

# Scrum in Military Hardware

## SAAB TECHNOLOGIES CASE STUDY



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A dramatic night scene at an airfield. In the center, a Gripen fighter jet is parked on a wet, reflective tarmac. Several ground crew members in dark uniforms are visible; one is in the foreground with their back to the camera, while others are further back near the aircraft. The scene is lit by three bright spotlights from above, creating strong highlights and deep shadows. The overall mood is professional and high-tech.

# GRIPEN IS READY

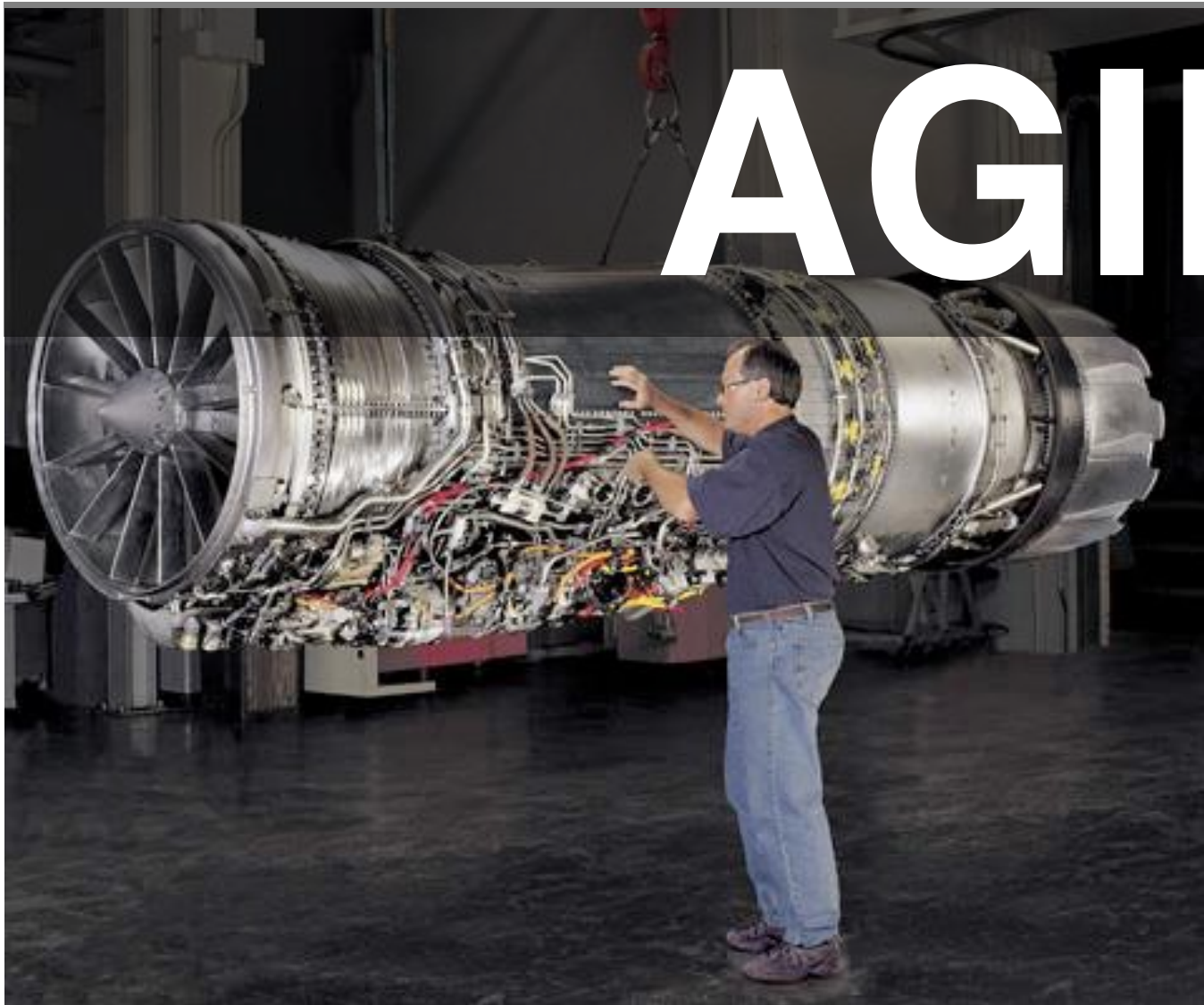
Source: [https://www.youtube.com/watch?v=sxMYFYDNF\\_g](https://www.youtube.com/watch?v=sxMYFYDNF_g)

# SCRUM ROOM



Source: ScrumInc, Agile in Military Hardware

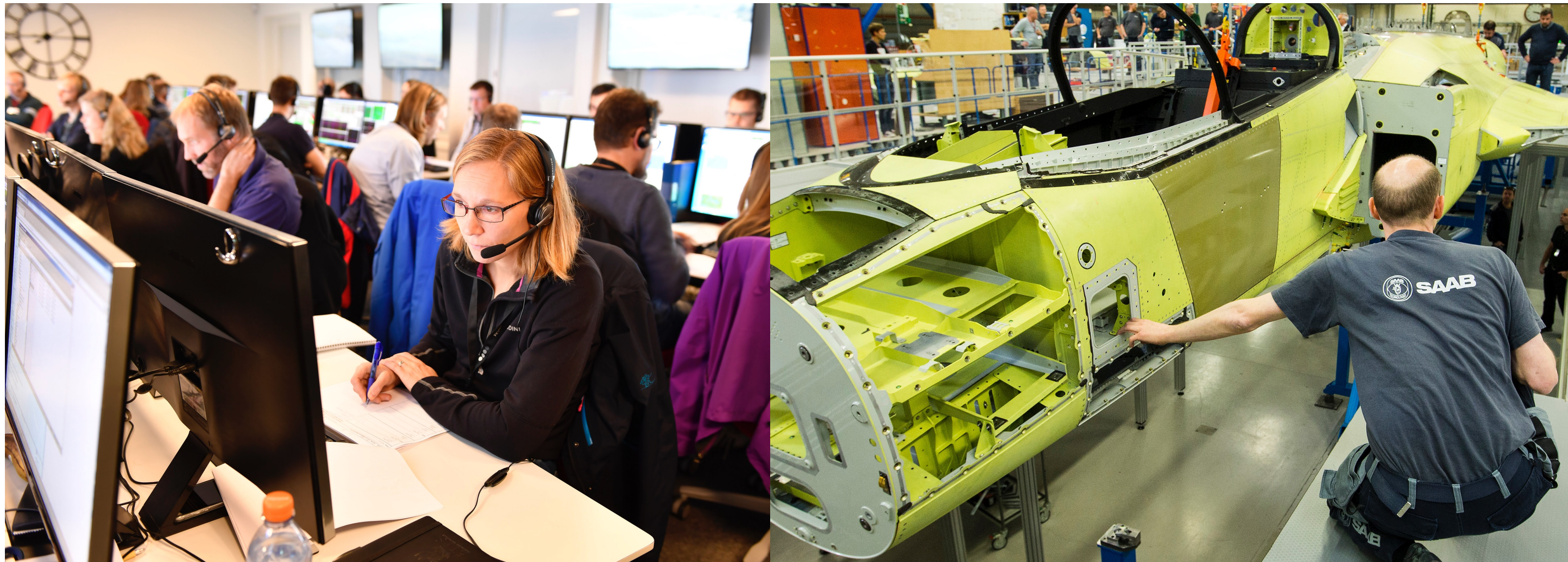
# AGILE ARCHITECTURE



Source: ScrumInc, Agile in Military Hardware

# CADENCE

- All of Saab Aeronautics on the same 3 week sprint cadence.
- “It is a Heartbeat. Everyone knows what day of the Sprint we are on.”
- All Systems, Goals, and Backlogs on Physical Scrum Boards visible to all staff.



Source: Scrum Inc, Agile in Military Hardware

# Scaling 2000 People in about 1 Hour!



7:30 Daily Scrum  
7:45 Scrum of Scrums - Scaled Daily  
8:00 SoSoS - Scaled Daily  
8:15 SoSoSoS - Scaled Daily  
8:30 Executive Action Team



# Management

- Highest priority is to remove impediments
- Very little difference in salary with Engineers
- Daily meeting with senior management.
- Decompose contract into goals.
- Backlogs with burn downs create the schedule of increments with targets (goals).



Source: Scrum Inc, Agile in Military Hardware

# Culture

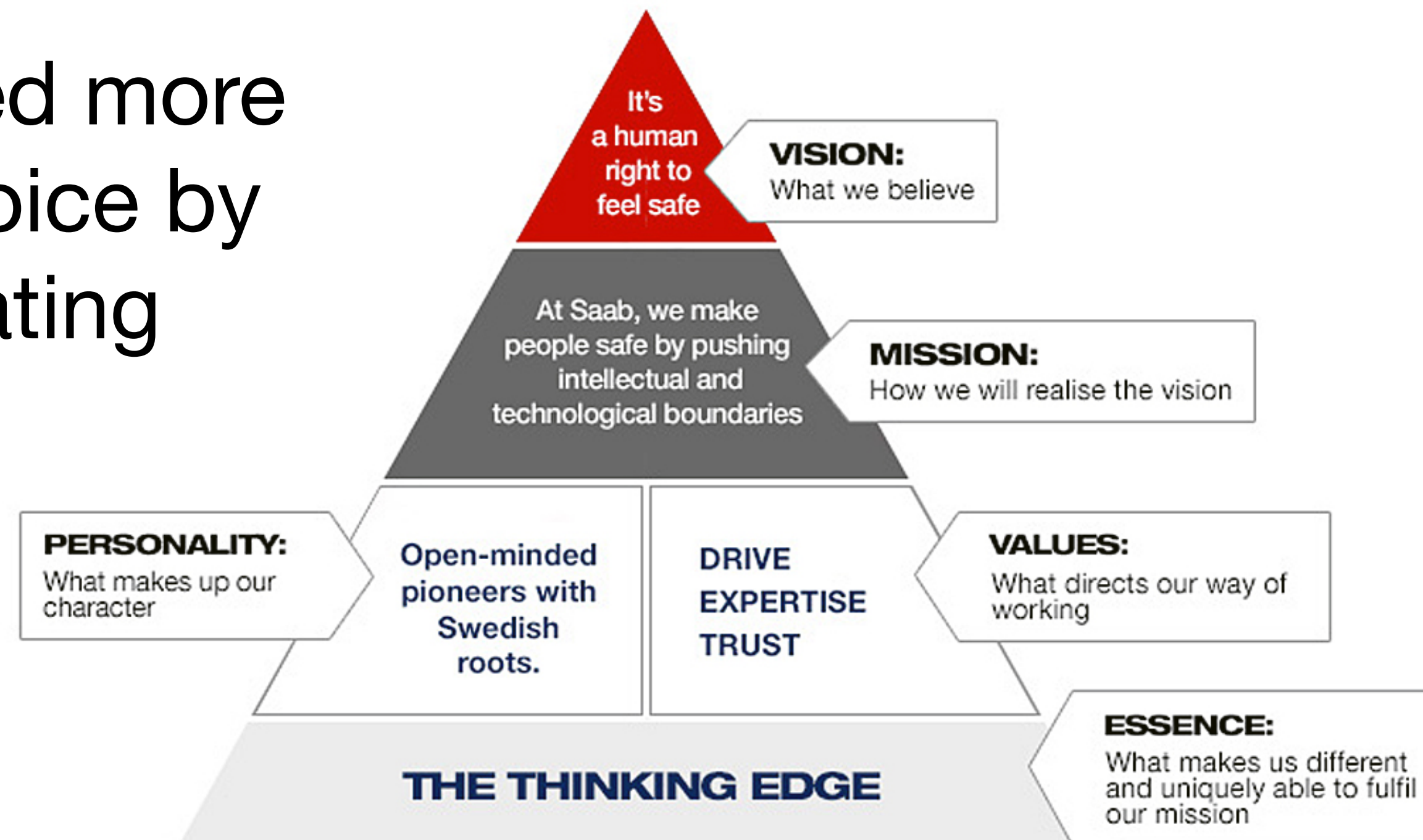
Teams do the detailed planning

Teams set the sprint targets (aligning the overall time plan)

Teams celebrate their victories

Swedish engineering culture: Don't ask manager to get something for you from another department, go there yourself right now and get it.

Only Google is rated more desirable work choice by Swedish graduating engineers.



# Practices are not Prescriptive

- Teams have varying levels of maturity
- All have visual boards and daily Stand-Up meeting
- All teams have multi-level planning before the iteration start.
- All teams have 3 week cadence, starting and ending on the same day.
- Teams have authority to optimize other aspects of the process to their own local context.
- Many teams add technical practices from XP and flow maximizers from Kanban
- “Real Kaizen mentality lead to what is better, unregarding what methodology is. Scrum just happen to work good for the majority”



# Hardware is all Software Anyway

A n y o n e i n t h e  
c o m p a n y a t a n y t i m e  
h a s a c c e s s t o  
c o m p l e t e c u r r e n t 3 d  
m o d e l a n d s o f t w a r e .  
E v e r y o n e h a s t h e f l i g h t  
s i m r u n n i n g t h e  
c u r r e n t C A D a n d c o d e  
o n t h e i r d e s k t o p .



# Hardware is all Software Anyway

Anyone can test new part or code in simulation, fly the plane around on their desktop. Simulate high speed collision with a bird. Simulate more powerful fuel pump. Try different bolt sizes. Whatever.

The simulator is fully scriptable, you don't need controls for running the available tests.



# Hardware is all Software Anyway

3 Level of simulation:

- 1) Remote Desktop
- 2) Flight Simulator with cockpit
- 3) Training System with complete cockpit and external view



# Hardware is all Software Anyway

The complete commitment to scaled simulation is inspiring.



# Collocation



**8 Pilots working full time in the site**

# Short feedback cycles



- Swing-role fighter  
Glass cockpit:
- 3 monochrome Multi –Function Displays
  - Wide angle Head-Up Display
- Swedish Digital Fighter Link  
Advanced Medium Range Air-to-Air Missile  
Tailored for Swedish needs:
- Small logistic footprint
  - Rapid reaction & turn-around time
  - Swedish text and symbology
  - Swedish low-drag pylons



- Fully integrated EWS suite  
Increased T/O weight  
3 large (6"x8") colour Multi-Functions Displays  
Improved lethality and survivability  
Meteor Long range BVR Missile integration  
Smart A-G weapons integrated (GBU-39B, GBU-49)  
Tailored for export needs:
- World Wide Climate Clearance
  - LINK16/NATO Interoperability
  - NATO pylons
  - Air-to-Air refuelling
- Ground Collision Avoidance System  
Helmet Mounted Display



Test bed for the Gripen E



- Increased range and endurance  
Increased internal fuel capacity  
Increased Max Take-Off Weight  
Additional pylons and increased weapons  
Increased thrust  
AESA radar  
IRST  
Enhanced EWS  
Enhanced NCW  
Full Capability Helmet Mounted Display  
Jammer pod integration  
Open architecture avionics  
WAD – Wide Area Display (Brazil)



**To reduce feedback cycle they use the Gripen D (two seats) for testing new components (eg: Radar) for new models.**

# Regulatory Compliance

- Certifying officials on site regularly throughout iterative development.
- Certification documents developed iteratively.
- Over time, trust has been earned between certifying officials and development teams.
- Final certification almost instant, and a formality.



# Problems

**Time**

**Cost**

**Quality**

# Agile Issues

**Ready Backlog Item**

**Prioritized Backlog**

**Clean Backlog**

# Other Companies

- Other SAAB groups companies are using Scrum.
- Scrum is becoming the new normal for hardware companies in Sweden.