AnalytiCon

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The HGFactor
Vespa.ai
Streamcare Health

Demystifying AI in life sciences

Feb 26, 2026

Agenda

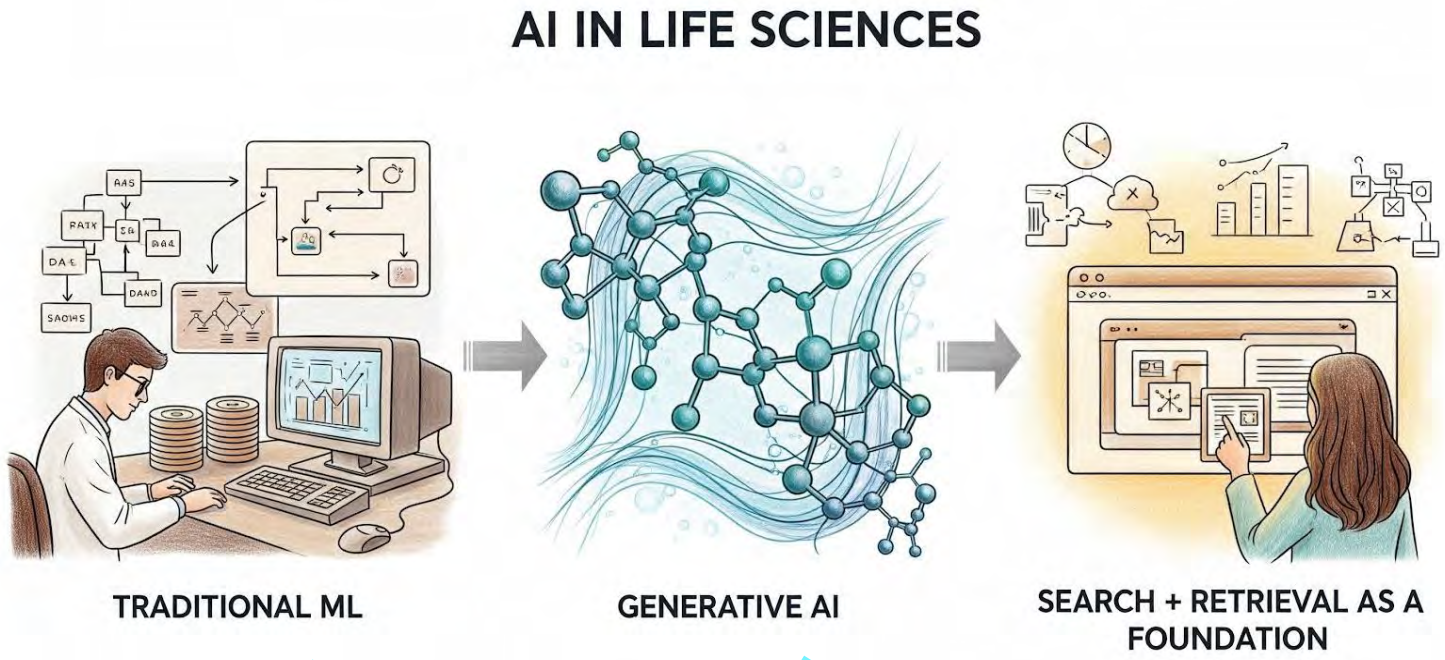
1. GEN AI and Agentic AI demystified
2. Impact of varying models on the AI journey
3. GEN AI & RAG: Claude, Gemini , Copilot
4. When to use what
5. Mapping it back to the cases across the value chain

And finally: Is AI safe? Is it out to get our jobs?

Do you think AI in lifesciences is relatively new?

AI in lifesciences is **not** new → decades of AI use

Breaking down AI in lifesciences
the journey



The application of AI isn't new. But the types of intelligence—and their capabilities—have evolved.

Evolution of AI

A BRIEF HISTORY

AI IN LIFE SCIENCES

Phase 1
Traditional ML 1

What
- algorithms like QSAR models and bioinformatics pipelines
- identify patterns and flag anomalies

Features
- task-specific and limited in
- could answer "what" but" but always "why" or "what next"

Phase 2
Generative AI

What
- large Language Models (LLMs), protein folding models like AlphaFold, and diffusion-based diffusion-based molecular generators

Features
- can generate text, molecules, often lacked context, suffered hallucinations, and couldn't justify their output

Phase 3
Search & Retrieval

What
- current era: retrieval-augmented generation (RAG)
- semantic + hybrid search, and domain-specific reasoning agents

Features
- excel at precision
- vital in life sciences, where clinical safety, scientific compliance demand traceability

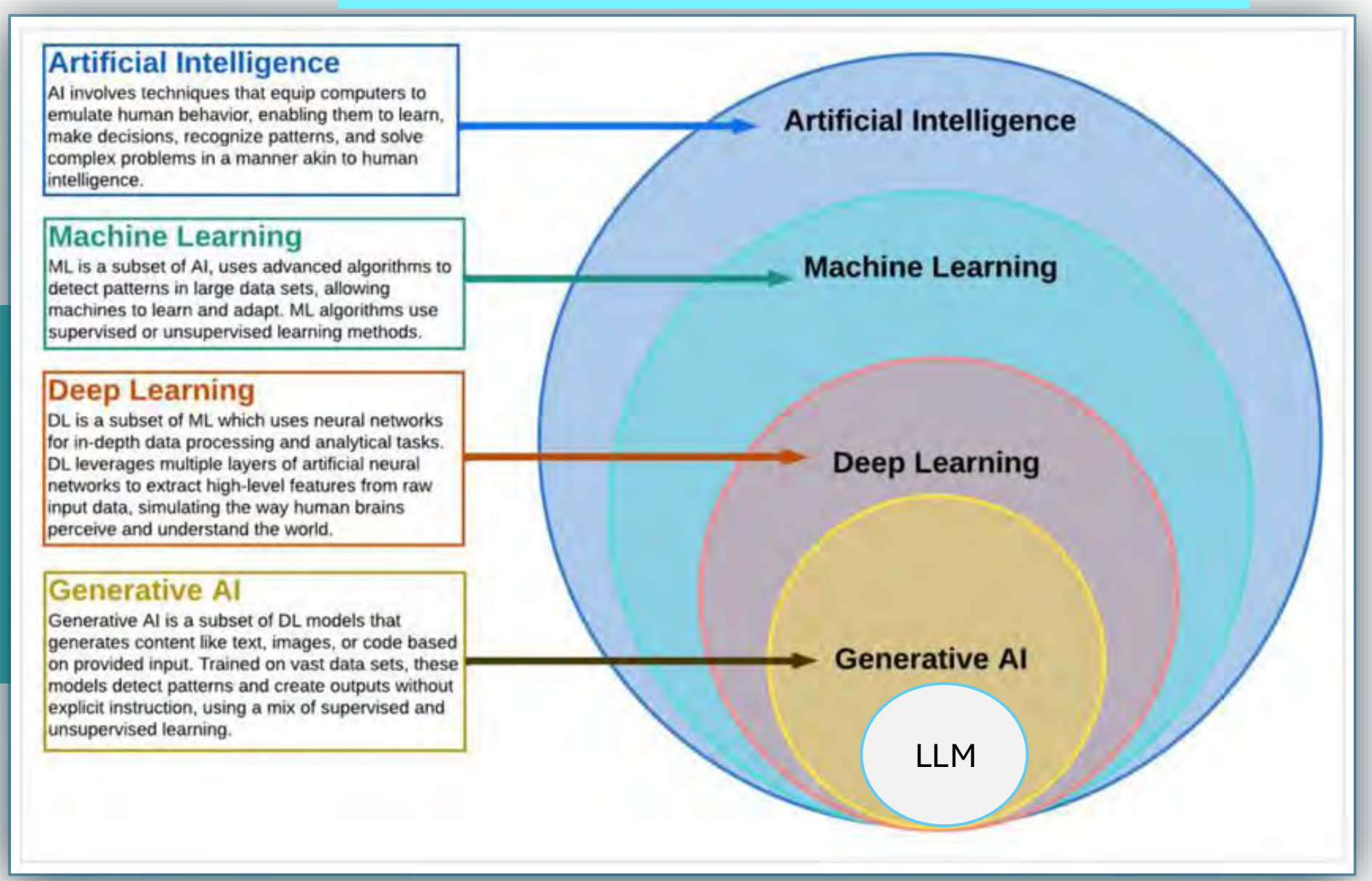
The Basics

What is your favorite Gen AI tool?

Claude, OpenAI, Gemini, Perplexity

The many terms we hear are all AI!

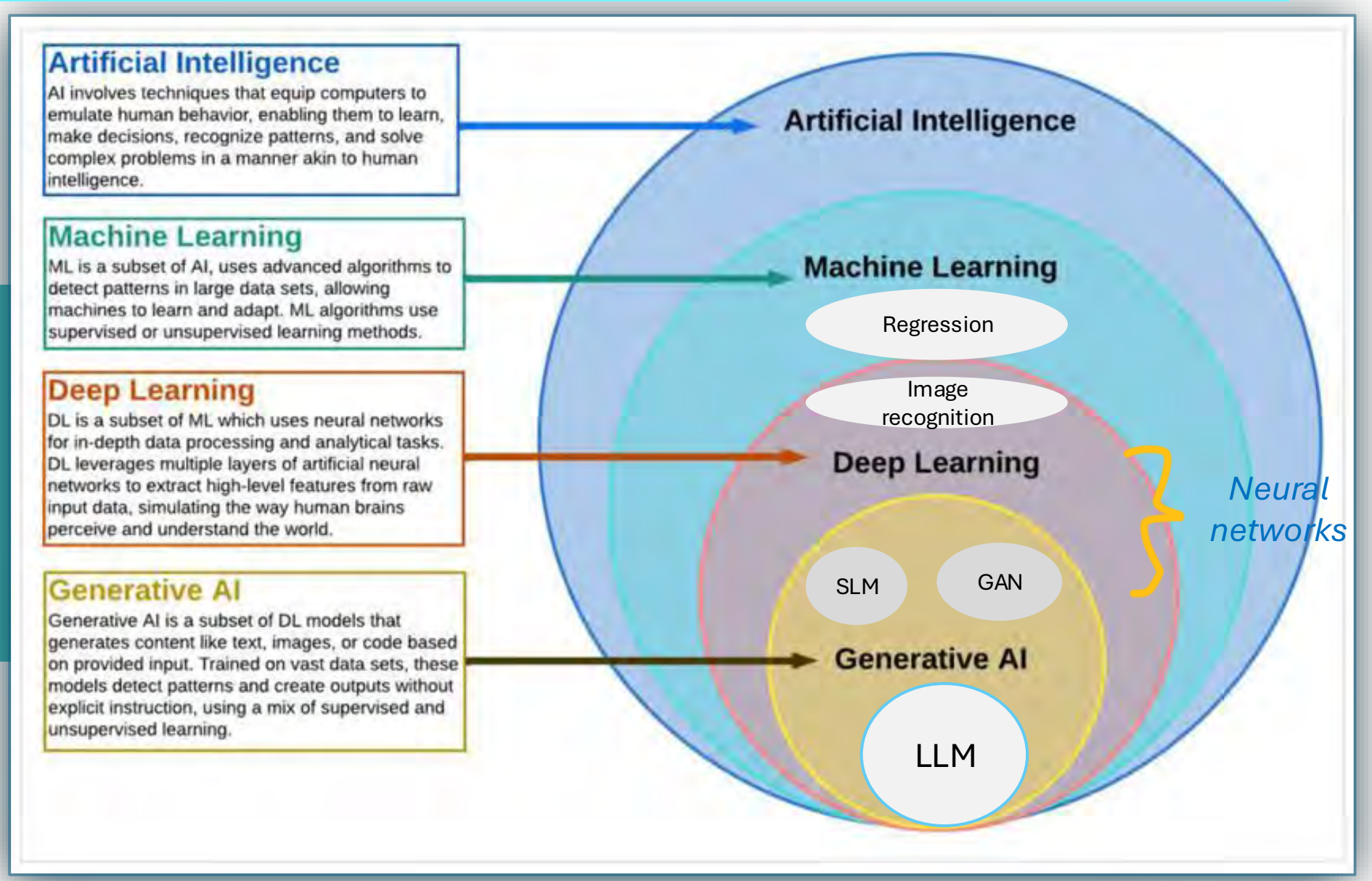
Different forms of AI



Zhuhadar, Lily & Lytras, Miltiadis. (2023). The Application of AutoML Techniques in Diabetes Diagnosis: Current Approaches, Performance, and Future Directions. Sustainability. 15. 13484. 10.3390/su151813484.

Artificial Intelligence is the broad umbrella that has many sub classes

Different forms of AI



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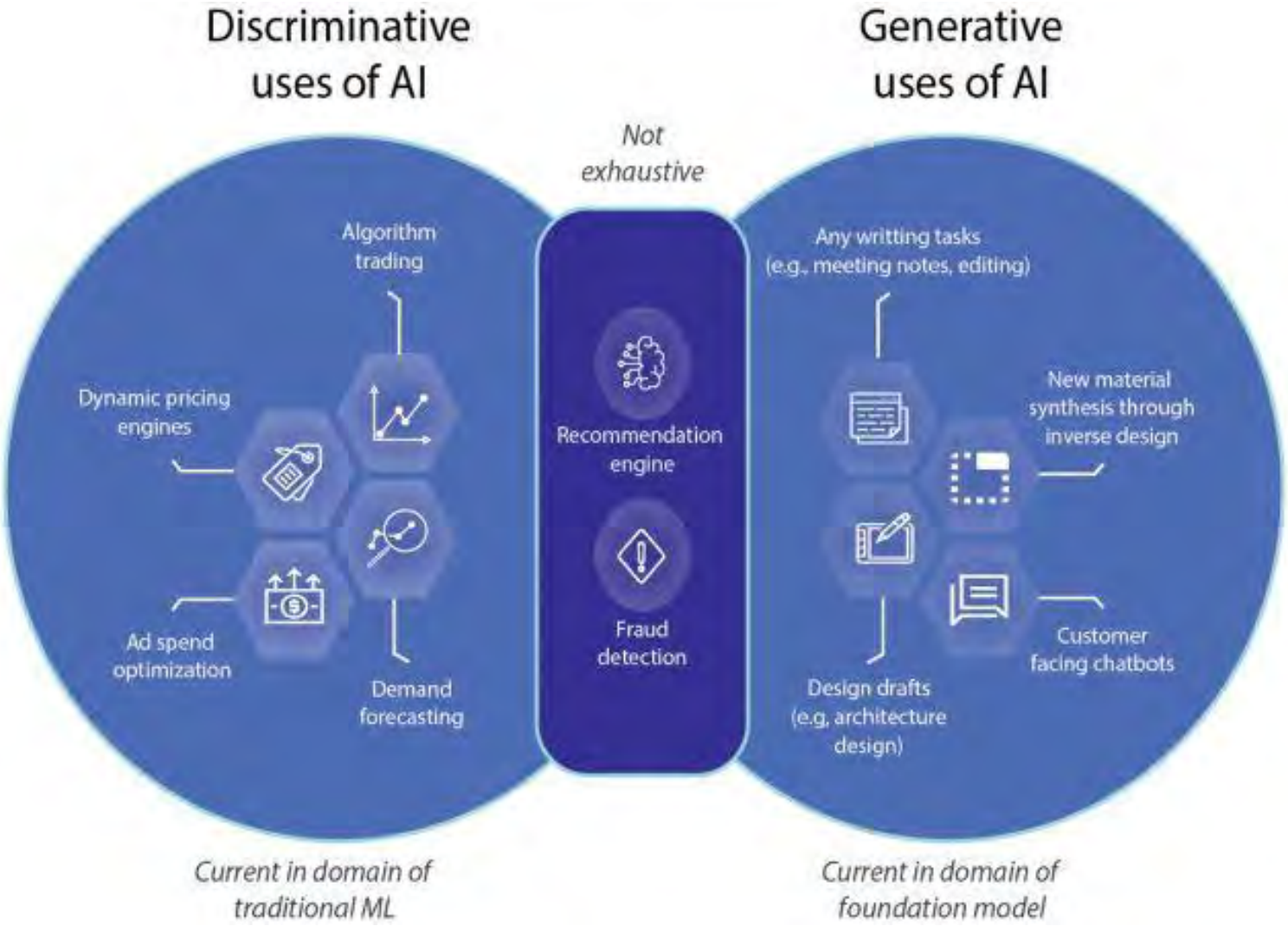
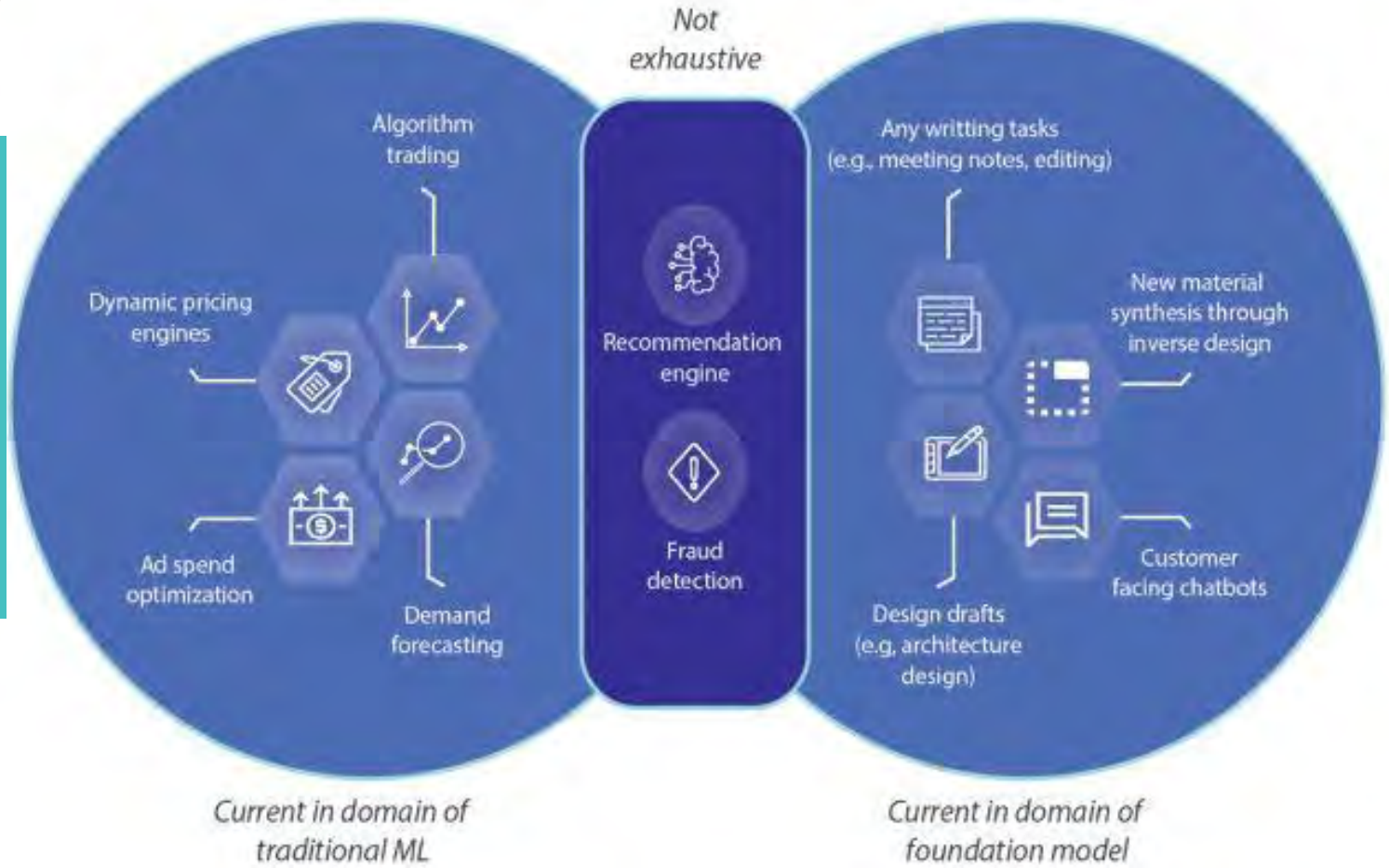
Breaking down AI examples



Classification

Input → Output

Breaking down AI examples



Generational

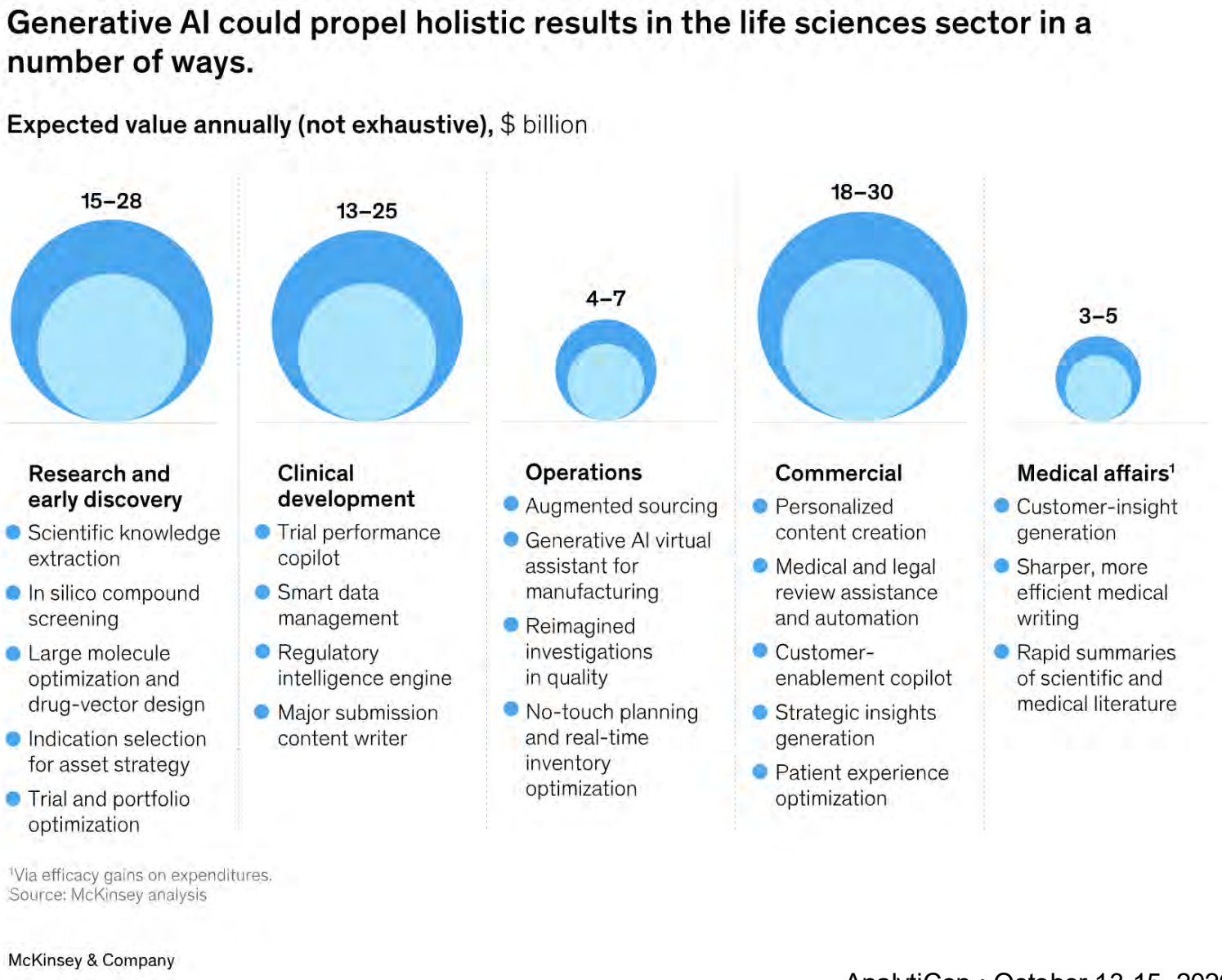
Question → Generate answer

The AI potential in lifesciences

Which sub domain in Lifesciences do you think has a lot of potential for AI use cases?

(Research, Clinical, Commercial, Manufacturing)

Life science use cases



Deeper view into Clinical

Clinical operations managers could deliver trials faster and more efficiently with actionable insights and personalized engagement through generative AI.

Clinical operation manager capabilities, present and future

	Present	Future
Analyze trial performance insights	Manually collect and analyze data across multiple sources to understand trial performance	Leverage automated analyses and visualizations, tailored to trial characteristics including therapeutic area, phase, and next milestone
Act early and effectively	Intervene in a reactive manner based on subjective judgment and incomplete information	Receive proactive alerts from copilot, with data-driven flagging of risks and prescriptive recommendations of early interventions that can support on-time trial delivery
Personalize site engagement	Engage principal investigators (PIs) across sites with the same message and content	Automatically draft personalized messaging to engage PIs and site coordinators, with high engagement based on tailored content and timing
Prepare trial documents and reports	Manually prepare thousands of pages of documents	Refine auto-drafted documents with documents tailored for each trial, localized for each site, and translated for each country

Source: McKinsey analysis

McKinsey & Company

Deeper view into Commercial

Sales representatives who use generative AI can more quickly create personalized engagement plans.

Sales rep capabilities, present and future

	Present	Future
Collect and analyze data/ insights	Manually collect, analyze, and synthesize data and insights to prioritize/select accounts and healthcare providers (HCPs)	Use on-demand data and insights based on vetted, high-quality data sources and cross-function market access information to prioritize/select accounts and HCPs
Tailor and personalize messaging	Use advanced analytics and basic demographic and behavioral data to customize HCP messaging	Use generative AI to synthesize and curate brand data and HCP-specific data
Coordinate omnichannel	Use limited data to coordinate HCP outreach across channels	Utilize real-time insights around HCP interactions to ensure seamless coordination and optimization of sales efforts
Attend training and upskilling sessions	Rely on quarterly trainings with headquarters and meetings with regional and district managers	Augment established training cadence with real-time on-demand coaching, and just-in-time insights during HCP office/account visits

Source: McKinsey analysis

McKinsey & Company

What changed recently?

AI moved from esoteric to **mainstream**;

From tech only geeks to **business users** → *Empowered insights generation without IT teams*

The disruption → **Productivity improvements**, companions , co-pilots

Kinds of LM
(*language models*)

Text2SQL : Generates code instead of text, in this case SQL , e.g Claude Code

Text Generation models: Generates text based on questions , e.g open AI → mostly called LLMs (large language models)

Protein Language models: Generates protein structures from 3D

Fine tuned models : Take any LM and train it on your data

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Protein Language models: Generates protein structures from 3D

Fine tuned models : Take any LM and train it on your data → ***model has native intelligence to answer questions***

Can hallucinate

Popular AI players today vs platform

Microsoft <> GPT (**Open AI**)

AWS <> Anthopic (**Claude**)

Google <> **Gemini**

Snowflake <> works with most models

Databricks. <> works with most models

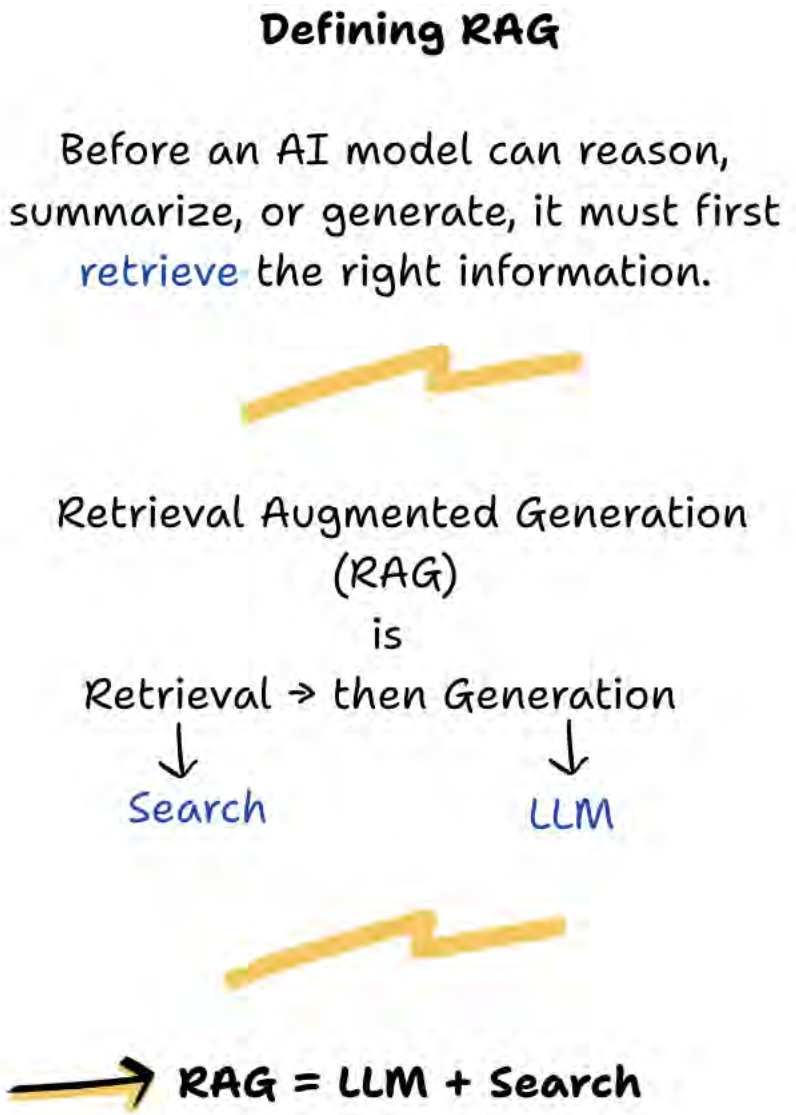
Others (Alibaba <> Qwen 3.5 plus)

Open (Llama, Deepseek, Qwen 2.5, Gemma)

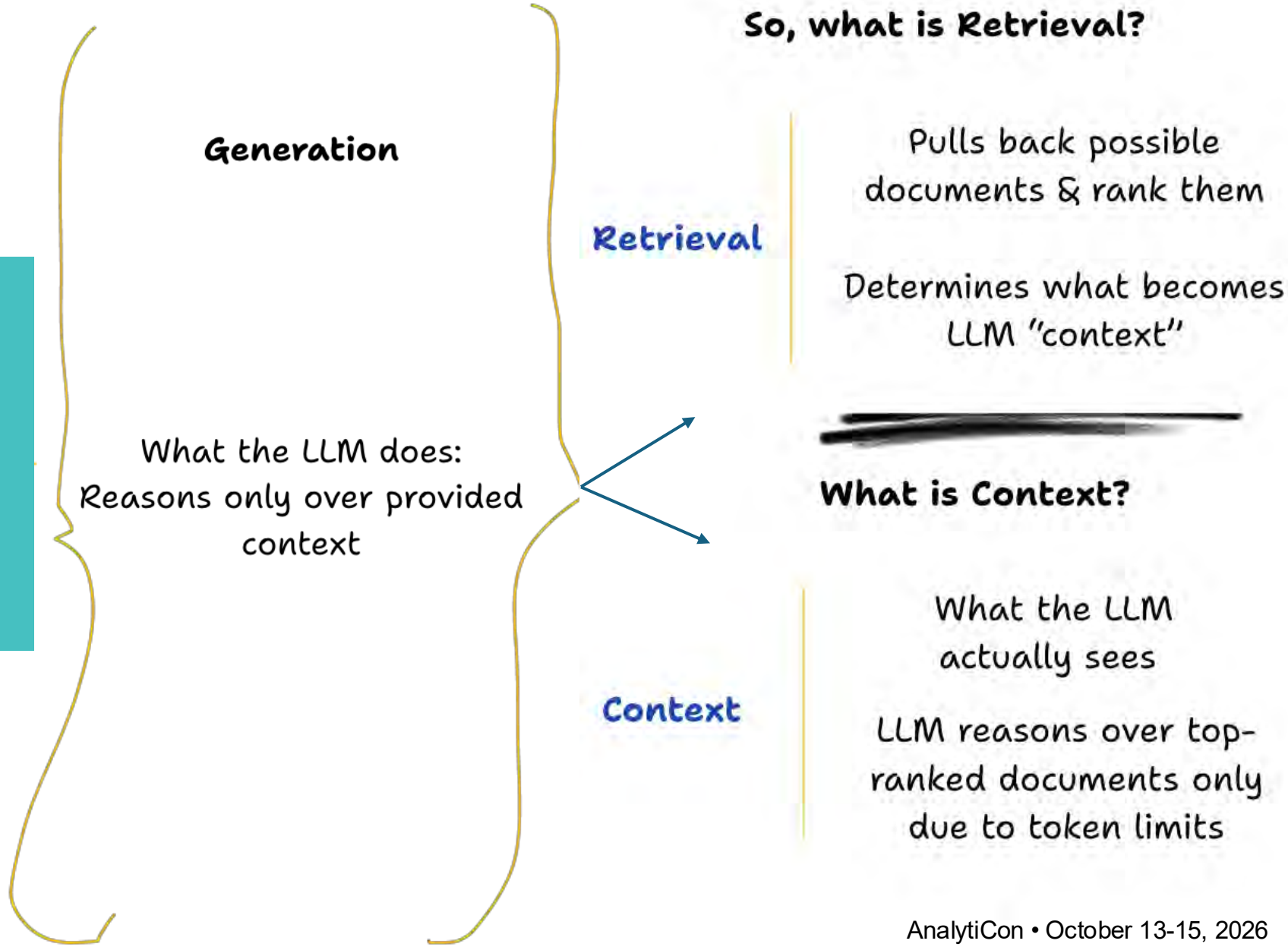
Have you heard of RAG, agents?

What is RAG?

- No hallucination
- Grounded in your corpus
- Adds what we call “context” to Models



What is RAG?


So, what is Retrieval?
Generation
Retrieval
Pulls back possible documents & rank them
Determines what becomes LLM "context"
What the LLM does: Reasons only over provided context
What is Context?
Context
What the LLM actually sees
LLM reasons over top-ranked documents only due to token limits

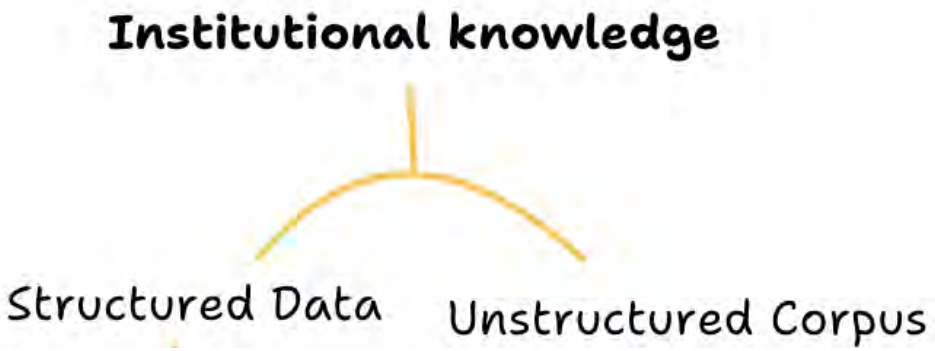
What are AI agents?

An AI agent is software that utilizes artificial intelligence to autonomously achieve specific goals by **reasoning, planning, and taking actions**, often using external tools

⇨ *Workflow orchestration*

Bringing it all together

From data to insights



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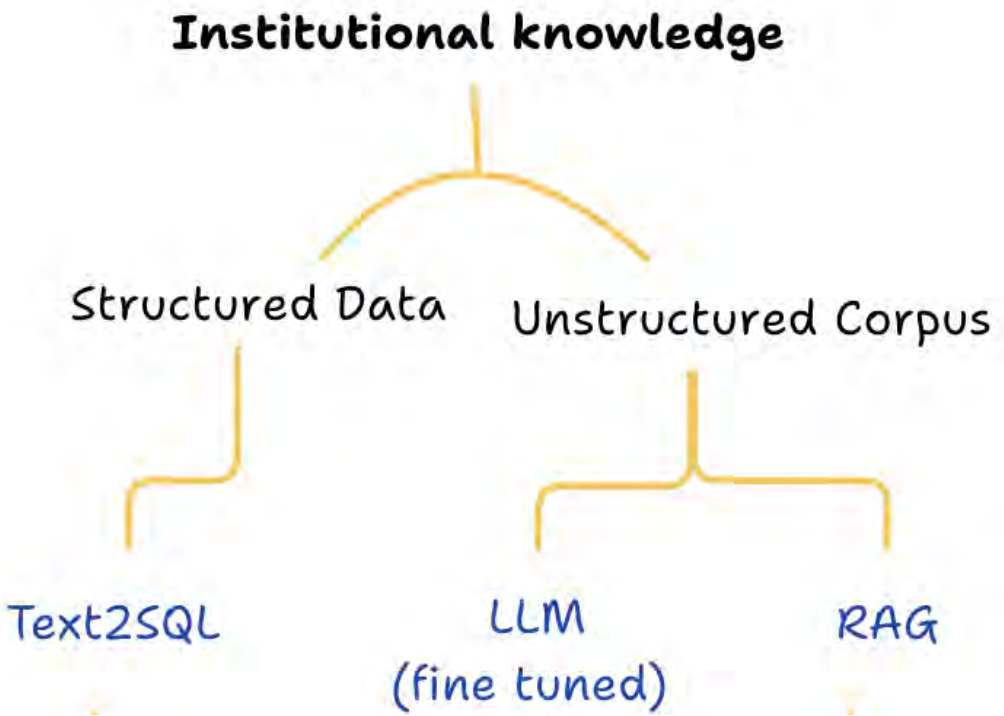

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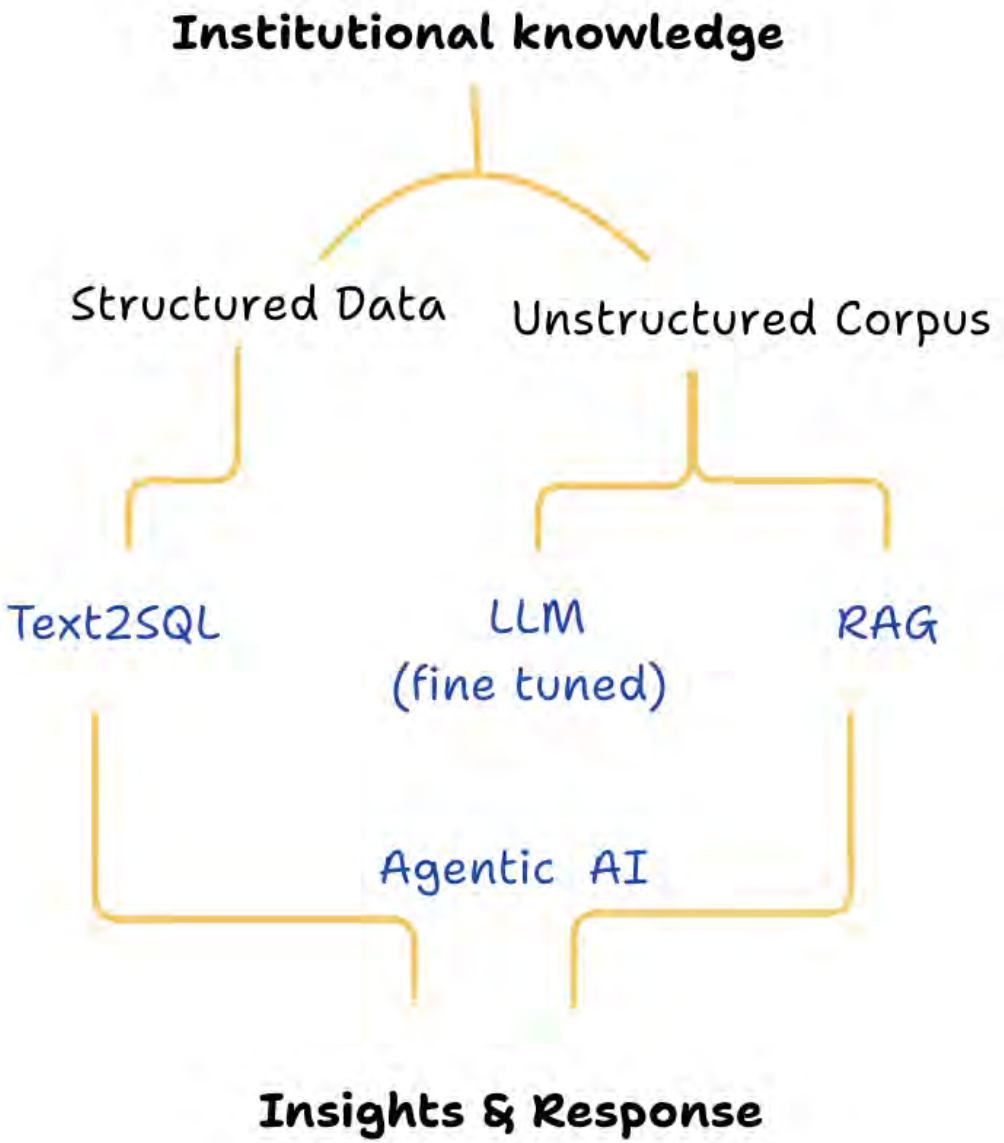

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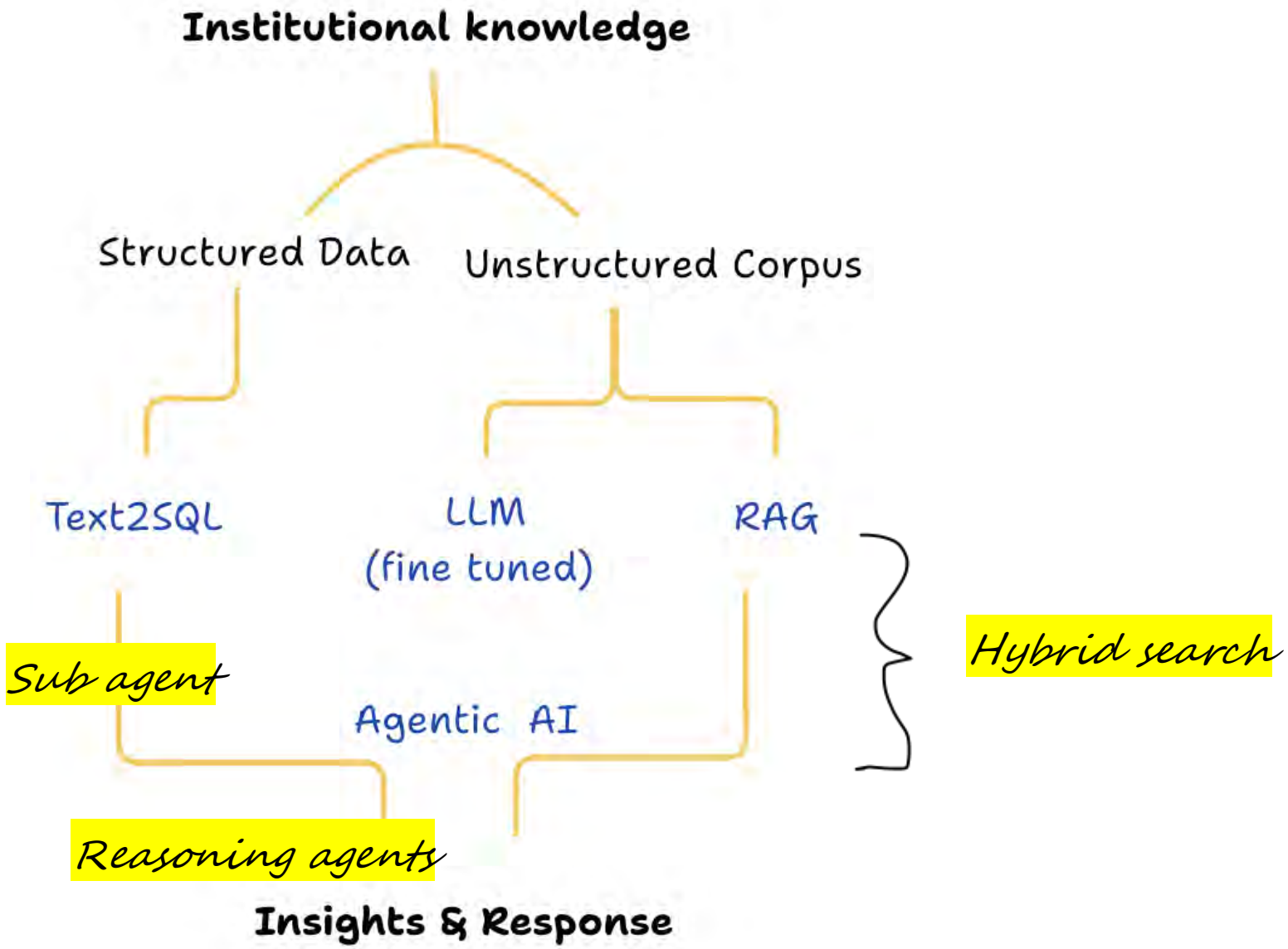


Which flavor do we use?

What use cases in Lifesciences ?

R&D / Medical

Value Chain Stage	Example Question	Best Approach	Why It Makes Sense
Discovery / Research	"What published evidence links IL-23 inhibition to long-term remission in psoriasis?"	**RAG**	Requires grounding in external literature + internal reports. Hallucinations are unacceptable.
Preclinical	"Compare liver enzyme elevation across compounds A, B, and C in rat tox studies."	**Text2SQL**	Structured assay and toxicology datasets → deterministic querying works best.
Clinical Development	"What protocol amendments were introduced after interim analysis in Study ABC-201?"	**RAG**	Information buried in CSRs, PDFs, protocol documents → retrieval + citation required.
Regulatory	"Summarize key safety findings submitted to FDA in the last oncology filing."	**RAG + LLM synthesis**	Retrieval ensures traceability; LLM summarizes for narrative clarity.
Medical Affairs	"What evidence supports off-label discussion of Drug X in elderly populations?"	**RAG**	Must be grounded in approved materials and published data. High compliance sensitivity.

What use cases in Lifesciences ?

Commercial & BI

Value Chain Stage	Example Question	Best Approach	Why It Makes Sense
Commercial (Field Strategy)	"Which HCP segments show declining adoption despite high patient volume?"	**Text2SQL**	CRM + prescription data structured → analytics-driven insights.
Commercial (Content Enablement)	"Summarize objections raised by oncologists in last quarter's field notes."	**RAG**	Unstructured call notes → retrieval over transcripts + summarization.
Market Access	"What payer restrictions are currently limiting access in the Northeast region?"	**RAG**	Policy PDFs + contract language require grounded retrieval.
Business Intelligence (Executive View)	"Show Q3 revenue vs forecast by indication and region."	**Text2SQL**	Clean warehouse data → fast structured querying.
BI / Strategic Planning	"Explain drivers behind declining market share in autoimmune portfolio."	**Text2SQL + LLM reasoning**	Structured metrics + narrative explanation layered on top.

When to use what?

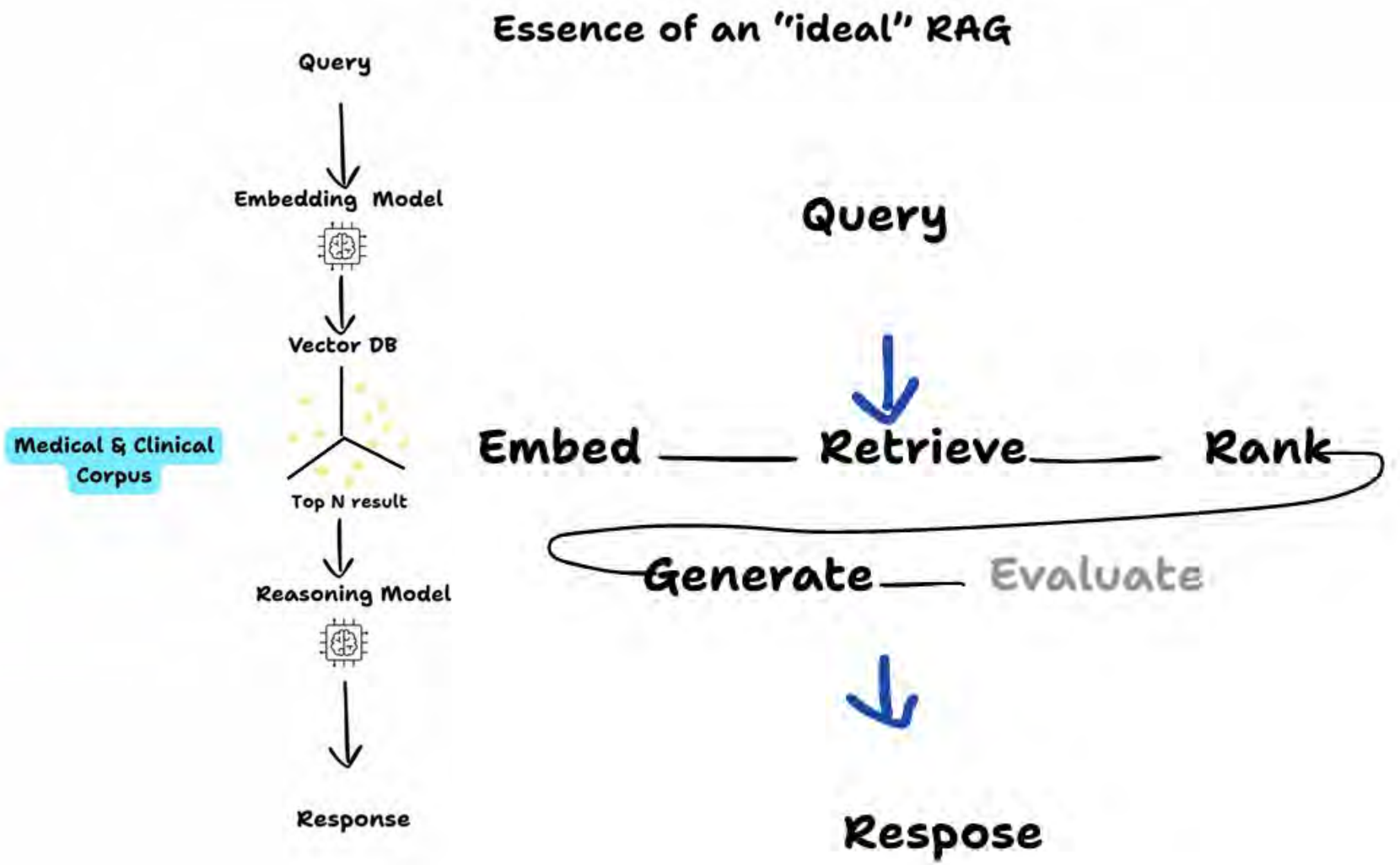
Use Text2SQL when the data is structured and the schema is trusted

Use RAG when the knowledge is buried in documents and traceability matters

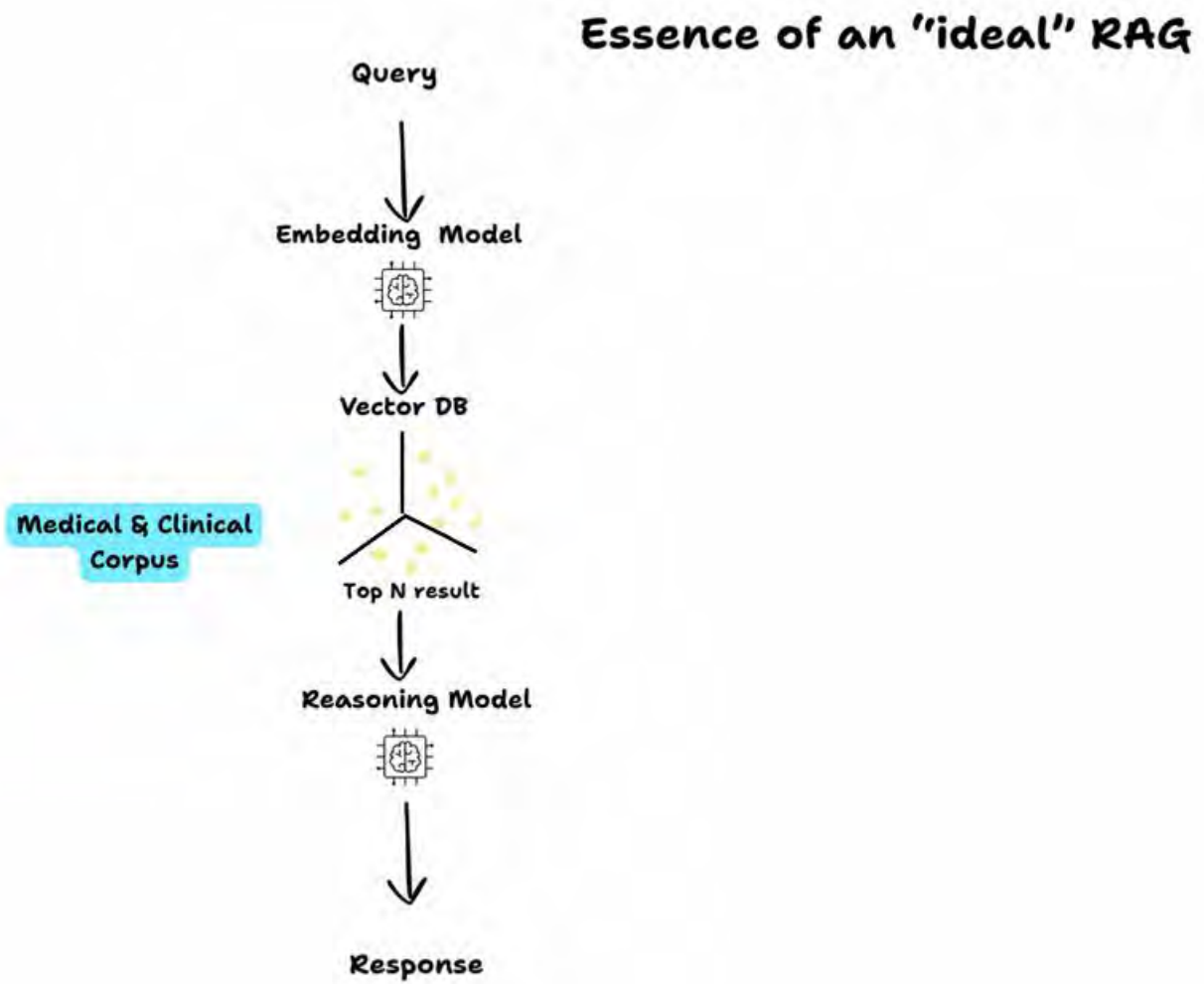
Use LLMs alone only for synthesis—not for truth.

Recap

Lets build a RAG in Lifesciences



Lets build a RAG in Lifesciences

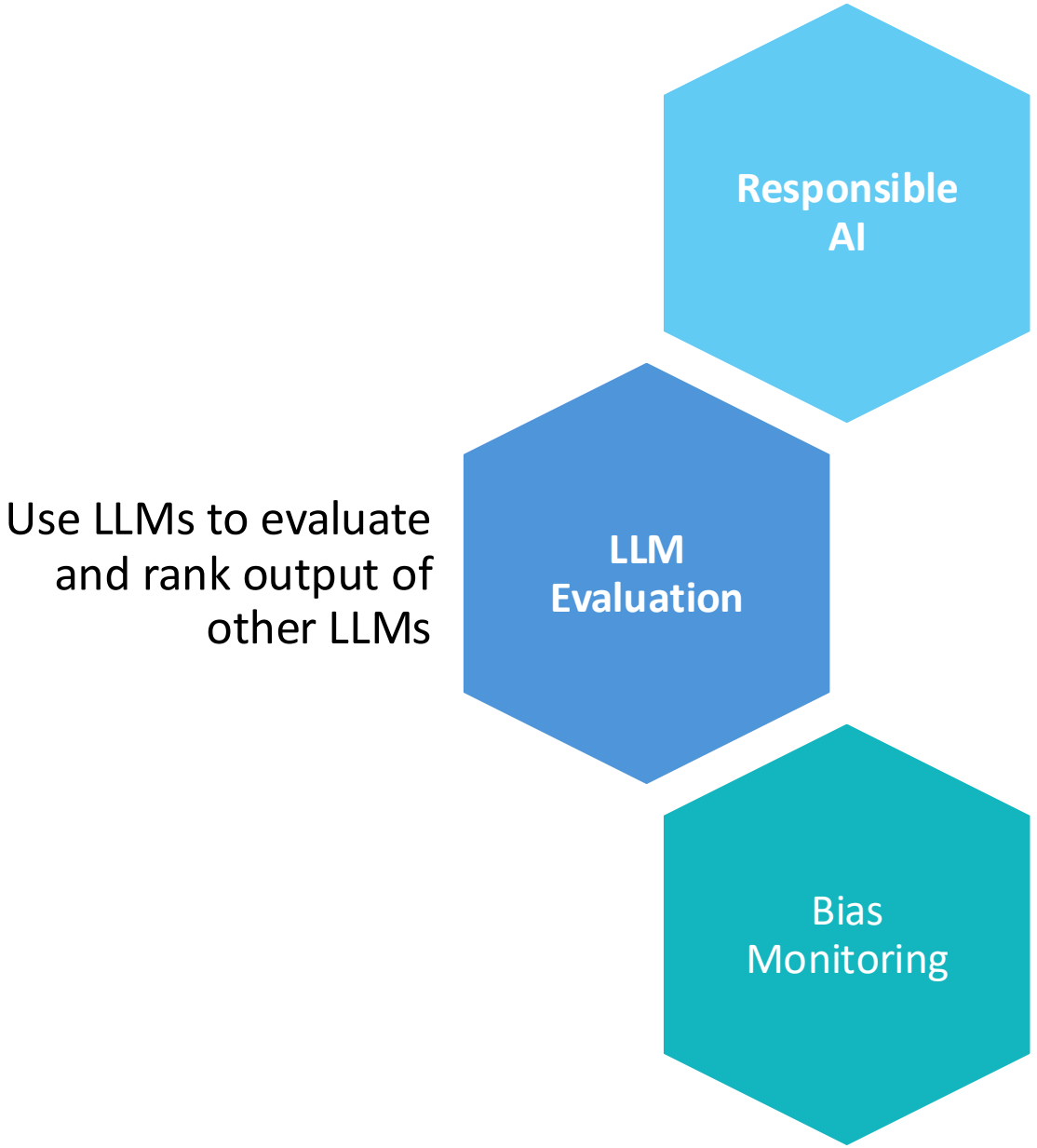


Concerns & Questions

Is AI safe?

Can I trust the results?

What about regulatory aspects?



e.g. Open Evidence

The million dollar question today

?

Will AI replace human jobs?

Takeaway

Embrace the world.. Make it your companion

Leverage it to inform you

Learn new topics

Additional Reads

https://www.mckinsey.com/industries/life-sciences/our-insights/generative-ai-in-the-pharmaceutical-industry-moving-from-hype-to-reality

https://thenewstack.io/how-tensors-are-changing-search-in-life-sciences/

https://www.forbes.com/councils/forbestechcouncil/2025/06/24/dear-life-sciences-meet-ai-native-search-your-missing-link/

https://www.linkedin.com/pulse/commercial-pharma-think-beyond-your-chatbots-what-12-gopalakrishnan-ya4qe/

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