THALES

PRESS KIT

November 2019
INNOVDAYS

↗ Building a trusted future through science and innovation

At Thales, we pride ourselves on being one of the few companies in the world with the capability to push back the boundaries of the possible. Innovation has always been part of who we are and remains crucial to our success today and into the future. A large proportion of the Thales workforce is dedicated to innovation, with more than 28,000 employees directly involved in science, technology and engineering. Every year, we invest close to 3.5 billion euros in research and development, financing more than 1 billion euros ourselves.

Beyond the figures, what drives us forward is a passion for open innovation with world-class partners from the academic research community, including CNRS and Université Paris-Saclay, but also with prestigious international partners such as the universities of Bristol, Southampton and Laval, and the IVADO (Institute of Data Valorization) in Montreal.

Sharing advanced research expertise in areas such as physical sciences, algorithms, modelling and software unleashes the potential and the performance of our products — and that is how we are able to shape the world of tomorrow today.

With our new Digital Identity & Security business in particular, Thales has a central role to play in addressing the major issues facing modern societies today, including the key question of digital trust.

Patrice Caine

Chairman & Chief Executive Officer, Thales

About Thales

Thales (Euronext Paris: HO) is a global technology leader shaping the world of tomorrow today. The Group provides solutions, services and products to customers in the aeronautics, space, transport, digital identity and security, and defence markets. With 80,000 employees in 68 countries, Thales generated sales of €19 billion in 2018 (on a pro forma basis including Gemalto).

Thales is investing in particular in digital innovations — connectivity, Big Data, artificial intelligence and cybersecurity —, technologies that support businesses, organisations and governments in their decisive moments.

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↗ Introduction by Marko Erman

Thales develops advanced technologies for critical systems that help its customers to make the right decisions, at the right time. From data capture, transmission and processing to context-sensitive decision support, Thales' holistic approach to critical systems provides users with a comprehensive view of the operational situation under all circumstances.

The success of the Thales approach hinges on technological excellence in sensors (radars, sonars, cameras), secure communications, Big Data analytics, and control and supervision systems. Day after day, our engineers are developing solutions that will perform even in the toughest environments, whilst offering unparalleled levels of dependability and cyberprotection.

To achieve this technological excellence, we need to innovate on a permanent basis in fields as diverse as materials science, components, software, algorithms and complex system architectures. All of this requires substantial resources. A total of 3,000 people at Thales are currently working on advanced research projects and in addition to supporting these in-house teams of experts, the Group is pursuing a long-established policy of open innovation with some of world's best academic minds and leading research institutes.

Innovating means more than just being state-of-the-art. It means opening up fresh opportunities by exploring new breakthrough ideas and in this respect, the priorities for Thales are digital technologies and deep tech solutions.

*In digital technologies, we are focusing our efforts in particular on Artificial Intelligence, where we have established a framework called **TrUE AI** to guide the development of a trusted AI that is **Transparent**, **Understandable** and **Ethical** and thereby meets the demanding requirements of critical systems.*

At the same time, we are actively involved in deep tech, with a particular focus on quantum technologies, which will lead to a revolution in sensors and communication systems, which will later also transform the world of computing.

At InnovDays, Thales is presenting some of its most outstanding technological achievements, the culmination not only of our 29 500 engineers' research efforts but of our collaboration with a vibrant ecosystem of partners in the academic research community.

All these innovations share the same objective — to achieve the technological excellence our systems require to help our clients to accomplish their complex missions.

Marko Erman

Chief Technology Officer, Thales

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Key innovation figures at Thales

- 3,5 billion euros invested in R&D
- 29,500 staff involved in Thales technical operations, from research to engineering, 3000 of them are dedicated to research
- 200 PhD every year
- 20 joints laboratories with partner research institutes around the world
- 30 partnership agreements with public partner research institutes in Asia, in the United States and in Europe
- A portfolio of over 20 000 patents, with some 330 new patents applications in 2015

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Programme for Wednesday 27 November 2019

Thales InnovDays events, an immersion in the world of tomorrow

First session of press journeys:

- **Tomorrow's connectivity in the world of defence**
  - **Connected soldier**
  - **ARMIN**
  - **Highway to space**

- **The augmented soldier**
  - **CONTEXT audio analyser**
  - **Real-time measurement of stress and fatigue**
  - **VIRTUALMAP**

- **Transportation of the future**
  - **Natively digital avionics for future aircraft**
  - **Virtual cockpit**
  - **Autonomous train: a new vision sense for trains using AI**

- **Biometrics**
  - **Facial recognition in transportation**
  - **Biometric payment card**
  - **Biometric experience**

Second session of press journeys:

- **Tomorrow's Air defence**
  - **Combat simulation**
  - **NEMO**
  - **Innovative radar design driven by AI**
  - **AR4CybAIR**

- **Tomorrow's connectivity in the civil world**
  - **Smart catenaries**
  - **IoT: Instant connect**
  - **Space Inspire**

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- **Citizens or companies: protecting data and identity**
    - **CHIMERE**
    - **Data discovery and classification**
    - **Trusted digital identities**

- **Big data**
    - **DeeperVision**
    - **Earth Streamer**
    - **Smart engine for prescriptive maintenance**

Third session of press journeys:

- **Tomorrow's Land and naval defence**
    - **ARIANE – Winner of the 2019 Janus prize**
    - **Collaborative combat 2.0**

- **Tomorrow's city**
    - **Security Digital Platform**
    - **Facial recognition in transportation**
    - **The urban rail of tomorrow**

- **The Cloud**
    - **Smart Orchestrator**
    - **Natively digital avionics for future aircraft**
    - **The next generation of rail signalling**

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↗ Tomorrow's connectivity in the world of defence

The connected soldier

Presenting data efficiently on the battlefield in an ultra-connected environment

In a connected environment, the augmented soldier can suffer from information overload. Combining imagery and sound in an augmented reality headset with built-in intelligence, this perception platform shows how all this data can be sorted and presented in readily usable form. It can effectively reduce the cognitive load on soldiers and distribute data transparently within the command chain.

Transmitting mission-critical information when connectivity is limited

When connectivity is constrained, the augmented soldier can transparently transmit the strict minimum of information from sensors with embedded AI to other deployed units and the command chain.

## ARMIN

Secure communications through a new 5G radio

With its ultra-high speed and almost instantaneous transmissions, 5G promises a new digital revolution by leveraging the performance of civil and military communication networks. The new ARMIN 5G hybrid radio combines the performance of military radios and resilient networks with the latest technologies available on the market and used in smartphones. Based on dual technologies, ARMIN handles both civil and military waveforms in a single device, providing enhanced connectivity, enabling users to communicate at all times and taking the armed forces a step closer to connected collaborative combat.

Highway to space

New optical links for secure, high-throughput satellite communications

With the imminent arrival of 5G, secure data networks will span the globe thanks to optical satellite communications. These networks will bring high-speed Internet access everywhere on the planet as well as the ability to monitor Earth from space in real time to understand climate change and much more. Come and learn about the business opportunities developed by an in-house start up at Thales Alenia Space as well as technical developments and solutions, from end-to-end system design to key technologies and equipment.

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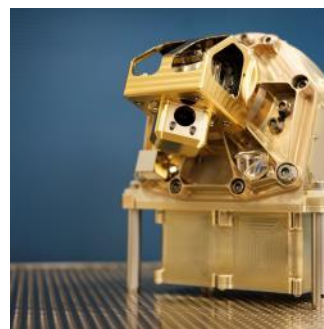
↗ The augmented soldier

CONTEXT audio analyser

Augmented hearing: a new pair of ears

The battlefield is noisy, unpredictable and vast. Soldiers often operate in environments where it can be hard to distinguish between ambient noise and mission-critical information transmitted by voice. This new technology uses AI to help soldiers hear this information more clearly and in more detail by cancelling out background noise.

Real-time measurement of stress and fatigue

Monitoring the soldier's state of mind to help ensure mission success

Soldiers can suffer from cognitive fatigue, which can have disastrous consequences on a mission, from poor decisions to increased levels of risk. This innovative physiological measurement technology makes it possible to assess their mental fatigue and stress level in the field.

VIRTUALMAP

Full-immersion mission planning and preparation

VirtualMap is an all-digital environment for remote mission planning and preparation. It includes highly innovative functionalities such as a fully reconstructed first-person view of the terrain to support remote command and control.

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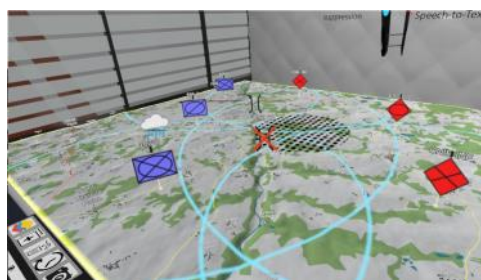
↗ Transportation of the future

Natively digital avionics for future aircraft

*AI at the service of pilots on the ground and in the air*

Avionics systems equip aircraft that remain in service for more than for 30 years. How to ensure they constantly benefit from the latest digital innovations? What does "cloud" mean for a pilot? Will artificial intelligence be on board one day? To answer these questions, Thales proposes a new relationship between avionics and open-world systems to support the timely introduction of new functions thanks to permanent connection to ground systems.

Virtual cockpit

Inventing tomorrow's avionics

This virtual reality cockpit offers a way to design interactions (displays, controls) in the cockpits of future civil and military aircraft or helicopters without being constrained by screen shape of the field-of-view restrictions of a helmet viewfinder. For example, free-form screens can fit the shape of the cockpit to optimise the display area. New human-machine collaboration functions will also be presented.
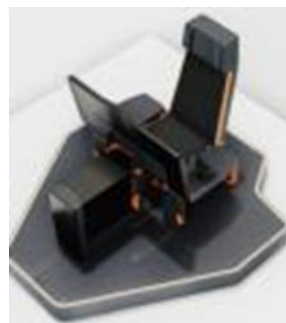
Autonomous train: a new vision sense for trains using AI

Help energy optimization and improve train punctuality

RailBot-Eye is a new solution that provides trains with a new visual sense using Artificial Intelligence to navigate autonomously in an open-world environment. The first application for the new solution is autonomous navigation from train depot to station platform. Later, RailBot-Eye could be used in normal traffic, as the train will be able to distinguish between all types of obstacles and determine the level of risk in order to take the right decision. Thanks to Thales solutions, autonomous trains will help to drastically improve train punctuality and increase capacity by enabling the network to carry more trains. Autonomous trains will be an opportunity to keep very low-density lines open and use the existing network at maximum capacity when needed. The solution will also improve the environmental performance of the rail sector by optimising movements to improve energy consumption during operation.
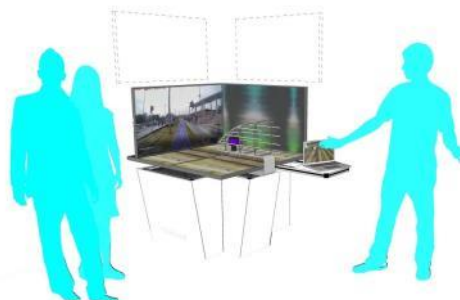
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⬀ **Biometrics**

Facial recognition in transportation

*Improved Passenger Travel Experience — Your face is your travel pass!-*

How to save time buying a train, metro or tram ticket? The new Thales facial recognition solution, which overcomes the need for a physical ticket, is already here! Facial recognition, compliant with GDPR regulations, will eliminate all issues related to physical fare media, such as swapping, loss and theft. This reliable new solution not only offers a fluid and secure traveller experience, but also brings other advantages such as easy deployment for IT or security managers, lower maintenance costs and more revenue generated thanks to faster transactions. Facial recognition provides real-time passenger ID authentication and secure transport access management while removing the need to control physical tickets. With this new solution, your face is your fast-pass!

Biometric payment card

Secure payments at your fingertips!

Biometrics offers an ideal balance between an optimal user experience and a secure solution. With these new biometric EMV (Europay, MasterCard, Visa) cards, you'll be able to make contactless payments without entering a PIN and with no transaction limit. Simply hold the card normally and the built-in fingerprint sensor will automatically authenticate you and approve the transaction. This solution combines ease of use with maximum security.
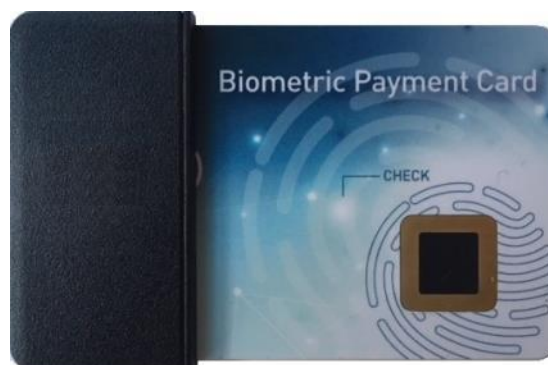
Biometric experience

Biometrics in all its forms

Each person has a unique way of walking, and the way we type on a keyboard is also easily recognisable. In this experimentation area we are testing multiple biometric technologies to better understand the role of machine learning in this field.

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↗ Tomorrow's Air defence

Combat simulation

AI-enhanced Computer Generated Forces for collective training

As platforms and missions become more complex, it is increasingly critical to train in a collective environment. The ground-breaking AI technology developed by Psibernetix brings a new level of realism to Computer Generated Forces and new opportunities to expand the capabilities of synthetic training solutions

NEMO

New radar concept for 3D surveillance

NEMO is a new tactical radar concept that creates a 3D surveillance zone and can simultaneously detect multiple threat types with a 360° field of view. Its performance is further enhanced by a receive antenna carried by a tethered balloon and a radar transmitter that uses the latest spatial signature processing techniques.

Innovative radar design driven by AI

Towards proactive radar

Combining artificial intelligence with digital twins, the engineering tools developed for this solution will allow radars to adapt to situations that were not foreseen during their design. While current systems require manual configuration, this new design could allow radars to be dynamically reconfigured and herald the emergence of "proactive radars" in the future.

Sensor Engineering based on AI: towards Proactive Radar

AR4CybAIR

Augmented cyberdefence for air operations

Operators have to analyse large volumes of data in real time. How can they be sure that the information has not been corrupted?

The AR4CybAIR® solution provides real-time analysis of the information displayed on the Human Machine Interface (HMI) of an air traffic control system. If an anomaly is detected, controllers are alerted on their augmented reality glasses.

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↗ Tomorrow's connectivity in the civil world

Smart catenaries

IoT for rail safety

The advent of 5G connectivity and the roll-out of the Internet of Things will facilitate real-time supervision and predictive maintenance of overhead lines. Radio networks offer flexible, inexpensive connectivity solutions for IoT communications while providing the cybersecurity protection needed for sensor authentication and to ensure data integrity. This demonstration shows how the data collection chain can be securely and reliably operated thanks to the combination of appropriate communication protocols, end-to-end ciphering, secure certificates and key management.

IoT: Instant connect

The challenge of low-latency connectivity

The Internet of Things (IoT) and 5G will connect billions of devices, creating value and/or enabling new services. The Instant Connect technology presented here will provide all unconnected eSIM-ready devices with out-of-the-box mobile connectivity, making life easier for users, device manufacturers, mobile operators and service providers.

Space Inspire

The all-digital system: a game-changer

Space Inspire offers complete in-orbit flexibility so that operators can seize new mission opportunities as they emerge.

Space Inspire creates a dynamic environment between the satellite and its ground segment that can be adapted to user demand in real time, optimising the use of satellite resources and enabling very high-performance services for users.

Space Inspire takes automated, intuitive operation to new heights in a fully cybersecure environment.

All this is made possible by a host of innovations in active antennas, mobile antennas and optical links to provide an all-digital satellite that can be reconfigured in orbit in real time from the ground.

Space Inspire is much more than a satellite — it's a revolution!

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↗ Citizens or companies: protecting data and identity

CHIMERE

Ethical use of dark web technologies for better security

The dark web is home to all manner of activities that are illegal and in some cases dangerous for our societies. Thales Chimère adopts the techniques used by hackers and uses them to improve information system security, adopting their weapons to protect ourselves against cyberattacks.

Data discovery and classification

Let us store and protect your assets!

In a world where data breaches constitute a constant threat for businesses, organisations and the general public, efficient data protection measures are becoming increasingly crucial. In addition, the laws and regulations governing privacy and compliance have become significantly more restrictive over recent few years. The Thales data discovery and classification solution provides customers with multiple layers of defence, with full visibility, control and extensive task automation. This stack of solutions provides centralised security controls, policies and compliance assurance in heterogeneous and dynamic hybrid cloud environments.

Trusted digital identities

Simple, trusted digital identity

In a connected world, trusted remote identification has become crucial to prevent ID theft and enable individuals to prove they are who they claim to be, in a safe yet easy way. Organisations, governments and individuals must be able to trust their digital interactions in critical and decisive moments. Thales is powering the next generation of digital identities that to address a new set of requirements for trusted identification to enable secure connections, interactions and transactions. Solutions showcased include Thales Mobile ID Smart App and the newly launched Thales Digital ID Wallet.

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↗ Big Data

DeeperVision

*Automated interpretation of satellite images*

New-generation optical satellites provide high-resolution images representing the equivalent of more than 100,000 screens per day. Developed by Thales Alenia Space, the DeeperVision solution uses AI to perform automatic feature detection, allowing operators to focus on tasks where human expertise is critical. Installed on satellites, DeeperVision will speed access to useful information thanks to improved information extraction and transmission.

Earth Streamer

Permanent Earth observation for global intelligence

Earth Streamer is a new concept devised by an in-house start-up in partnership with Delfox to allow instant access to 20% of the Earth's surface. Its permanent remote sensing capability coupled with AI-based processing algorithms paves the way for a new generation of advanced intelligence products with applications in trading, the oil and gas industry, civil and military security, etc.
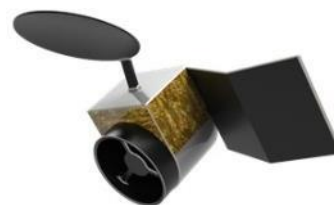
Smart engine for prescriptive maintenance

When AI has the answer !

When it comes to finding solutions to complex problems, artificial intelligence offers huge potential. Telecoms operators can now use AI assistance to better understand and resolve technical problems reported by their customers. A reasoning engine combines maintenance documentation, fault histories and support forum messages to propose optimised maintenance using a Deep Learning architecture. Through a chatbot, the engine refines its understanding of the customer's problem and suggests appropriate solutions to operators.

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↗ Tomorrow's Land and naval defence

ARIANE –Winner of the 2019 Janus prize

Digitalisation of mine countermeasures

The volume of sonar imagery data available for mine countermeasures operations remains relatively low, considering the complexity and the variability of the sea floor and the underwater threat landscape. For this reason, there is currently no automatic target recognition system that is powerful enough to be used operationally in multiple theatres of operations. But Deep Learning techniques and continuous learning capabilities can be used to capture and present the operational expertise of sonar analysts in order to make the system more responsive, reliable and efficient.

Collaborative combat 2.0

CONTACT on tomorrow's front lines

The CONTACT programme will enable tactical radios to interconnect intelligently with sensors and effectors in the battlespace. Combined with latest-generation vetronics solutions and Thales embedded sensor technologies, the programme ties together two of the key elements of collaborative combat.

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↗ Tomorrow's city

Security Digital Platform

Complete, smart new digital security solution

Thales' new digital security solution anticipates the emerging requirements of operators and integrates all security systems and services, with unrivalled data processing performance. Covering the full spectrum of requirements, it is based on an integration platform that processes and analyses the data generated by thousands of sensors and open sources. The new platform enables security operators to better anticipate, detect and resolve incidents and supports them at every stage of the process.

Facial recognition in transportation

Your face is your travel pass! - Improved passenger travel experience

How to save time buying a train, metro or tram ticket? The new Thales facial recognition solution, which overcomes the need for a physical ticket, is already here! Facial recognition, compliant with GDPR regulations, will eliminate all issues related to physical fare media, such as swapping, loss and theft. This reliable new solution not only offers a fluid and secure traveller experience, but also brings other advantages such as easy deployment for IT or security managers, lower maintenance costs and more revenue generated thanks to faster transactions. Facial recognition provides real-time passenger ID authentication and secure transport access management while removing the need to control physical tickets. With this new solution, your face is your fast-pass!

The urban rail of tomorrow

Safe, proven and efficient Artificial Intelligence for autonomous metros

When metro operators are asked about Autonomous Metro, their first questions are: is it safe, proven and how will it benefit my operations? Thales is preparing today the Urban Rail of tomorrow and is currently acquiring enough real data in order to build and offer a safe solution. Qualify new sensors, showcase that with less equipment on the wayside and easier installation on the trains Autonomous Metro will operate efficiently and drastically reduce recovery times in the event of an incident, these are the challenges for Thales.

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↗ **The Cloud**

Smart Orchestrator

How can we utilise cloud capabilities on the battlefield?

The Smart Orchestrator solution brings the benefits of the cloud to the battlefield, making it possible to design, integrate, migrate and instantly deploy tools and services completely autonomously and in the toughest conditions.

Natively digital avionics for future aircrafts

AI at the service of pilots on the ground and in the air

Avionics systems equip aircraft that remain in service for more than for 30 years. How to ensure they constantly benefit from the latest digital innovations? What does "cloud" mean for a pilot? Will artificial intelligence be on board one day? To answer these questions, Thales proposes a new relationship between avionics and open-world systems to support the timely introduction of new functions thanks to permanent connection to ground systems.

The next generation of rail signalling

Dynamic management of train routes and incident resolution

The digitisation of signalling systems will bring totally new possibilities to the rail sector: dynamic management of train routes, cloud-based applications that respect the separation between vital and non-vital actions, etc. For incident resolution, artificial intelligence will make it possible to automatically manage larger geographical perimeters and thus propose optimised solutions to control centre operators.

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