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AI and ML in Pharma: Redefining the Forecasting Landscape

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Today's Presenters

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Evaluate

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J+D Forecasting

20+ years of experience **supporting Pharmaceutical and Biotech companies** with their forecasting needs.

- **Experts** in all pharmaceutical forecasting methodologies. Using **innovative approaches** to resolve forecasting challenges.
- Led by a **senior level** team of forecasting, market research, technical and data analysis professionals, with **extensive experience.**
- Advanced technical capabilities, having developed over **1,000 forecast models** and deployed our FC+ software and FC365 forecasting platform **in 70+ countries.**

Evaluate, a Norstella Company

By combining Evaluate's world-class consensus forecasting and consulting expertise with J+D Forecasting's specialised models, delivered through cloud-based management and analytical solutions, clients can achieve a comprehensive understanding of the competitive landscape, seize important opportunities, and enhance the decision-making process.

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Agenda

- General Overview
- Application of AI in Pharma
- Practical uses of AI in Forecasting
- AI Revolution – What to Expect
- Q&A

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AI in Pharma Forecasting – **Challenges and Opportunities**

General Overview

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“A.I. could be ‘more profound’ than both fire and electricity”

Sundar Pichai, CEO Alphabet

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Different areas of **Artificial Intelligence.**

Today

Artificial Narrow Intelligence
(better than humans in ONE specific task)

Tomorrow

Artificial General Intelligence
(capable as humans in every task)

Artificial Super Intelligence
(better than humans in every task)

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AI in Pharma Forecasting – **Challenges and Opportunities**

Application of AI in Pharma

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Application of **AI in Pharma**

- Globally valued at ~$905 million in 2021 – ($9,241 million by 2030)
- 50% of global healthcare companies plan to implement AI strategies (by 2025)
- AI-driven new drug development expected to grow 40% annually – ($4bn in 2024)

AI Applications in Pharma

Drug Discovery	Clinical Trials	Diagnostics
		

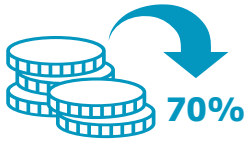
AI and ML in Pharma: **Redefining the Forecasting Landscape**

AI within **Drug Discovery**

Artificial intelligence has many implications for research, drug discovery and development and trials:

- Identify **new drug molecules** that have so far eluded scientists
- Synthetic data can bridge population data gaps
- Increase the probability of **success of NCE's**
- **Lower R&D costs** & reduced time to market

Time for drug discovery



Cost of drug discovery

Drugs in development

(Estimated predictions)

Already making drug discovery faster and cheaper, with a number of multiple AI-designed drugs now being tested in humans:

Exscientia

SCHRÖDINGER

Insilico Medicine

VERGE genomics

https://itrexgroup.com/blog/why-use-ai-in-pharma-and-how-to-get-it-right/#:~:text=Artificial%20intelligence%20can%20reduce%20drug,billion%20annually%20on%20R%26D%20costs

https://asia.nikkei.com/Business/Pharmaceuticals/AI-slashes-time-and-cost-of-drug-discovery-and-development

AI within Drug Discovery: **Forecasting Implications**

Est. around 270 companies currently working on AI-driven drug discovery.

Lack of in-house AI expertise driving vendor partnerships:

- GSK has partnered with Cloud Pharmaceuticals and Insilico Medicine to utilize their AI platforms for target identification, drug design, and lead generation.

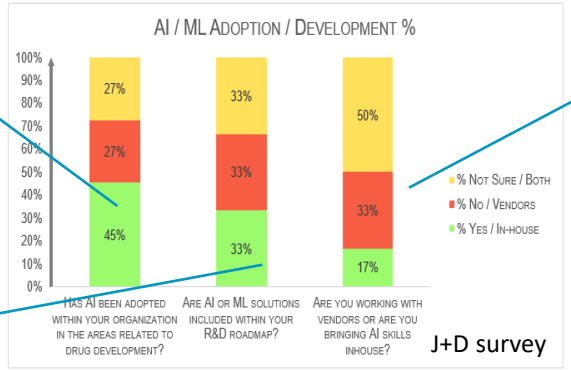
- Sanofi partnered with **Atomwise** to discover and synthesise drug compounds for five different targets, paying $20 million upfront for their innovation and AI capabilities.

Impact:

- The future competitive environment will change as more drugs are discovered.
- An increase in partnership deals between industry and vendors.
- Reduction in time to market and associated costs will change financial thresholds for new drugs.

45% adopted AI for drug development

33% already included within R&D plans



Inhouse vs Vendors 17% vs 83%

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AI within Clinical Trials.

AI can help to make clinical trials more **efficient, more accurate, and more effective.**

- Around 90% of clinical trials run significantly over time or over budget.
- 86% of clinical trials fail to recruit enough patients within their target time frame.
- Between 25% to 40% of trials will fail because they cannot meet their goals.

Success probability

Time to launch

Key finance metrics

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Benefits of AI application:

Patient recruitment and screening

AI can help to reduce the time and cost of clinical trials, and it can also help to ensure that the right patients are enrolled in the right trials.

Data collection and analysis

AI can help to identify patterns and trends in the data, plus identify patients who are most likely to benefit from a particular treatment.

Risk assessment

AI can help to ensure the safety of patients, and it can also help to identify patients who are at risk of experiencing adverse events.

Predictive modelling

AI can help develop predictive models to identify trials that are most likely to be successful, and those that are most likely to fail.

Decision support

AI can help investigators to make informed decisions about the design, conduct, and interpretation of clinical trials.

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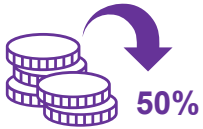
AI within Clinical Trials: **Forecasting Implications.**

Potential to revolutionise the way clinical trials are conducted - **estimated 50% reduction** in time to market and associated costs.

- Improved, faster recruitment for clinical trials, reducing overall trial length and potential costs.
- Creating a more effective use of R&D budget.

Reduction in time to market

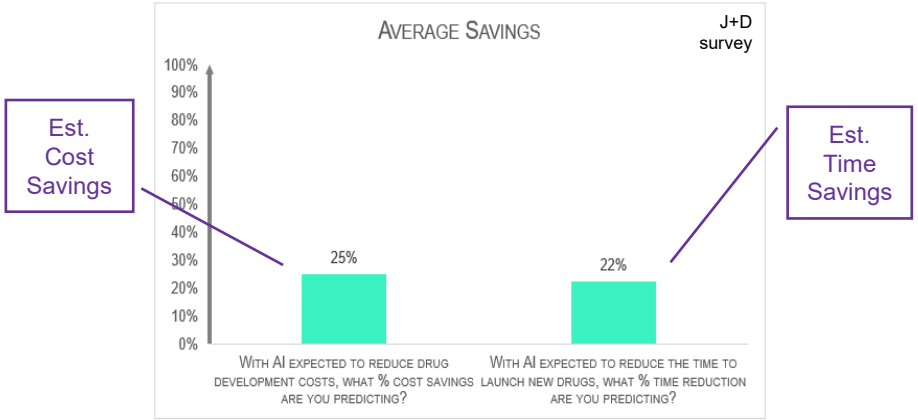


Reduction in associated costs

(Estimated predictions)

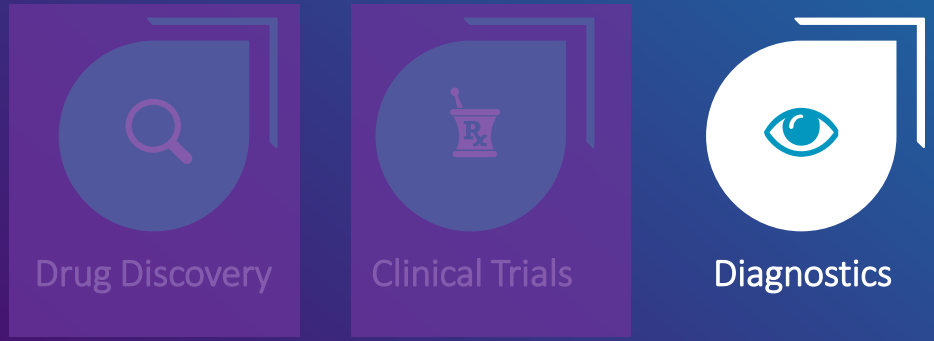
Impact:

- Decreasing drug development time and cost will require adjustments to forecast assumptions around probability of success, time to launch and key NPV assumptions.



https://pharmaintelligence.informa.com/resources/product-content/ai-driven-drug-development-seen-blossoming-in-korea-as-govt-lends-support

AI and ML in Pharma: Redefining the Forecasting Landscape



AI within **Diagnostics**

Has the potential to make healthcare more accessible and affordable – plus enhancing efficiency and accuracy of diagnostics.

Challenges AI can address:

- Identifying **at risk populations** for early intervention.
- **Diagnosis** and decisions about treatment plans.
- Personalised treatment based on patients' genetic makeup, resulting in **better patient outcomes**.

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AI in practice:

Identifying Lung Cancer

In a study of more than 42,000 low-dose computed tomography scans (LDCT), AI performed as well or better than six radiologists in its ability to **detect lung cancer tumours**.

Next-Generation Sequencing

Accelerated genomic data analysis by 10-fold helping **advance biomarker discovery**, accelerate drug development and develop new diagnostic tools.

AI Detecting Heart Disease

AI test providing higher diagnostic accuracy, reduces the need for unnecessary invasive angiograms by 83% and **reduces healthcare system costs by 26%.**

Credit: NVIDIA

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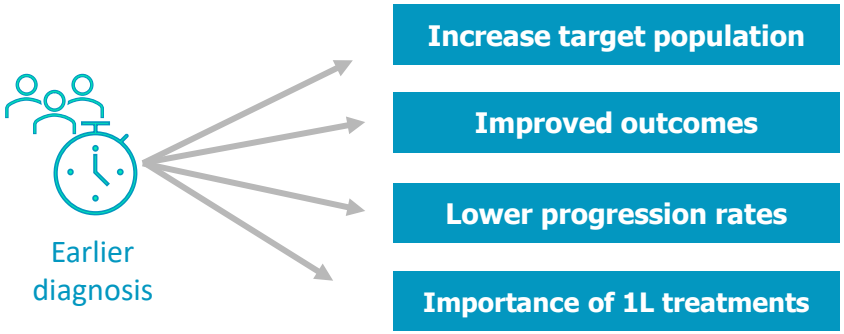
AI within Diagnostics: Implications

AI techniques are already being used to diagnose numerous diseases.

- How far, how fast and how effective could these be?
- Ability to detect and diagnose rare diseases that until now, have been extremely difficult.



Forecasting

Impact:

- Earlier diagnosis of diseases has implications on patient outcomes, therefore change patient distribution across lines of treatment or severity of disease.
- A significant impact on diseases such as oncology which the forecaster will need to reflect in their forecast models.
- Improved first line treatment resulting in less focus on next line drug development.

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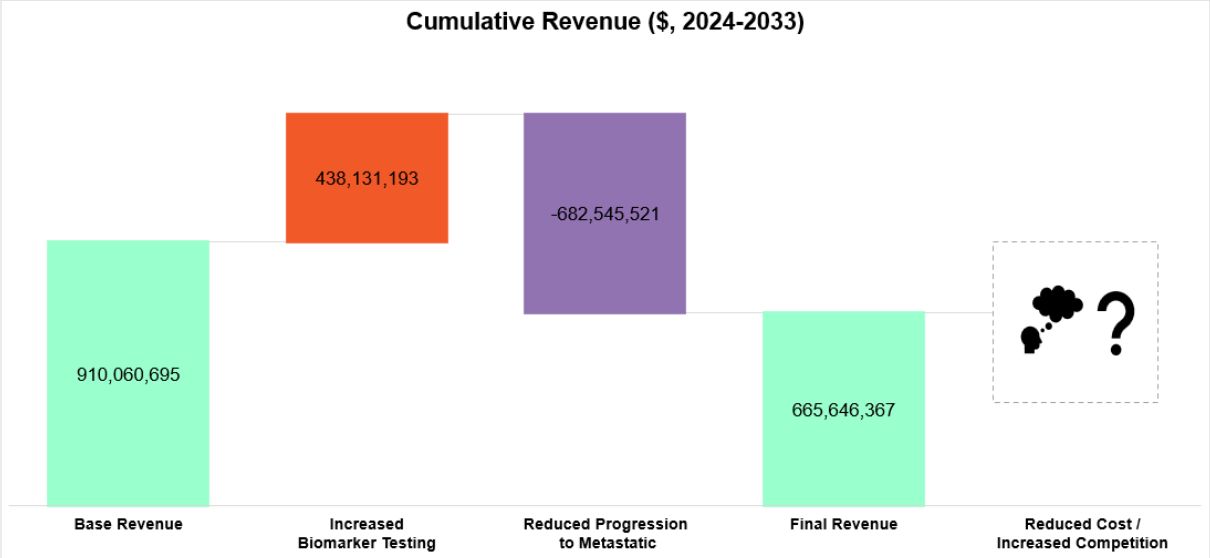
Impact Model



Assumptions

- Biomarker testing and positive identification rate has gone from 55% to 85% over the course of 5 years.
- Progression to metastatic (Stage III to Stage IV) has reduced from 80% to 20%.

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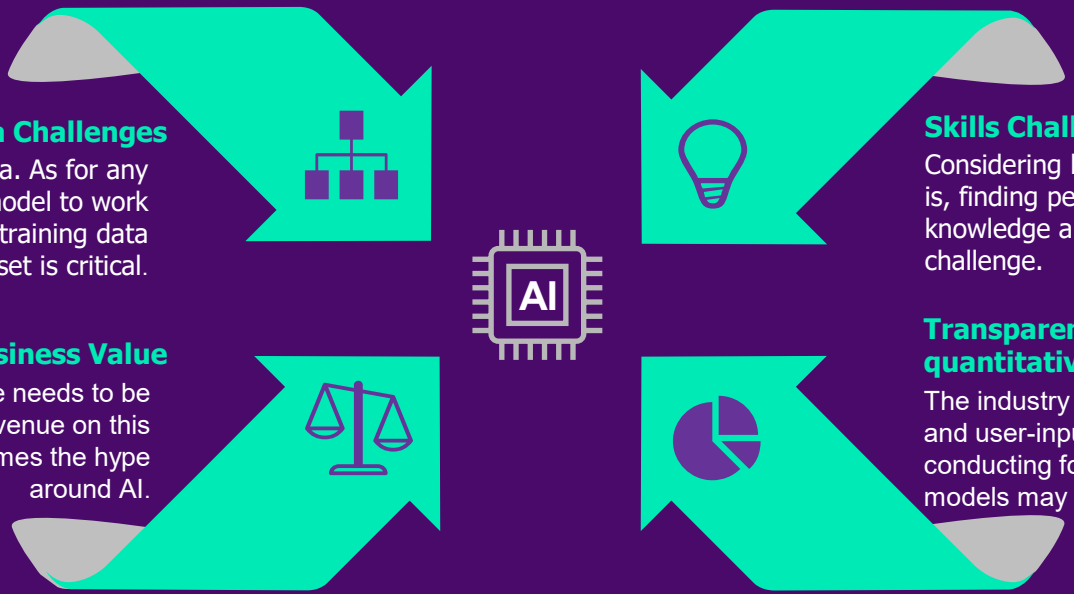
Challenges of Adopting AI



Data Challenges

Quality and quantity of data. As for any machine learning model to work efficiently, a comprehensive training data set is critical.

Business Value

With such huge spend, there needs to be some demonstrable revenue on this investment that overcomes the hype around AI.

Skills Challenges

Considering how new the concept of AI is, finding people with the necessary knowledge and skills is a considerable challenge.

Transparency and accepting quantitative results

The industry typically relies on transparent and user-input type modelling when conducting forecasting exercises. AI/ML models may reduce buy-in.

Data Considerations

What about data **privacy/patient consent?**

- Important to embed privacy considerations - including anonymising data, minimizing data collection and applying data protection measures
- Need to prioritise transparency and user consent to ensure individuals understand the data collection and processing activities associated with AI systems
- Monitoring and compliance – to ensure organizations adapt to evolving privacy requirements and address any potential privacy risks that may arise from the use of AI

What about using third party datasets to feed AI systems?

Publicly available third-party datasets
Not copyrighted.

Publicly available third-party datasets
Copyrighted.

Purchased third-party datasets

Note: several IP cases being reviewed by the Courts which will help to shape future direction.

https://ico.org.uk/media/for-organisations/documents/4022261/how-to-use-ai-and-personal-data.pdf

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AI in Pharma Forecasting – **Challenges and Opportunities.**

Practical uses of AI in Forecasting

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There are a lot of unknowns: What could future applications look like and what's happening now?

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Business Need: **Peak Share Prediction for New Product Launch.**

Peak Share prediction in the pharmaceutical markets is generally based on **three main drivers** that are mutually exclusive and exhaustive:

Competing clinical profiles
E.g. Efficacy, Safety, Dosage flexibility

Market structure
E.g. Order of Entry, Pricing competitiveness, Generic/Biosimilars vs. Brand

Company Profile
E.g. Marketing strength, Therapy reputation

Challenges

Data
Accessing the appropriate data sets and collecting relevant data

Resource
Lack of skilled resources / time constraints

Analysis
Analysing the data in an appropriate and efficient manner, which includes removing any redundant attributes OR not including unconsidered attributes

Validation
Validate based on any historical data

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AI within Forecasting: Peak Share Prediction for New Product Launches

Define New Product Characteristics

Indication

Geographic area

Target patients

Reimbursement status

Therapeutic characteristics

Plus others

AI Trained Models

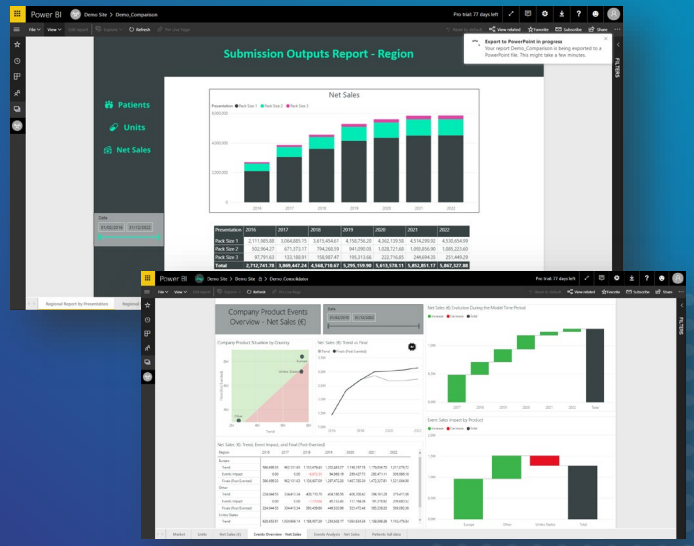
Clinical Profile Data

Market Structure Data

Company Profile Data

Based on a varying sources / databases AI will do the work of the user to precisely identify the most appropriate candidates

Output



Commercial Info: Drug development info, articles (ex-SCRIP, IN VIVO), regulatory, MedTech, etc

Clinical Info: services that provide information on clinical trials (e.g., Trialtrove, Sitetrove, Pharmaprojects)

Other sources (e.g. Synthetic Data)

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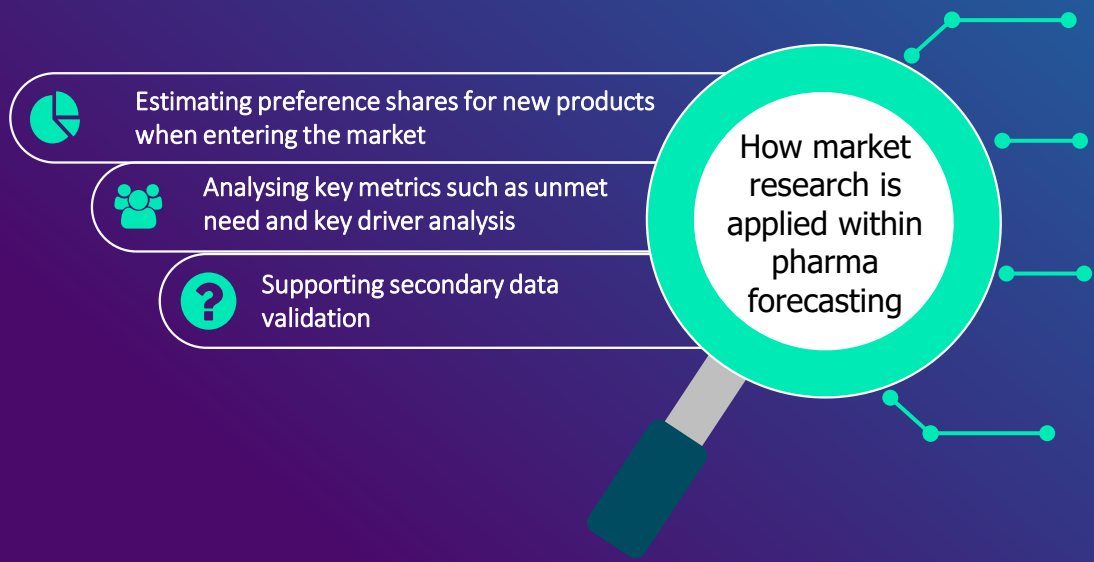
Business Need: Market Research for Pharma Industry



Challenges

Relevance

Designing market research appropriate for pharma forecasting models

Capability

Lack of skilled resources able to combine market research and pharmaceutical forecasting

Resource

Time constraints as market research usually requires a substantial amount of time to design, execute and analyse data

Budget costs

Validation

Ability to update / track results

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AI within Forecasting: Market Research for Pharma Industry

Define Study

Define New Product Profile

- Indication
- Geographic area
- Target patients
- Etc.

NLP – Design Questionnaire

Clinical Profile Data

Market Research Profiles / Structure

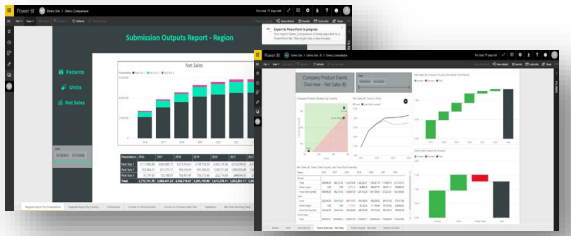
Questionnaire

- Key competitors
- Standardised clinical attributes and levels

Run Study

Collect and validate data

Analyse/Embed into FC Model/Outputs



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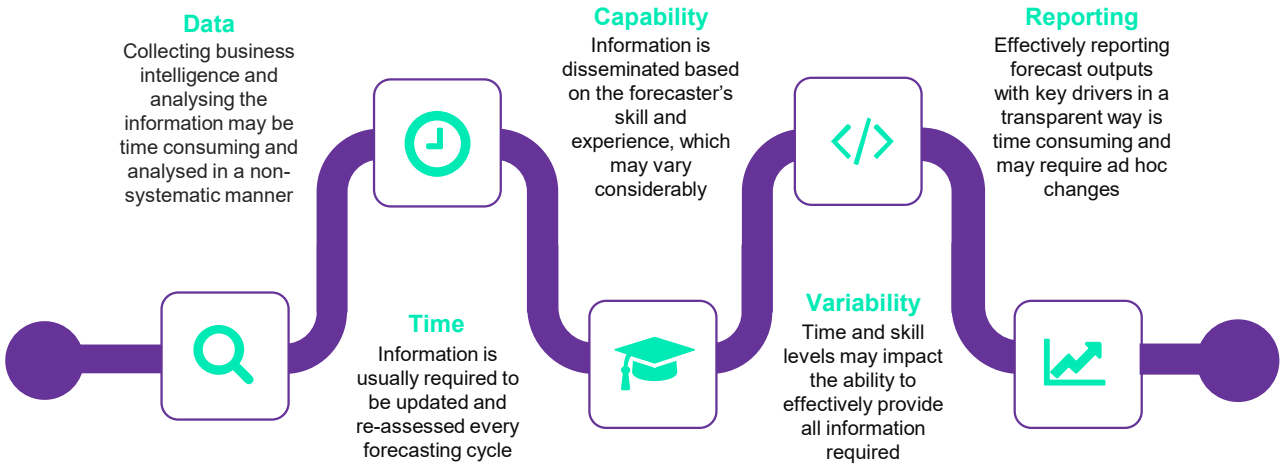
Business Need: Effective Forecasting Processes.



Key pain points during forecasting cycles is access to **actionable support material** when inputting into forecast models, and the ability to **visually present** the outcomes to senior management in a timely and effective manner.

AI within Forecasting: Processes

AI as a Forecast Support Agent

Data source: Clinical

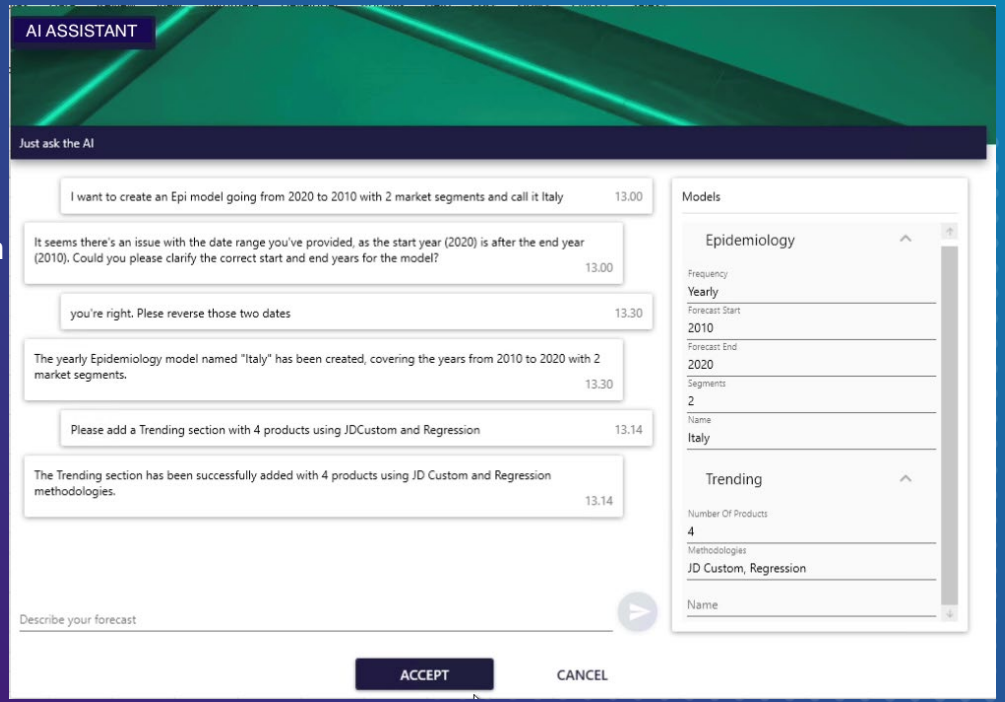
Data source: Financial

Data source: Marketing

Data source: Regulatory

Data source: Primary research

Data source: Secondary data



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AI in Pharma Forecasting – **Challenges and Opportunities**

AI Revolution – What to Expect

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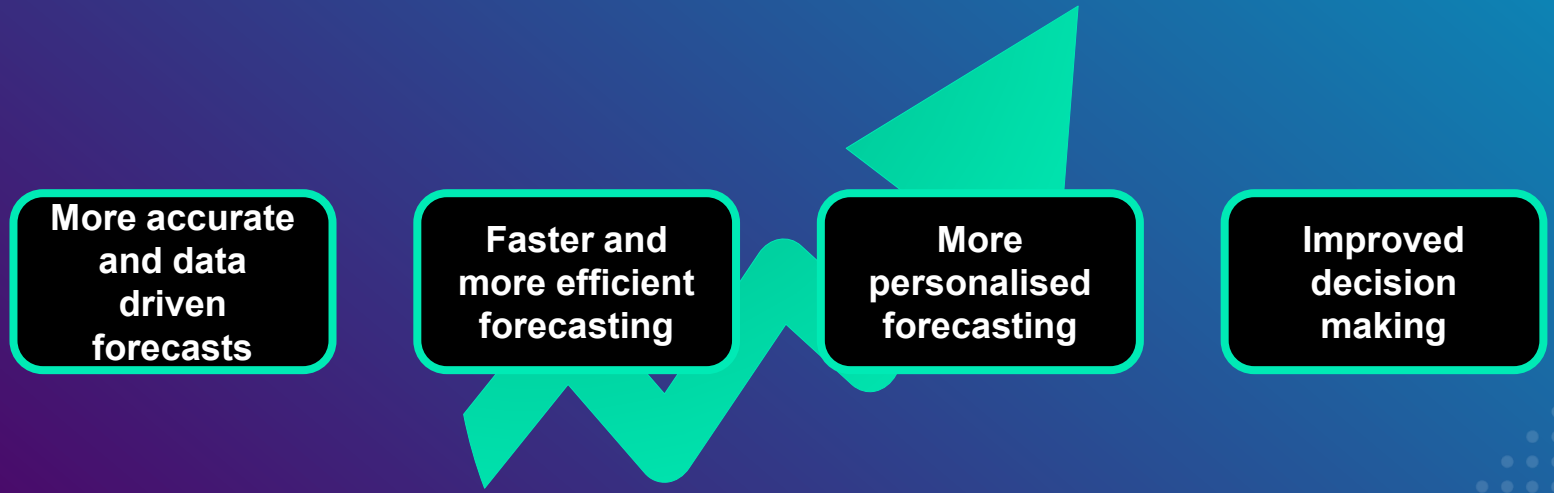
The AI Revolution – what to expect.



When bringing this advanced technology to your business:

- **Incorporate AI into your business strategy instead of treating it as a side project**
- **Build strong AI skills inhouse and/or partner with dedicated tech vendors**
- **Remember the technology is still evolving, so remain open to new learning and possibilities**

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