**Business Prioritization Tracking System**

**Technical Design**

**System Overview**

A comprehensive enterprise web application designed to manage work intake, prioritization, and tracking across multiple healthcare business verticals with integrated Microsoft 365 authentication and role-based access control.

**Architecture Components**

**1. Technology Stack**

* **Frontend**: React.js with TypeScript, Material-UI/Ant Design
* **Backend**: .NET Core Web API (recommended for IIS compatibility)
* **Database**: SQL Server 2019/2022 with Entity Framework Core
* **Authentication**: Windows Authentication + LDAP integration (or ADFS for hybrid)
* **Hosting**: IIS 10+ on Windows Server 2019/2022
* **Web Server**: IIS with ARR (Application Request Routing) for load balancing
* **API Gateway**: On-premises API Management solution (IIS ARR with custom modules or third-party solution)
* **Monitoring**: Custom logging + ELK Stack (Elasticsearch, Logstash, Kibana) or Seq + Application Performance Monitoring (APM)
* **CI/CD**: Jenkins with GitLab for source control and CI/CD pipelines
* **Caching**: Multi-tier caching strategy:
  + IIS Output Caching with custom cache policies
  + Redis for distributed caching across web farm
  + Database query result caching
  + Configuration data caching with invalidation
* **Message Queue**: SQL Server Service Broker for reliable messaging
* **Event Store**: Event sourcing implementation for audit and workflow state management

**2. Enhanced Architecture Components**

**API Gateway Layer**

* **Centralized Authentication/Authorization**: Single point for security policy enforcement
* **Rate Limiting and Throttling**: Protect backend services from overload
* **API Versioning**: Support multiple API versions for backward compatibility
* **External System Integration Management**: Standardized integration patterns
* **API Documentation**: Auto-generated API documentation and testing interfaces
* **Request/Response Transformation**: Data format adaptation for external systems

**Event Sourcing Architecture**

* **Event Store**: Immutable log of all system events
* **Event Projections**: Read models for current state reconstruction
* **Workflow State Management**: Complete audit trail of workflow transitions
* **Replay Capabilities**: Ability to replay events for debugging and state reconstruction
* **Snapshot Management**: Periodic snapshots for performance optimization

**Enterprise Service Bus Pattern**

* **Message Routing**: Intelligent message routing to appropriate services
* **Protocol Translation**: Support for different communication protocols
* **Service Registry**: Dynamic service discovery and registration
* **Circuit Breaker**: Fault tolerance for external service calls
* **Message Transformation**: Data format conversion between systems

**3. Core Domain Models**

**Business Verticals (Configurable)**

* Medicaid (Default)
* Medicare
* Exchange
* Pharmacy
* Additional verticals can be added through configuration

**Departments (Configurable by Business Vertical)**

Default Medicaid Departments:

* Regulatory
* Compliance
* Communication
* Community Outreach
* Clinical Services
* Contract Performance
* Operations
* Provider Network Operations
* Provider Network Management
* Service Coordination
* Data and Technical Services
* Associate Relations
* Finance and Actuarial
* Human Resources
* Program Management and Quality
* Quality
* Population Health Medical Services

Note: Department structure is configurable per business vertical through administrative interface

**Work Categories**

* Work Request: Smaller enhancements/changes
* Project: Large-scale initiatives
* Break Fix: Critical issues requiring immediate attention

**4. User Roles & Permissions**

**Role Hierarchy**

1. **System Administrator**
   * Full system access
   * User management
   * Configuration management
2. **Business Executive**
   * Dashboard access
   * Cross-department visibility
   * Strategic reporting
3. **Department Head**
   * Department-specific dashboard
   * Approval authority
   * Resource allocation oversight
4. **Department Manager**
   * Team work management
   * Priority voting
   * Progress tracking
   * Work request creation
   * Requirement documentation
   * Status updates
5. **Lead**
   * Implementation planning
   * Technical assessment
   * Development oversight
6. **End User**
   * Work request submission
   * Status viewing

**5. Work Request Lifecycle & Workflow**

**Workflow Stages**

1. Intake - Initial submission
2. Business Review - Department evaluation
3. Priority Assessment - Cross-department voting
4. Work Request creation – Create and assign the work to IS Organization
5. Architecture Assessment - Feasibility and back envelope estimation
6. Estimation – IS Department work estimation
7. Approval - Leadership and SLT sign-off
8. Budget Approval – Evaluate budget and approval process
9. Planning - Resource allocation and scheduling
10. Requirements – Requirement analysis & documentation
11. Development - Implementation phase
12. Testing - Quality assurance
13. UAT – Business review and sign off
14. Deployment - Production release
15. Closure - Final review and documentation

**State Transitions**

* Draft → Prioritized → Submitted → Under Review → Approved → In Progress → Testing → Deployed → Closed
* Rejected (can occur at multiple stages)
* On Hold (temporary suspension)

**6. Enhanced Prioritization System**

**Priority Scoring Algorithm**

Base Priority Score = Σ(Department\_Weight × Department\_Vote) / Total\_Departments

Enhanced Priority Score = Base\_Score × Time\_Decay\_Factor × Business\_Value\_Weight × Capacity\_Adjustment

Where:

- Department\_Vote: High(1.0), Medium(0.5), Low(0.1)

- Department\_Weight: Based on business impact (configurable)

- Time\_Decay\_Factor: Increases priority for older requests (configurable curve)

- Business\_Value\_Weight: Strategic business value multiplier (1.0-2.0)

- Capacity\_Adjustment: Resource availability factor (0.5-1.5)

- Final Score: Normalized to 0-1 scale

**Priority Categories**

* **Critical (0.8-1.0)**: Regulatory, compliance, or operational emergencies
* **High (0.6-0.79)**: Strategic initiatives with high business value
* **Medium (0.4-0.59)**: Important enhancements with moderate impact
* **Low (0.0-0.39)**: Nice-to-have improvements

**7. Enhanced Data Model Design**

**Core Entities**

**WorkRequest**

* ID, Title, Description, Category
* BusinessVertical, Department, Submitter
* CreatedDate, TargetDate, ActualDate
* CurrentStage, Status, Priority
* CapabilityID, EstimatedEffort, ActualEffort
* BusinessValue, TimeDecayFactor, CapacityAdjustment

**Priority (Enhanced)**

* WorkRequestID, DepartmentID, Vote, Weight
* VotedBy, VotedDate, Comments
* BusinessValueScore, StrategicAlignment
* ResourceImpactAssessment

**SystemConfiguration (Enhanced with Versioning)**

* ID, ConfigurationKey, ConfigurationValue, DataType
* BusinessVerticalID (nullable for global settings)
* Description, IsEditable, CreatedDate, ModifiedDate
* CreatedBy, ModifiedBy
* **Version, EffectiveDate, ExpirationDate, ChangeReason**
* **PreviousVersionID, ApprovedBy, ApprovalDate**

**ConfigurationChangeRequest (New Entity)**

* ID, ConfigurationID, RequestedValue, ChangeReason
* RequestedBy, RequestedDate, Status
* ApprovedBy, ApprovedDate, RejectedReason
* ImplementedDate, RollbackDate

**WorkflowStageConfiguration (Enhanced)**

* ID, Name, Order, Description, BusinessVerticalID
* RequiredRoles, ApprovalRequired, IsActive, StageType
* SLAHours, NotificationTemplate, AutoTransition
* AllowedTransitions (JSON), ValidationRules (JSON)
* CreatedDate, ModifiedDate, CreatedBy, ModifiedBy
* **Version, EffectiveDate, ChangeHistory (JSON)**

**WorkflowTransition (Enhanced)**

* ID, FromStageID, ToStageID, BusinessVerticalID
* TransitionName, RequiredRole, IsActive
* ConditionScript (JSON), NotificationRequired
* CreatedDate, ModifiedDate
* **EventSourceID, CorrelationID**

**PriorityConfiguration (Enhanced)**

* ID, BusinessVerticalID, PriorityName, MinScore, MaxScore
* ColorCode, IconClass, Description, IsActive
* EscalationRules (JSON), CreatedDate, ModifiedDate
* **TimeDecayConfiguration (JSON), BusinessValueWeights (JSON)**
* **CapacityFactors (JSON), AutoAdjustmentRules (JSON)**

**WorkCategoryConfiguration (New Entity)**

* ID, CategoryName, Description, BusinessVerticalID
* WorkflowTemplateID, IsActive, RequiredFields (JSON)
* ApprovalMatrix (JSON), SLAHours, CreatedDate

**BusinessVertical (Enhanced)**

* ID, Name, Description, IsActive
* CreatedDate, CreatedBy, ModifiedDate, ModifiedBy
* Configuration (JSON field for vertical-specific settings)
* **Version, ConfigurationHistory (JSON)**

**Department (Enhanced)**

* ID, Name, Description, BusinessVerticalID
* IsActive, DisplayOrder, DepartmentCode
* CreatedDate, CreatedBy, ModifiedDate, ModifiedBy
* VotingWeight (for priority calculations)
* **ResourceCapacity, CurrentUtilization, SkillMatrix (JSON)**

**BusinessCapability (Enhanced)**

* ID, Name, Description, Owner
* BusinessVerticalID, TechnicalOwner, IsActive
* Category, SubCategory, DisplayOrder
* CreatedDate, CreatedBy, ModifiedDate, ModifiedBy
* Configuration (JSON field for capability-specific settings)
* **Version, DependencyMap (JSON), ResourceRequirements (JSON)**

**CapabilityDepartmentMapping (Enhanced)**

* CapabilityID, DepartmentID, AccessLevel
* CanCreate, CanModify, CanView, CanApprove
* **EffectiveDate, ExpirationDate, Version**

**User (Enhanced)**

* ID, Email, Name, Department
* Roles, BusinessVertical, IsActive
* **SkillSet (JSON), Capacity, CurrentWorkload**

**EventStore (New Entity)**

* ID, AggregateID, EventType, EventData (JSON)
* EventVersion, Timestamp, CorrelationID
* CausationID, CreatedBy, Metadata (JSON)

**EventSnapshot (New Entity)**

* ID, AggregateID, SnapshotData (JSON)
* Version, Timestamp, CreatedBy

**AuditTrail (Enhanced)**

* WorkRequestID, Action, OldValue, NewValue
* ChangedBy, ChangedDate, Comments
* **EventID, CorrelationID, SessionID**
* **IPAddress, UserAgent, SecurityContext (JSON)**

**8. Key Features Implementation**

**User Management & Authentication**

* Windows Authentication integration with Active Directory
* LDAP integration for user directory services
* Custom RBAC implementation with database-stored permissions
* ADFS integration for federated authentication (optional)
* JWT tokens for API authentication with custom token service

**Work Intake Process**

* Dynamic forms based on work category
* File attachment support
* Automated notifications
* Integration with email systems
* **Basic reporting capabilities for immediate executive visibility**

**Priority Voting System**

* Weighted voting by department
* Real-time priority calculation with enhanced algorithm
* Voting deadlines and reminders
* Historical voting analytics
* **Time-based priority adjustments**
* **Business value assessment integration**
* **Resource capacity consideration**

**Enhanced Configuration Management**

* **Business Vertical Management**
  + Add/edit business verticals through admin interface
  + Configure vertical-specific workflows and settings
  + Department structure management per vertical
  + Custom priority weights by vertical
  + **Version control for all configuration changes**
  + **Change approval workflow for critical configurations**
* **Business Capability Management**
  + CRUD operations for capabilities through UI
  + Hierarchical capability structure (Category/SubCategory)
  + Department access level configuration
  + Capability ownership assignment
  + Bulk import/export capabilities
  + **Dependency mapping and impact analysis**
  + **Resource requirement planning**
* **Department Configuration**
  + Dynamic department creation per business vertical
  + Department-specific voting weights
  + Role-based department access controls
  + Department hierarchy and reporting structure
  + **Resource capacity management**
  + **Skill matrix tracking**

**Enhanced Workflow Engine**

* Configurable workflow stages per business vertical
* SQL Server Service Broker for reliable message processing
* Multi-tier caching for workflow state optimization
* Automated stage transitions with business rules
* SLA tracking and notifications via Service Broker
* Custom approval routing based on configuration
* **Event sourcing for complete audit trail**
* **Workflow state replay capabilities**
* **Advanced error handling and recovery**

**Enhanced Dashboard & Reporting**

* Executive dashboard with KPIs
* Department-specific views
* Work aging reports
* Priority distribution analytics
* Resource utilization metrics
* Custom report builder
* Export capabilities: CSV, Excel (XLS/XLSX), PDF formats
* Scheduled report delivery via email with attachments
* Bulk data export with filtering and column selection
* Report templates with pre-configured export settings
* **Real-time performance metrics**
* **Predictive analytics for resource planning**
* **Business value tracking and ROI analysis**

**9. Dashboard Components**

**Executive Dashboard**

* **Work Volume Metrics**
  + Total active requests by category
  + New submissions trend
  + Completion rate
* **Priority Distribution**
  + Pie chart of priority levels
  + Department priority comparison
  + Aging analysis
* **Performance Indicators**
  + Average completion time
  + SLA compliance
  + Resource utilization
* **Strategic View**
  + Capability investment analysis
  + Business value delivered
  + Risk indicators

**Department Dashboard**

* Department-specific work queue
* Voting status and deadlines
* Resource allocation view
* Team performance metrics

**10. Integration Points**

**Microsoft 365 Integration (Optional/Hybrid)**

* SMTP for email notifications (Exchange Server or external SMTP)
* File System + Network Shares for document management
* Custom collaboration features within the application
* SSRS/Crystal Reports for advanced reporting
* Export capabilities to Excel/PDF for offline analysis

**External Systems (Enhanced with ESB Pattern)**

* PA DHS systems integration via REST APIs or file-based integration
* On-premises project management Planview tools
* Financial systems integration via ODBC/APIs
* HR systems integration for resource management
* Legacy system integration via ETL processes
* **Standardized integration patterns through Enterprise Service Bus**
* **Circuit breaker patterns for fault tolerance**
* **Message transformation and protocol adaptation**

**11. Enhanced Non-Functional Requirements**

**Performance**

* Sub-2 second page load times
* Support for 1000+ concurrent users
* 99.9% uptime availability
* IIS Application Pool optimization
* SQL Server connection pooling
* **Multi-tier caching strategy:**
  + IIS Output Caching with configurable cache policies
  + Redis distributed caching for web farm scenarios
  + Database query result caching with intelligent invalidation
  + Configuration data caching with real-time updates
* SQL Server Service Broker for reliable async processing
* **Database indexing strategy for optimal query performance**
* **Query optimization and execution plan monitoring**

**Security**

* Windows Authentication + custom authorization
* SSL/TLS encryption for data in transit
* SQL Server encryption for data at rest
* HIPAA compliance considerations with on-premises control
* Network security with firewalls and VPN access
* Audit trail for all changes stored in SQL Server
* Configuration change tracking for compliance
* **Enhanced logging with correlation IDs**
* **Security event monitoring and alerting**

**Scalability**

* IIS Web Farm with multiple servers
* SQL Server Always On Availability Groups for high availability
* Application-level caching with Redis cluster
* Load balancing with IIS ARR or hardware load balancers
* Horizontal scaling through additional IIS nodes
* **Database partitioning strategy for large tables**
* **Read replicas for reporting workloads**
* **Auto-scaling policies based on performance metrics**

**Enhanced Monitoring & Operations**

* **Application Performance Monitoring (APM) integration**
* **Business metrics dashboards with real-time KPIs**
* **Health check endpoints for all services**
* **Performance counters for IIS/.NET applications**
* **Automated alerting for system and business events**
* **Correlation ID tracking across all system components**
* **Centralized logging with structured data**

**Data Management**

* **Automated backup and recovery procedures**
* **Database migration strategy with version control**
* **Data retention policies with automated archiving**
* **Cross-site disaster recovery capabilities**
* **Point-in-time recovery capabilities**

**12. Enhanced Implementation Phases**

**Phase 1: Foundation (3 months)**

* User management and authentication
* Basic work request creation
* Simple workflow implementation
* **Basic dashboard with executive visibility**
* **Fundamental reporting capabilities**
* **Core caching implementation**
* **Event sourcing foundation**

**Phase 2: Core Features (3 months)**

* Enhanced priority voting system with time decay
* Advanced workflow engine with event sourcing
* Comprehensive dashboard with real-time metrics
* Advanced reporting capabilities
* **Configuration versioning system**
* **Multi-tier caching implementation**
* **API Gateway deployment**

**Phase 3: Advanced Features (2 months)**

* Microsoft 365 integration
* Advanced analytics with predictive capabilities
* Mobile responsiveness
* Performance optimization
* **Enterprise Service Bus implementation**
* **External system integration patterns**
* **Advanced monitoring and alerting**

**Phase 4: Enhancement (Ongoing)**

* Machine learning for priority prediction
* Advanced reporting with business intelligence
* Integration with external systems
* User experience improvements
* **Continuous performance optimization**
* **Advanced analytics and insights**

**13. Success Metrics**

**Process Efficiency**

* Reduction in work request processing time
* Improved priority accuracy
* Increased stakeholder satisfaction

**Business Value**

* Better resource utilization
* Improved compliance tracking
* Enhanced leadership visibility
* Reduced operational overhead

**Technical Metrics**

* System availability and performance
* Cache hit rates and response times
* Database performance and optimization
* Integration success rates

**14. Risk Considerations**

**Technical Risks**

* IIS/.NET Core compatibility and version management
* SQL Server performance optimization and maintenance
* Windows Authentication integration complexity
* On-premises infrastructure scalability limitations
* Network connectivity and VPN dependencies
* Caching strategy complexity and cache invalidation
* Event sourcing implementation complexity
* API Gateway performance and reliability

**Business Risks**

* User adoption challenges
* Change management requirements
* Process standardization needs
* Training requirements
* On-premises maintenance overhead
* Configuration change management complexity

**Mitigation Strategies**

* Comprehensive testing strategy for all components
* Gradual rollout with fallback procedures
* Extensive monitoring and alerting systems
* Documentation and training programs
* Regular performance reviews and optimization