

# Systems Workforce Summit 2024

*Securing Competence for Large Scale Systems  
Engineering Projects*



Annika Meijer-Henriksson

Head of Design Gripen

& Deputy Head of Business Unit Gripen



**SAAB**

# Annika Meijer-Henriksson

## *Head of Design Gripen & Deputy Head of Business Unit Gripen*

- Studied Mathematics at Linköping University; MSc Mathematics.
- Joined at Saab 1998
  - Started at Saab in the Saab Trainee Program
  - Manager for Production Support in the JAS39 Delivery Hangar.
  - Chief Engineer for the JAS 39 C/D Gripen
  - Chief Engineer T-X/T-7 Saab part
  - Head of System Engineering Management Gripen E
- Today: Head of Design Organization Gripen

Head of Design Organization is a nominated role from the Swedish Military Airworthiness Authority assuring that the Gripen design organization follows the appointed requirements for a Design Organization (SE-EMAR) and delivers a safe product with a sound design.



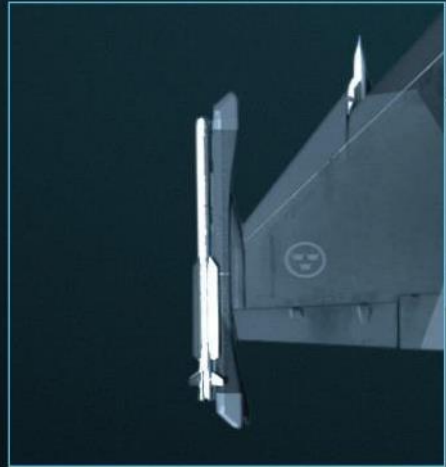
**SAAB**

# Background

## The Need for Practical System Engineering Experience

System Engineering is not tools and processes; it is a mindset and a structured way of thinking.

It is balancing and compromising the complete system against it's parts



## Developing System Engineering Competence Through Real-World Projects

### Key Message:

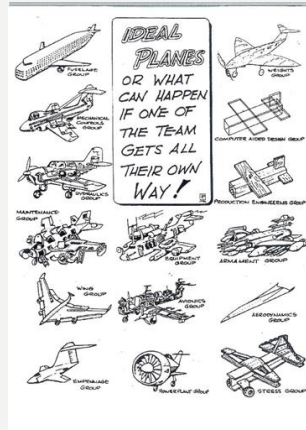
- Systems engineering is a multidisciplinary field that involves integrating complex systems to achieve desired goal.
- While formal education in systems engineering provides foundational knowledge, real competence is developed through hands-on experience in complex, real-world projects.

### Why Experience Matters:

- In academia, students learn the *theories* and *methodologies* of systems engineering.
- Actual system engineering competence requires dealing with *real-world constraints*, *cross-functional collaboration*, and managing *project risks*.
- A structured, theoretical approach often falls short in addressing the uncertainty and complexity found in practical environments.

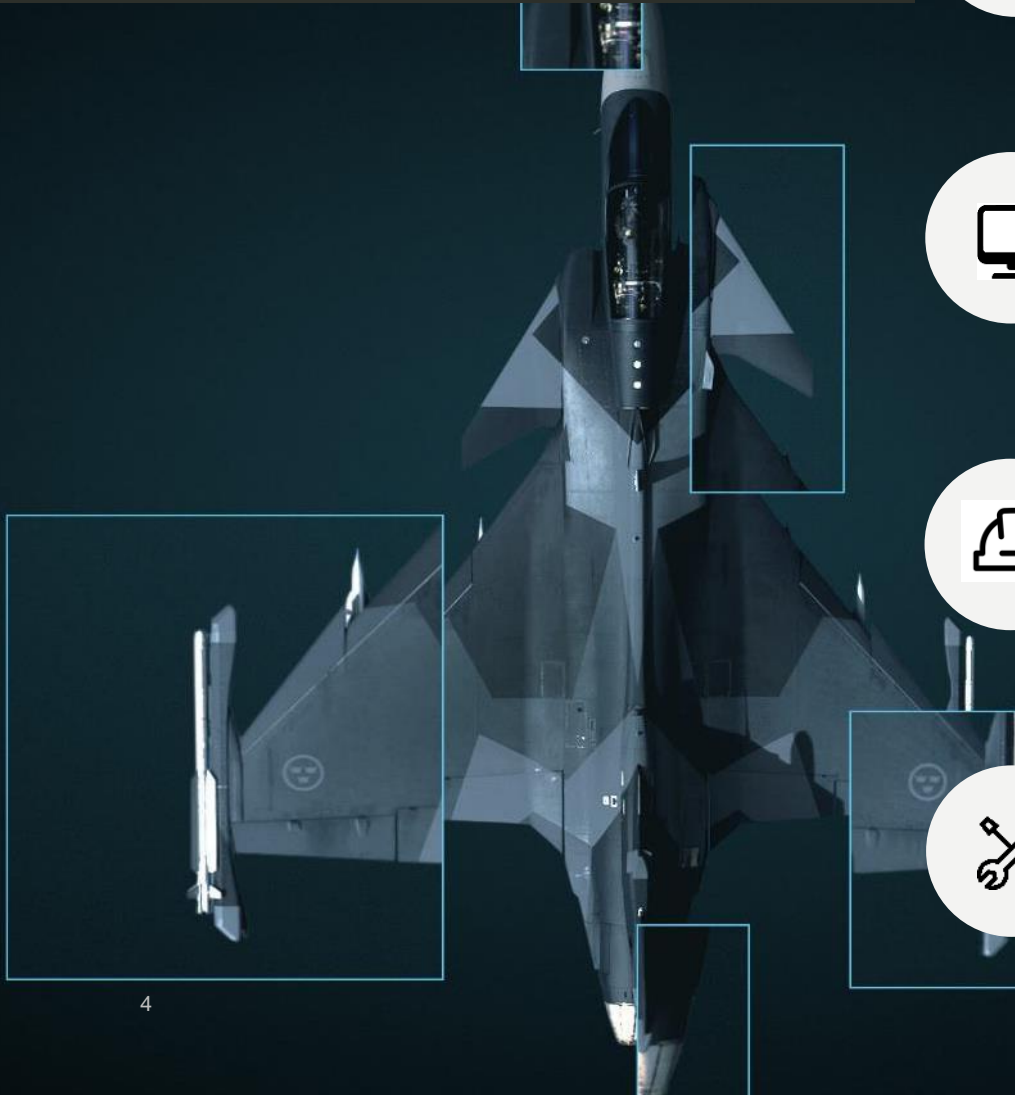
### Conclusion:

- To be a competent systems engineer, you need both theoretical knowledge and experience to be able to manage and solving problems on large, dynamic projects.



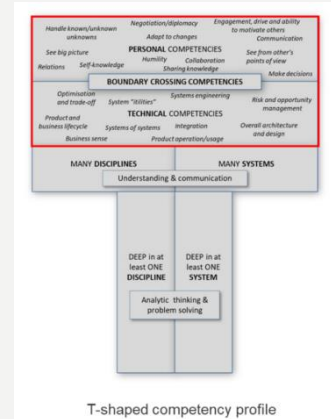
# What to do

## Activities to Build Systems Engineering Competence



## Key Activities to Develop System Engineering Competence

1. **Junior Leads – Senior Mentors**
  - Early responsibility on complex tasks
  - Let younger engineers grow with the support of the more experienced
2. **Competence matrix – We are all needed**
  - General competence, Particular competence
  - Bridge-builder, Specialized
3. **Programs to build T-shaped engineers**
4. **Plan for successors**



### What we then get is:

#### Hands-on Involvement in Entire Project Lifecycle:

- Exposure to all phases: concept development, design, implementation, testing, and maintenance.
- Learning to anticipate risks and make design trades. Compromises and balance.

#### Cross-disciplinary Collaboration:

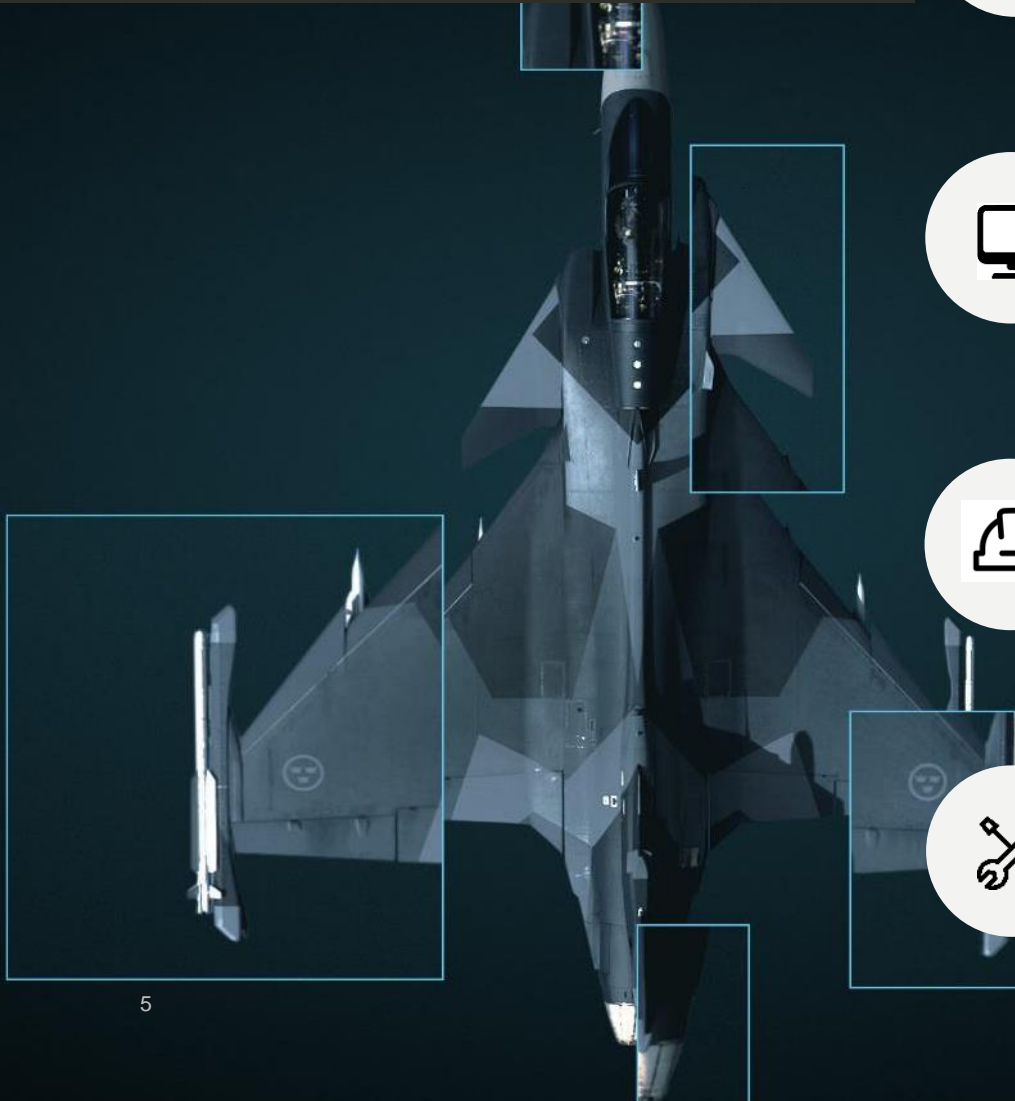
- Work with multiple teams: mechanical, electrical, software engineers, and other disciplines.
- Build communication skills, managing interfaces between different teams and system components.

#### General System Engineering:

- Developing troubleshooting skills.
- Gain understanding of how small changes can ripple through a complex system.
- Experience how requirements evolve in real-world projects.

# Challenges

*Gaining Competence in an ever changing world*



## Overcoming Challenges in Building Systems Engineering Skills



### Long project cycles:

- Projects like development of a fighter system has development cycles on up to 10 years and a new project starts every 15 year.
  - How to transfer competence?

### New generation of engineers:

- The new generation of engineers seems more prone to change work often. A wide system engineering competence takes years and projects.
  - How to transfer knowledge?



### Complexity and Uncertainty:

- Complex projects often involve high levels of uncertainty, which is difficult to simulate in a theoretical settings.
- Real-world constraints (budgets, deadlines) force engineers to make quick, practical decisions.
  - How to get a good mix of theory and practice?



### Integration Challenges:

- As systems grow more complex, integrating components (hardware and software) becomes a major challenge. A theoretical understanding often falls short in preparing engineers for the unexpected issues that can arise.
  - How to prepare for increasing complexity?
- Systems engineers must manage a vast amount of data. Gaining system engineering competence requires learning to filter out noise and focus on critical information.
  - How to get teach critical thinking, problem solving and sorting out what is important?



### Soft Skills:

- Leadership, communication and negotiation skills are vital in managing a technical team in a complex project
  - How to get more EQ knowledge into engineering curriculum?

## ChatGPT:

"Chuck Norris doesn't manage system engineering complexity—he stares at it until it simplifies itself."

***Thank You!***