

# **Development of the aerospace sector -in the region of western Sweden**

Henrik Runnemalm, VP Global Technology Center



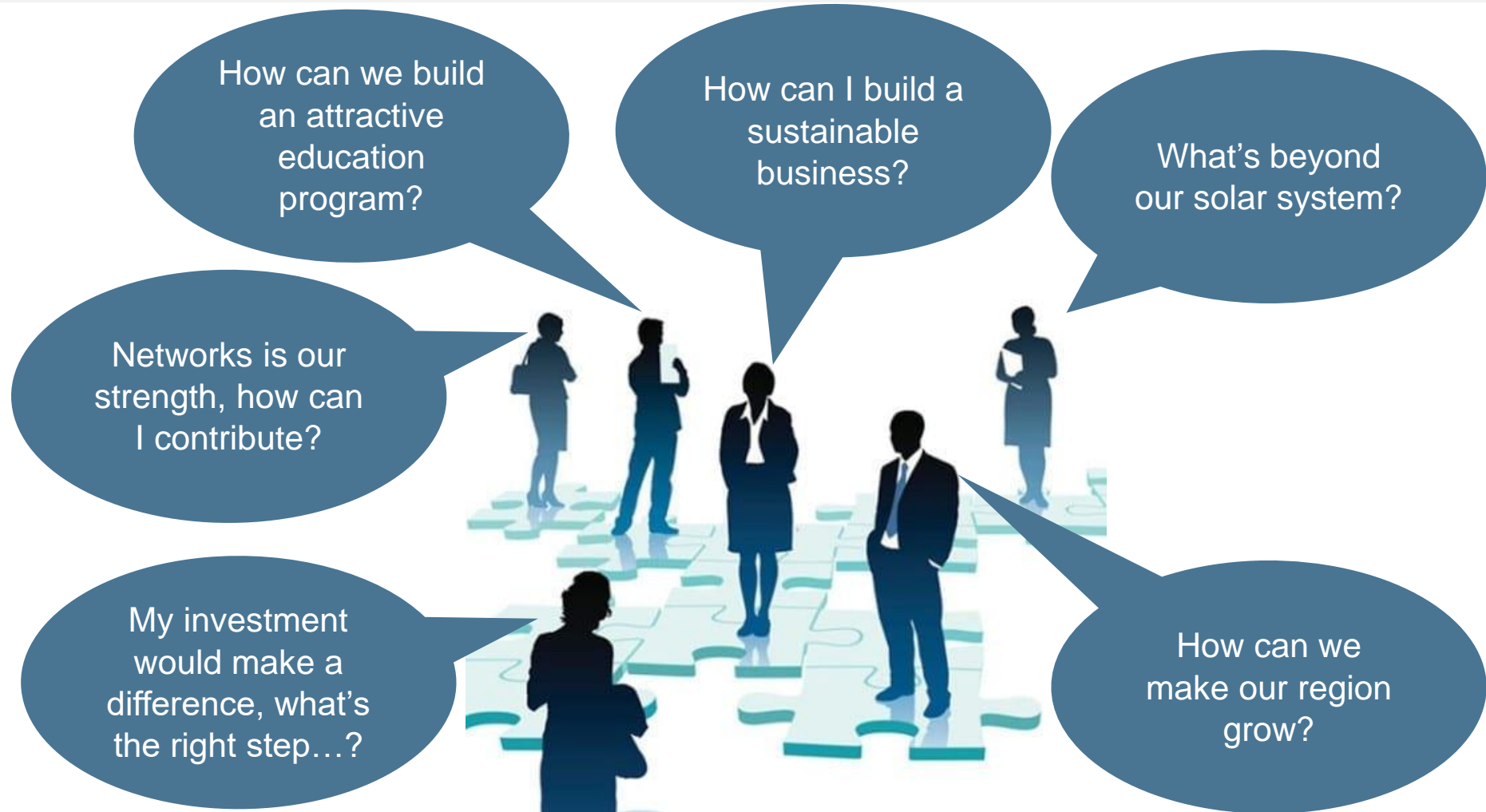
# Ingredients

- **To be successful we need to play together**

- Government
- Academia
- Industry

- **GKN Aerospace (or any industry)**

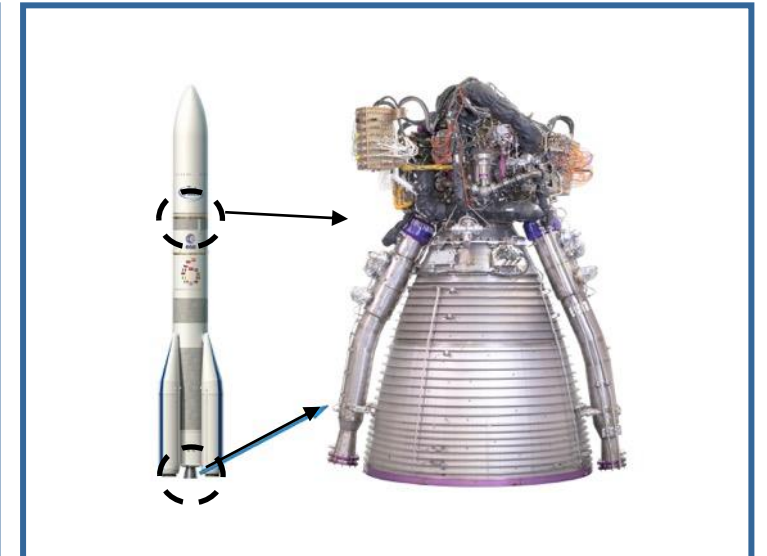
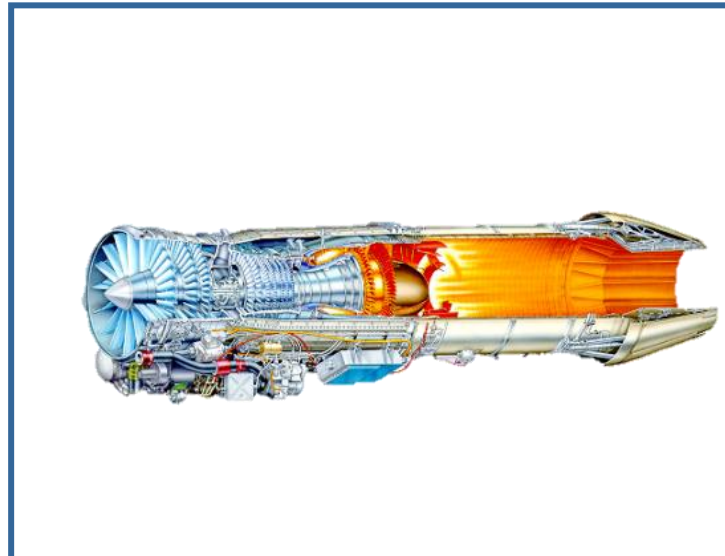
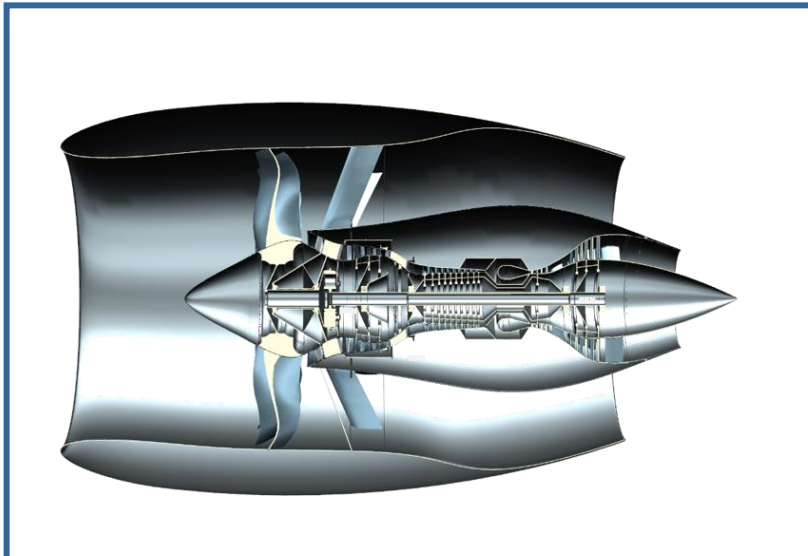
- Research
- Develop
- Produce
- Support
- ...



It is all connected

## Where to Play Product Portfolio

- Full engine OEM experience
- Developing systems, modules and products
- Partnering for integrated innovation in six focused areas



Fan Statics

Compressor Statics

Turbine Statics

Rotatives

Parts Repair

Military Systems

# GKN Space Program

- In the Space Business since 1974, supplier to all Ariane launchers.
- European Center of Excellence for Liquid Rocket Engine Nozzles and Turbines
- Technology development, product development and manufacturing
- Highly qualified jobs
- The first Ariane 6 flight is planned for the second quarter of 2022





innovatum  
science  
park



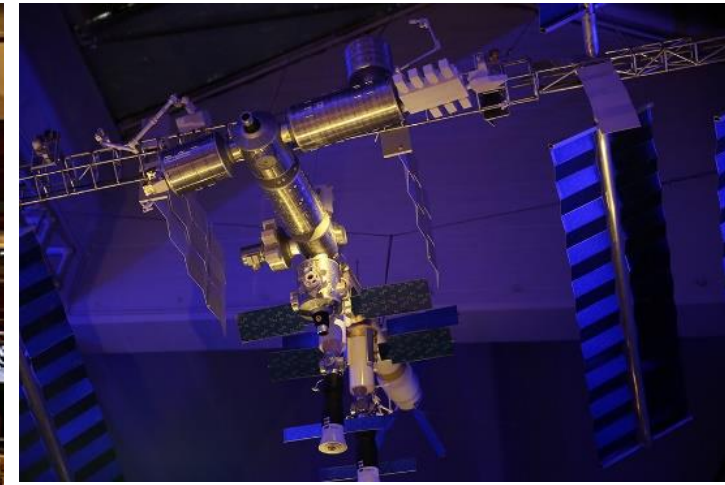
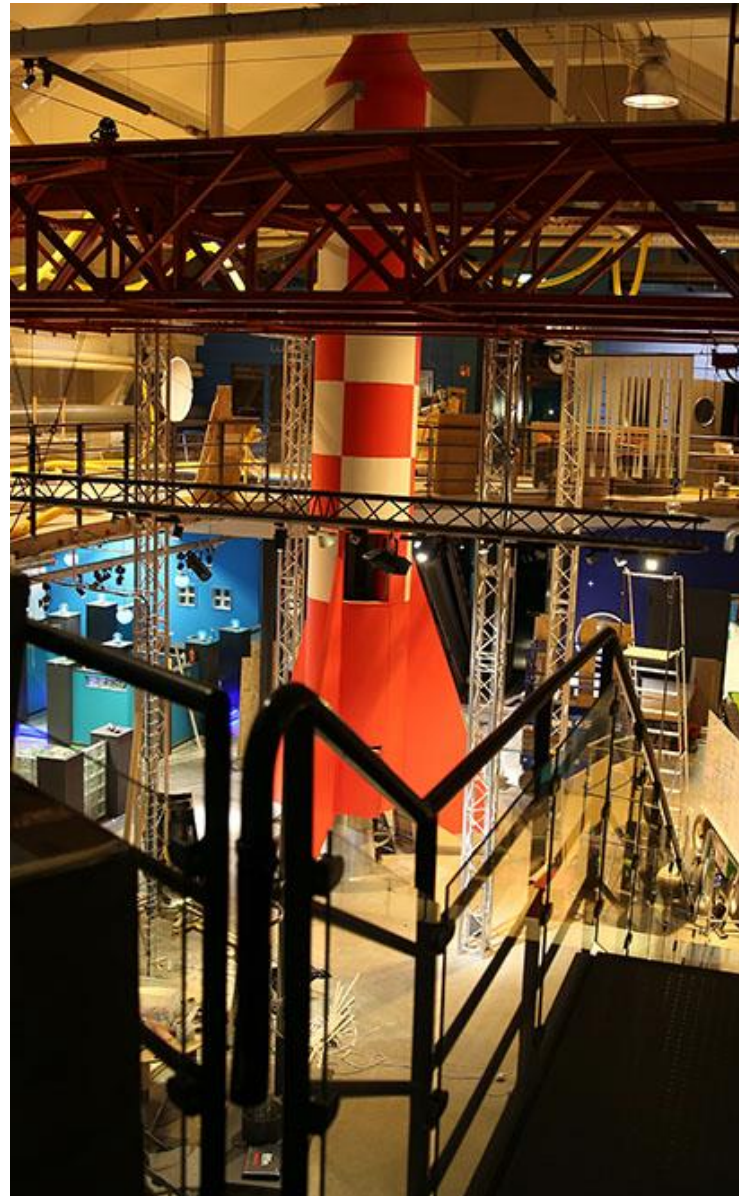


## Innovatum Science Center

Ett besöksmål där hela familjen kan upptäcka, uppleva och testa teknik. 4400 kvadratmeter fulla av interaktiva stationer, kreativa lekplatser och experiment.

# Rymdutställningen

- Raketer: Ariane 5 och Tintin
- Månlandskap med fjärrstyrda fordon
- ISS-replika
- Pedagogiska program: Space Escape



# För rymdstartups i Västsverige

- Coachning
- Expertkunskap & access till nätverk, support från extern kommitté
- Upstream / downstream / ESA IP bank
- Support för att söka finansiering (ESA BIC, Copernicus, Astropreneurs, etc.)





# Industriell teknik

- Moderna produktionsteknologier
  - Additiv tillverkning
  - Automation/kollaborativa robotar
  - ...
- Digitala verktyg
  - Artificiell intelligens
  - Sensorik, IoT
  - ...
- Uppskalning för att göra nytta!



# Event och samverkan

- Hackthons
- Venture Cup
- Rymdveckan
- Rymdforum
- Female Founder Talk på eHive, Vinn Group
- Women In Tech
- mfl



/Space Investment Day

# Vårt internationella rymdevent

- + 800 registrerade deltagare från 14 länder (140 startups och +100 investerare)
- + 3600 chattmeddelanden
- + 800 mötesförfrågningar



# Research and Technology strategy

Product Application



Development Programs



TRL 9  
VERIFIED  
TECHNOLOGY

International Collaborative Programs



TRL 6  
DEMONSTRATOR

Seeding Projects



TRL 3  
TECHNOLOGY

Time



# Clean Sky 2 major engine demonstrators

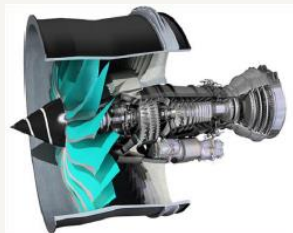


## Ultra-high Bypass & High Propulsive Geared Fans



### VHBR Turbofan Middle of the Market

Very High Bypass Ratio (VHBR)  
Large Turbofan demonstrator for long range introducing advanced low weight structures



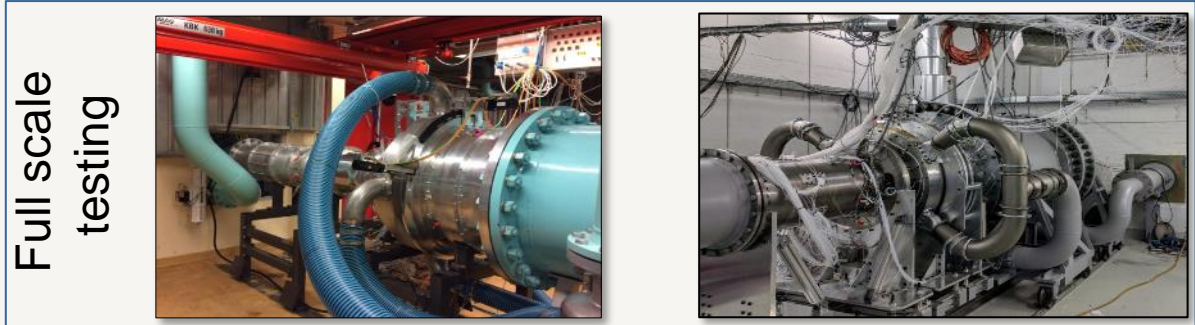
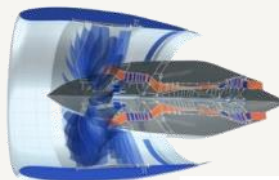
### UHPE Demonstrator

(Ultra High Propulsive Efficiency)  
Short/Medium range passenger aircraft developing advanced turbine structures and ICD solutions

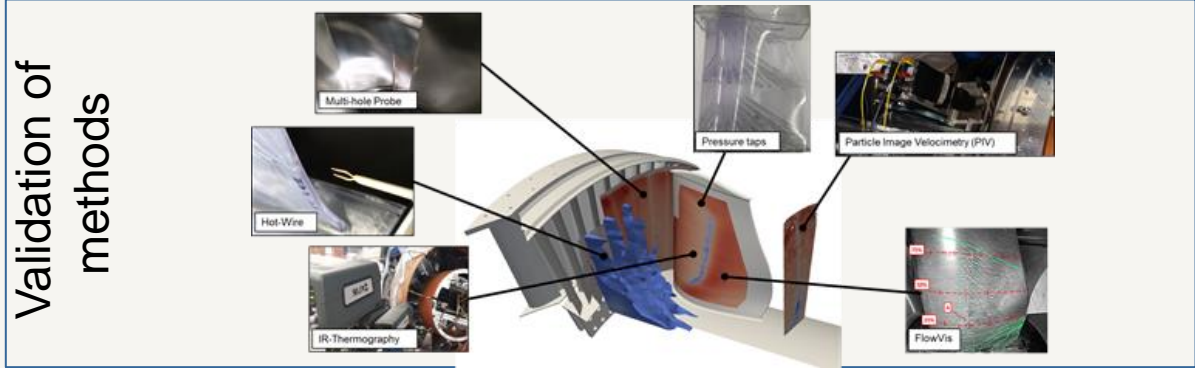


### Advanced Geared Engine Configuration

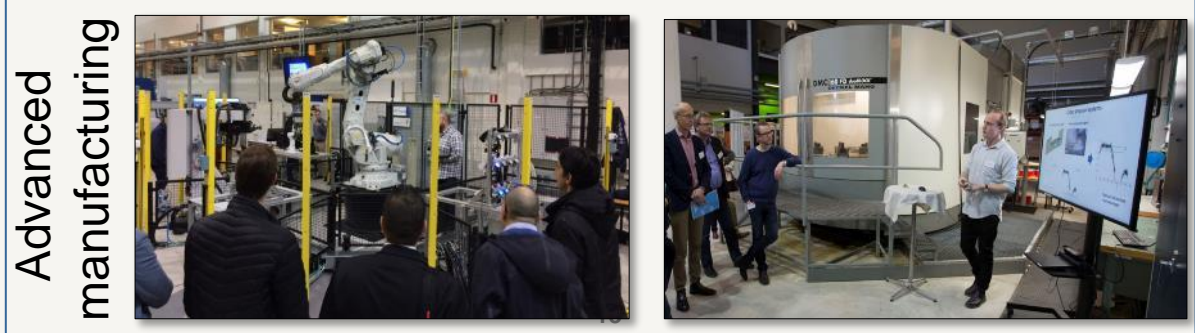
LPC and IMC technology demonstration for future regional GTF applications



Full scale testing

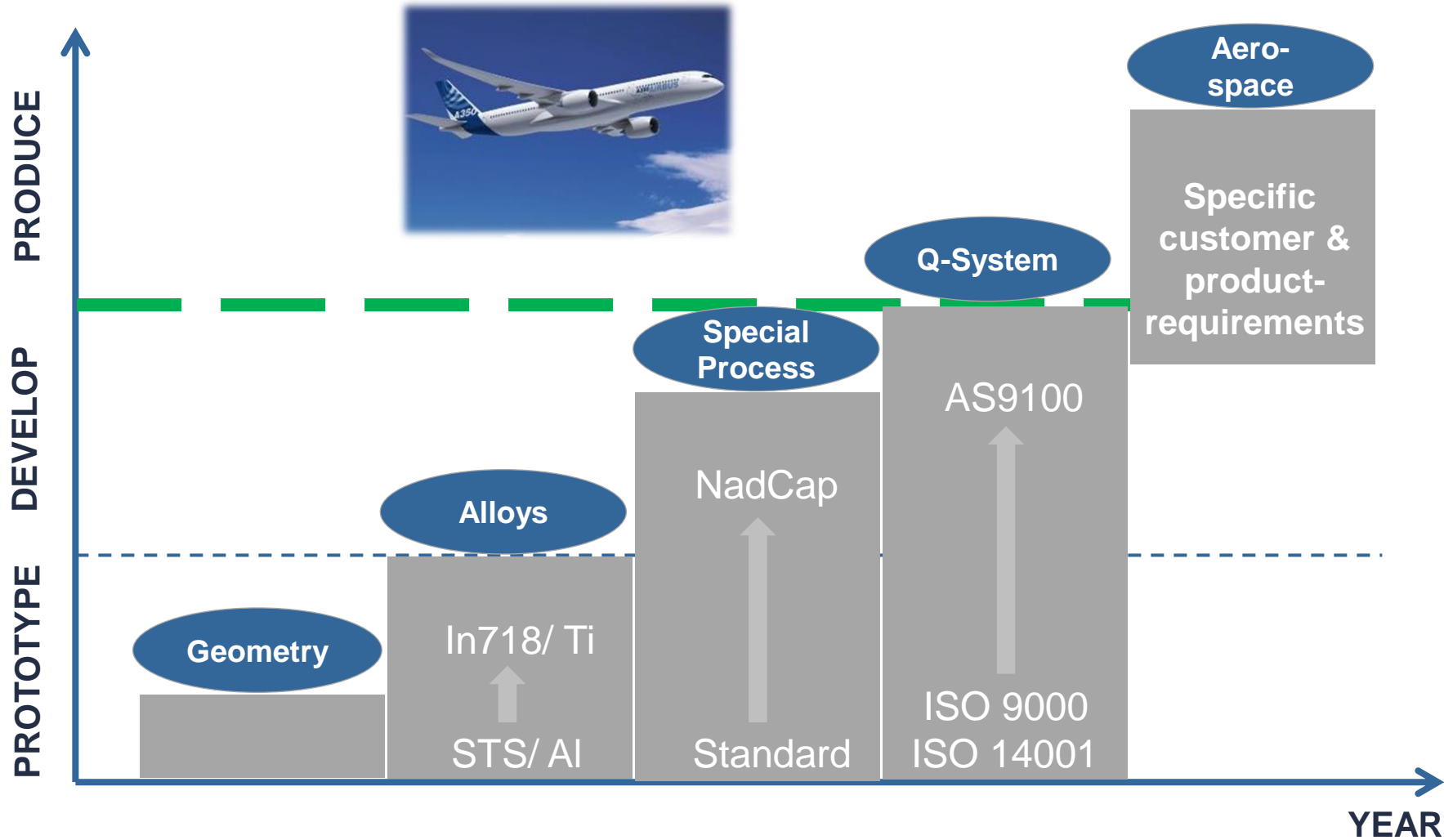


Validation of methods



Advanced manufacturing

# New supplier development



# SWE DEMO (a national 4 year program)

## Industry

- > GKN Aerospace Engines Systems, Trollhättan

## Research centres

- > Högskolan Väst
- > Innovatum
- > Rise IVF
- > Rise SICOMP
- > Chalmers
- > KTH

## SME-partners

- > Brogren Industries
- > Tooltec
- > Permanova
- > Midroc Automation

## SME suppliers (manufacturing)

- > MVG Kristinehamn
- > RLM Mekaniska
- > Råbe Tooling
- > Bröderna Carlsson
- > A-Teknik
- > VBRC
- > HB Mekaniska
- > HDL (hydroforming)
- > Finepart (water jet cutting)
- > TPC (casting)
- > AIM (3D-printing)

## SME- suppliers (other)

- > Tuvanium (laserteknologi)
- > Inpernova (laserteknologi)
- > Dalco (laserteknologi)
- > Elitkomposit
- > AH Automation
- > Arcam (EBM-utrustning)

**Over 20 SMEs involved**



# It all comes down to knowledgeable people

- Synergies
- Edge technology
- Innovative people

- Collaboration
- Research
- Value chains





# Thank you!

