



Brazil-Sweden Cooperation in Aeronautics

Presentation at the WIEFP 2018
4th Workshop on Innovative Engineering for Fluid Power

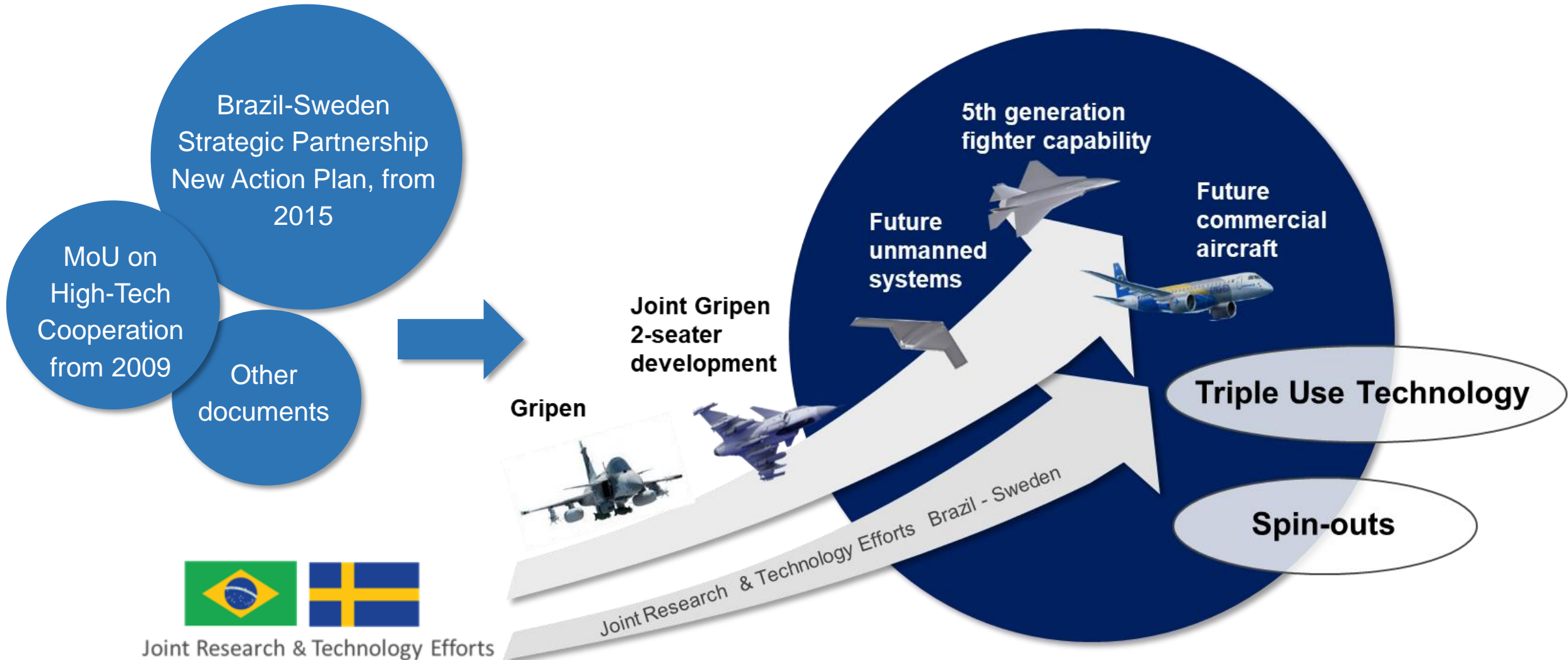
Sao Paulo 28th Nov, 2018

Col (ret.) Mats Olofsson, Innovair



The Background

The Brazilian-Swedish Aeronautics Vision

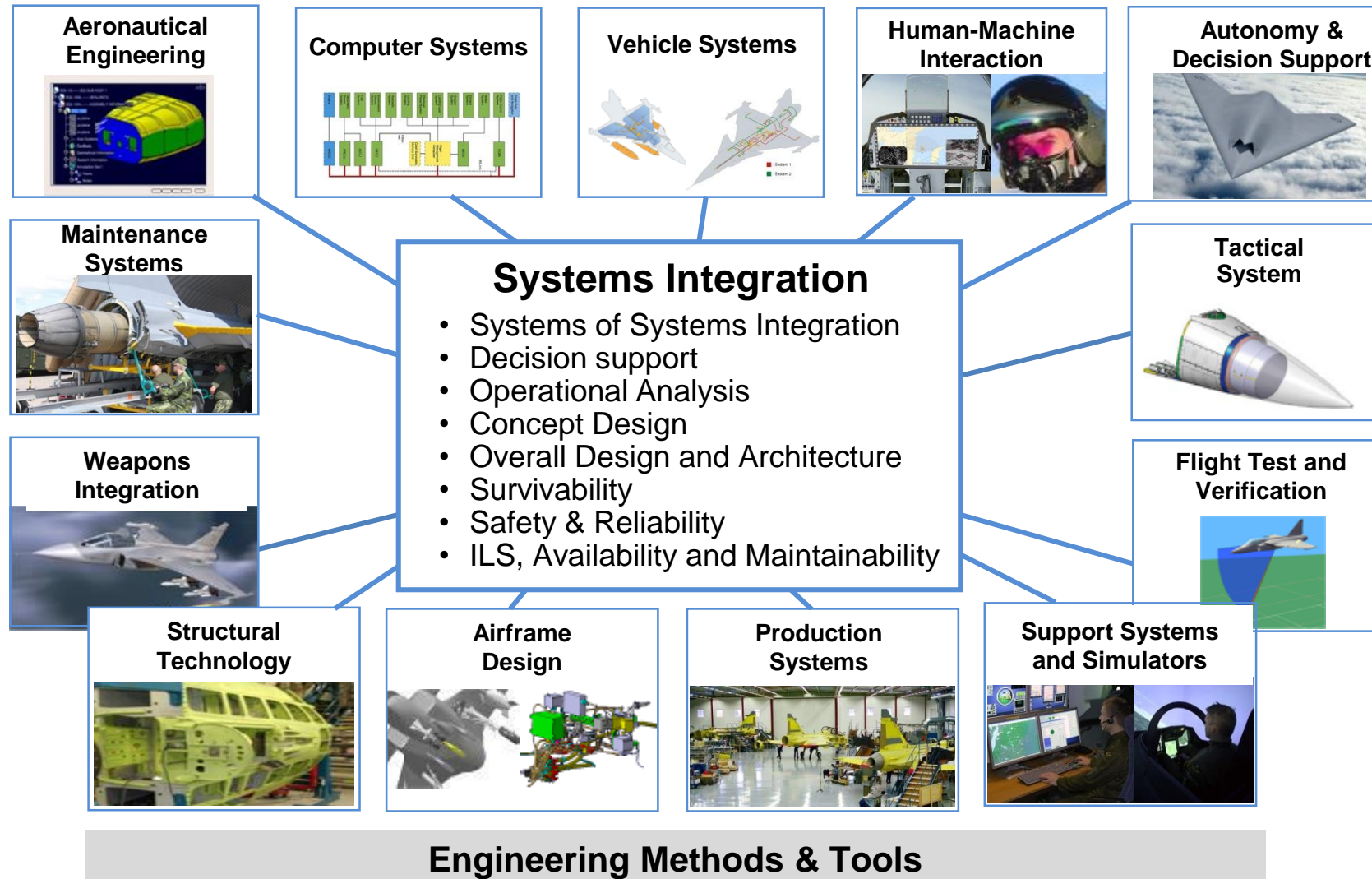


The Future

- From the Swedish Magazine Allers Veckojournal 1927
- The prediction for year 2000 – the new Orient Express



What does Aeronautics contain?

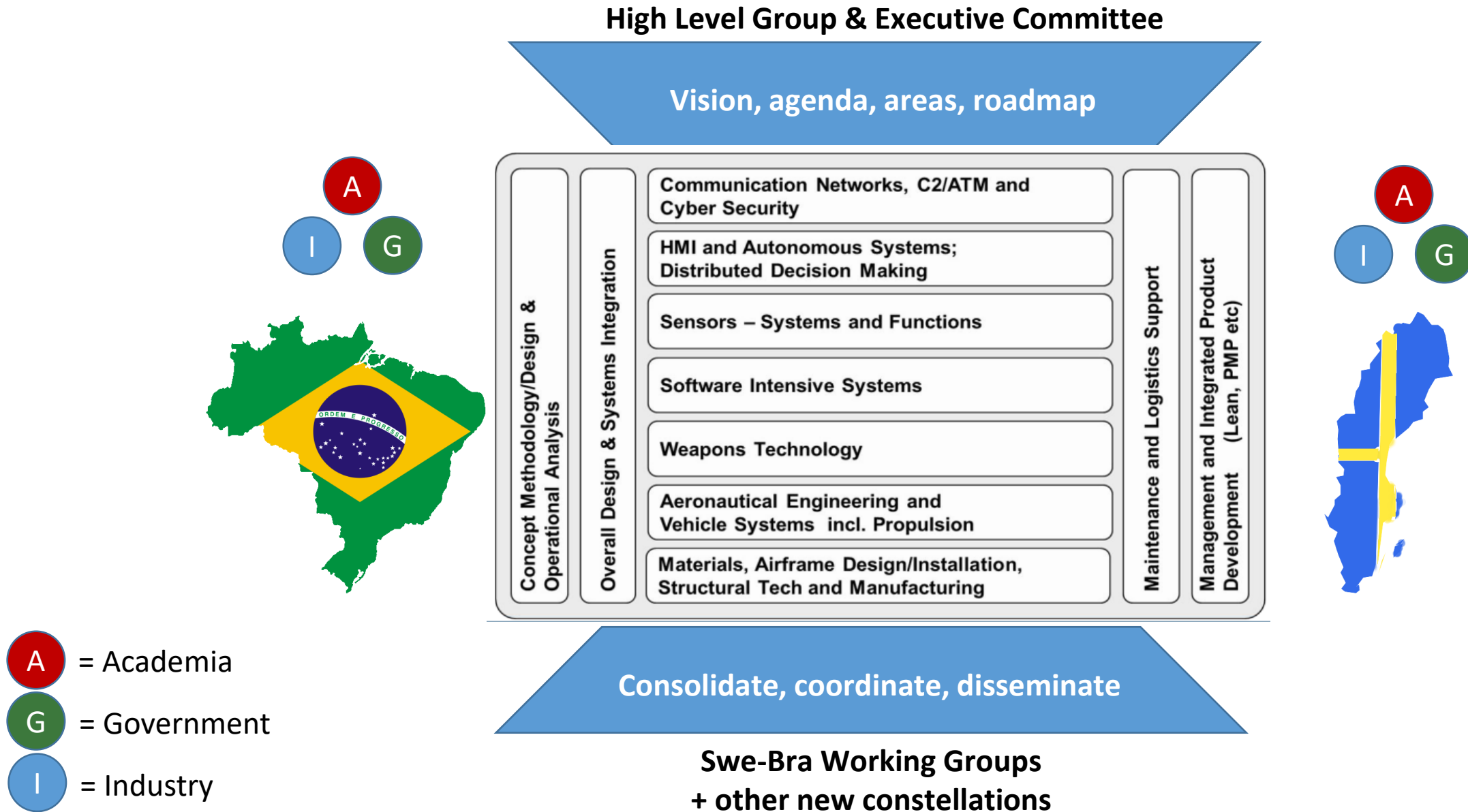


From the Meeting Minutes (draft) 19 Oct 2015

High Level Group on Aeronautics

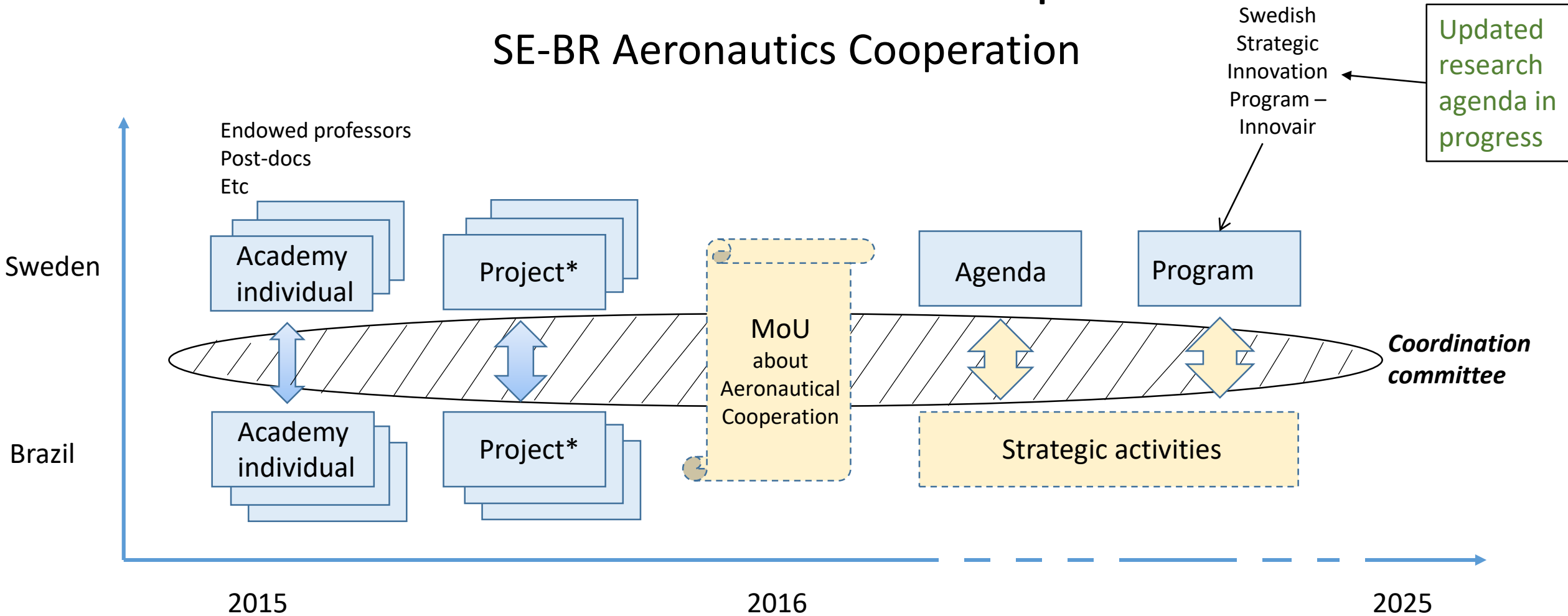
During the Brazilian-Swedish Joint Committee on Economic, Industrial and Technological Cooperation held in Brasília on 21 May 2015, **Brazil and Sweden agreed to establish a High-Level Group (HLG) on Aeronautics**, at Deputy Minister level, in order to broaden and extend the strategic collaboration in the field of Aeronautics. The HLG, formed under the additional protocol on innovative high industrial cooperation from 2009, is **a sign of the shared ambition to develop and deepen the bilateral cooperation in Aeronautics**, not only regarding military projects, but, regarding civil and dual use projects as well.

The Framework for Bilateral Cooperation



Coordination Roadmap

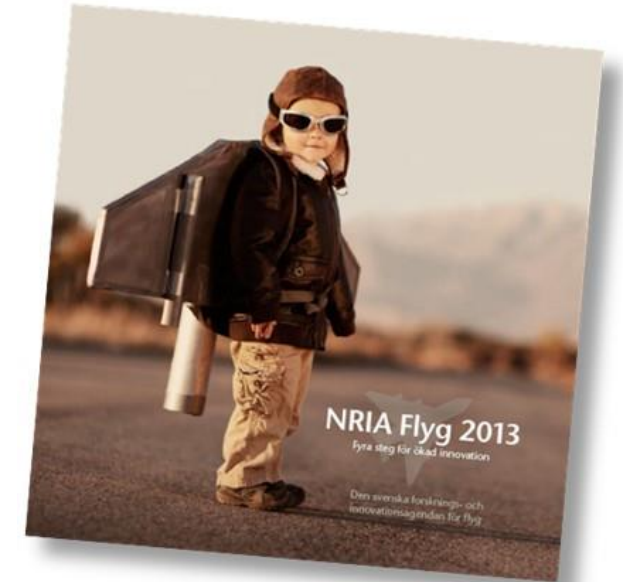
SE-BR Aeronautics Cooperation



*) Project activities should continue over time and eventually encompass the complete TRL-scale, from research and technology development, via technology demonstrators all the way to more mature demonstrators and finally products

The base for the Aeronautics Cooperation

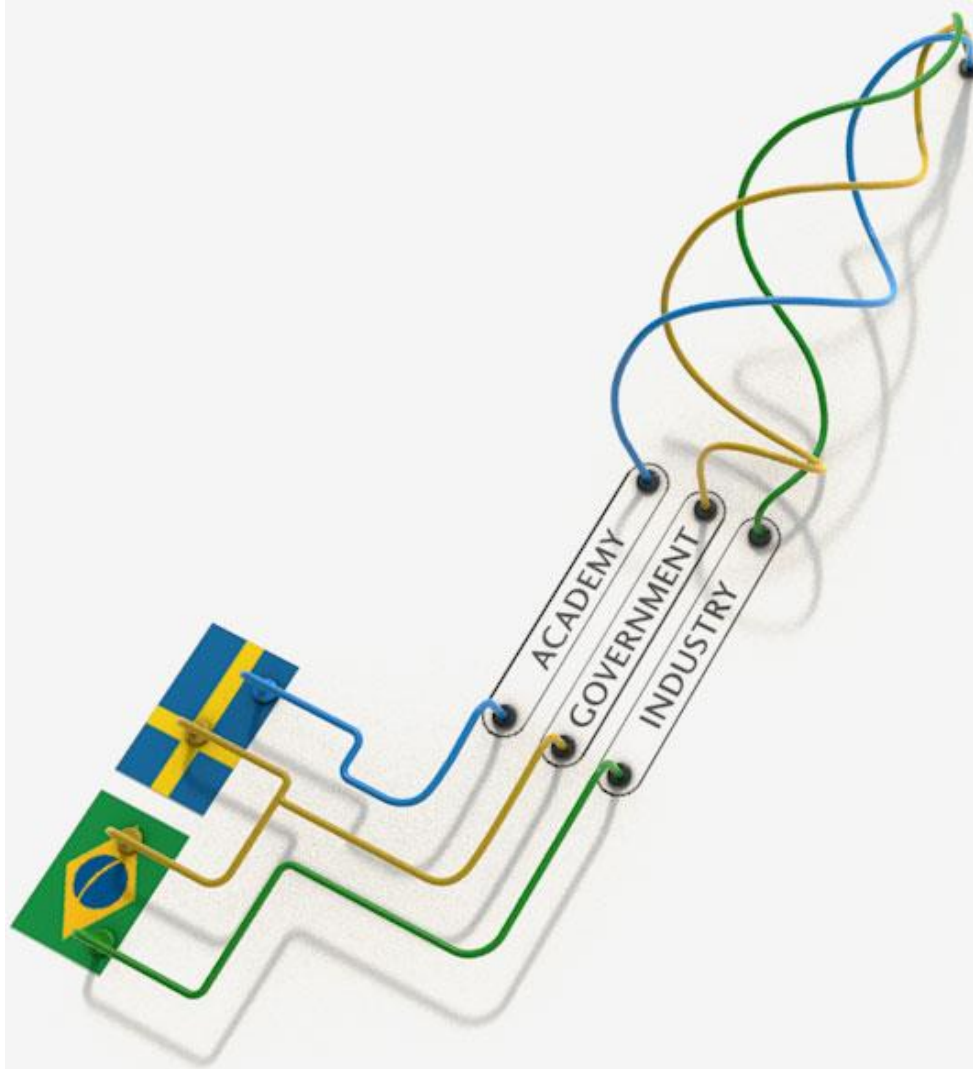
- In Sweden, the cooperation is expanded through Innovair – the Strategic Innovation Program in Aeronautics. Innovair has been instrumental in the production of the Swedish Aeronautical Research and Innovation Agendas, NRIA Flyg.



- In Brazil, the cooperation is supported by CISB and from various top-down and bottom-up initiatives to gather actors from the sector.



Cooperation with Brazil



- Based on the Gripen deal, but also on other common technology and industry interests
- The concept of Triple Helix has been in focus during the cooperation establishment

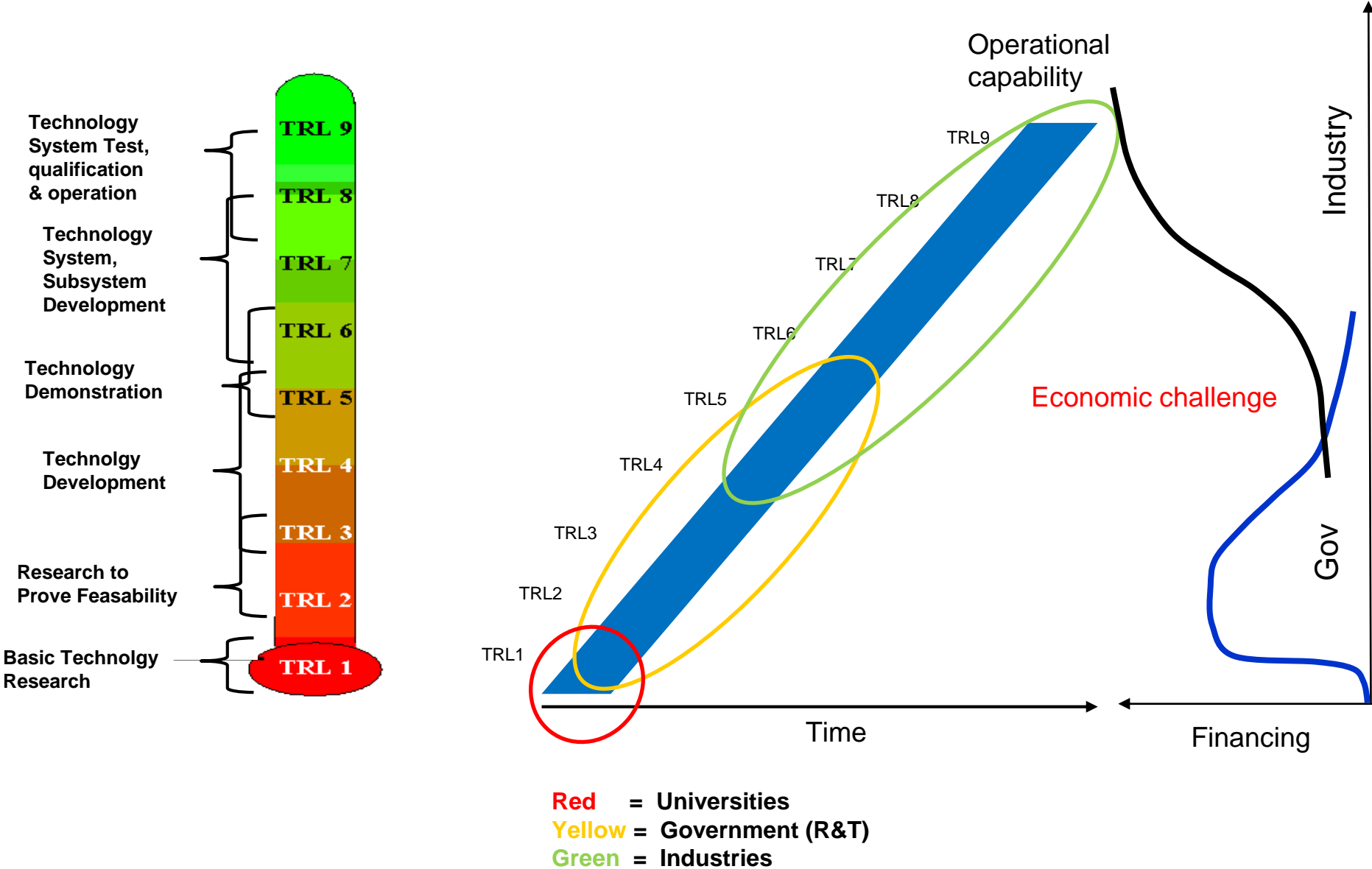
Results - Triple benefits

*In Triple Helix, **strategy** and **effort** are naturally aligned*

Academy	Industry	Government
Internationalization	Innovations	Multiplicative effects
Collaboration	Access to talents & market	Knowledge economy
Access to funds	Shared R&D costs	Efficient R&D funding

A successful R&D in Aeronautics can trigger other areas, like Mining, Digitalization, Water, Oil & Gas etc.

R&T is a vital for establishing operational capability



What is, so far, done in the
BR-SE Cooperation in Aeronautics

?

Ongoing Activities



Matchmaking

Annual Workshops
Started 2014
7th WS Sep 2018

Mobility

Researcher Scholarships
Project Travel Grants

Institutional Relationship

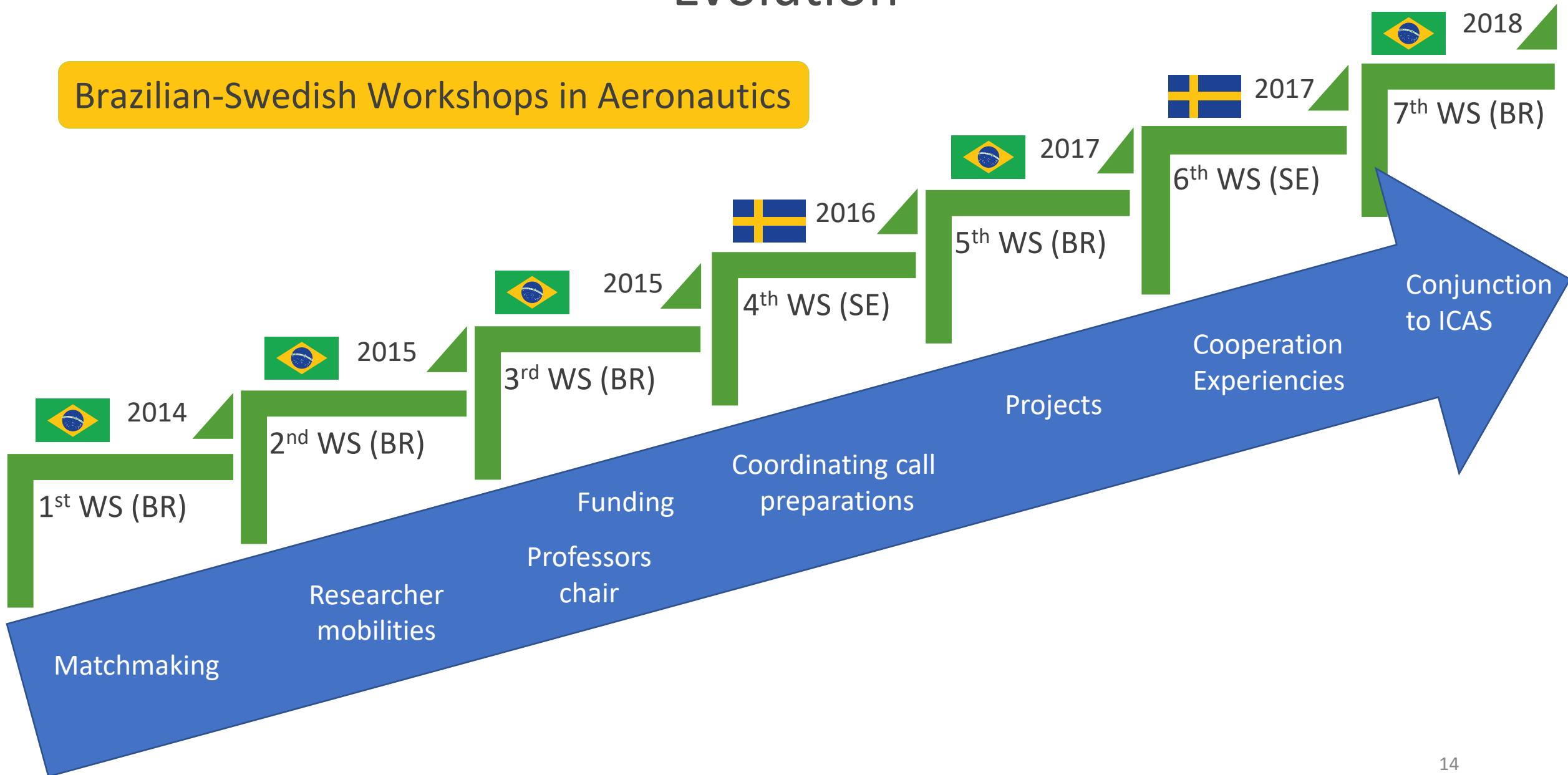
Swedish Professor Chair
at ITA (LiU, KTH & Chalmers)
Can it be expanded?

R&D Work

Research Projects Portfolio
Previously activated projects
+ New jointly funded projects
+ Other projects

Evolution

Brazilian-Swedish Workshops in Aeronautics



Quotes from the WS7 week in Belo Horizonte, Sep 2018

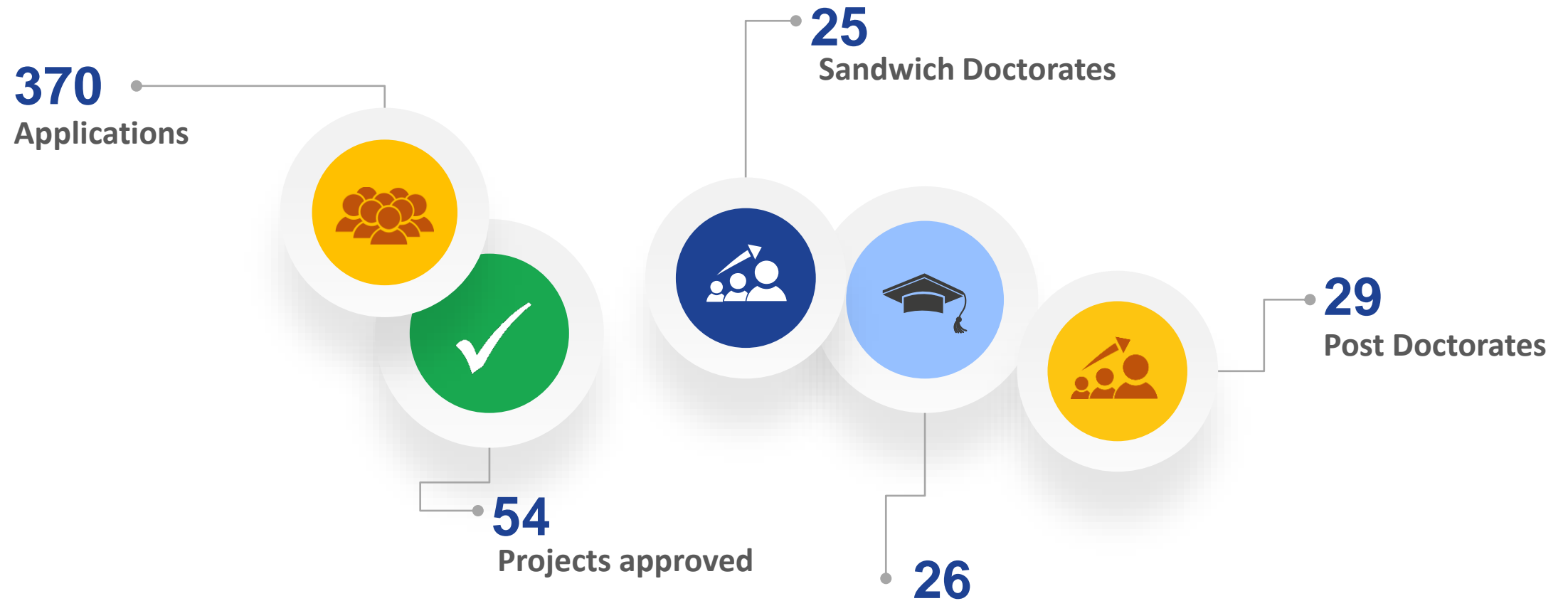
SARC (Swedish Aeronautics Research Center) newly inaugurated would probably not have happened if the Professor's chair at ITA would not have existed. So in some sense we went to Brazil and one outcome of it was SARC.

(Dan Henningson, Professor, KTH at the 7th Workshop in Aeronautics)



“The new gold is knowledge and the new mining tool is collaboration”
(Daniel Moczydlower, Vice President Technology, Embraer at the ICAS conference in the former gold mining state of Minas Gerais)

Brazilian Aeronautics Guest Researchers to Sweden – total since the beginning in 2014



Swedish Professors in Aeronautics – Endowed Chair at ITA

4 tasks for each professor

- Bilateral research
- Joint education
- Support the bilateral aeronautical research agenda
- Extend the scope of professors' chair:
 - More areas
 - More universities
 - Continuation

This could be used as a role model for more professor chairs, in BR and SE



Petter Krus
Professor Fluid and Mechatronic Systems
Project – Subscale Flight Testing



Ragnar Larsson
Professor Computational
Mechanics
Project – Multigraph



Thomas Grönstedt
Professor Turbomachinery
Project – Novel Propeller Concept



Dan Henningson
Professor Fluid Mechanics
Project – Laminar Flow Control

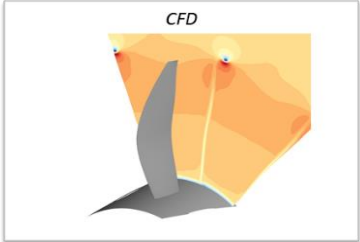







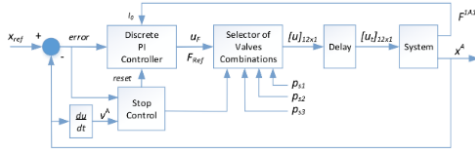




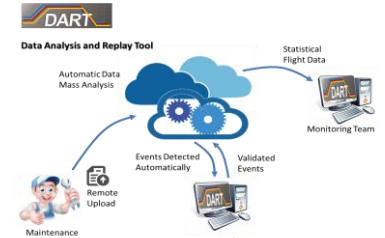





<p>Methods for sub-scaled demonstrator and control law testing (MSDEMO)</p> <p><i>Under NFFP6 financing</i></p>			
<p>Pre Laminar Flow Design (PreLaFloDes)</p> <p><i>Under NFFP6 financing</i></p>			
<p>Human Factors lab for Future Air Systems (HFlabFAS)</p> <p><i>Under NFFP6 financing</i></p>			
<p>MultiGraph</p> <p><i>Under SIO Graphene financing</i></p>			



Coordinated Research Projects



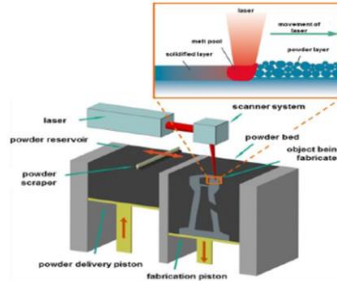
<p>InfloProp</p>		<p>CHALMERS UNIVERSITY OF TECHNOLOGY</p> 	<p>EMBRAER</p> 
<p>Methods for Subscale Flight Testing and Analytics (MESTA)</p>		 	 
<p>Digital Hydraulic Actuator (DHA) for Aeronautics for flight control</p> <p><i>Brazilian financing by Fapesc</i></p>		 	 
<p>Integrated health management and pilot performance analysis for future aircraft systems (IVHM-HFA)</p>		 	 <p>KONATUS</p>



Coordinated Research Projects



Tools and Methods for certification of Additive Manufacturing fabricated parts for aerospace applications (NDT-AM)



swerea | KIMAB

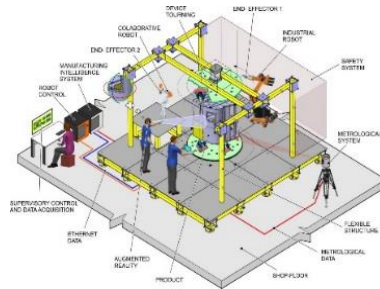


INSTITUTO SENAI DE INOVAÇÃO LASER

INSTITUTO SENAI DE INOVAÇÃO ENGENHARIA DE SUPERFÍCIES

INSTITUTO SENAI DE INOVAÇÃO SISTEMAS DE MANUFATURA

Flexible automation for cost effective aircraft manufacturing (FlexAM)



swerea | SICOMP SAAB

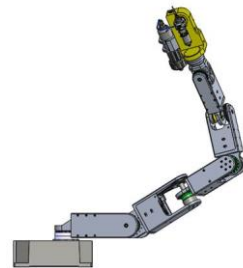
ProdSoft AB

Prodtex
Production / Technology / Excellence



SENAI CIMATEC SISTEMA FIEB
Federação das Indústrias do Estado da Bahia

Airframe Sealing Automation Using Snake Robot (ASASR)



SENAI Iniciativa da CNI - Confederação Nacional da Indústria



EngeMOVI

ENGENHARIA DE CONTROLE DE MOVIMENTO, VISÃO E INSTRUMENTAÇÃO

New Activities 2018

- Air Domain Study
- HMI-Human Factors Lab
- Swedish Aeronautical research funding (part of NFFP7)
- New project definitions (Industry & Academy)
- MoU FAPESP and Vinnova
- Continuation of the partnership CNPq-CISB-Saab
 - New Working Plan signed and new Call for proposal opened

Strategy

- Consolidation phase
- Step by step approach
- Build trust





The Air Domain Study (ADS)

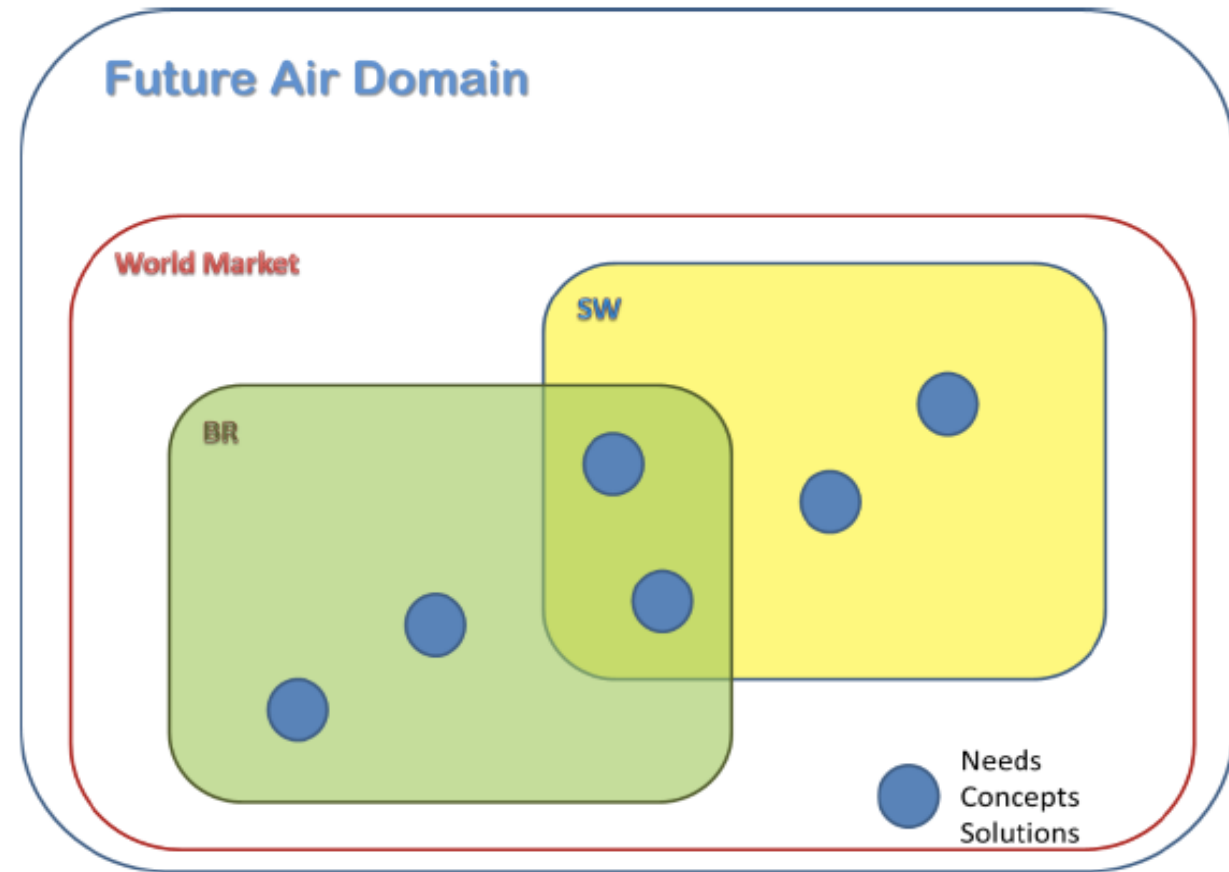
– part of the Brazil-Sweden
Cooperation in Aeronautics



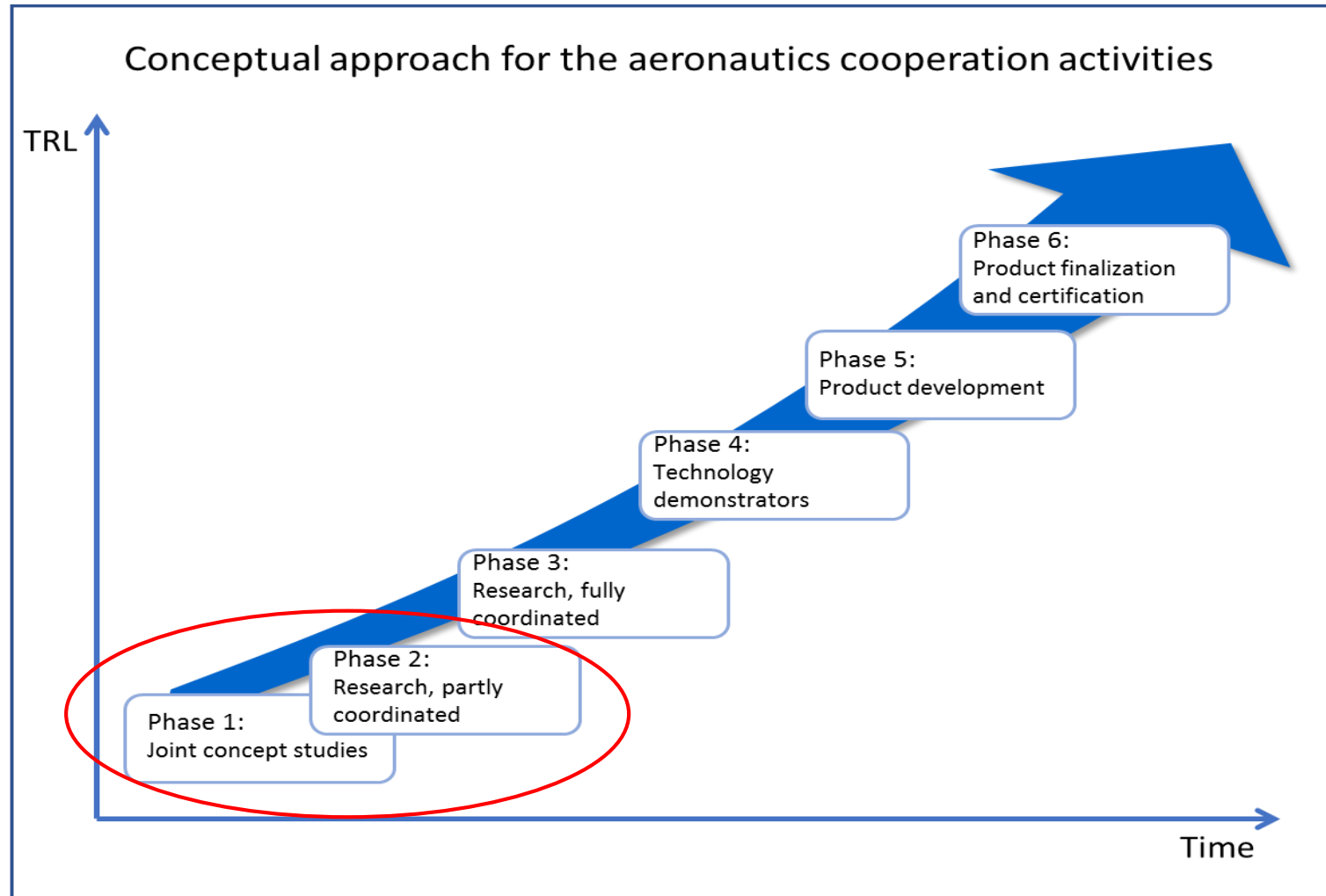
Air Domain Study (ADS)

The idea behind the ADS is to better understand the future air domain.

These activities will gradually expand the knowledge and support the efforts of the stakeholders, to position themselves in the future global aeronautics landscape.



A stepwise approach



From the ADS:

Suggested areas for further work in 2019-2020

The following activities and subjects have been identified as suitable for further studies and analyses to be planned and/or initiated in the 2019-2020 timeframe

From the ADS:

Suggested areas for further work in 2019-2020

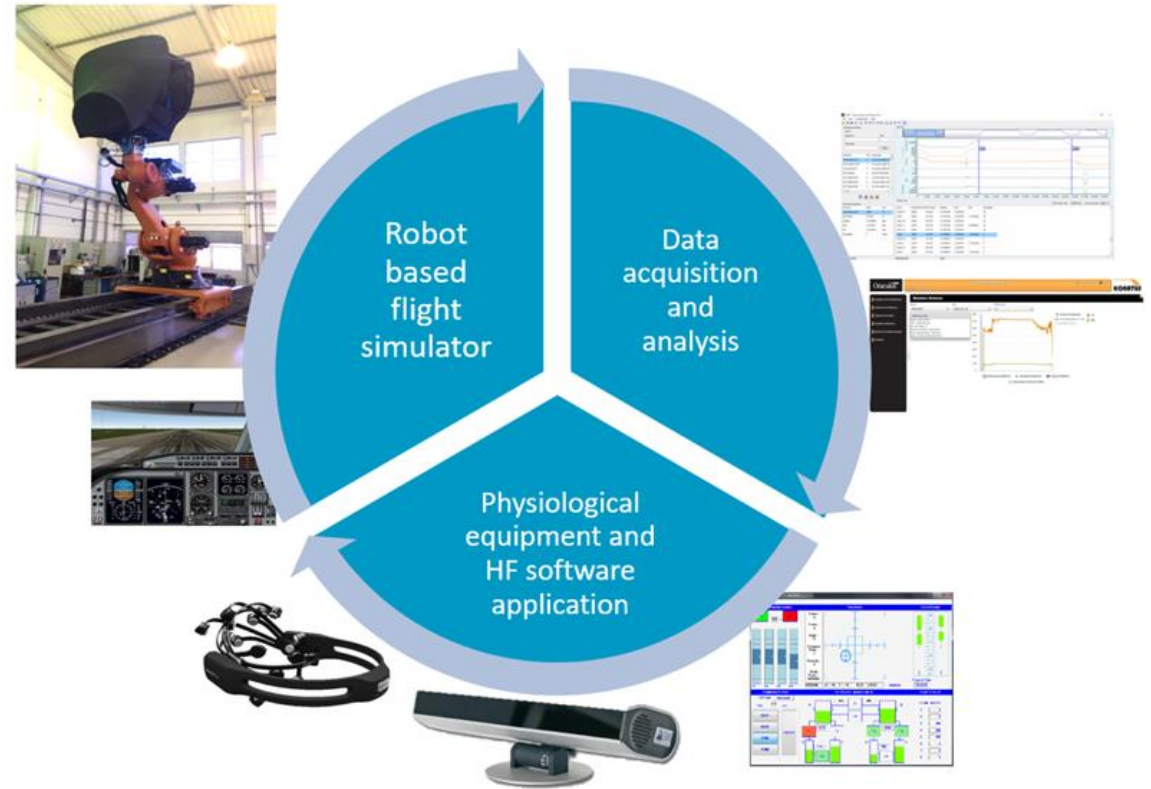
1. Develop scenarios based on mutually relevant needs, initially with Unmanned Aerial Systems (UAS) with Intelligence, Surveillance, Reconnaissance (ISR) capability as a focus



From the ADS:

Suggested areas for further work in 2019-2020

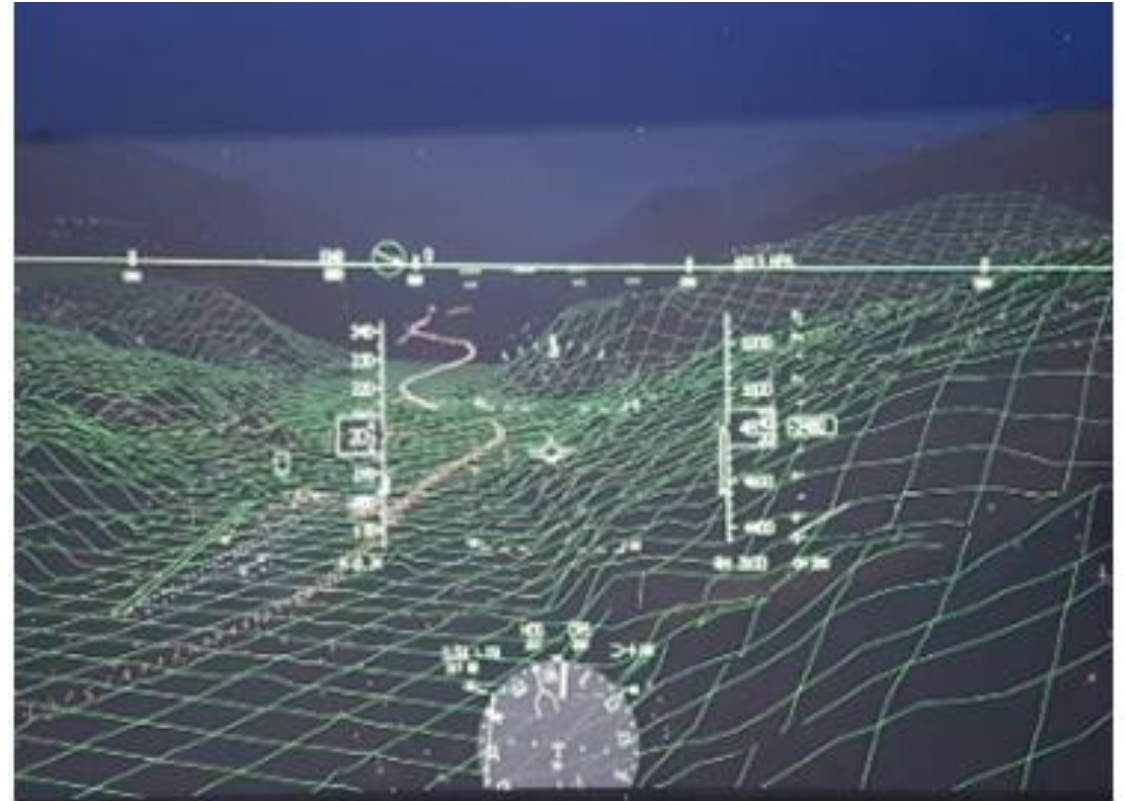
2. Develop scenarios (and projects) related to the Human Factors area, to support the HUF LAB activities already decided between the two Air Forces



From the ADS:

Suggested areas for further work in 2019-2020

3. Navigation issues with dependence on Global Navigation Satellite Systems (GPS etc.) versus inertia navigation and new onboard Geo-referencing systems

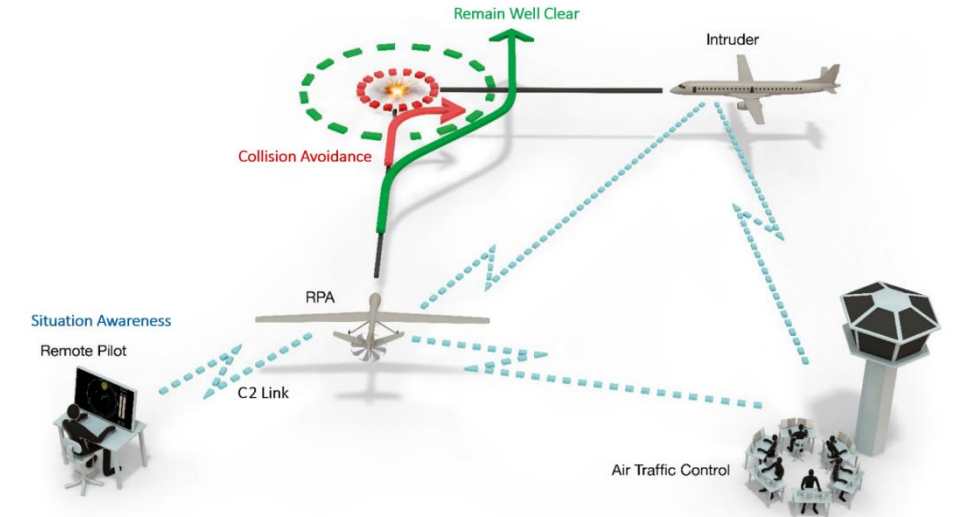


From the ADS:

Suggested areas for further work in 2019-2020

4. Air Traffic Management

- a) Unmanned Traffic Management (UTM) and autonomous system studies, including safe operations of UAS with manned aviation and integration of UAS in the Air Traffic Management (ATM)
- b) ATM in remote areas, such as remote operations of Air Traffic Control (ATC)



From the ADS:

Suggested areas for further work in 2019-2020

5. Sensors and software concerning detection and tracking of “difficult targets” such as foliage and camouflage penetration and objects with very small radar-cross-section



Connecting Innovation Eco-Systems - Gearing up for the future -

Future needs in
Brazilian and Swedish
Aeronautics Industry



Brazilian
universities
+
Swedish
universities

Research in BR+SE:

- Autonomous systems
- Decision support
- Sensors and sensor networks
- Materials technology
- Production technology
- Communications
- Software

Transport

Mining

Robotics

Digitalization

Telecom

Manu-
facturing

Civil
security

Bio
Economy

Benefits to many
parts of the
society in both
countries

Possible cost sharing in demonstrators

Obrigado!
Tack!
Thank you!

Presented by Mats Olofsson, Innovair
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