

The background of the slide is a complex, abstract network diagram. It consists of numerous thin, light-colored lines (nodes) that are interconnected, forming a dense web. The nodes are represented by small, colorful circles in various colors including blue, red, yellow, green, and purple. The overall color palette is muted and cool, with a light blue background. The network structure is non-hierarchical and appears to be a representation of a complex system or a neural network.

Nature's Intelligence

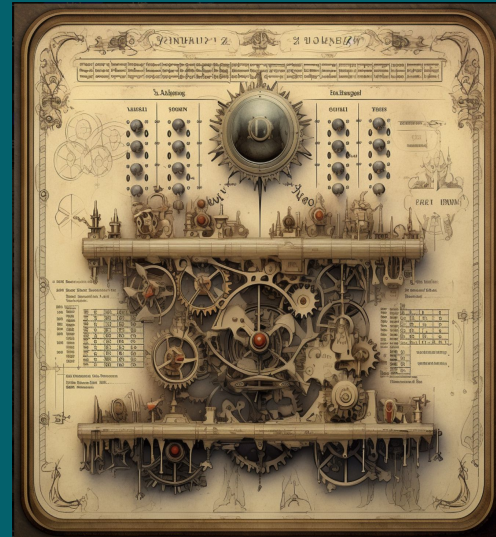
Human-Centered AI, Natural Systems
and Neuroscience: Societal Well Being

The greatest cumulative benefits of AI to economic development and social good will be realized in an AI that integrates human creativity with digital intelligence - an AI architecture that is based on nature's intelligence.

The quest: to learn from the collective unwritten knowledge of humanity

Leibniz Knowledge Calculator 1671

“I am convinced that the unwritten knowledge scattered among men of different callings surpasses in quantity and in importance anything we find in books, and that the greater part of our wealth has yet to be recorded.”
Gottfried Wilhelm Leibniz



We have not arrived – there is work to be done

“Large language models drop the provenance of fragments used to generate outputs. By definition, it cannot produce scientific knowledge”

John Seely Brown (former President of Xerox PARC)



Judea Pearl

You are smarter
than your data?



Hinton

'OK, that's what artificial neural nets are.' And they don't realize how arbitrary it is. We just made it up! And there's no reason why we shouldn't make up something else.

Statistical Generative AI is an extremely powerful digital intelligence that needs grounding in nature's intelligence

The human brain is an efficient adaptive learning system

Generative (statistical) AI

Hallucinates

Resource hungry
(GPT4 - 6 months, 60 million KWH,
13,000 metric tons of CO2)

Black box (does not reveal how it thinks)

Human Brain

Real-time learning

Corrected
hallucinations

30 watt light bulb

Explanatory



*The imagination of nature
is far, far greater than the imagination of man.*

The Evolution of Artificial Intelligence

FIRST WAVE:
Handcrafted Knowledge

The knowledge of experts in logical reasoning and symbolic representation.

SECOND WAVE

CATEGORIZE (NOW):
Statistical Learning

Mathematics of statistical physics

Generative == plausible

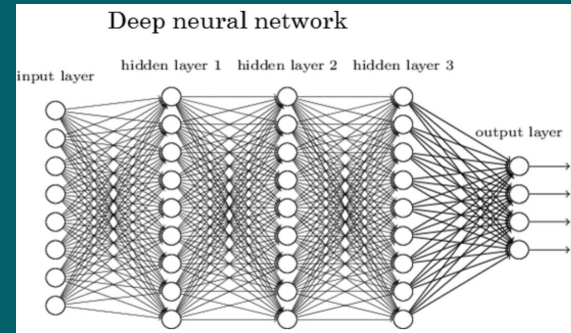
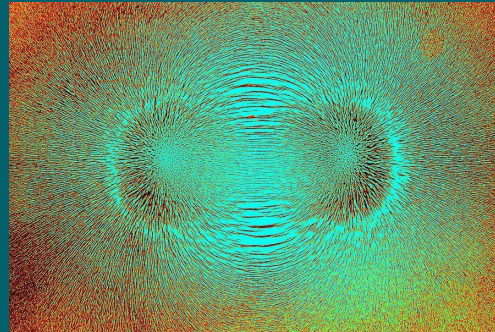
THIRD WAVE:
Explanatory with Contextual Adaptation

Generative Collective Intelligence (Human and Digital)

Physics of living systems

Active Inference
Natural Artificial Intelligence

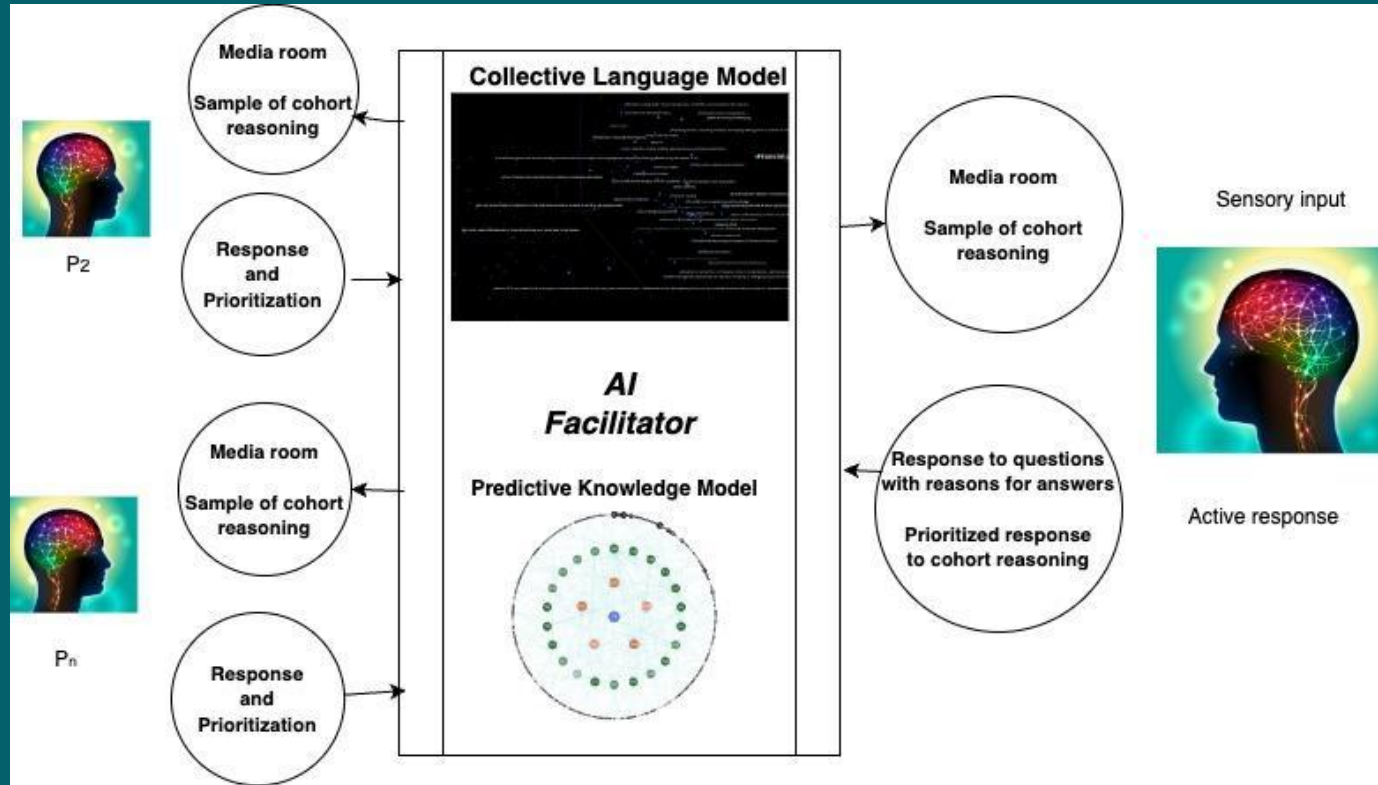
Natures intelligence: emergent intelligence is built into natural laws



$$E = -\frac{1}{2} \sum_{i,j} w_{ij} s_i s_j - \sum_i \theta_i s_i$$

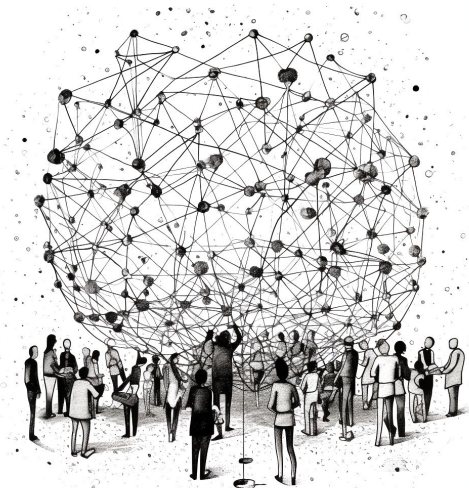
The physics of cooperative phenomena
– nature's intelligence on how things cooperate.

Generative Collective Intelligence: An AI that builds a generative model of our collective intelligence

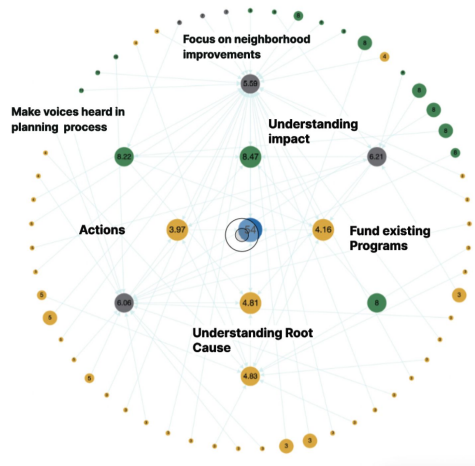


Amplifying human imagination

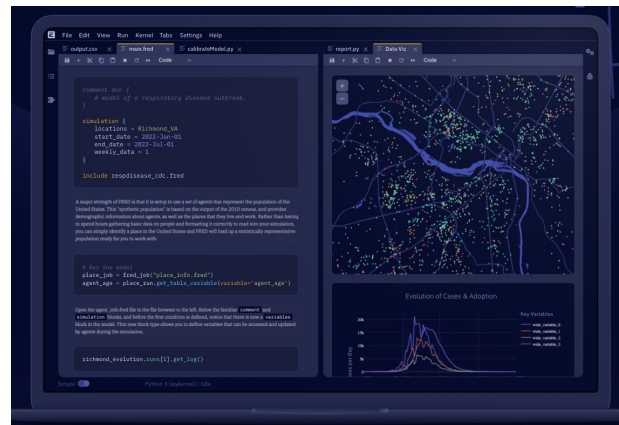
Bringing order to human knowledge discovery



Creating solutions to our greatest challenges



Projecting outcomes with population models



**From AI that kindles rage and division
To an AI that kindles collaboration and joy**

Collaborate

Co-Create

Collectively we can create solutions to our biggest challenges

**Thank
You!**

