

artificial life is
everywhere

SO WHY IS IT SO HARD TO TEACH?

ALife 2025

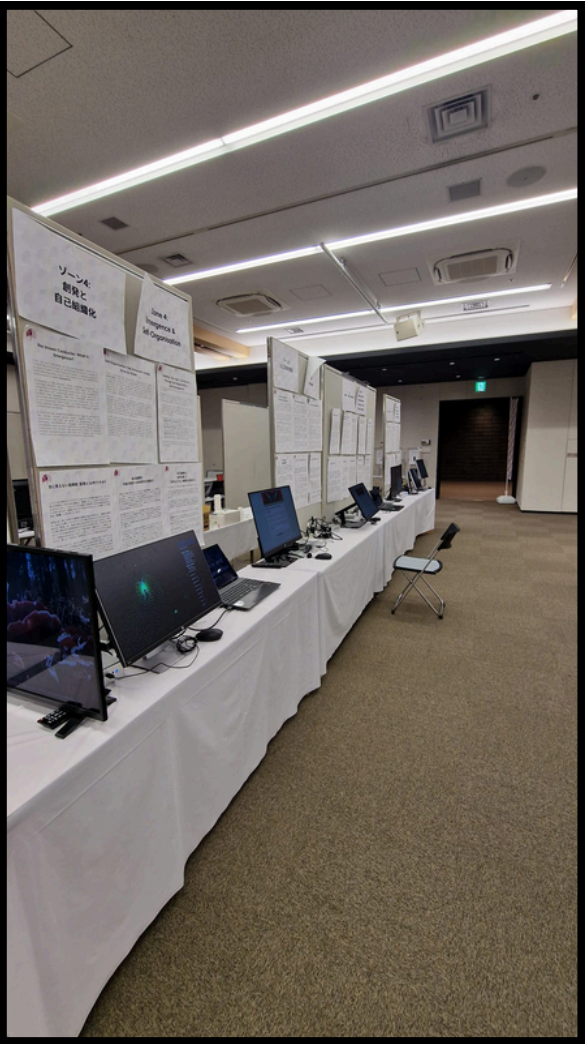
Ciphers of Life

Join ALife 2025, the Premier Conference on Artificial Life
6 – 10 October 2025 | Kyoto, Japan + Online

Societal Outreach Initiatives for Artificial Life

Imy Khan, Independent <imy@imyt.co.uk>
Emily Dolson, Michigan State University <dolsonem@msu.edu>

Does ALIFE have a “marketing problem”?



Podcast

What ALife! Podcast

Imy Khan

ZONE 4 • ALIFE FUNDAMENTALS I

Emergence & Self-Organisation

No leader, no blueprint – yet astonishing order arises. How does complexity emerge from simplicity?

▶ WATCH ▶

Watch

▼ ZONE 4 – EMERGENCE & SELF-ORGANISATION

1 ALIFE2025 Public Expo Zone 4 Emergence & Self Organisation

Imy Khan

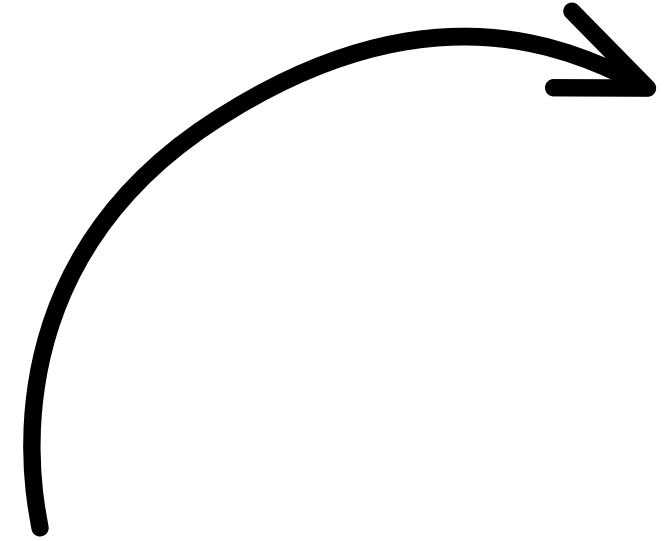
Illustration of a forest landscape with a deer, mountains, and a sun/moon.

**EXTERNAL
VISIBILITY**

**SHARED
UNDERSTANDING**

**INTERNAL
COHERENCE**

**“WHAT IS
ARTIFICIAL LIFE?”**



the **study** of man-made **systems** that exhibit behavior characteristic of natural living systems

The **study** of '**life-as-it-could-be**' in order to better understand 'life-as-we-know-it'.

the attempt to **create**, in a computer or other artificial medium, the **characteristic features of living things**.

A scientific and engineering **discipline** devoted to understanding the essential nature of life by means of its artificial reproduction.

CLASSICAL DEFINITIONS

A form of **theoretical biology** that uses synthetic approaches to explore lifelike processes like autonomy, agency, and sense-making.

An **interdisciplinary research domain** seeking to understand the science and engineering of life as it could be in general, whether in virtual, mechanical, or chemical substrates

A field that **explores the essence of 'life'** by constructing living systems from scratch, moving from low-level rules to high-level emergent behaviors.

“i looked into it briefly but didn’t understand
the point of it”

“sounds like science fiction 😊 ”

“is this a new area?”

“I think it’s a subfield of AI
[...] a set of optimisation techniques”

“AI with some consciousness”

RECENT DISCUSSIONS WITH COLLEAGUES AND STUDENTS

“it is about genetic algorithms”

“we played with cellular automata [in module X]”

“...algorithms we can use for video games”

“i came across it [...] i work in computational
biology [...] ”

“...like swarm intelligence”

“i looked it years ago [...] i liked the focus
on emergence”

“i can’t see how CS can create life”

OTHER DISCIPLINES



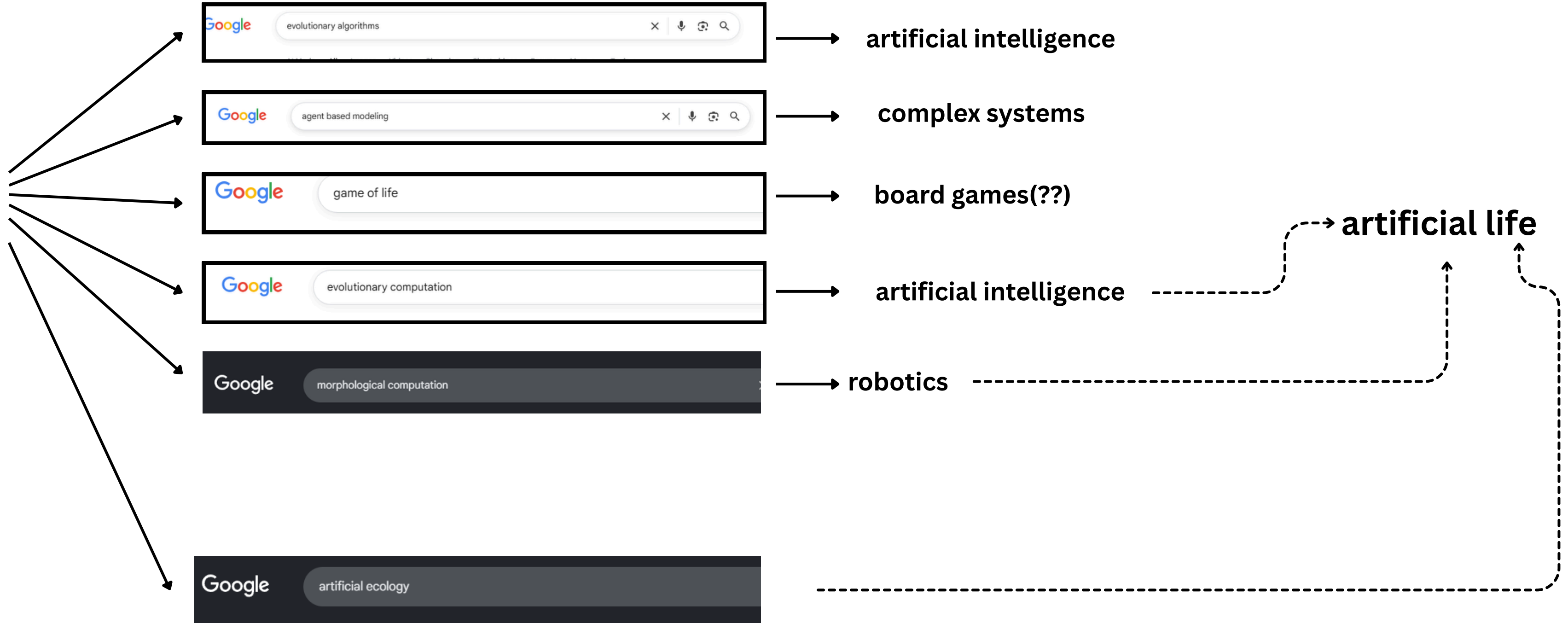
NAIVE AUDIENCES



“ALIFERS”



I want to learn about...



Google

evolutionary algorithms

AI ModeAllImages

AI Overview

Evolutionary algorithms are optimization techniques that use complex, non-linear, population of candidate solutions, mutation, recombination, and selection to find "good enough" solutions to complex problems. This video explains how evolutionary algorithms work.

EVOLUTIONARY ALGORITHMS

Wikipedia

https://en.wikipedia.org/wiki/evolutionary_algorithm

Evolutionary algorithms (EAs) are a family of optimization algorithms inspired by biological evolution. They are used to solve complex problems in order to find the best solution.

ScienceDirect.com

https://www.sciencedirect.com/science/article/pii/S0959652621000000

Evolutionary Algorithms (EAs) are a family of optimization algorithms inspired by biological evolution. They are used to solve complex problems in order to find the best solution.

People also ask

What is an example of evolutionary algorithm?

What are the 7 types of evolutionary algorithms?

What is an evolutionary algorithm?

What are the 4 methods of evolution?

Reddit · r/DebateEvolution

50+ comments · 10 months ago

Evolutionary Algorithms: When Nature's Sloppy Methods ...

Basically, the algorithms that survive to reproduce will have their "DNA" live on. And we can make them evolve to solve a certain problem. Read more

Google

agent based modeling

AI ModeAllImagesVideosShoppingShort videosForumsMoreTools

AI Overview

Agent-based modeling (ABM) is a computational simulation of complex systems by modeling the interactions of autonomous agents (people, firms, animals) within an environment. It is a "bottom-up" approach where simple agent rules produce complex, emergent macro-level behaviors. Columbia University Mailman School of Public Health

This video provides a brief introduction to agent-based modeling and simulation.

Agent-Based Modeling and Simulation

Wikipedia

https://en.wikipedia.org/wiki/Agent-based_modeling_and_simulation

Agent-based model (ABM) is a computational model for simulating the behavior of autonomous agents (individuals or collective entities) and their interactions. It is used to study the emergence of complex systems from simple rules.

HistoryTheoryApplicationsOrganizational ABM: agent-based modeling and simulation

People also ask

What is the difference between Monte Carlo and agent-based modeling?

Is agent-based modeling hard?

What is an example of agent-based modeling?

What is the difference between agent-based models and other models?

Columbia University Mailman School of Public Health

https://www.publichealth.columbia.edu/research/agent-based-modeling

Agent-Based Modeling

Agent-based models are computer simulations used to study the interactions of individuals in different places, and time. Read more

INET Oxford

https://www.inet.ox.ac.uk/news/agent-based-modelling-comes-of-age

Agent Based Modelling Comes of Age

31 Mar 2025 - The agent-based modelling (ABM) paradigm of simulation has become a leading approach for studying complex systems. Read more

Google

game of life

AI ModeAllImagesShoppingVideos

Wikipedia

https://en.wikipedia.org/wiki/Conway%27s_Game_of_Life

Conway's Game of Life

The Game of Life, also known as Conway's Game of Life, is a cellular automaton devised by the British mathematician John Horton Conway in 1970. Read more

John Conway's Game of Life

https://playgameoflife.com

Play John Conway's Game of Life

The Game of Life is not your typical computer game. It was invented by Cambridge mathematician John Conway.

Hasbro Gaming Game of Life...

£22.00 & more prices

Argos & more

4.6 (354)

Hasbro Game of Life

£17.99

Amazon.co.uk

5.0 (1)

THE GAME OF LIFE (PC) - Steam Key - Digital...

£0.88 £5.49

Green Man Gaming

Free delivery

Hasbro The Game of Life Vintage...

£44.99 & more prices

Amazon.co.uk & more

Free delivery

5.0 (9)

People also ask

How do you play The Game of Life?

Google

evolutionary computation

AI ModeAllImagesShoppingVideosForumsNewsMoreTools

AI Overview

Evolutionary computation (EC) is a subfield of artificial intelligence that uses algorithms inspired by biological evolution—such as selection, mutation, and crossover—to iteratively optimize candidate solutions. It finds near-optimal solutions for complex, high-variable problems by evolving a population of candidates over generations based on a defined fitness function. Wikipedia

Key Concepts in Evolutionary Computation

- Population-Based:** Unlike single-point optimization, EC works with a "population" of potential solutions, allowing for exploration of large search spaces.
- Fitness Evaluation:** A function is used to calculate the "fitness" of each solution, determining how well it solves the problem.

Show more

Wikipedia

https://en.wikipedia.org/wiki/Evolutionary_computation

Evolutionary computation

Evolutionary computation from computer science is a family of algorithms for global optimization inspired by biological evolution. Read more

HistoryTechniquesEvolutionary algorithmsPublications

Massachusetts Institute of Technology

https://direct.mit.edu/evco

Evolutionary Computation

Evolutionary Computation is a leading journal in its field. It provides an international forum for facilitating and enhancing the exchange of information among ... Read more

People also ask

Is evolutionary computation AI?

What are the 4 types of evolution?

What is the Lamarckian algorithm?

What is the evolutionary computation paradigm?

alife.org

https://alife.org

Artificial Life

Artificial life is a field of study that seeks to understand the principles of life and how they can be applied to the design of artificial systems. Read more

Evolutionary computation

Field of study

Evolutionary computation from computer science is a family of algorithms for global optimization inspired by biological evolution, and a subfield of computational intelligence and soft computing studying these algorithms.

Source: Wikipedia

People also search for

Machine learning

Artificial intelligence

Natural language processing

Neural network

See more

**“WHAT IS
ARTIFICIAL LIFE?”**

ALIFE EXPO STRUCTURE

1 - WELCOME TO LIFE AS IT COULD BE

2 - LIVING VS. NON-LIVING SYSTEMS

3 - HISTORY OF ALIFE

4 - EMERGENCE & SELF-ORGANISATION

5 - EVOLUTION & ADAPTATION

6 - COMPLEXITY FROM SIMPLICITY

7A - HARD ALIFE

7B - SOFT ALIFE

7C - WET ALIFE

8 - ARTIFICIAL LIFE & SOCIETY

9 - THE FUTURE OF ARTIFICIAL LIFE



DOMAIN

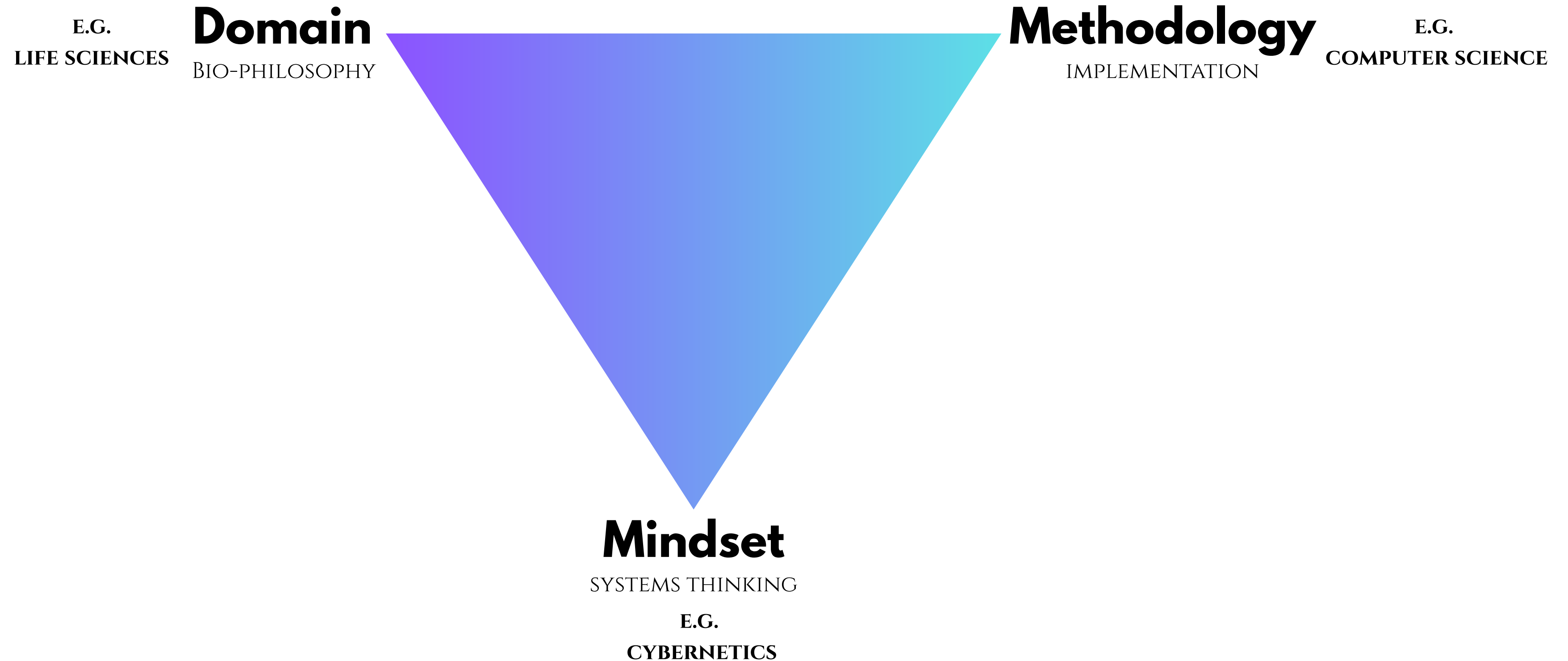


MINDSET



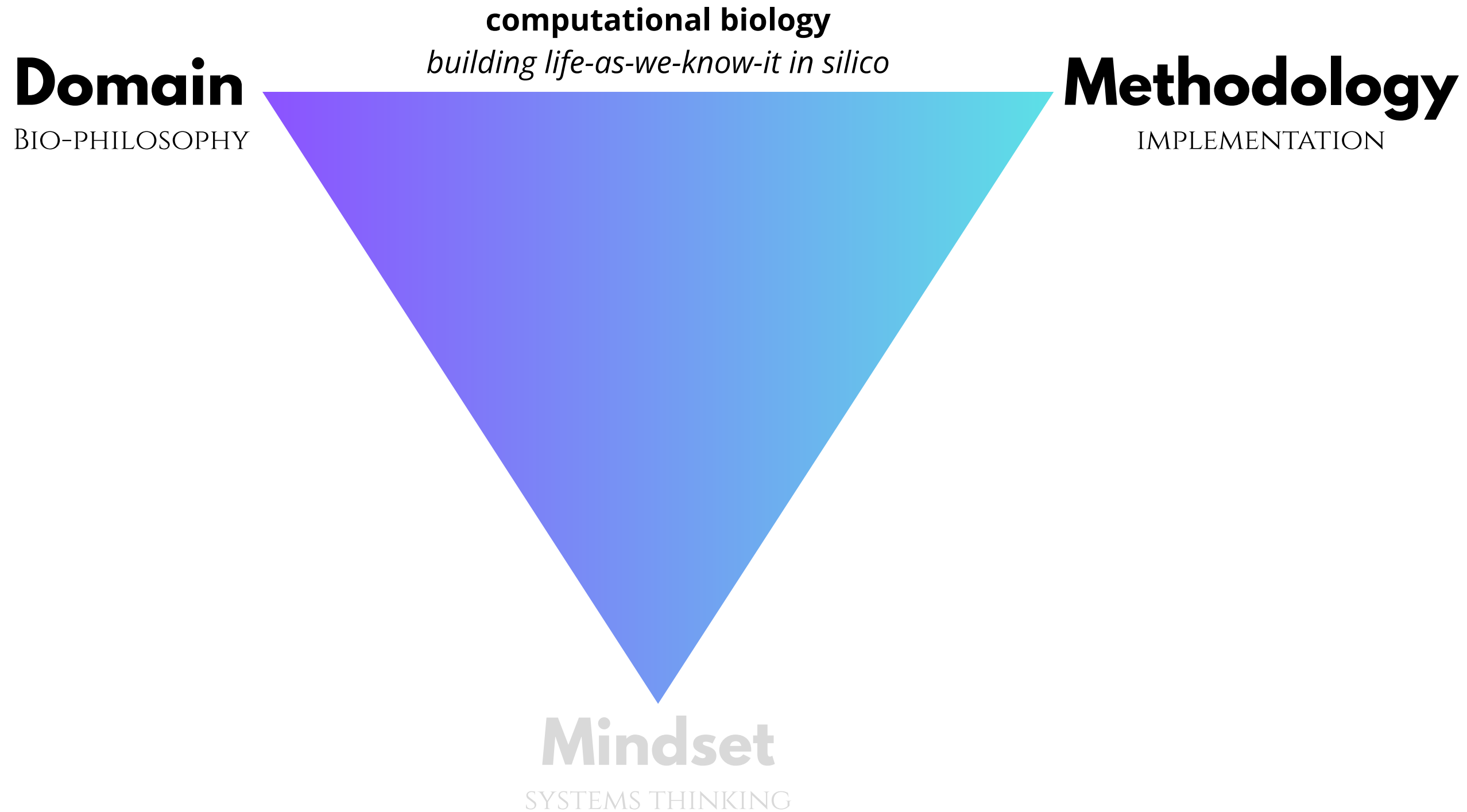
METHODOLOGY

ARTIFICIAL LIFE AS A ...

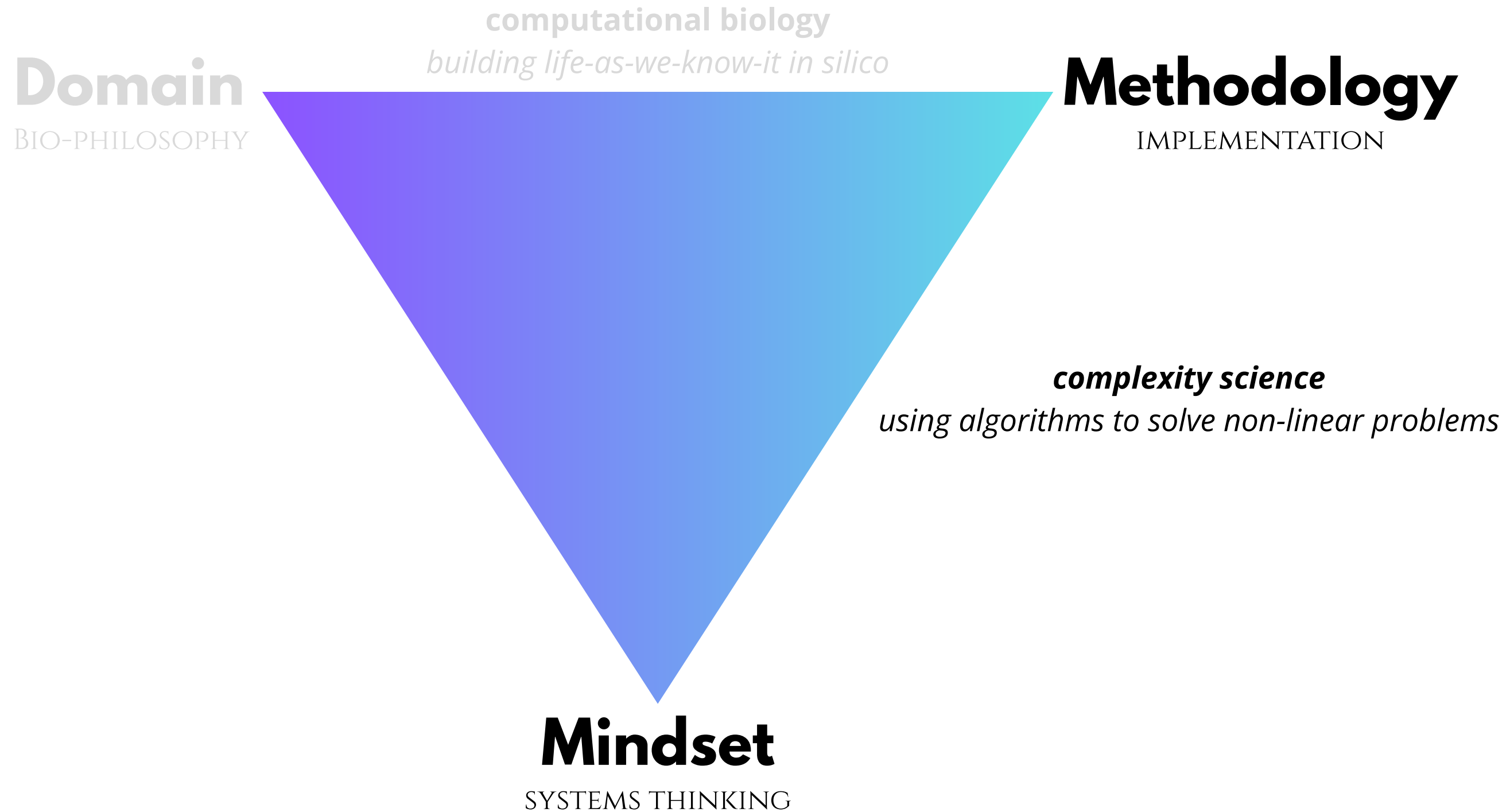


WHERE IS ALIFE?

ARTIFICIAL LIFE AS A ...



ARTIFICIAL LIFE AS A ...



ARTIFICIAL LIFE AS A ...

Domain

BIO-PHILOSOPHY

Methodology

IMPLEMENTATION

cognitive science

viewing the “mind” as a biological process of self-maintenance and environmental interaction

complexity science

using algorithms to solve non-linear problems

Mindset

SYSTEMS THINKING

WHERE IS ALIFE?



Domain

Methodology



ALIFE

Mindset

Domain

Methodology

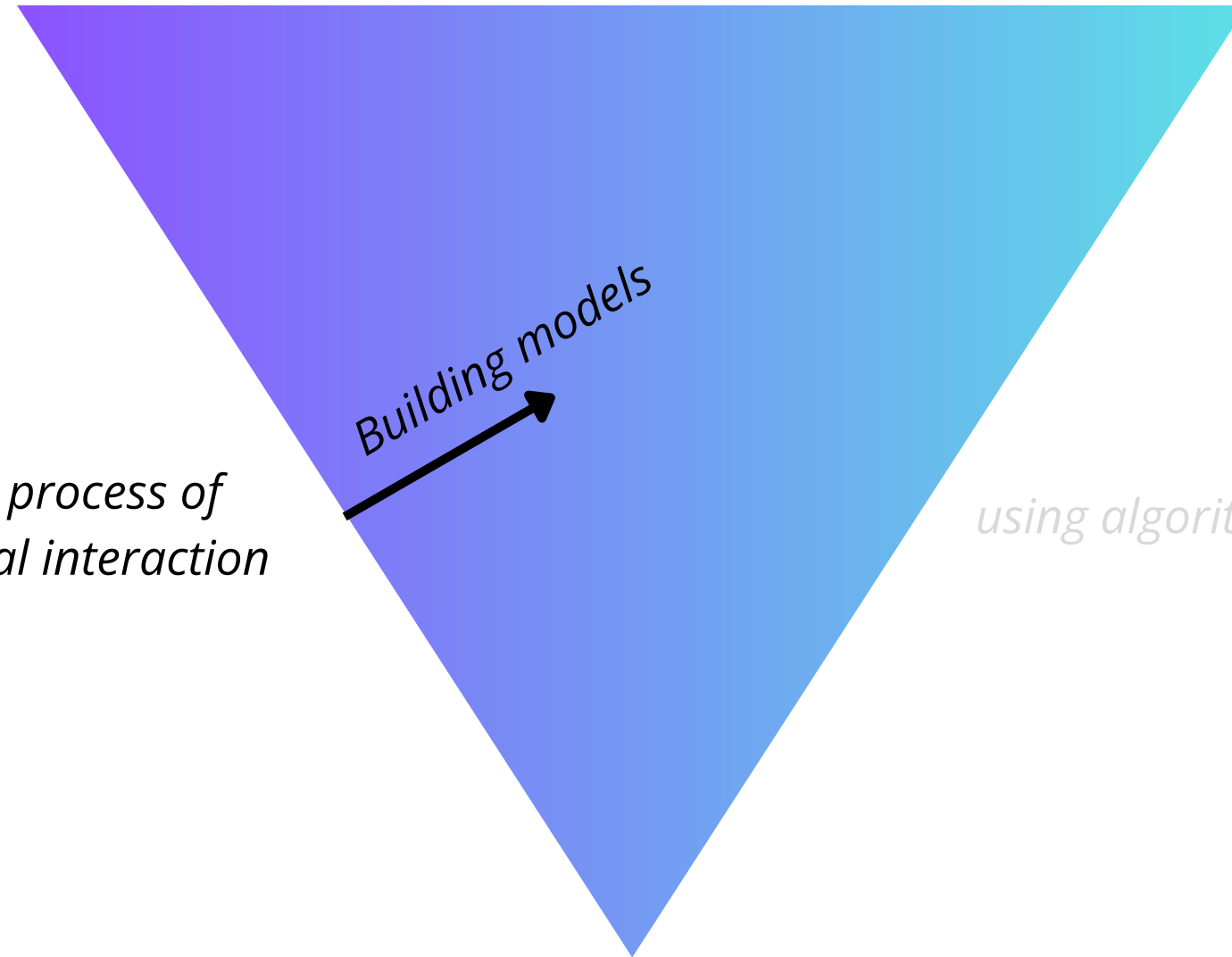
computational biology
building life-as-we-know-it in silico

cognitive science
*viewing the “mind” as a biological process of
self-maintenance and environmental interaction*

complexity science
using algorithms to solve non-linear problems

Building models

Mindset



Domain

computational biology
building life-as-we-know-it in silico

Methodology

*Relinquish
predictability;
embrace
emergence,
“what if..?”*



cognitive science
*viewing the “mind” as a biological process of
self-maintenance and environmental interaction*

complexity science
using algorithms to solve non-linear problems

Mindset

Domain

Methodology

computational biology

building life-as-we-know-it in silico

cognitive science

viewing the “mind” as a biological process of self-maintenance and environmental interaction

complexity science

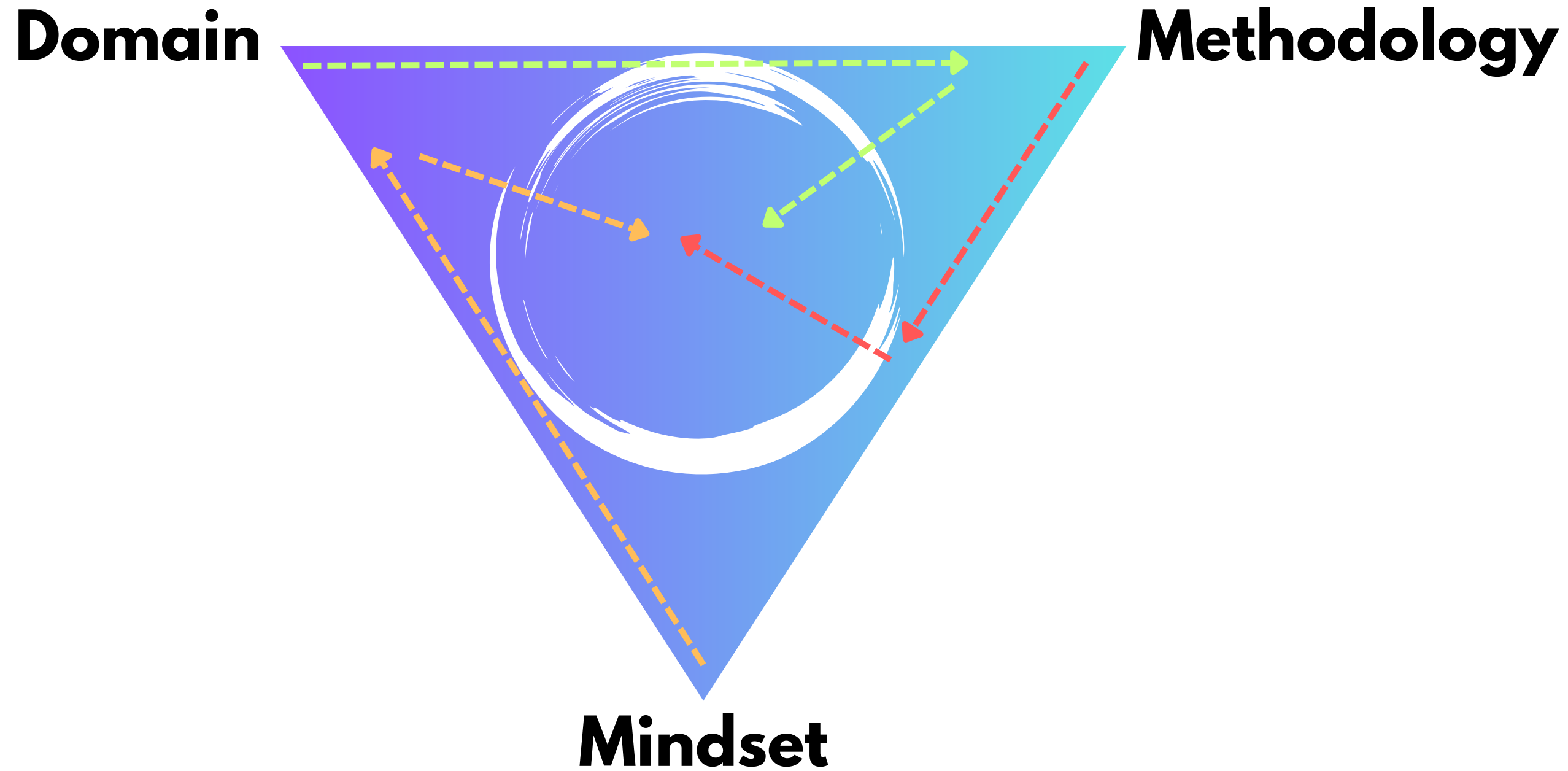
using algorithms to solve non-linear problems

Mindset

Grounding in l-a-w-n-i



BUILDING THE ALIFER...



Domain

Methodology



Mindset

**IF I TEACH A CLASS ON
[AGENT-BASED MODELLING],
HAVE I TAUGHT ARTIFICIAL LIFE?**

**WHAT DO YOU DO/TEACH
THAT IS “ARTIFICIAL LIFE”?**

WHAT’S MISSING?

artificial life is
everywhere

SO WHY IS IT SO HARD TO TEACH?