



# We are *numalis*

## Trustworthy company you can rely on

### French Deeptech founded in 2015

- 23 FTE with  $\frac{3}{4}$  of engineers and PhD
- 10 innovation awards
- Editor of the static analyzer for AI: Saimple®

### Experts in formal methods

- More than 2 decades of R&D
- More than 40 published scientific articles

### Experts in AI standardization

- Active member of standardization bodies: ISO/IEC, CEN-CENELEC, AFNOR...
- Major contributor to ISO/IEC 24029 series on robustness assessment of AI systems

## High-level experts team



- Standardization expert
- R&D team expanding the state of the art
- Scale up technology team
- Industrialization team
- Use case support team

# We Believe

That AI has numerous applications that can benefit the most,  
but it's facing **trust** challenges **preventing** its **adoption**...



**In critical applications,  
“probably” safe is unacceptable**

# Our Mission

Help industry streamline the development and confident adoption of trustworthy & regulatory compliant AI systems

**To do so Numalis endorses two key roles:**

Establishing rigorous framework described in international standards on AI



Products and services to control the risk using validation tools and proper skill management

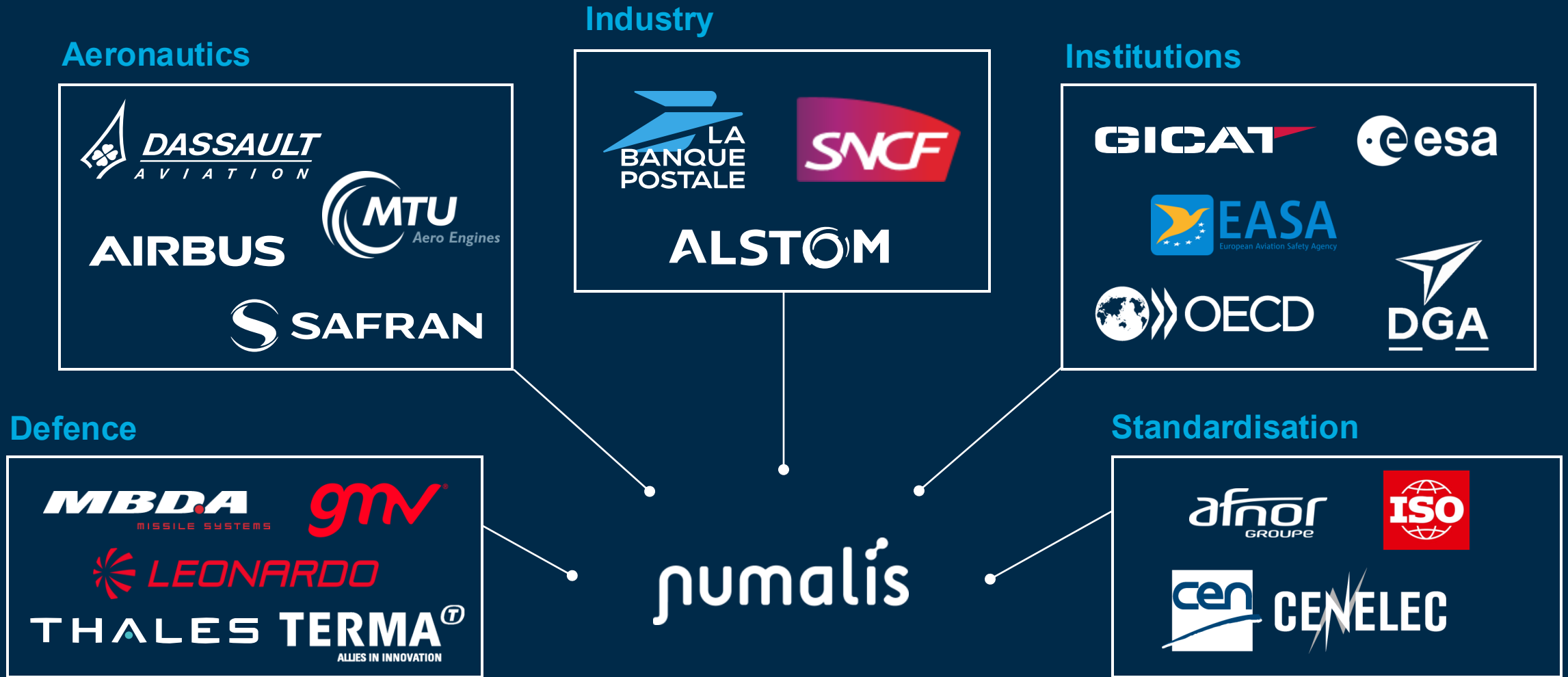


AI validation software






AI Competence Certification

# Our Partners and Clients



# High-Level Structuring Projects

Prime	Name	Objective
	MLEAP	Applicability of the EASA guideline for certification of AI avionic models
	NoLeFa	Developing the framework for notified bodies regarding the AI Act
	JEY CUAS	Specification of anti-drone systems
	AI4DEF	Methodology and tool for an AI for Defence platform
	CONVOY & GENIUS	Detection & neutralization of IED
	TELLi	Self piloting trains
	AITIVE	Validation of embedded AI system for space exploration

# **Standardization & EU Regulatory Landscape**

# The EU AI Act, a Risk Based Approach



**Prohibited AI practices:**  
Unacceptable risk Art. 5

**High-risk:**  
High-risk AI systems Art. 6

**Transparency:**  
Limited-risk AI systems Art. 52

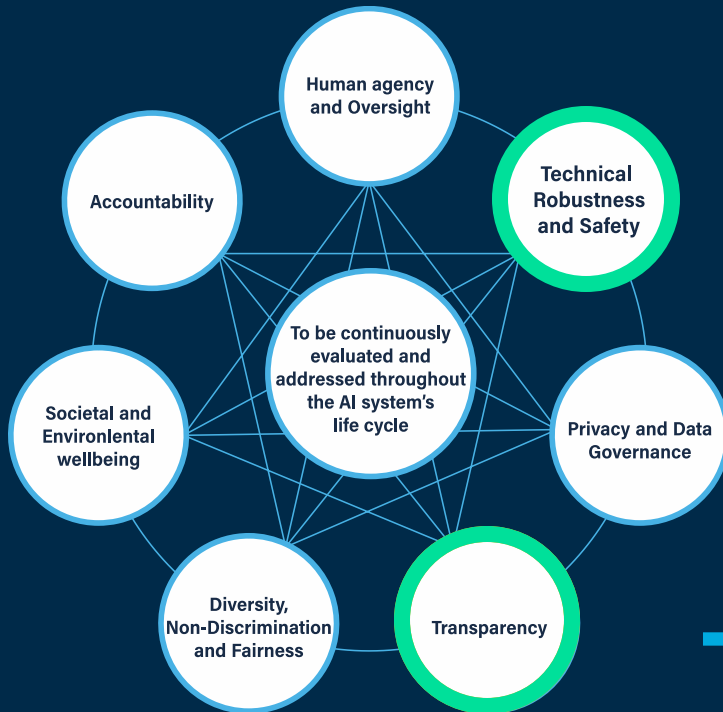
**No obligations:**  
Low or minimal-risk AI systems Art. 69



Trustworthy AI  
Source: HLEG, EU



# Key Challenges we Address



## We help prove AI model readiness for real world applications

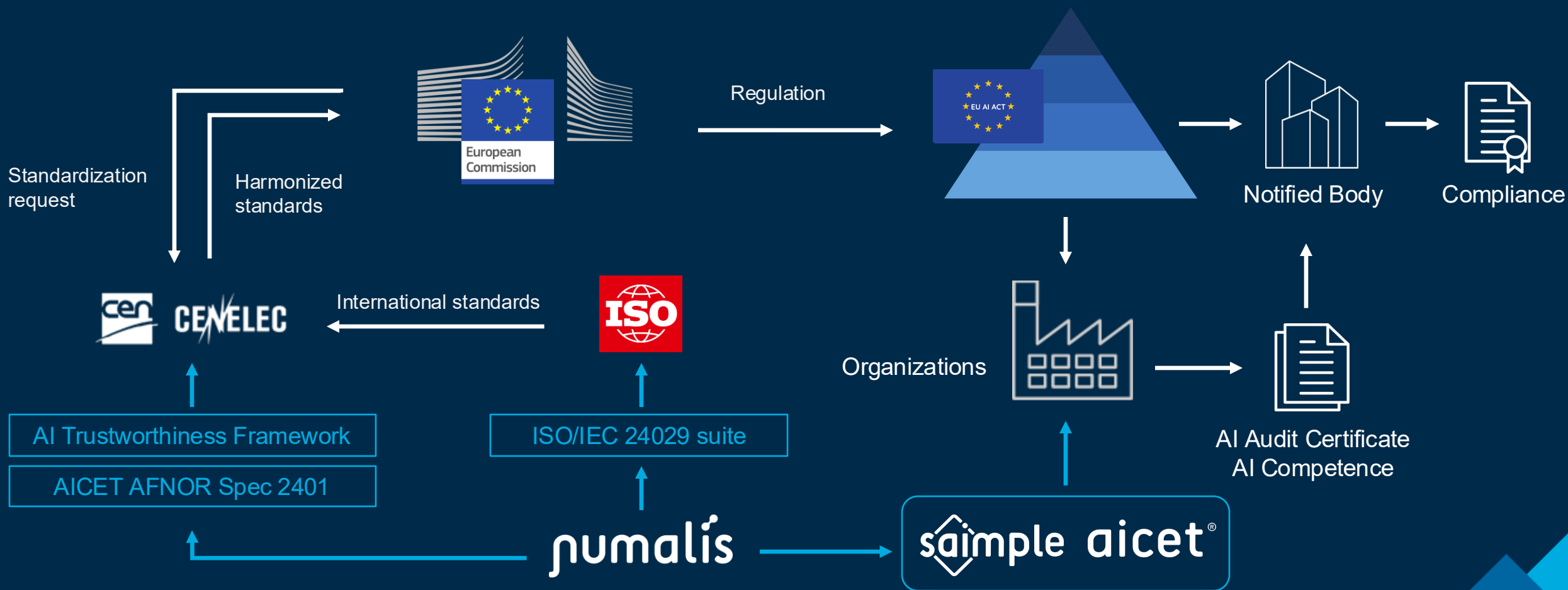
Using state-of-the-art techniques described in the standards, based on formal methods and abstract interpretation, we help demonstrate model ability to maintain stable decisions despite perturbations on inputs.

## We help explain AI model decisions in human-understandable way

We help demonstrate model's trustworthiness through formal proof, ensuring transparency and accountability. By explaining how models function and make decisions, we enable to build trust, detect biases, and comply with regulations, improving both user confidence and system reliability.

# EU AI Act mechanics

The regulation is implemented through harmonized standards produced by CEN and CENELEC using ISO documents. For robustness, the Trustworthiness Framework lays out the requirements and refers to the ISO/IEC 24029 standards, which Saimple ensures compliance with.

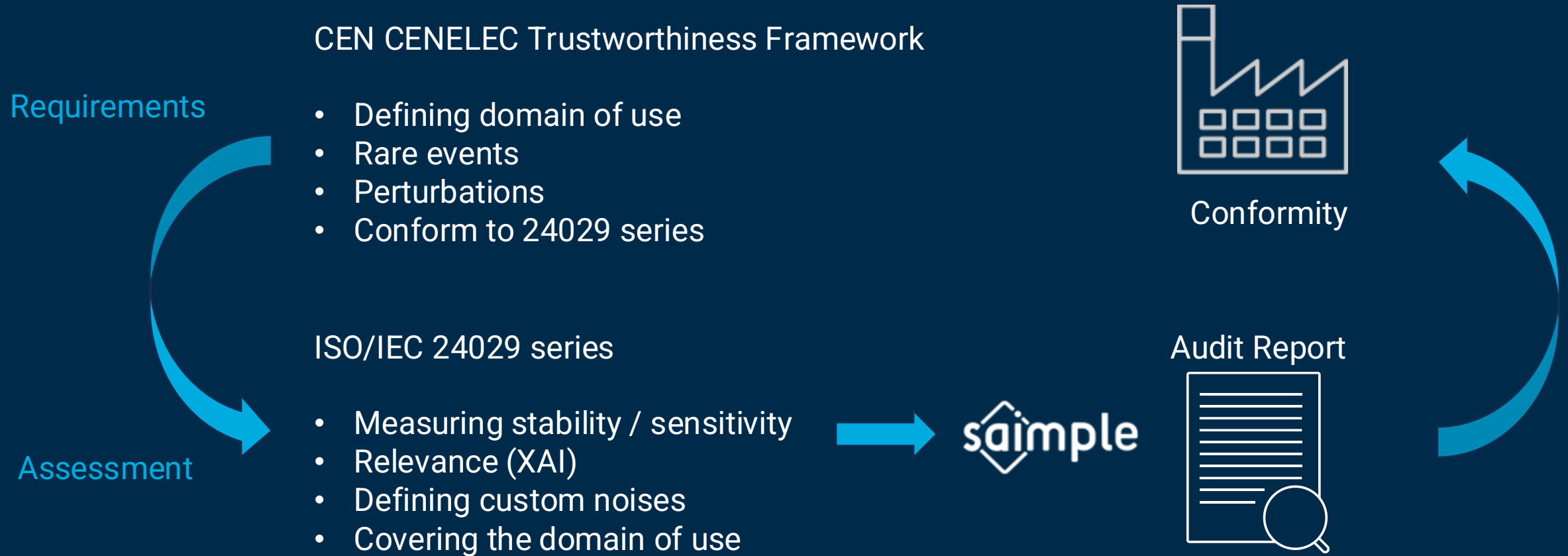




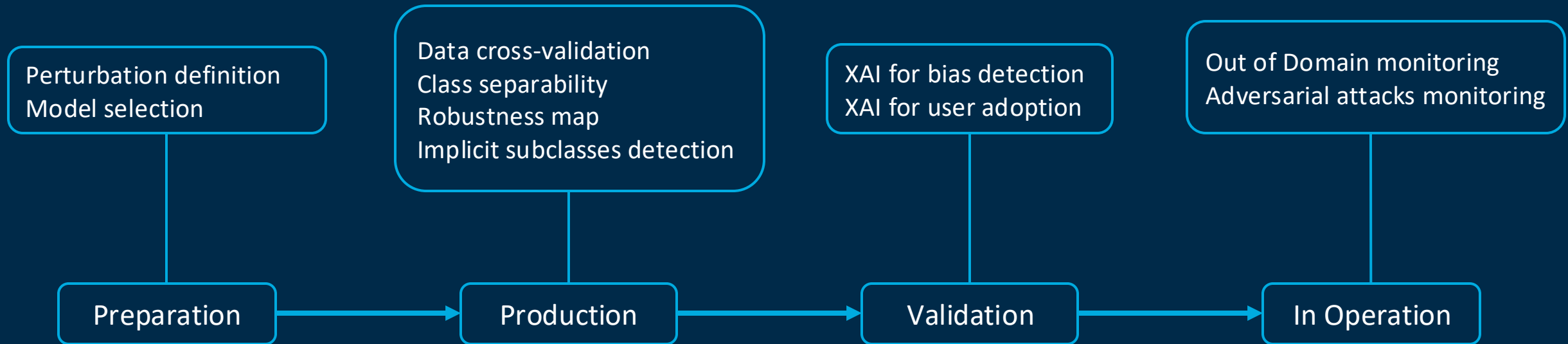
# Set of Tools for Achieving Trustworthy AI Models

Neural Network Explainability and Robustness Validation Solutions

# Robustness' standards and saimple



# Lifecycle-Based Verification Framework for Trustworthy AI Systems



# saimple main features

## Preparing

### Applications :

- Domain specification
- Custom perturbation
- Training and support

### Use :

- Expert at your disposal
- Fully scriptable tool

## Evaluating

### Applications :

- Understand the model behavior
- Identify bias
- Visualize input space robustness

### Use :

- CI/CD integration
- Full automation

## Correcting

### Applications :

- Detect unbalanced robustness
- Identify errors in the training set
- XAI to adjust your training set
- Guide your data augmentation

### Use :

- Before/After comparison
- Trigger correction request

## Documenting

### Applications :

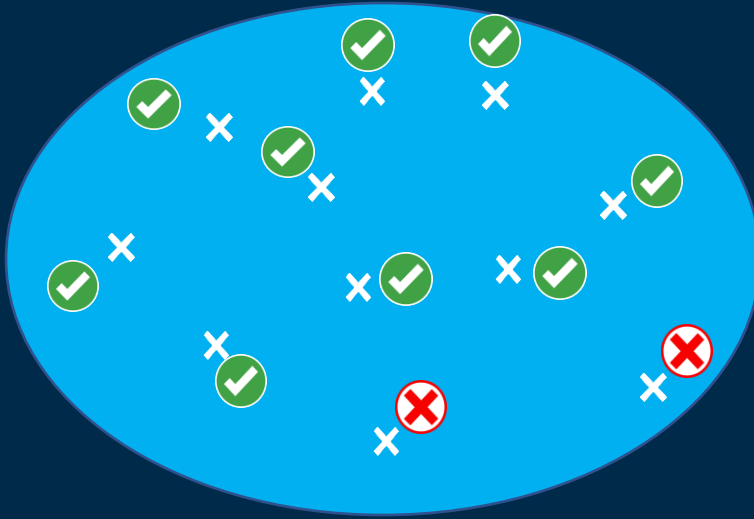
- Document testing procedure
- Validation process progress
- Impact of correcting actions

### Use :

- Report generation
- Dashboard visualization
- Requirements traceability

# Using saimple in your existing process

Statistical  
methods



TESTING

- Accuracy
- Recall
- F1-score
- AUC
- ...

Existing metrics

Audit Report



 saimple

Formal  
methods



PROVING

**Robustness**

- Stability
- Sensitivity
- Reachability

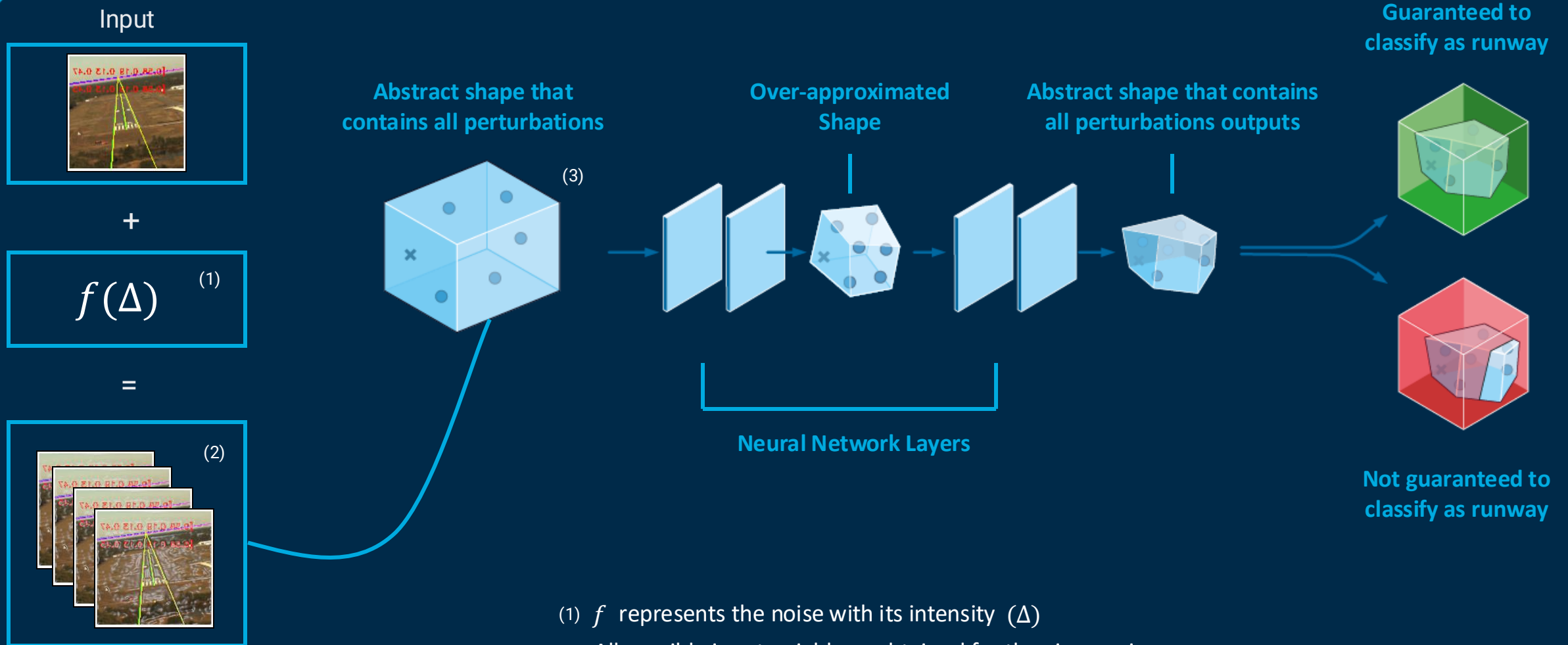
**XAI**

- Relevance

New metrics

# Model Robustness Validation Principle

Based on ISO/IEC 24029-2

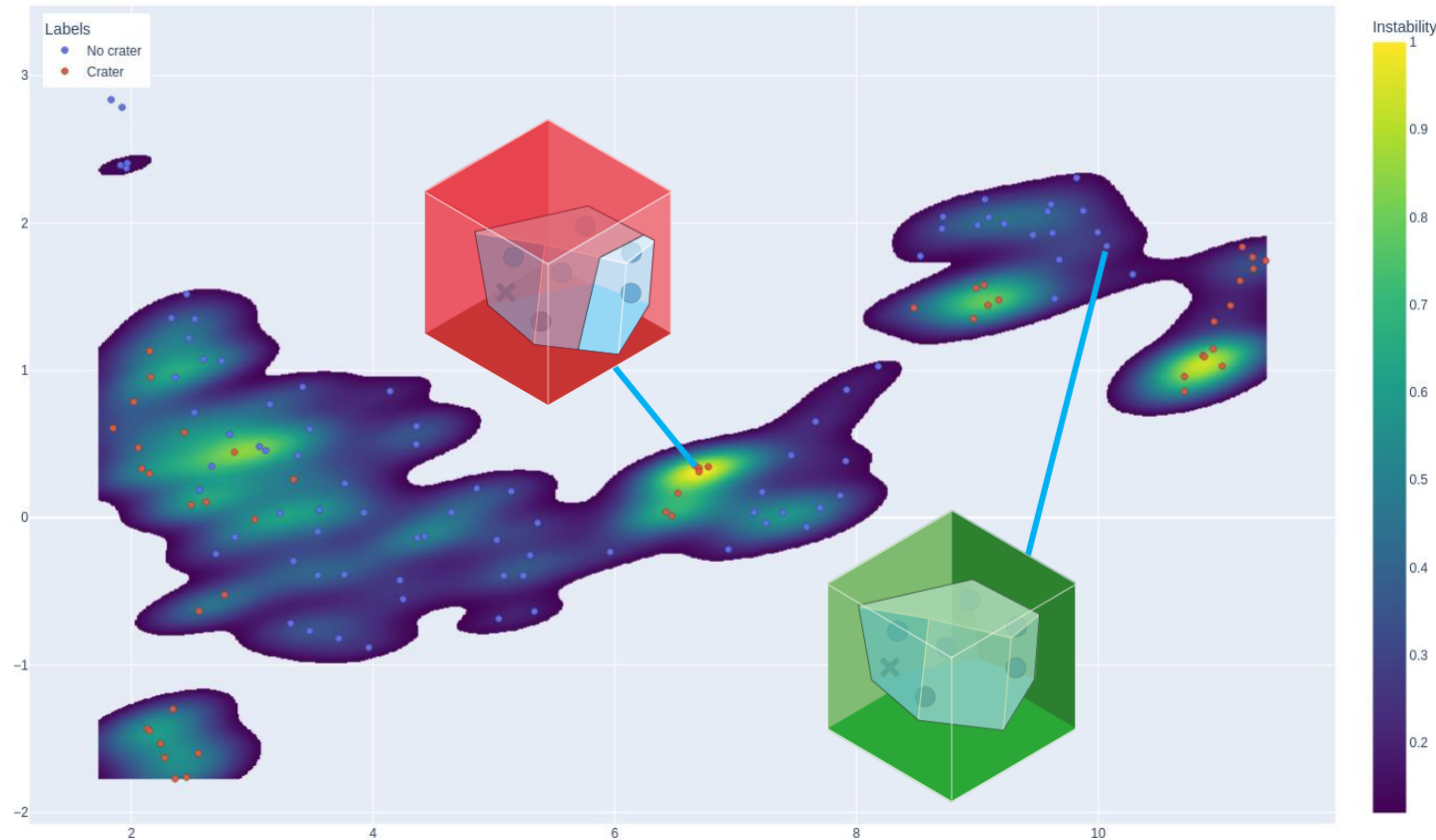


- (1)  $f$  represents the noise with its intensity ( $\Delta$ )
- (2) All possible input neighbors obtained for the given noise
- (3) Mathematical object containing all possibilities



# Robustness Map Visualization

UMAP Density Mapping of Model Representations by Delta max

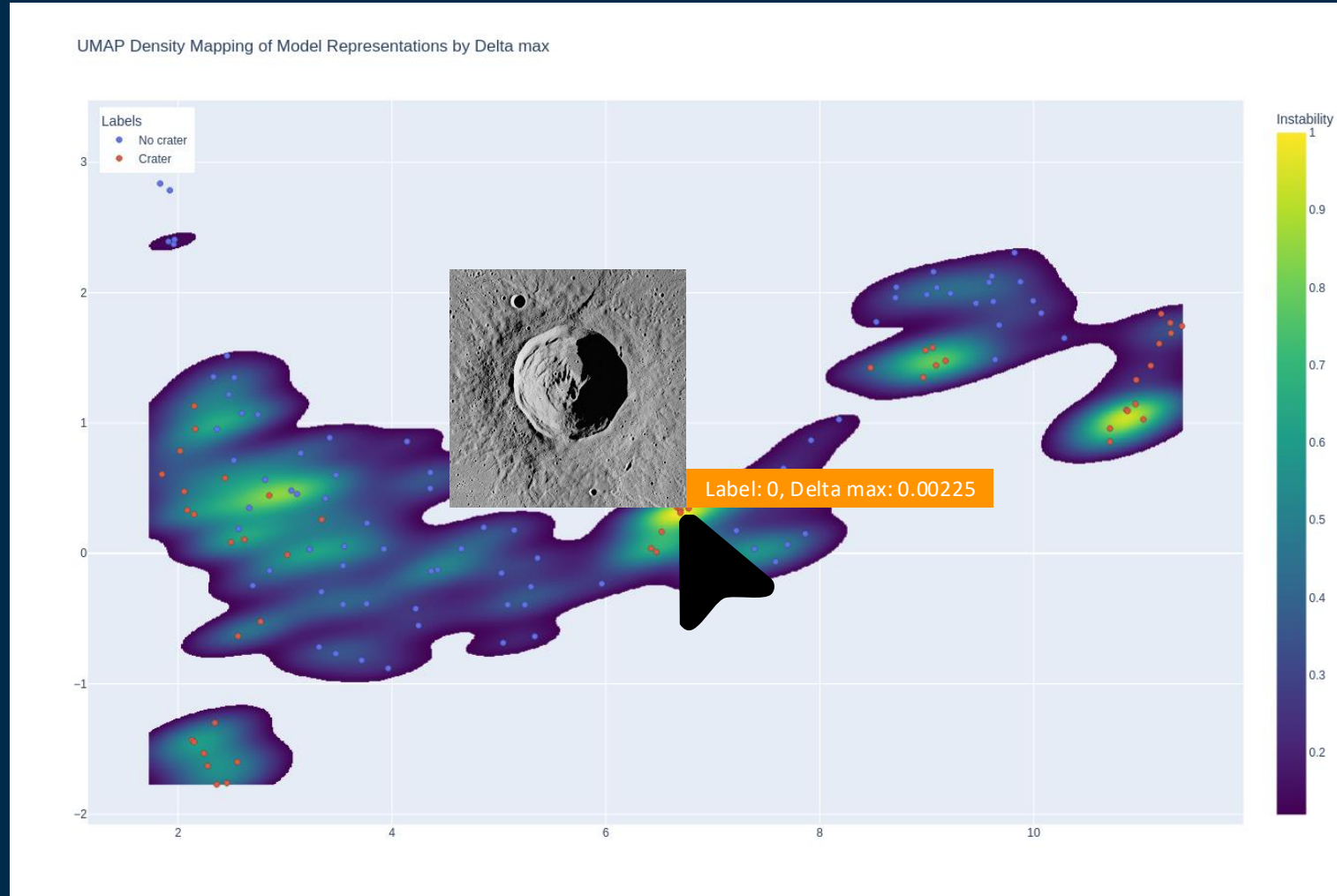


## Feature

The robustness map visualization allows users to quickly identify robust and weak areas across the input domain for each data point from the validation dataset.

The more yellow a cluster is, the more unstable its data points; the more blue it is, the more stable they are.

# Robustness Map Visualization

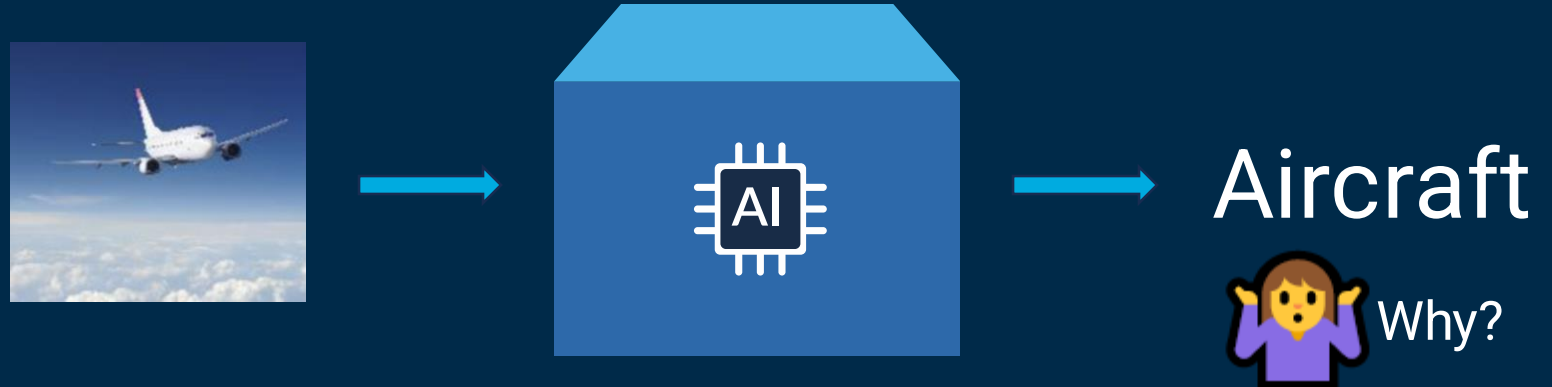


## Feature

Get valuable insights to guide improvement efforts by inspecting each data point with relevant information

# Explainability (XAI) Feature

Move from opaque decisions

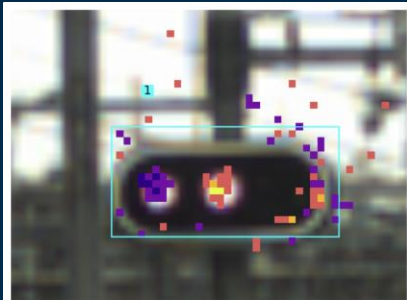


To explainable decisions

Saimple helps you validate your model decisions through human-understandable visualizations

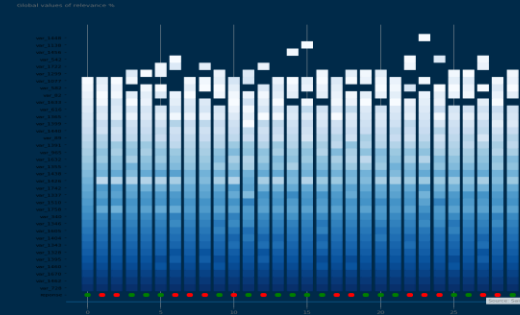


# Applicability of our Technology



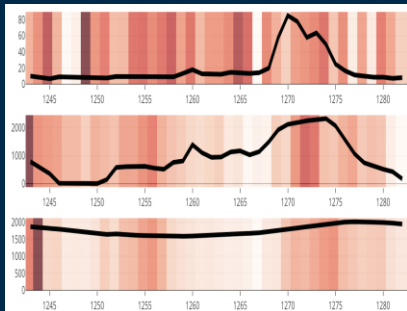
## Computer vision

- Classification
- Detection
- Segmentation
- Industrial quality check



## Tabular Data

- Scoring / Finance
- Pattern identification
- High level XAI



## Time Series

- Predictive maintenance
- Anomaly detection
- Acoustic oversight
- Medical diagnostic



## NLP (on going R&D)

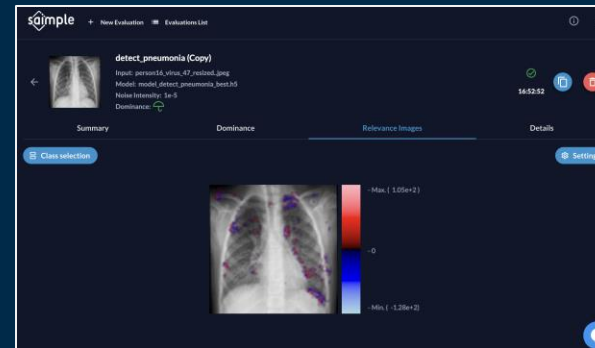
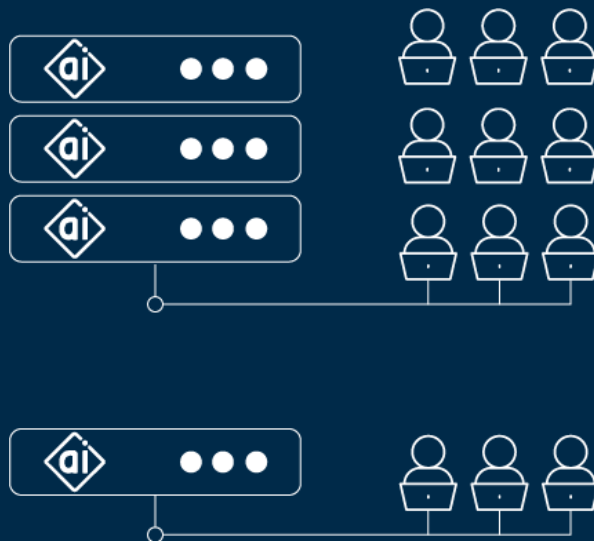
- Conversational AI
- Speech to text
- Report summary

## Supported models

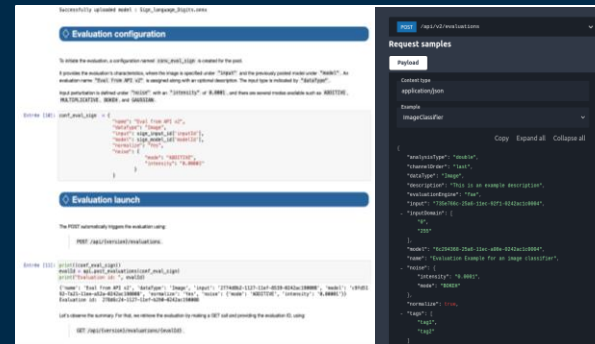
- Neural Networks (Convolutional, Recurrent, Residual, Detectors)
- Support Vector Machine, random forest, decision trees

# A Versatile Solution

Highly scalable solution available on-premise or secured HPC SaaS

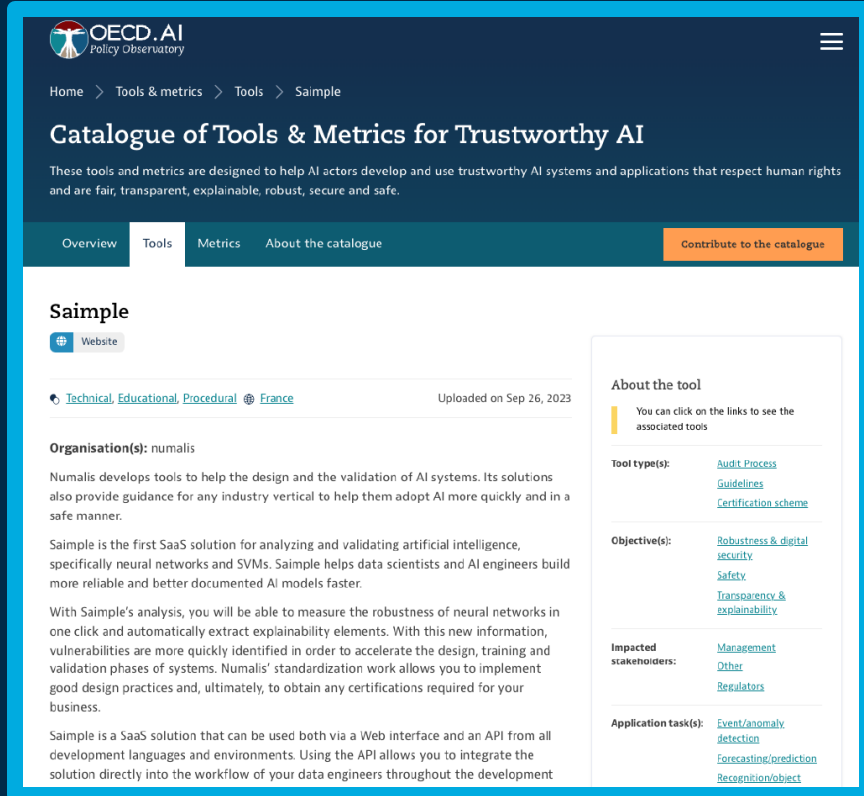


Comprehensive & easy to use GUI



Easy integration in any development environment with API and SDK

# Proudly Featured On



The screenshot shows the OECD.AI Policy Observatory website. The main heading is "Catalogue of Tools & Metrics for Trustworthy AI". Below this, a navigation bar includes "Overview", "Tools", "Metrics", and "About the catalogue". The "Tools" tab is selected. The tool "Saimple" is featured, with a description: "These tools and metrics are designed to help AI actors develop and use trustworthy AI systems and applications that respect human rights and are fair, transparent, explainable, robust, secure and safe." The tool is categorized as "Technical, Educational, Procedural" and "France". It was uploaded on Sep 26, 2023. The description states: "Numalis develops tools to help the design and the validation of AI systems. Its solutions also provide guidance for any industry vertical to help them adopt AI more quickly and in a safe manner. Saimple is the first SaaS solution for analyzing and validating artificial intelligence, specifically neural networks and SVMs. Saimple helps data scientists and AI engineers build more reliable and better documented AI models faster. With Saimple's analysis, you will be able to measure the robustness of neural networks in one click and automatically extract explainability elements. With this new information, vulnerabilities are more quickly identified in order to accelerate the design, training and validation phases of systems. Numalis' standardization work allows you to implement good design practices and, ultimately, to obtain any certifications required for your business. Saimple is a SaaS solution that can be used both via a Web interface and an API from all development languages and environments. Using the API allows you to integrate the solution directly into the workflow of your data engineers throughout the development". The "About the tool" section includes links for "Tool type(s)", "Objective(s)", "Impacted stakeholders", and "Application task(s)".

OECD.AI catalogue of trustworthy AI development tools



The screenshot shows the CONFIANCE.AI website. The main heading is "Saimple". Below this, a navigation bar includes "Overview", "Tools", "Metrics", and "About the catalogue". The "Tools" tab is selected. The tool "Saimple" is featured, with a description: "These tools and metrics are designed to help AI actors develop and use trustworthy AI systems and applications that respect human rights and are fair, transparent, explainable, robust, secure and safe." The tool is categorized as "Technical, Educational, Procedural" and "France". It was uploaded on Sep 26, 2023. The description states: "Numalis develops tools to help the design and the validation of AI systems. Its solutions also provide guidance for any industry vertical to help them adopt AI more quickly and in a safe manner. Saimple is the first SaaS solution for analyzing and validating artificial intelligence, specifically neural networks and SVMs. Saimple helps data scientists and AI engineers build more reliable and better documented AI models faster. With Saimple's analysis, you will be able to measure the robustness of neural networks in one click and automatically extract explainability elements. With this new information, vulnerabilities are more quickly identified in order to accelerate the design, training and validation phases of systems. Numalis' standardization work allows you to implement good design practices and, ultimately, to obtain any certifications required for your business. Saimple is a SaaS solution that can be used both via a Web interface and an API from all development languages and environments. Using the API allows you to integrate the solution directly into the workflow of your data engineers throughout the development". The "About the tool" section includes links for "Tool type(s)", "Objective(s)", "Impacted stakeholders", and "Application task(s)".

CONFIANCE.AI catalogue of trustworthy AI development tools

# Integrated in IBM watsonx.governance





# Raising AI Maturity Across the Board

By helping build state-of-the-art Governance, Risk and Compliance framework

## Organization

**pumalis**

Use for :  
Compliance to art. 9 of AI Act

How :

- Consulting
- Auditing
- Training

## People and Process

**aicet<sup>®</sup>**

Use for :  
Compliance to art. 4 of AI Act

How :

- Competence inventory
- Competence evaluation
- Competence certification

## Product

**saimple**

Use for :  
Compliance to art. 15 of AI Act

How :

- Robustness validation & XAI
- Licensing SaaS / on-prem
- Maintenance and training



# Thank you for your attention

+33 (0)4 67 15 10 78  
[contact@numalis.com](mailto:contact@numalis.com)