VANGUARD legal and ethical framework

Training on the AI Act

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Legal framework

- Charter of Fundamental Rights of EU
- General Data Protection Regulation
- AI Act
- (Ethics Guidelines for Trustworthy AI)

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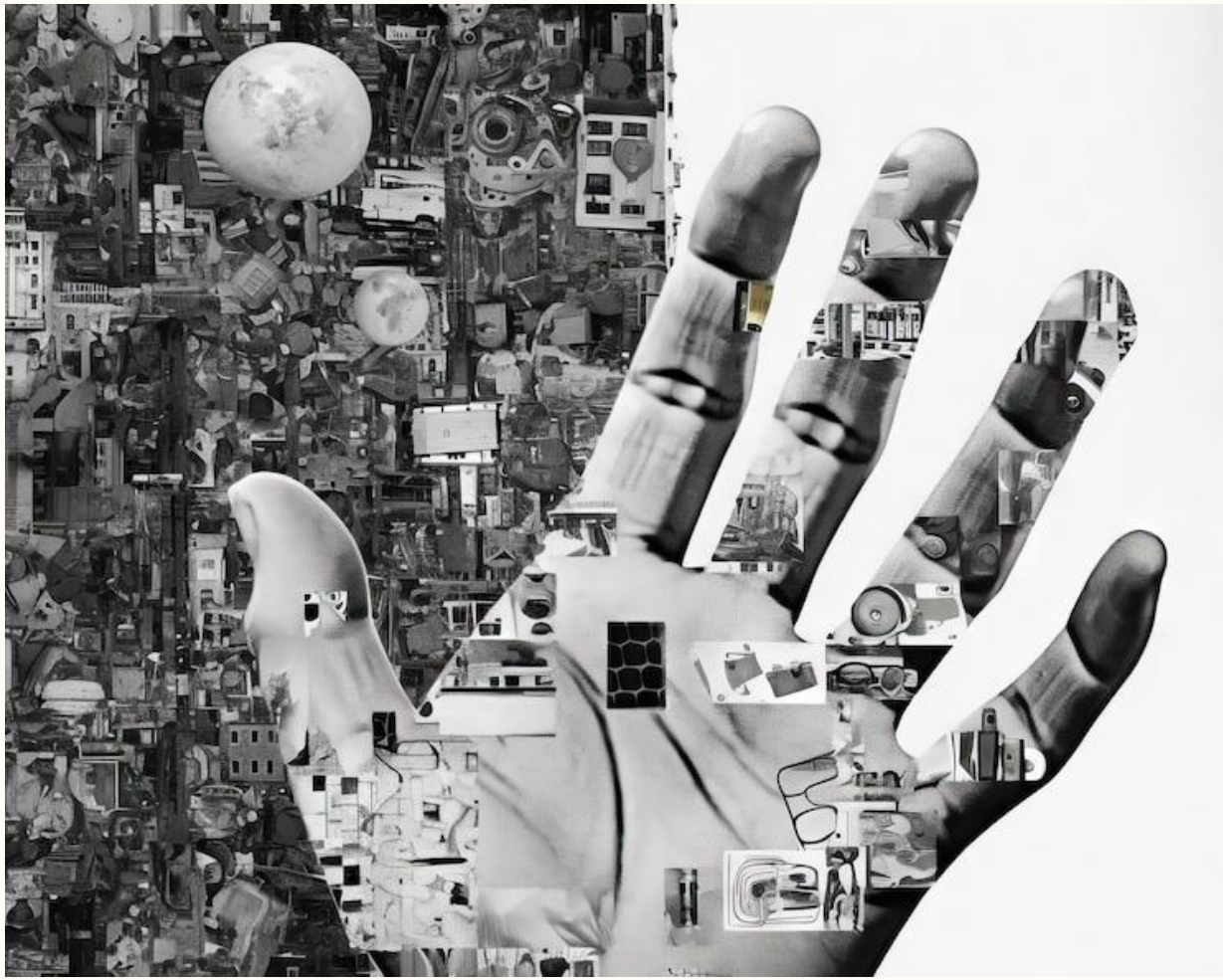
Charter of Fundamental Rights of the European Union

- Right to human dignity
- Presumption of innocence and right to an effective remedy and to a fair trial
- Right to equality and non-discrimination
- Freedom of expression and information
- Right to respect for private life and right to protection of personal data



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AI Act

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AI Systems

some degree of independence vis a vis human control

Machine-based system that is designed to operate with **varying levels of autonomy** and that

self-learning capabilities that allow the system to change

may exhibit **adaptiveness after deployment**, and that,

for explicit or implicit objectives,

Key requirement

infers, from the input it receives, how to generate outputs such as **predictions**, **content**, **recommendations**, or **decisions** that can influence physical or virtual environments

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Inference

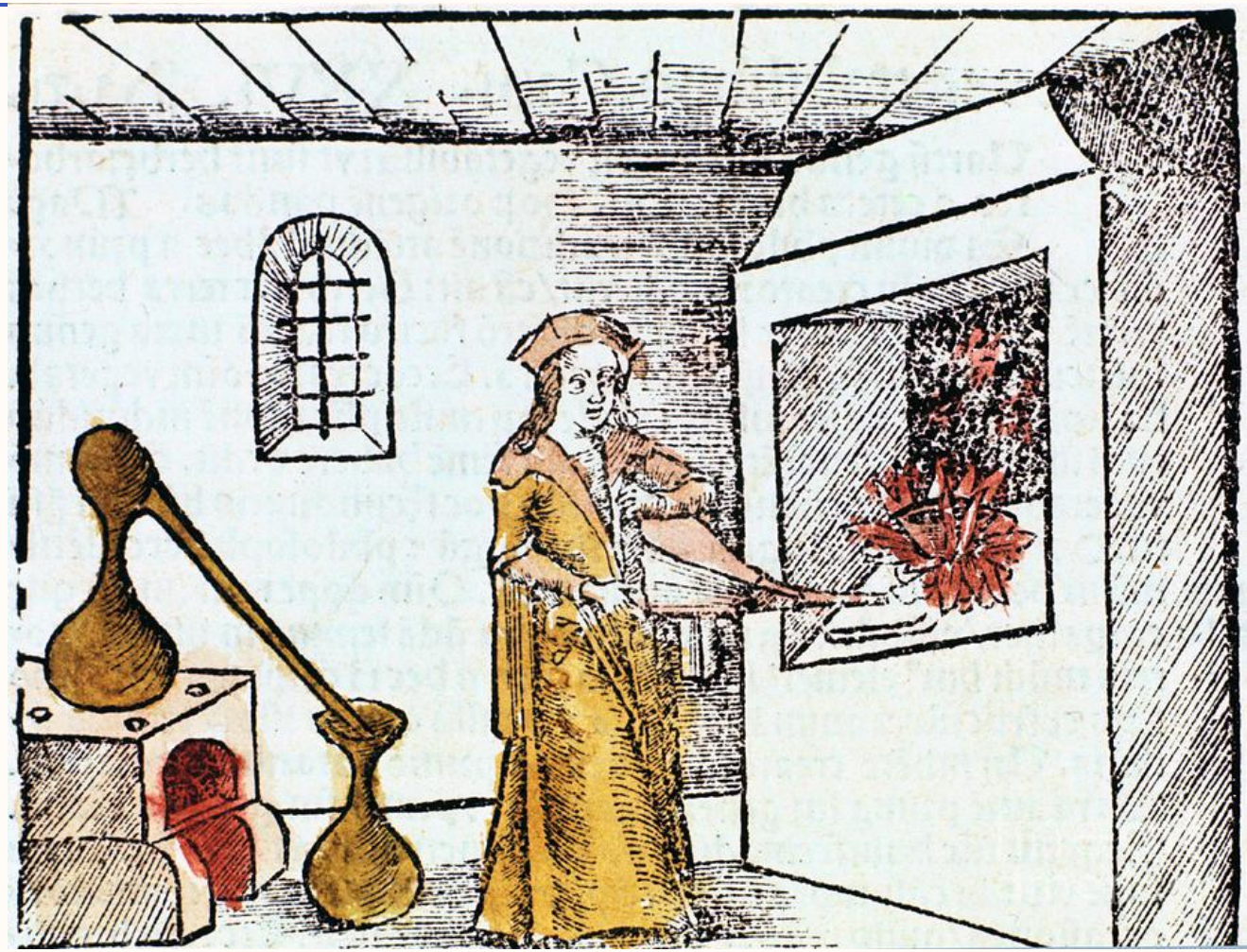
- Obtaining **outputs** from inputs or data
- Deriving **models** or algorithms from inputs or data

- Both

through

- **Machine learning** approaches that learn from data how to achieve certain objectives

- **Logic- and knowledge-based** approaches that infer from encoded knowledge or symbolic representation of the task to be solved.



Gregor Reisch, *The Chemist* (1508)

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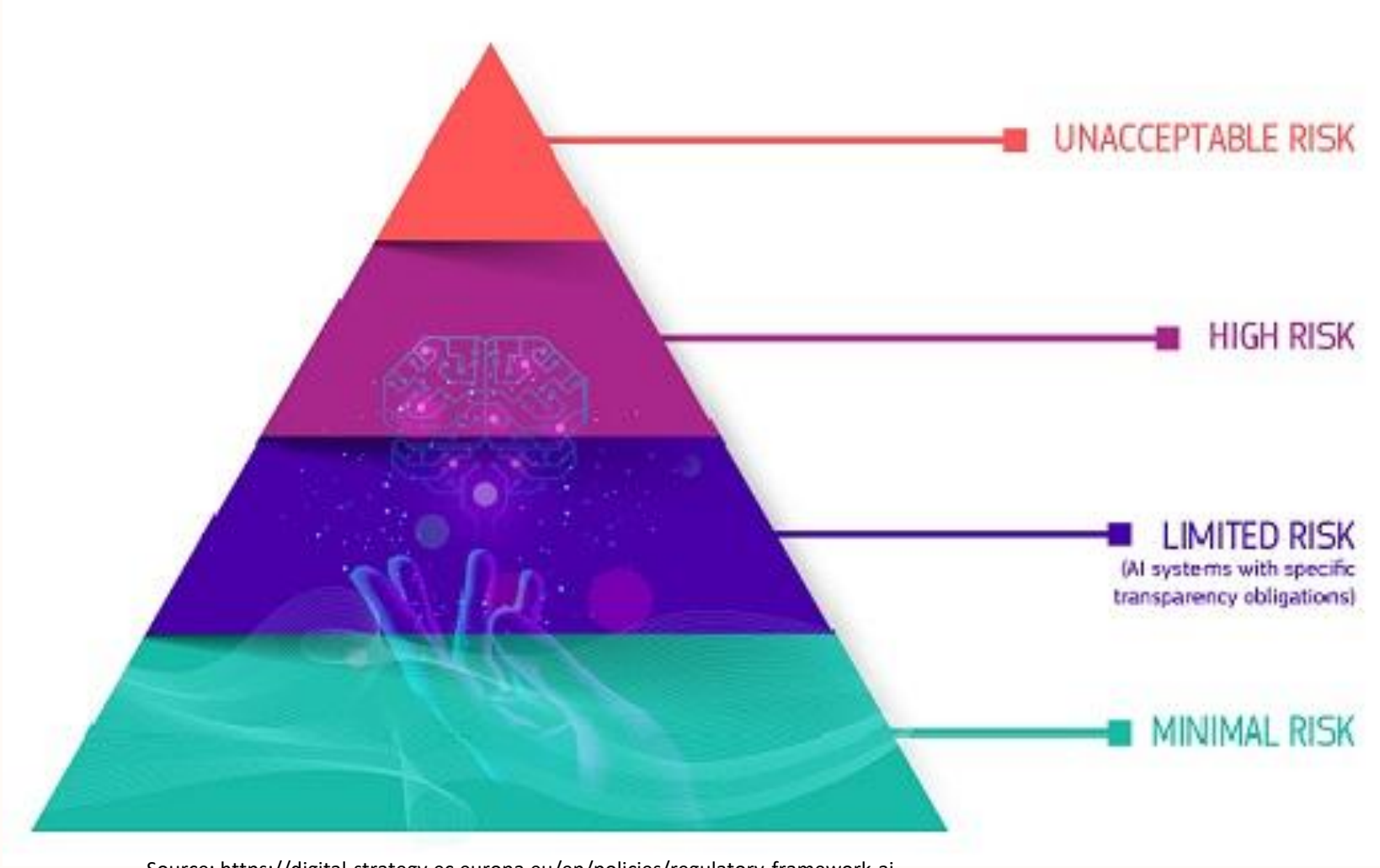
The Risk-based Approach



Source: https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai

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Prohibited Practices

- Harmful AI-based manipulation and deception
- Harmful AI-based exploitation of vulnerabilities
- Social scoring
- **Individual criminal offence risk assessment or prediction**
- Creation or expansion of facial recognition databases through untargeted scraping of the internet or CCTV material
- Emotion recognition in workplaces and educational institutions
- Biometric categorisation to infer certain protected characteristics
- **Real-time remote biometric identification for law enforcement purposes in publicly accessible spaces**

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Criminal offence risk assessment or prediction

AI systems used to **support the human assessment** of the involvement of a person in a criminal activity, which is **already based on objective and verifiable facts directly** linked to a criminal activity

Paula Rego, *The Interrogation* (1950)

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Real-time remote biometric identification

Can only be used to **confirm the identity of the specifically targeted individual**

Image source https://matrix.berkeley.edu/events/matrix-on-point-biometrics-and-privacy/

- search for **specific victims** of abduction, trafficking in human beings or sexual exploitation of human beings, and missing persons
- the prevention of a **specific, substantial and imminent threat** to the life or physical safety of natural persons or a genuine and present or genuine and foreseeable **threat of a terrorist attack**
- the localisation or identification of **a person suspected of having committed a criminal offence** (investigation, prosecution, or execution of a criminal penalty for specified offences)

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LEAs using Real-time remote biometric identification

- Ensure the system complies with national law authorising its use
- Complete a **fundamental rights impact assessment**
- Register the system in the EU database
- No decision that produces an adverse legal effect on a person may be taken based solely on the output of the ‘real-time’ remote biometric identification system.
- Obtain prior authorisation granted by a judicial authority or an independent administrative authority (reasoned request)
- Rejected authorization: the use shall be **stopped** and all the **data**, **results** and **outputs** of that use shall be **immediately discarded** and **deleted**.

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High-risk AI systems

- AI system used as a (safety component of) a product covered by the Union harmonisation legislation that is required to undergo a third-party conformity assessment
- AI safety components in critical infrastructures, whose failure could put the life and health of citizens at risk
- AI solutions used in educational institutions determining access to education and professional life
- AI-based safety components of products
- AI tools for employment, management of workers and access to self-employment
- AI systems used to give access to essential private and public services (e.g. credit scoring)

- **Remote biometric identification, emotion recognition and biometric categorisation**
- **AI use-cases in law enforcement**
- AI use-cases in migration, asylum and border control management
- AI solutions used in the administration of justice and democratic processes

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AI systems to be used by or on behalf of LEAs

- Assess the risk of an individual becoming the victim of criminal offences
- Polygraphs or similar tools
- Evaluate the reliability of evidence in the course of the investigation or prosecution of criminal offences
- Assess the risk of a natural person offending or re-offending not solely on the basis of the profiling
- Assess personality traits and characteristics or past criminal behaviour of natural persons or groups
- Profiling of individuals in the course of the detection, investigation or prosecution of criminal offences

*Results should be presented **probabilistically** and allow meaningful **contestation** in court. LEAs must be able to **explain** the outputs in court.*

Thomas Dekker, *A night watchman* (1608)

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Requirements for High-risk AI systems

- Risk assessment and mitigation system
- High-quality datasets
- Logging to ensure traceability of results
- Detailed documentation on the system and its purpose for authorities to assess its compliance
- Clear and adequate information to the deployer
- Human oversight measures
- Robustness, cybersecurity and accuracy

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Risk management system

Continuous iterative process

- Identification of reasonably foreseeable risks to health, safety or fundamental rights (including vulnerable citizens)
- Estimation of the risks of use in light of the intended purpose and reasonably foreseeable misuse
- Estimation of post-market risks (post-market monitoring system)
- Appropriate and targeted risk management measures

Risk management measures

- Elimination or reduction of risks to the extent technically feasible
- Adequate mitigation and control measures for risks that cannot be eliminated
- Provision of information and, where appropriate, training to deployers
- Testing identified risks, mitigation measures and compliance prior deployment – tests should be performed against prior-defined metrics and appropriate probabilistic thresholds

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Training, Validation and Testing datasets

- Data collection processes, the origin of data and the original purpose of the data collection
- Data-preparation processing operations (e.g., annotation, labelling, cleaning, updating, enrichment and aggregation)
- The formulation of assumptions regarding the information data is supposed to represent
- Data should be relevant, sufficiently representative, free of errors (availability, quantity and suitability)
- Possible biases likely to infringe on fundamental rights (feedback loops) - measures to detect, prevent and mitigate them
- Identification of data gaps or shortcomings preventing compliance, and how they can be addressed

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Technical Documentation

Aims

- Demonstrate that the high-risk AI system complies with the law
- Kept up to date throughout the lifetime of the AI system

Information regarding the AI system and its development

- General characteristics
- Capabilities and limitations of the system, algorithms, data, training, testing and validation processes used

A miniature of the hermit (monk) writing at a desk, *Estoire del Saint Graal, La Queste del Saint Graal, Morte Artu* (Royal MS 14 E III), France,. 1st quarter of the 14th century
Source: https://smarthistory.org/medieval-manuscripts/

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Record-keeping – Automated Logging

Aims

- Demonstrate that the high-risk AI system complies with the law
- Information regarding the AI system and its development
- Traceability of the functioning of a high-risk AI system
  - Identify situations that may result in a risk beyond what is reasonable and acceptable
  - Facilitating the post-market monitoring
- Logs shall be kept for a period appropriate to the intended purpose of the high-risk AI system, of at least six months, unless provided otherwise

Manuscripts at the Archivo de la Catedral de Burgos (Spain)
Souce https://grants.uccs.edu/deciphering-secrets/deciphering-secrets-medieval-spanish-manuscript-and-transcription-collection/

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Automated Logging in Remote Biometric Identification

- Recording start date and time and end date and time of each use
- The reference database against which input data has been checked by the system
- The input data for which the search has led to a match
- The identification of the individuals involved in the verification of the results
  (national law may require that identification is separately verified and confirmed by at least two natural persons with the necessary competence, training and authority, before any action or decision is taken by the deployer)

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Transparency obligations

- Enable deployers to interpret a system's output and use it appropriately

- Instructions for use accessible and comprehensible to deployers

Giovanni Strazza, The Veiled Virgin (before 1856)

Information to be provided

- identity and the contact details of the provider
- the characteristics, capabilities and limitations of performance
- pre-determined changes and the system's performance
- human oversight measures
- the computational and hardware resources needed, the expected lifetime and any necessary maintenance
- a description of the mechanisms that allows deployers to properly collect, store and interpret the logs
- the levels of accuracy and accuracy metrics

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Human Oversight

Types of measures

- Measures built into the high-risk AI system before deployment
- Measures identified by the provider to be implemented by the deployer

Enable people in charge of oversight to

- understand the relevant capacities and limitations of the high-risk AI system
- monitor its operation (detecting and addressing anomalies, dysfunctions and unexpected performance)
- remain aware of automation bias
- correctly interpret the high-risk AI system's output
- decide not to use the high-risk AI system or to otherwise disregard, override or reverse the output
- intervene and stop the system's operation

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Accuracy, Robustness and Cybersecurity

- Eliminate or reduce the risk of possibly **biased feedback loops** – and implement appropriate mitigation measures
- Resilient regarding errors, faults or inconsistencies in the **system** or the **environment**
- Resilient against attempts by unauthorised third parties to alter their use, outputs or performance by exploiting system **vulnerabilities**
- Built-in robustness through technical **redundancy** (backup or fail-safe plans)

Measures should prevent, detect, respond to, resolve and control

- attacks trying to manipulate the training dataset (data poisoning)
- pre-trained components used in training (model poisoning)
- inputs designed to cause the AI model to make a mistake (adversarial examples or model evasion), confidentiality attacks or model flaws

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Provider's Obligations

- Implement a **quality management system**
- **Document-keeping**
- Keep automated **logs**
- **Corrective** actions and duty of **information**
- Ensure that the high-risk AI system complies with accessibility requirements
- Be able to demonstrate compliance
- Indicate the name, registered trade name or registered trade mark, and the address in the AI system
- Conformity assessment procedure prior to being placed on the market or put into service
- Draw up an EU declaration of conformity
- Affix the CE marking
- Register themselves and their system in the EU database

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Quality Management System – Documented policies

- A strategy for compliance (conformity assessment procedures and procedures for the management of modifications)
- Techniques, procedures and actions to be used for the design, control and verification
- Techniques, procedures and actions to be used for the development, quality control and quality assurance
- Examination, test and validation procedures (before, during and after development, and their frequency)
- Technical specifications (e.g., standards)
- Systems and procedures for data management (data acquisition, data collection, data analysis, data labelling, data storage, data filtration, data mining, data aggregation, data retention and any other operation regarding the data)

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Quality Management – “Bureaucratic” Obligations

- Establishment, implementation and maintenance of a post-market monitoring system
- Procedures related to the reporting of a serious incident
- Handling and keeping communication with national competent authorities, other relevant entities
- Systems and procedures for record-keeping of all relevant documentation and information
- Resource management, including security-of-supply related measures
- Accountability framework setting out the responsibilities of the management and other staff with regard to providers’ obligations

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Corrective actions and duty of information

After placing the system in the market or putting it into service:

- When there is a reason to consider that it is not in conformity with the AIA, take corrective actions to bring a system into conformity

- Where high-risk AI system presents a risk beyond what is considered reasonable and acceptable and the provider becomes aware of that risk, it shall immediately investigate the causes, in collaboration with the reporting deployer, and other entities

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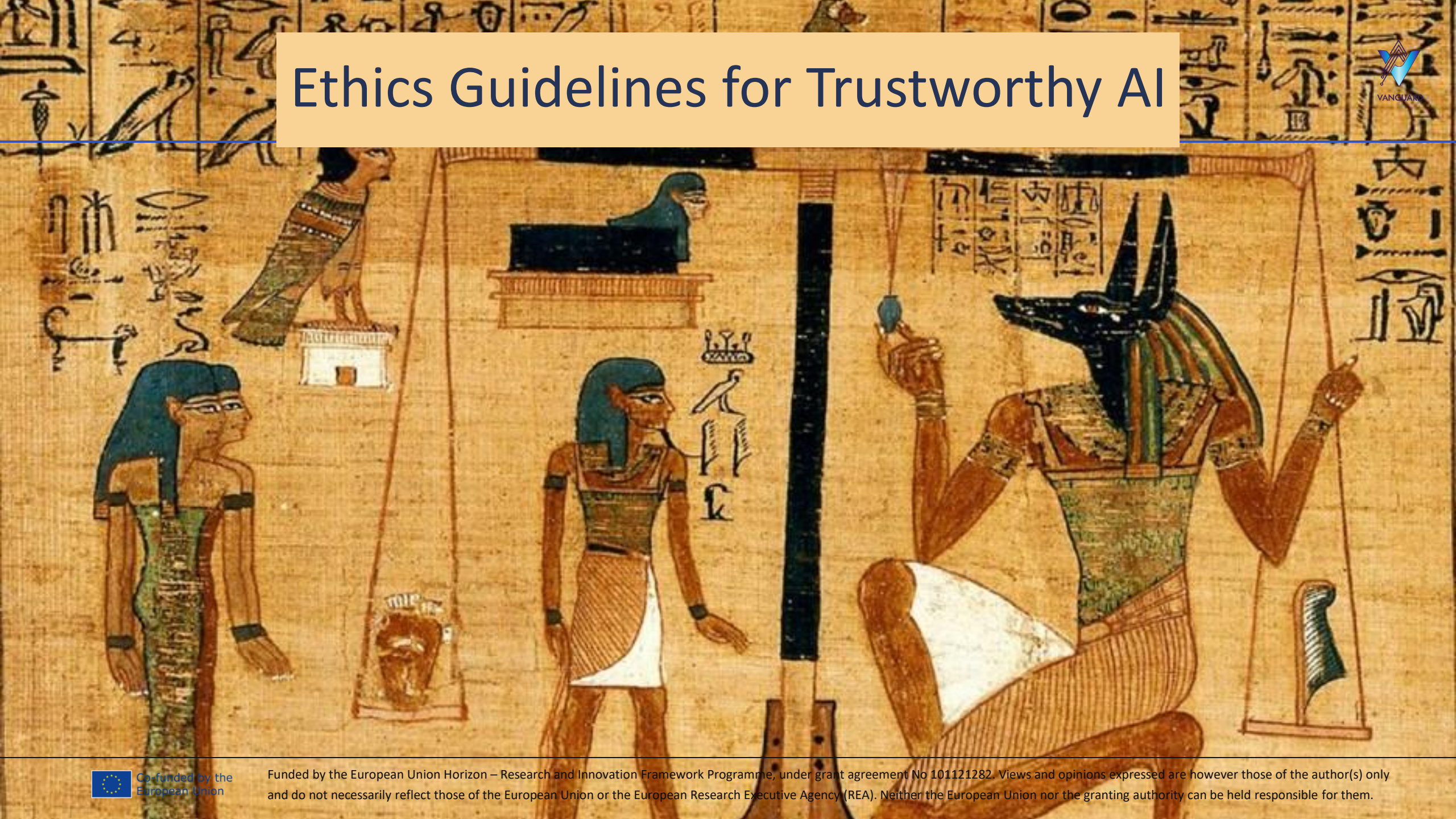
Ethics Guidelines for Trustworthy AI



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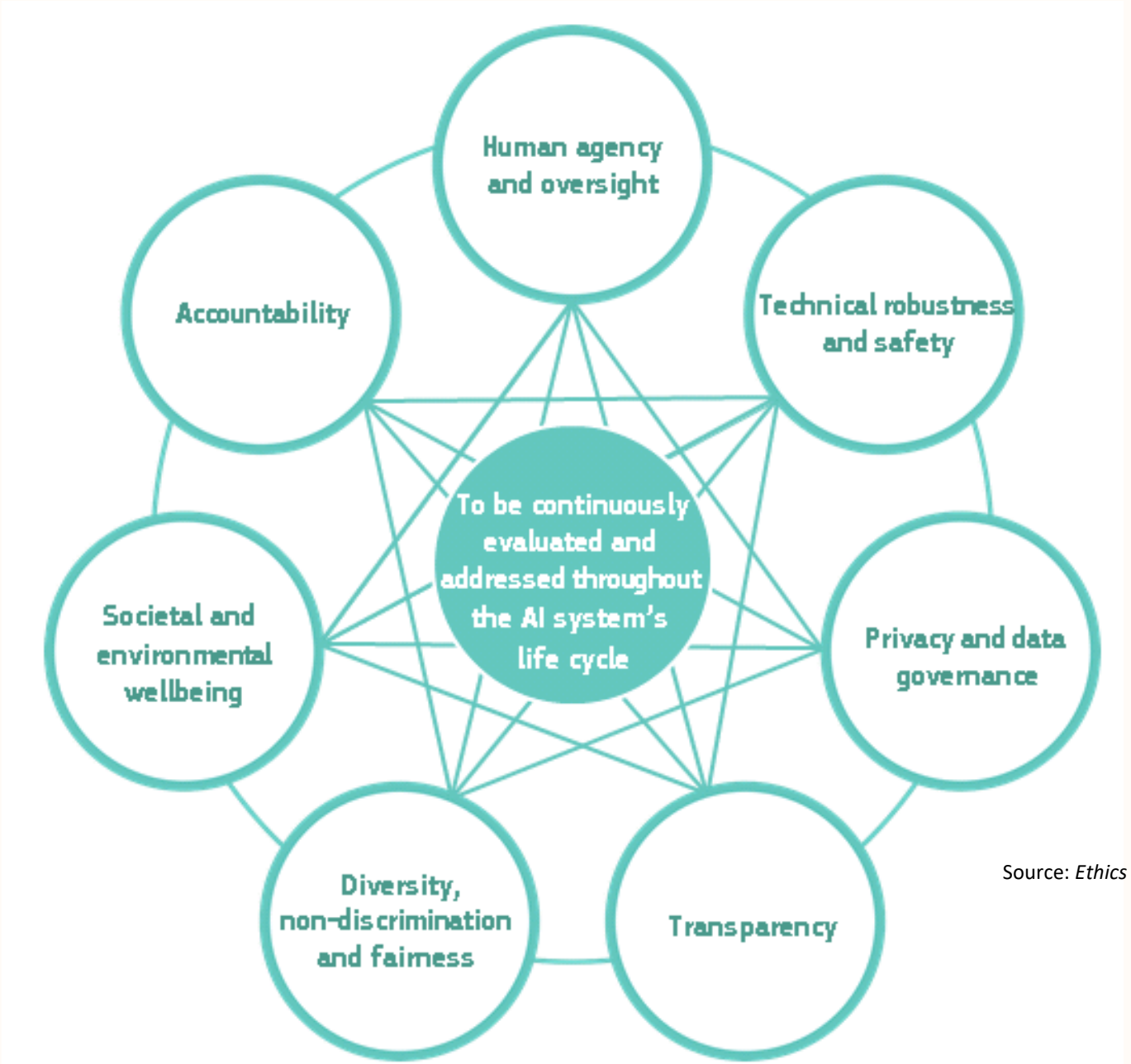

Source: *Ethics guidelines for trustworthy AI*

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Human agency and oversight = Human autonomy

- Fundamental rights
- Autonomous decision making
- Human oversight
  - Decision not to use an AI system in a particular situation
  - Levels of human discretion during the use of the system,
  - Ability to override a decision made by a system
  - LEAs: oversight in line with their mandate

Edward Hopper, *Cape Cod Morning* (1950)

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Technical Robustness and Safety = Prevention of Harm

- Resilience to attack and security
- Fallback plan and general safety
  - Minimisation of unintended consequences and errors
  - Processes to clarify and assess potential risks associated with the use of AI across various application areas
- Accuracy
- Reliability and Reproducibility.

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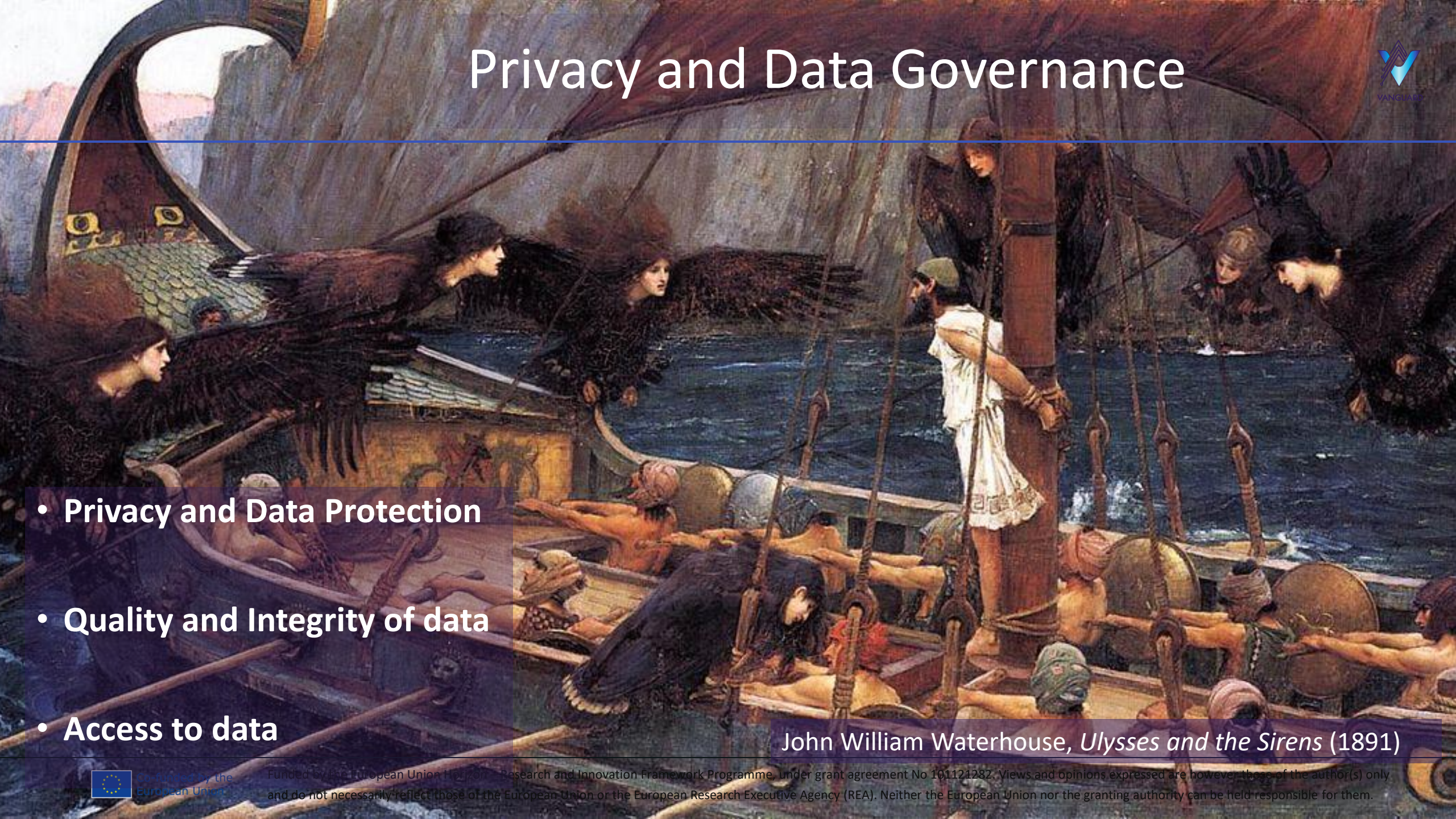
Privacy and Data Governance



- **Privacy and Data Protection**
- **Quality and Integrity of data**
- **Access to data**

John William Waterhouse, *Ulysses and the Sirens* (1891)

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Transparency = Principle of Explicability

- Traceability (documenting datasets, processes and decisions)
- Explainability
  - Technical processes traceable and understood by humans
  - Trade-offs between explainability and accuracy
  - The degree to which an AI system influences and shapes decision-making processes, design choices of the system, and the rationale for deploying it
- Communication
  - Humans must be informed that they are interacting with an AI
  - Option to decide against this interaction in favour of human interaction where needed to ensure compliance with fundamental rights.
  - AI system's capabilities and limitations should be communicated

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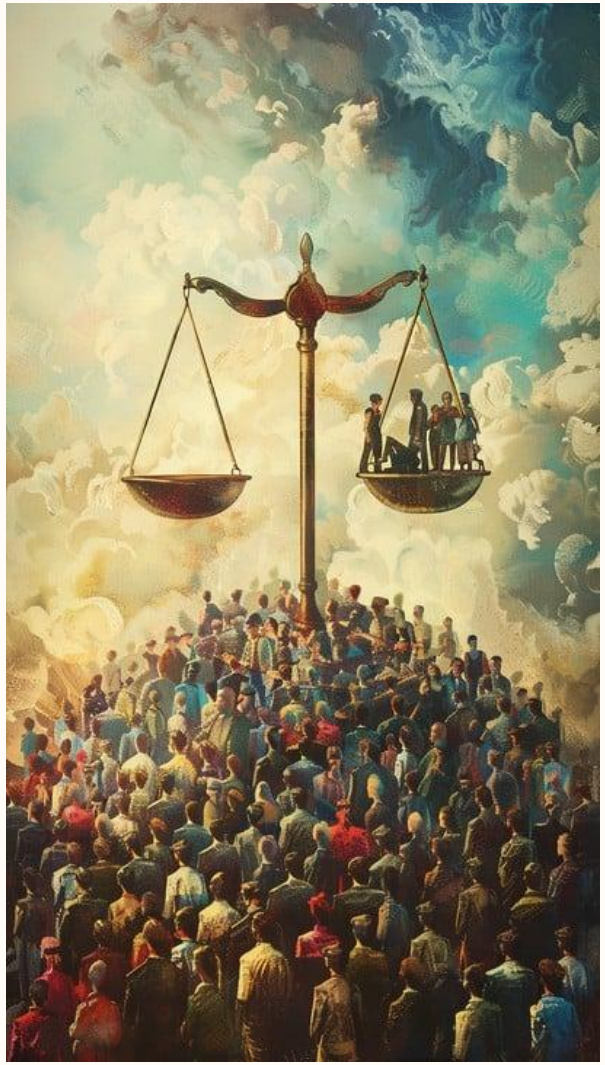
Diversity, non-discrimination and Fairness = Principle of Fairness

- Avoidance of unfair bias in data and algorithms
- Accessibility and universal design
- Stakeholder Participation



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Societal and environmental well-being

- Sustainable and environmentally friendly AI
- Social impact
- Society and Democracy

Claude Monet, The Artist's Garden at Vetheiul (1880)

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Accountability

- Auditability
- Minimisation and reporting of negative impacts
  - Algorithmic Impact Assessment
  - Due protection must be available for whistle-blowers, NGOs, trade unions or other entities when reporting legitimate concerns about an AI system
- Trade-offs (in light of ethical principles)
  - Decisions about trade-offs should be reasoned and properly documented.
  - The decision-maker must be accountable for the trade-off
  - Trade-offs should continuously be reviewed
  - Redress when unjust adverse impacts occur
  - When no ethically acceptable trade-offs can be identified, the development, deployment and use of the AI system should not proceed in that form

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Technical Methods

- Architectures for Trustworthy AI
  - White and black list rules
  - Sense-plan-act
- Ethics and Rule of Law by Design
  - Fail-safe shutdown
  - Resume operation after forced shutdown
- Explanation Methods
- Testing and Validating
  - Monitoring models
  - Ensure that the outcome of the planning process is consistent with the input
  - Data, pre-trained models, environments and the behaviour of the system as a whole
  - Adversarial testing, bug bounties
- Quality of Service Indicators

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Non-Technical Methods

- Regulation
- Codes of Conduct
- Standardisation
- Certification
- Accountability via governance frameworks
- Education and awareness to foster an ethical mindset
- Stakeholder participation and social dialogue
- Diversity and inclusive teams

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Thank you for your attention!
Questions?

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