



Build Trustworthy AI.



**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



# 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



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



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

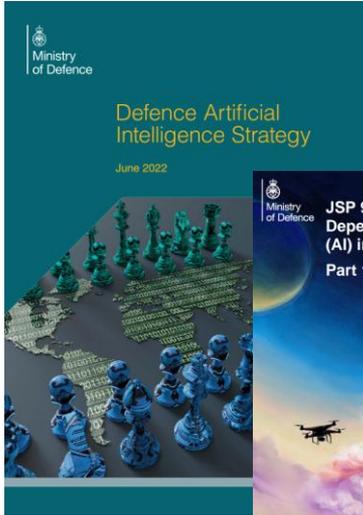


**2022+** **Specific Guidance**  
Sector regulators, agencies



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

# 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.

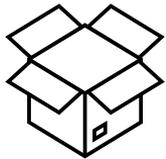
**Bias and harm mitigation.** Those responsible **MUST** proactively mitigate the risk of unexpected or unintended biases or harms...

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

# 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



# TIKOS<sup>®</sup> 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

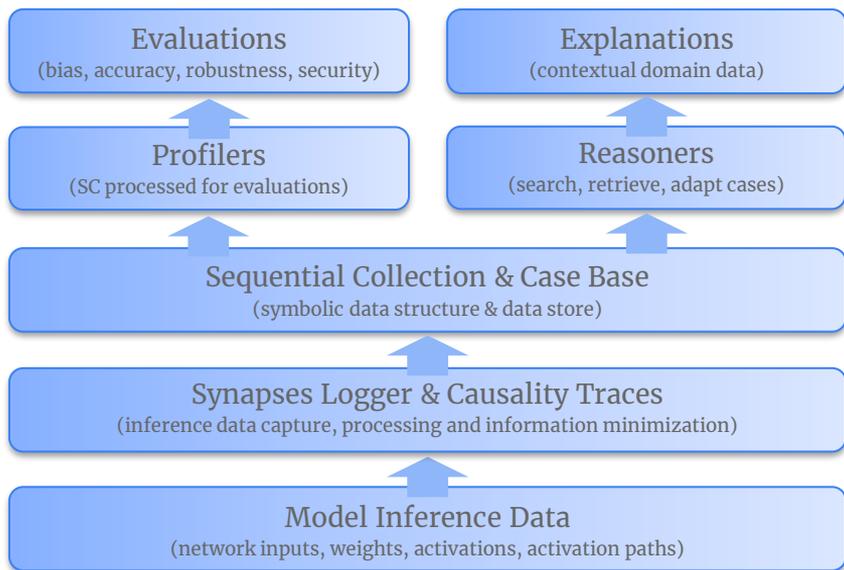
Mathematically robust, justifiable decision explanations

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

Build compliant models or upgrade existing models

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

# 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.

# 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

## 2 Model Robustness (ANN)

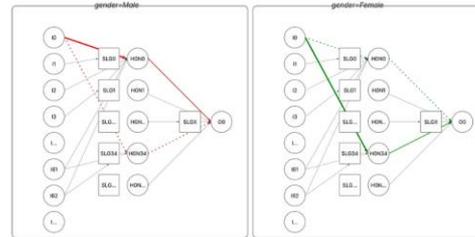
Read about our tests

TIKOS spots neural network weaknesses before they fail

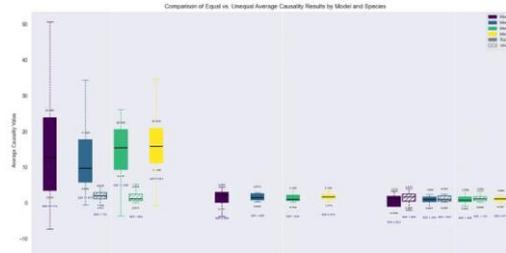
## 3 Guard-railing (LLM)

Read about our tests

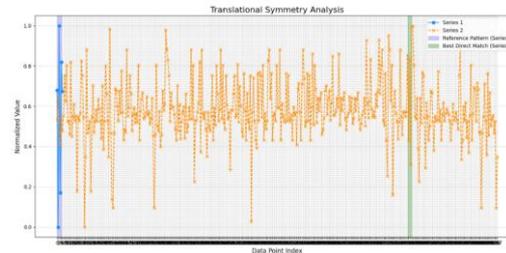
Your LLM is confidently wrong. Here's how to fix it



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

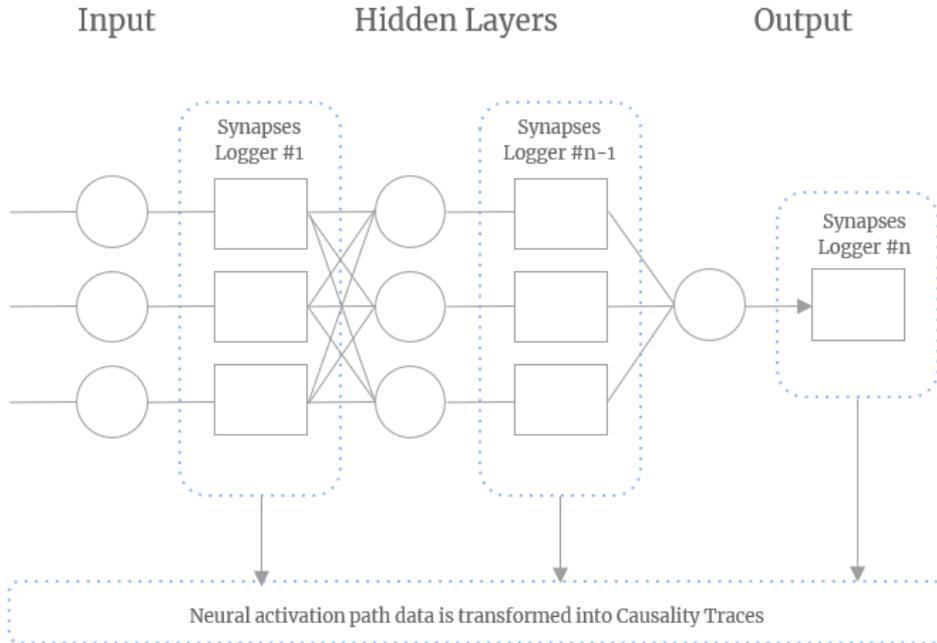


Evaluate model candidates for brittleness, remedy to ensure stability in production, then monitor in live deployments



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

# 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<sup>®</sup> evaluation tools – see over

# Mathematically Backed Reasoning.

```
"patient_demographics.age": 54,  
"patient_demographics.gender": "Female",  
"patient_demographics.smoking_history": false,  
"patient_demographics.family_history": true,  
"diagnosis.cancer_type": "Breast",  
"diagnosis.stage": "Stage IV",  
"diagnosis.grade": 3,  
"diagnosis.tumor_size_cm": 4.2,  
"diagnosis.metastasis": true,  
"diagnosis.lymph_node_involvement": true,  
"clinical_presentation.symptoms": "Fever, Nausea",  
"clinical_presentation.duration_months": 2,  
"clinical_presentation.performance_status": 1,  
"treatment.plan": "Surgery, Stem Cell Transplant",  
"treatment.start_date": "2020-10-13",  
"treatment.end_date": "2021-10-02",  
"treatment.response_rate": 91,  
"treatment.side_effects": "",  
"outcome.status": "Partial Remission",  
"outcome.survival_months": 35,  
"outcome.quality_of_life_score": 3,  
"outcome.complication_rate": 21.6,  
"biomarkers.marker1_level": 76.25,  
"biomarkers.marker2_level": 67.96,  
"biomarkers.genetic_mutation": true
```

A 'Case' can contain any data, including Causality Traces

1

```
T      1  
N      0  
w     1.0  
Z      0  
f      ["d0c148a7-f7c0-4a4c-9df4-db1946d3619c", ...  
fi     [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, ...  
ra     ["d0c148a7-f7c0-4a4c-9df4-db1946d3619c", ...  
S      [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, ...  
W      ["d0c148a7-f7c0-4a4c-9df4-db1946d3619c", ...  
Wv     [16800039, 69, 6502514, 1, 1, 8751434, 75314, ...  
t      ["str", "int", "str", "bool", "bool", "str", "str", "int", ...  
Vmin   [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, ...  
Vmax   [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, ...  
l      ["case_id", "patient_demographics.age", "patie...  
c      []  
P      [1, 1, 1, 1, 1, 1, 1, 1, 1, 0, 1, 1, 0, 1, 1, 1, 1, 1, 1, ...
```

Cases are serialised into the Sequential Collection data structure

2

```
"AggregativeAdaptation":  
0.0184397238760203,  
0.01872783686755745,  
0.01843971630036426,  
0.01843971630036426,  
0.0,  
0.01843971630036426,  
0.01843971630036426,  
0.01843971630036426,  
0.026387869878107477,  
0.0,  
0.0,  
0.01843971630036426,  
0.01843971630036426,  
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0.0,  
0.01843971630036426,  
0.01870314881894899,  
0.01843971630036426,  
0.018482204125941135,  
0.01843971630036426,  
0.01843971630036426,  
0.01843971630036426
```

Closest solutions adapted to output final solution case

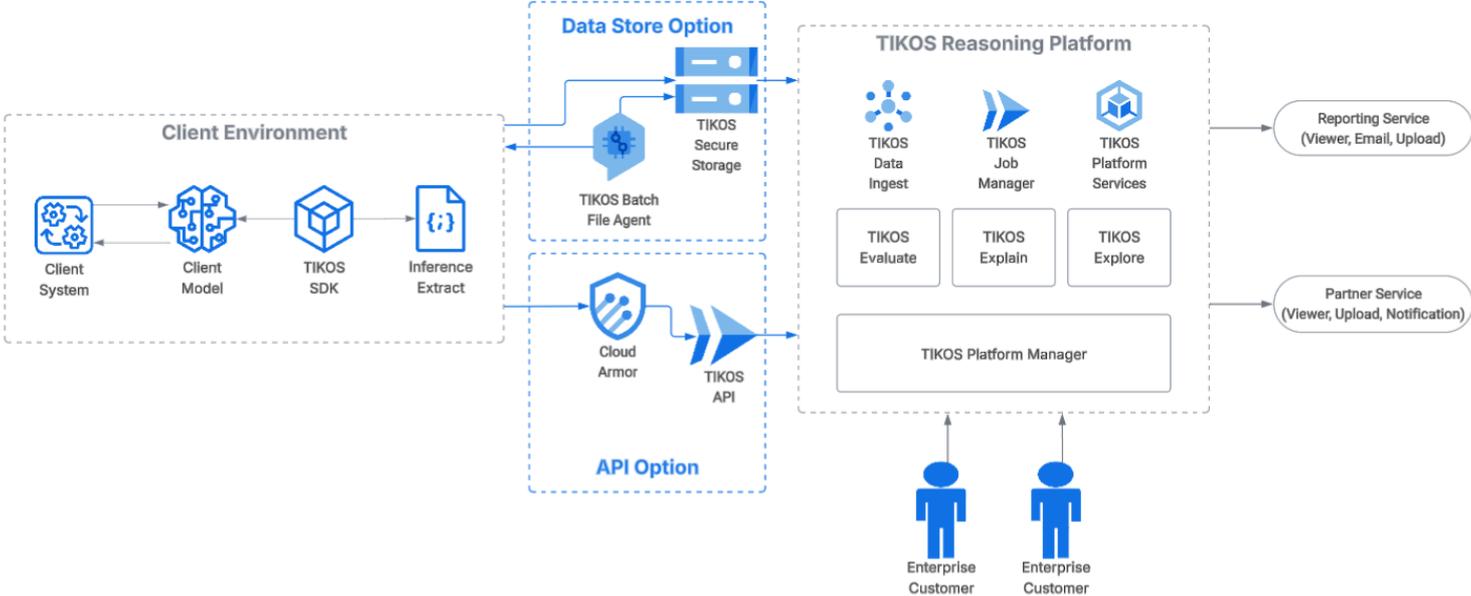
3

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.



# Deployment.



# API & Platform.

**TIKOS**  
v1.0 < API Reference

JUMP TO [CTRL+] [ ]

- TIKOS
  - TIKOS
  - Developer Support
- TIKOS PYTHON LIBRARY
  - Introduction
  - Quick Start
  - Documentation
  - Release Notes
- EXAMPLES
  - #1 Extraction Request
  - #2 Tikos Client
- TIKOS API
  - Initialise pipeline
  - Load data
  - Process data
  - Knowledge layer
  - Retrieval
  - Transparency & Explainability
    - UploadModel
    - UploadConfig
    - UploadModelCaseData
    - ProcessModel
    - BuildSequentialCollection
    - GetSimilarCase
    - GetReasoning**

## GetReasoning

<https://api.tikos.tech/interals/reasoningsc>

Performs reasoning from the problem case to proposed solution case candidates, undertakes case adaptation, returns the final solution, and saves the solution case to the case base.

See Python [example](#)

LOG IN TO SEE FULL REQUEST HISTORY

TIME	STATUS	USER AGENT
Make a request to see history.		

**BODY PARAMS**

- requestId** string **required** [300000000-XXXX-XXXX] Specify the request ID to associate with the request
- authToken** string **required** [300000000-XXXX-XXXX] Specify an authorisation token to associate with the request
- payloadId** string **required** [300000000-XXXX-XXXX] user supplied ID
- WType** string **required** [BIN] Binary search (BIN, default) or advanced binary search (BINADV)
- refCaseType** string **required** [Cancer] Name of the case-type to be searched
- refdoc** string [cancer\_context.pdf] file containing additional context
- RType** string **required** [Casual] The type of reasoning to be performed

**TIKOS**  
Build Trustworthy AI

- Home
- Model Robustness**
- Model Bias
- Model Accuracy
- Decision Reasoning

## Model Robustness

Description of each model

All four models are Regression models predicting cancer net survival rate.

Model	Input layer	Hidden layer	Output layer
<b>Model 1</b>	7 nodes	18 nodes	1 node
<b>Model 2</b>	7 nodes	40 nodes	1 node
<b>Model 3</b>	7 nodes	80 nodes	1 node
<b>Model 4</b>	7 nodes	200 nodes	1 node

### Comparison Metrics

Accuracy	Variance	Execution Time	RMSE
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Comparison of the Variance Correctly and Incorrectly Reasoned Cases for Each Model

Legend: Correct (blue), Incorrect (red)

Model	Case Type	Min	Q1	Median	Q3	Max
Model 1	Correct	0.04	0.05	0.06	0.07	0.10
Model 1	Incorrect	0.04	0.05	0.06	0.07	0.10
Model 2	Correct	0.04	0.05	0.06	0.07	0.10
Model 2	Incorrect	0.04	0.05	0.06	0.07	0.10
Model 3	Correct	0.04	0.05	0.06	0.07	0.10
Model 3	Incorrect	0.04	0.05	0.06	0.07	0.10
Model 4	Correct	0.04	0.05	0.06	0.07	0.10
Model 4	Incorrect	0.04	0.05	0.06	0.07	0.10

### Comparison of Model Variance

This chart shows the variance in predictions across different data subsets for each model.

# Next Steps.



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

**TIKOS<sup>®</sup>**

The logo consists of the word "TIKOS" in a bold, white, sans-serif font. A registered trademark symbol (®) is positioned at the top right of the letter "S". Below the text is a horizontal red line that ends with a small red square on the right side.

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