



IC-005

The Need for AI Facilitated Monitoring Methods and Techniques to Enhance Participant Safety and Welfare

PHUSE Connect 2024 – Bethesda, Maryland



Author:

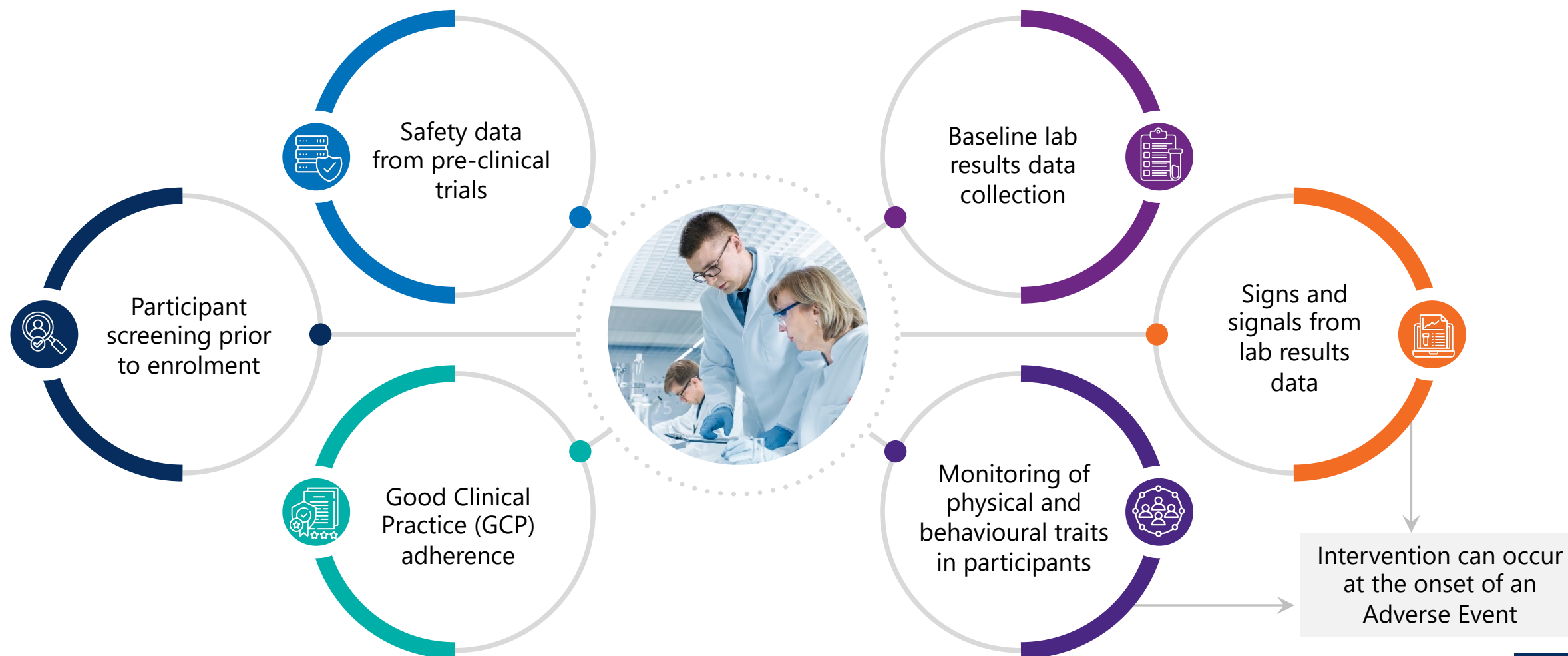
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Current Risk Based Monitoring in Clinical Trials



Enhancing AE Surveillance via Phenotype Data



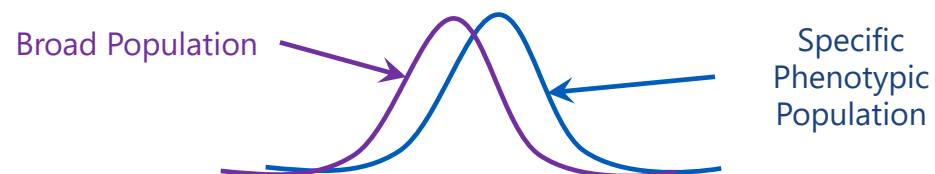
Statistical normal ranges can lack specificity at the genotypic and phenotype level



Populations with observable phenotypes can be differentiated from the broader population



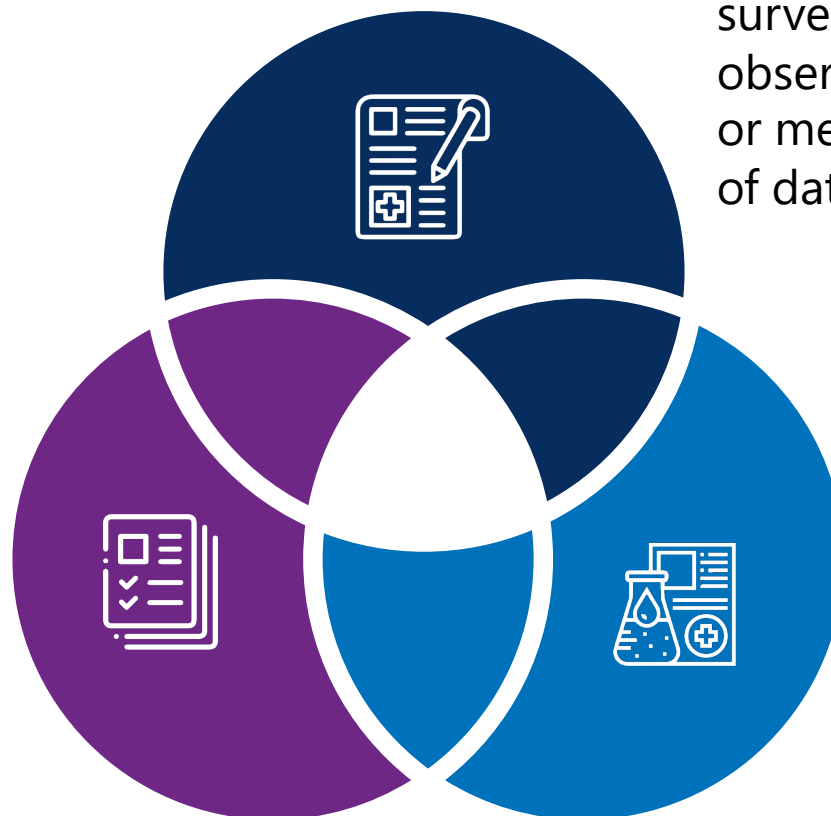
Specific observed levels (ex. bicarb, bilirubin, platelets and etc.) can signal the occurrence or initial onset of an adverse event



Preventing vs. Reacting to Adverse Events

Example: persons with south Asian ancestry are known to have statistically different curves on electrolytes vs. the broader population

- Atypical electrolytes can be a signal of Stevens Johnson and TENS



Current clinical adverse event surveillance relies upon participant, observations of the study staff and or medical reviewer interpretation of data

A data science tool could automatically measure biomarkers by phenotypes and push atypical findings to study staff. Intervention occurs prior to AE onset

Facilitation of Action on Atypical Biomarker Data



Insights on signals from labs – before other current means



Ranking of lab values at the level of phenotype

→ Specificity
→ Bias Adjustment

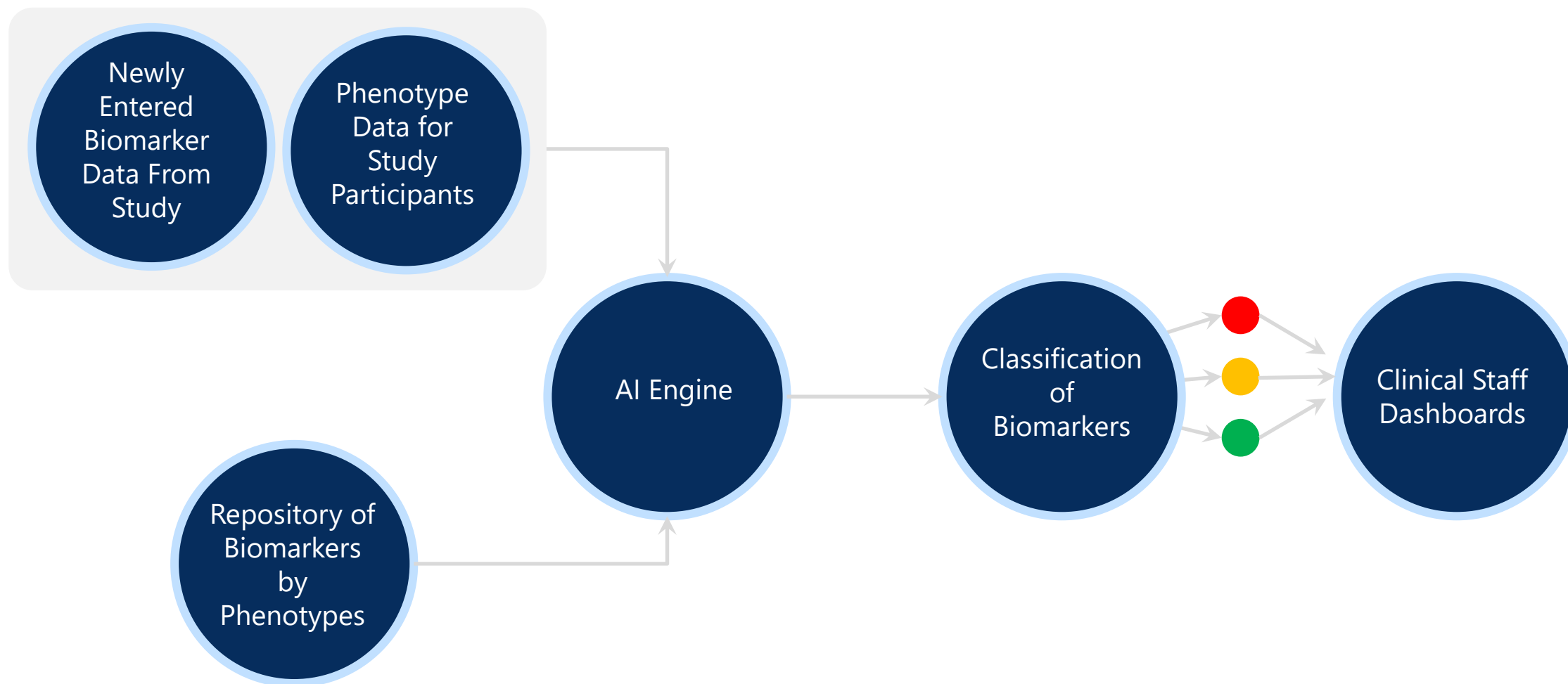


Within participant phenotypic comparative data pushed to study staff as biometric findings are available



1. Findings applied to dashboards and alerts
2. Warning signal appraised
3. Appropriate action taken
4. Negative outcome averted

A Simplified Design for the Safety Tool Suite



A Big Data Approach to Phenotypic Norms

Applied Data:

1. Filtered on control participants
2. Biomarkers grouped by phenotypic traits
3. Variation on a biomarker within a phenotype is calculated
4. Incoming data are applied with automatic bias correction

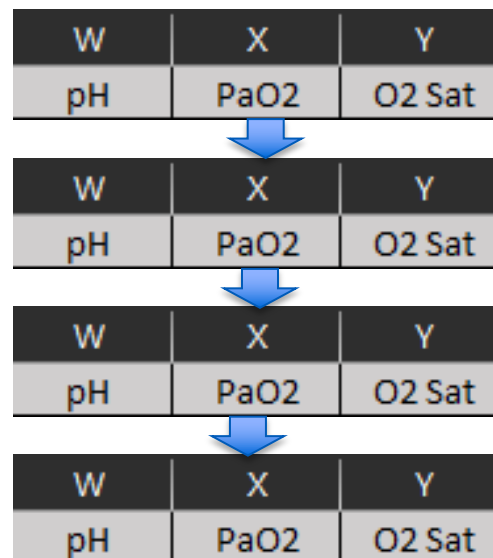


Industry and regulators comply with CDISC data standards

CDISC standardization allows the stacking of clinical trial data across contributors

Stacking Data Across Studies and Contributors

Uniform datasets allow for the data from many related and unrelated trials to be placed one atop of another in a massive but integrated repository



W	X	Y
pH	PaO2	O2 Sat

W	X	Y
pH	PaO2	O2 Sat

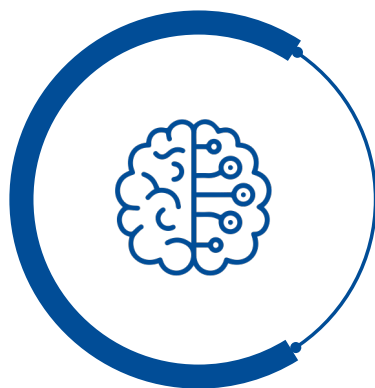
W	X	Y
pH	PaO2	O2 Sat

W	X	Y
pH	PaO2	O2 Sat

Facilitated Artificial Intelligence Integration



Biomarkers with the specific phenotypic traits and combined with repository data



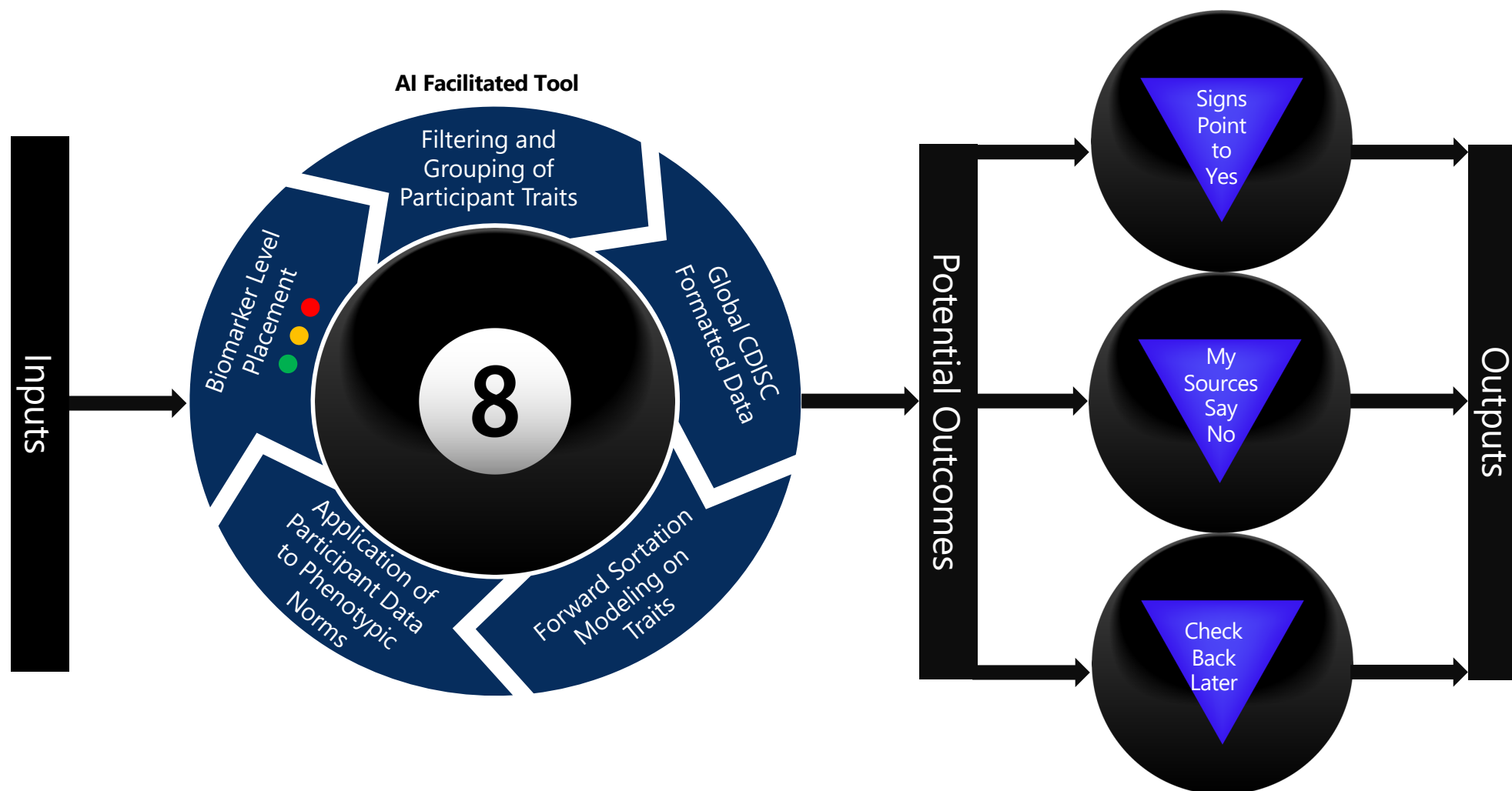
AI algorithms execute statistical calculations on phenotype specific placement on a normal distribution for biomarker values.



AI now “web scrapes” literature (ex. Cochrane Reviews) and attaches known potential biomarker and adverse event pairings



The Magic Eight Ball Analogy of Artificial Intelligence

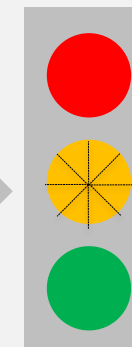


Assembly of Findings and Application

Participant data hybridized with repository data, and academic publications. The tool evaluates and stratifies the probability of an AE with phenotypic specificity



Participant is between 1 and 2 SD above mean on measure

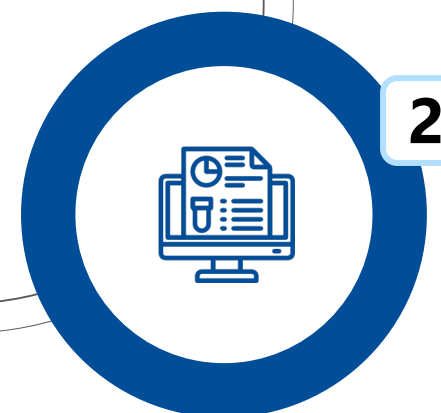
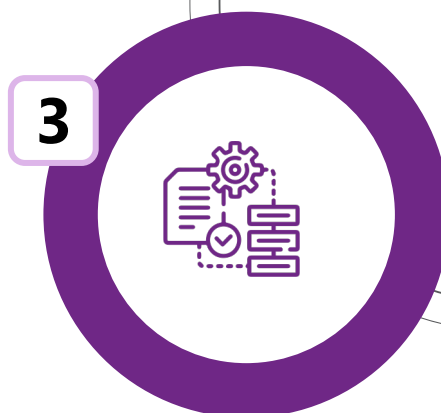


Bilirubin

Associated AEs

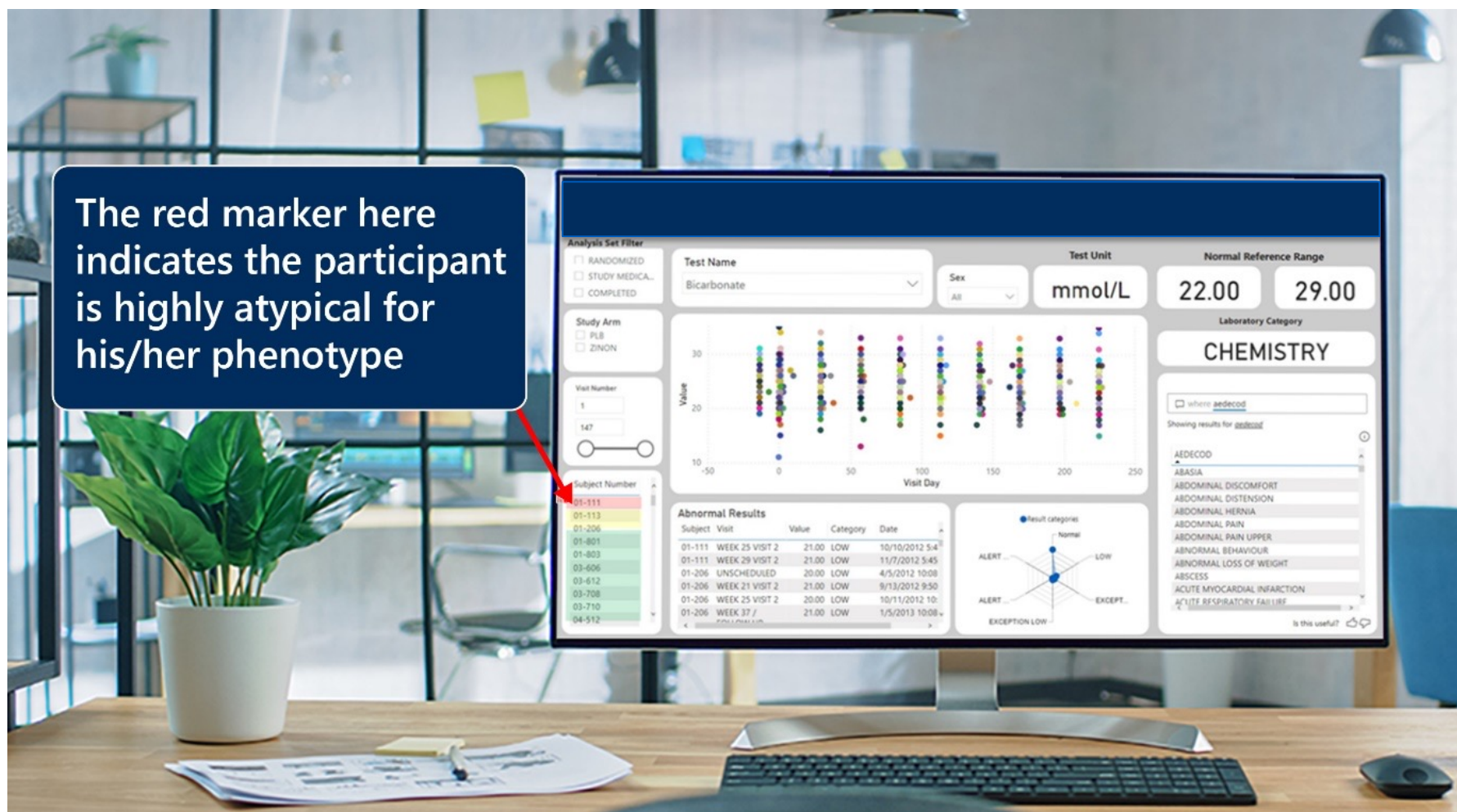
1. Jaundice
2. Hemolytic anemia
3. Gilbert's syndrome

Outputs color coded like an ordinary traffic signal – Potential AE's given a color code to demonstrate probability of outcome



Simple and intuitive outputs are created with all complex processes being done by the tool

What the Study Staff See



Conclusion



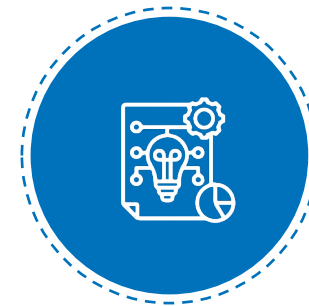
This tool will add a powerful yet simple to interpret method for identifying the onset of potential adverse events



This tool has the power to save lives



Applying the phenotypic traits of the participant will enhance specificity and produce appraisals that are in context



Secondary advantages include:

- a. Hypotheses generation
- b. Bias and error flagging
- c. Signal altered biomarkers
- d. More inclusive participant cohorts



Construction of this tool will require a team of subject matter experts from Data Management, Privacy and Deidentification, Data Science, Information Technology, Clinical Investigators, Medical Reviewers and Leadership



Any questions?



Thank you

Contact Information

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