

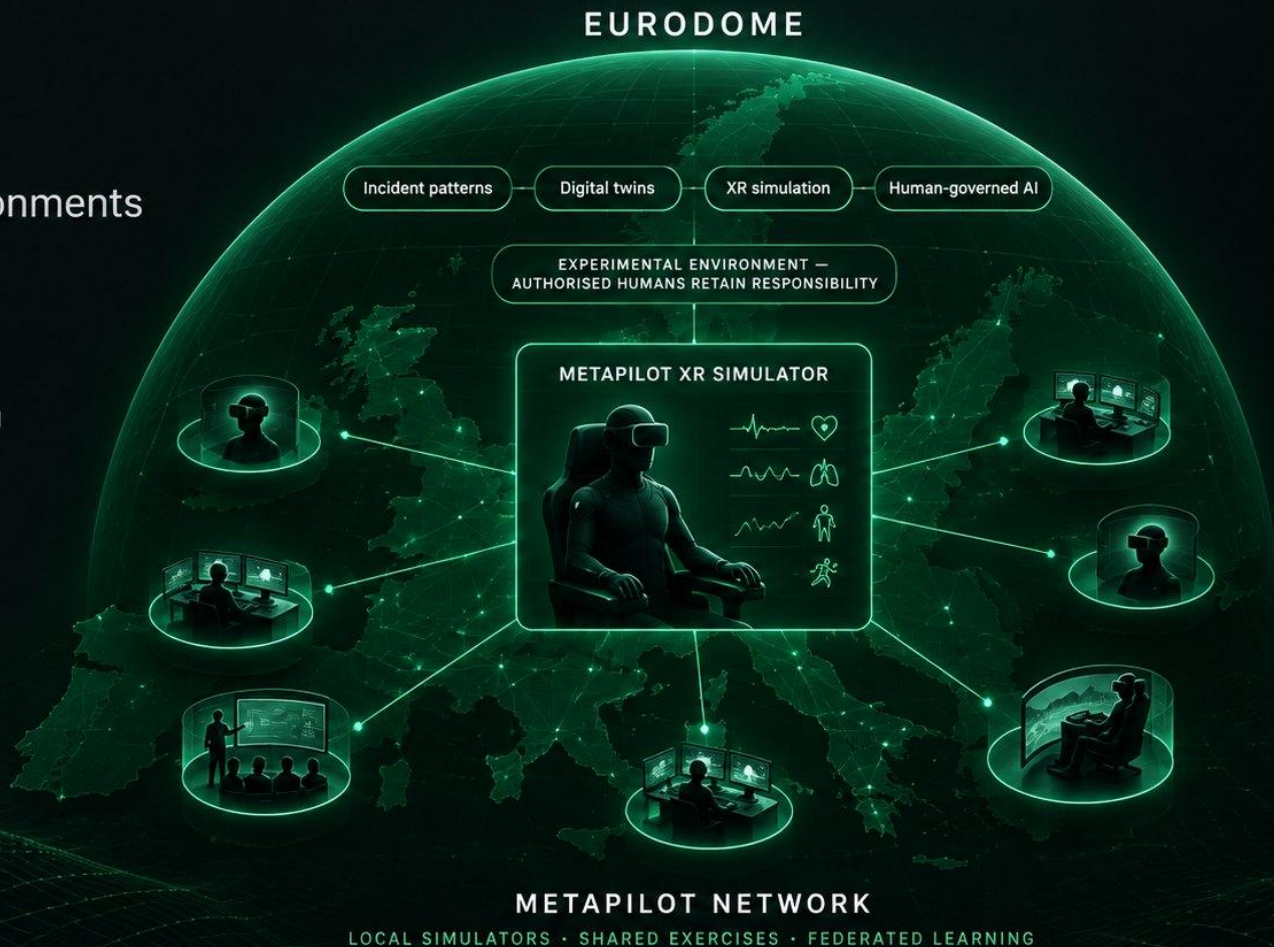
METAPILOT

Experimental Digital Twin Environments for NATO-Relevant Multi-Domain Defence Scenarios

Metapilot presents a NATO-relevant experimental environment for analysing, simulating and rehearsing complex unmanned-system scenarios.

We combine incident-pattern analysis, digital twins, XR simulation, human-performance research and AI-enabled decision support to reduce avoidable decision latency while preserving accountable human authority.

Diana Deca
Metapilot Academy / Metapilot NERVA
NATO CA2X2 Forum 2026 · Rome, Italy



A low-cost threat must not create a high-cost decision



KEY POINT

Each incursion forces fighters, pilots, missiles and closed airspace against drones worth tens of thousands.

NATO STO RESEARCH

SCI-301 capable missiles are “often too expensive” for small drones; there is “no silver bullet”.

STO Strategy 2025 “very few, very costly” assets vs “masses of cheap and sufficiently effective” kit.

Trends 2025–45 AI and autonomy enable effects “below the threshold of armed conflict”.

Source: [NATO STO SCI-301](#) · [NATO S&T Strategy 2025](#) · [NATO STO Trends 2025–2045](#)

What the incident record shows

Metapilot analysis of eight representative 2025–2026 incidents. Timings are only those publicly reported.

Date	Country	Objects	Detection → outcome	Response	Payload
9–10 Sep 2025	Poland	19 incursions	Overnight; no public per-drone timeline	F-35, F-16, helicopters; 3–4 downed	Examined Gerbera decoys: no explosives
25 Apr 2026	Romania	1 Geran-2 + debris of 2	15 km low-altitude flight, crashed	Not intercepted	Carrying explosives
7 May 2026	Latvia	2 drones	Crossed and crashed; no interception	None; minister resigned	One exploded at oil depot
24 Jul 2026	Romania	1 Shahed-type	09:30 → ~11:00 (≈90 min)	Romanian F-16	Not stated
16 Aug 2026	Romania	1 drone	≈17 min to engagement (05:01)	Spanish F-18 (NATO)	Not stated
20 Aug 2026	Romania	1 drone	02:23 → 03:24 crash (61 min)	2 F-18 + helicopter; no engagement	Not stated
20 Aug 2026	Romania (sea)	1 sea drone	Spotted by coastguard near gas field	Romanian F-16	Explosive-laden
15 Sep 2026	Lithuania	1 drone	≈30 min over Lithuania	2 Italian Eurofighters	Likely explosive

Source: [BBC](#) · [AeroTime](#) · [bne IntelliNews](#) · [Reuters](#) · [Reuters](#) · [France 24](#) · [Grosswald timeline](#) · [ITV](#)

Twelve months turned an incident into a pattern

From Poland's 19 incursions to armed drones over Lithuania, the Eastern Flank now faces repeated, low-cost probes.



Takeaway The threat is now recurring. The response is still largely fighter-centric and decided case by case.

Source: [BBC](#) · [NATO Eastern Sentry](#) · [Reuters](#) · [NATO's Drone Edge](#) · [Reuters \(Romania\)](#) · [ITV](#)

Tens of minutes where seconds are needed

Published timings show 17–90 minutes from detection to outcome. Targets are Metapilot research objectives.

17-90 min

detection to outcome in the four incidents with published timings (mean ≈ 50 min)

4 of 8

incidents in our dataset involved confirmed or likely explosive payloads

100%

of 2026 drone kills over or off NATO territory were made by crewed fighters

IDEAL REACTION TIME · METADOME EXERCISE TARGETS

< 10 s

trusted, shared track distributed to every authorised node

< 60 s

classify, generate options and identify the deciding authority

Minutes, not hours

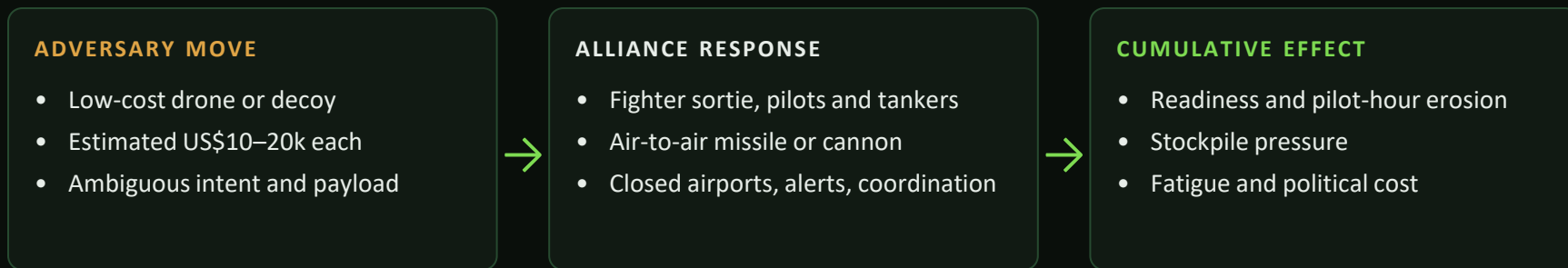
authorised, proportionate effect—the shortest lawful time

NATO STO EVIDENCE SCI-301 found radar/EO-IR C-UAS “can generate many false alerts” and are “manpower intensive”. NATO lessons (Feb 2026) urge rehearsing detect–decide–defeat–report in under 60 s.

Source: [Reuters](#) · [France 24](#) · [bne IntelliNews](#) · [Grosswald timeline](#) · [NATO STO SCI-301](#) · [NATO LL portal / CALL](#)

Do not accept an unfavourable exchange

Accepting exchanges that cost you more than your opponent slowly wears you down. Cheap drones do the same.



Poland reportedly spent ~US\$1.2bn countering drones costing US\$10–20k each. **The goal is not always the cheapest response. It is to preserve the expensive response for the threat that genuinely requires it.**

NATO STO EVIDENCE The STO S&T Strategy (2025) frames the trade-off between “very few, very costly” assets and “masses of cheap and sufficiently effective” kit; SCI-301: capable missiles are “often too expensive” for inexpensive drones.

Source: [bne IntelliNews](#) · [NATO S&T Strategy 2025](#) · [NATO STO SCI-301](#)

One question, six steps

How can the Alliance detect, decide and neutralise low-cost drone incursions within seconds to minutes—without wasting high-value assets?

1

PROBLEM

Low-cost threats create high-cost decisions

2

EVIDENCE

Our incident dataset and reaction-time gap

3

DIAGNOSIS

Why the decision gap persists

4

METADOME

Federated decision-readiness layer

5

PEOPLE

Training one million Metapilots

6

PATH

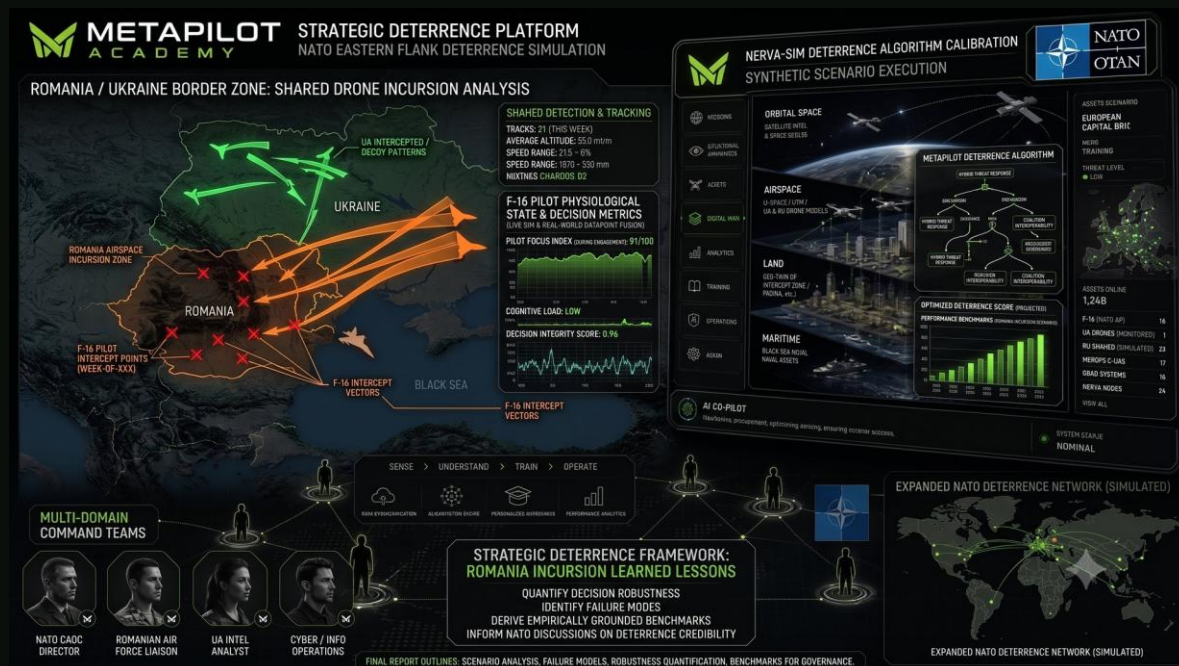
Grant, demonstrator and partners

GRANT CONTEXT 2026 NATO Chief Scientist Grant (1 of 8 from 173 applications): “Experimental Digital Twins for AI-Enabled Deterrence and Strategic Competition in the NATO Alliance”.

NATO STO EVIDENCE Every step is anchored in NATO STO research: SCI-301 (C-UAS), SET-322 (fusion), SAS-143 (multi-domain C2), IST-192 (AI decision support), TR-HFM-330 (human control), MSG-195/179 (M&S for acquisition).

Source: [NATO STO grant announcement](#) · [STO newsletter Jun 2026](#) · [STO 2024 Highlights](#)

Detection is improving. Coordinated action is the bottleneck



KEY POINT

Sensors now see more. The delay lies in fusing, classifying, routing authority and acting together.

NATO STO RESEARCH

SET-307 · SET-348 · IST-SET-204 radar, EO/IR and RF detection of small UAS; drone RF database (2026).

SET-322 tracking and fusion evaluation framework, concluded March 2026.

SAS-158 AI to federate sensors “across NATO through resource pooling”.

Source: [NATO STO CPoW 2025](#) · [IST-SET-204](#) · [SET-322](#) · [STO 2024 Highlights \(SAS-158\)](#)

Why does the decision gap persist?

Why Does the Decision Gap Persist?



Incomplete shared data

No single, trusted view of all relevant information, provenance and confidence.



Decision latency

Multiple hand-offs, checks and escalation paths delay shared understanding and action.



Governance and diplomatic complexity

Cross-border, civilian-military and political implications require coordinated authority—not merely technical detection.



Opacity and interoperability gaps

Different systems, data formats, access rules and classifications create friction.



Cognitive overload

Operators face alert volume, ambiguity, fatigue and insufficient prioritisation.



Resource mismatch

Low-cost threats can impose disproportionate use of expensive assets, fragmented procurement and legacy operating models.



Europe is modernising its equipment base—but readiness also requires modernising how systems, people and decisions work together.

KEY POINT

Six gaps—data, latency, governance, interoperability, cognitive overload, resource mismatch—compound under stress.

NATO STO RESEARCH

SAS-143 multi-domain operations “are likely to fail in the absence of harmonization”.

IST-192 first AI decision aid tested in an Article 5 exercise; studied trust and operator workload.

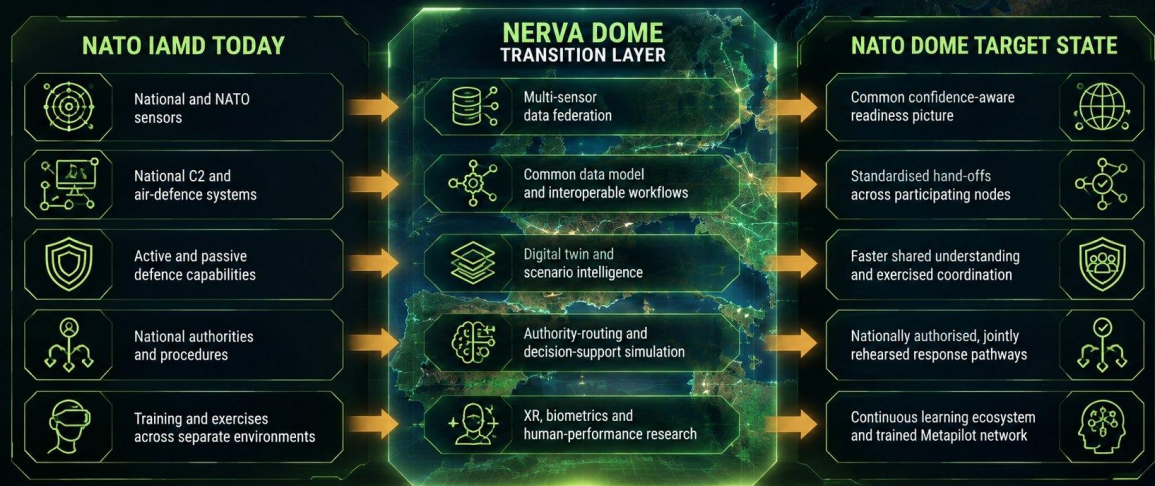
TR-HFM-330 human control across four nested loops, from operator to governance.

Source: [STO 2024 Highlights \(SAS-143, IST-192\)](#) · [TR-HFM-330 summary](#) · [NCIA TIE26](#)

From NATO IAMD to MetaDome

FROM NATO IAMD TO NATO DOME

A transition from connected capabilities to shared readiness, decision advantage and continuous learning



NATO DOME: A shared operational readiness layer — without replacing national authority.

KEY POINT

A shared operational readiness layer on top of existing IAMD—without replacing national authority.

NATO STO RESEARCH

NATO Data Strategy 2025 secure data-sharing “while ensuring Allies retain control over their data”.

IST-176 successful federated interoperability of C2 and IoT systems.

SDP 12000 new NATO IAMD plan from one-way attack drones to cruise missiles.

Source: [NATO Data Strategy](#) · [STO 2024 Highlights \(IST-176\)](#) · [Caliber \(SDP 12000\)](#)

From unmeasured cycle to rehearsed response

Every stage has an observed gap, a MetaDome target and a NATO STO research anchor.

Stage	Observed gap (2025–26)	MetaDome target	NATO STO anchor
Detect	Low-airspace gaps; a drone crossed into Bulgaria undetected	Radar, RF, EO/IR and acoustic ingest	SET-307, SET-348, IST-SET-204
Fuse	Separate national and technical pictures	One confidence-aware shared track	SET-322 tracking & fusion framework
Classify	Decoy or armed? Often unknown for hours	AI-assisted type with explicit uncertainty	IST-SET-204 drone RF database
Route authority	National vs NATO hand-offs	Pre-rehearsed authority pathway	TR-HFM-330 nested control loops
Decide & act	17–90 min; fighter by default	Human-authorised, lowest suitable effect	SCI-301 “system of C-UAS systems”
Learn	Fragmented after-action reporting	Federated replay and decision trace	NMSG M&S-as-a-Service

Source: [NATO STO CPoW 2025](#) · [SET-322](#) · [IST-SET-204](#) · [STO newsletter Mar 2026](#) · [TR-HFM-330](#) · [SCI-301](#) · [MSaaS](#) · [bne IntelliNews](#)

Evidence Coverage and the MetaDome Integration Gap

Research streams provide essential building blocks, but no single approach integrates the full human-authorised incident-to-decision workflow.

Research stream	Coverage in literature	Persistent limitation	Specific gap	MetaDome response	Core references	Integration status
Digital twins & systems-of-systems	Integrated modelling, simulation, semantic representation and ontology-based architectures.	Semantic, interface and service integration remain difficult across heterogeneous systems and lifecycles.	No full incident-lifecycle representation linking evidence, uncertainty, roles, authority, decision and outcomes.	Federated incident graph connecting observations, tracks, provenance, confidence, roles, approvals, actions and outcomes.	Li et al., 2022; Lu et al., 2021; Zheng et al., 2021.	Partial foundation
Human-machine teaming, trust & workload	Trust calibration, workload, task allocation, collaboration and human-in-the-loop evaluation.	Transparency alone does not ensure appropriate reliance under time pressure.	Limited full locutrnal chains combining sensor ambiguity, multi-role coordination, authority routing and response options.	Role-based views, confidence displays, evidence-gap indicators, override, logs and trust/workload measures.	Dubois & Ny, 2020; Boy & Morel, 2022; Zeillli et al., 2022.	Partial foundation
Governance & authority allocation	Authority sharing, role assignment, continuity and meaningful human control.	Authority is often conceptual, not traceable as permissions, handovers, escalation and approvals.	No experimental mechanism for tactical, operational, strategic and civil-military authority pathways.	Authority-routing layer with roles, permissions, thresholds, handovers, approvals, escalation and override.	Boy & Morel, 2022; Pekárev & Várno, 2026.	Partial foundation
Military AI & doctrinal decision support	Doctrine-compatible override, calibrated confidence, escalation states and accountable human control.	Usually limited to targeting, classification or local decision support.	Limited coverage of the complete multi-actor drone-incursion chain.	Human-authorised support spanning cue, fusion, routing, response comparison, action and replay.	Pekarev & Várno, 2026; Boy & Morel, 2022:	Partial foundation
C-UAS, layered defence & multi-domain C2	Layered sensing, tracking, classification, mitigation, network topology and synchronisation.	Sensor, mitigation and C2 studies remain separated.	No repeatable environment tests evidence conflict, handovers, responses alternatives and resource constraints together.	Scenario library with radar/RF/EO/IR/ acoustic inputs, airspace context, incomplete evidence, roles and replay.	Mondal, 2025; Wang & Pan, 2024; Topor, 2026.	Partial foundation
Decision latency & C2-network structure	Rapid information flow, coordinated decision cycles, synchronisation and network efficiency.	Hierarchical relays can create congestion and inhibit same-level coordination.	Technical delay, ambiguity, handovers, authority routing and workload are rarely measured together.	Stage timestamps across observation, fusion, classification, routing, decision, action and learning.	Klerx et al., 2021; Wang & Pan, 2024; Boy & Morel, 2022.	Partial foundation
Resource proportionality & response selection	Layered defence and matching resources to threat, mission and uncertainty.	Technical or cost studies often omit the effects of weak evidence, delays and workload.	Limited evidence of when fragmentation drives costly or escalatory response selection.	Bounded response options: monitor, deconflict, non-kinetic, dedicated C-UAS and high-value assets.	Topor, 2026; Mondal, 2025.	Partial foundation
Federated learning & decentralised collaboration	Privacy-preserving collaboration, distributed learning, reduced raw-data transfer and local data sovereignty.	Poisoning, backdoor, inference and communication risks require strong security engineering.	No operational representation of incident states, provenance, human approvals or replay.	Authorised/synthetic/metadata inputs; least privilege, segmentation, provenance, secure logging and controlled release.	Abhishek et al., 2022; Bellavista et al., 2021; Rodríguez-Barroso et al., 2022; Mothhuri et al., 2021:	Partial foundation
MetaDome proposed contribution	Combines digital twins, C2, HMT, AI support, C-UAS, federation and simulation.	Existing streams remain technically and organisationally separated.	Missing federated, human-authorised experimental layer for end-to-end decision readiness.	One secure, measurable workflow: observation → fusion → classification → authority routing → human decision → authorised action → replay learning.	This study; informed by the cited literature.	Integrated contribution

Figure X. Evidence coverage, persistent limitations and the MetaDome integration gap. MetaDome does not replace sovereign C2 or automate consequential force decisions; it provides a federated, human-authorised experimental environment for measuring decision readiness.

Rehearse every level of authority—together

Each role sees what it is entitled to see, acts within its authority, and experiences the cost of delayed hand-offs.

TACTICAL

Sensor operators, C-UAS teams,
air-defence crews, pilots

OPERATIONAL

Duty officers, CAOC Uedem /
Torrejón, joint staff

STRATEGIC

SACEUR delegation, ministries,
NATO consultation

CIVIL & DIPLOMATIC

Civil aviation, emergency
services, attribution and
diplomatic liaison

WHAT CHANGED IN 2026 At the July 2026 Ankara summit, Baltic Air Policing became an air-defence mission, with engagement authority vested in SACEUR and delegated through CAOC Uedem. Romanian shoot-downs were cleared through CAOC Torrejón. New authority paths must be rehearsed before they are used under pressure.

NATO STO EVIDENCE TR-HFM-330 (Dec 2025) models control as four nested loops—operator, mission, design, governance—and warns against using people as a “moral crumple zone”.

Source: [Grosswald timeline](#) · [bne IntelliNews](#) · [NATO SDP 12000 \(Caliber\)](#) · [TR-HFM-330 summary](#) · [STO newsletter Mar 2026](#)

AI accelerates; Metapilots decide

The objective is always to de-escalate, avoid wasted resources and keep accountable humans in charge.

AI DOES

- Fuse sensor data and flag inconsistencies
- Estimate confidence and expose uncertainty
- Compare response options and resource costs
- Adapt training scenarios to team performance
- Record every decision for replay

METAPILOTS DECIDE

- Whether, when and how to act
- Which level of effect is proportionate
- When to escalate or de-escalate
- What is shared, and with whom

No autonomous escalation. No live weapon control by MetaDome.

NATO STO EVIDENCE STO Trends 2025–45: Allied militaries “require humans to be ‘in the loop’”. IST-192 tested AI decision support in an Article 5 exercise; TR-HFM-330 recommends “human-machine co-training”.

Source: [NATO STO Trends 2025–2045](#) · [STO 2024 Highlights \(IST-192\)](#) · [TR-HFM-330 summary](#) · [SAS-181 review](#)

MetaDome technology stack

Metapilot's NATO Dome Technology Stack

A simulation-first, human-performance and decision-readiness layer for federated counter-UAS ecosystems.



AI accelerates understanding and rehearsal. Authorised humans retain legal, political and operational responsibility.

FROM THE INVESTMENT DECK



Federated readiness platform



Immersive XR rehearsal



Human-performance research

KEY POINT

Seven layers, from sensor federation to governance. AI accelerates understanding; authorised humans decide.

NATO STO RESEARCH

MSG-195 M&S as a Service: composable, on-demand simulation, adopted by acquisition programmes.

MSG-205 digital-twin interoperability across OEMs, IP and data ownership.

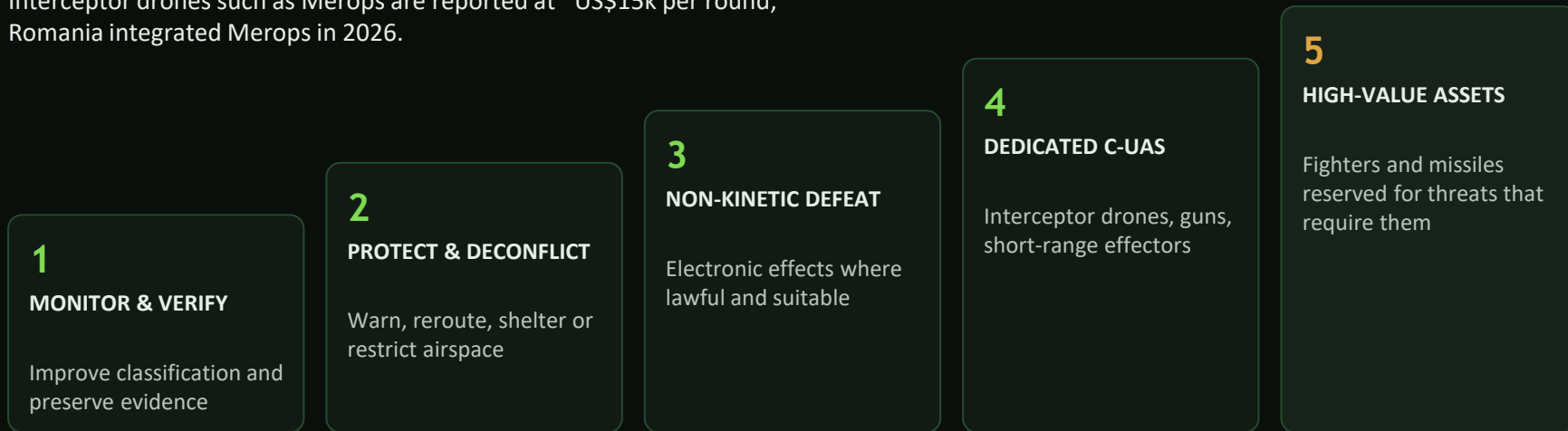
IST-208 data-centric security and provenance at the tactical edge.

Source: [STO 2024 Highlights](#) · [MSG-205 \(STO-MP-AVT-369\)](#) · [NMSG 2026 symposium](#)

Neutralise with the lowest suitable effect

Train a response ladder so the least escalatory effective option is chosen—and fighters are kept for threats that need them.

Interceptor drones such as Merops are reported at ~US\$15k per round;
Romania integrated Merops in 2026.



NATO STO EVIDENCE SCI-301 concluded there is “no silver bullet against the LSS air threat”; effective defence is “a system of C-UAS systems”.

Source: [NATO STO SCI-301](#) · [Grosswald timeline \(Merops\)](#) · [bne IntelliNews](#)

We ran MetaDome on 23 public incidents

Level-2 reconstructed digital twin · 6 NATO countries · conditions C0–C4 · 20,000 Monte Carlo draws per event

23

events in 6 countries: RO 9, LV 4, LT 4, EE 3, FI 3, PL 1

16

events with an airborne response; 7 crash, debris or impact events

≈40

fighter sorties modelled (≈67 flight hours)

11-13

air-to-air missiles modelled across 8 engagements

HOW THE RUN WORKS

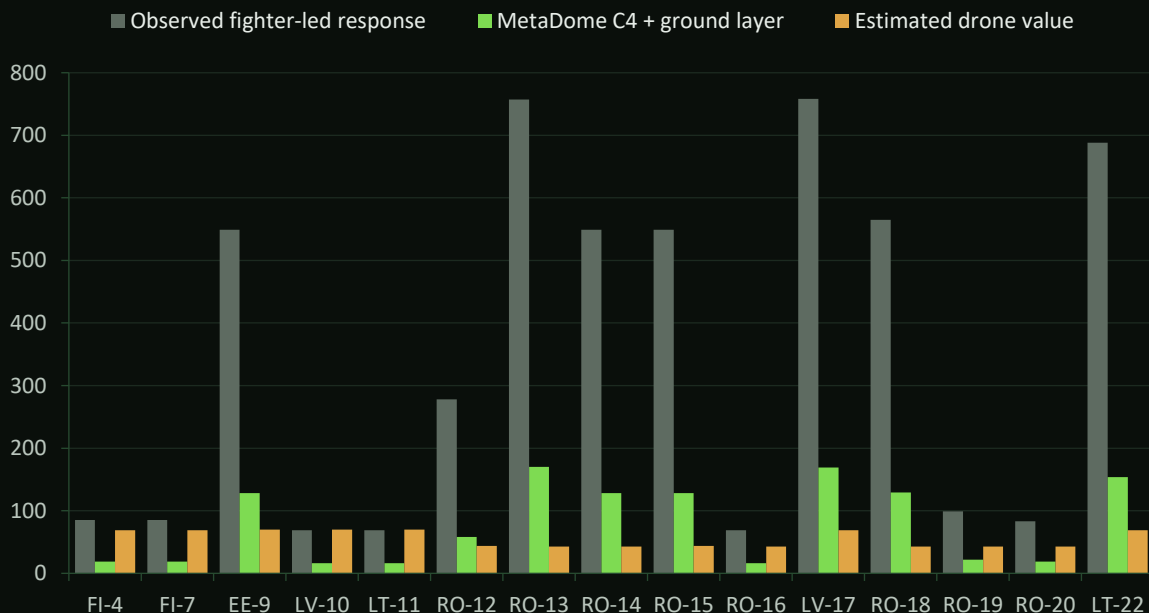
- 1 Corpus** Table B public incident record, source-graded
- 2 Incident graph** $G_I = (V, E, T, P, U, R, A, O)$; unknowns kept as uncertainty
- 3 Baseline C0** Observed fighter-led response, open-source unit costs
- 4 MetaDome C1–C4** Shared graph, AI explanations, authority routing, replay
- 5 Ground layer** Interceptor drones, guns, low-cost rockets; recon-UAS confirmation
- 6 Coverage** 50% (2026) · 80% (2027) · 90% (2028) scenarios

METHOD NOTE Only 5 of 16 airborne intervals are publicly calculable (8, 17, 20, 50, 83 min); 11 are imputed. Condition effects are priors to be tested in Level-3 trials, not measured results.

Source: [Table B public corpus](#) · [Popular Mechanics](#) · [Militarnyi](#) · [CSIS](#)

Fighter-led responses spent ~US\$5 per US\$1 of drone

Modelled expected cost per airborne event, baseline vs MetaDome C4 + ground layer at 80% coverage (US\$ thousand)



US\$8.0M

modelled baseline cost of all 23 events vs US\$1.7M of drones

~70%

of baseline cost was air-to-air missiles, not flight hours

US\$757k

vs a US\$43k drone: Romania, 24 Jul 2026 (F-16 missile kill)

US\$2.7M → 0.9M

Poland, 9–10 Sep 2025, 19 objects (not charted)

Source: [Popular Mechanics](#) · [Militarynyi](#) · [CSIS](#) · [Military Times](#) · [Escudo Digital](#) · [RBC-Ukraine](#) / Bild

Authority routing and ground effect save most time

Mean first-cue-to-outcome interval across 16 airborne events, cumulative conditions (minutes, 80% coverage scenario)



Event	Observed	MetaDome
RO 24 Jul 2026	83 min	≈40 min
LV 14 Aug 2026	≈50 min	≈26 min
LT 15 Sep 2026	≈20 min	≈13 min
RO 16 Aug 2026	17 min	≈12 min
RO 25 Jul 2026	≈8 min	≈7 min

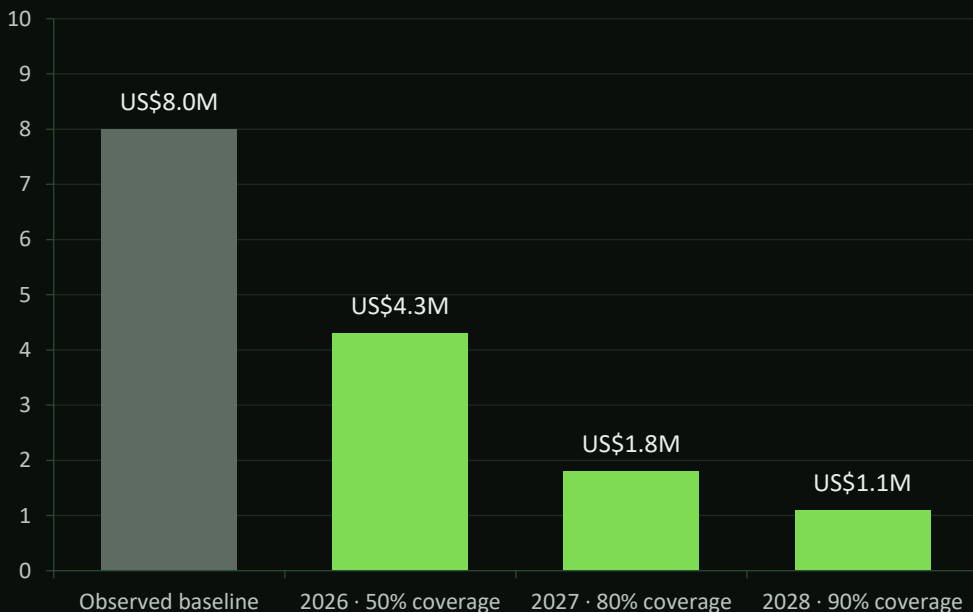
36 → 20.5 min

mean interval; summed across events 453 → 265 min. Fast responses (8–17 min) gain little; long multi-national chains gain most.

Source: [Reuters](#) · [France 24](#) · [Metapilot MetaDome simulation \(Level 2\)](#)

Ground coverage drives savings from -46% to -86%

Total modelled response cost for all 23 events by ground-layer coverage scenario (US\$ million, median)



-46% · -77% · -86%

median savings at 50%, 80% and 90% coverage

4-5 of 7

crash or impact events (incl. Auvere and Rēzekne) detectable before impact with persistent recon at 80% coverage

Not the business case

US\$6M saved on 23 events is small vs capex; value lies in missile stocks, fighter availability and impact prevention

Source: [EU Readiness Roadmap 2030](#) · [ECFR](#) · [War on the Rocks](#)

Buy response portfolios, not single platforms

Use one scenario library to generate evidence before money is committed.

DEFINE

requirements

SIMULATE

mission fit

TEST

controlled TEVV

EVALUATE

evidence pack

PROCURE

authorised route

EVIDENCE PACK

Mission effectiveness

Interoperability

Cyber assurance

Human workload

Training burden

Cost per defeat

WHY NOW

>US\$40bn

NATO counter-drone investment over five years, plus a NATO counter-drone marketplace (Drone Edge, July 2026).

SDP 12000

New NATO integrated air and missile defence plan, from one-way attack drones to cruise missiles.

NATO STO EVIDENCE MSG-179 built a framework linking acquisition to M&S; MSG-195 results were “adopted by various international acquisition programmes”. From July 2026, Capability Coordination Groups tie STO research to capabilities.

Source: [NATO's Drone Edge](#) · [Caliber \(SDP 12000\)](#) · [STO 2024 Highlights \(MSG-179, MSG-195\)](#) · [STO newsletter Jun 2026](#)

Country milestones aligned to EU deadlines

Each gate is measured with the Figure 7 metrics: time to shared track, authority and decision; sorties and missiles per incident

	Romania	Poland	Baltics (LT · LV · EE)	Finland
Q4 2026	Level-2 replay of 9 events; 2 cells IOC	Replay of Sep 2025 raid; link to Eastern Sentry	Delegated-authority rules; legal reviews; first cells funded	Legal review; C2 federation pilot
Q2 2027	50% coverage; quarterly authority drills	4 cells IOC; joint procurement lot 1	1–2 cells IOC each; Baltic hand-off drills; EDPCI start	2 cells IOC
Q4 2027	80% coverage; fighters as fallback only	80% coverage on priority sectors	Tri-Baltic federated incident graph live	Nordic–Baltic federation link
2028	90% coverage; Level-3 validation	90% coverage; Level-3 validation	Level-3 controlled validation	Level-3 controlled validation

EU MILESTONES European Drone Defence Initiative and Eastern Flank Watch: initial capacity end 2026; EDDI full capacity end 2027; Eastern Flank Watch end 2028.

Source: [EUR-Lex Readiness Roadmap](#) · [ECFR](#) · [LSM \(Latvia EDPCI\)](#)

People, law and funding make the ground layer real

NEW POSITIONS (PER CELL)

- Authority-Routing Duty Officer
- Duty Legal Adviser (LOAC / national law)
- Recon-UAS pilots and ground-effector crews
- Incident-graph engineer; AI assurance and replay analysts

TRAINING FOR CURRENT PERSONNEL

- QRA pilots: hand-over to the ground layer, fallback-only engagement
- Controllers: decoy vs armed recognition, calibrated AI reliance
- Commanders: quarterly cross-border authority drills
- Civil protection and airports: joint alert drills

LEGISLATION

- NATO: common drone ROE and threat categories under Eastern Sentry
- Pre-delegated authority to ground C-UAS commanders
- Nations: build on Romania (2025) and Lithuania (2025) laws
- Debris liability, peacetime EW cover, fast airspace restriction

FUNDING

- SAFE loans: Poland €43.7bn, Romania €16.7bn
- Lithuania €6.37bn, Latvia €3.49bn
- EDDI and Eastern Flank Watch flagships; EDPCI
- EDF / EDIP for incident-graph R&D and TEVV

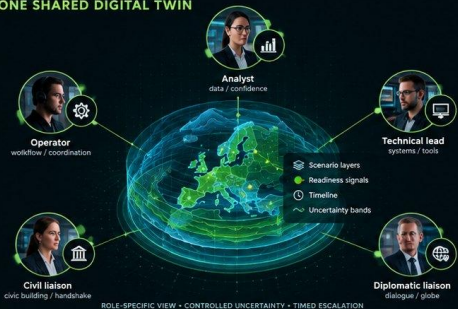
Source: [Reuters \(Romania law\)](#) · [Reuters \(Lithuania law\)](#) · [Reuters \(SAFE\)](#) · [Breaking Defense](#)

Train separately. Rehearse together.

The Metapilot Training Platform: Interoperable Exercises for Collective Readiness

Train separately. Rehearse together. Learn across borders.

ONE SHARED DIGITAL TWIN



EXERCISE DESIGN

- ✓ Shared digital-twin scenario with synthetic and authorised inputs.
- ✓ Different roles: analyst, operator, technical lead, civil liaison, diplomatic liaison, exercise controller and trainer.
- ✓ Controlled uncertainty, incomplete information and timed escalation points.
- ✓ AI-supported information prioritisation and scenario adaptation.
- ✓ XR or desktop participation depending on role and equipment.
- ✓ Replay, team debrief, individual feedback and scenario-library improvement.

CONTROLLED EXERCISE ENVIRONMENT



MEASURED OUTCOMES

- ✓ Time to shared understanding.
- ✓ Quality of information hand-offs.
- ✓ Workload and attention indicators.
- ✓ Coordination quality and procedural adherence.
- ✓ Explainability and completeness of the decision trace.

XR & DESKTOP PARTICIPATION



Experimental training environment. No live operational C2, targeting or weapon-control functions.

KEY POINT

One shared digital twin; national nodes keep release rules, data and after-action review.

NATO STO RESEARCH

NATO Data Strategy 2025 “a secure and impactful data-sharing ecosystem” for Alliance, industry and academia.

IST-208 new cybersecurity approaches for increasingly complex systems.

NCIA TIE26 radars, RF sensors and C2 from many nations exchanged data “in a common and operationally meaningful way”.

Source: [NATO Data Strategy](#) · [STO 2024 Highlights \(IST-208\)](#) · [NCIA TIE26](#)

Training the NATO and Allied defence workforce

Interdisciplinary pathways for military personnel, scientists, technologists, policymakers and industry specialists.

Command & decision-making

Counter-UAS operations

AI training & assurance

Diplomacy & civil–military
coordination

Data management &
cybersecurity

Acquisition & capability
development

Legal & ethical governance

**Neurotechnology, starting with
fNIRS**

COLLABORATION MODEL Multiple joint projects with universities, military academies, research centres, defence primes, governments, OEMs and NATO and national innovation ecosystems.

NATO aims to train five times as many drone operators by the end of 2027.

NATO STO EVIDENCE TR-HFM-311 (2024) reviews fNIRS for brain-state monitoring; HFM-334 reported multimodal workload assessment including fNIRS; STO ran a 2026 “Decision-Making for the Future” summer school.

Source: [NATO’s Drone Edge](#) · [NATO STO TR-HFM-311](#) · [STO-MP-HFM-334](#) · [STO newsletter Jul 2026](#)

The human layer: one million Metapilots

The Human Layer: One Million Metapilots for NATO Dome Readiness

A distributed training and certification ecosystem—not a centrally controlled force.



One million trained participants in a common readiness language—not one million people under a single command.

KEY POINT

Jobs across diplomacy, AI training, pilots, data, legal, cyber, command, acquisition and innovation.

NATO STO RESEARCH

HFM-374 COGARMY cognitive training and teamwork assessment of army personnel.

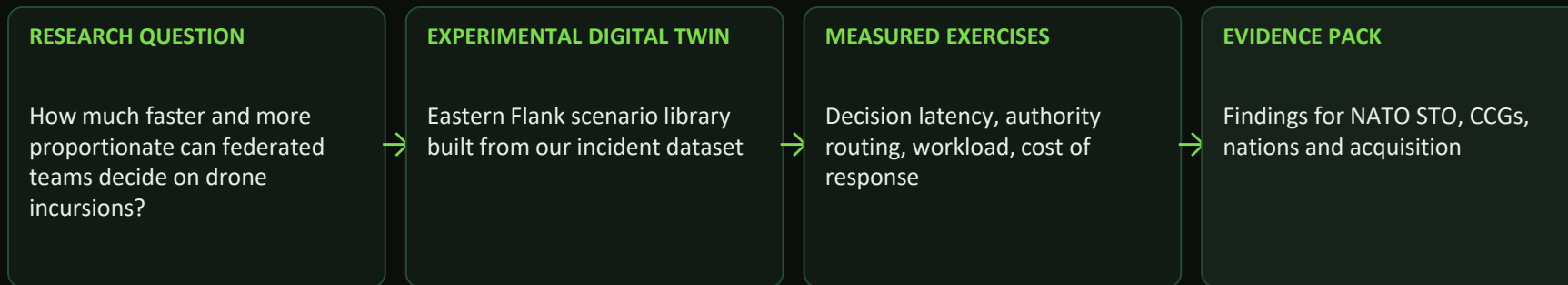
HFM-369 leader development for multinational NATO forces.

Drone Edge 2026 NATO aims for 5× drone operators by end-2027.

Source: [Chief Scientist report, Cognitive Warfare](#) · [STO 2024 Highlights \(HFM-369\)](#) · [NATO's Drone Edge](#)

Chief Scientist Grant: from research question to demonstrator

Experimental Digital Twins for AI-Enabled Deterrence and Strategic Competition in the NATO Alliance.

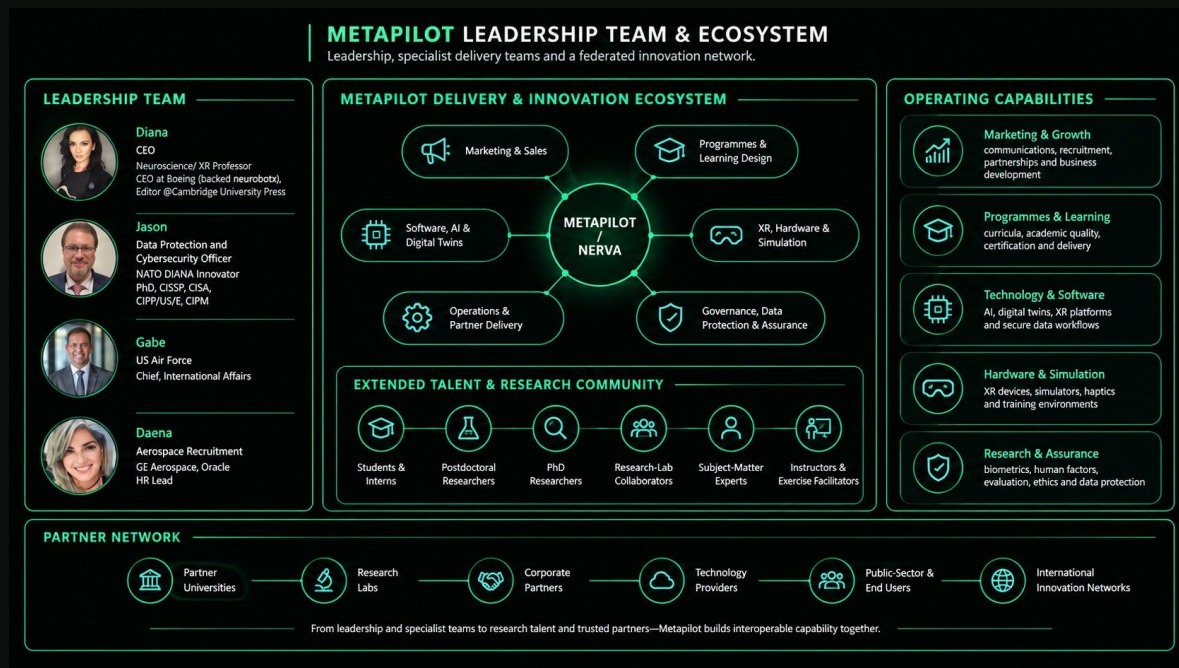


ASKS Scenario co-design with Allied units · access to unclassified incident timelines · a pilot nation on the Eastern Flank · a route into STO activities (NMSG, SAS, HFM).

NATO STO EVIDENCE SAS-181: explaining RL decision policies to decision-makers is “an almost unexplored feature”. MSG-179 identifies “critical acquisition activities where M&S bring added value”.

Source: [NATO STO grant announcement](#) · [SAS-181 review \(2026\)](#) · [STO 2024 Highlights \(MSG-179\)](#) · [NMSG 2026 symposium](#)

Metapilot leadership team and ecosystem



KEY POINT

A delivery and innovation ecosystem connecting research, training and industry partners.

NATO STO RESEARCH

Chief Scientist Grant 2026 Metapilot (Romania) among eight recipients alongside RAND, MUT and DTI.

Grant priorities AI and decision integrity; future warfare and defence industrial capacity.

Source: [NATO STO grant announcement](#)

Build the MetaDome readiness layer together

Six ways to take part, from the first Level-2 replay to Level-3 validation in 2028.

Testing

Co-run Level-2 replays and Level-3 controlled trials

End users

Units and ministries shaping scenarios and metrics

Consortium partners

Universities, primes, OEMs and C-UAS providers

Common grants

NATO STO, EDF, EDIP, SAFE and national calls

Investors

Scale the platform, cells and the training pipeline

Academy

Train the Metapilots who run the readiness layer

Join us for consortiums, investment and partnerships admissions@metapilotacademy.com

EuroDome

A Safer, More Resilient Europe

Q&A

Thank you for
your attention.

