listening to each other as talking
- To Sweden as a small nation and Brazil with an expanding university system should be able to have a relationship of great mutual benefit.

Swedish Universities

- Population 9.5million
- 16 universities
- 9 univ. colleges (with PhD)
- + >10 univ colleges (with Master)
- Total of ca 200 engineering programs!
- Anyone can have an education!

Linköpings universitet

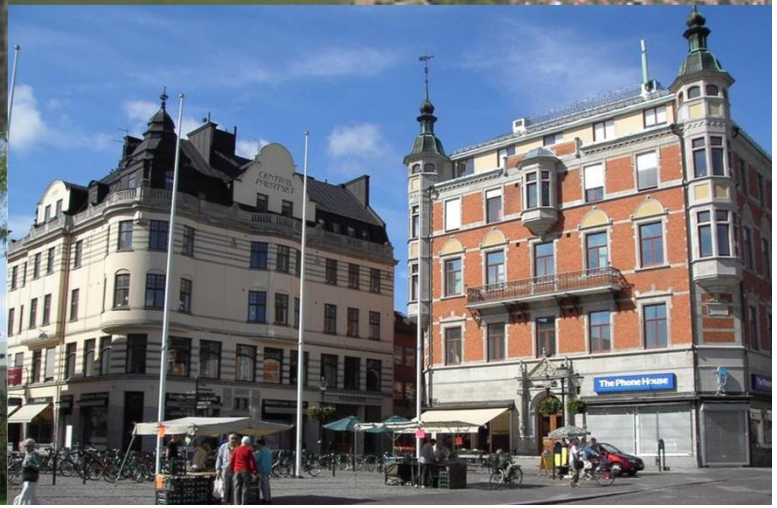
www.liu.se

Linköping University

- Linköping Municipality 140 000 people
- Students 27,000
- Employees 4,000
- Income total, SEK 3,400 million

Linköping
Birthplace of Swedish Aviation 1911

Carl Cederström 1912



Milestones

1967 A branch of Stockholm University

1969 Faculties of Engineering and Medicine

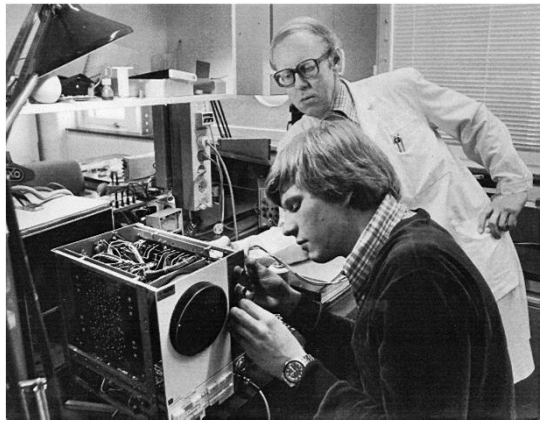
1975 Linköping University

1980 Thematic research

1986 Faculty of Health Sciences

1997 Campus Norrköping

2000 Malmstens



Four faculties

- Arts and Sciences
- Educational Sciences
- Health Sciences
- Institute of Technology

Areas of Interest for this Collaboration

- Division of Fluid and Mechatronic Systems
  - **Petter Krus**. Aircraft and system design
- Division of Machine Design
  - **Johan Ölvander**, Design optimization
  - **Kerstin Johansen**, Composites and Manufacturing
- Division of Engineering Materials
  - (Johan Moverare)

Areas of Interest for this Collaboration (cont.)

- Division of Automatic Control
  - **Andre Bittencourt**, Prof. Fredrik Gustafsson
- Artificial Intelligence and Integrated Computer Systems (AIICS)
  - Patrick Doherty
- Real-time Systems Laboratory (RTSLAB)
  - Simin Nadjm-Tehrani