Thales AI
in Real Use

Compendium of Use Cases

Generating significant operational gains through the use of Artificial Intelligence technologies.

www.thalesgroup.com

THALES
Building a future we can all trust

Philippe Keryer

Senior Executive Vice-President, Strategy, Research and Technology

At Thales, artificial intelligence is much more than just a technological advancement; it is a strategic response to the crucial needs of our customers in the fields of defence, aerospace, space, cybersecurity and digital identity. As a European leader in AI for critical applications, we develop solutions that not only perform well but also meet the highest standards of cybersecurity, explainability, and ethics. Our AI is trusted AI. With 800 AI experts, supported by a hundred doctoral students, and thanks to our cortAIx accelerator, we have created a genuine innovation ecosystem that combines advanced research, product development and operational deployment. This ongoing investment has allowed us to become the leading European patent applicant in AI for critical systems and to implement around a hundred concrete use cases that are either already integrated or in the process of being deployed.

The operational benefits of our AI are tangible and wide-ranging: improving the analysis of information (often critical) and decision-making in complex environments, optimising energy efficiency and environmental impact, and detecting, identifying and classifying surveillance information with unparalleled precision, even in the most challenging conditions. This technological mastery enables us not only to address our customers' security and sovereignty challenges, but also to enhance their technological and operational superiority. In the following pages we invite you to explore some concrete examples of the impact of AI in critical systems. These are the result of decades of research, and a clear vision: to make artificial intelligence a major transformative lever for a safer and more sustainable world.

> **Trusted AI at the heart of critical systems:** Thales's commitment to innovation and sovereignty.

AI for Critical Environments

We deliver Artificial Intelligence that is...

To deliver added value through AI, we draw on an outstanding dual skillset

1

Mastering of the critical environments AI is used in:

DOMAIN KNOWLEDGE
No useful AI without perfect domain knowledge.

HOST PRODUCT R&D
AI is not plug&play.
It is deeply integrated to host system.

CONSTRAINED ENVIRONMENTS
AI is different in constrained environments. Large availability of resources is rare in our field.

CONTINUITY OF OPERATIONS
- System upgrades enable continuity of service
- 2000 experts in cybersecurity

2

Lasting world class commitment to AI

COMPANY FOCUS ON AI
We use AI in Thales products for 40 years
Strategic priority since 2018 and towards 2030

WORLD CLASS SKILLS & MEANS
Dedicated AI organization: cortAIx
800 AI/Data engineers and scientists,
100 PhDs, 250+ Patents,
250 scientific papers since 2020

ABILITY TO DISRUPT
Business and operating models adapted to AI while dealing with sovereignty-related expectations

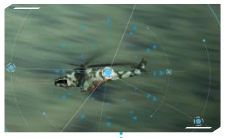
Use Cases in the Defence Sector

e.OODAL

to out perform across all stages of the OODA loop

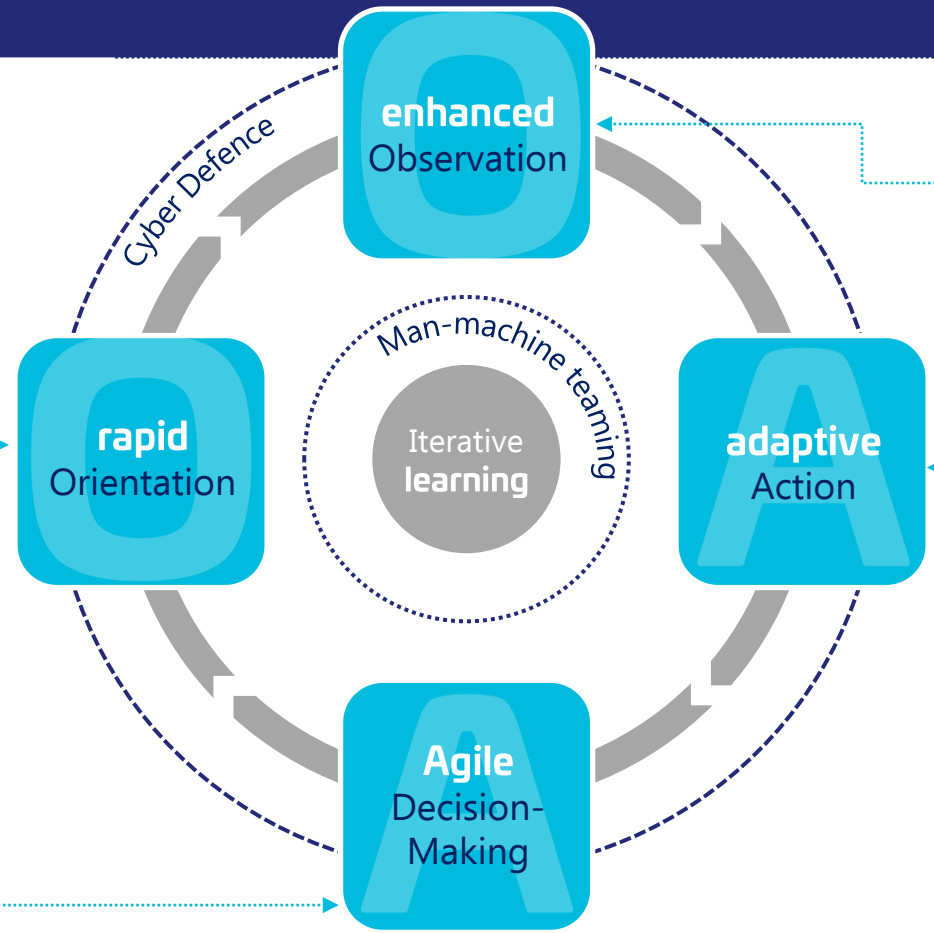
Orientation is faster

From Relevant Situational Intelligence to mission-oriented sense-making generated through concept of operation data and commander's intent inputs to provide operator with
> **Actionable Situational Understanding** <



Decision-making is more agile

From Actionable Situational Understanding to scenario-based decisions leveraging the power of hybrid AI, capable of rapidly exploiting massive or incomplete information, intertwined capacity enabling
> **Responsive Agile Solutions** <



Observation is enhanced

From narrow field of view sensors to behavioral sensing, leveraging AI- improved detection and classification, as well as autonomous and collaborative multi-sensing, for
> **Relevant Situational Intelligence** <

Actions constantly adapt

From Responsible Agile Decision to desired effects-based actions enabling fast and collaborative reconfigurations
> **Proactive Reconfigurations** <

Cyber Defence

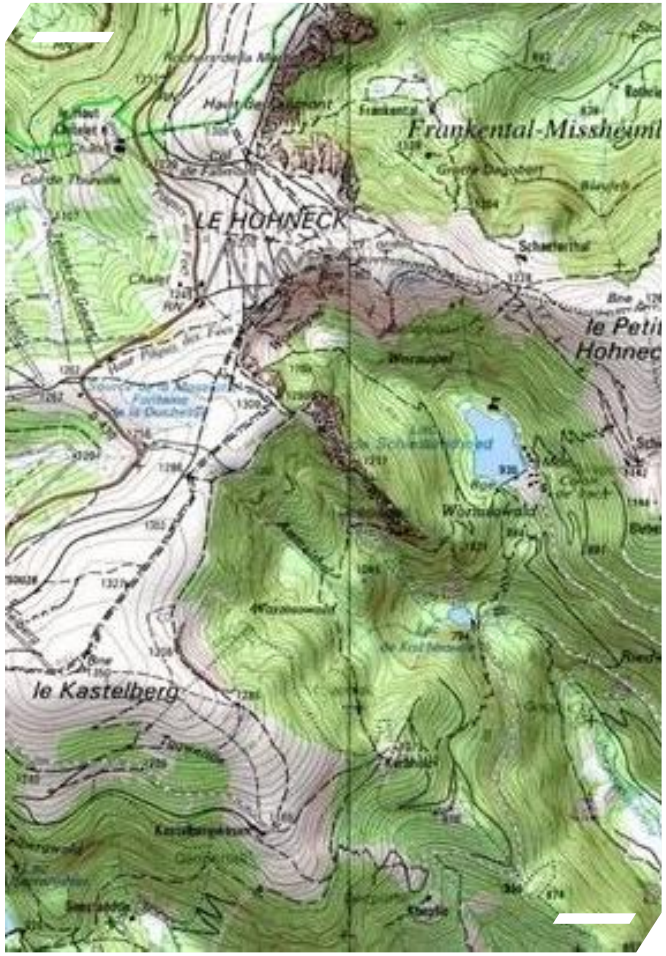
Strong cyber-defence ensure the integrity, availability, and resilience of the e.OODAL against new forms of cyberattacks.

Iterative Learning & Man-Machine Teaming

The military can combine the best of human strengths with operational data amplification through the usage and co-learning with AI-enabled capabilities leading to constant improvement of military power.

e.OODAL

to out pace in operation support



Shaping the battlefield environment is a crucial prerequisite for achieving successful outcomes in warfare.

Thales AI-driven solutions are designed to help Armed Forces achieve superiority in the warfighting environment, significantly **reducing the time cycles for fight preparation, mission planning, and combat logistics.**

There are multiples examples of use cases in which AI improves operations and optimize human resources management: **stock optimization, shared logistical situation, flows improvement, automation of replenishment, enemy's situation.**

AI performance in processing large amount of data, automating repetitive tasks, analyzing maps and pictures, and in optimizing complex constrained problems fully demonstrates its operational impact in advanced support to combat forces.

> **AI entails acquiring a deeper, broader, and faster understanding of the operating environment, the adversary, and oneself to conduct decisive actions that give an edge over the enemy.**

AI at the heart of the optronic systems of Dassault Aviation's Rafale

100x faster target detection

Thales equips the Dassault Aviation Rafale with the Talios pod, equipped with advanced optronics capabilities. With its high resolution, the Talios pod's super camera speeds up target identification in air support missions, saving precious time for the crew.

The AI integrated into the sensor analyses images in real-time and provides the position of detected targets **100 times faster** than manual search.

The display of detected targets allows the crew to confirm their identification and decide whether to engage in combat. The AI acts as an assistant to the pilot, who holds the final decision to open fire.
The AI embedded in the Talios pod meets **the requirements for computational power frugality**. It is the result of research conducted by Thales' AI laboratory, which developed the Thales Neural Processor.

Thales has designed an ergonomic man-machine interface adapted to the cockpit, based on studies conducted in collaboration with military crews and Thales simulators. Thales' advances in AI in the optronics field will be integrated into the upcoming F4-3 standard of the Dassault Aviation Rafale, thus providing unprecedented capabilities to the Talios pod and significant operational gains in operational theaters.

Domain	Air
Mission Type	Reconnaissance
Availability	Talios Pod

AI Technologies used

- Thales Neural Processor
- Embedded AI

Find out more

- France orders 21 more Talios optronic pods
- Airborne Optronics2

Ocean Control: Intelligent radar for maritime patrol aircraft

100x faster target recognition

The radar operator of an Atlantique 2 maritime patrol aircraft is faced with the task of searching for and identifying numerous targets: maritime, land-based, and airborne. The radar, therefore, produces a large volume of information that exceeds the human capabilities of the operators.

Their expectations are threefold: an automatic and intuitive adjustment based on mission scenarios, the ability to detect priority targets, and continuous radar improvement through learning over time.

In 2023, the French Defense Procurement Agency (DGA), the French Navy, and Thales conducted an AI processing demonstrator aboard the Atlantique 2 aircraft, with integration planned for 2025.Its purpose was to evaluate two functionalities: an AI-based maritime detection mode, covering large areas in an intuitive manner, and an AI-based classification function that enables the recognition oft he dimensions of hundreds of targets **in a matter of seconds, compared to several minutes previously**.

These advances are the result of Thales' AI research conducted in their laboratories in Palaiseau and the group's expertise of over 60 years in radar technology. Integrated at the core of the radar, this AI significantly improves its performance, providing the forces with the informational superiority they need.

Domain	Maritime
Mission Type	Maritime Airborne Surveillance
Availability	AirMaster / SearchMaster

AI Technologies used

- Deep Learning
- Reinforcement Learning
- Optimization problem

Find out more

- ATL2 as a testbed for SEARCHMASTER®'S AI functions

Enhanced detection capabilities of air defence radars

x3 Discrimination of UAV from clutter

Detecting and identifying threats is crucial to the protection of airspace. It is necessary to quickly discriminate between a multitude of targets in complex environments where drones are increasingly prevalent, and saturation attacks are a concern. Classifying, prioritizing, and handling threats are tasks that are becoming increasingly difficult. This is the role of command and control (C2) centers and surface radars, which provide real-time situational awareness and rapid and accurate threat detection.

AI allows radar operators to simplify their decision-making in increasingly complex environments by imitating the knowledge of an expert analyzing the radar-provided image. The task of identifying a drone among different objects moving at low speeds (birds, pedestrians, etc.) is significantly improved. Thales' AI algorithms **improve drone discrimination even in unfavorable weather conditions**, focusing on the targets of interest and thus enhancing decision-making in case of a threat.

Thales designs and develops medium and long-range surface radars (ranging from 250 to over500kms) with software that supports next-generation aerial threats such as low-speed, low-altitude drones, stealthy objects, helicopters concealed behind terrain features, rockets, artillery fire, and mortars.

Thales' radars benefit from the expertise of the Group's radars and the capabilities of Palaiseau research laboratory to continually enhance their performance, update their capabilities remotely, and do so in a fully cyber-secure manner. This qualified AI is embedded to ensure reliability, explainability, and security.

Domain	Land
Mission Type	Anti-aircraft defence
Availability	Ground Master

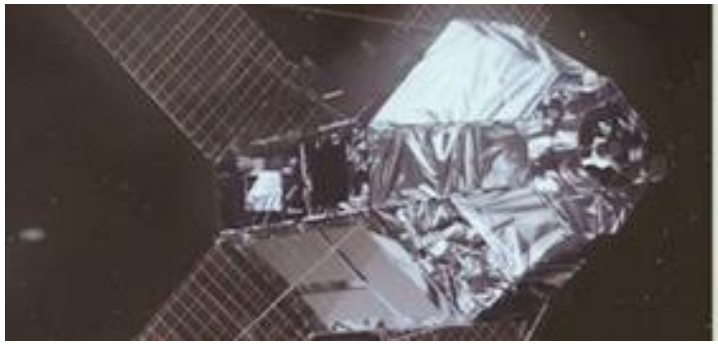
AI Technologies used

- Deep Learning

Find out more

- Ground Master 200

Space-based Sensors: AI boosts responsiveness



Access to space information reduced to just a few minutes

The effectiveness of sensors in operations depends on a number of factors, including the latency with which information is disseminated. The processing of moving targets, in particular, requires reduced transmission times to the command and control chain and to the players who have to use them in a detection, identification or targeting process.
Space-based sensors are of particular interest because they can fly over areas that are difficult or impossible for other sensors to access. Like other sensors on the battlefield, their effectiveness in detecting moving targets is conditioned by their ability to detect, by predicting the location of objects of interest and the time taken to transmit the positions of targets identified in the area of interest.
Today, the expertise held within the Thales Group means that it provides both the most highly resolved space observation sensors in Europe and powerful on-board computing capabilities enabling AI processing to be integrated into the raw data collected by the sensors.
This combination is now enabling the Thales Group to develop processing systems for the next generation of satellites, with the aim of **disseminating detection reports to the intelligence and command chains or to end-users in the shortest possible time**. In order to prevent any bias in AI processing, particularly in the face of decoy measures or when opening fire, humans remain present in the system loop.
A version of these processing algorithms is now being proposed for ground processing of space data under the MALICIA agreement.

MALICIA is the framework agreement awarded to Thales by the Délégation Générale de l'Armement, which aims to accelerate theintegration of artificial intelligence technologies into the Group's products.

Domain	Space
Mission Type	Surveillance, Identification
Availability	Malicia Framework agreement

AI Technologies used

- Thales Neural Processor
- Embedded AI

Find out more

- The most powerful "space camera" ever made in Europe

Frugal AI for military radio communications

More Intelligible audio, incl. in portable equipment

During surveillance missions, the Air Force equivalent of the 'golden ears,' are faced with daily routine, transcribing and analyzing audio communications for nearly 10 hours a day aboard intelligence aircraft. To facilitate their work, an AI signal processing system, deployable on one of the aircraft's computational servers, has demonstrated significant gains with regards to the quality of the audio data they analyze, leading to less fatigue and fewer errors. The AI is the result of a co-innovation approach, working closely with military personnel in the early stages.

On the ground, Thales aims to shape the future of radio communications in the context of land combat. In this type of environment, infantry soldiers require lightweight, space-efficient, and energy-efficient equipment to remain operational for extended periods. These constraints necessitate the implementation of tailored solutions that combine energy-efficient artificial intelligence with specialized hardware to embed new audio functionalities directly into the soldier's equipment, such as radios.

Thales presents the latest low-power demonstrator, incorporating a neural network. It includes a chip sourced through the partnership between Thales and Green Waves Technologies, in which Thales and the French Defence Procurement Agency (DGA) have a stake (Toulouse). This chip integrates an open hardware technology (RISC V) and benefits from an AI accelerator, enabling low-power consumption processing capabilities that are 1000 times lower than those of a laptop. With a formfactor equivalent to a Bluetooth earpiece, this chip can be embedded in radios and other Thale sinfantry equipment, serving as sensors that provide information superiority and enhanced communications capabilities for the armed forces.

Domain	Air, Land
Mission Type	Intelligence, Radio Communication
Availability	

AI Technologies used

- Machine Learning
- Deep Learning
- Neural Network

Find out more

- Radio Communications

AI in SkyView Air C41

Operators decision-making is 120x faster

An Air Operations Command and Control system plays a crucial role in ensuring national airspace security and sovereignty. It detects and identifies all flying objects and provides action control for threat neutralisation, such as allocation of threats to airborne or ground-based air defence components, conducting interceptions by fighter aircraft to enforce operational air defence measures, and controlling all types of air operation missions. At the heart of this system lies the Air C4I centre, which serves as a force multiplier, integrating assets and supporting timely decision-making by the Air Commander.

For years, Thales has been offering its SkyView system,adapted to various customer environments. AI is now embedded into the system to enhance the overall solution:

• SkyView operators face the task of identifying air threats (including Low/ Small/ Slow, high altitude, or hypersonic) among all targets displayed on their screens. In some of the harshest environments, false echoes or adverse weather effects may be presented to the operator. Thales is now proposing an AI-based decision-aid tool to help operators classify and discriminate false tracks (e.g. angels) from real targets, such as UAVs, in their daily tasks. This speeds up their decision-making process by a factor of x120 for targets classification. It complements the symbolic AI identification process that has been used for over 30 years.

• Post-event analysis is a huge and lengthy task that operators undertake every day, with limited tools to support their activity. Thanks to AI techniques in the analysis of recorded data, Thales automates the reconstruction of discontinued trajectories, providing the ability to quickly regain a comprehensive understanding of historical events and optimize future courses of action. This gives insights into patterns, trends, and potential threats that may have been missed in real time.

Thanks to that AI trajectory reconstruction tool, operators experience reduced cognitive workload and their mission become more efficient: it is estimated that the automatic discontinued trajectory reconstruction tool accelerates by x200 (from days to minutes) the task of the operator, ultimately contributing to the continual improvement of Air Defence systems.

These developments are the result of Thales' expertise and AI research, bringing Machine Learning and other AI techniques into operational systems. Integrated at the core of the AirC4I system, these AI-based tools significantly improve its performance, providing the forces with the informational superiority they need, enhancing airspace security, and reinforcing adaptation to new threats.

Domain	Air
Mission Type	Air Surveillance, Air Defence SkyView
Availability	SkyView

AI Technologies used
Machine Learning Symbolic AI Optimisation algorithm & Rule Based Knowledge

Find out more

Command & Control Operations Centre

Pathmaster: AI-assisted safe and efficient autonomous mine countermeasures

Up to 10x faster area coverage versus crewed systems

Sea mines present an inexpensive but persistent global threat to security and shipping lanes in all water depths. As mines proliferate and become more sophisticated there is a growing need for more data capture and advanced analysis to counter this threat. Today, autonomous mine countermeasure(MCM) systems offer greater efficiency and operational tempo at lower cost, whilst removing crew from the dangers of the minefield. Thales' Pathmaster toolkit provides leading-edge capability and operational advantage to MCM operations. Pathmaster utilizes AI in two key areas –

- **Mine Detection & Classification:** MiMap is the Thales sonar analysis application that enables operators to efficiently analyse hundreds of km² of high resolution sonar data, either real-time or post mission. AI tools are used to analyse sonar images to localise mine-like objects, significantly increasing the coverage rate and accuracy at which operators detect and classify sea mines. Compared to conventional sonar analysis tools, **MiMap is up to 4x faster whilst also decreasing operator workload, and AI-powered autonomous systems enable up to 10x faster area coverage versus crewed MCM operations.**
- **Uncrewed Surface Vehicle (USV) operation:** The Thales USV Management System delivers safe, certified and optimised autonomous operations. AI is being used to improve perception of the local environment for dynamic, real-time collision avoidance, thus **enabling the USV to behave as a "good mariner."** Real-time AI path planning enables continuous course adjustment in response to maritime traffic, other obstacles and operator defined mission priorities.

The Pathmaster system was fully operationally proven during comprehensive sea trials as part of the joint Anglo-French MMCM programme, and has achieved IMO degree 3 autonomy certification from the UK DE&S Naval Authority Group.

Domain	Maritime
Mission Type	Mine Counter Measeure (MCM)
Availability	PathMaster

AI Technologies used

- Machine Learning
- Embedded AI
- Neural Network

Find out more

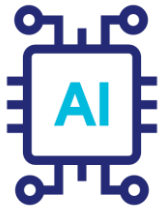
- Thales Mi-Map AI-assisted Mine Warfare
- Thales Unmanned Mine Countermeasures solution

Digital Crew: Enhanced decision-making and reduced cognitive burden

See more, know, act faster

DigitalCrew® is a suite of algorithms designed to reduce the 'cognitive burden' of the end-user through automatic detection, classification and tracking of threats.
As the battlespace becomes more congested, sensors more complex and threat environments more challenging, DigitalCrew® helps operators to digest sensor data, enhancing rapid decision-making and reducing workload; ultimately supporting manoeuvrability, survivability and increased lethality.
It is a real example of AI at the edge, where we have combined our domain expertise in hardware and AI to deploy computer vision in challenging environments, whether on land, under the ocean or in the air.
DigitalCrew® algorithms can be directly integrated onto the platform's sensors for low-latency image processing, resulting in the highest quality image.
User assistance functions such as tracking of small agile objects can be deployed with only a software update to the host platform.
DigitalCrew® is a truly versatile, platform and domain agnostic capability, combining the best of conventional and machine learning algorithms including Object Detection, Object Tracking, Object Classification, Video Combination, Turbulence Correction and bespoke Mission Support Tools to aid the operator in decision making.
For over 100 years Thales have been designing Optical technologies that up until now have been finely tuned for consumption by the human eyeball and processed by the human brain – now our DigitalCrew® algorithms will work alongside the human operator to consume and process the images generated on the battlefield.
This digital crewmember will not get fatigued, will not get distracted, they will always be watching.
Digital Crew is already installed on autonomous mine hunting platforms for testing. Elements are currently deployed on UK Ajax vehicle. It is soon to be deployed onto the UK Challenger 3 and German Joint Fires Support Team PAAG sighting system, and used for wider Counter-UAS applications.
It is also used in Civilian application: Object classification in anti-poaching operations from fixed wing aircraft in Botswana.

Domain	Multi-domain
Mission Type	Navigation Waterre
Availability	Multiple plateforms-see above



AI Technologies used

- Machine learning for object classification and mission support tools

Find out more

- Thales' DigitalCrew® enables the modern soldier to fight faster and smarter through the integration of AI and technology

NavSafe: a decisive advantage through Informational Superiority on Navigation Warfare with AI-Secured Open Source INTelligence

100x faster aircraft identification enables a real time worldwide GNSS jamming map

In an era of increasing threats, access to GNSS signals (such as the GPS, GALILEO, …) is increasingly contested with electronic jamming and spoofing. Attacker objective is to disrupt PNT services (Position, Navigation, Time) provided by theses GNSS constellation impacting from degraded communication to platform loss. Control this domain is crucial and known as NavWAR (Navigation Warfare) as its loss poses significant risks for both military and civilian applications.
Detecting and characterizing GNSS threats globally in real-time without specialized hardware is challenging. NavSAFE utilizing open-source data (ADS-B) and 15 000 aircraft as real-time sensors allow building a comprehensive, real-time global view of GNSS quality and swiftly detecting electronic warfare threats and denied environments.
However, the quality and integrity of open-source data are critical for military processes since OSINT sources like ADS-B can be easily falsified. AI modules rigorously verify data accuracy, analyzing behavior, patterns of life, and detecting even the smallest anomalies relying on Thales long expertise on air domain. Theses AI-based algorithm are supported by a robust MLOPS chains, ensuring consistent and unmatched performance over time to produce trustworthy data.
Leveraging Thales' expertise in cyber defense, electronic warfare and space technology, we provide reliable data for situational awareness and empower military operators to identify threats, understand adversary intentions to counter them, and make informed decisions in complex environments.
This approach enhances operational efficiency, focusing specialized platforms on high-value targets while using NavSafe secured OSINT for broader coverage. Combining both military-grade sensors and OSINT data enables the visualization and characterization of PNT-GNSS threats from ground to orbit, ensuring informational superiority in highly contested environment. The next release of NavSAFE will be able to locate and characterizes jammer sources with AI assisted algorithms offering a precise and trustworthy situational awareness for Navigation Warfare, delivering a decisive advantage to our customers.

Domain	Multi-domain
Mission Type	Navigation Warfare
Availability	ADS with NavSafe components

AI Technologies used

- Deep learning
- Optimization Problem

Find out more
TBC

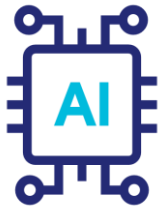
Powerful Activity-Based Intelligence (ABI)

4x faster media analysis for strategic sites monitoring

In military intelligence, Activity-Based Intelligence (ABI) is a powerful approach used to conduct site surveillance and monitoring of critical locations such as military bases. ABI allows analysts to detect track and analyze enemy activity by identifying patterns of life—monitoring the routine movement of personnel, vehicles, equipment, and supplies to pinpoint anomalies that could signal potential threats.
However, the ever-increasing volume of data makes this task very time-consuming. To address this challenge, Imagery Analysts now leverage Artificial Intelligence (AI)-driven Detection, Recognition, and Identification (DRI) algorithms, which automatically and efficiently detect, classify, and identify objects of interest and infrastructure in images and videos.
Yet, AI-powered detection is only valuable if its results are clear, actionable, and easy to interpret.
Recognizing this, THALES has developed an advanced ABI module integrated into its combat-proven, all-in-one Imagery Intelligence solution, MINDS (Multi-sensor Image INterpretation & Dissemination System).
This tool offers a powerful insight extraction tool. It transforms raw AI detections into time series data and user-friendly charts representations.

Additionally, it employs Generative AI to automate and streamline reporting tasks in accordance with NATO standards.
MINDS ABI module maximizes the value of IMINT by processing a growing volume of images and detections, thereby broadening intelligence coverage and uncovering valuable data insights. It enables continuous surveillance of areas of interest, allowing analysts to identify emerging patterns of life and receive real-time alerts for behavioral shifts—enhancing both operational awareness and decision-making superiority.
Additionally, the module delivers unmatched efficiency gains, enabling teams to generate reports up to 70% faster—reducing production time from 30 minutes to just 10 minutes with the use of Large Language Models (LLMs). More broadly, the integration of AI Detectors with this ABI module within MINDS accelerates the work of imagery analysts—who tend to be a scarce resource—by a factor of four, allowing them to focus more on interpretation.

Domain	Multi-domain
Mission Type	Intelligence
Availability	MINDS



AI Technologies used

- GenAI LLM
- Conventional Algo
- Symbolic AI

Find out more
TBC

ANTICIPE: an AI-supported assistant for command and control centres

Take informed actions in minutes rather than days.

Military forces today have an unprecedented ability to capture and transmit data, and this is growing exponentially. This volume of information provides an advantage over the enemy, but it can also obscure the critical information a commander needs to make the right decisions at the right time. Increasing the number of people involved in command and control centres only often means a compromise between the quantity, quality and the speed of information processed.

In this context, artificial intelligence has the potential to provide critical support to the armed forces. Its inherent effectiveness in fusing large amounts of information from multiple sources and multiple domains can augment human capabilities with rapid understanding of crisis dynamics and decision making.

ANTICIPE, developed by Thales, is an AI-supported cognitive decision-making assistant that processes data from multiple sources and recommends courses of action in collaboration with human users.

Targeted operational performance objectives:

- Reduce the decision cycle from 24 hours to minutes by reducing the time needed for manual tasks
- Handle 100 times more information with the same number of operators
- Facilitate operator training with a 30% reduction in time to full readiness

ANTICIPE performance was evaluated during the NATO Steadfast Jupiter Command-Post eXercise in October 2023, where a shadow HQ composed of only 10 NATO war fighters using ANTICIPE was compared with the Joint Force Command composed of 1000 operators.

Domain	Multi-Domain
Mission Type	C2 Multi-Domain Operation
Availability	ACCS, SkyView, CybAIR

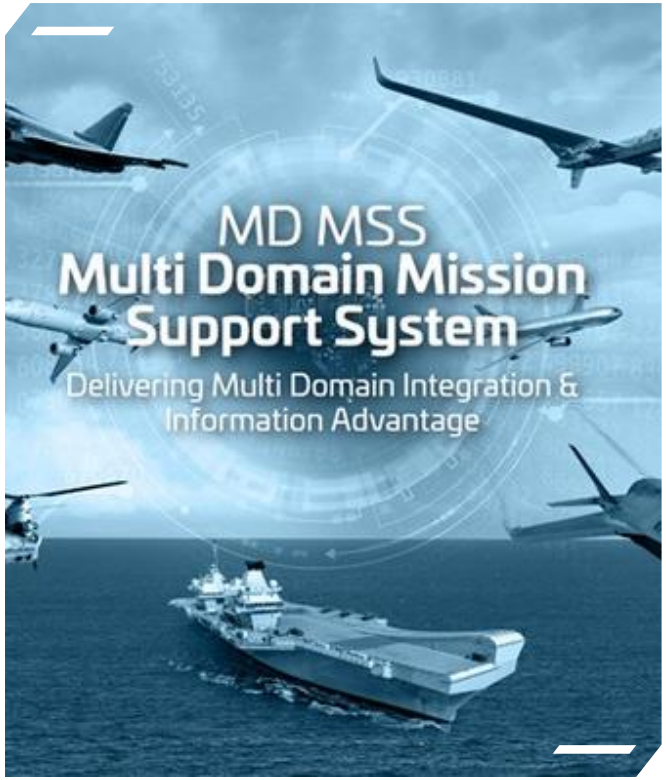
AI Technologies used

- Natural Language Processing (LLM, machine learning, symbolic AI)
- Hybrid semantic search
- Knowledge graph/Ontology

Find out more

- NATO STO IST 192 ANTICIPE
- Thales and NukkAI to develop AI-based data fusion solution for military applications

AI for Multi-Domain Situation Awareness



Understanding complex geo-located multi-modal data in a continuous changing military environment

Our ever-increasing ability to collect data for situational awareness has far outpaced our ability to distil this into a single, fused, relevant world picture and nowhere is this more apparent than in the highly complex military environment. Thales is capitalising on recent developments in Data Analytics and AI to redress this mismatch.

Over the last 40 yrs Thales and the UK MOD have spirally developed a Multi Domain Mission Support System, called MD MSS. This system provides situational awareness to military users planning and executing missions.

Development of the system has recently switched focus from integrating and visualising new data sources to the use of data analytics and AI to extract greater value from the existing data. This development has led to the following AI and Data Analytic capability:

- **Pattern of life** (in service): Visualisation of aggregated positional data viewed through heatmaps.
- **Behavioural analytics** (in service): Track analytics to find, filter and alert behaviours of interest based on predefined, operationally characteristic behaviour
- **Frugal Learning** (next release): Using Thales' General Feature Learner to train a foundation model to understand track features, enabling an Adaptive AI approach to behaviour identification based on limited user-defined examples.
- **Decision Aids** (MOD funded research): Using Computer Generated Forces to model behaviours then searching for optimal courses of action using heuristic search algorithms. Ref. DASA Fisheries Patrol Activity

Domain	Air, Land, Maritime
Mission Type	Collaborative Combat, IAMD
Availability	MD MSS

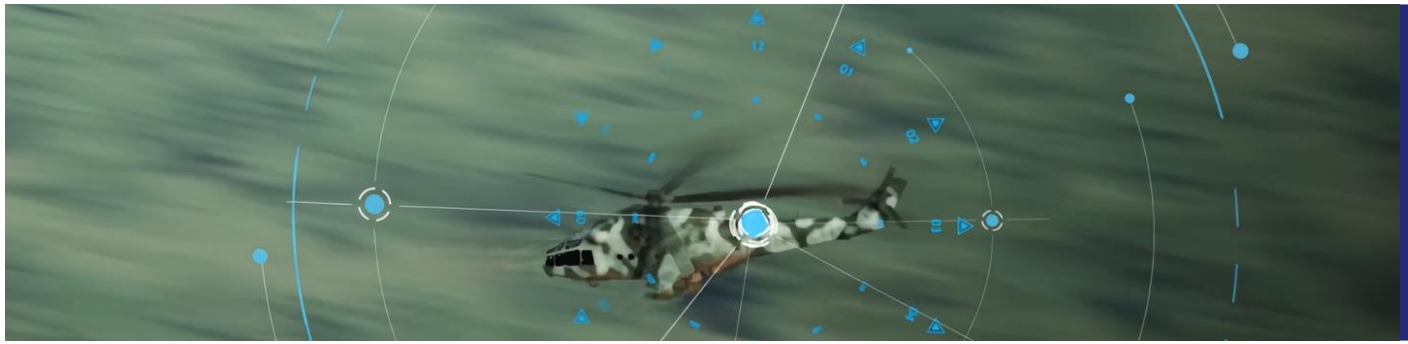
AI Technologies used

- Frugal Learning
- General Feature Learner
- Hybrid AI

Find out more

- Thales and RAF to continue information exploitation partnership

Quick and easy tactical mission planning inside a helicopter cockpit



Made possible by AI

On board a helicopter, the pilot's mission is to cross an enemy zone to capture images of an unknown vehicle. Since the area is mountainous, the challenge is to fly as low as possible to utilize the terrain for concealment while avoiding collisions with the ground.

Today, the complexity of such a mission lies in defining the optimal trajectory, taking into account all tactical constraints and adhering to a defined level of risk. Pilots currently spend hours on the ground preparing multiple scenarios to avoid surprises once in the operational theater.

Thanks to AI and the operational expertise of Thales and its ecosystem, an assistance function has been developed to identify in-flight trajectories and meet mission objectives while considering tactical constraints.

Through the onboard interface, it is possible to designate a vehicle, select the task to be performed, and communicate the mission's priority to the intelligent assistant. For the image capture phase, the assistant offers three criteria: **efficiency, risk-taking, and the ability to surprise the adversary**. The system is capable of evaluating the compliance of the proposed recommendations with operational intentions, which increases confidence in the AI and significantly impacts the pilot's decision-making process.

In the context of collaborative combat development, AI helps synchronize various actors and allocate and schedule different tasks. It has become the new way to interact with onboard systems. Pilots will experience **reduced mental workload**, and their missions will become more efficient with this **onboard decision support.**

Domain	Multi-Domain
Mission Type	Defence mission for helicopter, fighter, military aircraft or UAV
Availability	2028/2030

AI Technologies used

- Optimization algorithms
- Genetic fuzzy trees

Find out more

- Genetic Fuzzy Tree AI toolkit for critical decisions

The decisive contribution of AI for multi-drone and multi-robot systems

x10 manageable fleet size, faster, more resilient

Recent conflicts have seen the widespread use of drones and robots, which help to enhance visibility, act more quickly and efficiently, while also protecting human lives. Their intensive use saturates the enemy without increasing the number or cognitive load on operators. Recognizing these developments, the Ministry of Defense organized the second edition of the CoHoMa (Collaboration Homme-Machine) challenge in May 2023. Thales won this challenge by deploying **19 drones and robots operated by only 3 operators.**

To make it possible, Thales has incorporated numerous AI components in its solution:
Targets can be automatically detected through data processing from onboard sensors. Information fusion allows for a comprehensive reconstruction of the tactical situation.

AI technologies analyze the enemy's intentions, prioritize missions to be carried out, optimize trajectory planning, coordinate missions, and resolve trajectory conflicts.

In the event of necessary force reconfiguration, reliable, robust, and explainable AI intervenes to ensure the mission continues through autonomy rules, which enable "decentralized decision-making" while guaranteeing that drones and robots act only within the rules and missions defined by command.

In summary, AI enhances capabilities, efficiency, and resilience of the armed forces.
As a major player in collaborative combat, Thales provides mission systems for the collaborative engagement of units and continues to develop an innovative approach to **extended collaborative combat**, taking into account drones and robots.

Domain	Air, Land, Maritime
Mission Type	Collaborative Combat
Availability	Scorpion, Combat Digital Platform

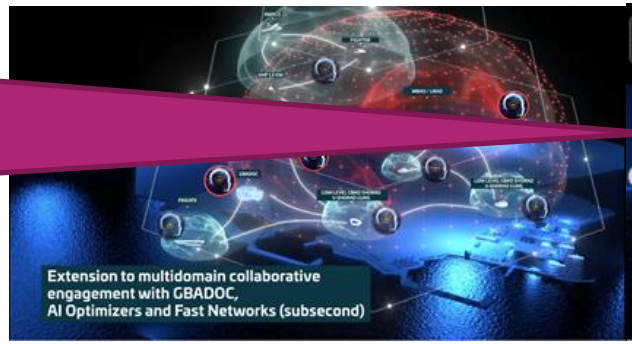
AI Technologies used

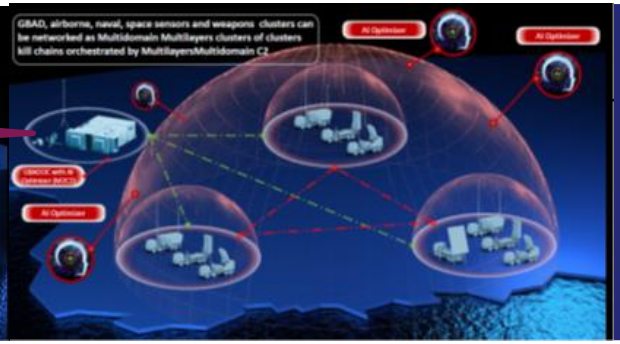
- Optimisation Algorithms
- Multi-agent Distributed Decision
- Hybrid AI

Find out more

- Victory for the force W team, led by Thales
- Thales in the CoHoMa II Challenge

AI Optimizers for IAMD Collaborative engagement below the second





10x faster cueing, in less than 1s

On different crisis arcs, new air and missile threats are creating many disruptive challenges to the integrated air and missile defense (IAMD), based on timely cumulative effects of saturation (drones, missiles), hypervelocity penetration of defense, maneuvers (ballistic, hypersonic) and jamming.

New Generation IAMD Multi-layered Medium and Long Range weapon systems are already designed to counter these air and missile threat. Their "system centric" architectures integrate C2, sensors and weapons. However, they are connected by tactical datalinks with a typical refreshment rate around 10s to cue a weapon system from C2, creating a risk of threat track loss.

To enhance reactivity and resilience, Thales is developing data-centric architectures based on a dynamic networking that adapt in real time to the situation (threats, loads, failure). They use low latency communications and AI optimizers, all integrated into Fire Control Center to enable a 1 second refreshment rate.

The AI optimizers are key bricks with low latency/high throughput communications to operate the systems in an autonomous mode or gradually integrated into the clusters. They perform high accuracy tracking service, data fusion, and tactical situation analysis to assist the operators. AI optimizers orchestrate hundreds of tasks in less than 1s, some of them below 100 ms, allowing cross cueing in time. Alike chameleon, they adapt jointly their tactics and reaction against simultaneous threat, saturating missiles, masking, jamming, highly agile missiles. AI Optimizers can be integrated at different C2 levels, FCC, GBADC2, M2C2 or in the sensors.

The Dynamic networking of sensors and Fire Control Systems with AI Optimizer is under study and development in the EISNET (European Integrated Sensors Network), a project from the European Commission coordinated by Thales. EISNET will perform demonstration scale 1 in 2028.

AI is also experimented by Thales on GBAD collaborative engagement in the Continuum Experience.

Domain	Air, Land, Sea
Mission Type	Collaborative Combat
Availability	SAMP/T NG BattleLab, GF300 Digital Twin on Eisnet

AI Technologies used

- Optimization Algorithms
- Multi agent distributed decision

Find out more

- TBC

GBADC2: Ground Based Air Defense Command and Control – M2C2:Multi layer Multidomain Command Control

Missionfit: AI for mission preparation efficiency and logistic optimization

Quickly identify your deployment improvements: the right stocks, in the right place, at the right time

In an increasingly unstable operational environment, where mission success depends on high fleet mobility in multiple theatre, optimizing logistics deployment becomes a strategic key success factor.
Artificial Intelligence is now plays a decisive and indispensable role in supporting Armed Forces at every stage of deployments. From preparation to execution, AI enables Forces to secure mission success, ensure asset readiness, optimize resource allocation, and conduct simultaneous critical deployments - all while maintaining uninterrupted fleet operations.

In order to meet these multiple challenges, Thales has developed a wide range of AI-driven solutions and propose a comprehensive digital tool embedding several types of AI technologies to mobilize the most adequate resources regarding mission objectives, failure prediction and asset health:

- Machine Learning & Deep Learning – for predictive maintenance and early fault detection, ensuring proactive support and avoiding unplanned downtime.
- Symbolic AI – for intelligent asset ranking and selection based on mission-specific parameters and operational priorities.
- Optimization Algorithms – to right-size spare part inventories, calculate real-time mission success probabilities, and reduce logistical burden.
- Constraint-Based Modeling – for dynamic, rules-driven asset allocation that aligns with evolving mission timelines and strategic priorities.

With this AI-powered solution, Armed Forces have the necessary effective tools to deploy smarter, faster and more efficiently, thus enabling them to:
- **Shrink the logistical footprint and cut associated costs,**
- **Minimize the need for in-field maintenance,**
- **Maximize mission success without compromising fleet availability,**

Reduce preparation workload and strengthen confidence in operational planning

Domain	Defencd / Air
Mission Type	Deployment
Availability	TrustNest Restricted

AI Technologies used

- Machine Learning
- Symbolic AI
- Optimization algorithms

Find out more
- marketing-css@thalesgroup.com

Use Cases in the

General and Civil Sector

Control systems optimized to reduce the carbon footprint of air traffic

Setup time reduced 10 fold, reduced landing time and emissions

The main task of air traffic controllers is to safely manage traffic flows. While the amount of traffic increases, support tools help controllers by providing sequenced flight schedules avoiding any risk of overlap and associated delays. Every minute an aircraft spends waiting incurs both financial and environmental costs, not to mention the negative passenger experience it generates.
Sequencing tools requires tedious configuration. Operators responsible for their deployment have to enter numerous configuration parameters to enable sequence calculation. Thanks to machine learning, Thales is able to provide an air traffic management support solution offering real-time optimal sequencing without offline configuration effort. The system instanciation time is thus reduced **from several months to a couple of days.**

The second significant gain relates to optimizing constraints applicable to the traffic to be sequenced. Until now, the planning method prioritized the flight with the earliest estimated time of arrival at the airport, following the "first come, first served" principle. With Thales' TopSky Sequencer solution, artificial intelligence algorithms combine the various constraints related to air traffic with the goal of **reducing delays, minimizing taxi times and favoring continuous descent operations** thereby reducing fuel consumption and CO2 emissions.

As a global leader in ATM systems, the Group has access to all the business data needed to build AI models and possesses fundamental expertise to leverage this data. This domain expertise is supported by a unique AI research center in Europe, specializing in critical systems, where cutting-edge methodologies are developed to assess AI.

Domain	Civil
Mission Type	Air Traffic Management
Availability	Top Sky- Sequencer

AI Technologies used

- Neural networks
- Deep learning
- Constraint programming solver

Find out more

- TopSky - ATC

The Importance Of Certification

In the field of aeronautics, particularly in the aerospace industry, qualification of AI is essential. Alongside academic and industrial partners, Thales has anticipated the development of qualification methodologies to ***build trusted AI****.*

The goal is to overcome barriers to the use of AI in critical systems, ***where infrastructure safety or human life is at stake****. Thales has developed learning models based on both data-driven knowledge of the domain and operational context, as well as mathematical rules (symbolic AI) to pave the way for AI models that are valid, explainable, robust, and secure against malicious attacks* ***: responsible AI in accordance with the principles of the European AI Act****.*

This combination of expertise in various AI technologies, along with knowledge of the operational environment and its constraints, allows for the provision of the most relevant ***Air Traffic Control system*** *possible for operational needs.*

Improving the passenger experience and boosting airport efficiency

Biometric Matching becomes 400x faster.

Airports are busy places where high levels of security have to be balanced against the need to ensure the smooth flow of travellers, and where the passenger experience is key. Thales is supporting airport operators in their quest to deliver a secure and seamless passenger journey with its Fly2Gate (F2G) solution that incorporates AI at every step of the process to ensure an enhanced user experience.

Fly2Gate uses AI to read biometric data from passports, to verify the ID documents' authenticity, and to authorise access to boarding gates or at border control. This plays an important role in **reducing boarding times by up to 30%** and enhancing the passenger journey at airports.

Whether the system checks the face, iris or fingerprints, the Thales Biometric Engine uses AI to improve capture quality, reduce verification error rates and defend against sophisticated frauds. By upgrading to the latest AI-based algorithms, comparisons with widely used biometrics such as fingerprints have shown **false error rates reduce by some 80% and matching speeds increasing by up to 400 times.**

Machine-learning techniques detect that ID documents are genuine, and that a person presenting their ID document or biometrics is **in fact present and live at any remote or unsupervised checkpoints**. Higher levels of data protection can also be achieved by introducing AI-generated data during the training, testing and validation of security algorithms.

Our approach is based on Thales TrUE biometric principles which aim to ensure our products and services are responsible and ethical, helping to build trust for passengers and airports.

Domain	Civil
Mission Type	ID verification
Availability	F2G platform, eGates, Face pod,enrolment stations, mobile application

AI Technologies used

- Neural networks
- Machine Learning

Find out more

- Fly to Gate : A touchless biometric journey improving passenger experience and airport efficiency

AI for Maintenance and Asset Management Optimization

Preventive maintenance plan of 700+ systems built within a minute

Thales offers Maintenance Optimizer to planners who manage the maintenance of vessels, aircraft, radars, and other complex assets with specific constraints.

This AI-powered innovation helps Thales deliver the AJISS in-service support contract awarded by the Canadian government in 2017 for the maintenance of a new fleet of Royal Canadian Navy vessels. Maintenance planners face immense challenges when planning preventive maintenance for more than 700 systems over 5-year periods and across more than 20 short work periods. Thales developed proprietary AI models with domain experts to transform manual or non-AI tools maintenance scheduling into a seamless and efficient process.

Saving days of spreadsheet analysis and scheduling with constraints and certifications, **Maintenance Optimizer helps planners optimize their 5-year plan in under a minute. The tool weights configured rules and constraints, such as asset availability and resource capacities**, and provides the essential visibility for updating schedules to address potential conflicts. For ship maintenance, Thales helps planners avoid unscheduled downtime with 94% fewer disruptions and reduces the total cost of ownership by at least 12%, thanks to logistics, certifications, and staffing alignment.

Maintenance Optimizer enables the optimization of complex planning with minimal operational experience. Changes to schedules can also be orchestrated with external systems of action, including IBM Maximo, MS Project or Primavera. Maintenance Optimizer will integrate Generative AI to allow planners to interact with schedules through a natural language interface.

Domain	Civil and Defence
Mission Type	In-Service Support
Availability	TrustNest Cloud Platform

AI Technologies used

- Optimization algorithms
- Constraint Modelling
- Symbolic AI
- Generative AI

Find out more

- New intelligent planning tool for shipyards
- Royal Canadian Navy taps Thales for in-service support for up to 35 years

AI Centric Approach to Data Security and Compliance

Larger protected dataset, Better accuracy, Faster

The consequences of exposing data to the wrong parties are severe and lead to a loss of reputation, regulatory fines, financial loss, and disruptions in day-to-day operations. To mitigate data risks, Thales gathers insights on data usage and level of sensitivity to help organizations protect their sensitive data and comply with required regulations.

Thales Data Security Platform (DSP) uses AI to deliver data security and compliance and help organizations accelerate their digital transformation. Good data security starts with understanding where your sensitive data is and how it is classified. Cipher Trust Data Discovery and Classification (DDC), **uses AI to improve data discovery and search precision** while providing complete visibility into the location of sensitive data across your enterprise, empowering you to make better use of your data while mitigating risks and ensuring compliance.

Thales Data Security Platform uses technologies that constitute AI, notably Machine Learning (ML) to enhance service delivery. For instance, **understanding user data access patterns and identifying deviations from them is another challenge that benefits from ML** by proactively providing advanced security alerts and actions when user activity does not correlate with data access patterns. Become more secure and more compliant safeguarding your sensitive data using Thales AI.

Domain	Civil and Defence
Mission Type	Cybersecurity
Availability	CipherTrust Data Security Platform, Data Security Fabric

AI Technologies used

- Data Risk Analytics
- Data Discovery and Classification
- Security for Generative AI

Find out more

- Cloud Protection & Licensing Solutions

AI comes with its own cyber vulnerabilities

While the most advanced AI technologies in machine learning allow for achieving performance levels that are beyond the reach of classical algorithms, they also come with vulnerabilities specific to them. This has led Thales to enhance its expertise and resources in cybersecurity, specifically addressing the needs of AI, in order to mitigate these vulnerabilities.
Here are a few illustrative examples of attacks studied by the dedicated Thales teams responsible for research on AI cybersecurity:

Example 1

- Deep learning algorithms are based on the exploitation of training data, and it is evident that the quality of this data (representativeness and correct labeling, among others) affects the algorithm's performance. To degrade the performance of such an algorithm, it is possible to "poison" the training data.

Example 2

- Another possibility is to develop AI systems capable of generating input data through learning that can deceive the best image recognition AI algorithms. For example, the AI Friendly Hacking team has designed an AI algorithm that slightly modifies the characteristics of certain pixels in an image (their RGB components) in a way that causes the best image recognition algorithms in the world to produce incorrect responses.

Example 3

- Another type of attack involves extracting a part of the training data from the learned model. This raises concerns about the protection of training data, particularly issues of privacy (such as GDPR: General Data Protection Regulation) for models based on human faces.

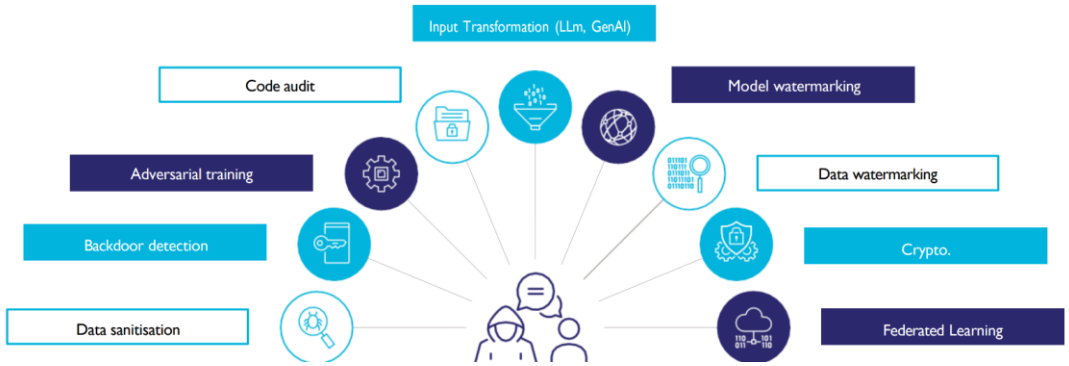
Thales offers solutions especially designed to protect AI-powered systems

Being forefront user of AI for critical use cases, and a world-leader in cybersecurity, Thales systematically addresses AI security throughout its lifecycle. The AI Lifecycle typically encompasses 3 phases: sourcing, training, and deployment. Each phase with different exposure points and cybersecurity challenges. Thales is constantly assessing existing and emerging threats to AI supply chain in order to provide solutions to protect sensitive data, models, platforms and users throughout the AI lifecycle.

In this field, Thales is developing a **MLSecOps approach** specifically focused on the security of systems and application where AI is central. It spans from data collection and sanitization to model training, deployment and updates. Thales AI security guidelines and frameworks encompass: Data Protection (data biases-free, deep fake detection, secure storage, and compliance with privacy regulations), Model Security (adversarial attack-proof, watermarking for intellectual property protection), Continuous Monitoring (for performance & security).Here are some examples of Thales solutions already in use to protect AI in different use cases:

- Major cloud providers use Thales external key management solution to enforce sovereign controls over sensitive data used by critical AI workloads. The collaboration between Thales and major cloud providers has led to the development of services that help organizations maintain control over their encryption keys and manage access to sensitive data securely when using generative AI models in the cloud.
- **Thales Sentinel License Development Kit (LDK)** helps organizations to efficiently manage AI model licensing and entitlements. It provides protection against reverse engineering with file encryption, code obfuscation, and anti-debugging. Sentinel LDK addresses key AI OWASP attacks including model stealing, input manipulation, and output integrity attacks by protecting application code against manipulation.
- **Security evaluation of AI models** - Thales provides dedicated libraries designed to implement AI-specific penetration tests leveraging the extensive experience of its cybersecurity experts and its awarded friendly hackers team. Thales has designed and use AI-based attack simulation platforms to accelerate and broaden the scope of its testing and ultimately improve effectiveness of security monitoring and countermeasures. Thales also focuses on Generative AI stress test and countermeasures to ensure ethical & safe use of its customer LLM-based application
- **Intellectual Property protection** - Thales currently addresses two major challenge in this field: Collaborative learning and Model Watermarking. Thales SaferLearn distributed framework makes it possible to train a collaborative model from private learning datasets. The sharing of sensitive information is not required anymore and the subsequent retrieval of private training data is cryptographically prevented by design. In the latter case, Thales BattleBox-IP protects models against undesired replication by injecting watermarks during model design and training. It then becomes possible to identify derived and stolen models trained from the original model using unexpected answers to a specific data trigger set.

Awarded Friendly Hacking Unit



Market leading Battle Box security countermeasures

If AI can surpass humans in many tasks, it can also be attacked in all phases of its lifecycle. Cyberattackers can deceive models by querying them with manipulated requests, extract sensitive information from training data, or even steal models or data used in their construction.

Thales has established a Friendly Hacking unit, whose skills have been recognized in recent world-renowned hacking challenges. Composed of AI and cybersecurity researchers, this unit aims toenhance the robustness of Thales products by testing their vulnerabilities. It has developed a range of effective attacks and countermeasures, called the **BattleBox,** which has already secured several AIs. The BattleBox has been used to protect vision algorithms against adversarial attacks, safeguard the intellectual property of model creators in the Confiance.ai project, and enable learning on sensitive data in defence programs.

With its expertise, Thales' Friendly Hacking unit **won the CAID* 2023 challenge** hosted by the French Defense Procurement Agency (DGA). The objective was to identify, among a set of images, those used for training an AI algorithm and extract sensitive information from the training data using a technique known as unlearning on a protected AI algorithm. This sophisticated attack surpasses the current state of the art and was presented during the CAID 2023 conference.

Domain	All
Mission Type	All
Availability	All Thales products using AI

AI Technologies used

- ML adversarial attacks
- ML watermarking
- Computer vision
- Thales AI Battle Box
- Generative AI
- Privacy-preserving ML

Find out more

- French mod challenge : Thales performs asuccessful AI hack

We Hacked CHATGPT!

Hacking large language models like ChatGPT aims to bypass the ethical safeguards of these models. By applying advanced code injection techniques, ***Thales Friendly Hacking unit*** *has successfully obtained instructions for making a bomb, despite this question being blocked by ChatGPT.*

The same achievement has been accomplished with other chatbots, such as Google's Gemini. It is also possible to extract private data using the same type of attack.

Thales' Friendly Hacking unit *subsequently developed a shield so that ChatGPT or any other language model can block malicious requests of this kind. Today, the AI used in Thales' core business activities, such as motion, shape, and facial recognition, as well as signal processing, benefit from the group's research in AI cybersecurity through the Friendly Hacking unit.*

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