



# 4 Steps for Evaluating AI Reliability in Life Sciences

A Framework to Minimize Risk and Maximize Value

## STEP 1

# Assess Data Quality and Representativeness

Evaluate the quality, scope, representativeness, and governance of the data powering your AI solution.



## Key Considerations

- ▶ **Scope and representativeness:** What is the scale, diversity, and longitudinal breadth (across time and care settings) of the patient population represented in the data?
- ▶ **Integration and interoperability:** What methodologies does the solution employ to overcome fragmentation, integrate diverse third-party and customer data assets, and standardize data across disparate sources?
- ▶ **Quality and handling:** What mechanisms ensure data completeness, accuracy, stability, and coverage across therapeutic areas? How does the system handle data ingestion, linking, and warehousing?
- ▶ **Governance, transparency, and recency:** What data governance frameworks and compliance measures are in place? How transparent is the solution about known data limitations and coverage gaps? What is the frequency of data refreshes, and how are they implemented?



## Evaluation Methods

In healthcare AI, the quality of the underlying data directly determines the reliability of insights. Key features to look out for include:

- ▶ **Longitudinal completeness:** Assess patient coverage breadth (total unique patients) and depth (years of longitudinal data) to verify that the data captures the full patient journey across time, providers, and insurance changes.

- ▶ **Multisource integration capabilities:** The ability to securely incorporate organization-specific first- and third-party data assets multiplies the value of analytics. Evaluate capabilities for secure integration of all disparate healthcare data sources (claims, EHR, lab, pharmacy) to ensure that the platform provides the most valuable insights.
- ▶ **Representativeness drives validity:** Compare demographic representation to national benchmarks to ensure that the data accurately reflects diverse patient populations and provides trustworthy AI insights.
- ▶ **Standardization and quality:** Healthcare’s complex coding systems require sophisticated standardization to enable accurate cross-patient and -provider analysis. Review data synthesis protocols and taxonomies.
- ▶ **Transparency about limitations:** All healthcare datasets have inherent limitations, and reliable AI will acknowledge these constraints to prevent misinterpretation. Examine transparency around data provenance and known limitations.
- ▶ **Governance and compliance:** Ensure regulatory compliance and ethical use by reviewing data governance documentation and compliance certifications.
- ▶ **Data recency and refreshes:** Healthcare practices evolve rapidly, which makes data currency critical for obtaining relevant insights. Assess refresh cycles and quality assurance processes.



## Use Case

A pharmaceutical company previously relied on a traditional claims database for market insights into a specialty medication. After evaluating Komodo’s **Marmot™** solution, the client discovered that its “existing data solution” captured only 15% of patients with its condition of interest while Marmot’s Healthcare Map foundation provided visibility into over 80% of the diagnosed population. More importantly, Marmot revealed critical gaps in the client’s understanding of the patient journey, showing that 40% of patients were receiving care from multiple specialists — a pattern entirely missed by its previous single-source data. By identifying these previously invisible care patterns, the company redesigned its market access strategy to address the complex multispecialty nature of the patient journey. This resulted in a 35% improvement in appropriate patient identification and treatment initiation.

## STEP 2

# Evaluate Technological Proficiency and User Experience

Assess the AI solution's technical capabilities, explainability, security features, and capacity for integration into existing workflows and systems effectively.



## Key Considerations

- ▶ **Explainability and trust:** Can the system explain the factors that influenced specific recommendations or insights? How are confidence levels, uncertainty, and limitations communicated to users?
- ▶ **Accuracy and safety:** What mechanisms ensure the accuracy and reliability of outputs, and how does the system detect anomalies when the AI is operating outside its knowledge boundaries?
- ▶ **Integration and security:** How does the solution integrate with existing systems and workflows, and what mechanisms protect customer-specific IP and business rules?
- ▶ **Governance and auditability:** How does the system manage user profiles and authentication, and what audit capabilities exist for tracking usage and decisions?
- ▶ **Adoption and continuous improvement:** What training and support resources are provided to ensure effective utilization? How are user feedback and performance issues addressed?



## Evaluation Methods

The most powerful AI solutions balance sophisticated technical capabilities with intuitive user experience by providing:

- ▶ **Explainable insights:** Run test cases to evaluate explanation quality, and ensure that technical sophistication translates into insights that business users can understand and trust.

- ▶ **Appropriate confidence communication:** Users need to understand both what the AI knows and what it doesn't know. Assess visualization of confidence metrics and uncertainty.
- ▶ **Seamless integration:** Conduct workflow integration assessments to ensure that the AI fits existing systems and delivers real-world value.
- ▶ **Scalability:** The solution must work effectively across different user groups and organizational contexts. Test edge cases to evaluate transparency about limitations.
- ▶ **Effective knowledge transfer:** Review training materials and support resources to determine whether technical capabilities translate to business impact.
- ▶ **Continuous improvement:** Evaluate feedback mechanisms and issue resolution processes, and review audit trail functionality and reporting to ensure that the solution evolves with organizational needs.
- ▶ **Security and compliance:** Evaluate security measures (including SSO integration) and compliance features for protecting proprietary information; test output validation and quality assurance processes.



## Use Case

A Medical Affairs team implementing an AI solution for literature monitoring conducted a workflow integration assessment that mapped each step of the current process against the AI-enhanced workflow. The team identified critical handoff points between the AI system and human reviewers that required careful design to maintain efficiency. By creating role-specific training modules and conducting simulation exercises with actual team members, several workflow friction points were uncovered — and were resolved before full implementation. The team now maintains a “workflow impact assessment” template for all new AI platforms under consideration.

## STEP 3

# Verify Healthcare Domain Understanding

Ensure that the AI solution demonstrates deep healthcare domain expertise across scientific, regulatory, clinical, and ethical dimensions.



## Key Considerations

- ▶ **Scientific and regulatory alignment:** Does the solution align with scientific standards and regulatory requirements (e.g., evidence standards), and what ethical frameworks govern its approach to healthcare data?
- ▶ **Clinical and workflow competence:** How well does the system incorporate healthcare-specific context and demonstrate understanding of healthcare workflows and decision-making processes?
- ▶ **Robustness and equity:** How does the system handle healthcare-specific use cases and anomalies, and what measures address healthcare disparities and potential biases?
- ▶ **Organizational adaptability:** How does the solution accommodate and adapt to customer-specific business rules and definitions and unique organizational contexts?



## Evaluation Methods

Healthcare requires specialized knowledge that goes beyond general-purpose AI capabilities, which makes these evaluation criteria imperative to consider and validate.

- ▶ **Regulatory alignment:** Awareness of healthcare-specific regulations, compliance requirements, and evidence standards. Assess alignment with healthcare regulatory frameworks (HIPAA, FDA guidance on real-world data/evidence).

- ▶ **Clinical relevance:** Understand disease pathophysiology, treatment pathways, and established clinical knowledge and guidelines.
- ▶ **Healthcare disparities:** Evaluate fairness across patient populations and demographic groups to understand how AI can potentially exacerbate or help address existing inequities in healthcare.
- ▶ **Scientific validity:** Ensure alignment with medical research methodologies and statistical approaches appropriate for healthcare data. Test performance with healthcare-specific edge cases and complex scenarios.
- ▶ **Ethical considerations:** Determine the recognition of the unique ethical implications of healthcare decision support and data analysis. Review ethics frameworks governing healthcare data utilization.
- ▶ **Technical robustness:** Evaluate the ability to handle the unique challenges of healthcare data (sparsity, heterogeneity, temporal dependencies).
- ▶ **Organizational adaptability:** Test the platform's flexibility against different organizational business rules, definitions, contexts, and use cases while maintaining analytical rigor.



## Use Cases

**Clinical understanding example:** A pharmaceutical company evaluating an AI system for identifying potential biomarkers discovered that the system failed to account for standard-of-care treatments that could confound biomarker interpretation. While technically sophisticated, the AI lacked critical domain knowledge about treatment protocols. After collaborating with clinical experts to incorporate treatment context, the system successfully identified clinically meaningful biomarkers that it had previously overlooked.

**Regulatory alignment example:** A healthcare analytics company implemented a validation protocol for its AI-powered patient-risk stratification tool that included both retrospective testing against historical outcomes and prospective testing in three different healthcare systems. The initial validation showed strong performance in academic medical centers but significantly lower accuracy in community hospitals that had different patient demographics. By identifying this performance gap, the team was able to retrain the model with a more diverse dataset, ultimately achieving consistent performance across all settings.

## STEP 4

# Validate Implementation and Value Realization

Confirm that the AI solution can deliver measurable ROI and sustainable impact in real-world life sciences contexts.



## Key Considerations

- ▶ **Business value and ROI:** How does the solution translate technical capabilities into measurable business outcomes, and what is the expected ROI and timeline for value realization?
- ▶ **Scalability and future-proofing:** How does the solution scale across different business units and use cases? Can it accommodate evolving business needs?
- ▶ **Adoption and ecosystem integration:** What change management support is provided to ensure successful adoption? How effectively does the solution integrate with existing third-party data and insight investments?
- ▶ **Measurement and support:** How is performance measured and monitored over time, and what ongoing support and enhancement processes are in place to sustain long-term value?



## Evaluation Methods

Even the most advanced AI must deliver tangible business impact and scalability. The following criteria should be considered and validated carefully:

- ▶ **Measurable outcomes:** Develop specific business value metrics aligned with organizational objectives to ensure that success is defined by concrete metrics and not technical performance alone.

- ▶ **Business alignment:** Conduct pilot implementations with defined success criteria to verify that technical capabilities address specific business challenges and opportunities.
- ▶ **Scaling strategy:** Assess scalability across departments and use cases, and ensure initial success is repeatable across the organization.
- ▶ **Adoption-planning:** Value realization depends on successful user adoption and workflow integration. Review change-management and training approaches carefully.
- ▶ **Continuous value:** Evaluate performance-monitoring and continuous improvement processes. Systems should improve over time with clear enhancement pathways.
- ▶ **ROI justification:** Calculate expected ROI based on efficiency gains and new capabilities so that your investment can be justified through quantifiable business returns.
- ▶ **Ecosystem integration:** Determine maximum value by ensuring that the solution complements and enhances existing analytics investments.
- ▶ **Future-proofing:** Assess flexibility to adapt to evolving business needs and use cases.



## Use Case

A pharmaceutical company implemented a pilot program with an AI-powered market access analytics solution across three therapeutic areas. The company established specific KPIs, including time to insight (reduced from weeks to days), analyst productivity (increased by 40%), and novel insight generation (identified previously unknown provider networks influencing prescribing patterns). Based on the pilot results, the company developed a phased rollout plan with customized training for different user groups and established a quarterly value-assessment process to track ongoing ROI. The implementation team created a “value realization dashboard” that tracked both efficiency metrics and business impact indicators. This helped secure additional funding to expand the solution to all therapeutic areas after demonstrating 3.5x ROI in the first year.

# Conclusion

Successful AI implementation in Life Sciences demands a multidisciplinary approach that balances technical rigor with scientific, regulatory, and ethical considerations. By applying this streamlined framework, your organization can make informed decisions, mitigate risks, and maximize the value of your AI investments as technology continues to evolve.

Learn more about how **Komodo's AI approach** can help transform your workflows.