

# Product Requirements Document (PRD)

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## Patent Analysis Web App

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### 1. Executive Summary

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#### Product Vision

A comprehensive patent analysis platform that leverages multi-agent AI systems to provide deep research insights for inventors, researchers, legal professionals, and business strategists.

#### Key Value Propositions

- Multi-agent research engine for comprehensive patent analysis
- Batch processing capabilities for large-scale analysis
- Persona-specific dashboards and workflows
- Real-time collaboration and sharing features
- Advanced visualization and reporting tools

### 2. User Personas

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#### Persona 1: Independent Inventor

**Profile:** Individual inventors working on new products/technologies

**Goals:**

- Validate invention novelty
- Identify potential patent conflicts
- Understand competitive landscape
- Estimate patentability

**Pain Points:**

- Limited budget for professional patent searches
- Lack of legal expertise
- Time-consuming manual research
- Difficulty interpreting complex patent documents

**Key Features Needed:**

- Simple, guided patent search interface
- Plain-language explanations
- Cost-effective analysis options
- Prior art identification
- Patentability assessment

#### Persona 2: Corporate R&D Team

**Profile:** Research teams in medium to large corporations

**Goals:**

- Monitor competitor patents

- Identify white space opportunities
- Support IP strategy decisions
- Conduct freedom-to-operate analysis

**Pain Points:**

- Need for comprehensive market intelligence
- Managing large volumes of patent data
- Coordinating team research efforts
- Integrating with existing workflows

**Key Features Needed:**

- Batch processing capabilities
- Team collaboration tools
- Advanced filtering and search
- Competitive intelligence dashboards
- Integration APIs

**Persona 3: Patent Attorney/Legal Professional**

**Profile:** Legal professionals specializing in intellectual property

**Goals:**

- Conduct thorough prior art searches
- Prepare patent applications
- Support litigation cases
- Provide client advisory services

**Pain Points:**

- Need for exhaustive, defensible searches
- Time pressure from clients
- Requirement for detailed documentation
- Managing multiple client cases

**Key Features Needed:**

- Professional-grade search tools
- Detailed citation tracking
- Export capabilities for legal documents
- Case management features
- Audit trails and documentation

**Persona 4: Business Strategist/IP Manager**

**Profile:** Strategic decision-makers focused on IP portfolio management

**Goals:**

- Assess IP portfolio value
- Identify licensing opportunities
- Support M&A due diligence
- Develop IP monetization strategies

**Pain Points:**

- Need for high-level strategic insights
- Portfolio-wide analysis requirements
- ROI measurement challenges
- Market trend identification

**Key Features Needed:**

- Portfolio analytics dashboards
- Market trend analysis
- Valuation tools
- Strategic reporting
- Executive summaries

## 3. Core Features & Requirements

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### 3.1 Multi-Agent Research Engine

**Description:** AI-powered system with specialized agents for different analysis tasks

**Functional Requirements:**

- FR-001: System shall deploy multiple specialized AI agents for patent analysis
- FR-002: Agents shall include: Prior Art Agent, Claims Analysis Agent, Market Intelligence Agent, Legal Assessment Agent
- FR-003: System shall coordinate agent workflows for comprehensive analysis
- FR-004: Each agent shall provide confidence scores and source citations
- FR-005: System shall allow manual agent selection and customization

**User Stories:**

- As an inventor, I want AI agents to automatically search for prior art so I can understand existing solutions
- As a patent attorney, I want specialized legal analysis agents so I can get defensible search results
- As an R&D manager, I want market intelligence agents so I can identify competitive threats

**Acceptance Criteria:**

- Multiple agents can run simultaneously on the same patent
- Agent results are clearly attributed and timestamped
- Users can view individual agent outputs and combined results
- System provides explanations for agent reasoning

### 3.2 Batch Processing System

**Description:** Capability to process multiple patents or large datasets simultaneously

**Functional Requirements:**

- FR-006: System shall accept batch uploads of patent numbers, files, or search queries
- FR-007: System shall process batches asynchronously with progress tracking
- FR-008: System shall provide batch result summaries and individual item details
- FR-009: System shall support batch sizes up to 1000 items
- FR-010: System shall allow batch job scheduling and prioritization

**User Stories:**

- As an R&D team, I want to analyze our entire patent portfolio so I can identify gaps and opportunities
- As a business strategist, I want to process competitor patent lists so I can assess market positioning
- As a patent attorney, I want to batch process prior art searches so I can efficiently serve multiple clients

**Acceptance Criteria:**

- Batch jobs can be submitted via UI upload or API
- Users receive real-time progress updates

- Failed items in batches are clearly identified with error reasons
- Batch results can be exported in multiple formats

### 3.3 Persona-Specific Dashboards

**Description:** Customized interfaces optimized for each user type

**Functional Requirements:**

- FR-011: System shall provide role-based dashboard configurations
- FR-012: Dashboards shall display relevant KPIs and metrics for each persona
- FR-013: Users shall be able to customize dashboard layouts and widgets
- FR-014: System shall provide persona-specific quick actions and workflows
- FR-015: Dashboards shall support real-time data updates

**User Stories:**

- As an independent inventor, I want a simple dashboard showing my patent searches and results
- As a corporate R&D manager, I want a dashboard showing team activity and competitive intelligence
- As a patent attorney, I want a case management dashboard with client work and deadlines
- As a business strategist, I want an executive dashboard with portfolio metrics and trends

**Acceptance Criteria:**

- Each persona has a default dashboard configuration
- Users can add, remove, and rearrange dashboard widgets
- Dashboards load within 3 seconds
- All data visualizations are interactive and exportable

### 3.4 Advanced Search & Analysis

**Description:** Sophisticated patent search and analysis capabilities

**Functional Requirements:**

- FR-016: System shall support natural language and structured patent searches
- FR-017: System shall provide semantic search capabilities beyond keyword matching
- FR-018: System shall offer advanced filtering by date, classification, assignee, etc.
- FR-019: System shall generate automated analysis reports
- FR-020: System shall provide citation network analysis and visualization

**User Stories:**

- As any user, I want to search patents using natural language so I don't need to learn complex syntax
- As a patent attorney, I want advanced Boolean search capabilities so I can conduct thorough prior art searches
- As an R&D manager, I want to visualize patent citation networks so I can understand technology evolution

**Acceptance Criteria:**

- Natural language queries return relevant results within 5 seconds
- Advanced search supports complex Boolean logic
- Search results include relevance scores and explanations
- Citation networks are interactive and explorable

### 3.5 Collaboration & Sharing

**Description:** Tools for team collaboration and result sharing

**Functional Requirements:**

- FR-021: System shall support team workspaces and shared projects
- FR-022: Users shall be able to share analysis results with customizable permissions
- FR-023: System shall provide commenting and annotation features
- FR-024: System shall maintain version history for shared analyses
- FR-025: System shall support external sharing via secure links

**User Stories:**

- As an R&D team member, I want to share my analysis with colleagues so we can collaborate on research
- As a patent attorney, I want to share search results with clients so they can review findings
- As a business strategist, I want to create executive reports that can be shared with leadership

**Acceptance Criteria:**

- Shared items have clear permission levels (view, comment, edit)
- Comments are threaded and timestamped
- Version history shows all changes with user attribution
- External links can be password-protected and time-limited

## 4. Technical Requirements

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### 4.1 Performance Requirements

- PR-001: System shall support 1000+ concurrent users
- PR-002: Search results shall return within 5 seconds for 95% of queries
- PR-003: Batch processing shall handle 1000 items within 30 minutes
- PR-004: System uptime shall be 99.9% excluding planned maintenance
- PR-005: Dashboard loading time shall not exceed 3 seconds

### 4.2 Security Requirements

- SR-001: System shall implement OAuth 2.0 authentication
- SR-002: All data transmission shall use HTTPS encryption
- SR-003: System shall provide role-based access control (RBAC)
- SR-004: User data shall be encrypted at rest
- SR-005: System shall maintain audit logs for all user actions

### 4.3 Integration Requirements

- IR-001: System shall provide RESTful APIs for third-party integration
- IR-002: System shall support webhook notifications for batch job completion
- IR-003: System shall integrate with major patent databases (USPTO, EPO, WIPO)
- IR-004: System shall support SAML SSO for enterprise customers
- IR-005: System shall provide data export in JSON, CSV, and PDF formats

### 4.4 Scalability Requirements

- SC-001: System architecture shall support horizontal scaling
- SC-002: Database shall support read replicas for improved performance
- SC-003: System shall implement caching for frequently accessed data
- SC-004: Background job processing shall be distributed across multiple workers
- SC-005: System shall support multi-region deployment

## 5. User Interface Requirements

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### 5.1 Design Principles

- Clean, professional interface suitable for business users
- Responsive design supporting desktop, tablet, and mobile
- Accessibility compliance (WCAG 2.1 AA)
- Consistent design system across all components
- Progressive disclosure of complex features

### 5.2 Key UI Components

- Global navigation with persona-specific menus
- Advanced search interface with query builder
- Results display with multiple view options (list, grid, network)
- Interactive data visualizations and charts
- Batch processing status and progress indicators
- Collaborative annotation and commenting system

## 6. Success Metrics

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### 6.1 User Engagement Metrics

- Monthly Active Users (MAU)
- Average session duration
- Feature adoption rates by persona
- User retention rates (30, 60, 90 days)
- Net Promoter Score (NPS)

### 6.2 Performance Metrics

- Search query response time
- Batch processing completion time
- System uptime and availability
- API response times
- Error rates and resolution times

### 6.3 Business Metrics

- User conversion from trial to paid
- Revenue per user by persona
- Customer acquisition cost
- Customer lifetime value
- Support ticket volume and resolution time

## 7. Implementation Phases

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### Phase 1: Core Platform (Months 1-3)

- Basic user authentication and management
- Simple patent search functionality
- Single-agent analysis capability

- Basic dashboard for each persona
- MVP batch processing

## **Phase 2: Multi-Agent System (Months 4-6)**

- Deploy multiple specialized AI agents
- Agent coordination and workflow management
- Enhanced analysis capabilities
- Improved batch processing with progress tracking
- Basic collaboration features

## **Phase 3: Advanced Features (Months 7-9)**

- Advanced search and filtering
- Citation network analysis
- Enhanced collaboration tools
- API development
- Mobile responsiveness

## **Phase 4: Enterprise Features (Months 10-12)**

- SSO integration
- Advanced security features
- White-label capabilities
- Advanced analytics and reporting
- Third-party integrations

# **8. Risk Assessment**

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## **Technical Risks**

- AI agent performance and accuracy
- Patent database integration complexity
- Scalability challenges with large datasets
- Real-time processing requirements

## **Business Risks**

- Competition from established patent search providers
- User adoption across different personas
- Pricing model validation
- Regulatory compliance requirements

## **Mitigation Strategies**

- Extensive testing and validation of AI agents
- Phased rollout with user feedback incorporation
- Performance monitoring and optimization
- Legal review of patent data usage rights