TIKOS®

Build Trustworthy AI.

TIKOS®.

TIKOS® is a software platform for testing & monitoring AI models
To comply with Trustworthy/Responsible AI requirements.

High stakes and regulated environments
Financial Services, Defence, Healthcare

VC-backed, Team of 5, Jan 2024

NVIDIA INCEPTION PROGRAM · Ministry of Defence · FCA Digital Sandbox · bsi. British Standards Institution Committee Member · Crown Commercial Service Supplier · CYBER ESSENTIALS PLUS · International Association for Safe & Ethical AI

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Trustworthy AI – What is it, Where did it come from?

Fair & Unbiased Mitigate model and data bias to ensure fair, non-discriminatory outcomes

Transparent & Explainable Record processing & provide justified, verified decision explanations

Accurate, Safe & Robust Perform reliably, resist errors & misuse, operate without causing harm

Accountable Enable human oversight and accountability, with contestable outputs

OECD unesco

2019+ **Supra-national bodies**
Issue AI principles

HM Government

2020+ **Territorial Laws & Policies**
UK, principle-based
EU, law-based (EU AI Act)

FCA FINANCIAL CONDUCT AUTHORITY
Ministry of Defence MHRA

2022+ **Specific Guidance**
Sector regulators, agencies

ISO

2024+ **Standards, Internal Policies**
Int. standard frameworks
AI, data, procurement policies
SLAs, insurance contracts

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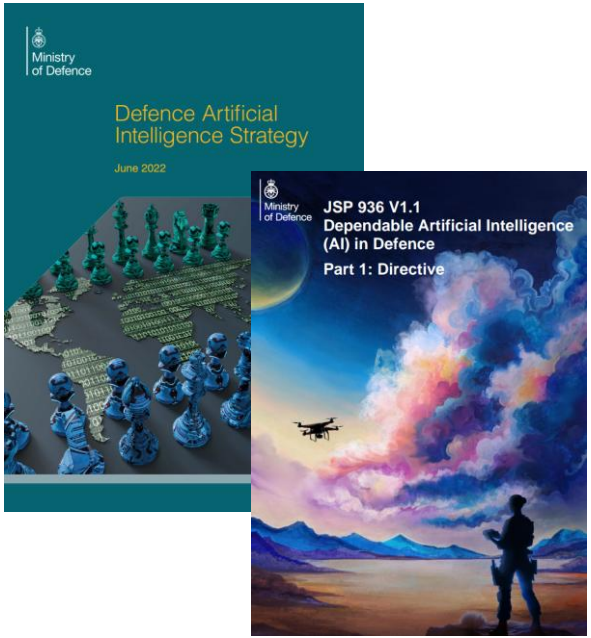
An Example From Defence.



JSP 936 v1.1 Dependable Artificial Intelligence (AI) In Defence Directive, Nov '24

Human-centricity. The impact on humans **MUST** be assessed and considered…

Responsibility. Human responsibility **MUST** be clearly established… with clearly defined means by which human control is exercised…

Understanding. Systems and outputs, **MUST** be appropriately understood.., understanding made an explicit part of system design.

Bias and harm mitigation. Those responsible **MUST** proactively mitigate the risk of unexpected or unintended biases or harms…

Reliability. Systems **MUST** be demonstrably reliable, robust and secure.

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Unique Technology, Deep Expertise.

Competitors
input > output
closed box techniques

TIKOS
input > internals > output
open box techniques

Original research: 10-year research career (PhD) in AI transparency, reasoning, & explainability

3 components, IP owned outright by TIKOS and each subject to patent applications.

Dr. Don Liyanage, PhD
Co-Founder
CTO & Chief Scientist

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TIKOS® High-Performance AI Assurance Tech.

1. 

Model Internals Tracing

Compatible with all models: ML/DL/LLMs (open-weights).
100% model decision transparency & logging.
(Synapses Logger, patent-pending)

2. 

Decision Reasoning & Explainability

Mathematically robust reasoning drives explanations.
(Sequential Collection, patent-planned.)

3. 

Distributed Processing

Information minimization, computation optimisations, ensures scaling. *(ReduceBySC, patent-planned.)*

Accurate, auditable ‘chain of custody’ for every decision

100% transparency of model operations

Mathematically robust, justifiable decision explanations

Identify & rectify model bias, fragility, inaccuracy, etc.

Build compliant models or upgrade existing models

TIKOS® AI Assurance software. Demonstrate your AI systems are fair, safe, transparent and explainable

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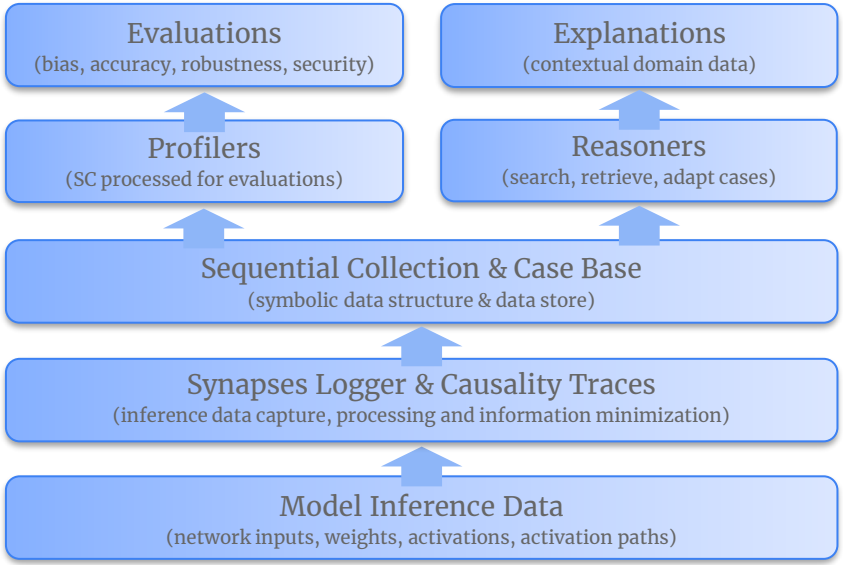
Product Propositions.



Model inference data is capture, transformed and optimised into 3 distinct products to help risk, product and technical teams – all rooted in a single source of truth.

TIKOS® Evaluate

Testing, Audit, Assessment

Helping GRC teams quickly access, analyse and report AI systems for all relevant regulations.

TIKOS® Explain

Monitoring, Transparency, Explainability

Helping product and ops managers evidence their AI systems are trustworthy in every single run.

TIKOS® Explore

Developer Kit

Helping tech teams bake in best-in-class AI model and system compliance from day one.

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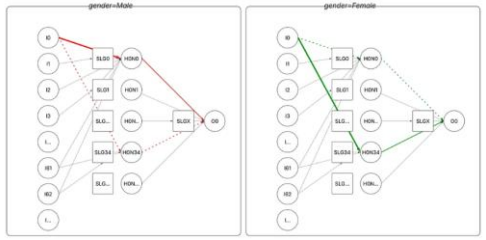
Example Use Cases.

1 **Model Bias (ANN)**

Read about our tests

From hints to hard evidence: finally, how to find and fix model bias in DNNs

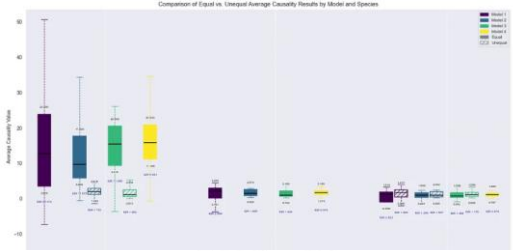


Identify exact neurons causing biased outcomes and directly edit model weights to remedy, then monitor in live deployments for algorithmic bias.

2 **Model Robustness (ANN)**

Read about our tests

TIKOS spots neural network weaknesses before they fail

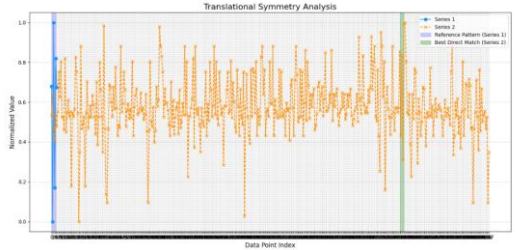


Evaluate model candidates for brittleness, remedy to ensure stability in production, then monitor in live deployments

3 **Guard-railing (LLM)**

Read about our tests

Your LLM is confidently wrong. Here's how to fix it



Analyse inference data (model internals) and implement guardrails to mitigate hallucinations, system misuse & security vulnerabilities.

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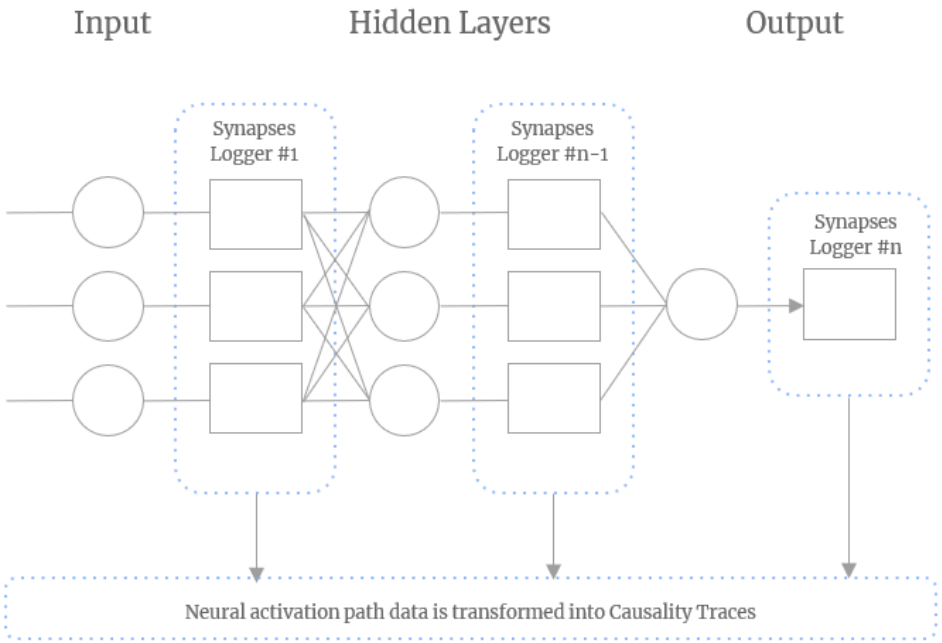
Causality Traces.



At inference, Synapses Logger collects and processes neural network node inputs, weights, activations and outputs Causality Traces.

Synapses Logger is not a wrapper around an artificial neural network but embedded into the information flow of the neural activation process.

Causality Traces are analysed with TIKOS® evaluation tools – see over

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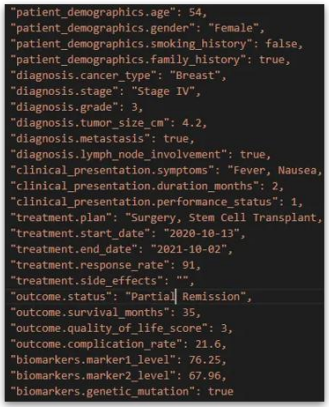
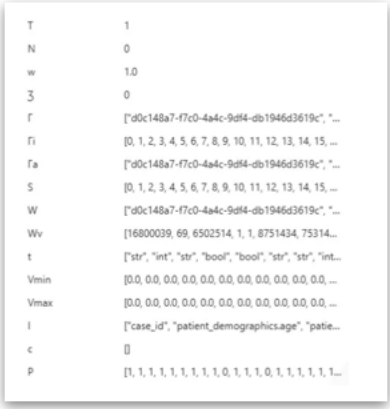
Mathematically Backed Reasoning.



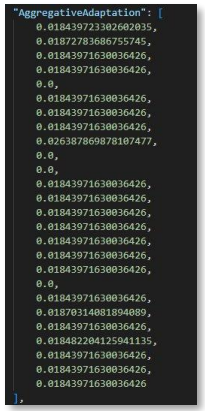
A ‘Case’ can contain any data, including Causality Traces

1



Cases are serialised into the Sequential Collection data structure

2



Closest solutions adapted to output final solution case

3

Cases are serialised into a proprietary data structure - ‘Sequential Collection’ - and maintained in a case-base of previous solutions. Cases can be comprised of any data types, including standard ML, DL, LLM model inference data – including Synapses Logger data.

Different reasoners are available for searching the case-base and for matching and adapting previous cases. This process controls the reasoning process which always has a mathematical basis.

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Robust Explanations.


```
"AggregativeAdaptation": [
    0.018439723302602035,
    0.018727836867557745,
    0.01843971630036426,
    0.01843971630036426,
    0.0,
    0.01843971630036426,
    0.01843971630036426,
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    0.026387869078107477,
    0.0,
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    0.01843971630036426
],
```
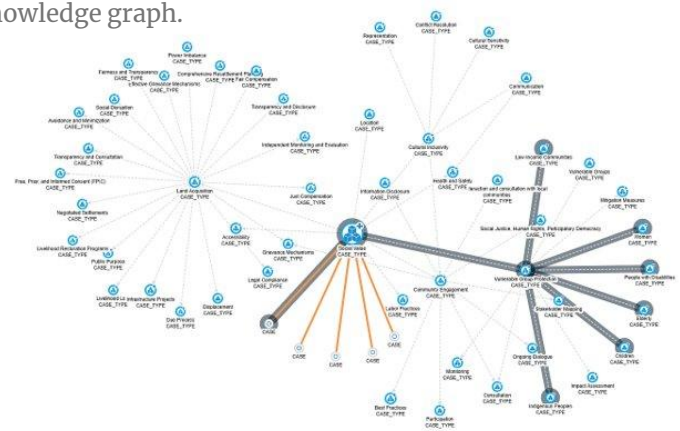


Adaptation of Cases guides traversal of knowledge graph.



"The cancer case involves Stage IV breast cancer in a 54-year-old female with a family history of cancer, indicating a genetic predisposition. Biomarkers play a critical role, particularly HER2 overexpression (Marker2), which necessitates targeted therapy like trastuzumab. The high Marker1 level also aligns with hormone receptor positivity, potentially influencing prognosis and treatment strategies."

To output (via NLP/LLM) a natural language context aware explanation.

Case adaptation data (output from the reasoning process) is used to create robust, justified explanations for each AI decision.

The adaptation data guides a search over a knowledge graph which contains features from the AI/ML model, as well as contextual information representing the problem domain.

The final output can be a natural language explanation curated by an NLP process.

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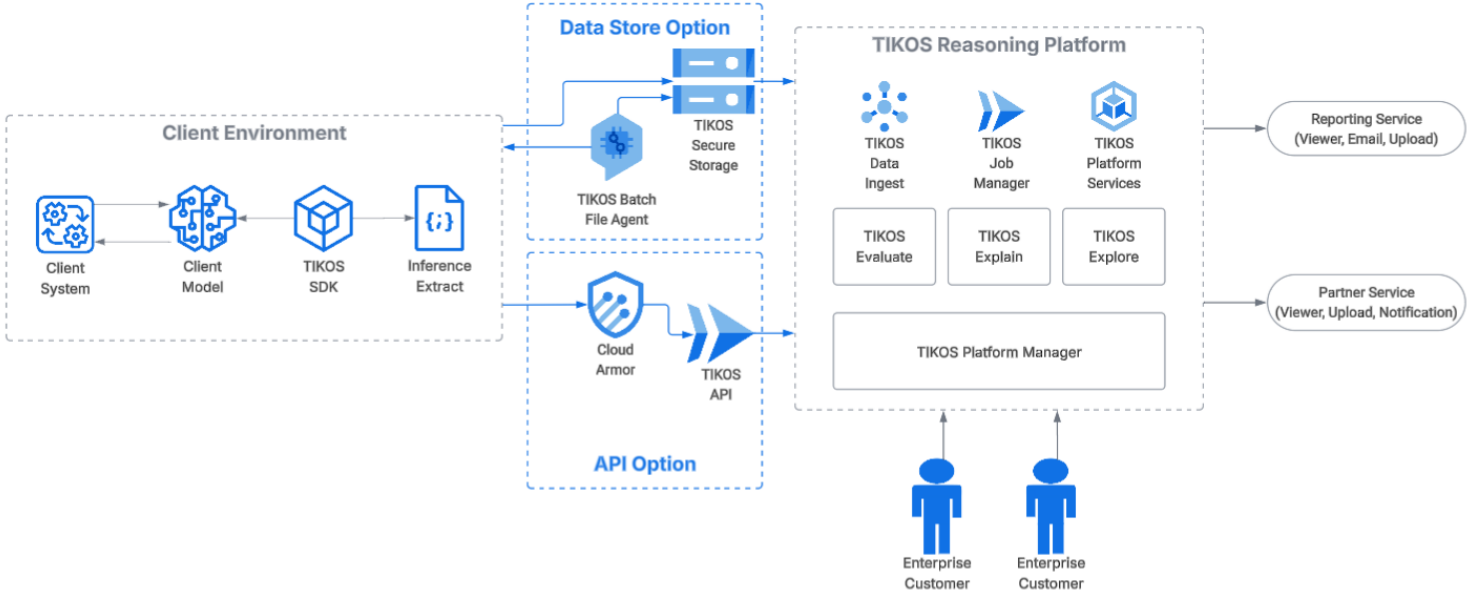
Deployment.



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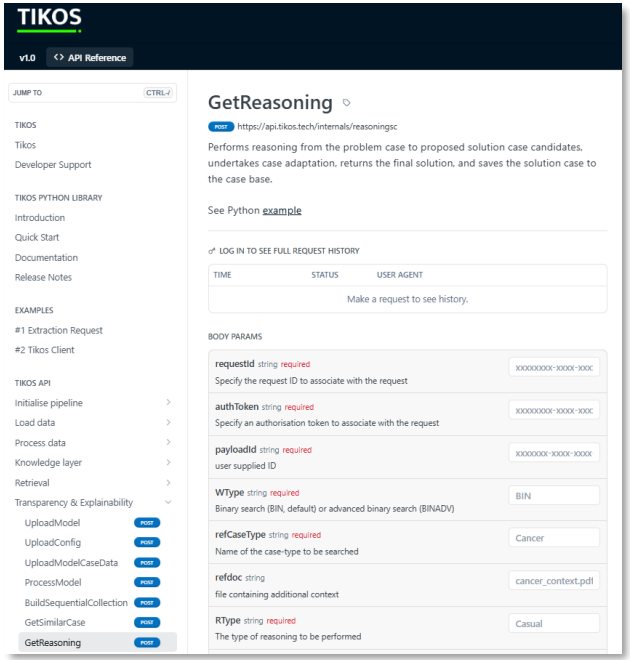
API & Platform.



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Next Steps.

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https://calendly.com/mike-oaten/

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