PPO4

The Recipe for Optimizing Efficiency in Clinical Operations

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△ ALTAIR

ENGINEER	ANALYZE	ENHANCE

Onboard Source Data	Integrate Data as Knowledge Graphs	Generate Insights Using Data Science + Simulation + Optimization + AI	Enhance Business Outcomes

Onboard Source Data

- Patient Demographics
- Regulations
- Site Performance
- Protocols
- Patient Recruitment
- Industry Taxonomies
- Clinical Trials
- Genetics
- Real World Data
- Literature

...and more

Integrate Data as Knowledge Graphs

A Primer on Knowledge Graph

SOURCE DATA

In-house Product Data Base

Product	Indication	Side Effects
Inflammo	Arthritis	Headache, Dizziness
Insuleptol	Diabetes	Nausea

Individual Case Safety Report

Ad-hoc Notes, Forms, Etc.

KNOWLEDGE GRAPH

Generate Insights Using Data Science + Simulation + Optimization + AI

Adaptive Trial Eligibility: Optimize recruitment based on new data + simulation

Proactive Safety Monitoring: Using drug, disease, genetics data + risk simulation

Protocol Optimization: Using historical performance, protocol, and patient data

Virtual Trials and Synthetic Arms: Using historical data, predictive models, and simulation

Endpoint Optimization: Using patient journey simulation + RWD

Digital Twins: For patient outcome simulation, dose optimization, virtual trials

Cross Trial Analysis: For subgroup discovery, intervention comparison, label extension analysis, signal detection, dose-response analysis

...and more

Enhance Business Outcomes

✓ **Accelerate trial timelines**
✓ **Lower costs**

✓ **Make** data-driven decisions
✓ **Minimize** subjectivity
✓ **Reduce** inefficiencies
✓ **Reuse** data across contexts
✓ **Improve** protocol quality and feasibility
✓ **Enhance** patient recruitment and retention
✓ **Increase** diversity and representativeness in trials

✓ **Optimize** resource allocation
✓ **Enable** adaptive, real-time decision-making
✓ **Reduce** protocol deviations and amendments
✓ **Anticipate** and **mitigate** risks proactively
✓ **Improve** endpoint selection and validation
✓ **Enhance** regulatory compliance and inspection readiness
✓ **Facilitate** collaboration and data sharing across studies
✓ **Support** personalized and precision medicine approaches

Software Platform With Modular Components | Highly Automated | Low Code/No-Code | Unified Data Management

Informed decision-making requires timely access to diverse reliable data unlocked from siloes	Unified data minimizes subjective decision-making, suboptimal enrolment strategies, inconsistent protocol adherence, inadequate resource allocation, and deficient monitoring.	Simulations model trial scenarios, allowing for prediction of risks and outcomes in combination with predictive analytics. Optimization techniques, coupled with AI, improve site selection, align data collection with study endpoints, and ensure more efficient trial execution.

• **Open standards**-based data modeling, integration, and access to prevent vendor lock-in • Distributed architecture for **scalability** • Support for structured, semi-structured, and unstructured data	• **In-memory Massively Parallel Processing (MPP)** data transformation for scalable performance • Pipeline + Data Mapping UI low-code UX • API support	• **Visual workflow designer** for data engineering and science • Access to 450k+ AI/ML models on Hugging Face and OpenAI • AI Chat Interface for Conversational Business Intelligence • Low Code "Build Your Own App" tooling