



FINOS

Fintech
Open Source
Foundation

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- Price-sensitive information
- Actual or projected changes in production, output, capacity or inventories
- Matters relating to bids, prospective bids, or bid policies
- Matters relating to actual or potential individual suppliers that might influence the business conduct of firms toward such suppliers
- Matters relating to actual or potential customers that might have the effect of influencing the business conduct of firms toward such customers
- Current or projected costs of procurement, development or manufacture of any product
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- Confidential or otherwise sensitive business plans or strategy

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Zenith

Emerging Technology
Special Interest Group
July 13th, 2023

Please add your attendance to:
<https://github.com/finos/zenith/issues/41>

Agenda



- Announcements
- ~~POC Program~~
- Deep Dives
- Any Other Admin
- Calls to Arms
- Any Other Business
- Thanks & Close-Out

Announcements



Announcements



Blogs & Znglists



New Blogs

- Meta releasing 'Game Super Resolution' technology for Quest
- Zoom joins the tools in Meta Horizon Workrooms



Znglist Updates

- Zenith Showcase is now live with 2 new videos
 - Zenith Program Overview
 - Brain Trust Overview

Announcements



Upcoming Events



Thursday, July 13 *(Today!)*

- 11am EST / 4pm BST

[FDC3: Web Browsers](#) - [Calendar Invite](#)

- 11pm EST / 4pm BST

[Morphir](#) - [Calendar Invite](#)

<https://www.finos.org/news-and-events>

- **August 2 –
[Open Source London](#)**

Our August meetup in partnership with Scott Logic will be hosted at NatWest's Bishopsgate offices in London and will focus AI and open source, and the opportunities and challenges of harnessing AI's business potential. [Register here.](#)

- **November 1 –
[Open Source in Finance Forum - NYC](#)**

Registration is open for our annual Open Source in Finance Forum in the Marriott Marquis Hotel in Times Square NYC. [Find information on how to sponsor or register here.](#)

Announcements



New Teammates



Announcements

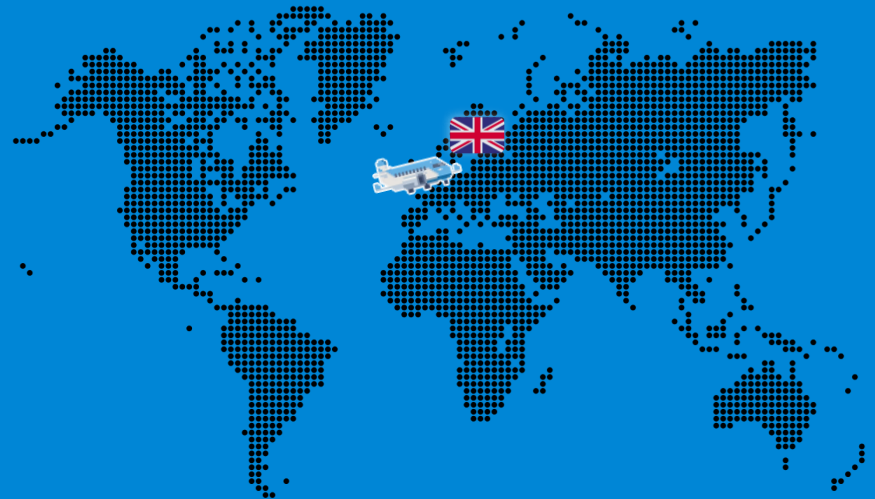


New Teammates



Carly
Richmond

*Developer
Engagement*



Move List



Front End Engineer



Blogger



Public Speaker

Super Art



Developer
Advocacy

Announcements

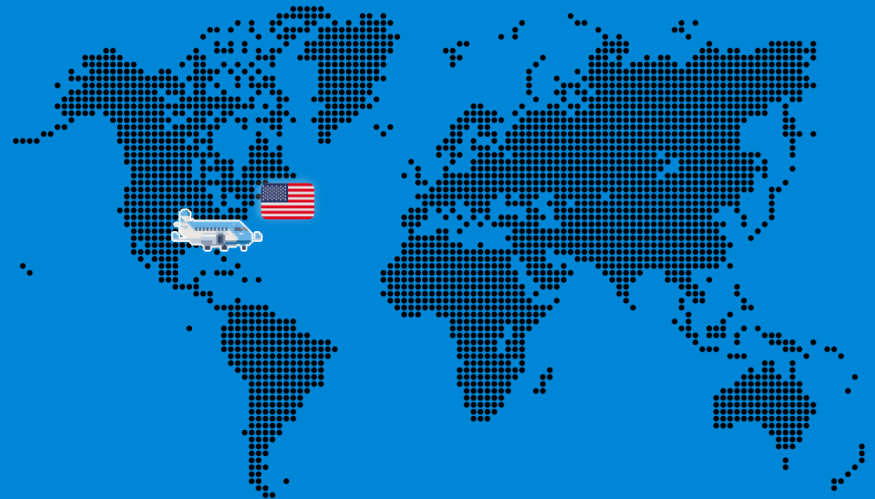


New Teammates



Leo
Mordasini

POC Program
Co-ordinator



Move List



Innovation Program
Expert



Cloud & Data Focus



Latin America
Engagement

Super Art



Tinkering

Announcements

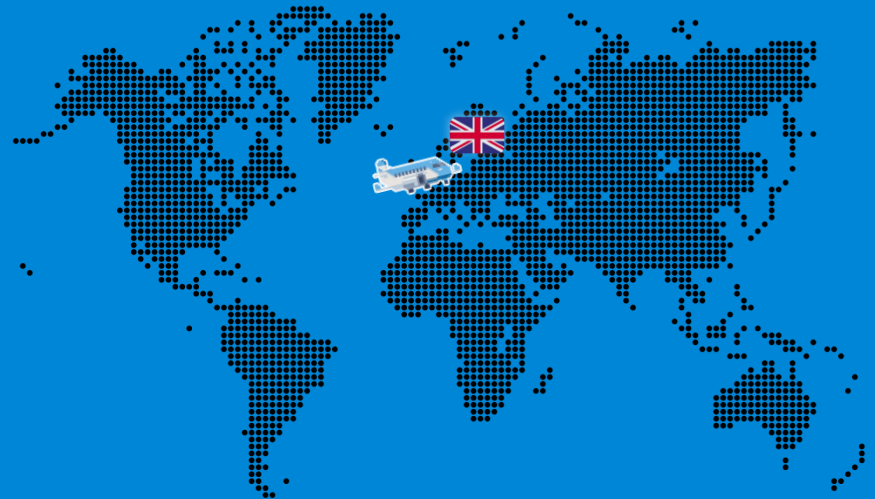


New Teammates



Polina
Levyant

Developer



Move List



Software Engineer



Decentralised
Finance Industry



Emerging Tech
Enthusiasm

Super Art



Economics

Deep Dive



Primers

First Primer Launch

- Artificial Intelligence

Next Primers

- Quantum Tech
- Spatial Computing

Initial Technologies	
Artificial Intelligence	4D Printing
Blockchain & DLT	Biotechnology
IOT, 5G & 6G	Regulatory Technology
Robotics & RPA	Next-Gen Materials
Spatial Computing	Natural Language Processing
Quantum Technology	Advanced Data Processing
Neural Interfacing	Cloud Computing
Space Technology	Crypto Agility

Artificial Intelligence



Introduction to AI



History of AI



Current AI ETAC



Technology Readiness



Current Blockers

Artificial Intelligence



Introduction to AI



History of AI



Current AI ETAC



Technology Readiness



Current Blockers



- Learning
- Perception
- Reasoning

Artificial Intelligence



Introduction to AI



History of AI



Current AI ETAC



Technology Readiness



Current Blockers

Weak AI

Alexa, *Play* 
Despacito

Alexa, how
does my 
commute traffic
look today?



Artificial Intelligence



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History of AI



Current AI ETAC



Technology Readiness



Current Blockers

Weak AI

- Collects Information
- Analyses preferences
- Improves over time



Artificial Intelligence

2



Introduction to AI



History of AI



Current AI ETAC



Technology Readiness



Current Blockers

Strong AI

Artificial
General
Intelligence
(AGI)



- Contextualise
- Learn new skills
- Apply knowledge to plan ahead
- Adapt as changes occur

Artificial Intelligence



Introduction to AI



History of AI



Current AI ETAC

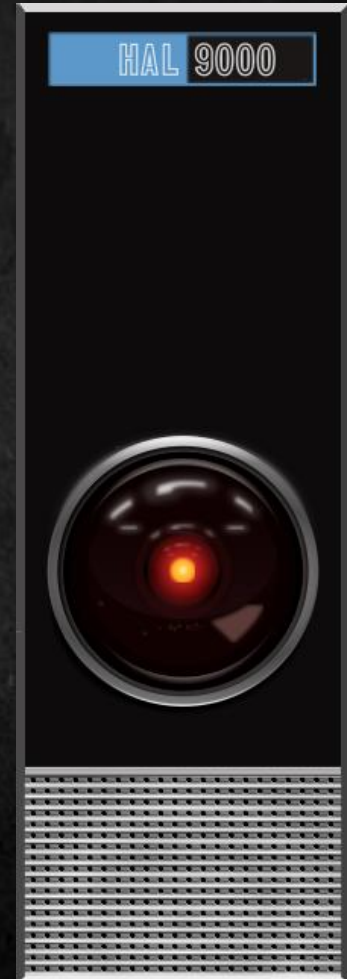


Technology Readiness



Current Blockers

Strong AI



Artificial Intelligence



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History of AI



Current AI ETAC

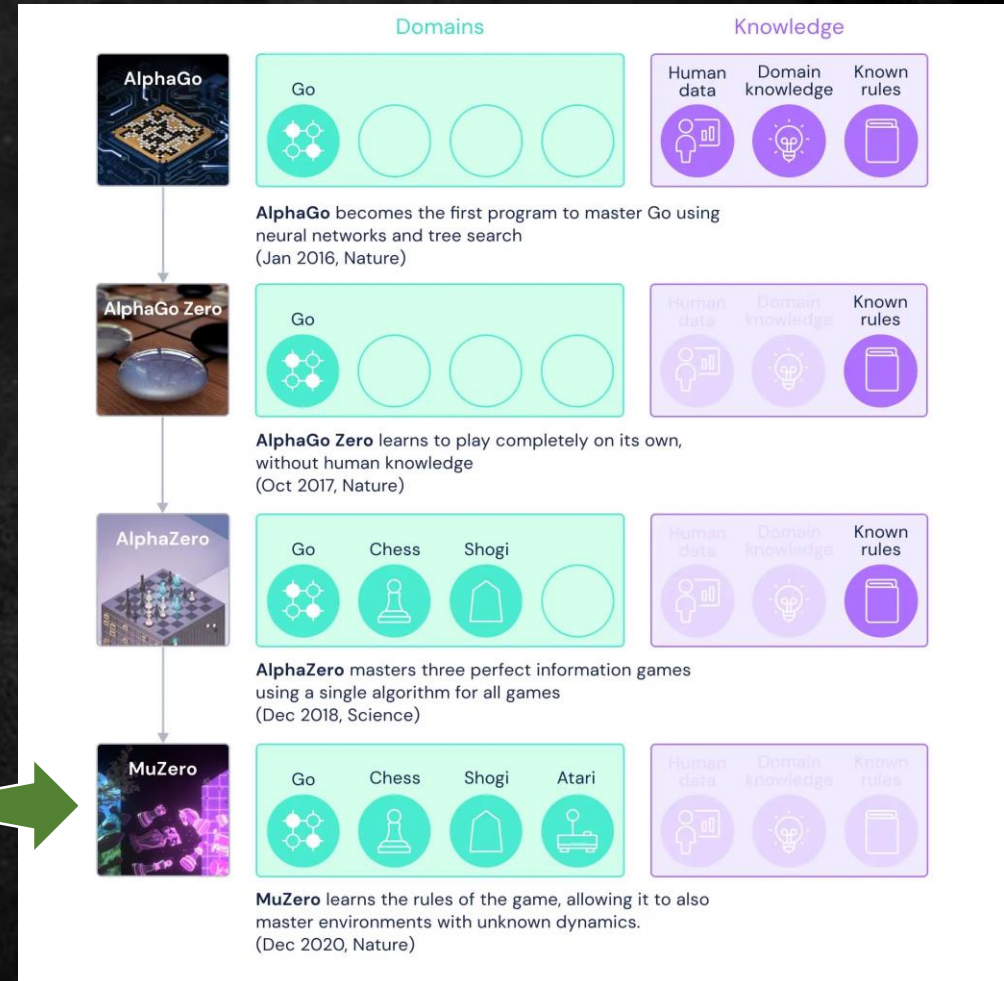


Technology Readiness



Current Blockers

Strong AI



Artificial Intelligence



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History of AI



Current AI ETAC



Technology Readiness



Current Blockers

Superintelligence in AI



- Completely Self Aware
- Surpasses human intelligence in every way
- Still complete science fiction
- Data is from the 24th Century

Artificial Intelligence



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History of AI



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Technology Readiness



Current Blockers

Imitation Game/Turing Test proposed by Alan Turing (1950)



TURING TEST EXTRA CREDIT:
CONVINCE THE EXAMINER
THAT HE'S A COMPUTER.

1. Take a neutral evaluator
2. Observe a conversation between two parties
3. Decide which one is the machine
4. Test to see if machines can "think"

YOU KNOW, YOU MAKE
SOME REALLY GOOD POINTS.
I'M ... NOT EVEN SURE
WHO I AM ANYMORE.



Artificial Intelligence



Introduction to AI



History of AI



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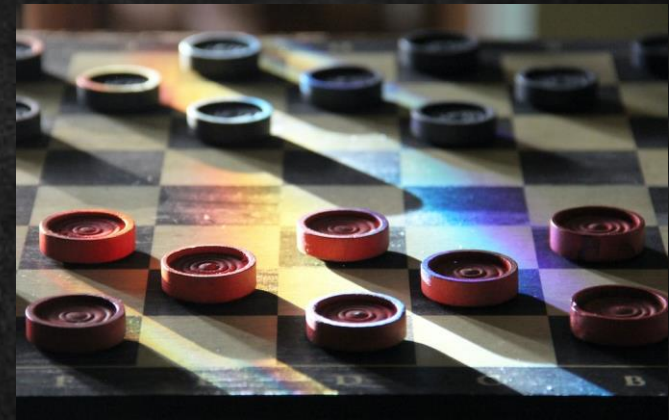


Technology Readiness



Current Blockers

Arthur Samuel develops a Checkers playing algorithm (1952)



Alpha-Beta Pruning: Search algorithm that seeks to decrease the number of nodes evaluated by the minimax algorithm in its search tree. Can be used well in adversarial games!

Artificial Intelligence



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Technology Readiness



Current Blockers

First use of the term
“Artificial Intelligence” and the
Logic Theorist program (1955)



*“The science and engineering of making
intelligent machines”*

John McCarthy

Artificial Intelligence



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History of AI



Current AI ETAC

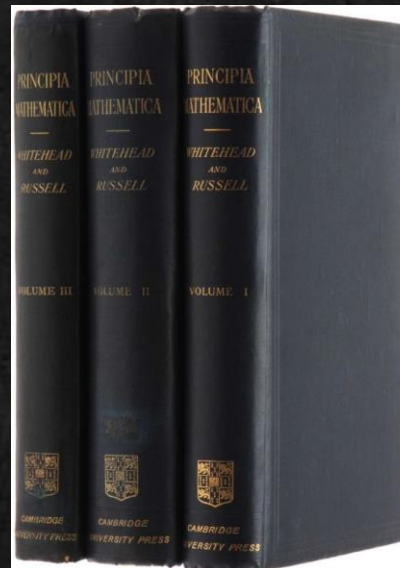


Technology Readiness



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First use of the term
“Artificial Intelligence” and the
Logic Theorist program (1955)



#54.43. $\vdash : \alpha, \beta \in 1 . \supset : \alpha \cap \beta = \Lambda . \equiv . \alpha \cup \beta \in 2$

Dem.

$\vdash . \#54.26 . \supset \vdash : \alpha = t'x . \beta = t'y . \supset : \alpha \cup \beta \in 2 . \equiv . x \dagger y .$
[#51.231] $\equiv . t'x \cap t'y = \Lambda .$
[#13.12] $\equiv . \alpha \cap \beta = \Lambda$ (1)

$\vdash . (1) . \#11.11.35 . \supset$
 $\vdash : (\exists x, y) . \alpha = t'x . \beta = t'y . \supset : \alpha \cup \beta \in 2 . \equiv . \alpha \cap \beta = \Lambda$ (2)
 $\vdash . (2) . \#11.54 . \#52.1 . \supset \vdash . \text{Prop}$

From this proposition it will follow, when arithmetical addition has been defined, that $1 + 1 = 2$.

Artificial Intelligence



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History of AI



Current AI ETAC

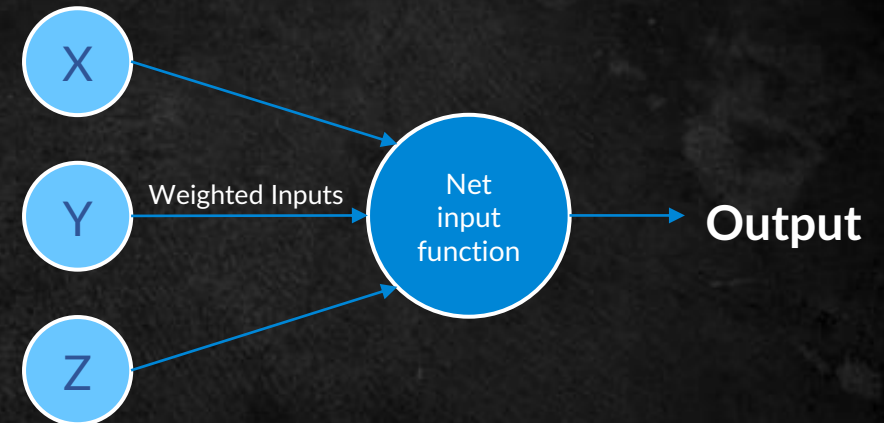
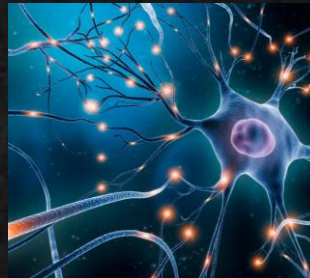


Technology Readiness



Current Blockers

Frank Rosenblatt creates Perceptron Neural Networks Innovation (1957)



Binary classifier algorithm which can tell if an input belongs to a specific class

Artificial Intelligence



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Technology Readiness



Current Blockers

Developments through the 20th Century



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History of AI



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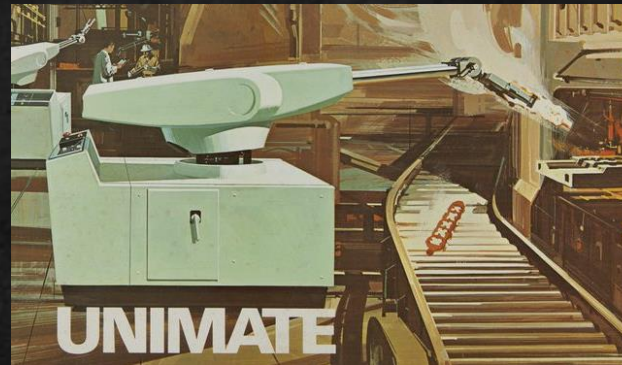


Technology Readiness



Current Blockers

Developments of the 60s



```
Welcome to
EEEEEE LL      IIII ZZZZZZ AAAAA
EE      LL      II   ZZ  AA  AA
EEEEEE LL      II   ZZ2 AAAAAAA
EE      LL      II   ZZ  AA  AA
EEEEEE LLLLLL IIII ZZZZZZ AA  AA

Eliza is a mock Rogerian psychotherapist.
The original program was described by Joseph Weizenbaum in 1966.
This implementation by Norbert Landsteiner 2005.

ELIZA: Is something troubling you ?
YOU:  Men are all alike.
ELIZA: What is the connection, do you suppose ?
YOU:  They're always bugging us about something or other.
ELIZA: Can you think of a specific example ?
YOU:  Well, my boyfriend made me come here.
ELIZA: Is it important to you that your boyfriend made you come here ?
YOU:  He says I'm depressed much of the time.
ELIZA: I am sorry to hear that you are depressed.
YOU:  It's true. I am unhappy.
ELIZA: Can you explain what made you unhappy ?
YOU:
```

STUDENT is an early artificial intelligence program that solves algebra word problems. It is written in Lisp by Daniel G. Bobrow as his PhD thesis in 1964 (Bobrow 1964). It was designed to read and solve the kind of word problems found in high school algebra books. The program is often cited as an early accomplishment of AI in natural language processing.

Artificial Intelligence



Introduction to AI



History of AI



Current AI ETAC



Technology Readiness



Current Blockers

Developments of the 60s

DENDRAL

Shakey the Robot

Backpropagation



Artificial Intelligence



Introduction to AI



History of AI



Current AI ETAC



Technology Readiness

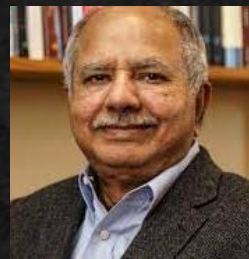


Current Blockers

Developments of the 70s



Funding cuts caused by lack of progress and over-ambitious statements



Raj Reddy publishes “Speech Recognition by Machine: A Review” creating a brilliant primer on early **Natural Language Processing (NLP)**



The Stanford Cart crosses a chair-filled room becoming an **Autonomous Vehicle**

Artificial Intelligence



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Current AI ETAC



Technology Readiness



Current Blockers

Developments of the 80s



WABOT-2



Mercedes-Benz
self-driving car



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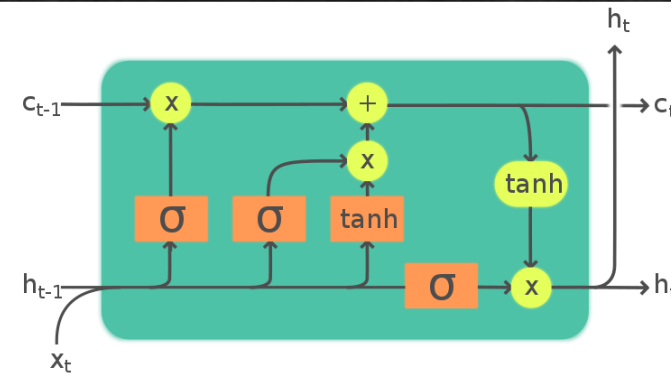


Technology Readiness



Current Blockers

Developments of the 90s



Legend:

Layer

ComponentwiseCopy

Concatenate



Long short-term memory (LSTM)

Artificial Intelligence



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History of AI



Current AI ETAC



Technology Readiness



Current Blockers

Developments of the 90s



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Technology Readiness



Current Blockers

Developments through the 21st Century



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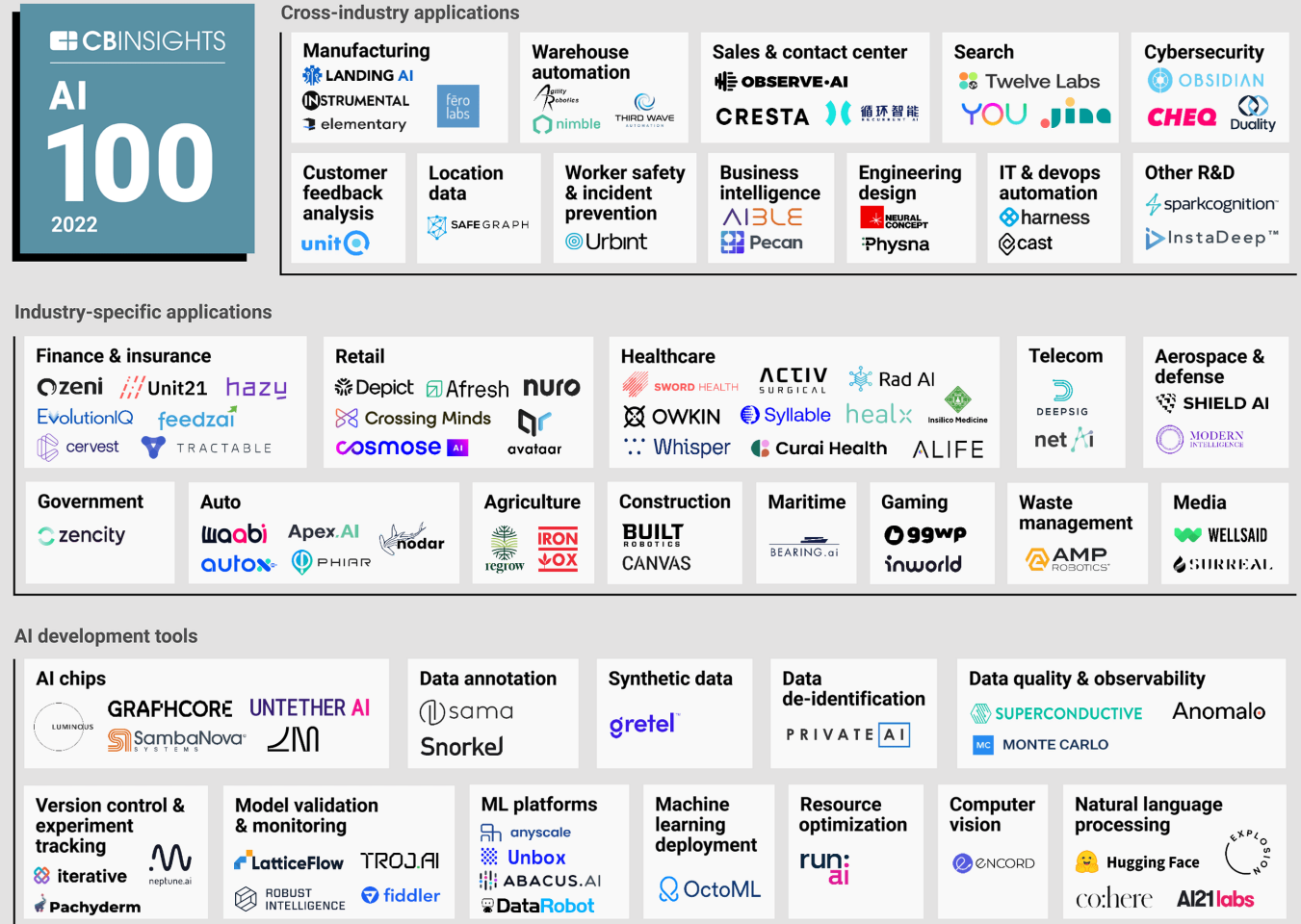
Current AI ETAC



Technology Readiness



Current Blockers



Note: Companies are private as of 4/29/22

Image courtesy of CB Insights

Artificial Intelligence



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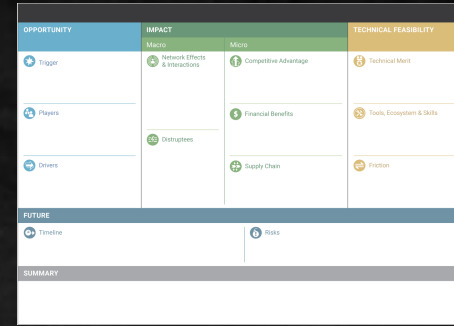
Technology Readiness



Current Blockers

OPPORTUNITY	IMPACT		TECHNICAL FEASIBILITY
	Macro	Micro	
<div> Trigger</div> <div></div> <div></div> <div> Players</div> <div></div> <div></div> <div> Drivers</div> <div></div> <div></div>	<div> Network Effects & Interactions</div> <div></div> <div></div> <div> Disruptees</div> <div></div> <div></div>	<div> Competitive Advantage</div> <div></div> <div></div> <div> Financial Benefits</div> <div></div> <div></div> <div> Supply Chain</div> <div></div> <div></div>	<div> Technical Merit</div> <div></div> <div></div> <div> Tools, Ecosystem & Skills</div> <div></div> <div></div> <div> Friction</div> <div></div> <div></div>
FUTURE			
<div> Timeline</div> <div></div> <div></div>		<div> Risks</div> <div></div> <div></div>	
SUMMARY			

Artificial Intelligence



Introduction to AI



History of AI



Current AI ETAC



Technology Readiness



Current Blockers

AI Development Tools

AI Development Tools		
AI Chipsets	Data Annotation	Synthetic Data
Data De-Identification	Data Quality & Observability	Version Control & Experiment Tracking
Model Validation & Monitoring	Machine Learning Platforms	Machine Learning Deployment
Resource Optimisation	Computer Vision	Natural Language Processing

Artificial Intelligence



Introduction to AI



History of AI



Current AI ETAC



Technology Readiness



Current Blockers

For the Final Primer

- Showcasing of where the commercialisation of adoption lies for each technology
- Considerations for ethics and fair use by members of the open source community
- Where we perceive security vulnerabilities
- What comes next once blockers are resolved?

Artificial Intelligence



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Current AI ETAC

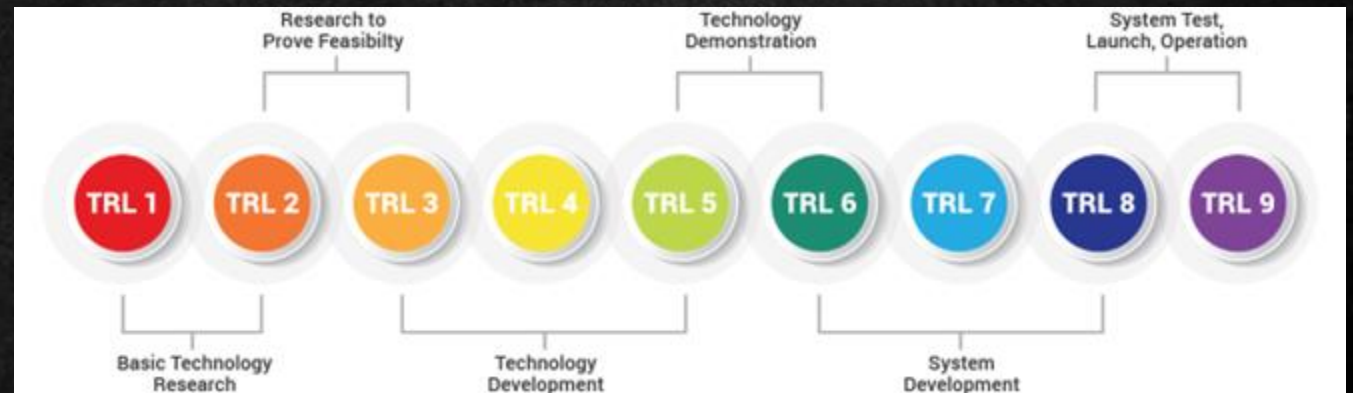
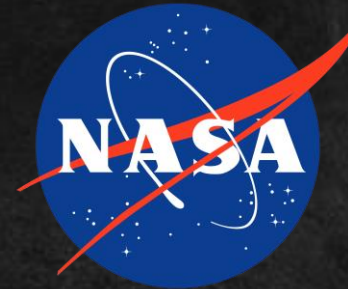


Technology Readiness



Current Blockers

Technology Readiness



Artificial Intelligence



Introduction to AI



History of AI



Current AI ETAC



Technology Readiness



Current Blockers

AI Chipsets

- Enable high performance computer for AI Applications
- Used in deep learning & neural networks
- Extremely specialised & expensive to make

Data Annotation

- Labelling & tagging datasets to train AI models
- Used in supervised machine learning
- Scaling automation is complex and costly

TRL 8

TRL 7

Artificial Intelligence



Introduction to AI



History of AI



Current AI ETAC



Technology Readiness



Current Blockers

Synthetic Data

- Creating artificial data that mimics real world data
- Mirrors existing patterns and distributions
- Helps to address privacy concerns

Data De-Identification

- Anonymises and pseudonymisation protect sensitive information
- Crucial for addressing data privacy regulations

TRL 6

TRL 7

Artificial Intelligence



TRL 6



Introduction to AI



History of AI



Current AI ETAC



Technology Readiness



Current Blockers

Data Quality & Observability

- Ensures that AI data is accurate, consistent and trustworthy
- Relies on Anomaly detection, governance frameworks & data profiles

Version Control & Experiment Tracking

- Ensures AI reproducibility and managing projects
- Involves tracking code versions, parameters and results

TRL 7

Artificial Intelligence



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History of AI



Current AI ETAC



Technology Readiness



Current Blockers

Model Validation & Monitoring

- Monitoring & assessing the performance and behaviour of AI Models in real-world scenarios
- Detects model drift, bias and ensures ongoing accuracy

TRL 8

Machine Learning Platforms

- Infrastructure & tools to develop, train and deploy AI models
- Focus on integrated environments for data preparation, model building and deployment pipelines

TRL 8

Artificial Intelligence



Introduction to AI



History of AI



Current AI ETAC



Technology Readiness



Current Blockers

Machine Learning Deployment

- Deploying trained models into production systems to make predictions / generate insights
- Requires managed model versions, scalability and real-time inference

Resource Optimisation

- Focuses on the efficient utilisation of CPU, GPU or cloud infrastructure
- Seeks to improve performance while reducing operational costs

TRL 7

TRL 6

Artificial Intelligence



Introduction to AI



History of AI



Current AI ETAC



Technology Readiness



Current Blockers

Computer Vision

- Enable AI systems to analyse and understand visual data (e.g., images and videos)
- Can cover tasks like object recognition, image classification & scene understanding

Natural Language Processing

- Involves interaction between computers and human language
- Covers tasks like language understanding, sentiment analysis and language generation

TRL 9

TRL 9

Artificial Intelligence



Introduction to AI



History of AI



Current AI ETAC



Technology Readiness



Current Blockers

AI Chipsets

Blockers:

- ❑ Complexity and cost of development
- ❑ Optimisation for specific algorithms
 - Convolutional Neural Networks (CNNs)
 - Recurrent Neural Networks (RNNs)
 - Transformer Networks
 - Deep Reinforcement Learning
 - Generative Adversarial Networks (GANs)

Artificial Intelligence



Introduction to AI



History of AI



Current AI ETAC



Technology Readiness



Current Blockers

Data Annotation

Blockers:

- ☐ Availability of high-quality annotated datasets
- ☐ Standards of consistency for automation
- ☐ Blueprints for automated annotation

Synthetic Data

Blockers:

- ☐ Identification of Financial Services use cases
- ☐ Generating accurate & diverse synthetic data
- ☐ Validation of effectiveness

Artificial Intelligence



Introduction to AI



History of AI



Current AI ETAC



Technology Readiness



Current Blockers

Data De-Identification

Blockers:

- ☐ Standards for obfuscation to satisfy evolving privacy regulations

Data Quality & Observability

Blockers:

- ☐ Identification of common data inconsistencies
- ☐ Establishing comprehensive data quality processes for automation or process improvement

Artificial Intelligence



Introduction to AI



History of AI



Current AI ETAC



Technology Readiness



Current Blockers

Version Control & Experiment Tracking

Blockers:

- ☐ Integration with common platforms
 - Identification of expected platforms for interoperability
- ☐ Understanding versioning control governance at different levels of enterprise

Model Validation & Monitoring

Blockers:

- ☐ Automation of validation & monitoring
- ☐ Mathematical models for model drift & bias

Artificial Intelligence



Introduction to AI



History of AI



Current AI ETAC



Technology Readiness



Current Blockers

Machine Learning Platforms

Blockers:

- ☐ Creating common use frameworks for rapid testing/training deployment
- ☐ Addressing scalability for adaptations of micro-systems

Machine Learning Deployment

Blockers:

- ☐ Defining common deployment pipelines
- ☐ Creating plug-ins for specific purposes from common framework such as Miniature model training

Artificial Intelligence



Introduction to AI



History of AI



Current AI ETAC



Technology Readiness



Current Blockers

Resource Optimisation

Blockers:

- ☐ Creation of common libraries for industry standard hardware
- ☐ Creation of guiding principles for ASICs and their designers

Computer Vision

Blockers:

- ☐ Defining core libraries for accuracy and robustness
- ☐ Addressing example real-world scenarios to further develop core libraries

Artificial Intelligence



Introduction to AI



History of AI



Current AI ETAC



Technology Readiness



Current Blockers

Natural Language Processing

Blockers:

- ☐ Create standard language models for common global languages
- ☐ Develop interoperability into special purpose use-cases and domains
- ☐ Scale for running on diverse systems
 - Local device configurations
 - Windows
 - MacOS
 - Linux
 - Entry tier common cloud provider offerings

Any Other Admin



Please add your
attendance to this call!

<https://github.com/finos/zenith/issues/41>



Join our mailing list
for future updates

(You don't need to put anything in the message)



Next Deep Dive:

*Tech Passporting
for enterprise
and innovation*

Call to Arms



Potential POCs



Get in touch with us
through the mail group

Artificial Intelligence

- Introduction to AI
 - History of AI
 - Current AI ETAC
 - Technology Readiness
 - Current Blockers
- AI Chipsets**
- Blockers:
- Complexity and cost of development
 - Optimisation for specific algorithms
 - Convolutional Neural Networks (CNNs)
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Artificial Intelligence

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- Data Annotation**
- Blockers:
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- Synthetic Data**
- Blockers:
- Identification of Financial Services use cases
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Artificial Intelligence

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Artificial Intelligence

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Artificial Intelligence

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Artificial Intelligence

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 - Scale for running on diverse systems
 - Local device configurations
 - Windows
 - MacOS
 - Linux
 - Entry tier common cloud provider offerings

Any Other Business?





Thank you



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