



ELSEVIER

# Using data and AI to accelerate innovation in Pharma

BioTechX

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# Introduction



- **Managing Director, Life Sciences at Elsevier** - helping pharma, biotech, medical device companies accelerate innovation and drive ROI
- Background
  - Elsevier, Thomson Reuters, McKinsey, IP lawyer
  - Healthcare & life sciences
  - Digital information solutions across B2B segments
- Focus on deploying advanced technologies to rich content sets to help solve complex customer problems

# About Elsevier - a global leader in scientific, technical medical information and analytics



## ELSEVIER

**9,500** employees; ~30% in technology

~**20%** share of global research output

**Comprehensive R&D solutions** across article abstracts, biomedicine, chemistry, health

Partnering with **100%** of top pharma

**A RELX Group Company** FTSE 100, #5 in terms of market cap  
Global provider of information-based analytics and decision tools for B2B segments  
**Employing 36,000 people with \$12B revenues.** Annual tech investment is \$1.7 billion



## Our Mission

Help researchers and healthcare professionals to advance science and improve health outcomes for the benefit of society

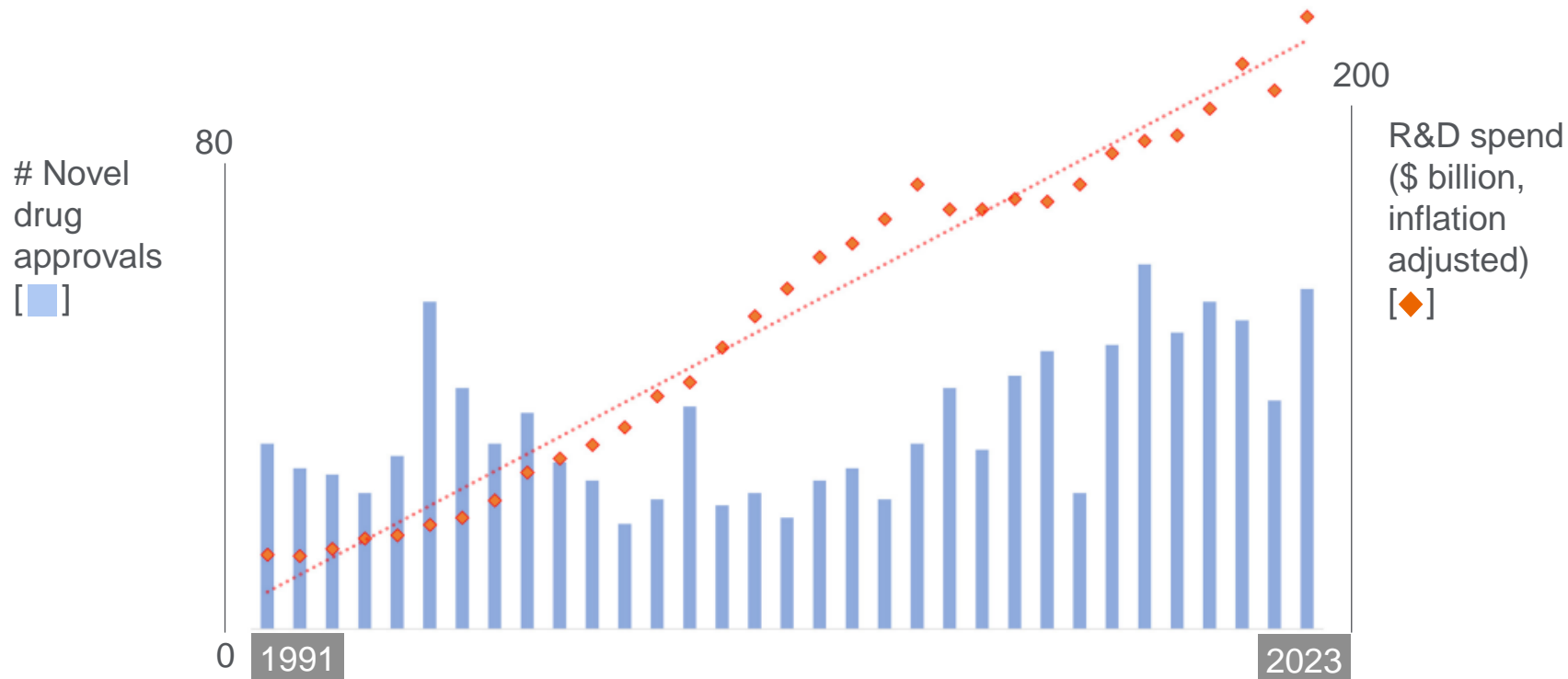
# Why are we here?



## Our industry has an efficiency problem...

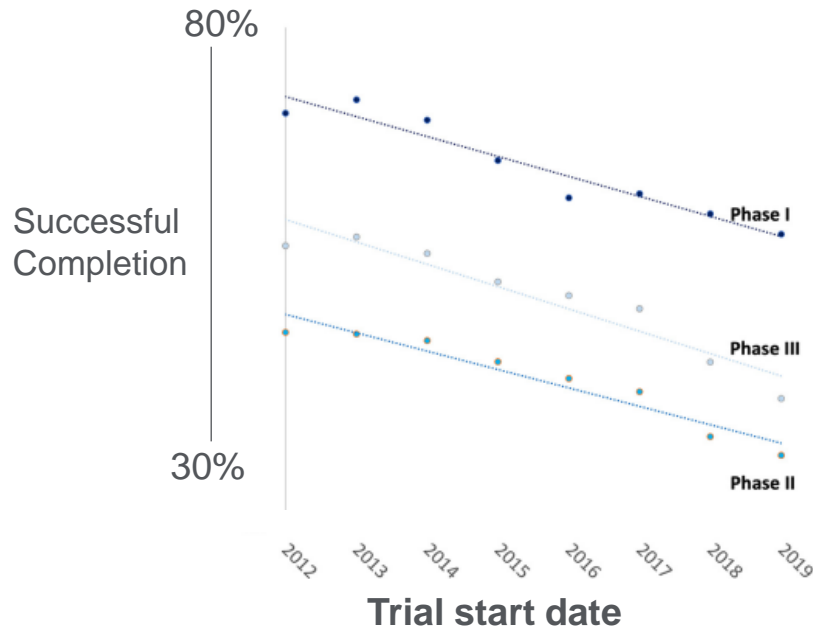
### The pharmaceutical productivity gap – decline in R&D efficiency

*Drug Discovery Today, Sept 2024*

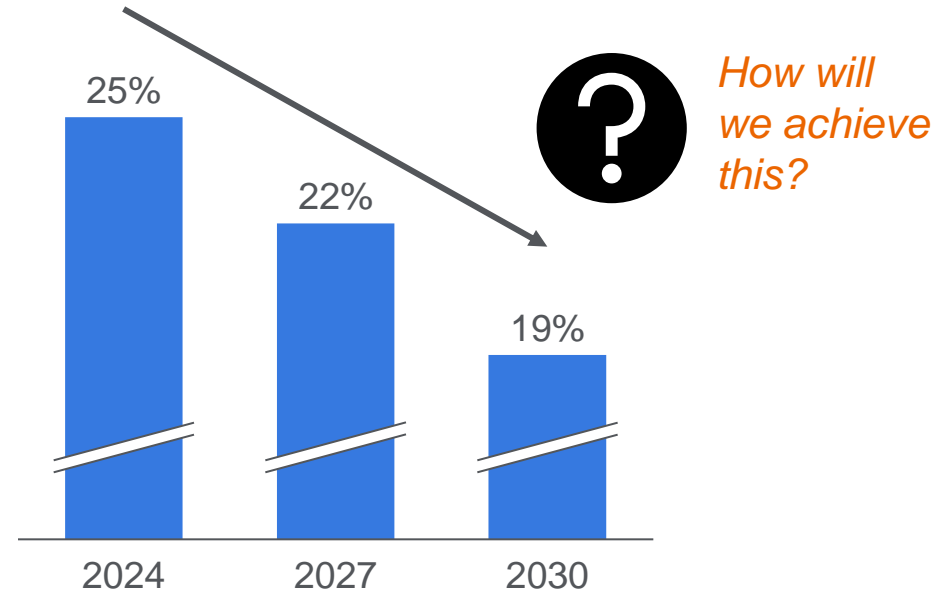


...failure rates are increasing, whilst the industry expects to generate more revenue from less investment

**Clinical trial success per phase**  
(within 4 years, trials starting 2012-2019)



**Pharma R&D spend as % of sales**



# We need to do things differently

“

*The universe of molecules that could be turned into potentially life-saving drugs is mind-boggling in size: researchers estimate the number at around **10 to the power of 60**.*

*That's more than all the atoms in the solar system, offering virtually unlimited chemical possibilities – If only chemists could find the worthwhile ones.”*

”

David Rotman, Editor, MIT Technology Review, April 2020

AI is becoming an imperative for our industry if we are to improve productivity and ROI

# AI is key for improving R&D productivity, but concerns remain

## How researchers and clinicians are feeling about AI:

95%

Believe AI will **accelerate knowledge discovery**

72%

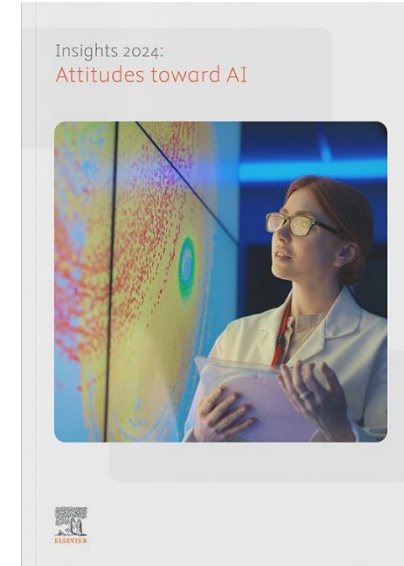
Believe AI will have a **transformative or significant impact** on their area of work

96%

Believe AI **could be used for misinformation**

84%

Believe AI **may cause critical errors**



### Online survey

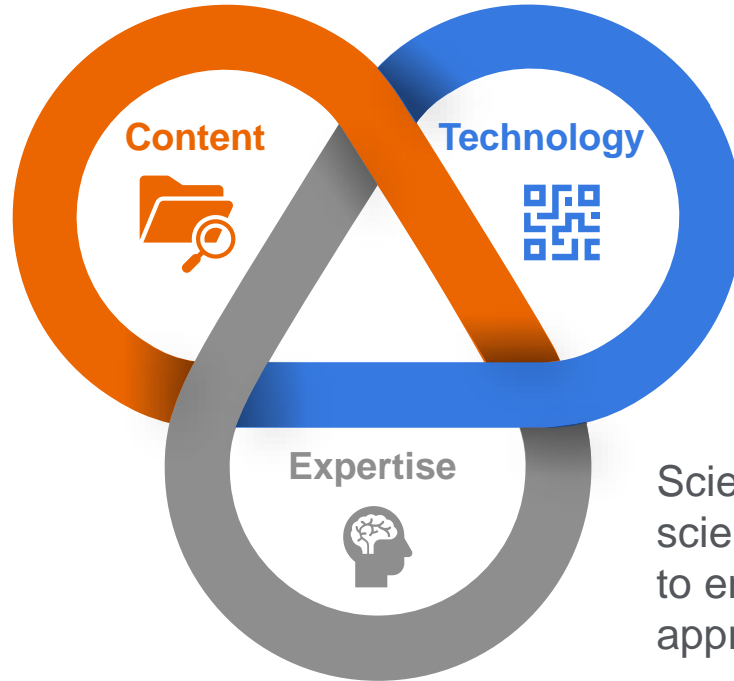
Dec 2023 - Feb 2024

Respondents: 2,999 researchers & clinicians from 123 countries



# Three key components for AI to be trusted

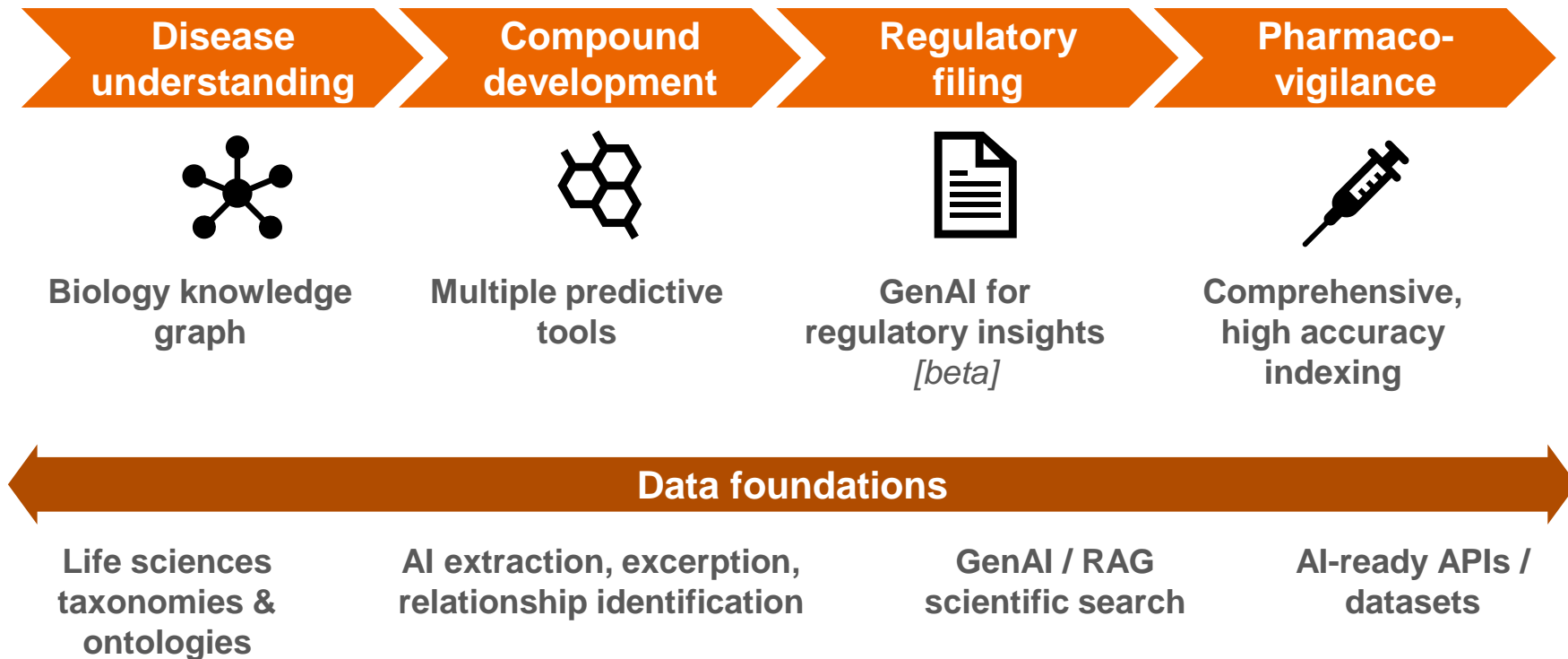
Data used in models has to be robust & trustworthy



Powerful technology with accurate models

Scientific and data science expertise to ensure approach is correct

# At Elsevier, we use a range of AI / advanced technologies to help answer the most challenging R&D questions



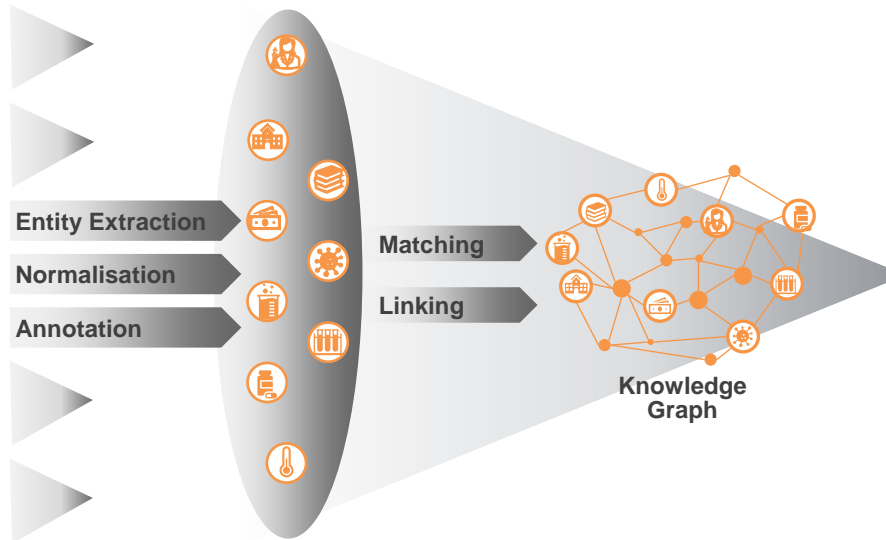
# Our approach to data and AI

## Data Sources

- Full text journal articles
- Book Chapters
- Clinical trials data
- FDA documents
- Drug databases
- Biomedical data
- Patents



## Data Extraction, Enrichment, Linking



## Sample Insights

- Relationships between biological entities
- Potential adverse events
- Biomarker discovery
- Relationships between chemical structures and biological effects
- Toxicology models
- AI predictions (multiple use cases)

# But remember, when innovating - start with the problem, not the solution

When you fall in  
love with the  
solution....



One potential solution

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When you fall in  
love with the  
problem....



Many potential solutions

# Example: Disease understanding

## Finding 'buried' biological connections via knowledge graph



**Researcher need:** Discovering connections between biological entities and how they connect to disease progression to make critical R&D decisions

- Which targets to pursue?
- Which drugs to prioritise in the development pipeline?

**Biomedical Content**  
(36M publications + other texts)



*(with option to map additional data to expand insights / use cases)*

**Extractive & Enrichment AI**



**Biology Knowledge Graph**



**Multiple delivery options**

*UI designed for biologists*

*Enriched dataset*

# Key learnings from working with AI

1. **Start with a use case**, not a technology
2. **Make an honest evaluation of the fit of AI to this problem.** Is it truly superior to existing approaches (speed, accuracy etc.)? Is it cost effective?
3. **Be open and collaborate**, acknowledge your own bench strengths and seek partners where it makes sense
4. **Adopt responsible AI principles from outset:** Human in the loop, explainability, privacy and data governance, consider model bias
5. **Ensure the data used is robust**, comprehensive, high-quality, accurate
6. **Platform level thinking** will be needed at some stage, be ready for this

# What excites me for the future

- Seamless exploration across content sources - Elsevier, customer, third party
- Continuing to put AI and advanced technologies to work where it helps customers solve a problem
- Working with the industry – development partners, technology partners etc.

# Learn more about using chat-based search, evaluating AI quality and how to use GenAI

## SciBite | Joe Mullen

Director of Data Science



### Talk:

“SciBite Chat,”  
evaluation and the  
future; GenAI’s role in  
the automation of  
human workflows

**Today, 12:45pm**

**Track:** Analytics  
Platform





Visit us at **booth 732**

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