

READ 2018

EWADE 2018

Brno, Czech Republic

EWADE & READ 2018

EWADE 2018 - 14th European Workshop on Aircraft Design Education

Brno University of Technology, Czech Republic

7th to 9th November 2018

EWADE Session, 08.11.2018, 14:10 to 15:50

<http://Presentations2018.AircraftDesign.org>

Establishment of the Swedish Aeronautical Research Center (SARC)

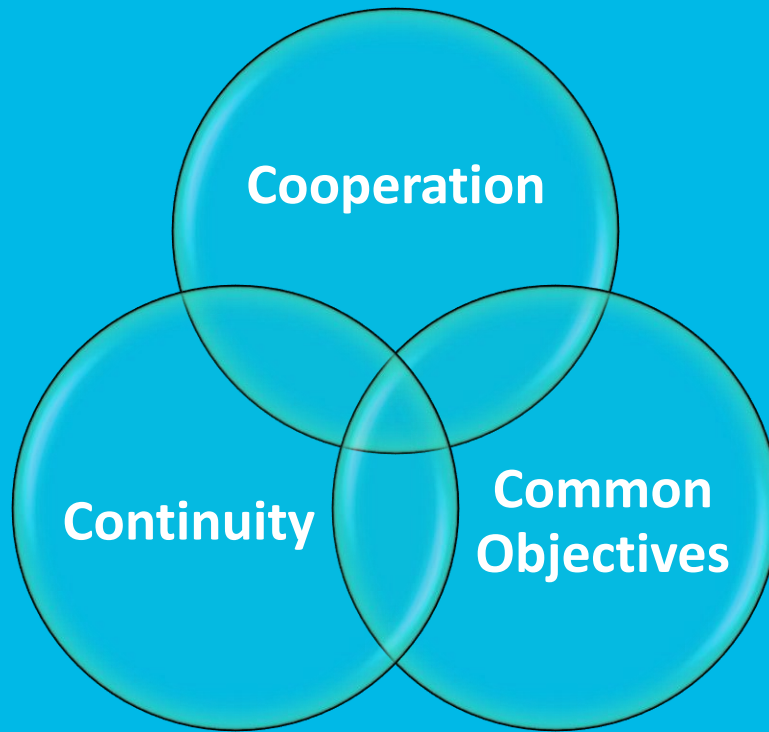
Ingo Staack, Linköping University



SARC is a **national aeronautical research center** hosted by Linköping University and funded by INNOVAIR, one of the first VINNOVA strategic innovation programs

Globalization: Efficient Innovation

- Competitiveness via technology
- Shortened time from idea → product on market
- Internationalization
- The 3C challenge:



VINNOVAs SARC Vision

INNOVAIR:s SARC vision

Swedish Aeronautics Research Centre **SARC** will:

- organize competitive **education programmes** at all levels
- **establish contacts** between all relevant actors (students, researchers, professors) such that they may cooperate nationally and jointly form strong teams for international research proposals
- **work with** the appointed **cluster leaders** from Saab and GKN to organize meetings between actors in each technical cluster
- **contribute to state of the art** technical summaries and proposed priorities for next and future **NRIA**
- be involved in Innovairs **internationalization** activities

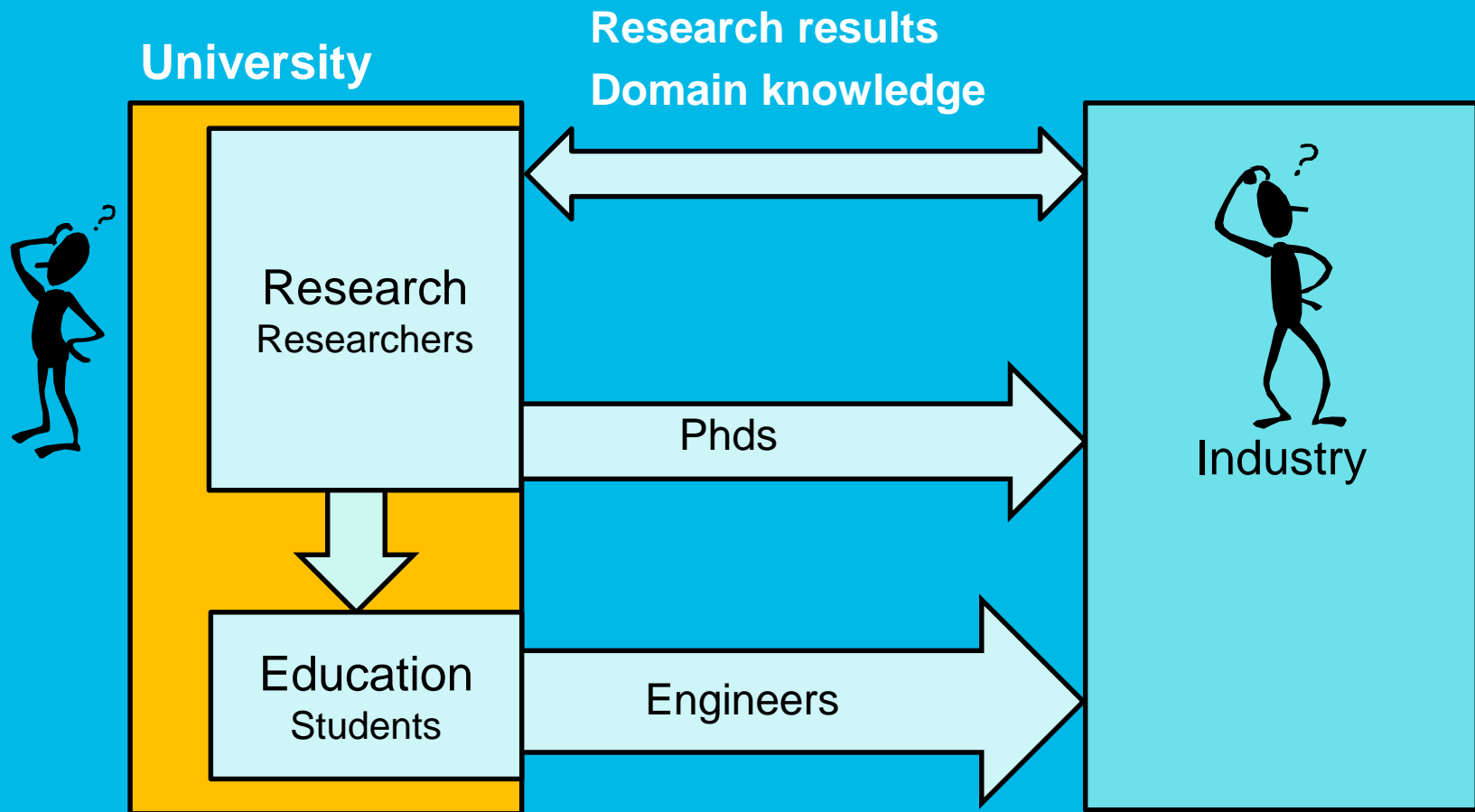
Background

- Ensure Sweden's future **competitiveness**.
- Provide **complete** innovation system
- Strengthen **collaboration** between basic research and research on higher TRL levels
- Increased need for **research at low TRL levels** at universities

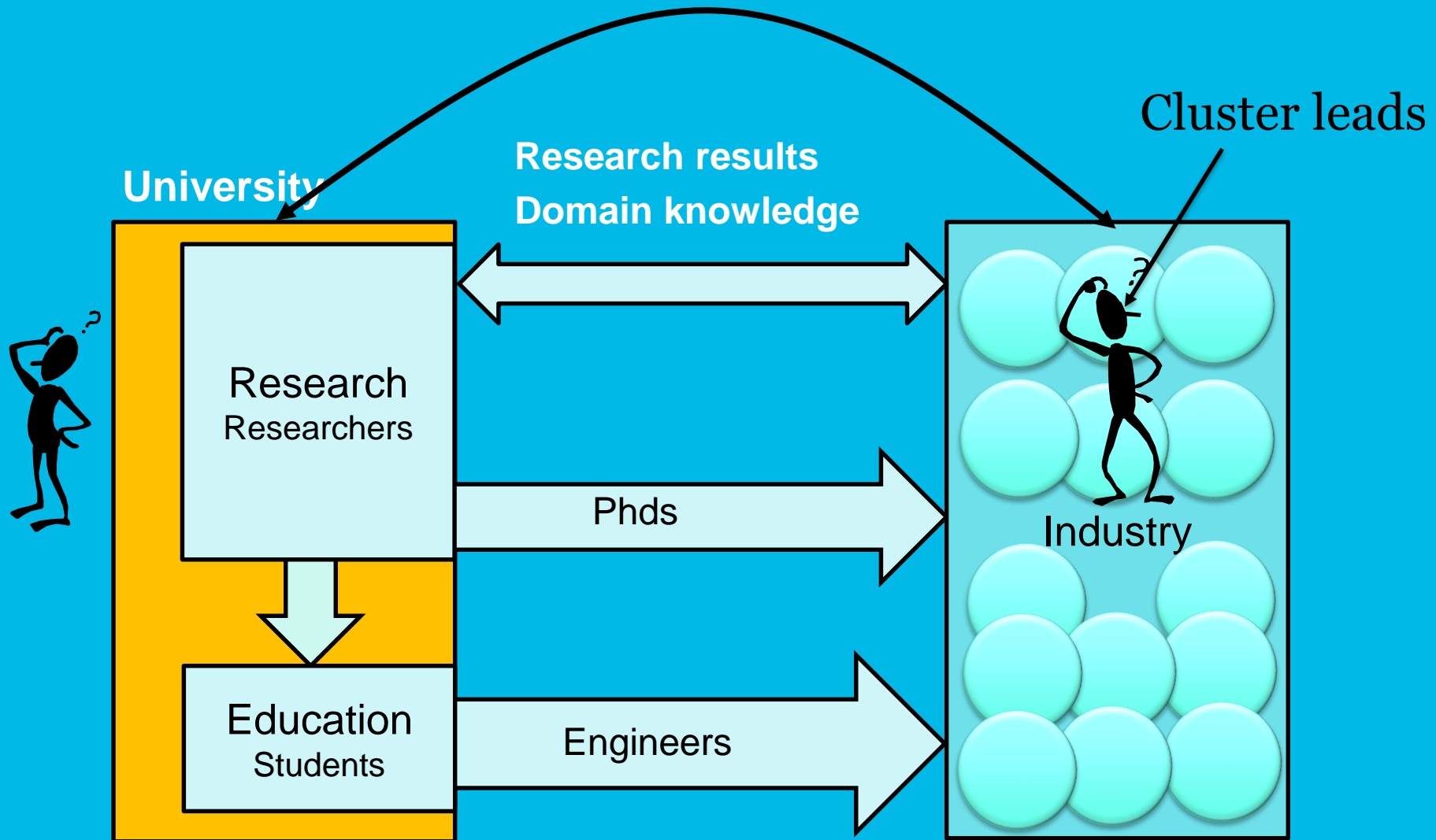


University – Industry – Government Interplay

The Role of Academy/Industry Research Programmes



Straddlers



Avionic Plat-
form Technology

Cooperating
Systems

Value Driven
Development

SAAB

Operation and
Maintenance

Sensors - System
& Functions

Advanced
Materials
(Metallic)

Aeronautical
Engineering

Structures &
Manufacturing
Technology

Composite
Components

HMI and
Decision
Support

Engine Systems
& Installation

Lifting

Concept & SoS
Methods

GKN

Turbomachinery

Lifting

Give Feedback and Strategic Decision for the National
Aeronautical Research Projects (NFFP)

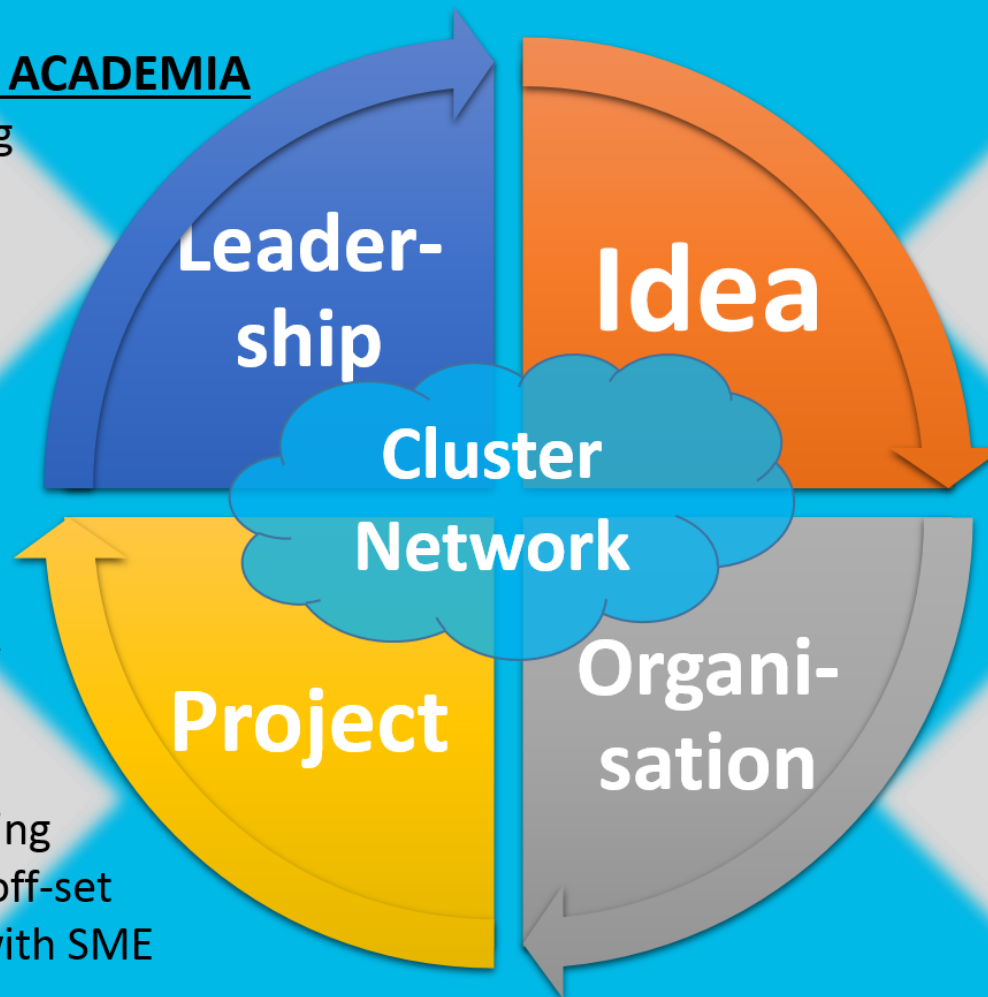


UNIVERSITIES & ACADEMIA

- problem solving
- publications
- financing
- examine
- education strengthening

INDUSTRY

- cluster strategy
- effective R&D
- skills supply
- external financing
- affair support/off-set
- collaboration with SME



RESULT

- knowledge
- skilled staff
- public welfare
- new research
- formation of opinion
- competitiveness

INNOVAIR / VINNOVA

- increase of public welfare/industry
- long-term effects
- support of / collaboration with SMEs
- synergies effects

Straddlers

Cluster leads

University

Research results
Domain knowledge

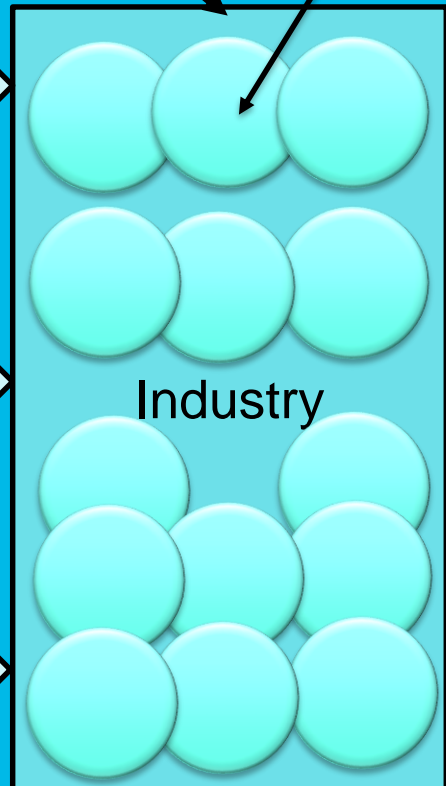
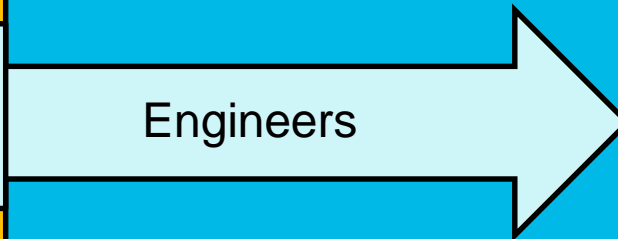
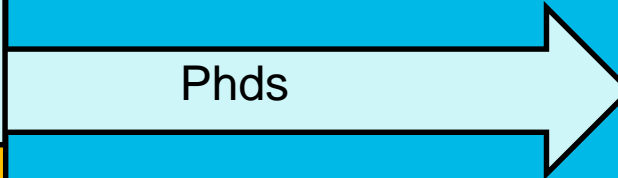
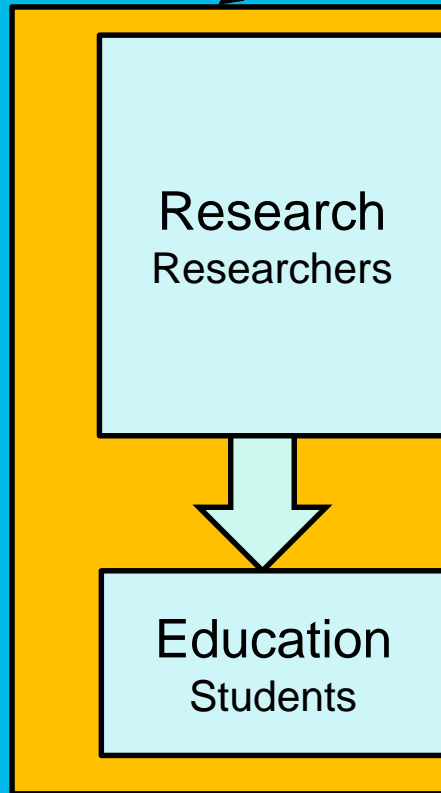
Research
Researchers

Phds

Education
Students

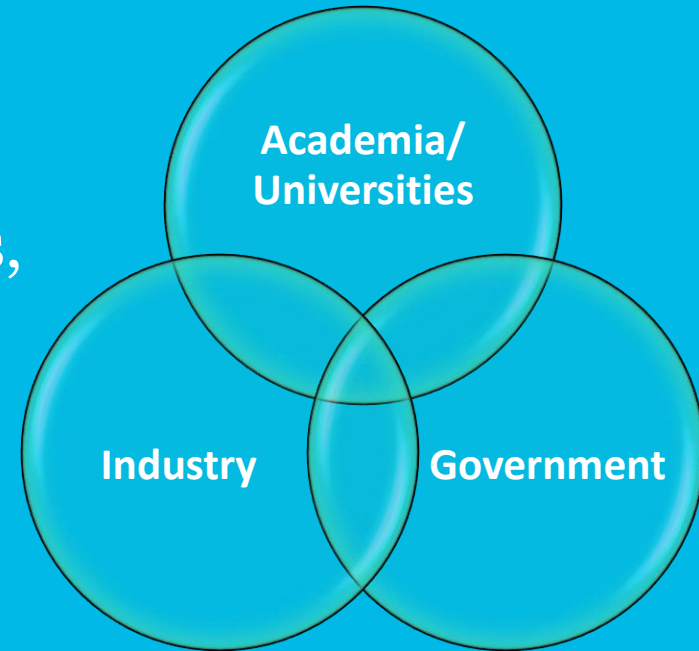
Engineers

Industry

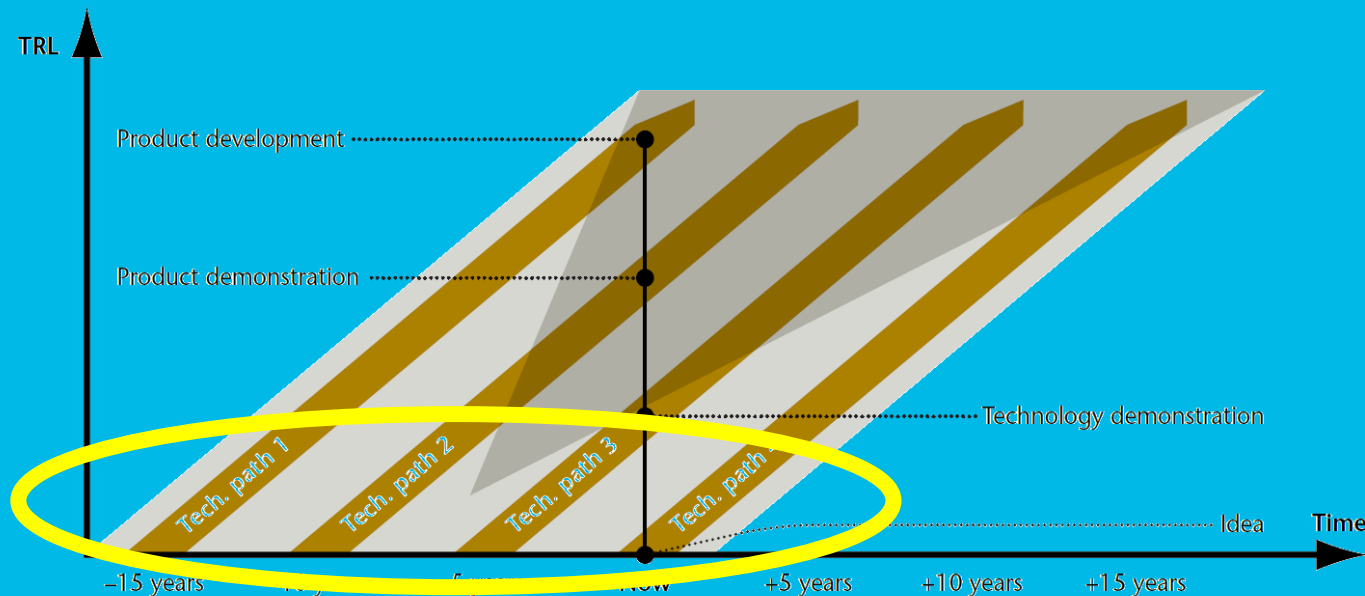
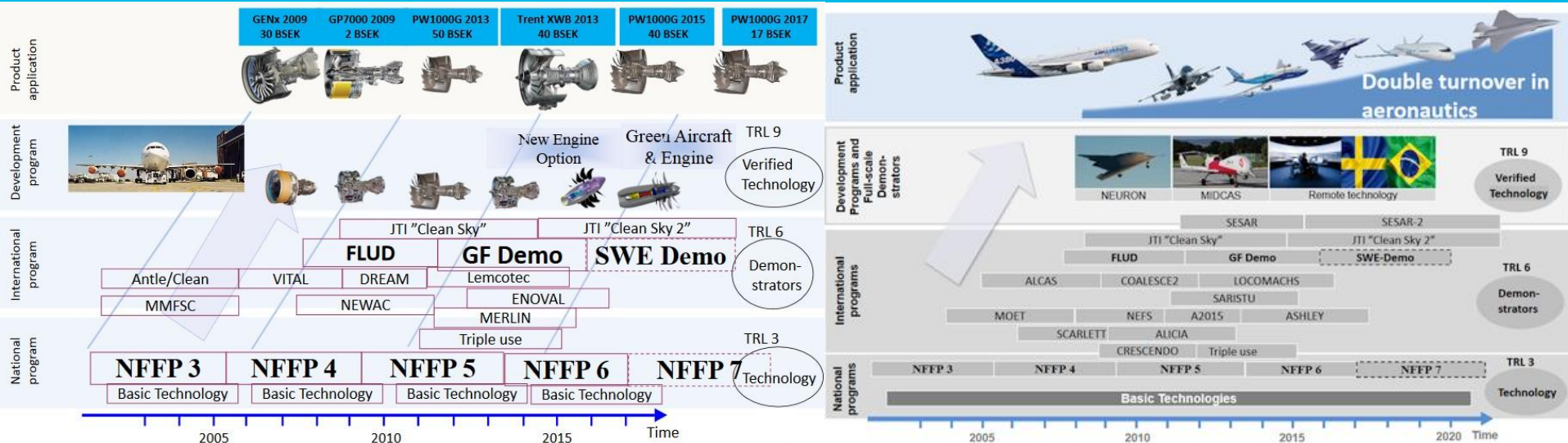


The Triple Helix

- Sweden with one of the most <digitalized> society
- Country of high innovation
- Interplay on different levels:
 - research centers, science parks, tech. transfer offices, incubators, etc.
- *Specialty*: Dual (or even triple) use research financing
- Social pay-off of the Gripen E/F:
 - 2.6-fold return on public investment!

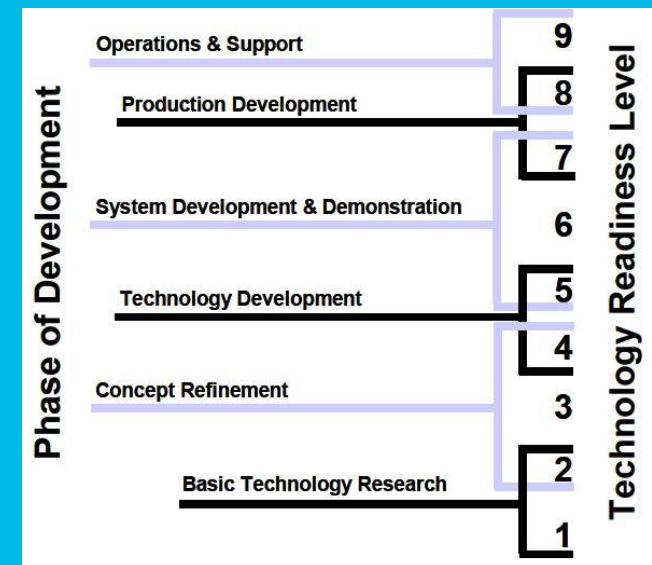


The TRL Research/ Commercialization Dilemma



Prediction of Research/Technology Maturity

- TRL well established index
- BUT:
 - product development VS research VS market
 - scaling effects
 - fails short on complex System of Systems (SoS) applications



TRL Alternatives

- MRL := Manufacturing Readiness Level
- BRL := Business Readiness Level
- IRL := Integration Readiness Level
- SRL := System Readiness Level



Collaborative Research Project

- Generate a SARC-common evaluation method of the environmental (and social) impact of future technologies
- SARC target:
 - sustainability goals: UN, European (e.g Flightpath 2050) and National goals
 - enable comparison of assessments
 - **more robust decision making**
 - **identification of strategic low TRL research fields**
 - **research financing, lobbying and collaboration with SIPs etc.**

SARC Activities

Four SARC Fields of Operation

- I. SARC.RESEARCH
- II. SARC.ACADEMY
- III. SARC.INTERNATIONAL
- IV. SARC.EDUCATION



SARC.RESEARCH Initial Activities

- Kick-off meeting 18-19/6 at LiU with >100 participants



Ongoing work:

- Establishment of dialog arenas with the 15 industrial cluster leads



SARC.ACADEMY

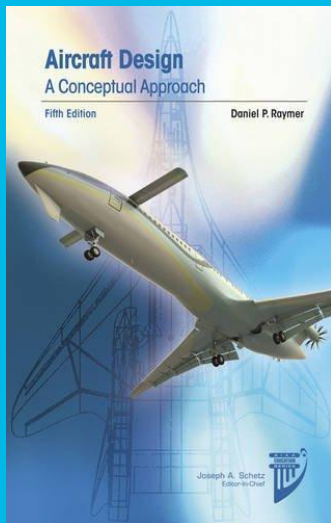
- Expertise from earlier graduated schools
- National high-quality course program
- Creates a network among PhD students, both nationally and also internationally
- Fundamental courses in Aeronautics for all NFFP PhD students:
 - *Create understanding for relations at system level. This is important in order to understand how individual projects relate to top level requirements.*

SARC.ACADEMY Kick-off:

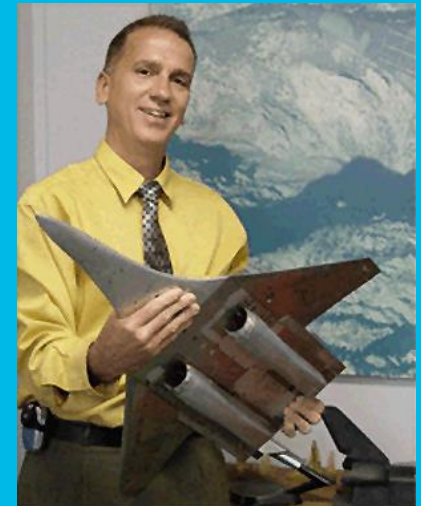
S4: "SARC Short Summer School"



- Daniel P. Raymer:
Aircraft Design: A Conceptual Approach
- Preliminary date: March 18-22, 2019



- Location: Florianopolis, Brazil
- Participants:
20 Swedish + 20 Brazilian
PhD students





SARC.INTERNATIONAL

- Center gives Swedish universities an arena to strengthen internationalization
 - Initial focus on Brazil, UK and Germany
 - Both countries have strong academic focus on aeronautics
- The national Graduate school will prioritize activities that make international collaboration possible
 - International competitions (e.g. SAE BRASIL AeroDesign project)
 - Double degree programs




SARC.EDUCATION

- Exchange of experiences
- Sharing of know-how and infrastructure
- Wider international reach of Sweden's aeronautical education competence / attractiveness
- Investigate possibilities for collaboration between master programs e.g. course sharing



<http://www.sarc.center>



The image is a screenshot of the SARC (Swedish Aeronautics Research Center) website. The header features the SARG logo on the left and navigation links for 'Welcome', 'Sections', 'Kick-Off Workshop', and 'About' on the right. The main banner has a background of a sunset sky with a silhouette of an aircraft. The text 'SARC' is prominently displayed in large white letters, followed by 'Swedish Aeronautics Research Center' and 'The National Network of Aeronautical Scientists'. Below the banner, three circular icons represent different aspects of the center: research (people with a gear), academia (a graduation cap), and international relations (a globe with people). Each icon is accompanied by a title and a brief description.

SARG

Welcome Sections ▾ Kick-Off Workshop ▾ About

SARC

Swedish Aeronautics Research Center

The National Network of Aeronautical Scientists

SARC.RESEARCH
Foster your research cooperations

SARC.ACADEMY
The Swedish aeronautic Ph.D. academy (forsarskolan).

SARC.INTERNATIONAL
Intensify your international research relations

How it started

2013

The SAAB Gripen contract with Brazil

The SAAB Gripen contract with Brazil including aeronautical technology transfer set needs for a tighter academia-industry relationship and enhances the importance of international collaborations.

2015

Professors of Aero-nautics at ITA / CISB

To tighten the Brazilian-Swedish collaborations within aeronautical research, three Swedish aeronautic professors **Petter Krus (LiU)**, **Dan Henningson (KTH)** and **Tomas Grönstedt (Chalmers)** get the endowed Chair at ITA in honour of the Peter Wallenberg Stiftelse.

2016

First Center Foundation Work

First ideas within INNOVAIR for a national aeronautical research organization as a complement to industry were formulated.



SARC is born...

Everybody has to prepare before take-off, also SARC. Basic ideas and the foundation were actually already established within the Swedish aviation sector before SARC was born. Read more about this exciting times below.

[See Kick-off](#)

2017

Industrial Cluster Leads

The establishment of fifteen industrial **competence clusters within aeronautics** (with cluster leads from GKN and Saab AB) strengthens the need for an academic complement.

2017

Center preparation work

Center preparation work commenced. Dan Henningson, Petter Krus and Tomas Grönstedt are assigned by INNOVAIR to work out a proposal of a national aerospace research organisation/cluster. During 2017 several work meetings were arranged at KTH, LiU,

2018-05-21

SARC is born!

The Swedish Aeronautics Research Center (SARC) is born! LiU principal Mrs. Helen Dannetun signed the center establishment contract at Linköping University as the host. Executive director of the first year is Dan Henningson (KTH/LiU), chairman is Anders Blom (INNOVAIR).

2018-06-18/19

SARC Kick-off

SARC is presented to the public with a **two-day inauguration event** at Linköping to over 100 participants from academia, industry, agencies and politics.

Heading for education...





DET STRATEGISKA INNOVATIONS-
PROGRAMMET FÖR FLYG

Tack så mycket!