Emerging Programs AI Workgroup Meeting #5

Date: 07/10/2025

Topic: Trial Design, Planning, & Configuration

Overview and Current Issues:

The fifth convening of the Emerging Programs AI Workgroup explored the role of AI in clinical trial design and configuration. This meeting focused on the early phases of trial execution—design translation, system setup, and automation of study configuration—areas that are gaining interest as sponsors and technology partners seek to increase efficiency upstream.

The discussion surfaced opportunities for hybrid approaches that blend deterministic logic with probabilistic large language models (LLMs) to interpret protocols, generate form logic, and accelerate system buildout.

Participants discussed the regulatory implications of AI-generated configurations, emphasized the need for human-in-the-loop oversight, and examined the evolving expectations for validation and auditability in pre-production environments.

Meeting Key Points:

- **AI is moving upstream in the clinical trial lifecycle:** This meeting marked a shift in focus from data analysis and endpoint assessment to earlier trial phases—design, planning, and configuration. AI is now being used not just to interpret results but to build the infrastructure of clinical trials.
- **Human oversight remains essential, regardless of AI maturity:** Even as AI tools improve, participants emphasized that human-in-the-loop review is non-negotiable. Whether for validating logic generated by AI or overseeing its integration into workflows, expert review is a foundational safety mechanism.
- **Current validation frameworks are not designed for AI-assisted tools:** There was widespread agreement that traditional CSV (computer system validation) does not fit emerging AI workflows—especially those using structured prompts, dynamic outputs, or agentic architectures. The need for updated risk-based validation guidance was a recurring theme.

- **AI introduces value through speed, structure, and accessibility:** AI tools can accelerate trial setup, help translate protocols into structured logic and empower less technical users to engage in configuration tasks. This creates efficiency but requires well-defined boundaries and error mitigation.
- **There is ambiguity around what counts as "AI" in clinical systems:** Participants noted confusion when deterministic tools, rule-based logic, and generative AI are all labeled "AI." This ambiguity complicates risk assessment, communication across stakeholders, and regulatory alignment—underscoring the need for clearer terminology.

Case Examples presented:

Ece Kavalci (Lindus Health) and colleagues presented an AI-assisted approach to study configuration currently in use within their Citrus platform. The process enables transformation of protocol designs—initially drafted as visual workflows in Miro—into structured digital study builds. A combination of deterministic logic and AI agents supports translation of natural language rules, acceleration of configuration tasks, and preparation of studies for user acceptance testing (UAT). Key features of the approach include:

- **Protocol-to-Platform Translation:** Study designs and visit schedules created in Miro are parsed into configuration files using deterministic logic for standard structures and AI agents for more variable, free-text instructions.
- **Natural Language Rule Interpretation:** Users input logic (e.g., conditional form display rules) in natural language. AI agents translate these into platform-specific backend logic to drive dynamic behavior in the study configuration.
- **Scoped Use of AI:** AI agents are restricted to UAT environments and do not interact with live production systems. Human review is required before any AI-generated configuration is finalized or deployed.
- **Structured Agent Architecture:** The platform includes modular agents with defined roles—such as documentation-aware components, output formatters, and function callers—each operating within tightly scoped constraints.
- **Auditability and Data Controls:** All AI interactions are logged with full transparency, including user prompts, function calls, output values, and timestamps. AI agents operate only on configuration metadata and have no access to patient data or PHI.

Challenges to Adoption:

Challenges	Description
Validation Readiness	Traditional computer system validation frameworks are not yet aligned with agent-based or prompt-driven AI workflows.
Scope Clarity	Difficulty distinguishing between deterministic tools and true AI systems creates ambiguity in risk classification.

Ambiguity in User-Defined Logic	When study designers enter conditional rules in natural language, slight variations in phrasing can lead to different interpretations by AI agents. This introduces risk in configuration accuracy and necessitates manual review before moving AI-generated logic into production.
Complexity of Agent Logging	While detailed, logs may require additional tooling or expertise to interpret effectively.
Cross-Functional Understanding	Terminology such as “functions,” “agents,” and “rules” introduced communication challenges across teams.

Perspectives:

Technology Developers:

- Highlighted the value of combining deterministic logic with AI agents to accelerate study configuration and reduce manual build time.
- Emphasized the importance of modular architectures, constrained agent behavior, and transparent logging to ensure safe, auditable AI integration.

Regulators:

- Raised questions about how current validation frameworks can accommodate prompt-driven or agent-based systems.
- Stressed the importance of distinguishing between deterministic and AI-driven functions when assessing risk and documenting system behavior.

Sponsors:

- Expressed interest in tools that reduce complexity and enable rapid study startup, particularly for protocol configurations that repeat across trials.
- Reiterated the need for strong human oversight, clear change control, and thorough validation — especially when trial setup influences downstream data quality.

Academic Experts:

- Encouraged more precise definitions around AI functionality in clinical systems and supported greater transparency into how logic is generated and reviewed.
- Suggested that future work focus on edge-case handling, system explainability, and risk-adjusted governance models.

Future Directions:

1. **Advance AI Validation Frameworks:** Explore modern validation protocols for agent-based systems and prompt-driven architectures, incorporating continuous integration and structured output validation into existing CSV expectations.
2. **Clarify AI Use Definitions:** Promote clearer taxonomy differentiating deterministic systems, AI-assisted logic generation, and autonomous AI tools to support consistent risk assessment and regulatory alignment.
3. **Enable Safe Testing Environments:** Expand sandbox environments where AI tools can be tested, audited, and validated without risk to live data or active trials.
4. **Support Adoption Through Education:** Equip operational and regulatory teams with resources to understand AI functions, interpret logs, and effectively review AI-derived configuration outputs.
5. **Encourage Precompetitive Collaboration:** Leverage learnings from early adopters to inform shared standards, reduce duplication, and advance best practices in trial configuration automation.