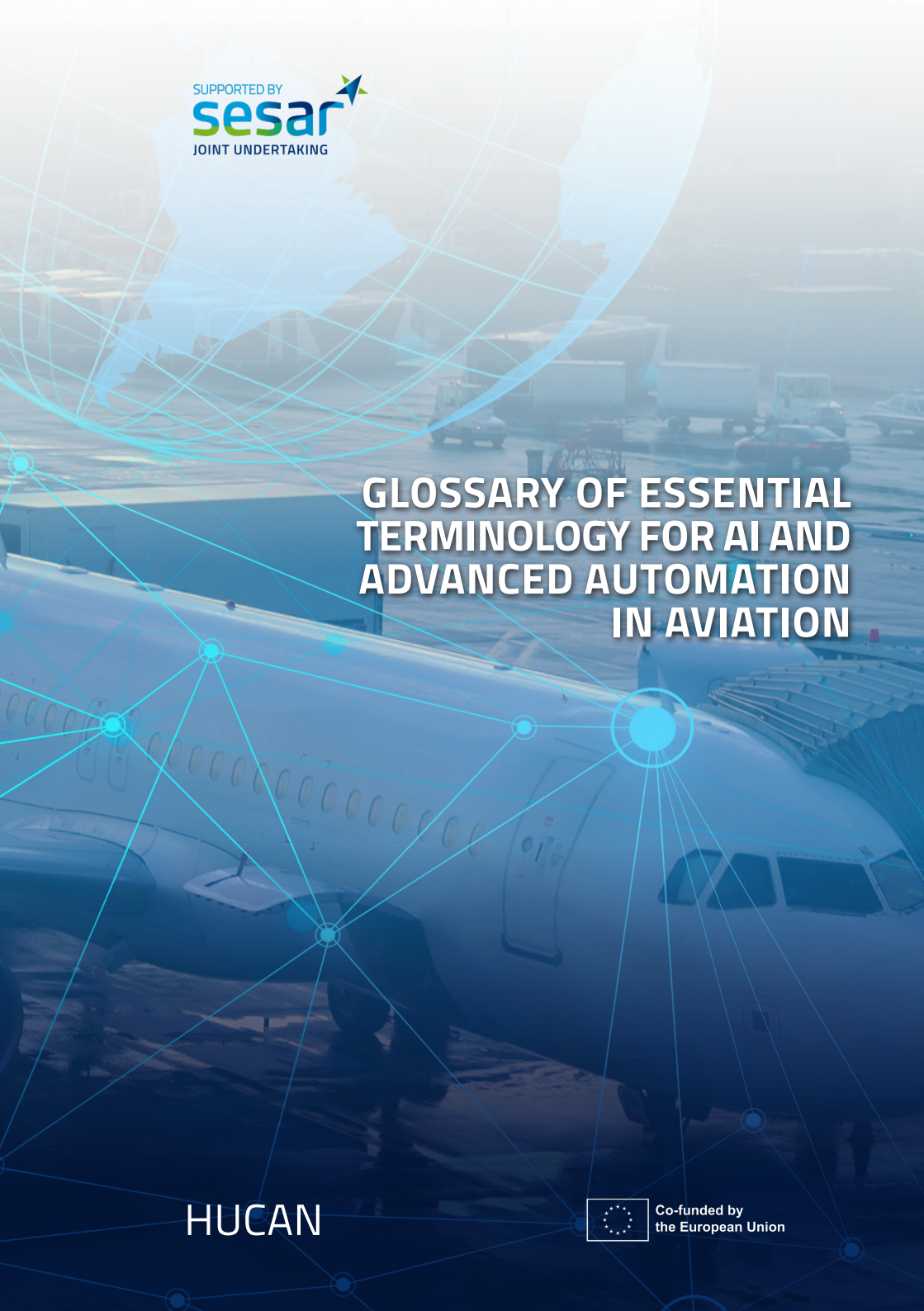
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GLOSSARY OF ESSENTIAL TERMINOLOGY FOR AI AND ADVANCED AUTOMATION IN AVIATION

HUCAN

Co-funded by the European Union

Foreward

Remarkable technological advancements over the past decade have significantly expanded the role of automation. Today, these systems have the ability to evaluate complex scenarios, learn from them, and independently make informed decisions. Highly automated systems are now capable of performing tasks once considered exclusive to humans, often delivering faster and more efficient solutions. These breakthroughs are largely driven by advances in Artificial Intelligence and Machine Learning.

The Air Traffic Management (ATM) sector has experienced rapid growth, marked by increasing demands and the arrival of new entrants. To address these evolving challenges and prepare for future needs, integrating higher levels of automation into ATM systems is now essential.

However, the use of advanced development methods, including AI, in aviation raises several critical questions. How can we build public trust and incorporate ethical considerations into our processes? What steps are necessary to secure approval for advanced automation systems? And most importantly, how can we obtain certification?

What additional processes, methods, and standards are required to unlock AI's full potential and further enhance the safety of air transport?

These pressing questions have driven the need for targeted research, prompting the SESAR 3 project HUCAN to take responsibility for addressing these challenges. HUCAN supports SESAR 3 projects pursuing high levels of automation by developing a holistic certification approach that tackles the complexities of certifying advanced automation systems. Additionally, the project validates new methodologies for approval and certification processes, ensuring compliance with the existing legal and regulatory framework while aligning with EASA's ongoing initiatives.

This preliminary glossary serves as a key reference, offering definitions and terms related to the certification of highly automated technologies in the aviation sector, with a focus on automation in ATM systems. We hope this glossary enhances your understanding as we work towards shaping the future of ATM through automation.

We invite you to explore its contents and encourage you to stay engaged with HUCAN's achievements as we move forward.

Oznur Uygur
SESAR3JU Programme Manager

Table of contents

Introduction

HUCAN - Holistic Unified Certification Approach for Novel Systems Based on Advanced Automation is a SESAR 3 Joint Undertaking funded project that addresses certification challenges related to advanced automation and Artificial Intelligence (AI) in Air Traffic Management (ATM). The project's goal is to develop a new holistic approach to certification, along with a design toolkit to support the research and development of these technologies from the earliest stages of conception.
In examining the challenges that arise prior to certification, HUCAN identified a variety of key concepts. HUCAN created this **Certification Glossary, which compiles official definitions of essential terms related to the certification of advanced automation and AI in ATM.**
The Certification Glossary incorporates new terminology introduced by the latest AI regulatory framework, alongside terminology from EU research projects. Specifically, it features a comprehensive collection of relevant keywords, as defined by the **AI Act** (Reg. (EU) 2024/1689), the **EASA Basic Regulation** (Reg. (EU) 2018/1139), the **GDPR** (Reg. (EU) 2016/679), the **Ethics Guidelines for Trustworthy AI** by the High-Level Expert Group on AI (2019), the **EASA AI Roadmap 2.0** - Human-Centric Approach to AI in Aviation, and **SESAR AI** (2024).

Some important observations have been made regarding definitions. First, the terms and definitions across EU regulations are not entirely harmonised. Although they often describe similar or identical concepts, the specific terms used may vary. Second, while the AI Act

(Reg. (EU) 2024/1689) and the High-Level Expert Group on AI (2019) provide more general definitions, the EASA (2023) and SESAR AI (2024) frameworks offer aviation-specific terminology. This leads to discrepancies, such as the more general definition of "Serious Incident" in the AI Act compared to its narrower interpretation in the aviation sector.

The purpose of the Certification Glossary is not to analyse and come up with a different list of Glossary applicable to the certification of AI in the ATM, but to provide an overview which actors in the certification approach may refer to.

To facilitate navigation, the glossary is divided into three main categories. In the **Automation and AI section**, you'll find all technical definitions related to the technology itself, including concepts of AI, data and models that can be applied. The **AI Regulation and Certification section** covers key regulatory aspects, such as legal requirements for systems, development phases and roles throughout the lifecycle of AI solutions. Lastly, the **Society and Ethics section** addresses terms related to AI's social implications, including ethical principles, privacy and data protection. Each section provides an alphabetical list of relevant terms, with cross-references for easy navigation throughout the document. A complete Index is included at the end, with page numbers for quick reference.

AUTOMATION AND AI

This section provides technical definitions related to automation and AI technologies, including key concepts of AI like Deep Learning, Machine Learning, relevant to ATM, linked to the realm of automation.

Adaptive Learning • Learning capability during the operations.

EASA AI Roadmap 2.0 (2023)

Adaptivity (of the Learning Process) • The ability to improve performance by learning from experience.

EASA AI Roadmap 2.0 (2023)

Advanced Automation • The use of a system that, under specified conditions, functions without human intervention.

EASA AI Roadmap 2.0 (2023)

AI System's Life Cycle • An AI system's life cycle encompasses its development (including research, design, data provision, and limited trials), deployment (including implementation) and use phase.

Ethics Guidelines for a Trustworthy AI, EC HLEG-AI (2019)

AI System • A machine-based system that is designed to operate with varying levels of autonomy and that may exhibit adaptiveness after deployment, and that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments.

AI Act (Reg. (EU) 2024/1689)

AI-Based System • A system that is developed with one or more of the techniques and approaches listed in Annex I to the EU AI Act and can, for a given set of human-defined objectives, generate outputs such as content, predictions, recommendations, or decisions influencing the environments they interact with.

*Please note that this definition provided by EASA in 2023 refers to the draft EU AI Act available at that time. The approved version of the AI Act issued in 2024 no longer includes the list of technologies mentioned here.

EASA AI Roadmap 2.0 (2023)

Artificial Intelligence (AI) • Technology that can, for a given set of human-defined objectives, generate outputs such as content, predictions, recommendations, or decisions influencing the environments they interact with.

EASA AI Roadmap 2.0 (2023)

Artificial Intelligence (AI) • A branch of computer science that aims to create intelligent machines. It has become an essential part of the technology industry. AI can be narrow, handling just one particular task, or strong

meaning a machine with the ability to apply intelligence to any problem.

SESAR AI (2024)

Artificial Intelligence or AI Systems ▪ Software (and possibly also hardware) systems designed by humans that, given a complex goal, act in the physical or digital dimension by perceiving their environment through data acquisition, interpreting the collected structured or unstructured data, reasoning on the knowledge, or processing the information, derived from this data and deciding the best action(s) to take to achieve the given goal. AI systems can either use symbolic rules or learn a numeric model, and they can also adapt their behaviour by analysing how the environment is affected by their previous actions.

As a scientific discipline, AI includes several approaches and techniques, such as machine learning (of which deep learning and reinforcement learning are specific examples), machine reasoning (which includes planning, scheduling, knowledge representation and reasoning, search, and optimization), and robotics (which includes control, perception, sensors and actuators, as well as the integration of all other techniques into cyber-physical systems).

Ethics Guidelines for a Trustworthy AI, EC HLEG-AI (2019)

Artificial Intelligence Office ▪ The Commission's function of contributing to the implementation, monitoring and supervision of AI systems and general-purpose AI models, and AI governance.

AI Act (Reg. (EU) 2024/1689)

Artificial Neural Network or Neural Network ▪ A computational graph which consists of connected nodes ('neurons') that define the order in which operations are performed on the input. Neurons are connected by edges which are parameterised by weights (and biases). Neurons are organised in layers, specifically an input layer, several intermediate layers, and an output layer.

EASA AI Roadmap 2.0 (2023)

Authority ▪ The ability to make decisions and take actions without the need for approval from another member involved in the operations.

EASA AI Roadmap 2.0 (2023)

Automation ▪ The use of control systems and information technologies reducing the need for human input, typically for repetitive tasks.

EASA AI Roadmap 2.0 (2023)

Autonomy ▪ Characteristic of a system that is capable of modifying its intended domain of use or goal without external intervention, control or oversight.

EASA AI Roadmap 2.0 (2023)

Bias (in the data) ▪ [The common definition of data bias is that] the available data is not representative of the population or phenomenon of study.

EASA AI Roadmap 2.0 (2023)

Bias (in the ML model) ▪ An error from erroneous assumptions in the learning [process]. High bias can cause a learning algorithm to miss the relevant relations between attributes and target outputs (= underfitting).

EASA AI Roadmap 2.0 (2023)

Big Data ▪ A recent and fast evolving technology, which allows the analysis of a big amount of data (more than terabytes), with a high velocity (high speed of data processing), from various sources (sensors, images, texts, etc.), and which might be unstructured (not standardised format).

EASA AI Roadmap 2.0 (2023)

Biometric Categorisation System ▪ An AI system for the purpose of assigning natural persons to specific categories on the basis of their biometric data, unless it is ancillary to another commercial service and strictly necessary for objective technical reasons.

AI Act (Reg. (EU) 2024/1689)

Biometric Data ▪ Personal data resulting from specific technical processing relating to the physical, physiological or behavioural characteristics of a natural person, such as facial images or dactyloscopic data.

AI Act (Reg. (EU) 2024/1689)

Biometric Identification ▪ Automated recognition of physical, physiological, behavioural, or psychological human features for the purpose of establishing the identity of a natural person by comparing biometric data of that individual to biometric data of individuals stored in a database.

AI Act (Reg. (EU) 2024/1689)

Biometric Verification ▪ The automated, one-to-one verification, including authentication, of the identity of natural persons by comparing their biometric data to previously provided biometric data.

AI Act (Reg. (EU) 2024/1689)

Convolutional Neural Networks (CNNs) ▪ A specific type of deep neural networks that are particularly suited to process image data, based on convolution operators.

EASA AI Roadmap 2.0 (2023)

Data Governance ▪ A data management concept concerning the capability of an organisation to ensure that high data quality exists throughout the complete life cycle of the data, and data controls are implemented that support business objectives.

The key focus areas of data governance include data availability, usability, consistency, integrity, and sharing. It also relates to establishing processes to ensure effective data management throughout the enterprise, such as accountability for the adverse effects of poor data quality, and ensuring that the data which an enterprise has can be used by the entire organisation.

EASA AI Roadmap 2.0 (2023)

Data Set (In ML in general) ▪ The sample of data used for various development phases of the model, i.e. the model training, the learning process verification, and the inference model verification.

EASA AI Roadmap 2.0 (2023)

Data-Driven AI ▪ An approach focusing on building a system that can learn a function based on having been trained on a large number of examples.

EASA AI Roadmap 2.0 (2023)

Decision ▪ A conclusion or resolution reached after consideration. A choice that is made about something after thinking about several possibilities.

EASA AI Roadmap 2.0 (2023)

Decision-Making ▪ The cognitive process resulting in the selection of a course of action among several possible alternative options. Automated or automatic decision-making is the process of making a decision by automated means without any human involvement.

EASA AI Roadmap 2.0 (2023)

Deep Learning • The most advanced type of machine learning. In recent years, the availability of large amount of data (big data) and the leap forward in computing power have paved the way towards unprecedented levels of performance, allowing for new levels of automation.

SESAR AI (2024)

Deep Learning • A specific type of machine learning based on the use of large neural networks to learn abstract representations of the input data by composing many layers.

EASA AI Roadmap 2.0 (2023)

Determinism • A system is deterministic if when given identical inputs, it produces identical outputs.

EASA AI Roadmap 2.0 (2023)

Domain • Operational area in which a system incorporating an ML subsystem could be implemented/used. Examples of domains considered in the scope of this guideline are ATM/ANS, air operations, flight crew training, environmental protection or aerodromes.

EASA AI Roadmap 2.0 (2023)

End User • An end user is the person that ultimately uses or is intended to ultimately use the AI-based system. This could either be a consumer or a professional within a public or private organisation. The end user stands in contrast to users who support or maintain the product.

EASA AI Roadmap 2.0 (2023)

Failure • An occurrence which affects the operation of a component, part or element such that it can no longer function as intended (this includes both loss of function and malfunction). Note: errors may cause failures, but are not considered to be failures.

EASA AI Roadmap 2.0 (2023)

Floating-Point Operation • Any mathematical operation or assignment involving floating-point numbers, which are a subset of the real numbers typically represented on computers by an integer of fixed precision scaled by an integer exponent of a fixed base.

AI Act (Reg. (EU) 2024/1689)

General-Purpose AI Model • An AI model, including where such an AI model is trained with a large amount of data using self-supervision at scale,

that displays significant generality and is capable of competently performing a wide range of distinct tasks regardless of the way the model is placed on the market and that can be integrated into a variety of downstream systems or applications, except AI models that are used for research, development or prototyping activities before they are placed on the market.

AI Act (Reg. (EU) 2024/1689)

General-Purpose AI System ▪ An AI system which is based on a general-purpose AI model, that has the capability to serve a variety of purposes, both for direct use as well as for integration in other AI systems.

AI Act (Reg. (EU) 2024/1689)

High-Impact Capabilities ▪ In general-purpose AI models means capabilities that match or exceed the capabilities recorded in the most advanced general-purpose AI models.

AI Act (Reg. (EU) 2024/1689)

Human-Centric AI ▪ The human-centric approach to AI strives to ensure that human values are central to the way in which AI systems are developed, deployed, used and monitored, by ensuring respect for fundamental rights, including those set out in the Treaties of the European Union and Charter of Fundamental Rights of the European Union, all of which are united by reference to a common foundation rooted in respect for human dignity, in which the human being enjoy a unique and inalienable moral status. This also entails consideration of the natural environment and of other living beings that are part of the human ecosystem, as well as a sustainable approach enabling the flourishing of future generations to come.

Ethics Guidelines for a Trustworthy AI, EC HLEG-AI (2019)

Inference ▪ The process of feeding the AI model an input and computing its output.

*See also the related definition of *Training (p.20)*.

EASA AI Roadmap 2.0 (2023)

Inference Model ▪ The ML model obtained after transformation of the trained model, so that the model is adapted to the target platform.

EASA AI Roadmap 2.0 (2023)

Information Security ▪ The preservation of confidentiality, integrity, authenticity and availability of network and information systems.

EASA AI Roadmap 2.0 (2023)

Input Data ▪ Data provided to or directly acquired by an AI system on the basis of which the system produces an output.

AI Act (Reg. (EU) 2024/1689)

Instructions For Use ▪ The information provided by the provider to inform the deployer of, in particular, an AI system's intended purpose and proper use.

AI Act (Reg. (EU) 2024/1689)

Intended Purpose ▪ The use for which an AI system is intended by the provider, including the specific context and conditions of use, as specified in the information supplied by the provider in the instructions for use, promotional or sales materials and statements, as well as in the technical documentation.

AI Act (Reg. (EU) 2024/1689)

Machine Learning ▪ A core part of AI. It uses data to train algorithms and give computer systems the ability to learn (i.e. progressively improve performance on a specific task) with data, without being explicitly programmed.

SESAR AI (2024)

Machine Learning (ML) ▪ The branch of AI concerned with the development of learning algorithms that allow computers to evolve behaviours based on observing data and making inferences on this data.

EASA AI Roadmap 2.0 (2023)

ML Model ▪ A parameterised function that maps inputs to outputs. The parameters are determined during the training process.

EASA AI Roadmap 2.0 (2023)

Natural Language Processing ▪ Refers to the branch of computer science — and more specifically, the branch of AI — concerned with giving computers the ability to understand text and spoken words in much the same way as human beings can.

EASA AI Roadmap 2.0 (2023)

Non-Personal Data ▪ Data other than personal data.

**If the data involves personal information, its processing can have significant implications for the individuals concerned.*

*For the definition of *Personal data (p.36)*, *Special Categories of*

Personal Data (p.37), and *Sensitive Operational Data (p.37)*.

AI Act (Reg. (EU) 2024/1689)

Performance Of An AI System ▪ The ability of an AI system to achieve its intended purpose.

AI Act (Reg. (EU) 2024/1689)

Post Remote Biometric Identification System ▪ A remote biometric identification system other than a real-time remote biometric identification system.

AI Act (Reg. (EU) 2024/1689)

Predictability ▪ The degree to which a correct forecast of a system's state can be made quantitatively. Limitations on predictability could be caused by factors such as a lack of information or excessive complexity.

EASA AI Roadmap 2.0 (2023)

Profiling ▪ Any form of automated processing of personal data consisting of the use of personal data to evaluate certain personal aspects relating to a natural person, in particular to analyse or predict aspects concerning that natural person's performance at work, economic situation, health, personal preferences, interests, reliability, behaviour, location or movements.

GDPR (Reg. (EU) 2016/679)

Putting Into Service ▪ The supply of an AI system for first use directly to the deployer or for own use in the Union for its intended purpose.

AI Act (Reg. (EU) 2024/1689)

Real World Testing Plan ▪ A document that describes the objectives, methodology, geographical, population and temporal scope, monitoring, organisation and conduct of testing in real world conditions.

AI Act (Reg. (EU) 2024/1689)

Real-Time Remote Biometric Identification System ▪ A remote biometric identification system, whereby the capturing of biometric data, the comparison and the identification all occur without a significant delay, this comprises not only instant identification, but also limited short delays in order to avoid circumvention.

AI Act (Reg. (EU) 2024/1689)

Recurrent Neural Networks (RNNs) ▪ A type of neural network that involves directed cycles in memory.

EASA AI Roadmap 2.0 (2023)

Reinforcement Learning ▪ The process of learning in which the agent(s) is (are) rewarded positively or negatively based on the effect of the actions on the environment. The ML model parameters are updated from this trial-and-error sequence to optimise the outcome.

EASA AI Roadmap 2.0 (2023)

Remote Biometric Identification System ▪ An AI system for the purpose of identifying natural persons, without their active involvement, typically at a distance through the comparison of a person's biometric data with the biometric data contained in a reference database.

AI Act (Reg. (EU) 2024/1689)

Reproducibility ▪ Reproducibility describes whether an AI experiment exhibits the same behaviour when repeated under the same conditions.

Ethics Guidelines for a Trustworthy AI, EC HLEG-AI (2019)

Risk ▪ Combination of the probability of an occurrence of harm and the severity of that harm.

AI Act (Reg. (EU) 2024/1689)

Robust AI ▪ Robustness of an AI system encompasses both its technical robustness (appropriate in a given context, such as the application domain or life cycle phase) and as well as its robustness from a social perspective (ensuring that the AI system duly takes into account the context and environment in which the system operates). This is crucial to ensure that, even with good intentions, no unintentional harm can occur. Robustness is the third of the three components necessary for achieving Trustworthy AI.

Ethics Guidelines for a Trustworthy AI, EC HLEG-AI (2019)

Robustness ▪ The ability of a system to maintain its level of performance under all foreseeable conditions. At model level (trained or inference), the robustness objectives are further split into two groups: the ones pertaining to 'model stability' and the ones pertaining to 'robustness in adverse conditions'.

EASA AI Roadmap 2.0 (2023)

Supervised Learning ▪ The process of learning in which the learning algorithm processes the input data set, and a cost function measures the difference between the ML model output and the labelled data. The learning algorithm then adjusts the parameters to increase the accuracy of the ML model.

EASA AI Roadmap 2.0 (2023)

Surrogate Model (Or substitute model or emulation model) ▪ Generally a mathematical model that is used to approximate the behaviour of a complex system. In the aviation industry, surrogate models are often used to represent the performance of aircraft, propulsion systems, structural dynamics, flight dynamics, and other complex systems. They can be particularly useful when it is not practical or cost-effective to use physical models or prototypes for testing or evaluation.

EASA AI Roadmap 2.0 (2023)

System ▪ A combination of inter-related items arranged to perform a specific function(s).

EASA AI Roadmap 2.0 (2023)

Test Data Set ▪ [Dataset] used to assess the performance of the model, independent of the training data set.

EASA AI Roadmap 2.0 (2023)

Testing Data ▪ Data used for providing an independent evaluation of the AI system in order to confirm the expected performance of that system before its placing on the market or putting into service.

AI Act (Reg. (EU) 2024/1689)

Testing In Real World Conditions ▪ The temporary testing of an AI system for its intended purpose in real world conditions outside of a laboratory or otherwise simulated environment with a view to gathering reliable and robust data and to assessing and verifying the conformity of the AI system with the requirements of this regulation; testing in real world conditions shall not be considered as placing the AI system on the market or putting it into service within the meaning of this regulation, provided that all [the required] conditions are fulfilled. [Article 57 and 60 of the AI Act].

AI Act (Reg. (EU) 2024/1689)

Trained Model ▪ The ML model which is obtained at the end of the learning/training phase.

EASA AI Roadmap 2.0 (2023)

Training ▪ The process of optimising the parameters (weights) of an ML model given a data set and a task to achieve on that data set. For example, in supervised learning the training data consists of input (e.g. an image) / output (e.g. a class label) pairs and the ML model 'learns' the function that maps the input to the output, by optimising its internal parameters.

EASA AI Roadmap 2.0 (2023)

Training Data ▪ Data used for training an AI system through fitting its learnable parameters.

AI Act (Reg. (EU) 2024/1689)

Training Data Set ▪ Data that is input to an ML model in order to establish its behaviour.

EASA AI Roadmap 2.0 (2023)

Unsupervised Learning (Or Self-Learning) ▪ The process of learning in which the learning algorithm processes the data set, and a cost function indicates whether the ML model has converged to a stable solution. The learning algorithm then adjusts the parameters to increase the accuracy of the ML model.

EASA AI Roadmap 2.0 (2023)

User ▪ A user is a person that supports or maintains the product, such as system administrators, database administrators, information technology experts, software professionals and computer technicians.

EASA AI Roadmap 2.0 (2023)

Validation Data ▪ Data used for providing an evaluation of the trained AI system and for tuning its non-learnable parameters and its learning process in order, inter alia, to prevent underfitting or overfitting.

AI Act (Reg. (EU) 2024/1689)

Validation Data Set ▪ [Dataset] used to tune a subset of the hyper-parameters of a model (e.g. number of hidden layers, learning rate, etc.).

EASA AI Roadmap 2.0 (2023)

Variance ▪ An error from sensitivity to small fluctuations in the training set. High variance can cause a learning algorithm to model the random noise in the training data, rather than the intended outputs (=overfitting).

EASA AI Roadmap 2.0 (2023)

AI REGULATIONS AND CERTIFICATIONS

This section focuses on the regulatory framework governing AI systems, covering essential legal requirements, certification processes and key roles throughout the AI solution lifecycle in aviation.

AI Literacy ▪ Skills, knowledge and understanding that allow providers, deployers and affected persons, taking into account their respective rights and obligations in the context of [the AI Act], to make an informed deployment of AI systems, as well as to gain awareness about the opportunities and risks of AI and possible harm it can cause.

AI Act (Reg. (EU) 2024/1689)

AI Practitioners ▪ All individuals or organisations that develop (including research, design or provide data for) deploy (including implement) or use AI systems, excluding those that use AI systems in the capacity of end user or consumer.

Ethics Guidelines for a Trustworthy AI, EC HLEG-AI (2019)

AI Regulatory Sandbox ▪ A controlled framework set up by a competent authority which offers providers or prospective providers of AI systems the possibility to develop, train, validate and test, where appropriate in real-world conditions, an innovative AI system, pursuant to a sandbox plan for a limited time under regulatory supervision.

AI Act (Reg. (EU) 2024/1689)

Auditability ▪ The ability of an AI system to undergo the assessment of the system's algorithms, data and design processes. This does not necessarily imply that information about business models and intellectual property related to the AI system must always be openly available. Ensuring traceability and logging mechanisms from the early design phase of the AI system can help enabling the system's auditability.

Ethics Guidelines for a Trustworthy AI, EC HLEG-AI (2019)

Authorised Representative ▪ Any natural or legal person located or established in the Union who has received and accepted a written mandate from a provider of an AI system or a general-purpose AI model to, respectively, perform and carry out on its behalf the obligations and procedures established by this Regulation .

AI Act (Reg. (EU) 2024/1689)

CE Marking Of Conformity ▪ A marking by which a provider indicates that an AI system is in conformity with the requirements set out [by the AI Act for high-risk AI systems] and other applicable Union harmonisation legislation providing for its affixing.

AI Act (Reg. (EU) 2024/1689)

Common Specification ▪ A set of technical specifications, intended as a document that prescribes technical requirements to be fulfilled by a product, process, service or system and which lays down the characteristics required of a product including levels of quality, performance, interoperability, environmental protection, health, safety or dimensions, and including the requirements applicable to the product as regards the name under which the product is sold, terminology, symbols, testing and test methods, packaging, marking or labelling and conformity assessment procedures [as per Reg. (EU) 2012/1025, Article 4].

AI Act (Reg. (EU) 2024/1689)

Conformity Assessment ▪ The process of demonstrating whether the requirements set out in [the AI Act] relating to a high-risk AI system have been fulfilled.

AI Act (Reg. (EU) 2024/1689)

Conformity Assessment Body ▪ A body that performs third-party conformity assessment activities, including testing, certification and inspection.

AI Act (Reg. (EU) 2024/1689)

Critical Infrastructure ▪ An asset, a facility, equipment, a network or a system, or a part of thereof, which is necessary for the provision of an essential service. [As defined by Article 2, point (4), Dir. (EU) 2022/2557].

AI Act (Reg. (EU) 2024/1689)

Deployer ▪ Any natural or legal person, public authority, agency or other body using an AI system under its authority except where the AI system is used in the course of a personal non-professional activity.

AI Act (Reg. (EU) 2024/1689)

Development Assurance ▪ All those planned and systematic actions used to substantiate, to an adequate level of confidence, that errors in requirements, design, and implementation have been identified and corrected such that the system satisfies the applicable certification basis.

EASA AI Roadmap 2.0 (2023)

Distributor ▪ Any natural or legal person in the supply chain, other than the provider or the importer, that makes an AI system available on the Union market.

AI Act (Reg. (EU) 2024/1689)

Downstream Provider ▪ A provider of an AI system, including a general-purpose AI system, which integrates an AI model, regardless of whether the model is provided by themselves and vertically integrated or provided by another entity based on contractual relations.

AI Act (Reg. (EU) 2024/1689)

End User ▪ An end user is the person that ultimately uses or is intended to ultimately use the AI-based system. This could either be a consumer or a professional within a public or private organisation. The end user stands in contrast to users who support or maintain the product.

EASA AI Roadmap 2.0 (2023)

Harmonised Standard ▪ A European standard adopted on the basis of a request made by the Commission for the application of Union harmonisation legislation (as defined in Article 2(1)(c) of Regulation (EU) no 1025/2012).

AI Act (Reg. (EU) 2024/1689)

Importer ▪ Any natural or legal person located or established in the union that places on the market an AI system that bears the name or trademark of a natural or legal person established [outside the Union].

AI Act (Reg. (EU) 2024/1689)

Making Available On The Market ▪ Any supply of an AI system or a general-purpose AI model for distribution or use on the union market in the course of a commercial activity, whether in return for payment or free of charge.

AI Act (Reg. (EU) 2024/1689)

Market Surveillance Authority ▪ The national authority carrying out the activities and taking the measures necessary [to monitor the market and to ensure compliance of the products]. (Regulation (EU) 2019/1020).

AI Act (Reg. (EU) 2024/1689)

National Competent Authority ▪ [Any of the following]: the notifying authority or the market surveillance authority; as regards AI systems put into service or used by EU institutions, agencies, offices and bodies, any reference to national competent authorities or market surveillance authorities in [the AI Act] shall be understood as referring to the European Data Protection Supervisor.

AI Act (Reg. (EU) 2024/1689)

Notified Body ▪ A conformity assessment body notified in accordance with [the AI Act] and other relevant Union harmonisation legislation.

AI Act (Reg. (EU) 2024/1689)

Notifying Authority ▪ The national authority responsible for setting up and carrying out the necessary procedures for the assessment, designation and notification of conformity assessment bodies and for their monitoring.

AI Act (Reg. (EU) 2024/1689)

Operator ▪ The provider, the product manufacturer, the deployer, the authorised representative, the importer or the distributor.

AI Act (Reg. (EU) 2024/1689)

Placing on the Market ▪ The first making available of an AI system or a general-purpose AI model on the Union market.

AI Act (Reg. (EU) 2024/1689)

Post-Market Monitoring System ▪ All activities carried out by providers of AI systems to collect and review experience gained from the use of AI systems they place on the market or put into service for the purpose of identifying any need to immediately apply any necessary corrective or preventive actions.

AI Act (Reg. (EU) 2024/1689)

Provider ▪ Any natural or legal person, public authority, agency or other body that develops an AI system or a general-purpose AI model or that has an AI system or a general-purpose AI model developed and places it on the market or puts the system into service under its own name or trademark, whether for payment or free of charge.

AI Act (Reg. (EU) 2024/1689)

Putting Into Service ▪ The supply of an AI system for first use directly to the deployer or for own use in the union for its intended purpose.

AI Act (Reg. (EU) 2024/1689)

Real-World Testing Plan ▪ A document that describes the objectives, methodology, geographical, population and temporal scope, monitoring, organisation and conduct of testing in real world conditions.

AI Act (Reg. (EU) 2024/1689)

Reasonably Foreseeable Misuse ▪ The use of an AI system in a way that is not in accordance with its intended purpose, but which may result from reasonably foreseeable human behaviour or interaction with other systems, including other AI systems.

AI Act (Reg. (EU) 2024/1689)

Recall of an AI System ▪ Any measure aimed at achieving the return to the provider or taking it out of service or disabling the use of an AI system made available to deployers.

AI Act (Reg. (EU) 2024/1689)

Red Teaming ▪ Practice whereby a "red team" or independent group challenges an organisation to improve its effectiveness by assuming an adversarial role or point of view. It is particularly used to help identifying and addressing potential security vulnerabilities.

Ethics Guilines for a Trustworthy AI, EC HLEG-AI (2019)

Robustness ▪ The ability of a system to maintain its level of performance under all foreseeable conditions. At model level (trained or inference), the robustness objectives are further split into two groups: the ones pertaining to 'model stability' and the ones pertaining to 'robustness in adverse conditions'.

EASA AI Roadmap 2.0 (2023)

Safety Component ▪ A component of a product or of an AI system which fulfils a safety function for that product or system, or the failure or malfunctioning of which endangers the health and safety of persons or property.

AI Act (Reg. (EU) 2024/1689)

Sandbox Plan ▪ A document agreed between the participating provider and the competent authority describing the objectives, conditions, timeframe, methodology and requirements for the activities carried out within the sandbox.

AI Act (Reg. (EU) 2024/1689)

Serious Incident ▪ Any incident or malfunctioning of an AI system that directly or indirectly leads to any of the following:

a. The death of a person or serious damage to a person's health;

b. A serious and irreversible disruption of the management and operation of critical infrastructure;

c. The infringement of obligations under union law intended to protect fundamental rights;

d. Serious damage to property or the environment.

AI Act (Reg. (EU) 2024/1689)

Stakeholders ▪ By stakeholders we denote all those that research develop, design, deploy or use AI, as well as those that are (directly or indirectly) affected by AI – including but not limited to companies, organisations, researchers, public services, institutions, civil society organisations, governments, regulators, social partners, individuals, citizens, workers and consumers.

Ethics Guidelines for a Trustworthy AI, EC HLEG-AI (2019)

Subject ▪ For the purpose of real world testing means a natural person who participates in testing in real world conditions.

AI Act (Reg. (EU) 2024/1689)

Substantial Modification ▪ A change to the AI system after its placing on the market or putting into service which is not foreseen or planned in the initial conformity assessment by the provider and as a result of which the compliance of the AI system with the requirements set out [for high-risk AI systems in] this regulation is affected or results in a modification to the intended purpose for which the AI system has been assessed.

AI Act (Reg. (EU) 2024/1689)

Systemic Risk ▪ A risk that is specific to the high-impact capabilities of general-purpose AI models, having a significant impact on the [internal] market due to its reach, and with actual or reasonably foreseeable negative effects on public health, safety, public security, fundamental rights, or the society as a whole, that can be propagated at scale across the value chain.

AI Act (Reg. (EU) 2024/1689)

Traceability ▪ The capability to keep track of the system's data, development and deployment processes, typically by means of documented recorded identification.

Ethics Guidelines for a Trustworthy AI, EC HLEG-AI (2019)

Widespread Infringement ▪ Any act or omission contrary to Union law protecting the interest of individuals, which:

a. has harmed or is likely to harm the collective interests of individuals residing in at least two Member States other than the Member State in which:

i. the act or omission originated or took place;

ii. the provider concerned, or, where applicable, its authorised representative is located or established; or

iii. the deployer is established, when the infringement is committed by the deployer;

b. has caused, causes or is likely to cause harm to the collective interests of individuals and has common features, including the same unlawful practice or the same interest being infringed, and is occurring concurrently, committed by the same operator, in at least three Member States.

AI Act (Reg. (EU) 2024/1689)

Withdrawal of an AI System · Any measure aimed at preventing an AI system in the supply chain being made available on the market.

AI Act (Reg. (EU) 2024/1689)

ETHICS AND SOCIETY

This section addresses the societal and ethical aspects of AI, highlighting terms related to privacy, data protection and ethical principles guiding the safe deployment of AI technologies.

Accountability ▪ This term refers to the idea that one is responsible for their action – and as a corollary their consequences – and must be able to explain their aims, motivations, and reasons. Accountability has several dimensions. Accountability is sometimes required by law. For example, the General Data Protection Regulation (GDPR) requires organisations that process personal data to ensure that security measures are in place to prevent data breaches and report if these fail.

EASA Concept Paper (2023)

Bias ▪ An inclination of prejudice towards or against a person, object, or position. Bias can arise in many ways in AI systems. For example, in data-driven AI systems, such as those produced through machine learning, bias in data collection and training can result in an AI system demonstrating bias. In logic-based AI, such as rule-based systems, bias can arise due to how a knowledge engineer might view the rules that apply in a particular setting. Bias can also arise due to online learning and adaptation through interaction. It can also arise through personalisation whereby users are presented with recommendations or information feeds that are tailored to the user's tastes. It does not necessarily relate to human bias or human-driven data collection. It can arise, for example, through the limited contexts in which a system is used, in which case there is no opportunity to generalise it to other contexts. Bias can be good or bad, intentional or unintentional. In certain cases, bias can result in discriminatory and/or unfair outcomes, indicated in this document as unfair bias.

*See also *Bias (p.12)* in *Automation and AI section.*

Ethics Guidelines for a Trustworthy AI, EC HLEG-AI (2019)

Deep Fake ▪ AI-generated or manipulated image, audio or video content that resembles existing persons, objects, places, entities or events and would falsely appear to a person to be authentic or truthful.

AI Act (Reg. (EU) 2024/1689)

Emotion Recognition System ▪ An AI system for the purpose of identifying or inferring emotions or intentions of natural persons on the basis of their biometric data.

AI Act (Reg. (EU) 2024/1689)

Ethical AI ▪ The development, deployment and use of AI that ensures compliance with ethical norms, including fundamental rights as special moral entitlements, ethical principles and related core values. It is

the second of the three core elements necessary for achieving Trustworthy AI.

Ethics Guidelines for a Trustworthy AI, EC HLEG-AI (2019)

Ethics ▪ An academic discipline which is a subfield of philosophy. In general terms, it deals with questions like "what is a good action?", "what is the value of a human life?", "what is justice?", or "what is the good life?".

In academic ethics, there are four major fields of research:

i. meta-ethics, mostly concerning the meaning and reference of normative sentence, and the question how their truth values can be determined (if they have any);

ii. normative ethics, the practical means of determining a moral course of action by examining the standards for right and wrong action and assigning a value to specific actions;

iii. descriptive ethics, which aims at an empirical investigation of people's moral behaviour and beliefs; and

iv. applied ethics, concerning what we are obligated (or permitted) to do in a specific (often historically new) situation or a particular domain of (often historically unprecedented) possibilities for action.

Applied ethics deals with real-life situations, where decisions have to be made under time pressure, and often limited rationality.

AI ethics is generally viewed as an example of applied ethics and focuses on the normative issues raised by the design, development, implementation and use of AI.

Within ethical discussions, the terms "moral" and "ethical" are often used. The term "moral" refers to the concrete, factual patterns of behaviour, the customs, and conventions that can be found in specific cultures, groups, or individuals at a certain time. The term "ethical" refers to an evaluative assessment of such concrete actions and behaviours from a systematic, academic perspective.

Ethics Guidelines for a Trustworthy AI, EC HLEG-AI (2019)

Fairness ▪ Refers to ensuring equal opportunities and non-discriminatory practices applied to individuals or groups of users (or end users). (definition based on EU guidelines on nondiscrimination).

EASA AI Roadmap 2.0 (2023)

Human-Centric AI ▪ The human-centric approach to AI strives to ensure that human values are central to the way in which AI systems are developed, deployed, used and monitored, by ensuring respect

for fundamental rights, including those set out in the Treaties of the European Union and Charter of Fundamental Rights of the European Union, all of which are united by reference to a common foundation rooted in respect for human dignity, in which the human being enjoy a unique and inalienable moral status. This also entails consideration of the natural environment and of other living beings that are part of the human ecosystem, as well as a sustainable approach enabling the flourishing of future generations to come.

Ethics Guidelines for a Trustworthy AI, EC HLEG-AI (2019)

Informed Consent • A subject's freely given, specific, unambiguous and voluntary expression of his or her willingness to participate in a particular testing in real world conditions, after having been informed of all aspects of the testing that are relevant to the subject's decision to participate.

AI Act (Reg. (EU) 2024/1689)

Law Enforcement • Activities carried out by law enforcement authorities or on their behalf for the prevention, investigation, detection or prosecution of criminal offences or the execution of criminal penalties, including the safeguarding against and the prevention of threats to public security.

AI Act (Reg. (EU) 2024/1689)

Law Enforcement Authority • [Any of the following:] (a) Any public authority competent for the prevention, investigation, detection or prosecution of criminal offences or the execution of criminal penalties, including the safeguarding against and the prevention of threats to public security or (b) Any other body or entity entrusted by member state law to exercise public authority and public powers for the purposes of the prevention, investigation, detection or prosecution of criminal offences or the execution of criminal penalties, including the safeguarding against and the prevention of threats to public security.

AI Act (Reg. (EU) 2024/1689)

Personal Data • Any information relating to an identified or identifiable natural person ('data subject'); an identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person.

GDPR (Reg. (EU) 2016/679)

Publicly Accessible Space ▪ Any publicly or privately owned physical place accessible to an undetermined number of natural persons, regardless of whether certain conditions for access may apply, and regardless of the potential capacity restriction.

AI Act (Reg. (EU) 2024/1689)

Robust AI ▪ Robustness of an AI system encompasses both its technical robustness (appropriate in a given context, such as the application domain or life cycle phase) and as well as its robustness from a social perspective (ensuring that the AI system duly takes into account the context and environment in which the system operates). This is crucial to ensure that, even with good intentions, no unintentional harm can occur. Robustness is the third of the three components necessary for achieving Trustworthy AI.

Ethics Guidelines for a Trustworthy AI, EC HLEG-AI (2019)

Sensitive Operational Data ▪ Operational data related to activities of prevention, detection, investigation and prosecution of criminal offences, the disclosure of which can jeopardise the integrity of criminal proceedings.

AI Act (Reg. (EU) 2024/1689)

Special Categories of Personal Data ▪ Personal data revealing racial or ethnic origin, political opinions, religious or philosophical beliefs, or trade union membership, and the processing of genetic data, biometric data for the purpose of uniquely identifying a natural person, data concerning health or data concerning a natural person's sex life or sexual orientation.

GDPR (Reg. (EU) 2016/679)

Trust ▪ Trust is viewed as:

1. A set of specific beliefs dealing with benevolence, competence, integrity, and predictability (trusting beliefs);
2. The willingness of one party to depend on another in a risky situation (trusting intention); or
3. The combination of these elements. While "trust" is usually not a property ascribed to machines, this document aims to stress the importance of being able to trust not only in the fact that AI systems are legally compliant, ethically adherent and robust, but also that such trust can be ascribed to all people and processes involved in the AI system's life cycle.

Ethics Guidelines for a Trustworthy AI, EC HLEG-AI (2019).

Trustworthy AI • Trustworthy AI has three components:

1. it should be lawful, ensuring compliance with all applicable laws and regulations;

2. it should be ethical, demonstrating respect for, and ensure adherence to, ethical principles and values; and

3. it should be robust, both from a technical and social perspective, since, even with good intentions, AI systems can cause unintentional harm.

Trustworthy AI concerns not only the trustworthiness of the AI system itself but also comprises the trustworthiness of all processes and actors that are part of the system's life cycle.

Ethics Guidelines for a Trustworthy AI, EC HLEG-AI (2019)

Vulnerable Persons And Groups • No commonly accepted or widely agreed legal definition of vulnerable persons exists, due to their heterogeneity.

What constitutes a vulnerable person or group is often context-specific. Temporary life events (such as childhood or illness), market factors (such as information asymmetry or market power), economic factors (such as poverty), factors linked to one's identity (such as gender, religion or culture) or other factors can play a role. The Charter of Fundamental Rights of the EU encompasses under Article 21 on non-discrimination the following grounds, which can be a reference point amongst others: namely sex, race, colour, ethnic or social origin, genetic features, language, religion or belief, political or any other opinion, membership of a national minority, property, birth, disability, age and sexual orientation. Other articles of law address the rights of specific groups, in addition to those listed above. Any such list is not exhaustive, and may change over time. A vulnerable group is a group of persons who share one or several characteristics of vulnerability.

Ethics Guidelines for a Trustworthy AI, EC HLEG-AI (2019)

Index

Index

S

T

U

V

W

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