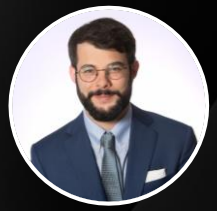
THE NEW INNOVATION ENGINE

Unpacking the risks and opportunities of using AI to power innovation



Anthony Schiavo
Senior Director

AGENDA

01 **AI: A brief primer**

02 Use-cases and case studies in innovation

03 Building an AI roadmap with the Lux AI Framework

AI IS A PROBABILISTIC TOOL

GPT-2 next-word probabilities

The best thing about AI is its ability to

learn	4.5%
predict	3.5%
make	3.2%
understand	3.1%
do	2.9%

Out[ ]= {The best thing about AI is its ability to,
The best thing about AI is its ability to learn,
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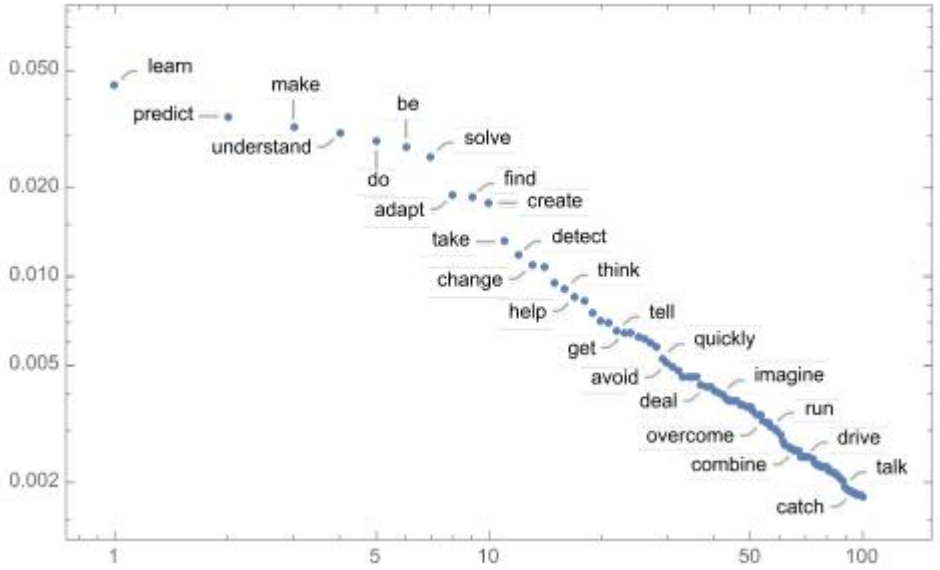
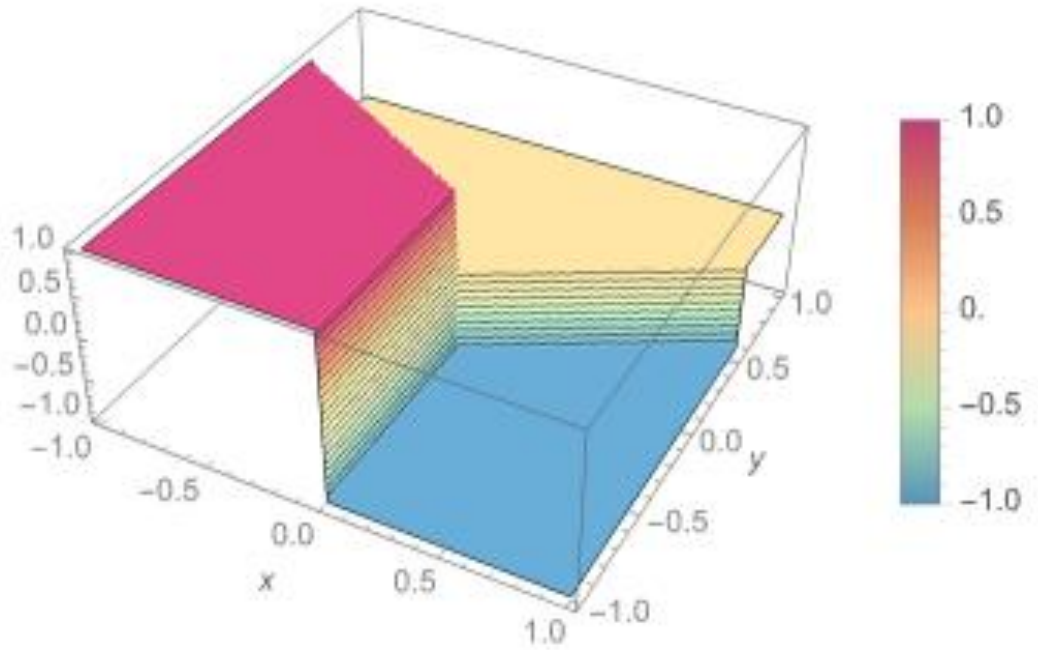
GPT-2 temperature chart



AI CAN APPROXIMATE COMPLEX FUNCTIONS

If we want to approximate this function...



...we can use increasingly complex neural nets.

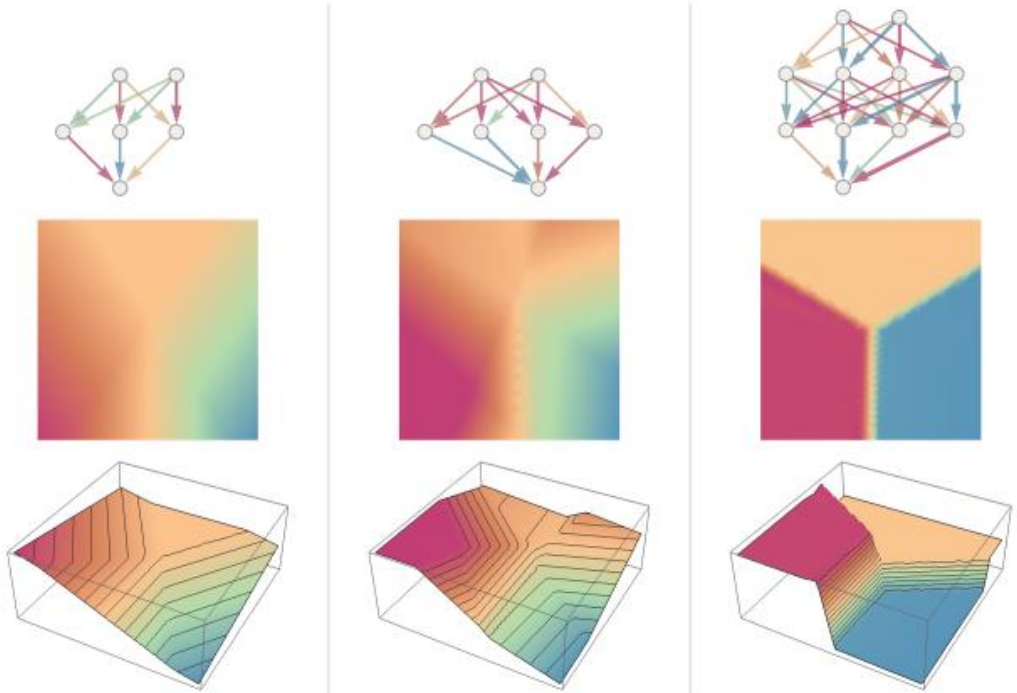
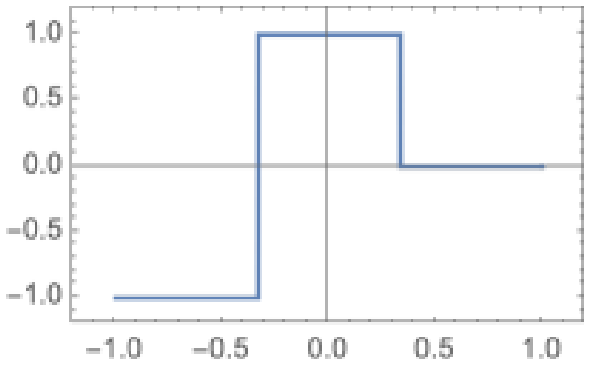


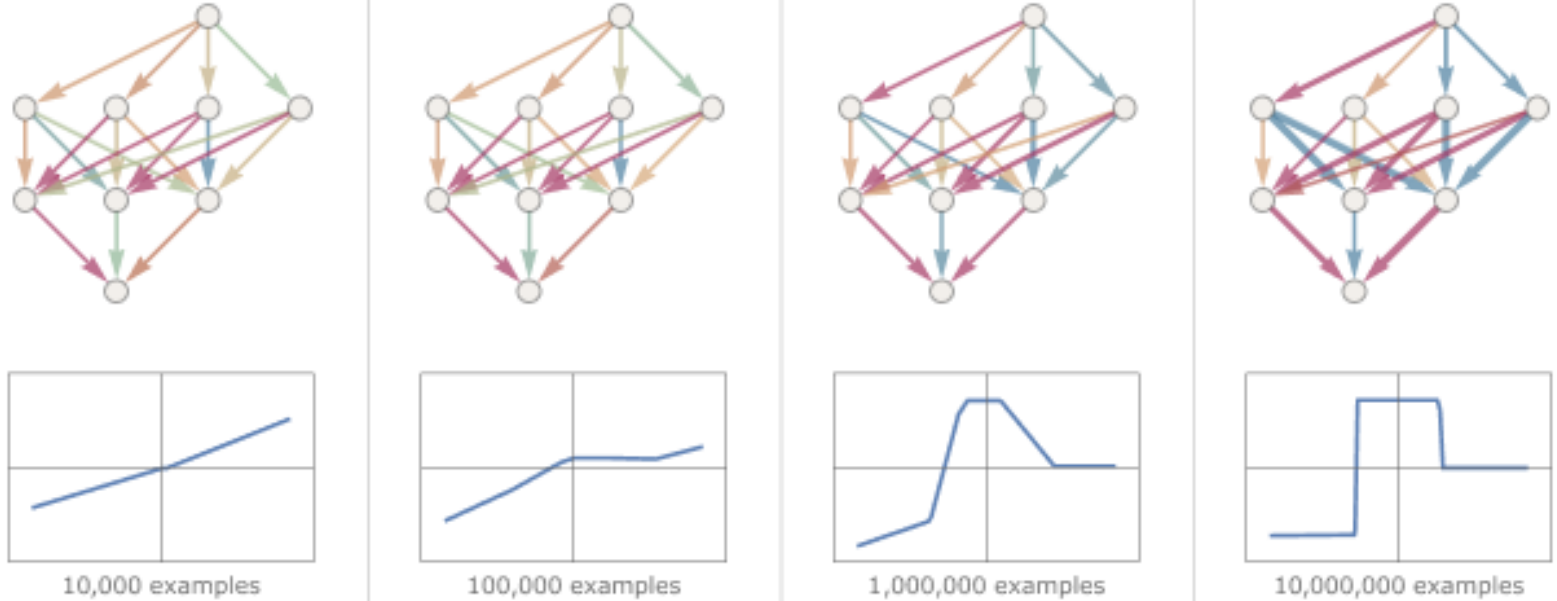
Image credits: Stephen Wolfram.

AI NEEDS DATA FOR TRAINING

Let's say we want to recreate this function:



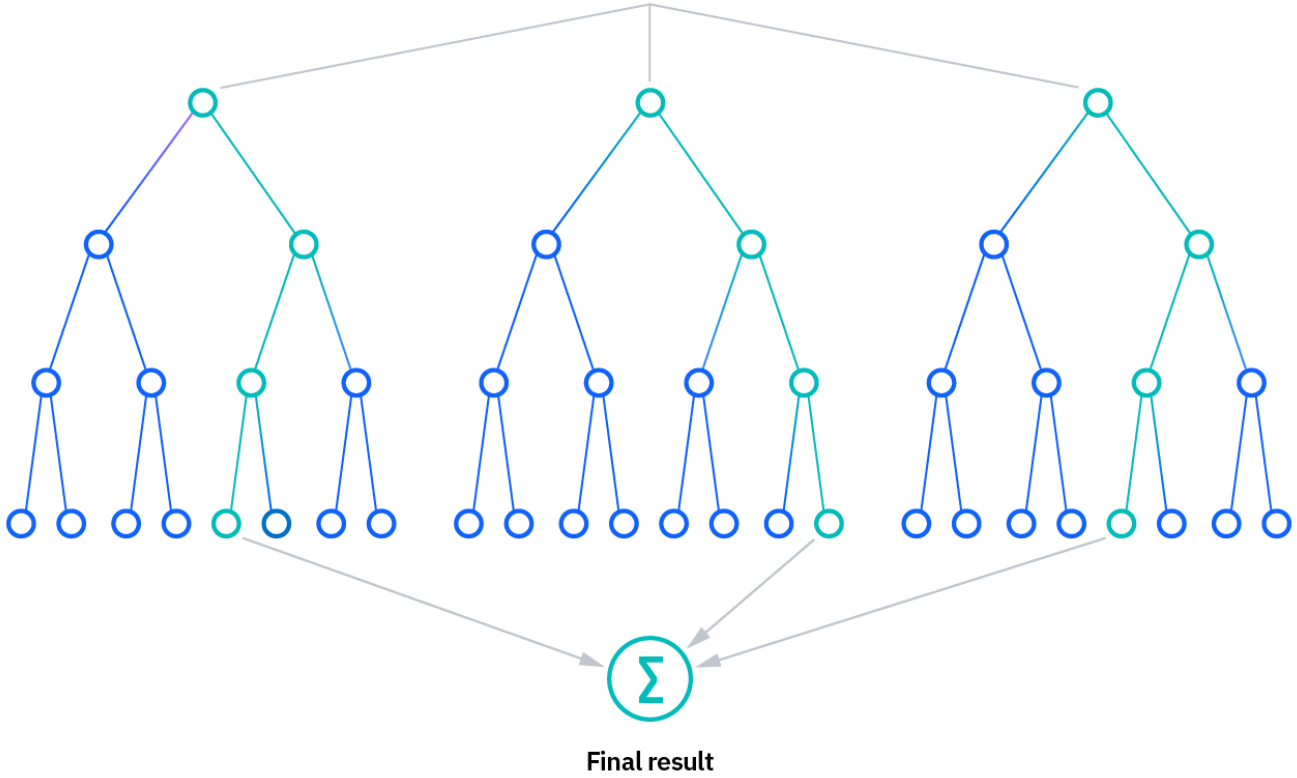
We can train a neural net by providing it examples and adjusting the results. More data points = better results.



AIs are probabilistic programs, trained on large amounts of data, which can replicate the outputs of complex tasks.

MOST TECHNICAL AI APPLICATIONS STILL RELY ON ALGORITHMS

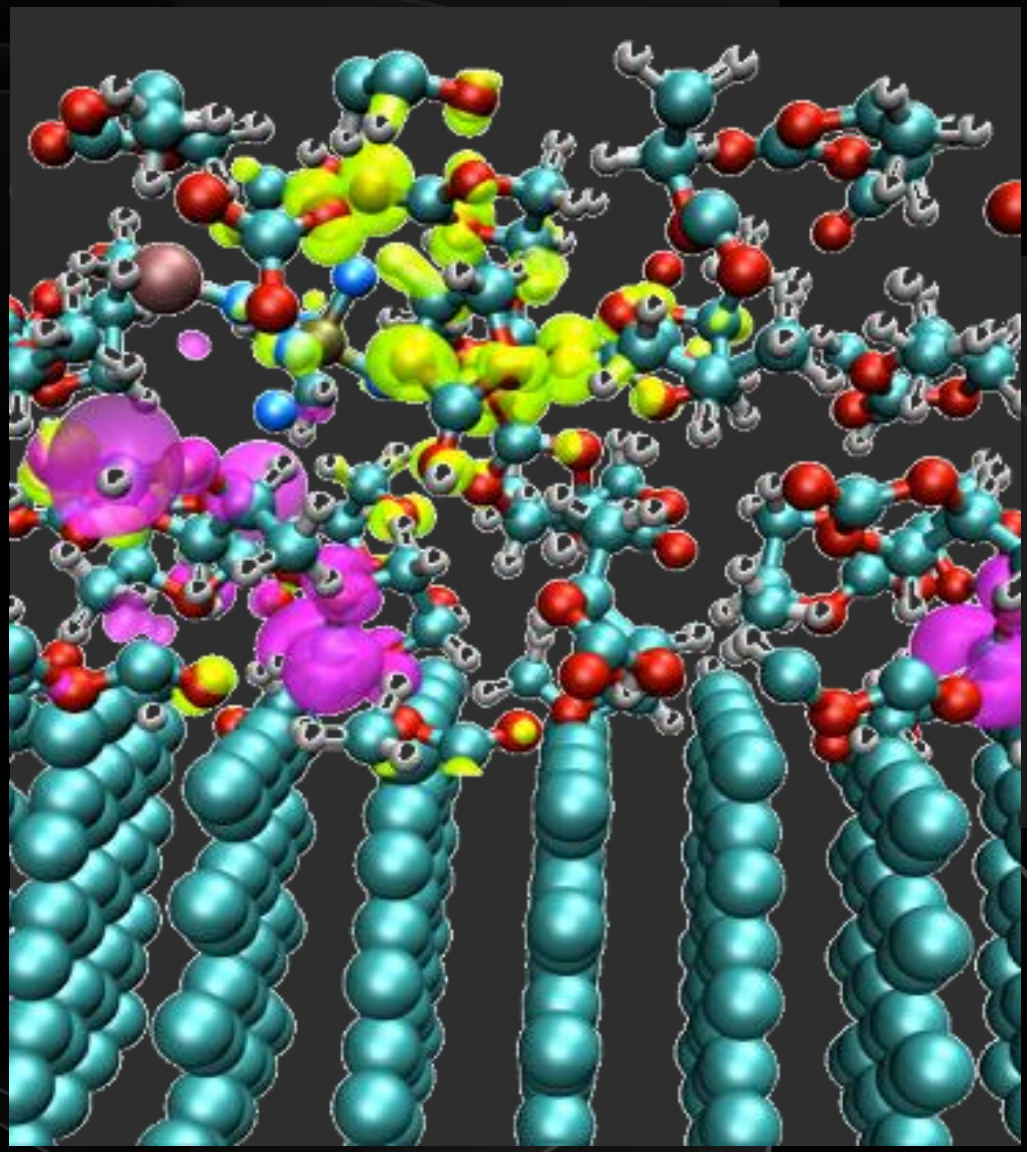
Techniques like random-forest algorithms shown below are still most common in highly technical applications.



“ ”

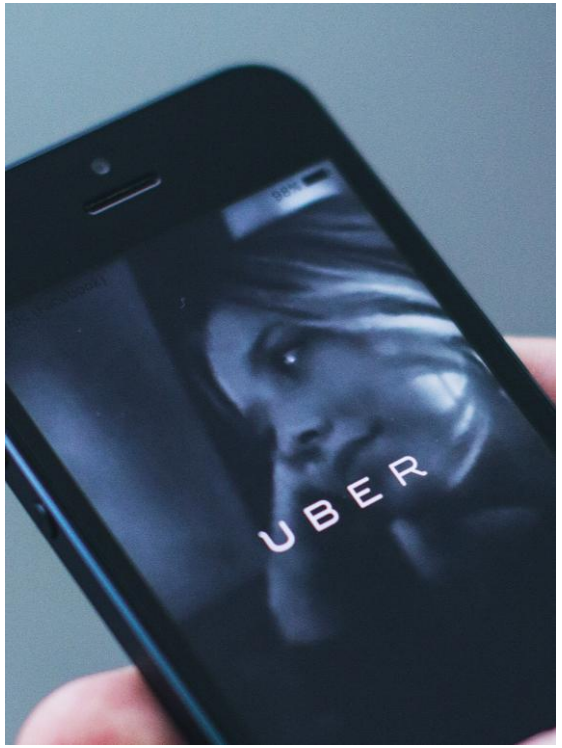
[AI] increased understanding because when the scientists didn’t understand a prediction, they would chase down an explanation rooted in physical science.

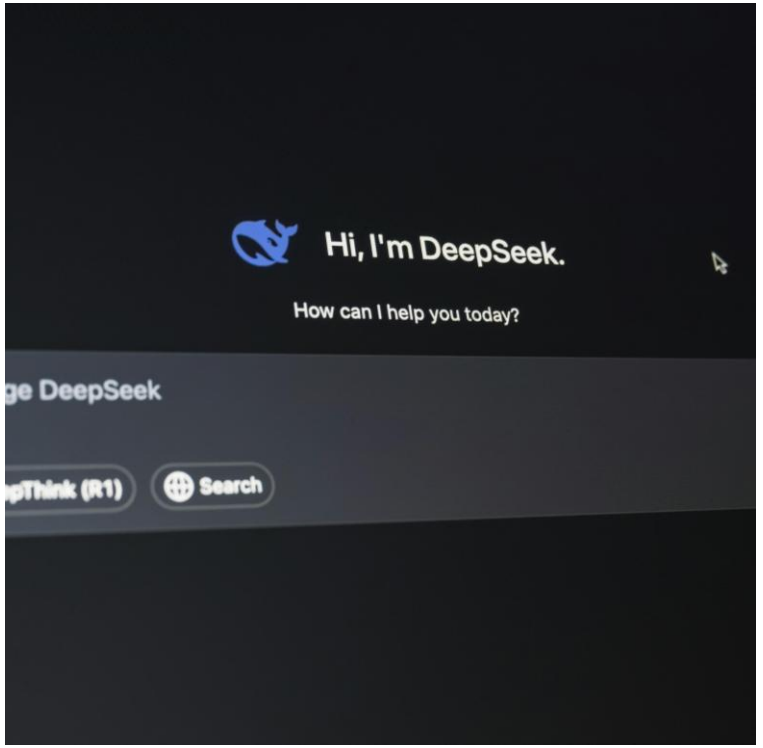
CTO, Cabot, Lux Executive Summit 2019



AI MEDIATES HUMAN LABOR

AI is a way to automate, fragment, de-skill, and casualize certain kinds of human labor





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5 KEY CAPABILITIES OF AI

DOCUMENT SUMMATION & REVIEW

INFORMATION SEARCH & RETRIEVAL

GENERATION OF CONTENT (CODE, TEXT, IMAGES)

HUMAN-MACHINE INTERFACE

COMPLEX-SYSTEMS MODELING

WHERE WILL AI IMPACT INNOVATION?

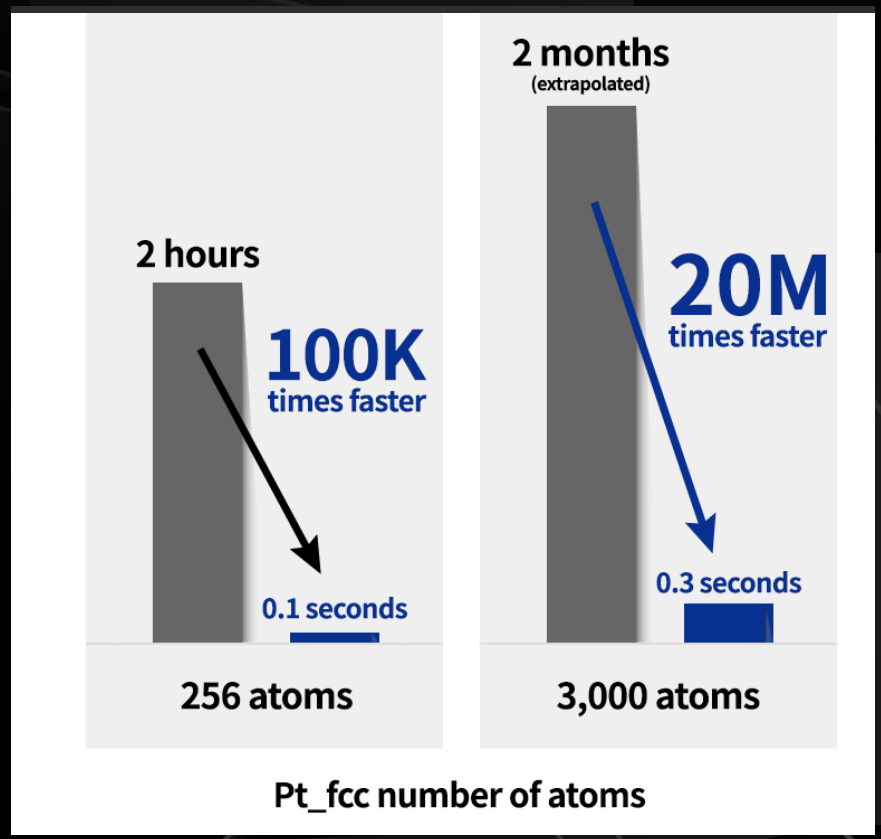
	Tasks	
STAGE 1 **Insight**	Basic R&D	Trend identification
STAGE 2 **Ideation**	Brainstorming	Future-state forecasting
STAGE 3 **Investigation**	Technical modeling	Innovator mapping
STAGE 4 **Investment (pilot)**	Partnership formation	Financial modeling
STAGE 5 **Implementation (launch)**		

SIMULATION

PFCC's Matlantis platform uses neural nets to accelerate DFT calculations

PFCC used a proprietary database of around 60 million DFT simulation results to train a neural net model to predict the outcome of DFT simulations.

Running the neural net is orders of magnitude faster than performing DFT calculations.



LUX TAKE

This type of approach is powerful but difficult and expensive: PFCC needed support from its partners to develop enough data to train the model.

MATLANTIS

TRENDSPOTTING

Tastewise unveils TasteGPT, a chatbot to streamline product concept development

Tastewise's generative AI platform uses computer vision and NLP to analyze public data, track consumer preferences, and generate new product ideas.

Its TasteGPT tool offers conversational insights for numerous product ideas, helping brands select the best concepts.

LUX TAKE

While it's unclear how well Tastewise's AI predicts trends, as it relies on short-term data like social media and menus, it has been gaining traction.

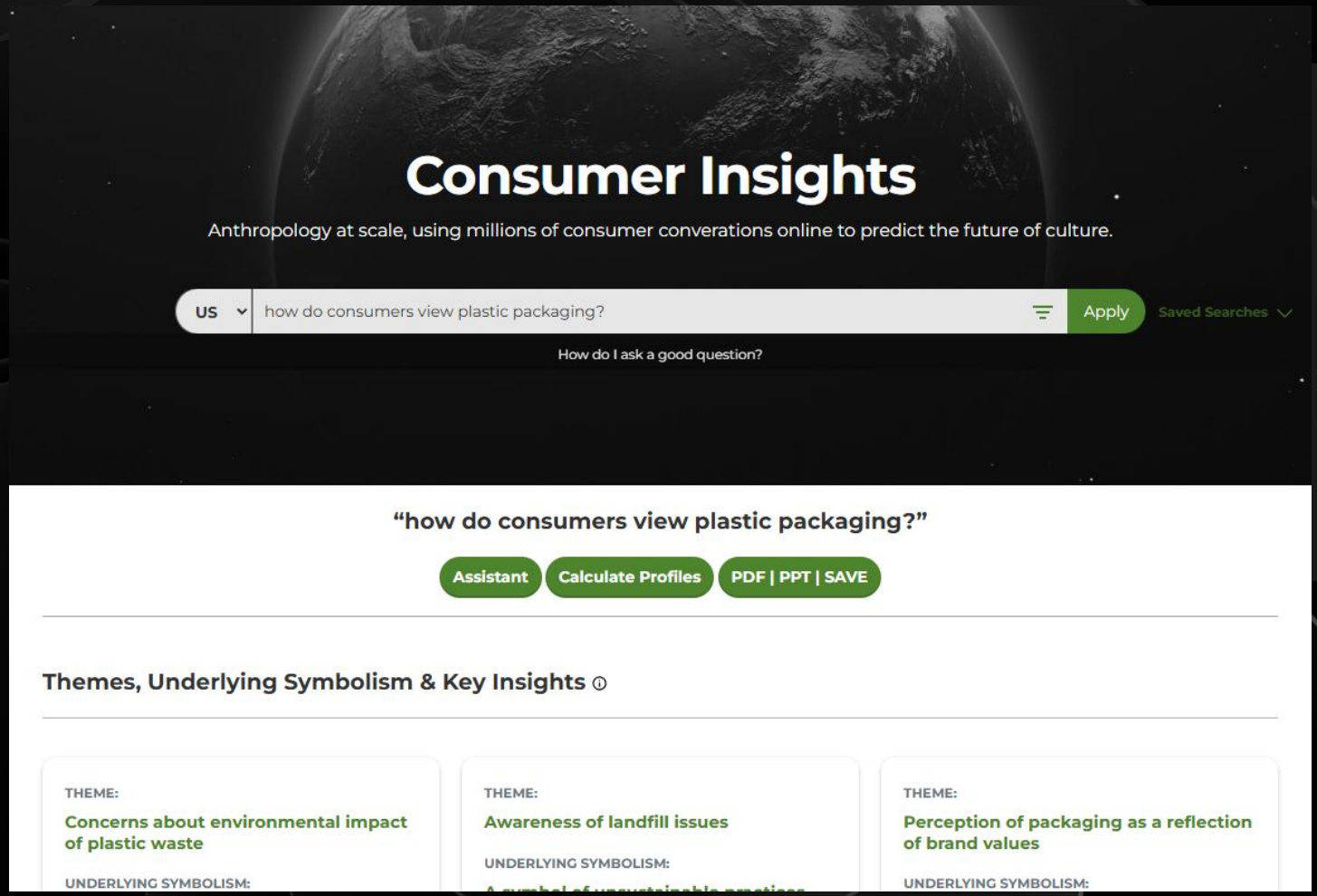
tastewise

VIRTUAL ANTHROPOLOGIST

Identifying needs

Validating solutions

Revelation & evolution



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EXPERTS

Nvidia partners with SES to develop battery technology experts

Nvidia will train a Llama 3 model on battery literature to produce an LLM designed to aid the development of batteries.

This will be paired with physics-based simulation to create a large data set of battery property and structure data to accelerate innovation.

LUX TAKE

While the use of LLMs *can* accelerate R&D, the impact of these tools in practice remains to be seen.

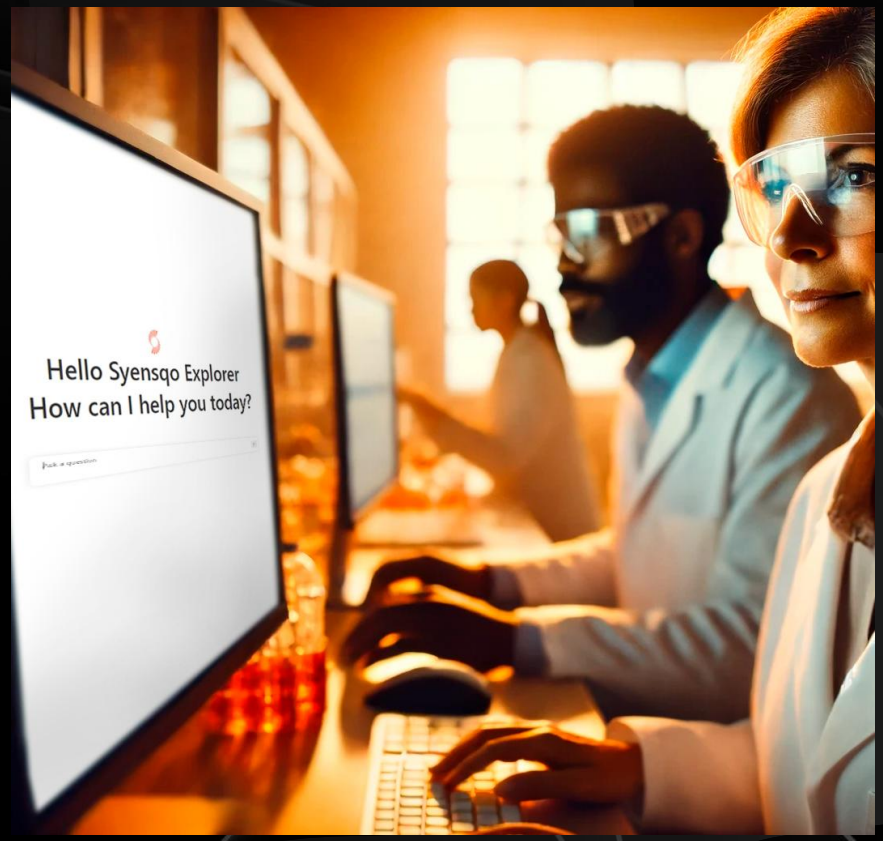
NVIDIA

KNOWLEDGE MGMT.

Syensqo (Solvay) launches SyGPT for internal information management

Large corporations like Syensqo have huge amounts of internal knowledge, but accessing these data is both a time sink and a potential failure point for employees.

Syensqo partnered with Microsoft to deploy a ChatGPT-based, retrieval-augmented generation solution.

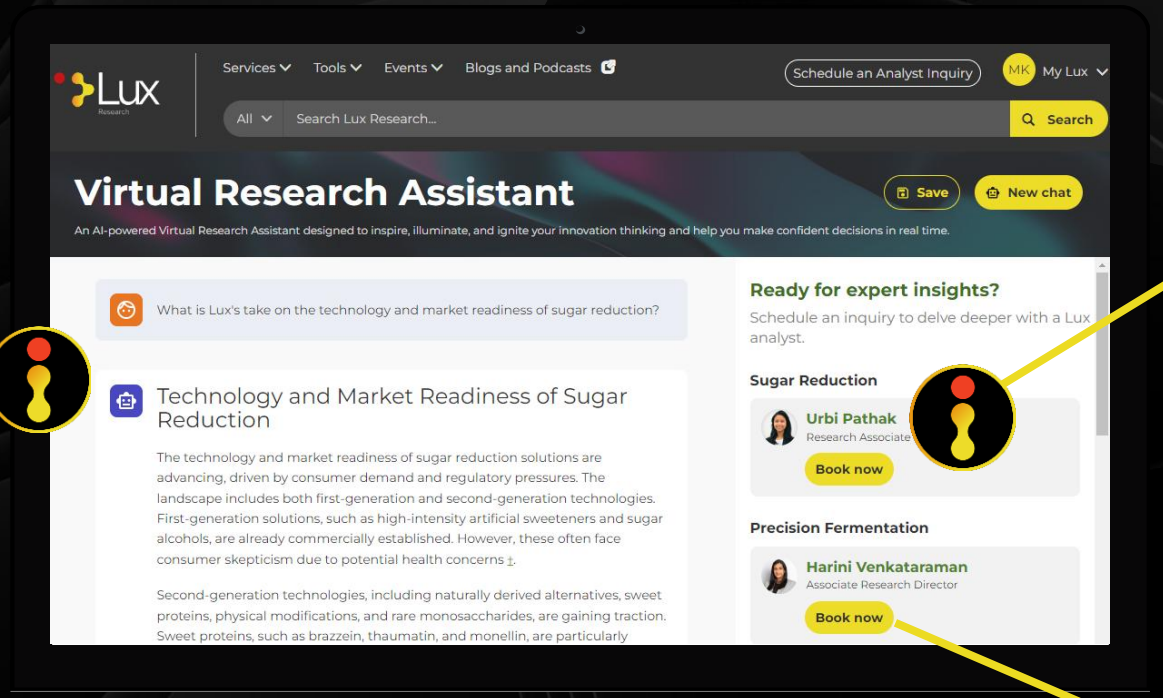


LUX TAKE

This technique allows Syensqo employees to search for information in natural language by chatting.

SYENSQO

LUXER



IMMEDIATE ANSWERS

With sources cited? Absolutely. Luxer points you directly to the Lux research behind every answer.

Never wait days for a written inquiry again!

EXPERT GUIDANCE

Luxer suggests the perfect Lux expert to take your understanding further.

SEAMLESS SCHEDULING

You can see the analyst's calendar and book a meeting — all within the Luxer app.

WHERE WILL AI IMPACT INNOVATION?

STAGE 1
Insight

STAGE 2
Ideation

STAGE 3
Investigation

STAGE 4
Investment (pilot)

STAGE 5
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Tasks

Basic R&D	Trend identification	
Brainstorming	Future-state forecasting	
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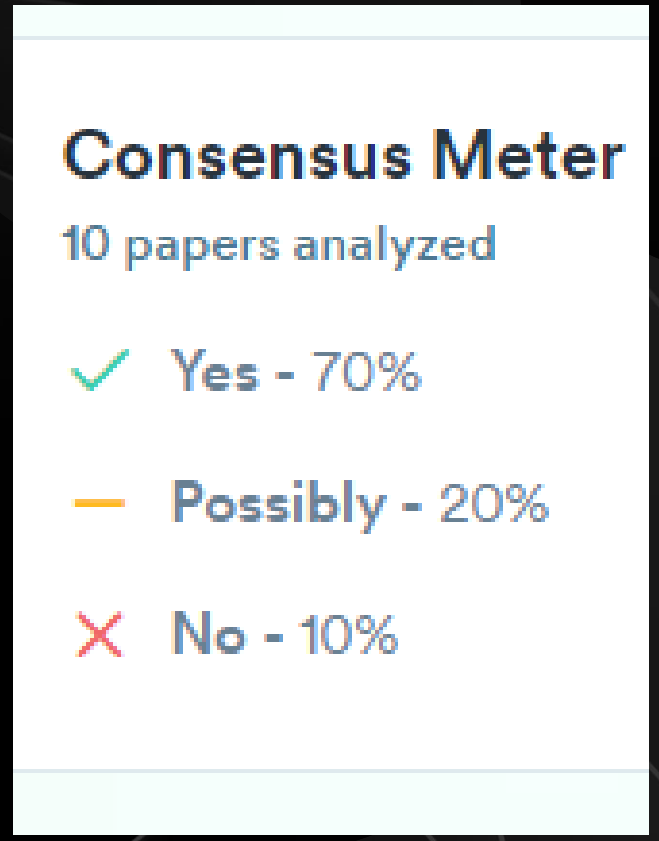
Partnership formation	Financial modeling	

ACADEMIC SEARCH

Academic tools go beyond search into synthesis, but the tools need work

A number of companies have begun to offer “semantic” or “contextual” AI-powered search of academic literature.

The key differentiation for these platforms is summation: Most offer a summary of individual papers as well as synthesized summaries of a field of research.



LUX TAKE

The quality and accuracy of these summaries remains in doubt, especially because you can fail to search the right area to answer your question.

Elicit

Consensus

IP SEARCH

Patent search and drafting with AI is already a growing space

Startups are already proliferating for a wide range of pattern-related functions, including search and novelty, patent drafting, and patent checking.

LUX TAKE

IP tools may be a double-edged sword — the capabilities to write patients could overwhelm unprepared offices and fill databases with less meaningful information.

PATENT ASSIST.ai
pqai
PatentPal
xlscout

FORMULATION

Kellanova applies Foodpairing's AI platform to launch a new Pringles flavor

Foodpairing's AI platform pinpoints combinations of ingredients based on flavor and aroma and defines technical specifications for product formulation.

The company recently helped Kellanova generate and assess millions of flavor combinations, leading to a faster launch of a new Pringles line.

LUX TAKE

While Kellanova could have used traditional methods, AI streamlined the process, showing potential to shorten product launch times more efficiently.

FOODPAIRING®
THE FLAVOR INTELLIGENCE COMPANY

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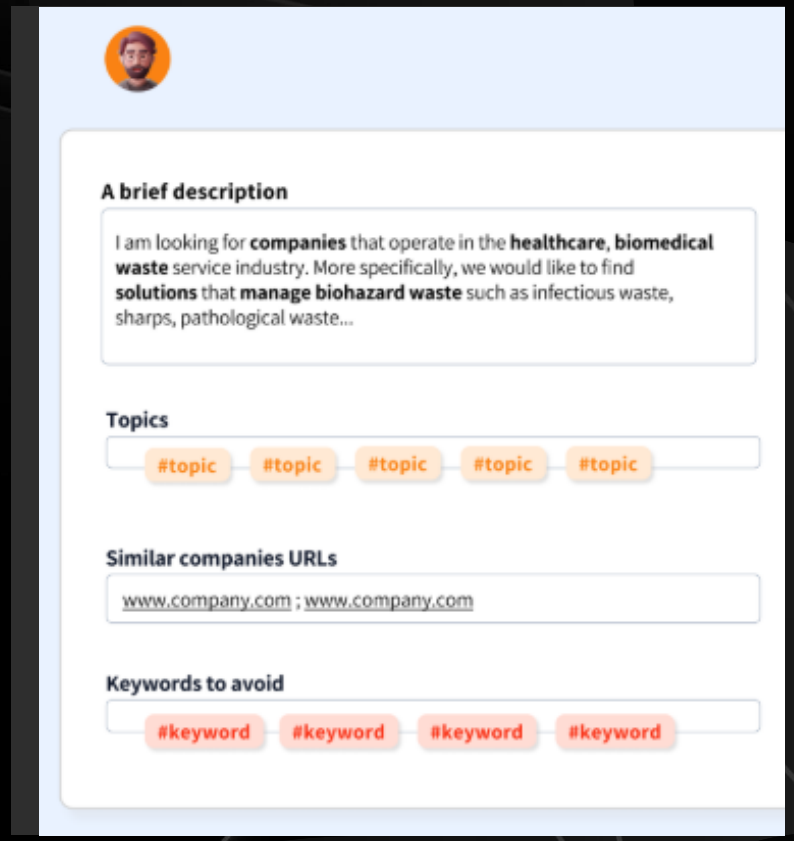
VENTURE SEARCH

Specialized tools for scouting leverage AI search capabilities

LLMs are being used to scrape the web for publicly available information and produce basic profiles of companies.

LLM-powered contextual research can also help identify startups of interest.



LUX TAKE

Unlike with IP and academic search, the use of LLMs is more incremental here. Nonpublic information will become more valuable as public information is commoditized.

NOVABLE

vocean

Paperade AI

THE LUX AI APPLICATION MAP: INNOVATION

	Simulation	Trends	Experts	Knowl. Mgmt.	Formulation	Search
Summary	●	●	●	●		
Retrieval			●	●	●	●
Generation			●			
Interface		●				
Modeling	●				●	

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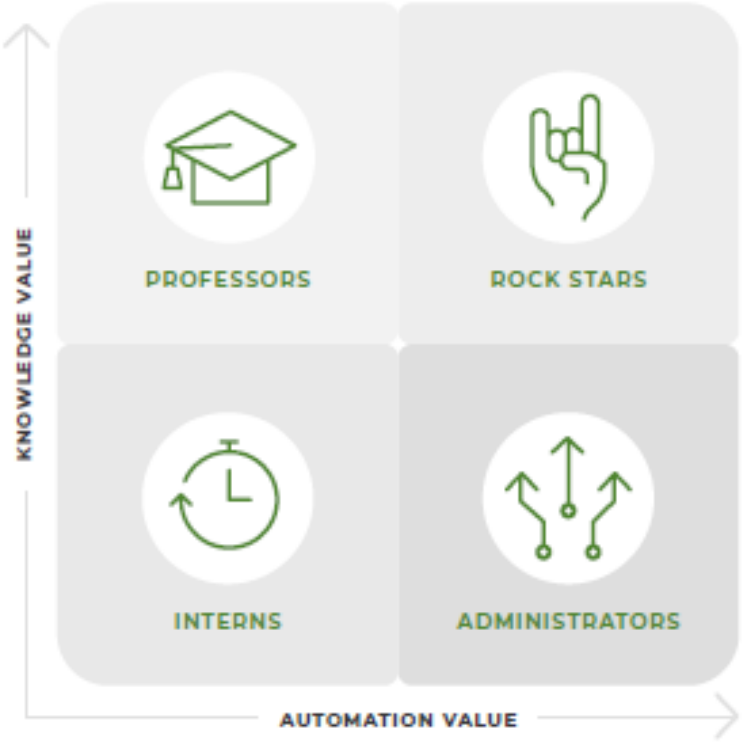
INTRODUCING THE LUX AI FRAMEWORK



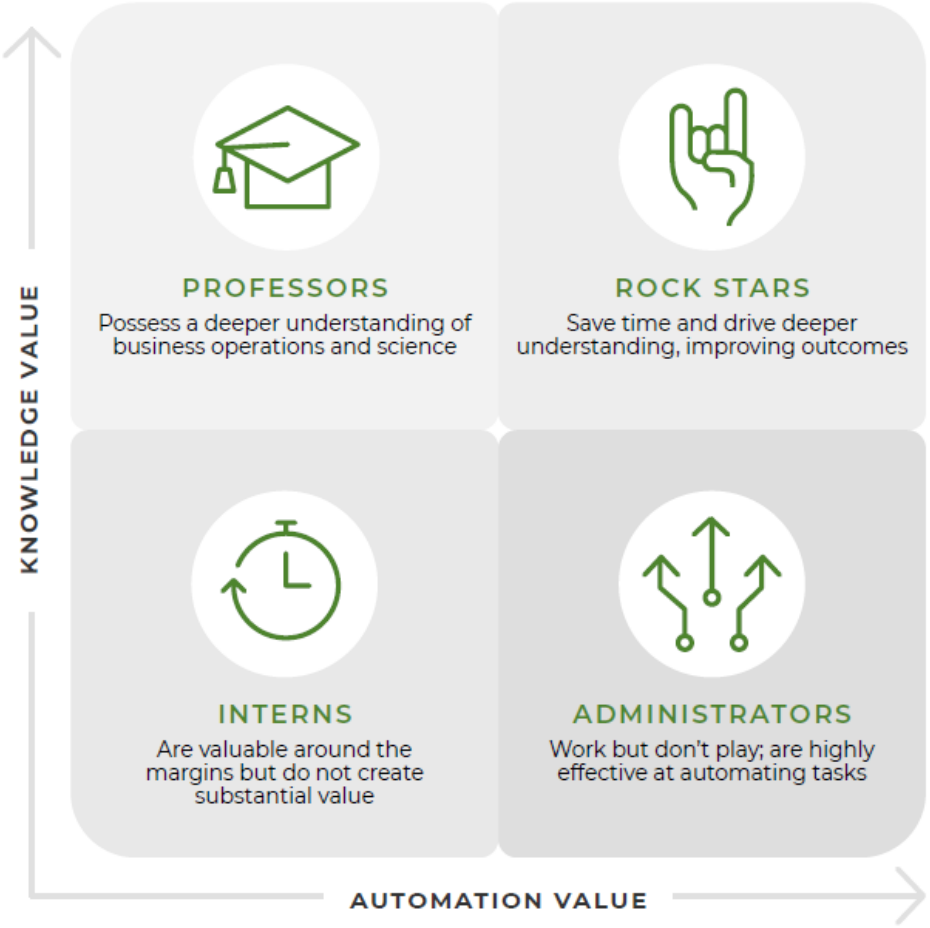
THE LUX AI APPLICATION VALUE MODEL

THE LUX AI APPLICATION PRIORITIZATION MODEL

THE VALUE FRAMEWORK

Knowledge value captures the impact the application has on company performance, on availability of knowledge, and on other parts of the business.

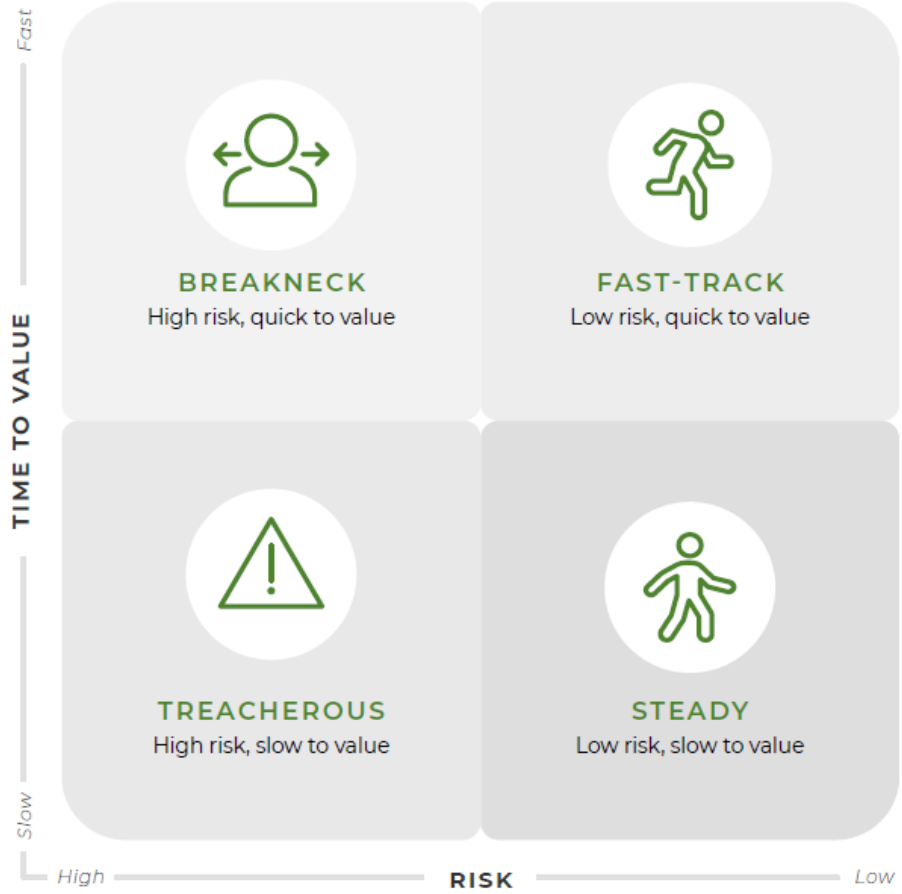
Automation value captures the standardization, frequency, time sensitivity, labor, and centrality of the application.



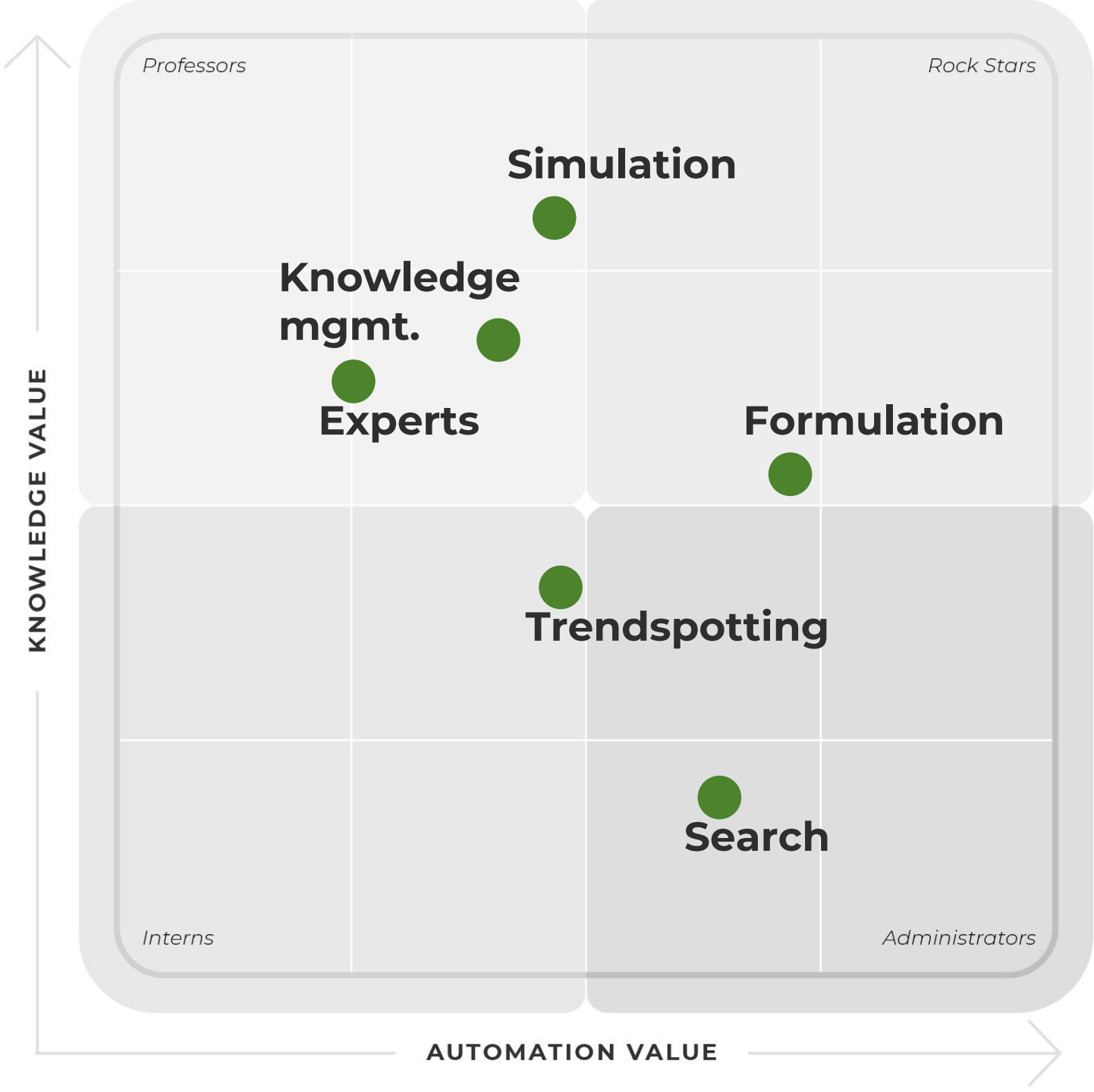
THE PRIORITIZATION FRAMEWORK

Time to value captures both the time to implement and the time to prove ROI.

Risk captures the likelihood that the AI implementation will fail, due to internal barriers, misalignment, or employee rejection.

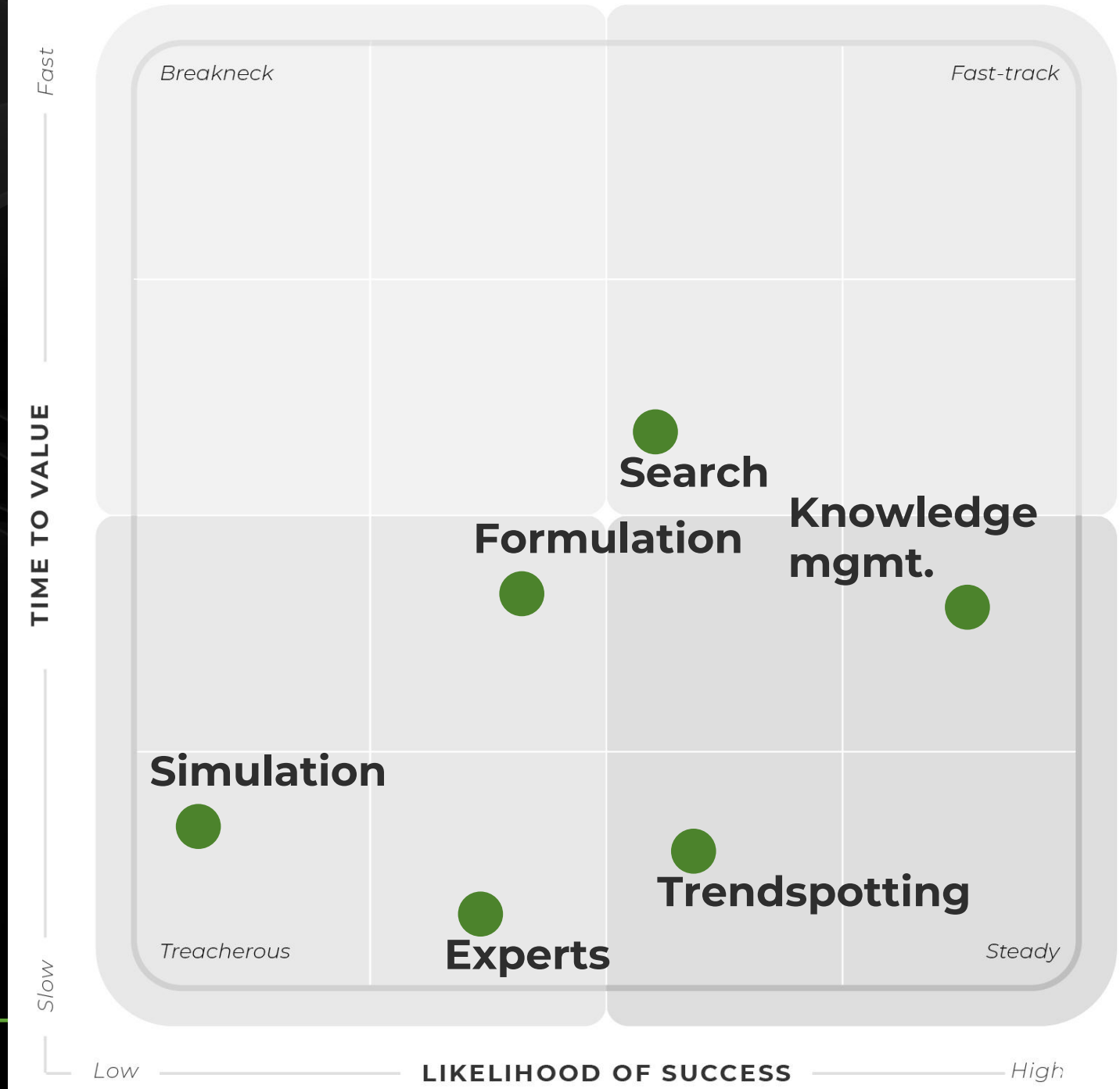


Innovation applications promise long-term value…



Innovation applications promise long-term value…

…But will be tough to deploy in a corporate environment



Teams lack innovation KPIs in core R&D, so roadmaps will start with search and knowledge management

KEY TAKEAWAYS

1

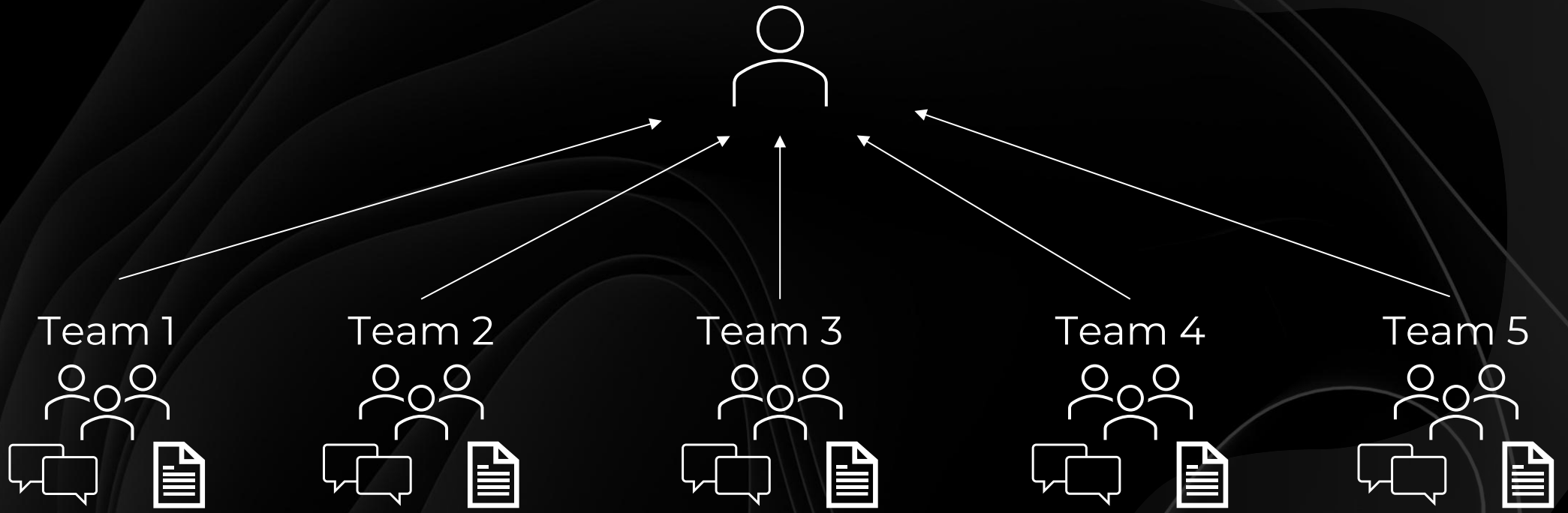
There are many AI tools proliferating across innovation, but we've only just begun to leverage the capabilities of AI.

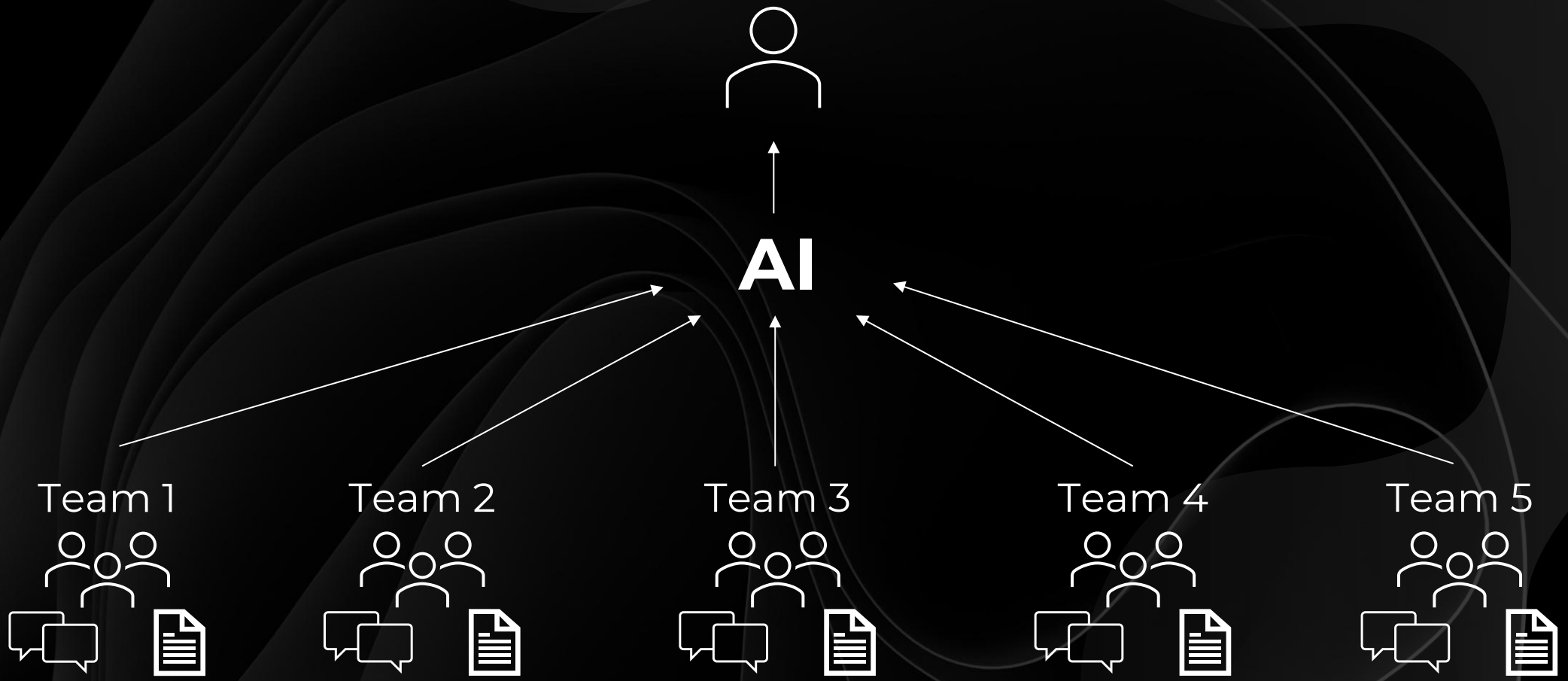
2

AI tools bring real value to innovation by unlocking deeper understanding of fundamental processes and systems.

3

Innovation AI is often going to be at the lowest priority for corporate implementation.





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ABOUT LUX

Lux Research fuels innovators to not only imagine what's possible in the future but also operationalize innovation success in the near term. We deliver research and advisory services to inspire, illuminate, and ignite innovative thinking that reshapes and grows businesses. Using quality data derived from primary research, fact-based analysis, and opinions that challenge traditional thinking, our experts focus on finding truly disruptive innovations that are also realistic and make good business sense.

The "Lux Take" is trusted by innovation leaders around the world, many of whom seek our advice directly before placing a bet on a startup or partner — our clients rely on Lux insights to make decisions that generate fantastic business outcomes. We pride ourselves on taking a rigorous, scientific approach to avoid the hype and generate unique perspectives and insights that innovation leaders can't live without.

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