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Digital Ethics **Charter**

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Thales's 10 commitments for digital responsibility

Digital technologies are radically transforming the structure of our society and the daily lives of billions of people worldwide. Yet the digital transformation is far from complete. These technologies still hold enormous promise, harbouring the potential to transform our economy for the better, to help us protect our planet, and to drive technological and social progress. But the digital age is also prompting growing concern around subjects such as artificial intelligence, data protection and the environmental cost of the infrastructure supporting these technologies.

Empowered by cutting-edge research and development in many of the areas where these changes are playing out, Thales is helping to shape the technology landscape of tomorrow. Most of the Group's products are not designed for consumers – but they impact the lives of millions of citizens across the globe.

As a provider of sovereignty solutions, Thales has long been attuned to issues around security, resilience and resource frugality. Today the Group considers it important to establish a set of guidelines on digital trust and responsibility as a way to better articulate its innovation priorities with its commitments on sustainability and ethics. This Charter applies to each and every Thales employee – the people who are shaping the technologies of the future. By adhering to these principles, they will play their part in realising the Group's ambition to make the world safer, more inclusive and more environmentally responsible. Thales's priorities are clear: its products must interact with human beings at all times; they must be resilient and secure; and they must help protect the planet.

This Charter does not replace or supersede the national and international laws and standards in effect in the Group's countries of operation, which Thales strives to apply in the strictest possible way.

The contents of this document are liable to evolve over time to reflect advances in technology, the changing expectations of customers, employees, partners and citizens, new societal demands and environmental objectives, and the national and European standards of digital ethics that are currently being established.

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HELPING TO MAKE THE WORLD SAFER BY INCREASING THE SECURITY OF OUR DIGITAL SOLUTIONS

1. KEEPING HUMANS IN CONTROL OF ARTIFICIAL INTELLIGENCE

As artificial intelligence becomes more sophisticated, algorithm-powered systems are increasingly able to operate autonomously in applications as diverse as transport, security, healthcare and more. This development is giving rise to serious concerns over the degree of autonomy granted to machines – and where the ultimate responsibility lies.

Working with the customer to establish use cases from the earliest design phase, **Thales undertakes** to start from the premise that human beings must decide when and where these technologies are used, and that they must conserve the capacity to assume control, either before or during any action by a machine. Thales uses artificial intelligence to enhance people's ability to make decisions, not to replace human beings.

Thales uses artificial intelligence in its automated passport control gates. These systems are designed to share all electronically scanned data with the border guard on duty, enabling human oversight at all times. At any point in the process, the border official is able to take over from the machine, talk to the traveller, proceed with a manual passport inspection and make a final decision.

2. DESIGNING EXPLAINABLE ARTIFICIAL INTELLIGENCE SYSTEMS

Some artificial intelligence systems operate with little or no clarity as to the process by which inputs are converted into outputs. This "black box" phenomenon can erode users' trust in these technologies.

Thales undertakes to provide customers with the information they need to understand the basis of decisions made or proposed by its artificial intelligence systems. This includes explaining the rules by which the algorithms operate and providing details of the design of the technologies themselves, to the extent possible under the rules governing data confidentiality and protection of sensitive information.

The Refit Optimizer, a predictive maintenance system developed by Thales in Canada, uses model-based artificial intelligence to schedule naval in-service support. Unlike other, similar technologies, it does not merely generate a list of maintenance tasks. Instead, it presents a set of key parameters (such as cost and vessel downtime), then proposes different maintenance options based on these parameters. As a result, human users understand the rationale behind the system's recommendations and can select the most appropriate course of action themselves.

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3.

ADOPTING A PRIVACY-BY-DESIGN APPROACH

In today's hyper-connected world, it is becoming increasingly difficult to keep track of even our most private details and confidential business data. This situation is giving rise to new threats – from systemic risks caused by rapid replication of malfunctions and cyber-attacks, to concerns around sharing sensitive information and more.

Thales undertakes to apply the principles of privacy- and cybersecurity-by-design in the development of its systems and solutions. This means that the Group's development teams constantly strive to optimise the types and amounts of data needed to achieve the desired outcome.

As a global leader in the design of SIM cards, Thales is harnessing the encryption capabilities of 5G chips as an initial layer of protection for users' personal data. And for end-to-send security, the Group combines this technology with tamper-proof systems for telecommunication infrastructure, reflecting its privacy-by-design approach.

4.

STRIVING TO MAKE THALES'S SOLUTIONS AS SECURE AND RESILIENT AS POSSIBLE

Cybercrime remains an ever-growing threat, with perpetrators employing increasingly sophisticated methods to attack infrastructure and organisations or every type. The only way to guard against these threats is to plan ahead and implement appropriate protections.

Thales undertakes to use its expertise, coupled with its cutting-edge research and development capabilities, to develop solutions that make society more digitally secure – now and in the future.

In the not-too-distant future, quantum computers may well be capable of breaking the encryption keys that currently keep a large portion of global data flows secure. In order to stay ahead of the curve, Thales's research and development teams are already working on "post-quantum" encryption algorithms that will stand firm against these attacks if and when they happen. The Group is also working with the US National Institute of Standards and Technology (NIST) and equivalent organisations to establish new standards for post-quantum cryptography.

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USING DIGITAL TECHNOLOGIES TO HELP BUILD A MORE ENVIRONMENTALLY RESPONSIBLE WORLD

5.

HARNESSING THE POWER OF DIGITAL TECHNOLOGY TO TACKLE CLIMATE CHANGE

As the world faces an uncertain climate future, there is a pressing need for concerted action to limit the scale of the damage and mitigate its impact. Technology providers are often seen as part of the problem, with critics citing the technology sector's high energy use and environmental footprint. But they can also be part of the solution, providing answers to many of the environmental protection challenges we face.

Thales undertakes to tap into the potential of new technologies in order to help shape a more sustainable future. The Group channels a portion of its research and development spend into innovations that help reduce natural resource and energy use and cut greenhouse gas emissions.

Thales's latest intelligent flight and air traffic management systems make it possible to optimise flight paths in real time. These technologies are expected to reduce aircraft fuel consumption – and associated CO2 emissions – by around 10%, without the need to renew aircraft fleets.

6.

ADOPTING A FRUGAL APPROACH TO DATA

By 2025, global data creation is projected to grow to more than 180 zettabyes (or 180 billion terabytes). Such a huge volume of data poses a whole range of problems, starting with the energy needed to store and process it.

When developing its digital systems, **Thales strives** to be reasoned and proportionate in the production and use of data. The Group prioritises smart data over big data and data quality over data quantity.

Thales develops edge computing approaches that ensure that processing operations take place as close as possible to the data source (e.g. sensors such as radars, cameras and satellite instruments), thus limiting the amount of data that is sent.

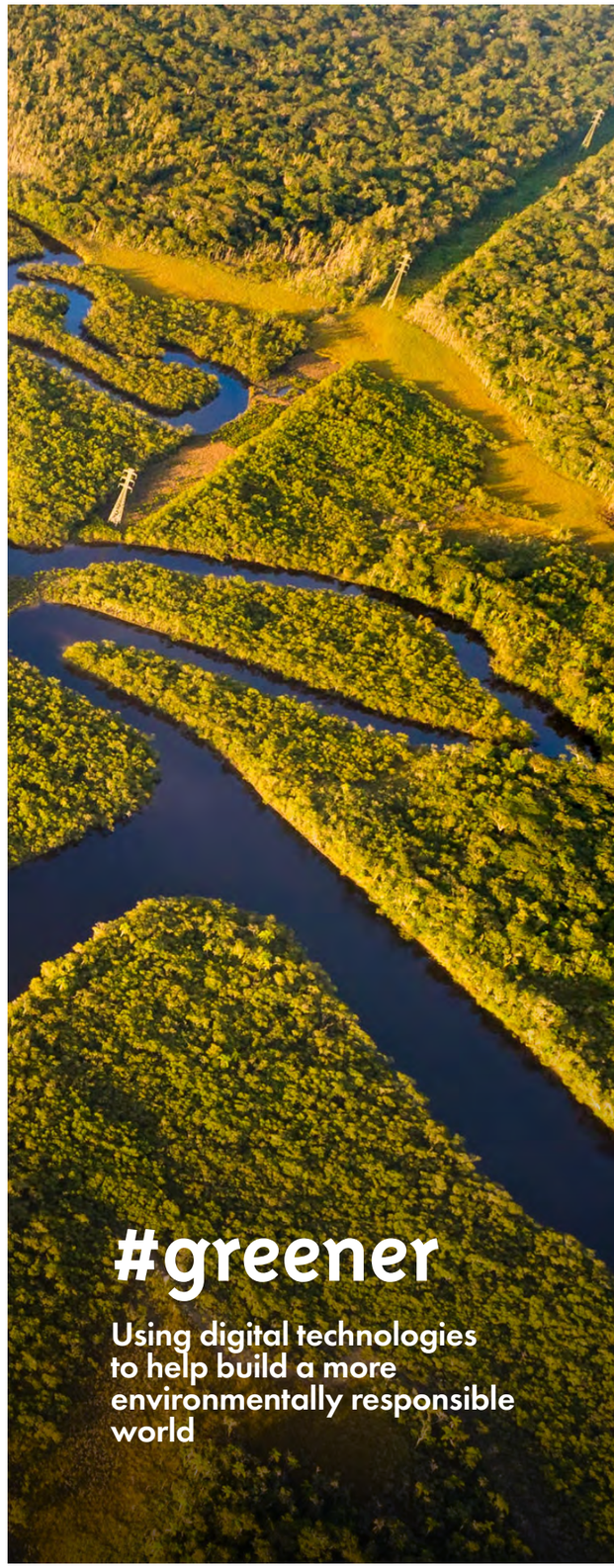
7.

MAKING ECO-DESIGN THE NORM

The Earth's natural resources are being depleted, and extracting these resources is an energy-intensive activity. The pressing need to reduce greenhouse gas emissions is compelling industry players like Thales to shrink the environmental footprint of their products, all along their life cycle.

Thales pledges to adopt eco-design principles for 100% of its new products by 2023. In practice this means that, when developing a new product, the Group will aim to keep raw material use to a minimum, to maximise the product's lifespan, to reduce associated energy use and greenhouse gas emissions, to favour compact, lightweight structures, and to make its systems and technologies as easy to recycle as possible.

Thales has cut the number of servers needed to power its latest-generation air traffic management systems by switching to virtual servers and shared hosting. As a result, these systems require fewer raw materials to build and less energy to operate – both of which help to reduce their overall carbon footprint.



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PLACING HUMANS AT THE CENTRE OF DIGITAL TECHNOLOGIES AND HELPING TO BUILD A MORE INCLUSIVE, MORE EQUITABLE WORLD

8.

TACKLING DISCRIMINATORY BIAS IN DIGITAL TECHNOLOGIES

Artificial intelligence is not always neutral, and algorithm design and training data can both introduce involuntary bias into these systems. Certain image recognition and automated profiling technologies, for example, have been seen to discriminate against women, ethnic minorities and other population groups.

From the earliest design phase, **Thales undertakes** to put in place the best available tools and practices to detect and avoid bias in its artificial intelligence systems. In particular, the Group strives to ensure that its datasets are balanced and fair, and is working to achieve greater diversity within its development teams.

The algorithms used in Thales's biometric technologies are designed to be as accurate and neutral as possible. As an added layer of assurance, the Group submits all of its algorithms to the US National Institute of Standards and Technology (NIST) – an independent standard-setting body – for testing and assessment.

9.

PROMOTING INCLUSION THROUGH DIGITAL TECHNOLOGIES

Although we live in an increasingly connected world, many people worldwide remain digitally excluded – a situation that deprives them of access to knowledge, the benefits of technological progress and the opportunity to participate in civic life. According to the United Nations, more than one-third of the world's population is still offline, while close to one billion people globally do not possess proof of legal identity.

Thales undertakes to use its knowledge and expertise to bring digital inclusion to disadvantaged communities, both through its products – such as digital identification systems and telecoms satellites – and through its employee engagement initiatives.

Under the Thales Solidarity programme, the Group leverages innovation to support a range of projects focusing on education, professional integration and environmental protection. Since the programme began in 2019, the Group has lent its support to numerous non-profit-led and employee-backed projects. Examples include a distance learning programme for unemployed young people in Senegal, coding workshops in Benin and digital training courses for people entering the job market in France.

10.

HELPING EMPLOYEES NAVIGATE THE DIGITAL AGE

Technological progress is just one part of the digital transformation. To unlock the full potential of innovation, new technologies need to be intelligible and accessible to all. Because once people understand how these systems work, they will be more likely to trust them and feel confident using them. And they will be better equipped to guard against the potential risks they present to their health and well-being and to the environment.

Thales undertakes to provide digital training to all of its employees, including those in non-technical roles. In doing so, it aims to build a community of informed users who make intelligent use of the tools at their disposal, helping to further the Group's commitment to digital responsibility.

The Group has added new courses for non-specialists to its Thales Learning Hub, which also offers programmes on ethics and other non-technical topics for employees in all roles and functions.

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