

# Saab HX Update

Kaivopuisto Airshow  
Gripen and GlobalEye for Finland



Presentation for media

August 5<sup>th</sup> 2021



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# Agenda

**Magnus Skogberg**

Saab's campaign director, HX programme

**Fredrik Follin**

Director, GlobalEye

**Jussi Halmetoja**

Saab's operational analyst and Gripen pilot

**Q&A**





# Saab and the HX Programme



**Magnus Skogberg**  
Campaign director, HX programme



Saab was founded in 1937  
with the aim to ensure  
**security of supply**



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More than **80 years of experience**  
and over 5500 aircraft built







# Saab's broad portfolio





# An innovative and growing international defence and security company with a strong Swedish base

## Saab value drivers

- A strong Swedish base and heritage to grow from
- We invest in innovation and increased efficiency
- Accelerating our international expansion to fuel future growth, with a multi-domestic strategy (US, UK, Brazil, Australia, Finland, Germany)



**United States** Local establishment & partnerships to access the largest market

**United Kingdom** FCAS is the opportunity for next generation fighter development

**Finland** Key partner for Swedish bilateral cooperation

**Sweden** Maintain strong position in Sweden within sovereign defence capabilities (VSI). Home market & main reference customer

**Germany** Bridgehead into EU & largest market increasingly important after BREXIT

**Brazil** Gripen contract generates opportunities & partnerships

**Australia** Further developing position as part of national industry

Saab operates in >30 countries

**Key figures 2020**

- 100** Order backlog SEK billion
- 35.4** Sales SEK billion
- 7.4%** EBIT margin\*
- 21%** R&D spending
- 100** Customer countries

\* Adjusted for items affecting comparability



# Saab's operations in Finland

Saab's operations in Finland started in 1946 and we are proud of a broad and fruitful cooperation with the Finnish Defence Forces.

✓ Growth from 70 to 160 employees since 2015 and constant recruitments ongoing

- Operations at six locations: Helsinki, Tampere, Espoo, Turku, Jyväskylä and Säkyä

✓ Large installed product base

- Navy, Army, Air Force and Civil services

✓ Strategic research co-operation with Aalto university since 2017

- Long term research - advanced electronics, microwave technology, AI, hydro-acoustics

✓ Technology Centre Tampere – part of Saab's global R&D organization

- Centre for advanced Electronic Warfare (EW) capabilities
- C2 System Centre established for SQ2020 program



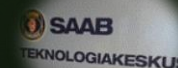
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# Finland – a country for further growth

Saab's operations in Finland are successful, contributing to our global business, and we are planning additional growth within several areas.

- ✓ Strategic research cooperation with **Aalto University** to grow further
  - Soon to expand into new field with further investment
- ✓ Cooperation with **VTT** moves forward
  - Research on e.g. transceiver design, surface treatment technology and augmented reality
  - Million euro investment in 2021, potential additional million euro investments for five consecutive years
- ✓ **Saab Technology Center** to expand
  - Our Technology Center in Tampere will reach 100 employees in the next couple of years
- ✓ Saab is growing in Finland no matter HX
  - However, by selecting Gripen and GlobalEye, our successful journey would significantly accelerate





# Supporting the HX Programme

- Saab and Sweden are fully committed
- Best-And-Final Offer submitted in April
- Ready to support the final phase





# Gripen E/F

## The game changer

In an age where software beats hardware and where adaptability beats predictability, Gripen has the capabilities to determine the rules of engagement – from one mission to the next.

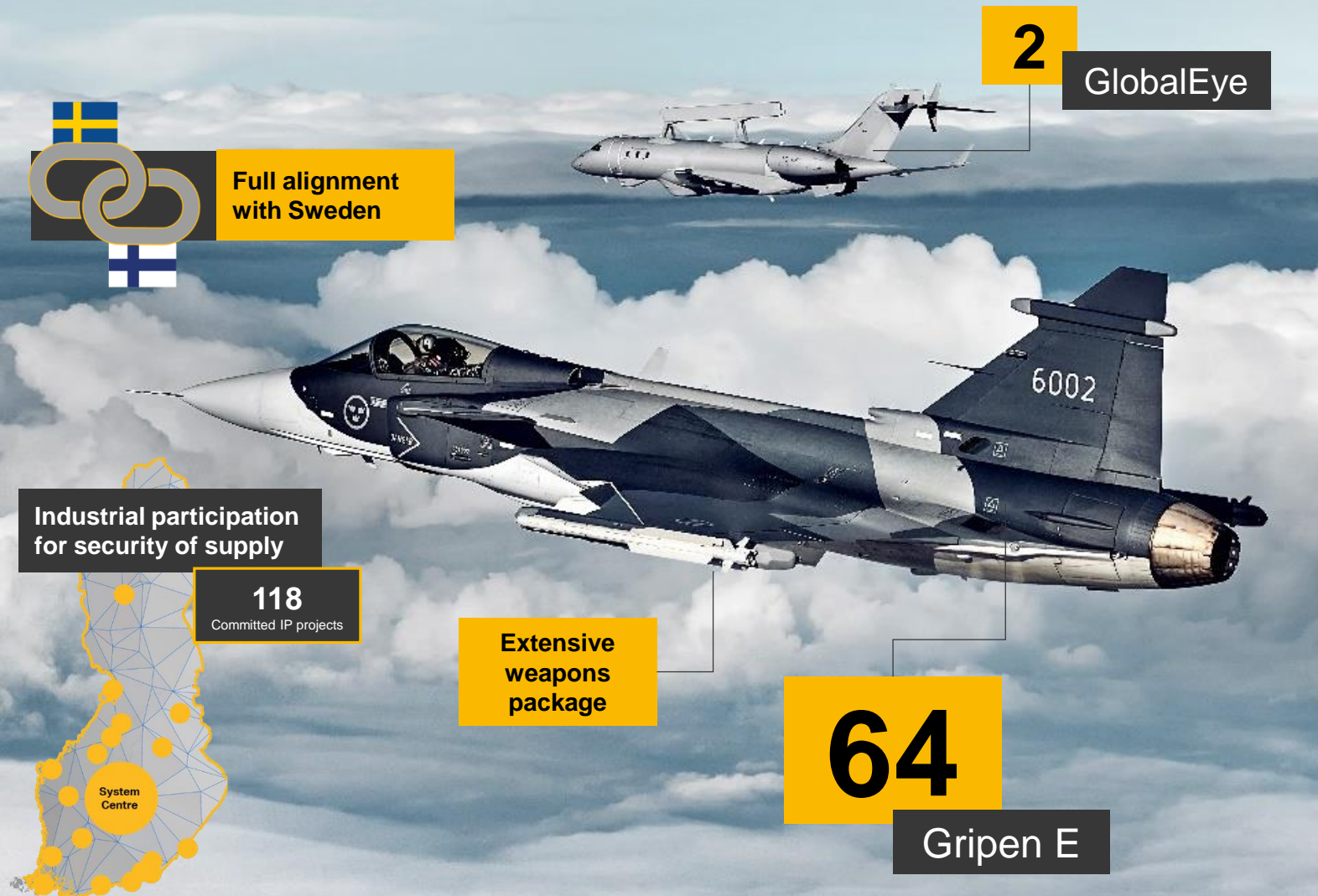
- True multi-role
- **Designed for the operational context**
- Most recent technology
- Future-proof



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# Gripen & GlobalEye for Finland - a strong offering



- ✓ Large number of aircraft
- ✓ Fighters and AEW&C
- ✓ Substantial weapons package
- ✓ Security of supply with an extensive Industrial Participation (IP)
- ✓ Firm proposal on content, price and delivery schedule



# Choose your weapon

Gripen has the most flexible weapon system on the market. It embraces weapons for all types of missions, from the best suppliers world-wide.

- ✓ **Weapons from the best suppliers world-wide** - for all types of missions
- ✓ **High flexibility** for efficient integration of new weapon systems to affordable cost
- ✓ **For Finland** an extensive weapons package. >20% of the proposal price relating to Gripen is allocated to weapons. Examples of weapon types included:

- Meteor



- IRIS-T



- KEPD-350 (TAURUS)



- SPEAR



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# Survivability and offensive electronic warfare capabilities

An Electronic Warfare (EW) system designed to ensure Gripen avoids detection, acquisition, tracking and guidance. Gripen was created to get close, engage, attack and evade.



## ✓ World-Class 360° self-protection

- Radar warning receivers, Missile Approach Warning System (MAW) and internal jammer
- Active electronic countermeasures
- Chaff, hot chaff, flares and active decoys

## ✓ Powerful electronic attack

- Suppression of Enemy Air Defence (SEAD) systems, without specialised platforms
- Built in with on-board EW system and may be complemented by jammer pods and decoys.



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# Offensive EW capabilities available with all 64 Gripens

available with all 64 Gripens



Anti-access/  
area denial



# Offensive EW capabilities

available with all 64 Gripens



- ✓ Combining Gripen sensors, systems and weapons ensures that Gripen can enter highly contested airspace to deliver its ordnance



- ✓ **Electronic Attack Jammer Pod (EAJP)**  
A highly capable escort jammer
  - Additional jamming capability to the on-board EW system - increased frequency range at very low band and higher output power



- ✓ **Air-Launched Decoy Missile system (LADM)**  
A highly capable stand-in jammer
  - Additional jamming capability to the on-board EW system - tactical jamming flexibility for e.g. increased saturation, false targets



# Offensive EW capabilities available with all 64 Gripens

EAJP with extended  
electronic attack

Anti-access/  
area denial



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# Offensive EW capabilities available with all 64 Gripens

EAJP with extended  
electronic attack

LADM  
suppressing

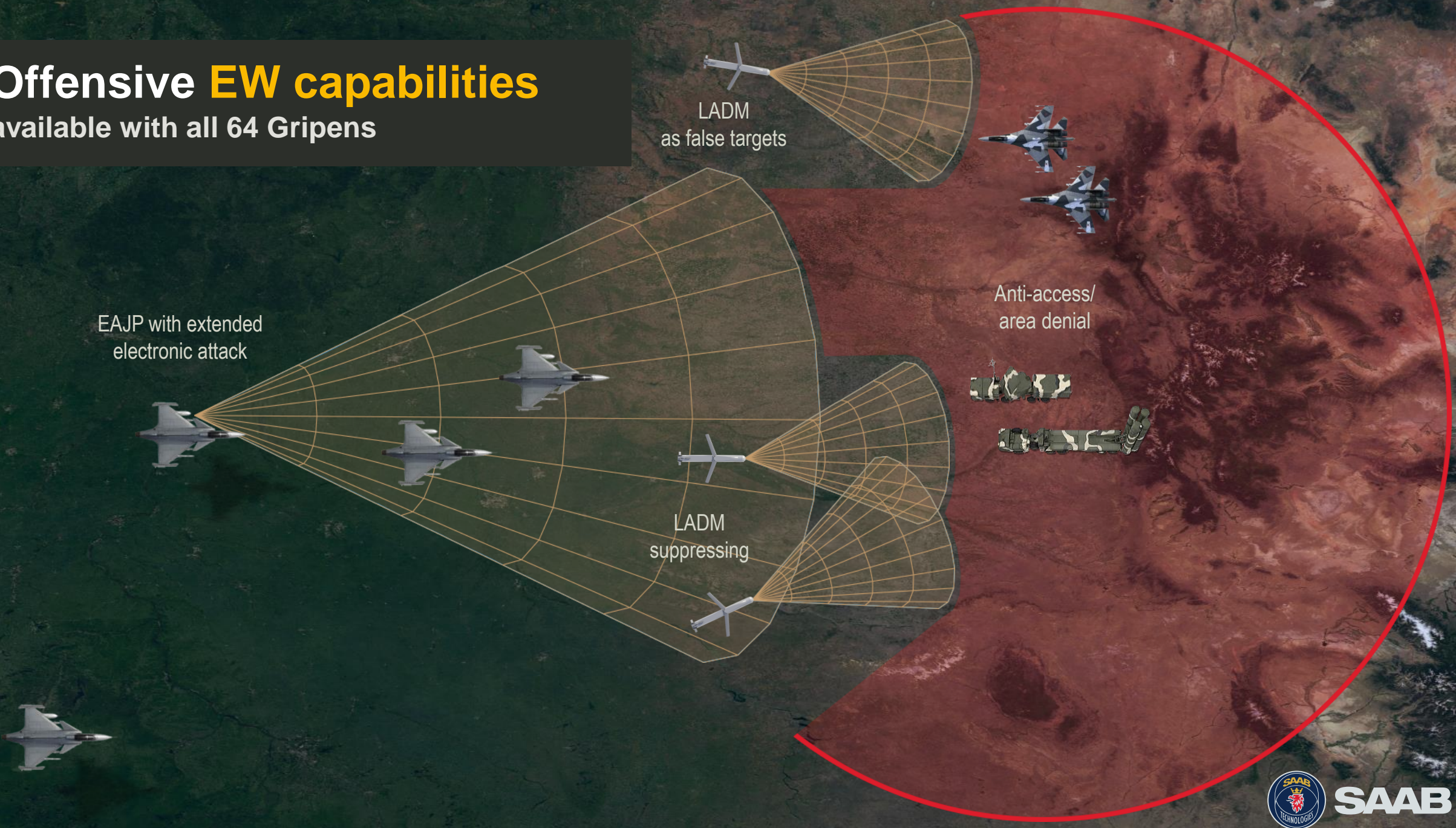
Anti-access/  
area denial



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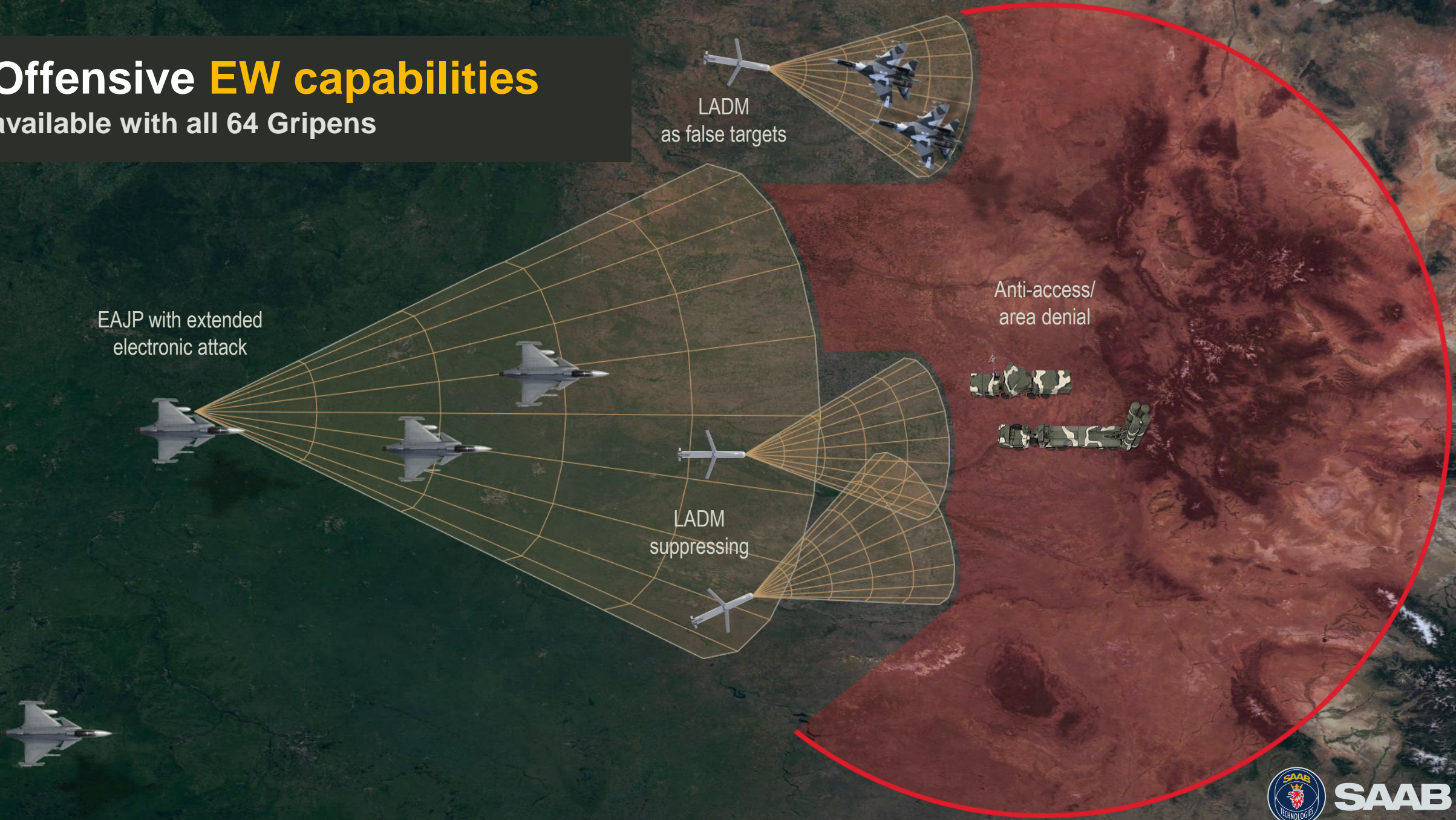


# Offensive EW capabilities available with all 64 Gripens





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# Offensive EW capabilities available with all 64 Gripens

LADM  
as false targets

EAJP with extended  
electronic attack

Anti-access/  
area denial

LADM  
suppressing

Advanced on-board  
EW capability



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# GPS-denied navigation

To further strengthen the GPS independence and the jamming resistance, Saab has included an extended navigation capability for GPS-jammed environment.

## Provides operational flexibility

Navigation and target data accuracy remains also when the GPS is jammed, spoofed or un-available

## A "disruptive" capability

Three independent technologies work automatically in the background. No additional pilot workload.

### ✔ Terrain navigation

Comparing measured height profile from radar altimeter with a terrain database in the aircraft

### ✔ Odometry navigation

Estimating velocity and relative displacement by feature and pixel tracking in images collected from on-board optical sensors

### ✔ Image map navigation

Comparing images from on-board optical sensors with an on-board image map database



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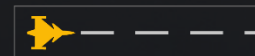
# Born to be airborne

Air bases are obvious, primary targets in any conflict and often among the first to be neutralised. This does not take Gripen out of the fight.

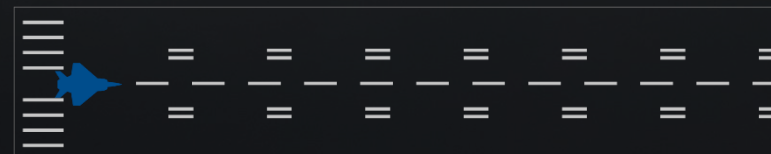


- ✓ Optimized for high tempo in harsh conditions
- ✓ Easy maintenance with conscript mechanics
- ✓ Unbeatable combat turn-around in 10-15 min
- ✓ **Designed for dispersed combat operations**
  - Short take off and landing
  - No fixed installations required
  - Can operate from unprepared roads

Requirement for  
Gripen 16x800m



Normal runway  
45x2400m



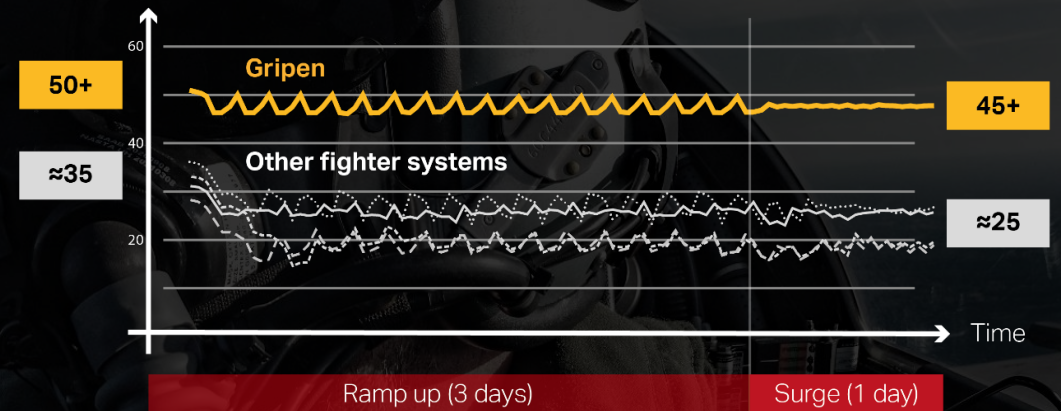


# Always combat ready

Gripen availability and maintainability translates into more aircraft in the air, enabling air superiority.

- ✓ Designed for high availability and maintainability
- ✓ **Availability**  
- 9 hours Mean Time Between Failure (MTBF)
- ✓ **Maintainability**  
- 3 hours Mean Time To Repair (MTTR)
- ✓ Gripen projects force with many fighters in the air, i.e. **front-line availability**

Number of  
available aircraft





# Security of supply

We establish extensive national capabilities to support in-country operation, sustainment and capability growth over the lifecycle.



- ✓ For availability
  - Extensive support capabilities in co-operation with local industry
- ✓ For operational relevance over time
  - A **Gripen and GlobalEye System Centre** for in-country sustainment and development



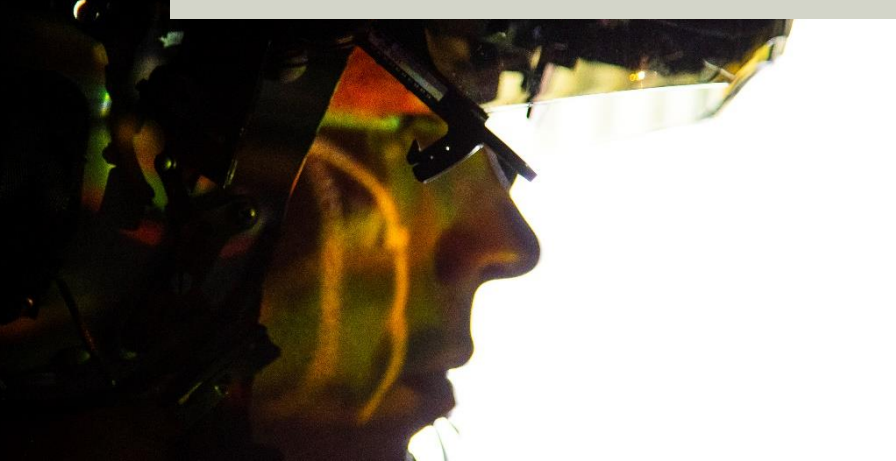
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# Industrial participation

An extensive industrial participation programme is offered to ensure establishment of national capabilities to operate and keep the systems relevant over time.



- ✓ **Direct IP** – Connected to the HX programme and security of supply
  - Maintenance, Repair & Overhaul capabilities
  - Engineering support and sustainment
  - Integration to Finnish infrastructure/systems
- ✓ **Indirect IP** – Strengthen Finnish defence industries in areas critical for total defence
  - E.g: C4ISTAR, cyber, advanced materials, manufacturing capabilities (e.g AM), Artificial Intelligence (AI), autonomy

- ✓ Actively worked with HX IP since 7+ years and dialogue with 60+ companies
- ✓ **Focus on direct IP** and FDF strategic partners

**Patria** **INSTA**

- ✓ **37 companies and organization directly engaged** in our IP programme

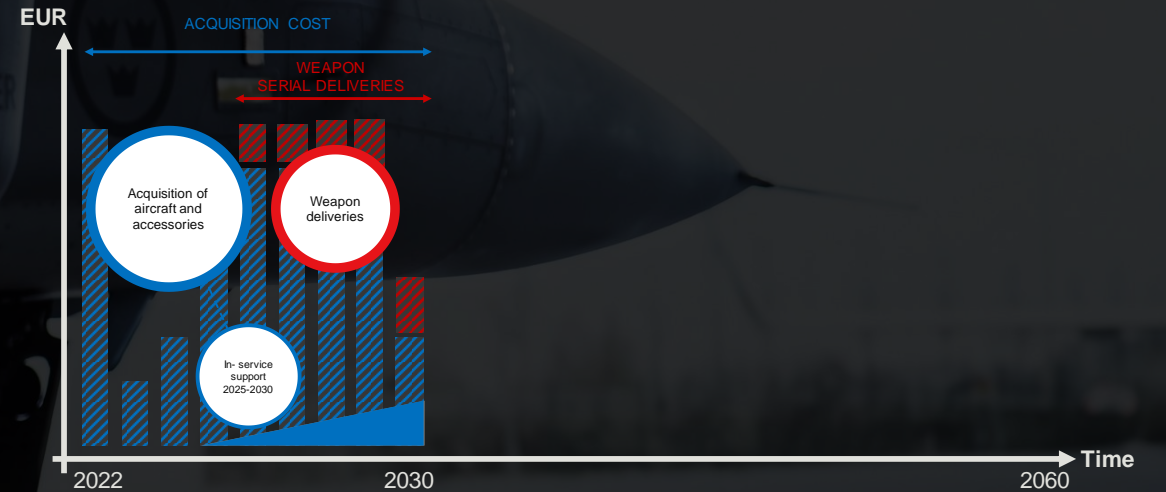


# Affordability

## Budget stability

We don't like surprises. Neither do our customers. Budget stability and budget predictability is a key factor for us, for our customers, and for the citizens of nations protected by Gripen.

✓ ≈ 9 BEUR for Gripen, GlobalEye and weapons acquisition



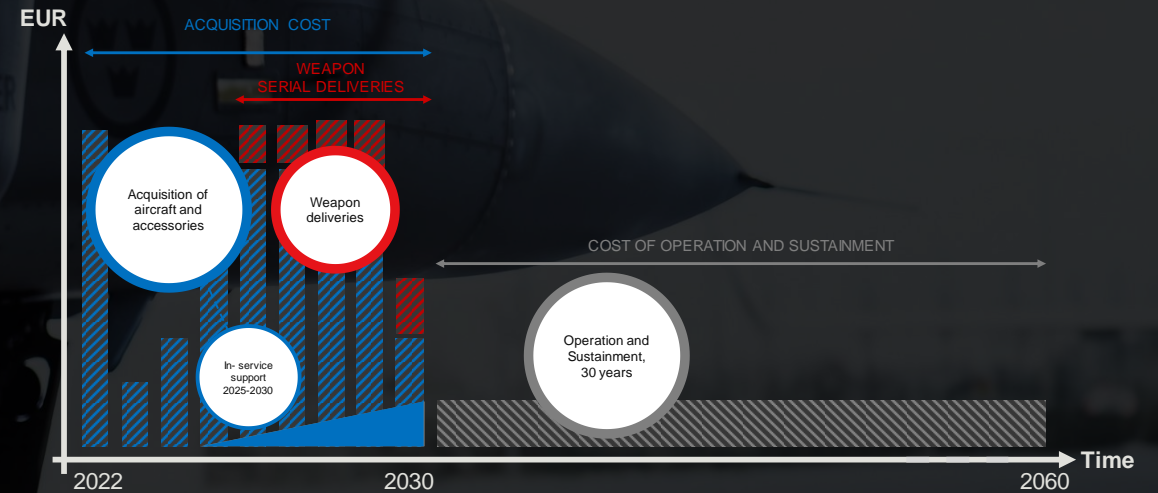


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- ✓ Meets target for yearly operational cost of max. **10% of the defence budget (250 MEUR) with a clear margin**



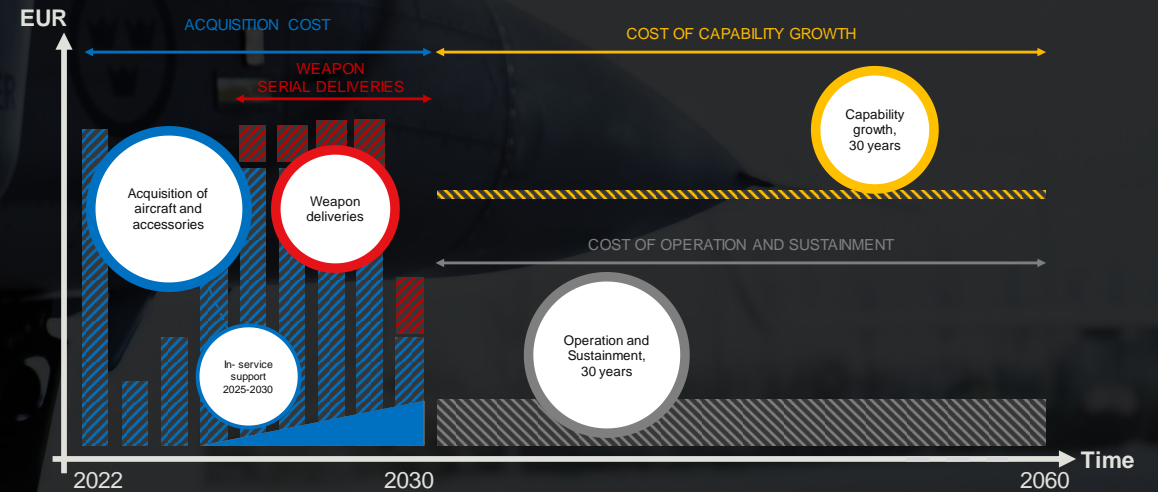


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- ✓  $\approx 9$  BEUR for Gripen, GlobalEye and weapons acquisition
- ✓ Meets target for yearly operational cost of max. **10% of the defence budget (250 MEUR) with a clear margin**
- ✓ **Estimated 2 BEUR enables substantial capability growth** throughout the lifecycle, thanks to our unique design





# Gripen & GlobalEye

## The perfect match for Finland

- ✓ **Gripen is made for the operational context and threats of our region**
  - GlobalEye is a strong force multiplier
- ✓ **Unbeaten cost efficiency**
  - max. operational effect for the budget
- ✓ **Extensive security of supply**
  - in close co-operation with local industry
- ✓ **Timing is perfect**
  - Latest available technology on-board proven platforms
- ✓ **Long-term commitment for Finland**





# GlobalEye

Integral part of HX offer



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**Fredrik Follin**

Sales Director, GlobalEye



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# GlobalEye

The latest Airborne Early Warning & Control (AEW&C) solution from Saab.

More than 30 years of AEW&C evolution and 60 years of advanced radar design



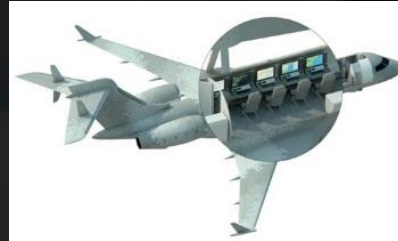
- ✓ Provides vital tactical and strategical intelligence for FDF all domains
- ✓ Provides extensive pre-warning time for first-strike survivability
- ✓ Combines simultaneous use of active and passive sensors
- ✓ Off-loads and supports the HX fighters for max availability



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- ✓ Rapid deployment
- ✓ Field and runway flexibility
- ✓ Very small logistic footprint
- ✓ Mission time well above 11 hours



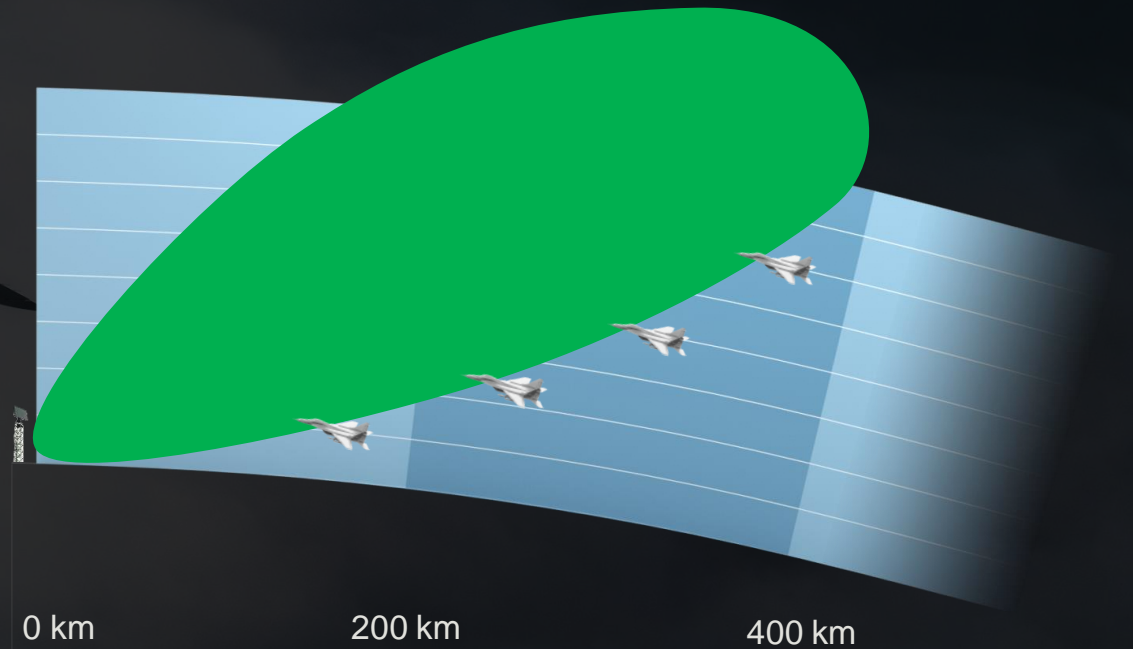
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- ✓ Ground based radars cannot detect low-level targets at long distances





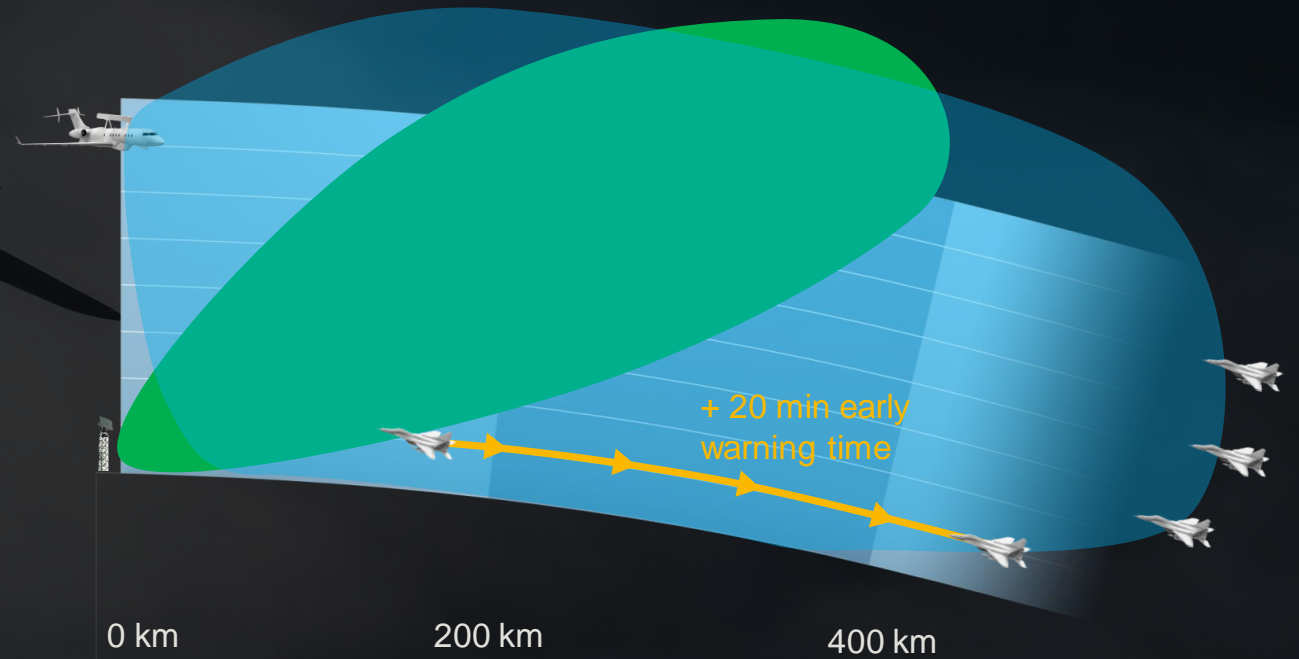
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- ✓ Ground based radars cannot detect low-level targets at long distances
- ✓ GlobalEye extends the low level coverage 10 times, providing +20 minutes pre-warning





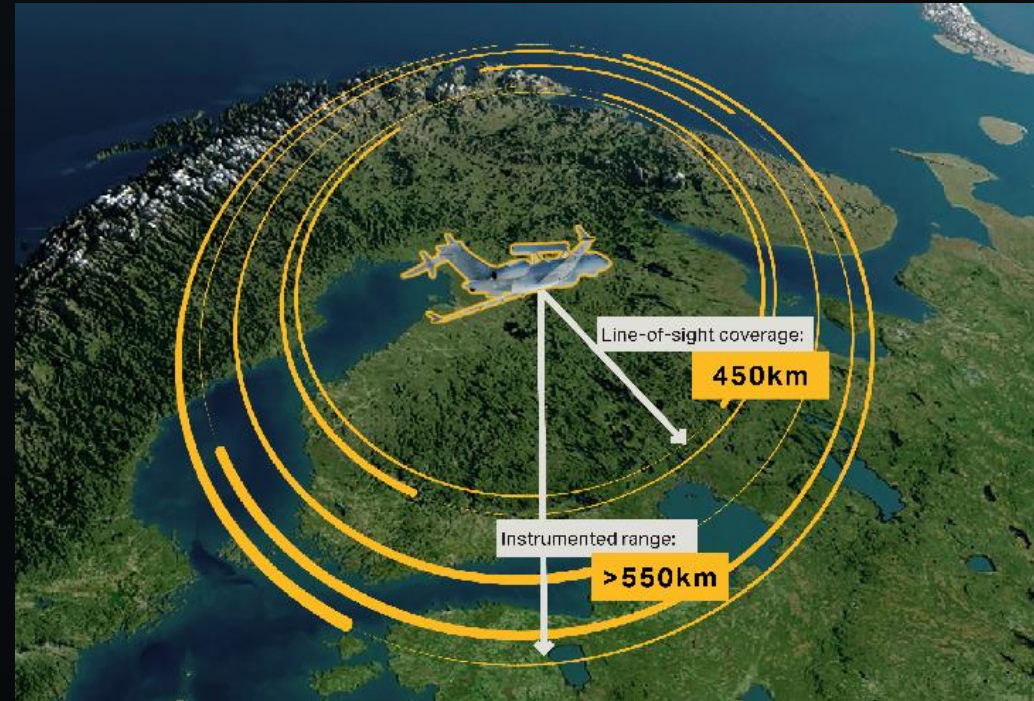
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- ✓ GlobalEye coverage is beyond comparison
- ✓ Sensor range of >550 km
- ✓ Low altitude coverage out to ~ 450 km



Sensor coverage when operating at >35 000 feet



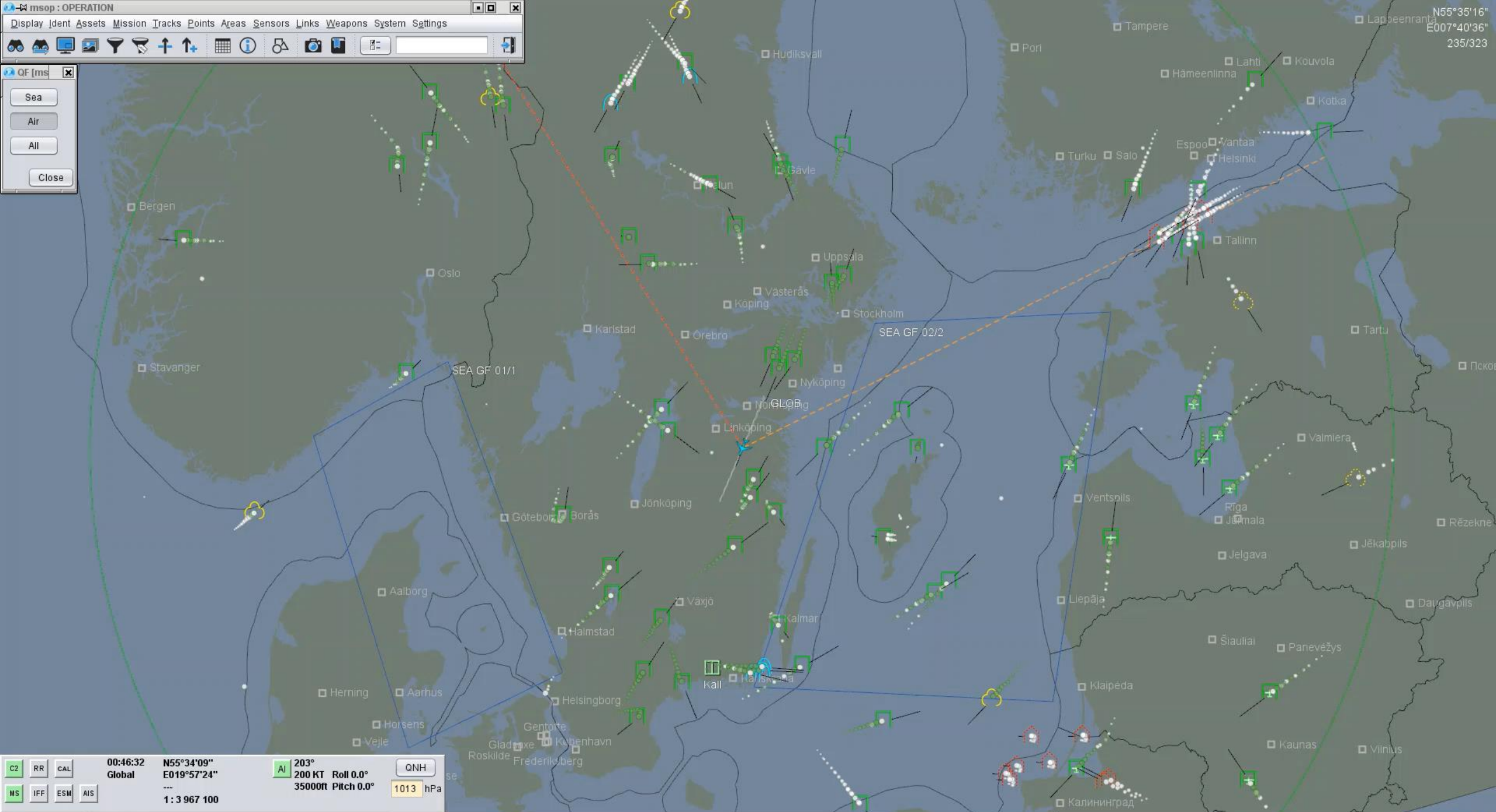
QF [ms]

Sea

Air

All

Close



C2	RR	CAL	00:46:32	N55°34'09"	AI	203°	QNH
MS	IFF	ESM	Global	E019°57'24"	200 KT	Roll 0.0°	1013 hPa
			1:3 967 100		35000ft	Pitch 0.0°	



# Operational Capability



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**Jussi Halmetoja**  
Operational advisor and Gripen pilot



# Human Machine Collaboration

Gripen E embraces new technology that enables HMC. The Gripen and its pilot co-operate, co-ordinate, learn, develop and engage the enemy collaboratively. AI is being incorporated into mission effectiveness.



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# Human Machine Collaboration

Gripen E embraces new technology that enables HMC. The Gripen and its pilot co-operate, co-ordinate, learn, develop and engage the enemy collaboratively. AI is being incorporated into mission effectiveness.



- ✓ The pilot focuses on the mission while Gripen provides situational awareness and decision support
- ✓ The pilot uses high-level commands and Gripen optimizes the use of on-board sensors
- ✓ All domains are handled simultaneously



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## Perception

- What info is important now?



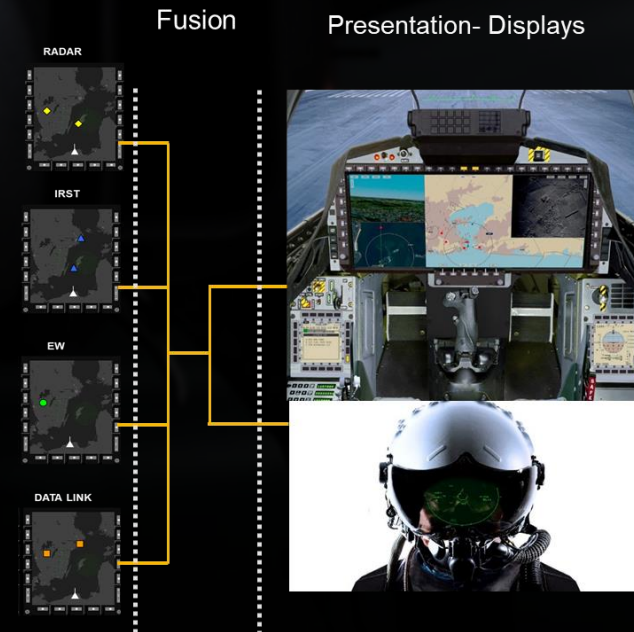
## Comprehension

- What does it mean for the mission right now?



## Projection

- What does it mean for the mission in near future?
- What is the best action for success?



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- ✓ Fused information presented
  - Only information which is important now
- ✓ Tactical suggestions presented
  - Best course of action to achieve effect & survive
- ✓ Continuous SA on missile engagement
- ✓ Automatic threat reaction support from the other members within the TAU

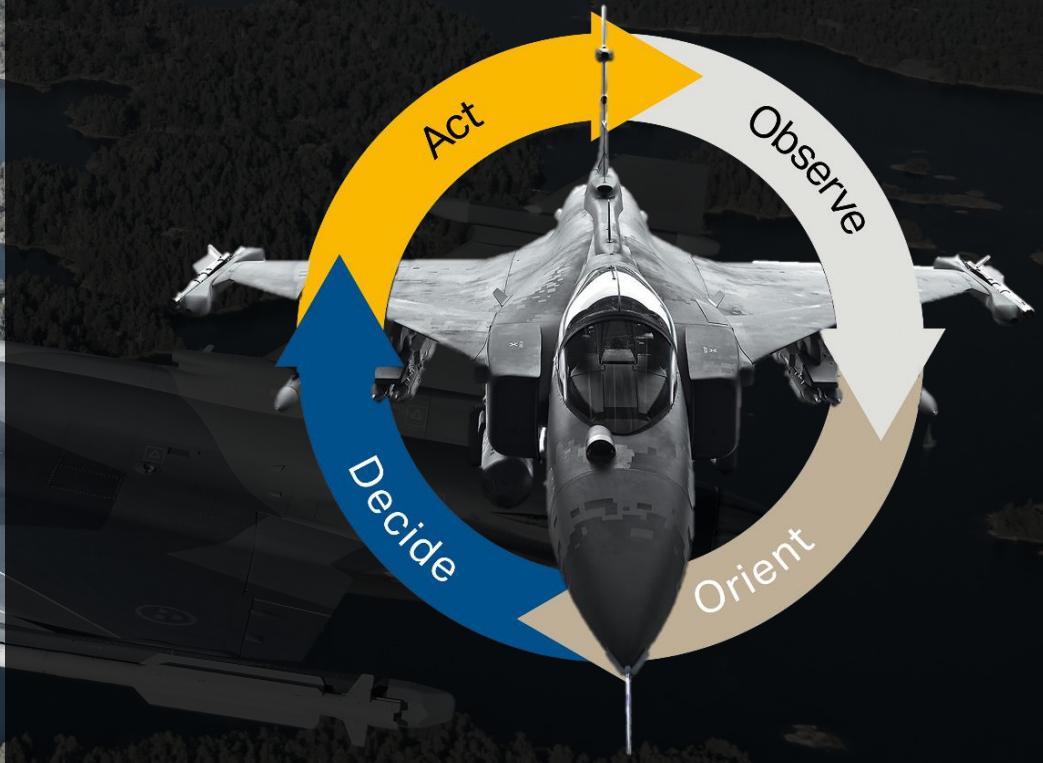
This enables high effect engagement and high survivability, i.e. a high Kill Ratio



# Gripen supports **the pilot** throughout the mission



- ✔ Supports the pilot in all steps of the OODA loop – Observe, Orient, Decide and Act
- ✔ Efficient Human-Machine Collaboration and high level of automation enables quick decisions

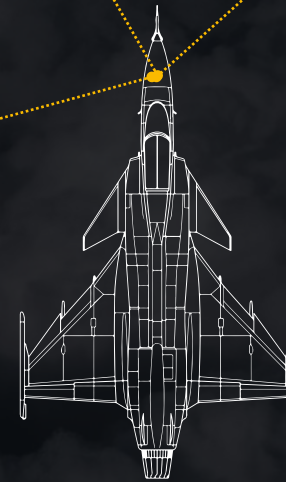
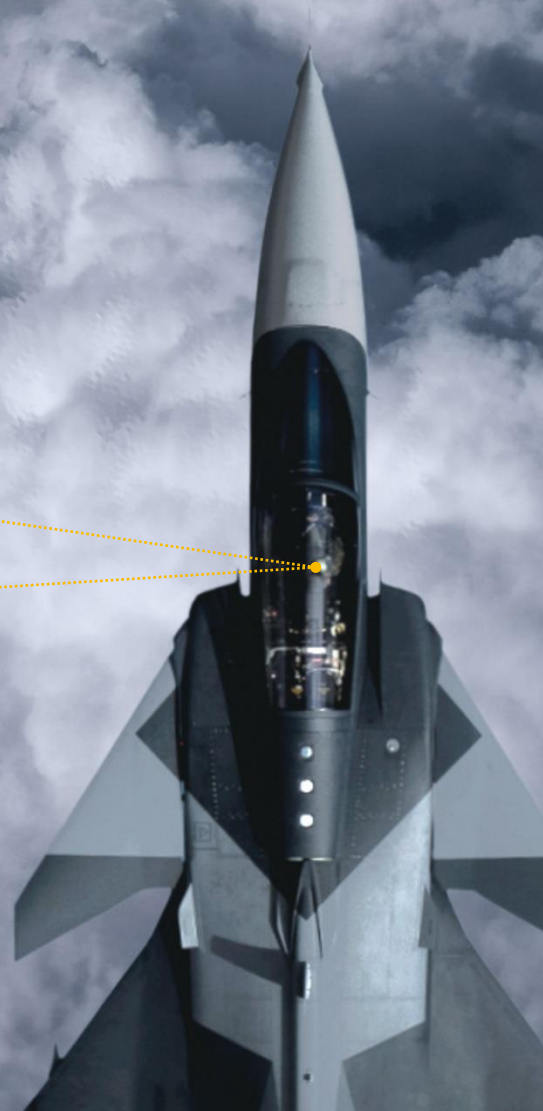


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# Leader of the pack

The element of surprise is an important element of combat effectiveness. Spreading out and networking enables Gripen to maintain the advantage – restricting the opponent to manoeuvre and respond.

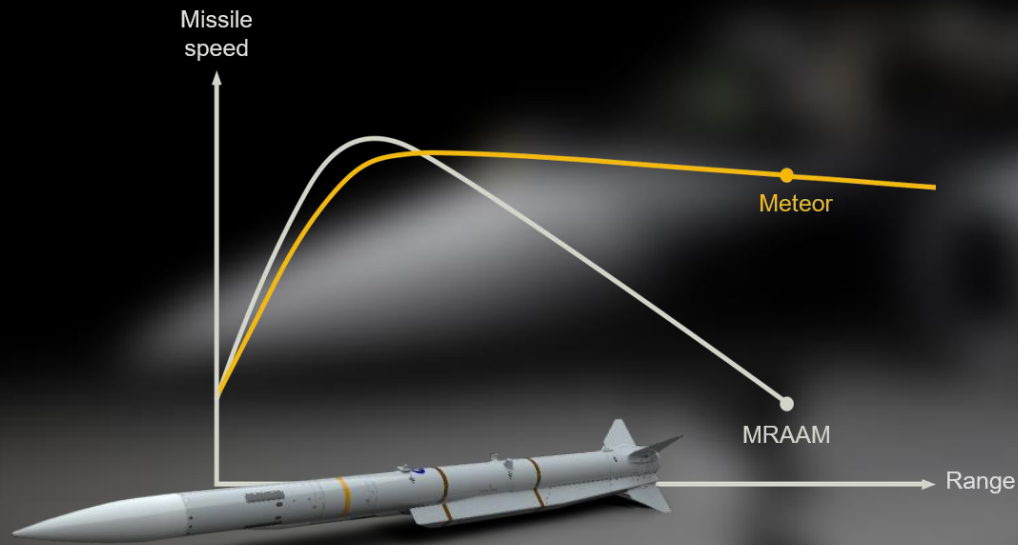


## ✓ Wolfpack tactics

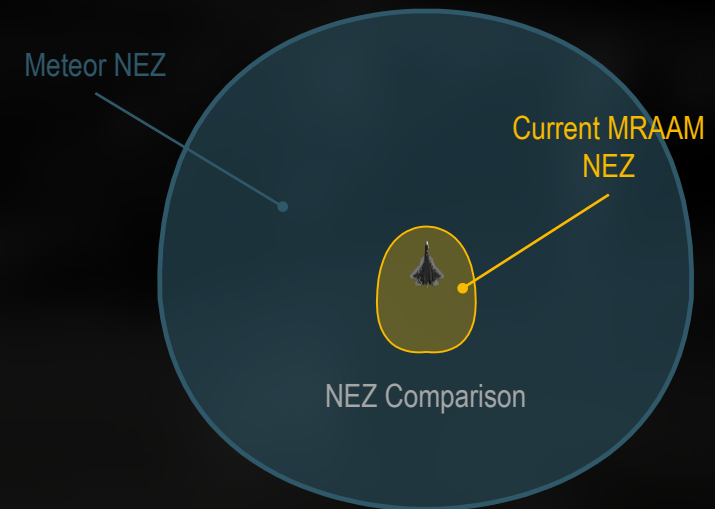
- Tactical aircraft formations to engage effectively
- Many aircraft – one active, the others passive
- Silent networking
- Total sensor fusion across the wolf-pack
- Always first missile launch opportunity



# Air-to-Air superiority with Meteor



- ✓ Very high Probability of Kill provided through un-beaten endgame kinematic performance
- ✓ High energy missile shots throughout the fight - 2nd and 3rd 'Fox' fired at non-optimal launch speeds
- ✓ **For a No-Escape-Zone (NEZ) engagement, Meteor kinematic range is:**
  - Approximately **3 times greater** than current Medium-range Air-to-Air Missile (MRAAM) in head-on engagement
  - Approximately **6 times greater** in the rear sector



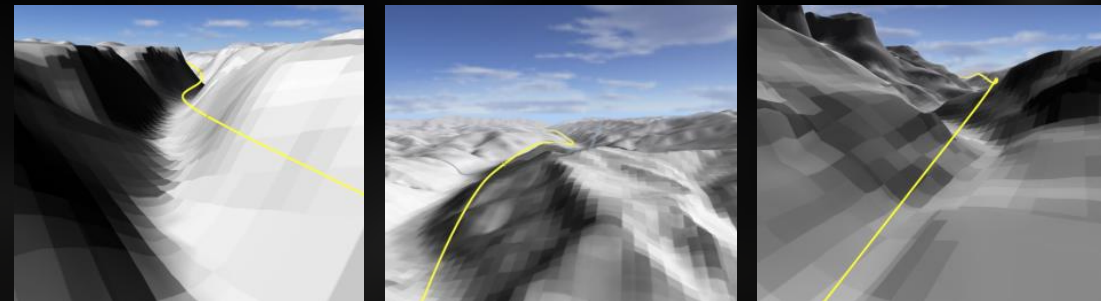


# Air-to-Ground engagement with **KEPD-350 TAURUS**



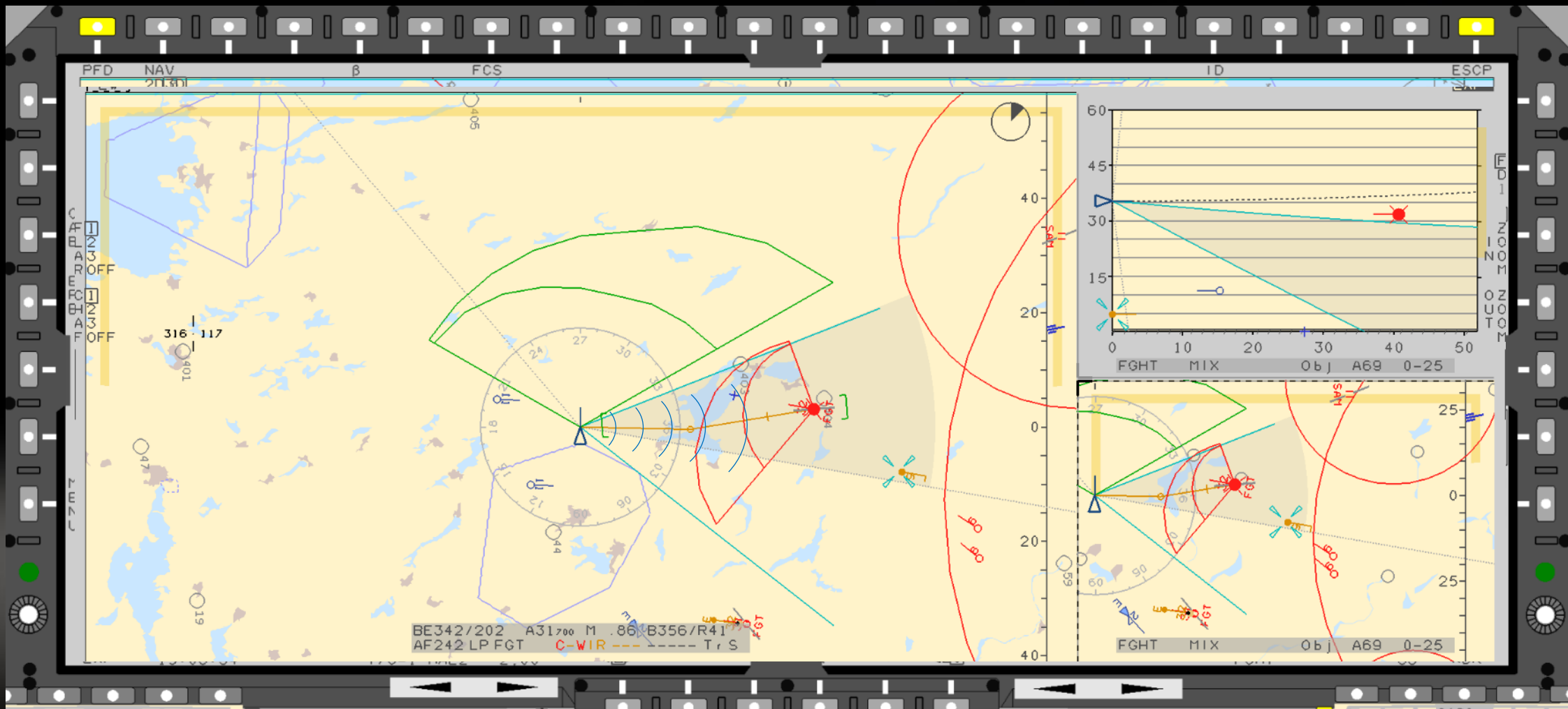
Weight; 1400 kg  
Length; 5.1 m  
Range; +500 km  
Warhead; 495 kg (Tandem) (481 kg)  
Propulsion; Turbofan  
Navigation; INS supported by GPS, Terrain Reference Navigation and Image Based Navigation  
Target Seeker; IIR  
Cruise; Nap-of-the-earth, 30 – 70m  
Speed; M0.60-0.95

- ✓ **Excellent survivability and navigational robustness**
- ✓ **Extensive stand-off capability**
- ✓ **Very efficient blast effect capacity**
  - Engagement against strategic and tactical targets
  - Flexible attack profiles



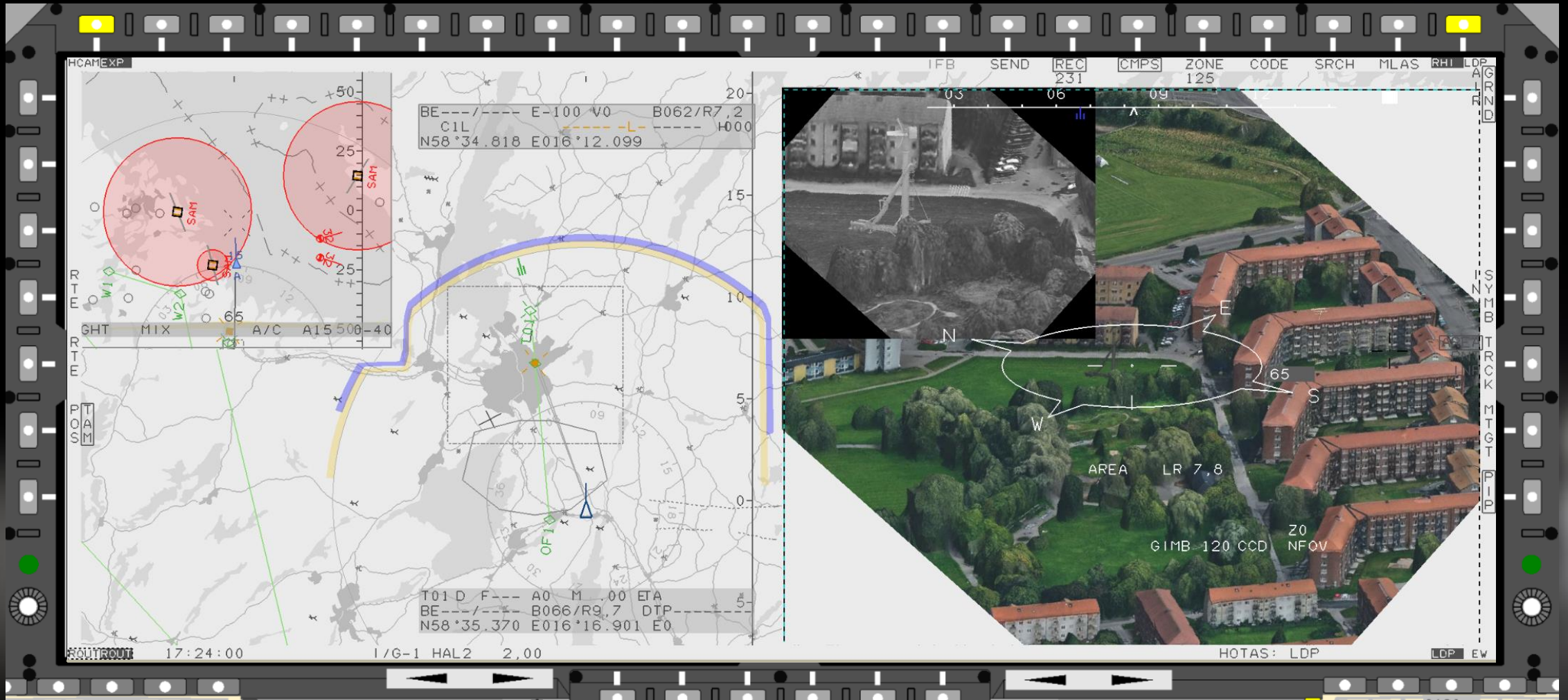


# Air-to-Air engagement





# Air-to-Ground engagement





# Mission at night

The cockpit display is divided into several functional areas:

- Top Left:** A terrain map showing the flight path with waypoints W1 through W6. A flight plan summary is displayed:
 

FGHT	MIX	A/C	A17	0-45
------	-----	-----	-----	------
- Top Center:** A data box containing mission parameters:
 

BE---	---	E-100	V0	B047/R5,9
CIL	---	---	---	L---
N58°35.148 E016°13.635				
- Top Right:** A graph showing altitude or pressure over time. The y-axis ranges from 50 to 175, and the x-axis from 0 to 100. A blue line shows a steady climb, and a red line shows a lower profile. A red circle highlights a specific point on the graph.
- Bottom Left:** A table for the mission route:
 

ROUTE ROUTE1			
ROLEX: +002:00			
PNT NAME	ALT	MACH	TIME
L0	MIL-UPPSALA		
W1	30001	0,85	
W2	30001	0,85	
W3	30001	0,85	
W4	30001	0,85	
W5	30001	0,85	
W6	30001	0,85	
L1	MIL-UPPSALA	30001	0,85
- Bottom Center:** A data box with timing and location information:
 

T01 OF F---	A0	M	.00	ETA
BE---	---	B138/R13	DTP	---
N58°18.656 E016°02.035 E---				
- Bottom Right:** A video feed showing a night aerial view of a landscape. A red circle on the map is magnified here. Text on the screen includes "AREA LR 6,5" and "Z92".



# A strong combination

Together, Gripen and GlobalEye provide an excellent contribution to the Finnish Defence Forces as well as to civilian defence structures



## ✓ Integrated Air Defence System

- Vital intelligence gathered for FDF all domains
- Extensive additional pre-warning time

## ✓ Operational effect

- Off-loading effect to the fighter fleet
- Acquisition, command & control in highly contested combat environments
- Advanced cooperative engagement
- Increased deterrence effect



**GLOBAL EYE**  
THE FORCE MULTIPLIER



**GRIPEN**  
THE SMART FIGHTER



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