EBSA WEBINAR · PART 1

Artificial Intelligence and Biorisk Management



From hype to the biosafety officer's toolkit

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Today's objectives



Understand

AI basics and why it matters for biorisk management



Explore

Practical biosafety and biosecurity applications



Think critically

About responsible adoption and governance

Images and graphics were generated by AI (OAI GPT-6 Astra; Claude Opus 5.5). Text was reviewed by Grammarly.

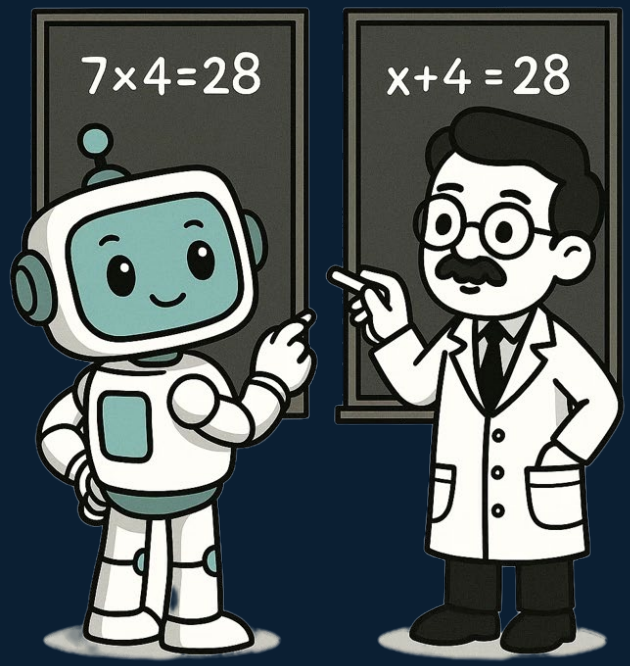
A biosafety officer wears many hats

- Risk assessments
- SOPs
- Training
- Inspections & audits
- Incidents
- Compliance
- Inventory & security
- Emergency response

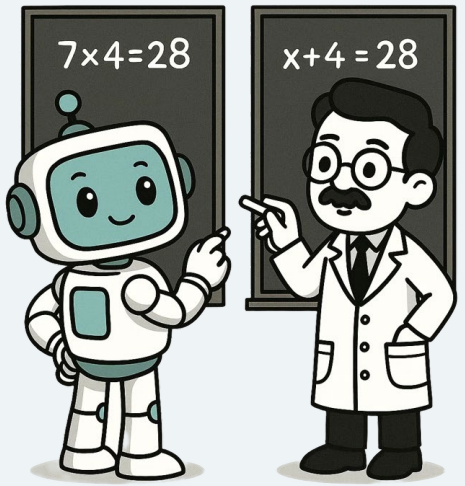
AI can help with each one, but the accountability stays with you.

MODULE 1

Understanding AI fundamentals



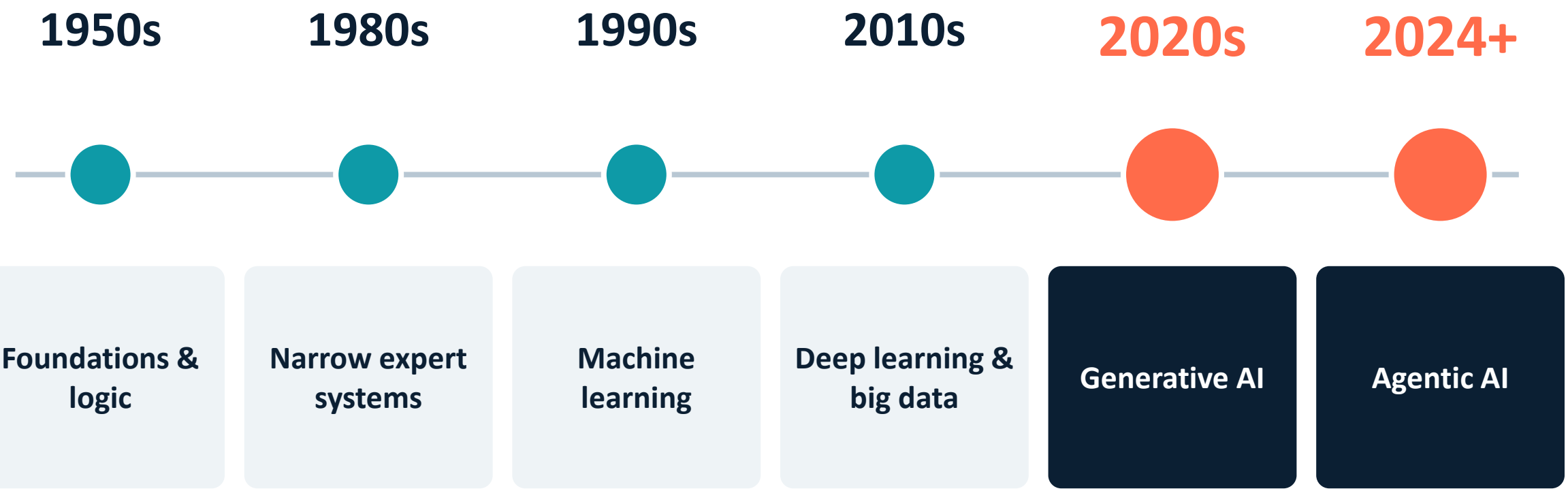
What is AI?



Machines trained to perform human-like problem-solving tasks

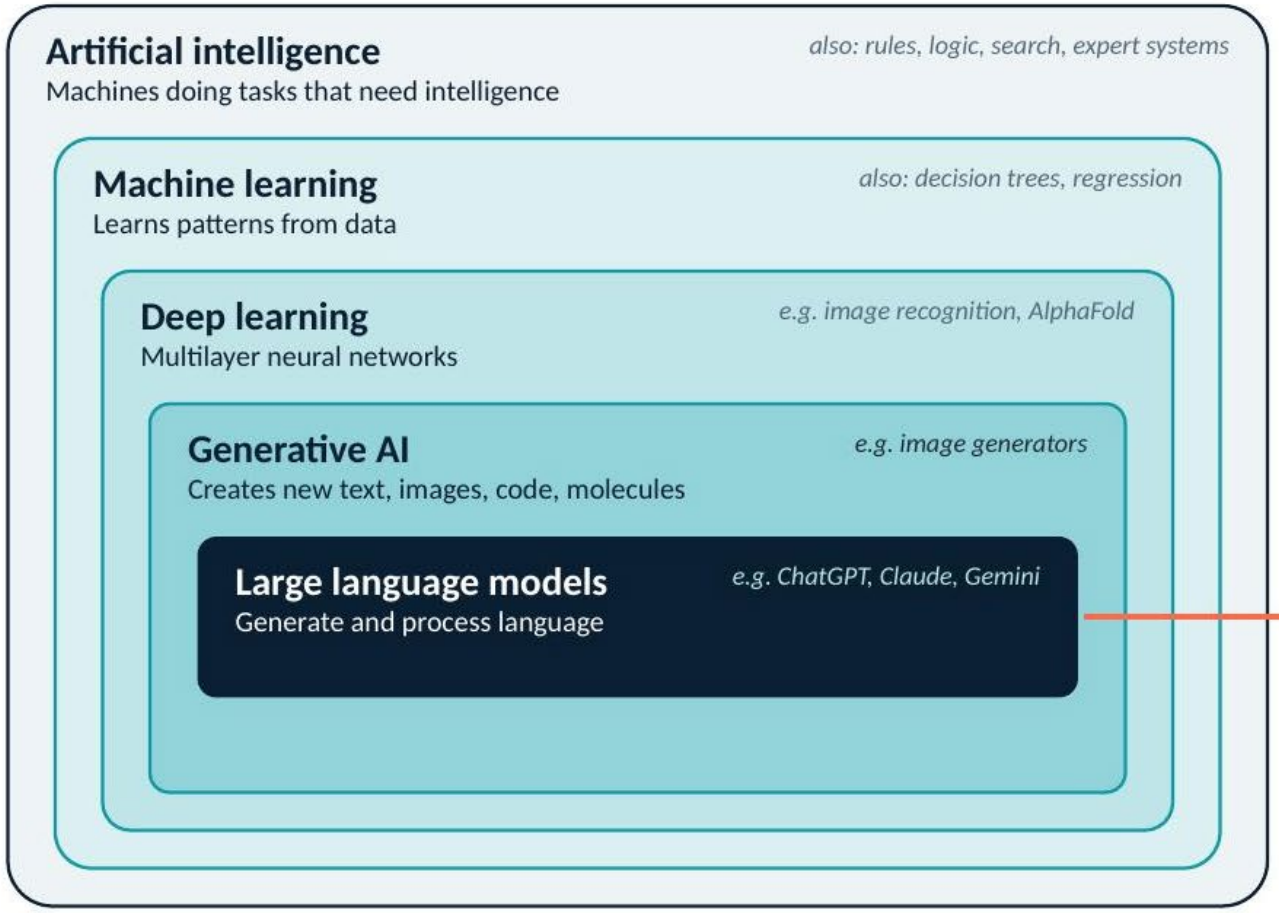
Key idea: AI learns from data, not only from hand-written rules.

70 years of AI, in six steps

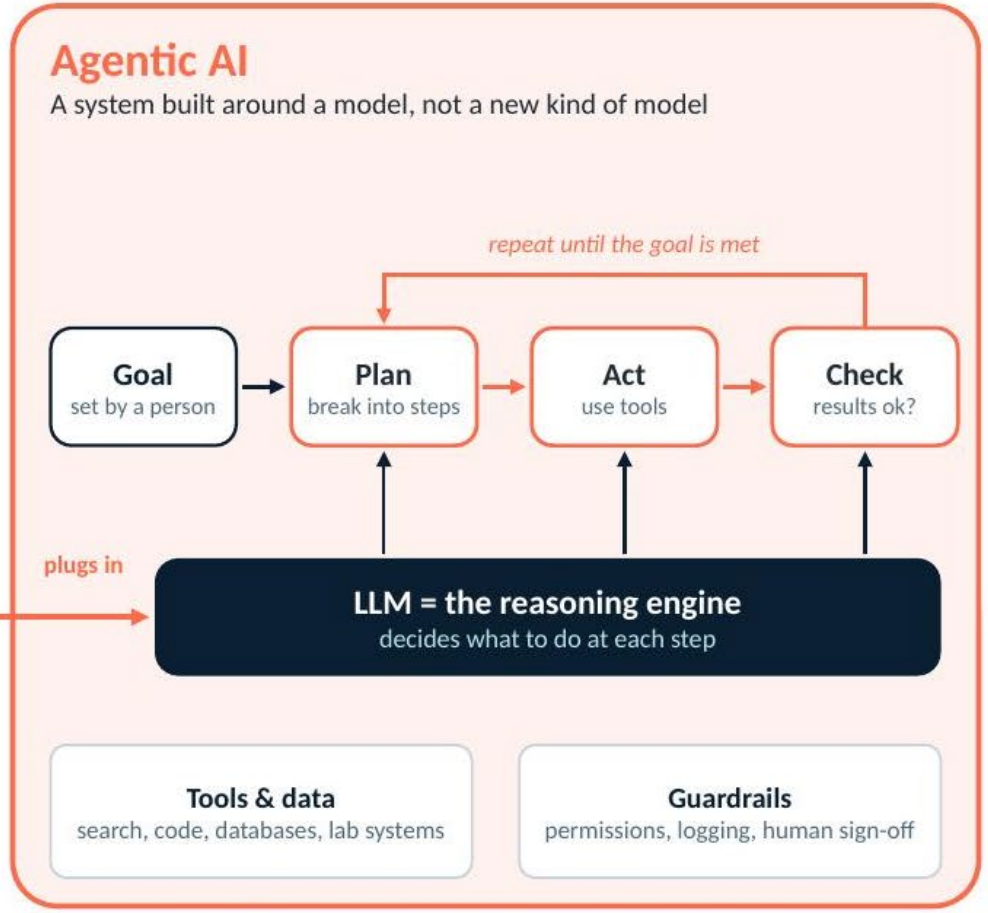


The last five years changed more than the previous fifty

How AI concepts relate

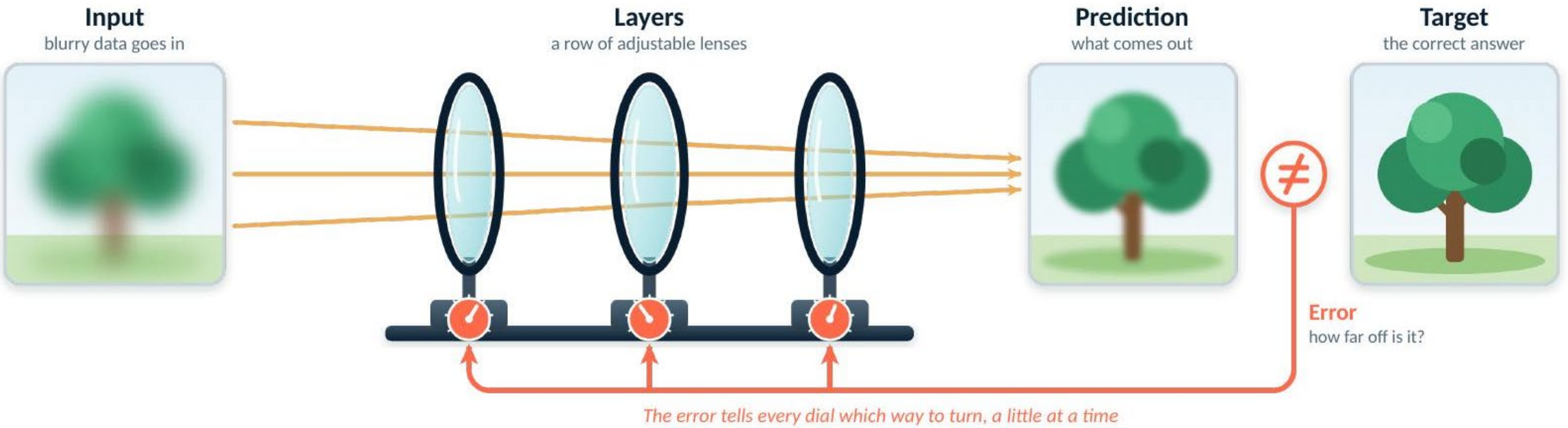


Kinds of models: each box is a subset of the one around it



How it works: a model + tools + a goal, running in a loop

Neural networks: the lens analogy



Lens = **Layer**
transforms the signal a little

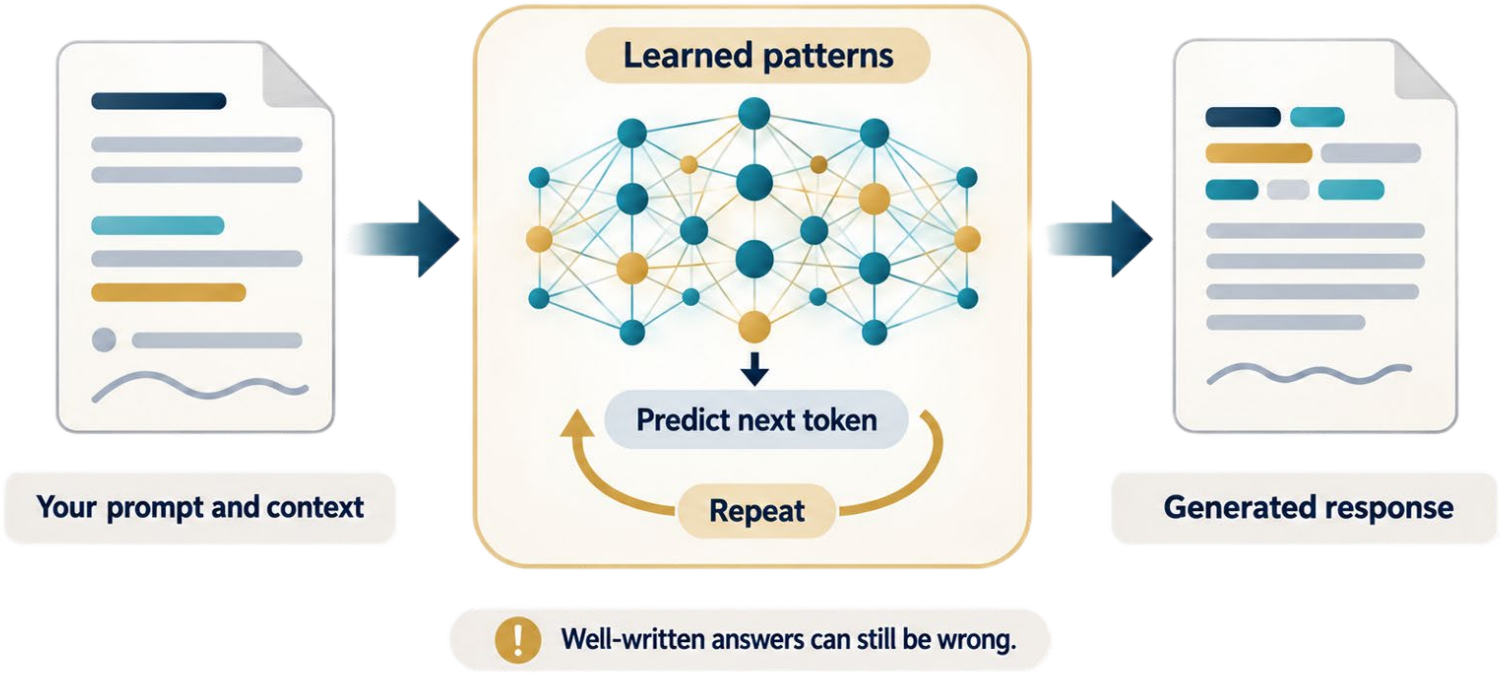
Dial setting = **Weight**
the number training adjusts

Blur vs. target = **Error**
how wrong the prediction is

Repeat, repeat = **Training**
millions of small nudges

Layers work together, but improvement is not guaranteed.

How a large language model works



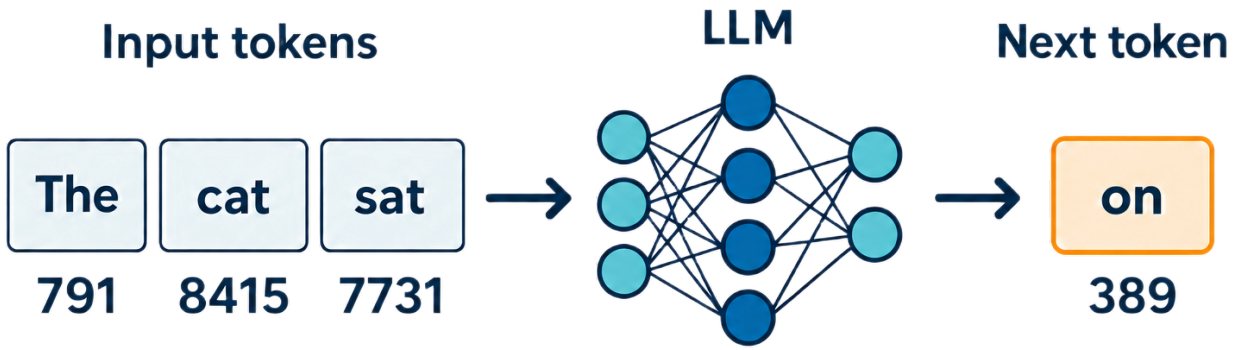
It predicts the next token

...again and again

Fluent language does not mean it is correct.

Text becomes tokens

…because tokens are numbers



Learns patterns in language

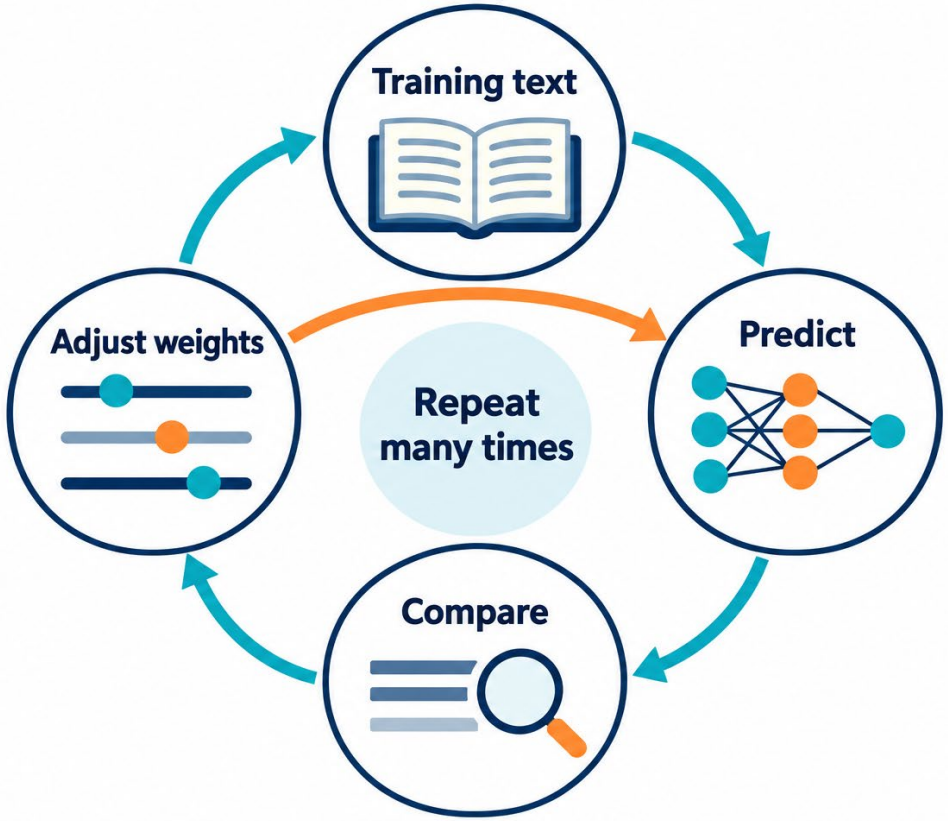
Generates text token by token

Token = word, part of a word, or punctuation

Each token has a numerical ID

cl100k_base tokenizer: IDs include the space before 'cat', 'sat' and 'on'

Training adjusts the weights

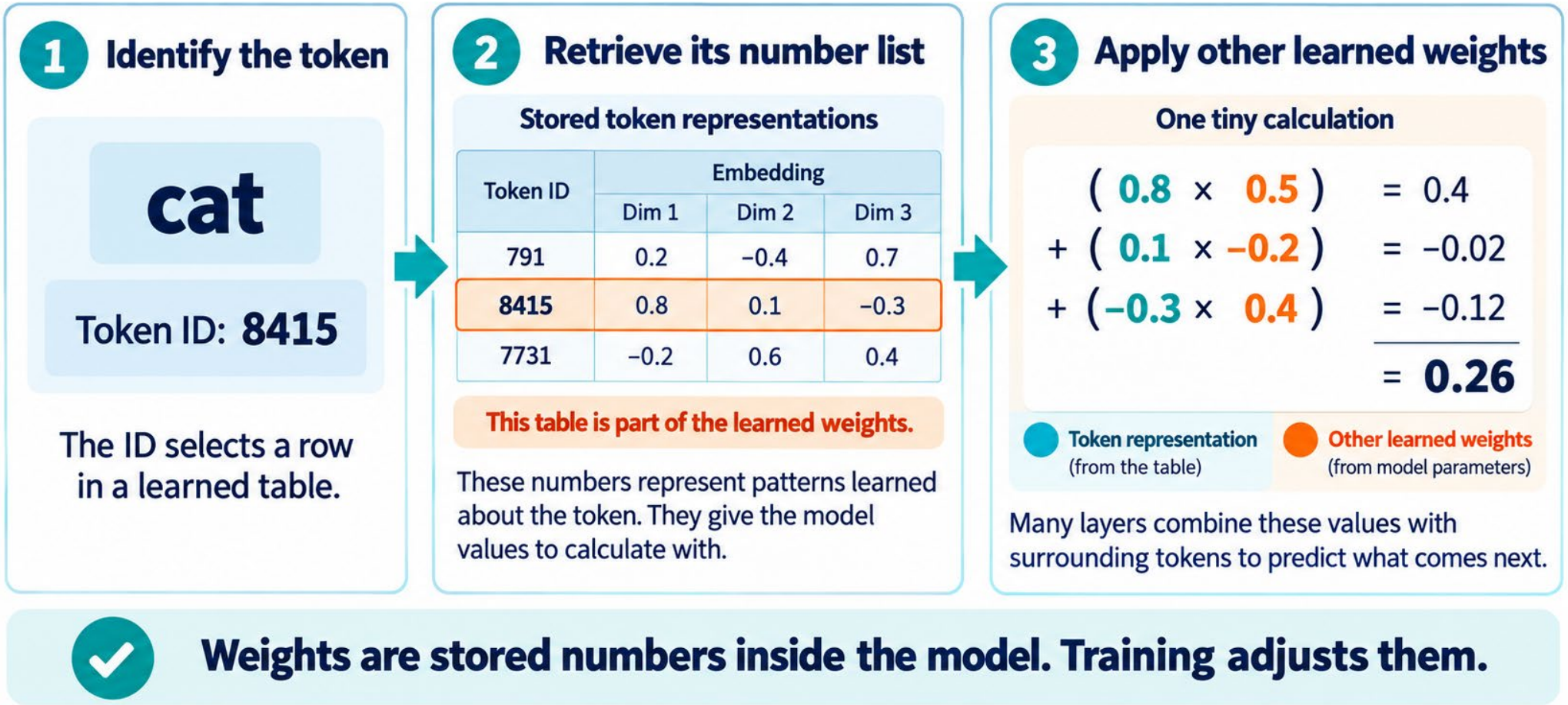


Trained on many text examples

Prediction errors guide weight changes

Weights are learned numerical settings

Inside the model: tokens meet weights



Token ID uses cl100k_base with a space before cat. All other numbers are illustrative.
Real models use much larger lists and more complex calculations.

Before you trust an LLM, test it

Test

Accuracy and sources

Consistency

Speed, cost and privacy

Watch for

Invented facts and references

Outdated or biased answers

Overconfidence

Verify before you act on it.

MODULE 2

AI applications in biorisk management



Your turn

How would you use AI in biorisk management?

Put your ideas in the chat



From concepts to the lab: five kinds of AI



Machine learning

IN THE LAB

Predicts freezer failure



Deep learning

IN THE LAB

Spots missing PPE



Generative AI

IN THE LAB

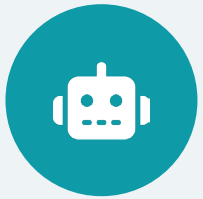
Drafts an SOP



AI agents

IN THE LAB

Runs an inspection workflow



Embodied AI

IN THE LAB

Handles samples in containment

Six use cases for biorisk management

LLM

Risk assessment

LLM

Compliance assistant

LLM

Incidents & root cause

ML

Inventory forecasting

DL

Video monitoring

LLM

SOP co-pilot

The risk matrix: useful, but limited

STRENGTHS

Clear and visual

Sets priorities

Common language

		Likelihood			
		Remote (1)	Unlikely (2)	Possible (3)	Likely (4)
Consequence	Minimal (1)	1	2	3	4
	Moderate (2)	2	4	6	8
	High (3)	3	6	9	12
	Major (4)	4	8	12	16

LIMITS

Subjective

Low resolution

Static and manual

From gut feel to data-informed risk assessment

INPUTS

- Pathogen data
- Procedure data
- Incident data
- Guidelines & regulations

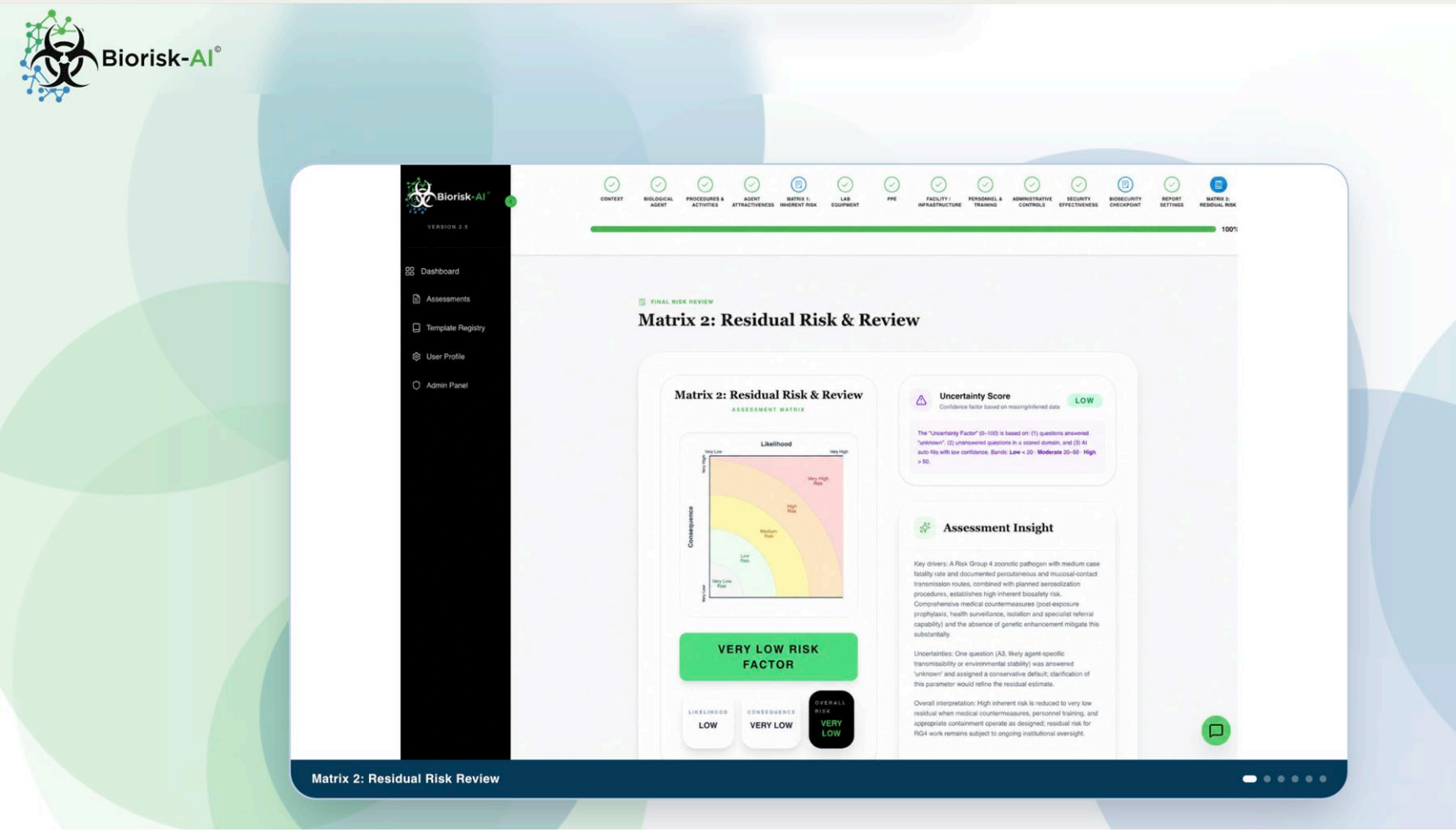


OUTPUTS

- Faster
- More consistent
- Finds hidden patterns
- Tests 'what-if' scenarios

The BSO reviews and decides. AI informs the mitigation; it does not make it.

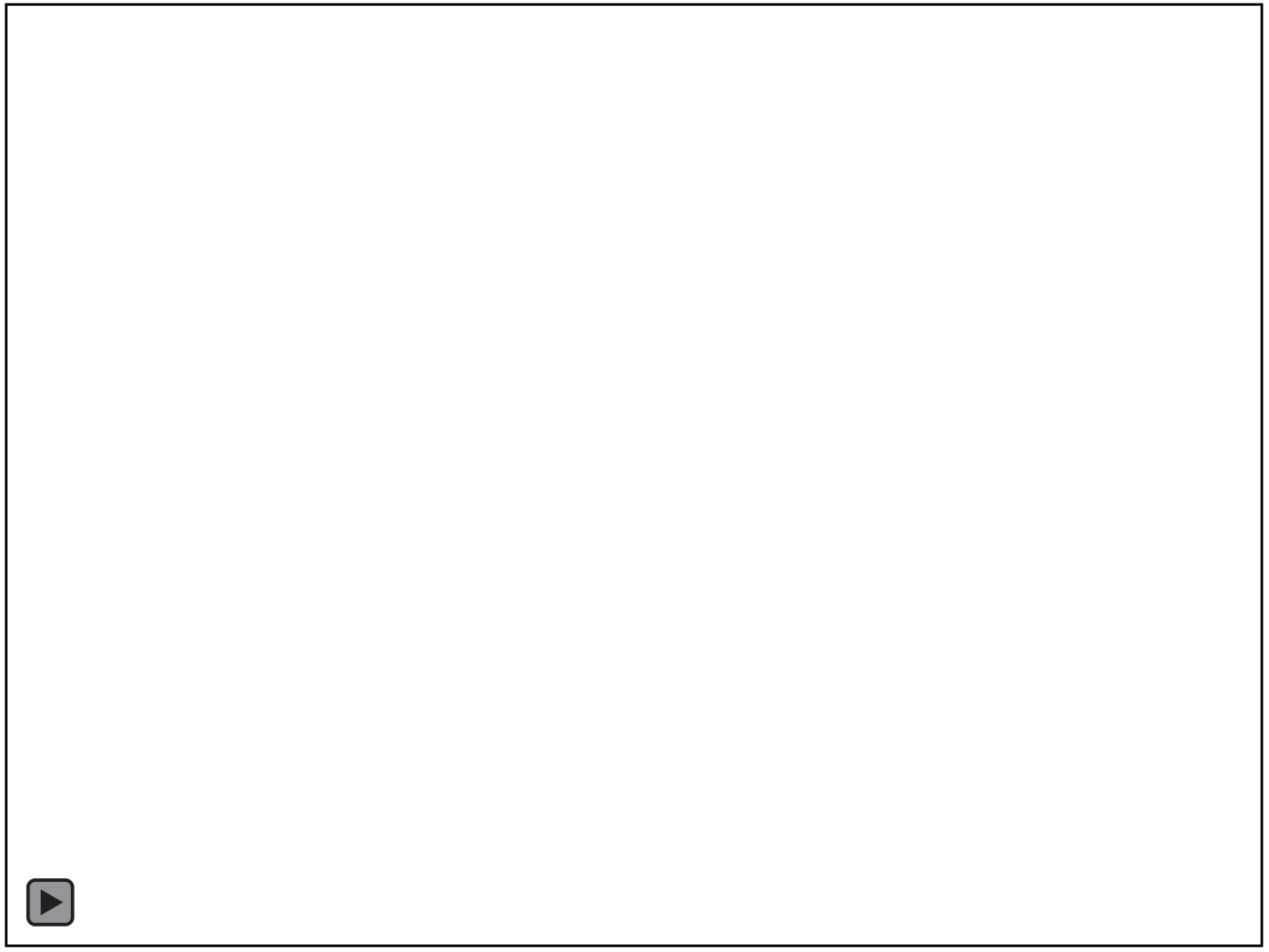
See it in action: Biorisk-AI



Live demo

biorisk.ai

AI checks PPE before BSL-3 entry

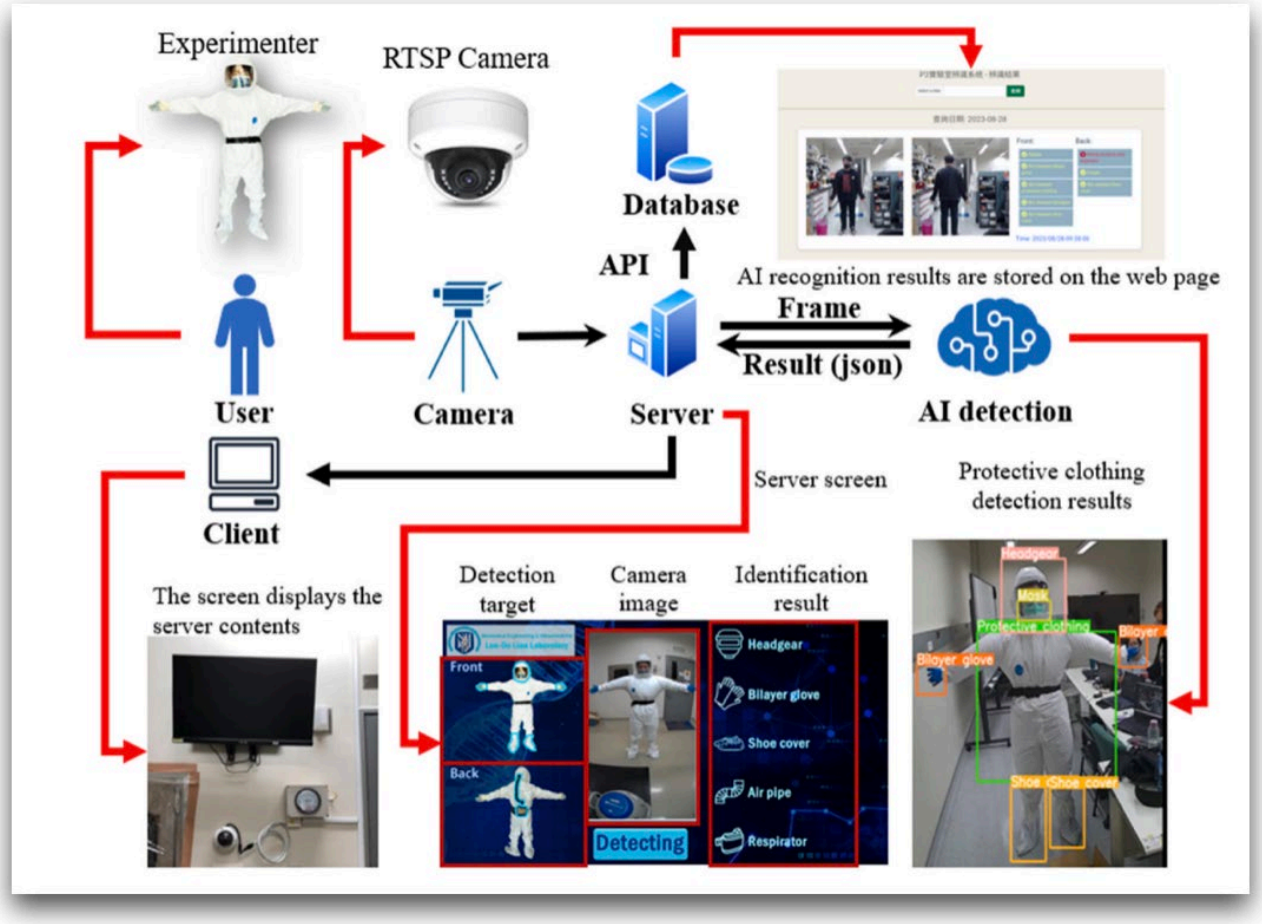


Camera + deep learning

Detects missing PPE items in real time

Enhancing safety with an AI-empowered assessment and monitoring system for BSL-3 facilities

Somebody is watching: AI video monitoring



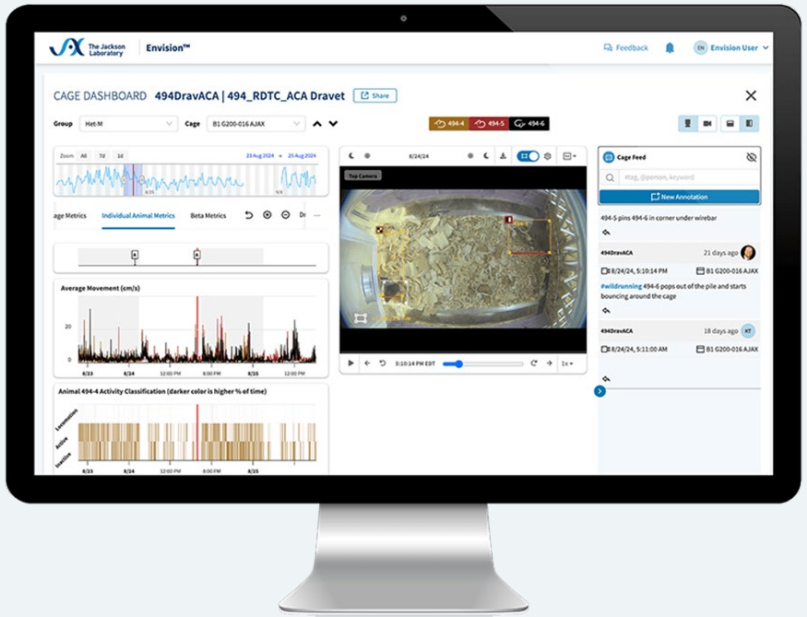
DISCUSS IN THE CHAT

? What is hard for humans to monitor?

? How could it help a BSO?

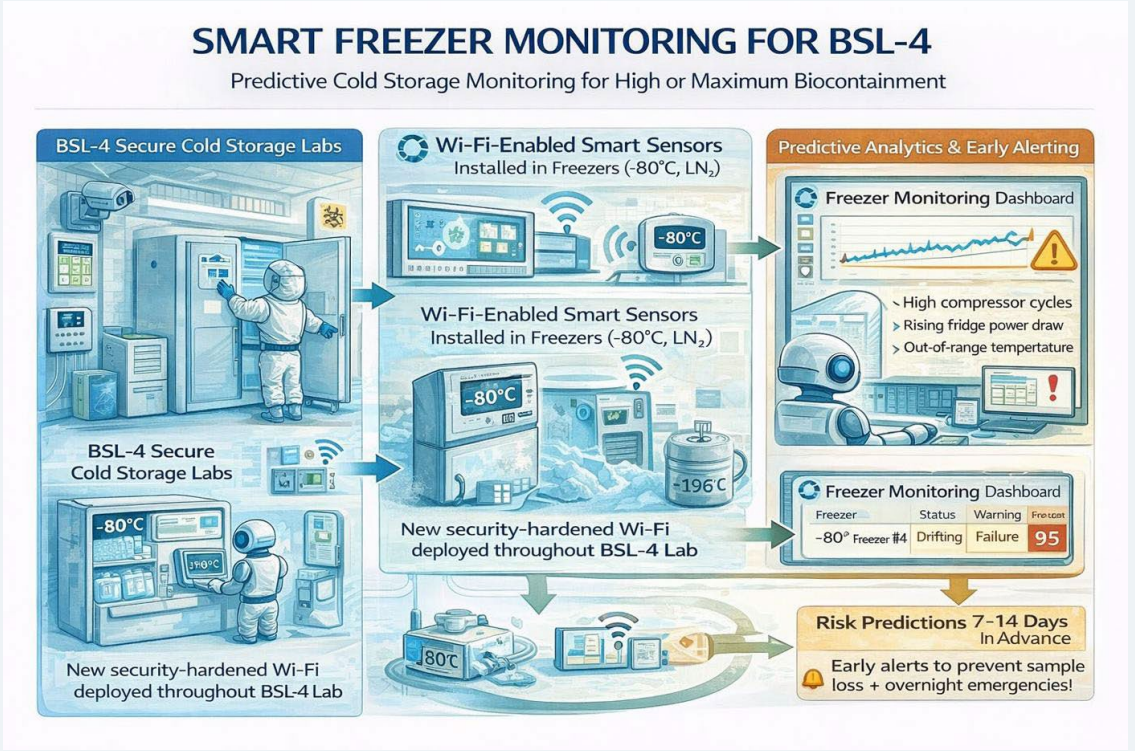
? What are the concerns?

In practice: UTMB examples



24/7 animal monitoring

Reproducibility and welfare



Predictive freezer monitoring (BSL-4)

Courtesy of Gene Olinger

Meet *Viri*: a biorisk co-pilot





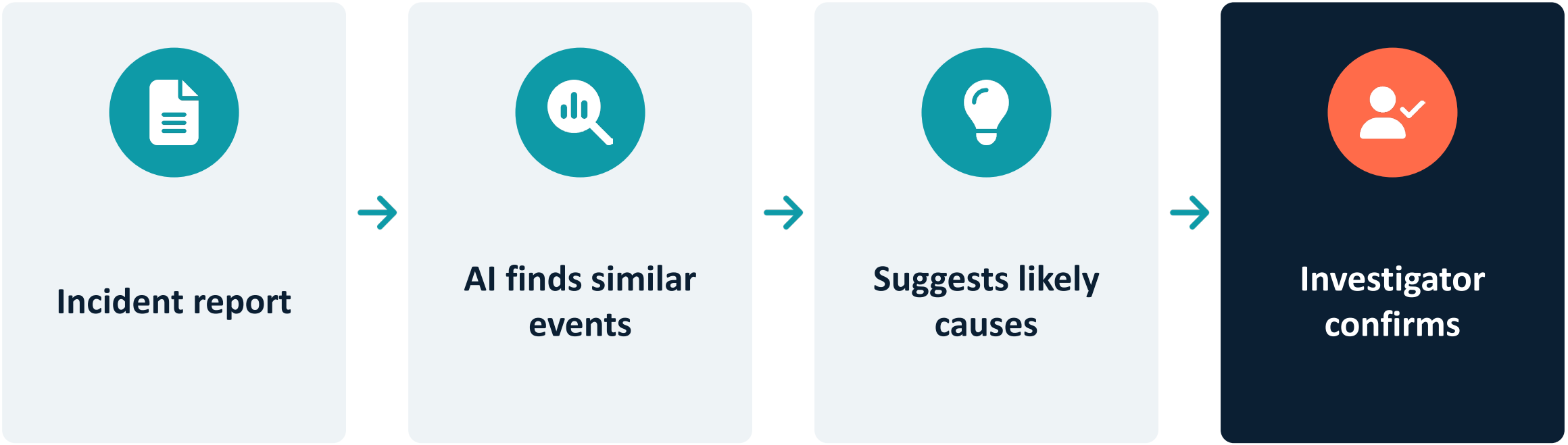
Step-by-step help at the bench

DISCUSS IN THE CHAT

What data does Viri need?

What limits should we set?

AI-assisted root cause analysis



Learn across incidents, not just within one. **Learn from published reports.**

More everyday uses for the BSO



Training materials



Document review



ISO 35001 conformity



Inspection & audit analysis



Start here: low-risk, high-volume tasks give the quickest wins.

Why governance matters: AI cuts both ways

> *“The people building AI earnestly believe that it could kill us all by the end of the decade.”*

Jacob Coxon, on resigning from Anthropic (Axios, Sept 2026)

AI can lower barriers to misuse

AI developers need to add biosecurity safeguards

We need to understand both sides

Coming in Part 2: govern AI like a new employee

BEFORE CHOOSING

1. Purpose and limits
2. Responsibility
3. Risk assessment
4. Applicable rules

BEFORE ROUTINE USE

5. Supplier evidence
6. Data protection
7. Local testing
8. Human approval

THROUGHOUT USE

9. Security and access
10. Procedures and skills
11. Controlled introduction
12. Monitoring and withdrawal



Job description, supervisor, references, probation: the same discipline applies to AI.

Key takeaways

1. **Force multiplier** for small biorisk teams
2. **Match AI to the task** LLM, ML or vision
3. **Start small** low-risk, high-volume tasks
4. **Govern before you rely on it** 12 points in Part 2

Thank you

Take a break

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