

Part 4: Reflection & Workflow Diagram (10 points)

1. Reflection (5 points)

What was the most challenging part of the workflow? Why?

The most challenging part was **balancing ethical considerations with practical implementation**, especially in the data strategy and deployment phases.

Multiple Competing Priorities:

- We needed accurate predictions to help patients, but also had to protect their privacy
- The hospital wants cost-effective solutions, but bias mitigation requires expensive diverse data collection
- Doctors want explainable models they could trust, but simpler models are less accurate
- HIPAA compliance added layers of complexity that made everything slower and more expensive

Real-World Constraints: Unlike a perfect textbook scenario, real hospitals have limited budgets, old computer systems, and staff who resist change. For example, we chose logistic regression partly because the IT department could actually maintain it, not because it was the most accurate option available. This kind of compromise between "ideal" and "possible" was constantly challenging.

Ethical Complexity: The bias mitigation strategy sounds good on paper, but implementing it is incredibly complex. How do you collect diverse data without violating patient privacy? How do you test for bias without creating new forms of discrimination? These questions don't have easy answers, and getting them wrong could seriously harm patients.

How would you improve your approach with more time/resources?

1. More Comprehensive Data Collection:

- Partner with more hospitals across different regions, urban/rural, and serving diverse populations
- Include patient-reported outcomes and social determinants data
- Collect data over 3-5 years to understand long-term patterns

2. Advanced Bias Detection and Mitigation (3 months, dedicated ethics team):

- Hire a diverse team of ethicists, community representatives, and bias experts
- Create continuous monitoring systems that track bias in real-time
- Use external experts regularly review the system

3. Pilot Testing and Iterative Improvement (1 year implementation):

- Start with a small pilot in one hospital unit (like cardiology) before full deployment
- Conduct A/B testing where some patients get AI predictions and others get standard care
- Gather feedback from doctors, nurses, and patients about usability and trust
- Use this feedback to refine the system before hospital-wide rollout

4. Enhanced Model Development (4 months, machine learning team):

- Develop ensemble methods that combine multiple models for better accuracy

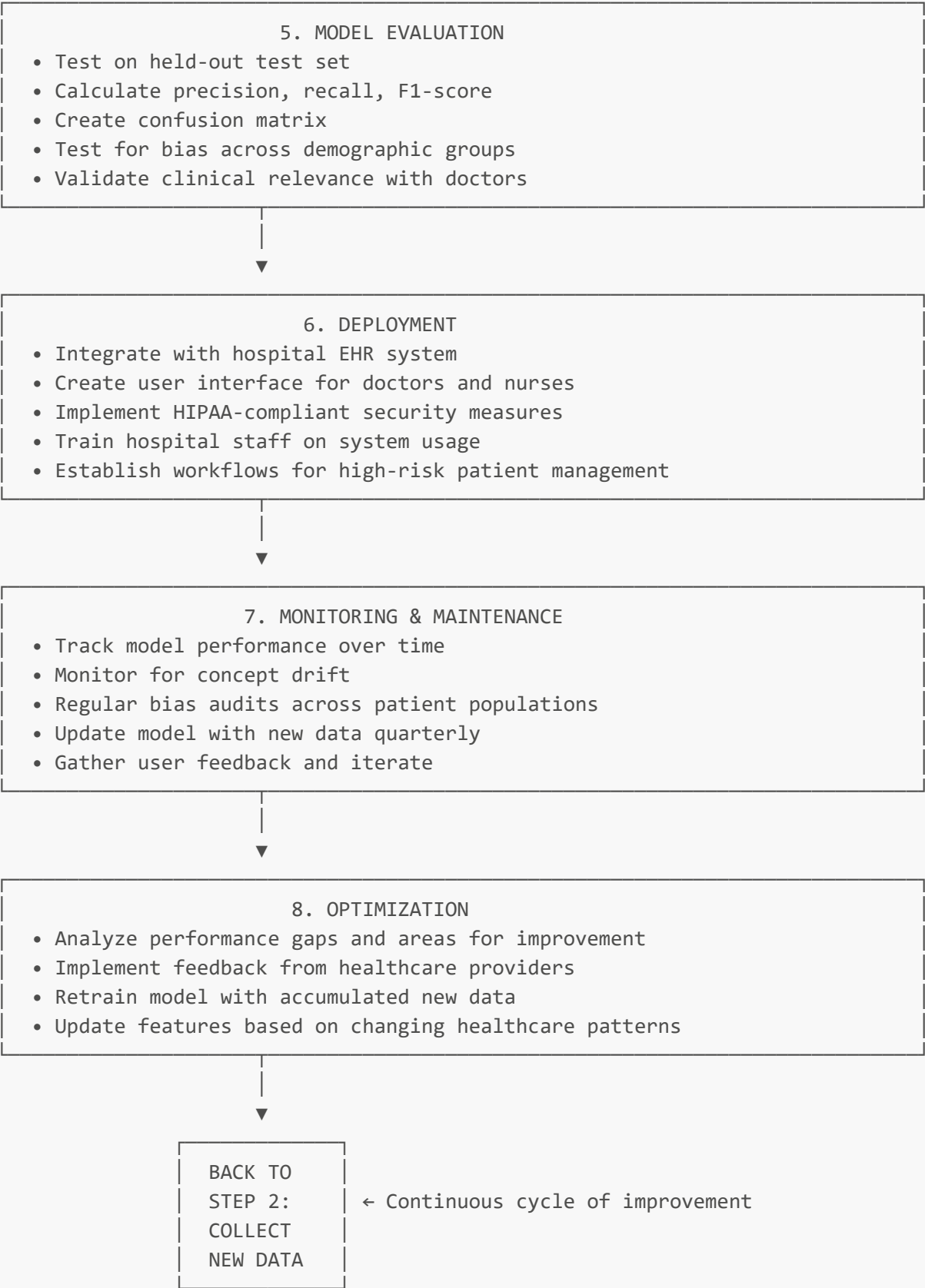
- Create "hybrid" models that are both accurate and interpretable
- Build in uncertainty quantification so doctors know when the AI is less confident
- Develop model updating procedures so the system learns from new data automatically

5. Comprehensive Training and Support (6 months, education team):

- Create detailed training programs for all hospital staff who will use the system
- Develop patient education materials explaining how AI predictions work
- Establish ongoing support systems and regular refresher training
- Create feedback loops so users can report problems and suggest improvements

2. Workflow Diagram (5 points)





Key Decision Points:

- After Step 5: If accuracy < 80%, return to Step 4 for model refinement
- After Step 7: If concept drift detected, return to Step 2 for data updates
- After Step 8: If major performance issues, return to Step 1 for problem redefinition

Ethical Checkpoints:

- ✓ Patient privacy protection (Steps 2, 6, 7)
- ✓ Bias testing and mitigation (Steps 3, 5, 7)
- ✓ Regulatory compliance (Steps 6, 7)
- ✓ Stakeholder feedback integration (Steps 8, 1)

This workflow shows how AI development is not a linear process but a continuous cycle of improvement, with ethical considerations and stakeholder feedback integrated throughout every stage.