**Recommendation System Framework**

*Source: Case Study Framework*

Recommendation System Framework:  
   
 1. PROBLEM UNDERSTANDING  
 - Define recommendation type (collaborative, content-based, hybrid)  
 - Identify user and item representations  
 - Determine evaluation metrics  
 - Understand business constraints  
   
 2. DATA PREPARATION  
 - User-item interaction matrix  
 - User and item features  
 - Handle cold start problems  
 - Data preprocessing and cleaning  
   
 3. MODEL SELECTION  
 - Matrix factorization (SVD, NMF)  
 - Neighborhood methods (user-based, item-based)  
 - Deep learning approaches  
 - Content-based filtering  
   
 4. EVALUATION METRICS  
 - Precision and recall  
 - Mean Average Precision (MAP)  
 - Normalized Discounted Cumulative Gain (NDCG)  
 - Diversity and novelty  
 - Coverage and serendipity  
   
 5. DEPLOYMENT CONSIDERATIONS  
 - Real-time vs batch recommendations  
 - Scalability and performance  
 - A/B testing framework  
 - Monitoring and feedback loops  
   
 6. CHALLENGES  
 - Cold start problem  
 - Data sparsity  
 - Scalability  
 - Diversity vs accuracy trade-off  
 - Privacy concerns