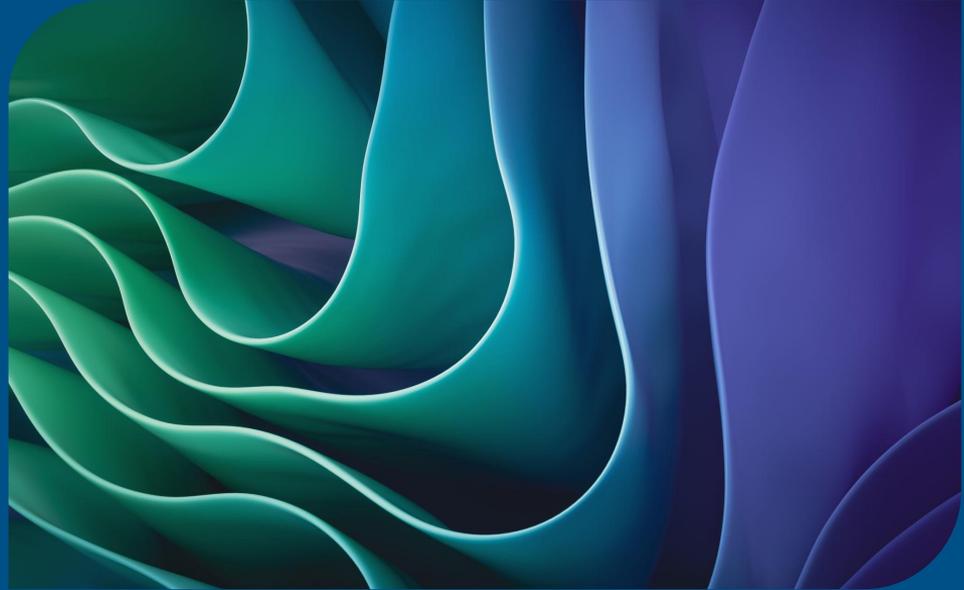# FDA Guidance on AI in Drug Regulatory Decision-Making

Critical Review and Applicability in Drug Development

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Regulatory Aspect of Drug Development

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Introduction

- Regulatory Frameworks for AI in Drug Development
  - The integration of Artificial Intelligence (AI) in drug development necessitates robust regulatory frameworks to ensure safety, efficacy, and quality.
- FDA's Focus on AI Integration
  - The FDA has issued draft guidance to provide recommendations on using AI to support regulatory decision-making for drugs and biological products.
- Purpose of the Guidance Document
  - To establish a risk-based credibility assessment framework for evaluating AI models used in regulatory contexts.

Objective and Scope of the Guidance

- Objective:
    - Provide recommendations for using AI to support regulatory decisions regarding drug safety, effectiveness, and quality.

- Scope:
    - Focuses on AI models that generate data impacting regulatory decisions.
    - Excludes AI applications in drug discovery or internal operational tools.

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AI Applications in Regulatory Decision-Making

- Examples of AI Use:
    - Predictive modeling for clinical trial outcomes.
    - Pharmacovigilance through analysis of real-world data.
    - Enhancing manufacturing quality assurance and control.
- Potential Benefits:
    - Reducing reliance on animal testing.
    - Increasing efficiency in data analysis and decision-making.
- FDA's Focus:
    - Emphasizes risk assessment and context of AI use in regulatory processes.

The 7-Step Risk-Based Credibility Assessment Framework

Step 1–3: Define & Assess

Define question of interest, context of use (COU), and assess model risk based on model influence and decision consequence.

Step 4–6: Plan & Document

Develop and execute credibility assessment plan; document deviations transparently.

Step 7: Evaluate Fit

Determine model adequacy for the defined COU and revise scope or model if necessary.

Key Considerations in AI Model Development

- Model Architecture
  - Sponsors must describe model structure, parameters, and rationale for design.
- Data Fitness
  - Data must be relevant, representative, and reliable to support credibility.
- Evaluation and Performance
  - Evaluation requires independent test data, metrics like ROC–AUC, recall, and uncertainty estimation.

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Critique and Challenges of AI in Drug Regulation

- Data Bias and Representativeness
  - Underrepresentation in training data can lead to biased outcomes.
- Explainability and Transparency
  - Complex models are difficult to interpret, reducing trust in results.
- Model Drift and Lifecycle Maintenance
  - AI performance may degrade over time, requiring ongoing validation.

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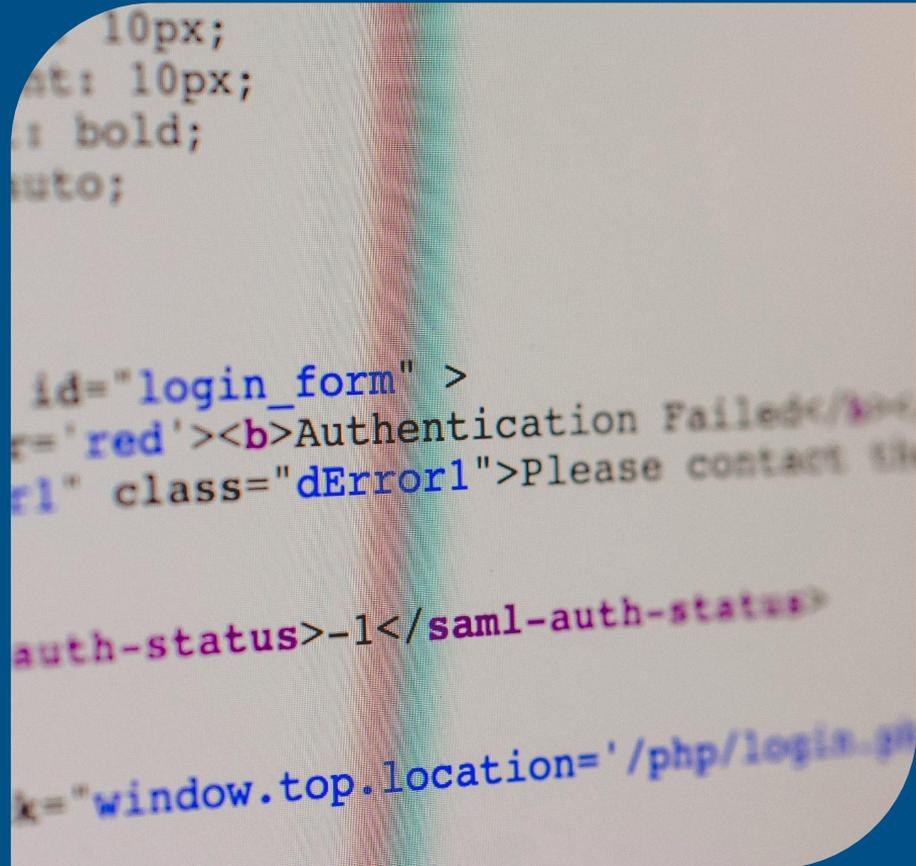
Early Engagement and Regulatory Pathways

- Formal Meeting Channels
  - Sponsors encouraged to engage FDA early via INTERACT, Pre-IND, and CID programs.
- Use-Specific Programs
  - Specialized pathways for DHTs, MIDD, RWE, and pharmacovigilance tools.
- Proactive Communication
  - Dialogue improves clarity on model expectations, risk, and documentation requirements.

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Conclusion

- Guidance Intent
  - Supports innovation with guardrails for AI credibility and reliability.
- Strategic Impact
  - Helps align AI adoption with safety, efficacy, and compliance priorities.
- Future Directions
  - Lifecycle maintenance, adaptability, and evolving regulatory frameworks.

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- FDA (2025). Considerations for the Use of Artificial Intelligence To Support Regulatory Decision-Making for Drug and Biological Products.
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- Executive Order 14110 (2023). Safe, Secure, and Trustworthy AI. https://www.federalregister.gov/d/2023-24283