PRODUCT REQUIREMENTS DOCUMENT

Personalized Portfolio & Investment Research Platform

Version: 1.0

Date: November 14, 2025

Owner: Alex (Product & Engineering)

Status: ✅ APPROVED FOR DEVELOPMENT

"The intelligent copilot for value investors"

Table of Contents

1. Executive Summary

1.1 Product Vision

A personalized AI-powered investment research companion that transforms portfolio monitoring from reactive dashboards into proactive, principle-driven decision-making—accessible to thoughtful value investors who follow Buffett/Munger/Burry principles.

1.2 Problem Statement

Existing portfolio trackers (Bloomberg Terminal, Snowball Analytics, Kubera) either:
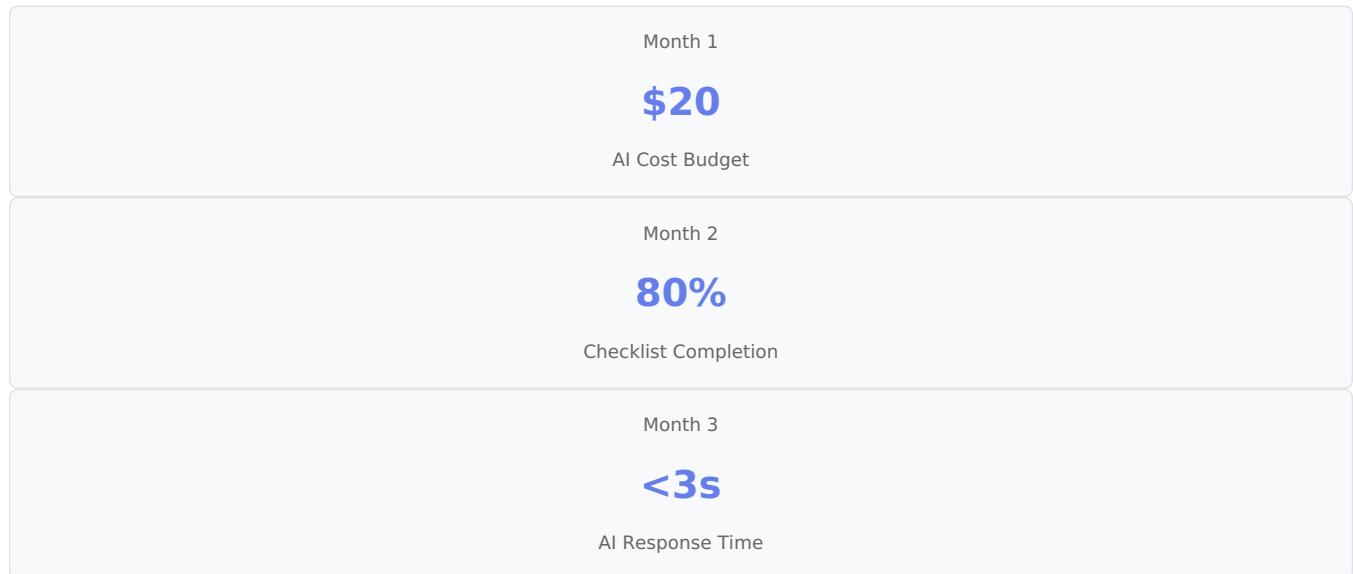
- Cost $300+/month (Bloomberg) - out of reach for individual investors
- Lack deep fundamental analysis (most trackers)
- Don't provide proactive, personalized guidance
- Fail to align with value investing principles
- Don't validate investment decisions against thesis

1.3 Solution

A Next.js-based platform that combines:

- Deep fundamental metrics (Michael Burry-style analysis)
- AI-powered intelligent decision support (multi-model routing)
- Proactive checklist system aligned with investment principles
- Beautiful, minimalist design (Vercel/Linear aesthetic)
- Budget-friendly ($0 for users, $20/month AI costs)

1.4 Success Metrics

Month 1

$20

AI Cost Budget

Month 2

80%

Checklist Completion

Month 3

<3s

AI Response Time

2. Target Users

2.1 Primary User (Phase 1)

Profile: Alex - Value-oriented retail investor

- Follows Munger/Buffett/Liu principles, open to Simons/Dalio/Soros strategies
- Uses 30-40% margin with strict stop-loss criteria
- Focuses on well-researched equity investments (stocks, ETFs)
- Tracks thematic portfolios (energy transition, copper demand)
- Needs daily/weekly/monthly monitoring discipline

Jobs to be Done:

1. Monitor portfolio health against investment thesis
2. Get proactive alerts when thesis invalidates
3. Conduct deep fundamental research (Burry-style)
4. Stay disciplined with checklists and risk management
5. Make informed decisions with AI copilot assistance

2.2 Secondary Users (Phase 2+)

- Small retail investors seeking personalized guidance
- Independent financial advisors managing <50 clients
- Value investing enthusiasts learning the discipline

3. Product Scope

3.1 In Scope (3-Month Roadmap)

Month 1: Foundation & Intelligence

- ✅ UX redesign (dark theme, Vercel/Linear aesthetic)
- ✅ Smart AI router (DeepSeek, Qwen, Mistral, Llama, Claude)
- ✅ Cost management (<$20/month)
- ✅ Smart caching (SEC filings 30-day, news 3x daily)
- ✅ 30+ fundamental metrics (Burry-style)
- ✅ Portfolio vs market timeseries charts
- ✅ Risk metrics (Sharpe, Sortino, Alpha, Beta, drawdown)

Month 2: Decision Support

- ✅ Intelligent proactive checklist system
- ✅ Investment thesis tracking & validation
- ✅ Automated monitoring & alerts
- ✅ Stop-loss trigger system
- ✅ Margin usage tracking

Month 3: Personalization & Polish

- ✅ Context-aware AI copilot 2.0
- ✅ Advanced stock screener (value-oriented filters)
- ✅ Watchlist intelligence
- ✅ Industry deep-dive dashboards
- ✅ Performance optimization

3.2 Out of Scope (Future Phases)

- ❌ Mobile app (Month 4+)
- ❌ Multi-user / team features
- ❌ Real-time market data (15-min delay acceptable)
- ❌ Automated trading / order execution
- ❌ Social features / community
- ❌ Backtesting engine (basic only)

4. Features & Requirements

4.1 Overview Dashboard P0 - Must Have

Timeline: Month 1, Week 1-2

User Story

As an investor, I want to see my portfolio's health at a glance so I can quickly assess performance and identify issues.
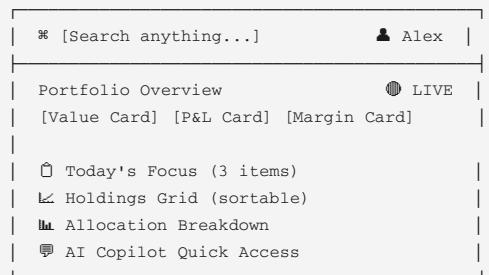
Functional Requirements

- Display total portfolio value, day P&L, total return
- Show margin usage with alert thresholds (>40% = warning)
- List all holdings with key metrics (weight, return, thesis health)
- Compare portfolio performance vs S&P 500 benchmark
- Show today's actionable focus items (proactive checklist)
- Visualize allocation by sector, industry, asset class

Non-Functional Requirements

- Page load time <1.5s
- Data refresh every 15 minutes during market hours
- Mobile-responsive (desktop-first design)

Design Specifications

```
Layout:

 ┌──────────────────────────────────────────┐
 |  ⌘ [Search anything...]          ▲ Alex  |
 ├──────────────────────────────────────────┤
 |  Portfolio Overview            ◍ LIVE    |
 |  [Value Card] [P&L Card] [Margin Card]   |
 |                                       |
 |  🗂 Today's Focus (3 items)            |
 |  ⬧ Holdings Grid (sortable)           |
 |  ⬧ Allocation Breakdown               |
 |  ⬧ AI Copilot Quick Access            |
 └──────────────────────────────────────────┘
```

Color System

- Background: #0A0A0A
- Cards: #111111 with subtle border (#1A1A1A)
- Gains: #10B981, Losses: #EF4444
- Accent: #3B82F6
- Fluorescent highlights: #00E5FF, #7C3AED

4.2 Fundamentals Tab `P0 - Must Have`

Timeline: Month 1, Week 3-4

User Story

As a value investor, I want to see comprehensive fundamental metrics so I can evaluate whether a stock is undervalued based on Buffett/Munger/Burry principles.

A. Valuation Metrics

- Display 9 core ratios: P/E, Forward P/E, PEG, P/B, P/S, P/FCF, EV/EBITDA, EV/Sales, CAPE
- Show 5-year average, sector average, S&P 500 comparison
- Calculate intrinsic value (Graham Number, DCF estimate)
- Display margin of safety percentage
- Visual indicators (✅ undervalued, ⚠ fair, 🔴 overvalued)

B. Quality Metrics

- ROE, ROIC, ROA with 5Y trends
- Gross/Operating/Net margins with sparkline charts
- Debt/Equity, Interest Coverage, Current Ratio, Quick Ratio
- FCF yield and growth rate
- Capital efficiency (CapEx/Sales, CapEx/Depreciation)

C. Michael Burry-Style Deep Dive

- 10-year historical financials (income statement, balance sheet, cash flow)
- Operating cash flow quality analysis
- Debt structure and maturity schedule
- Management efficiency metrics
- Off-balance-sheet risk indicators

Data Sources

Tier	Source	Limit
Primary	Financial Modeling Prep API	250 calls/day
Secondary	Alpha Vantage	25 calls/day
Fallback	Yahoo Finance (scraping)	Unlimited
SEC Data	Edgar API	Unlimited

4.3 Smart AI Router `P0 - Must Have`

Timeline: Month 1, Week 1-2

User Story

As the platform owner, I want an intelligent AI routing system so I can optimize for cost (<$20/month) while maintaining high-quality responses.

Multi-Model Integration

- **Tier 1 (Fast/Cheap):** DeepSeek, Qwen Plus, Llama 3.1-70B
- **Tier 2 (Quality):** Claude Sonnet 4, Qwen Max, Kimi K2
- **Tier 3 (Reasoning):** Claude Sonnet 4, DeepSeek Reasoner
- **Fallback chain:** Mistral Large, Llama 3.1-405B

Smart Caching Strategy

Content Type	TTL	Update Frequency
SEC Filings	30 days	On publish
News Digests	8 hours	3x daily (6AM, 12PM, 6PM)
Fundamental Metrics	24 hours	Daily after market close
AI Responses	24 hours	On identical query

Cost Management

- Track spend per model per day
- Alert when approaching 80% of $20 budget
- Auto-throttle to cheaper models when budget constrained
- Real-time cost dashboard

Rate Limit Handling

- Detect 429 errors from APIs
- Automatic failover to next model in chain
- Exponential backoff (1s, 2s, 4s, 8s)
- User notification when all fallbacks exhausted

Performance Targets

- Response time target: <3s for 90th percentile
- Uptime target: 99% (excluding upstream API issues)
- Cost target: <$20/month average
- Cache hit rate: >70% for repeated queries

4.4 Intelligent Checklist System **P0 - Must Have**

Timeline: Month 2, Week 5-6

User Story

As an investor, I want a dynamic checklist that tells me what to review each day/week/month so I stay disciplined and don't miss important portfolio events.

Dynamic Daily Checklist

- Generate daily tasks based on portfolio events
- **Morning routine (pre-market):** news review, earnings calendar, margin check
- **Market hours:** monitor alerts, sentiment shifts
- **Evening review:** P&L attribution, thesis updates, next-day alerts
- Show completion percentage and streaks

Event-Driven Tasks

- Auto-add: "Review [TICKER] - SEC 10-Q filed today"
- Auto-add: "Investigate [TICKER] - sentiment dropped 15%"
- Auto-add: "Check stop-loss - [TICKER] down 12% from entry"
- Auto-add: "Rebalance check - [TICKER] 8% above target weight"

Weekly Checklist

- AI suggests weakest thesis stock for deep dive
- Rebalance check (>5% deviation from targets)
- New SEC filings review (summarized by AI)
- Competitor analysis (AI-suggested)
- Correlation matrix update

Monthly Checklist

- Full portfolio review vs investment principles
- Thesis validation (Buffett/Munger criteria)
- Position sizing optimization
- Tax loss harvesting opportunities
- Performance attribution analysis

One-Click Actions

- "Investigate" button → Opens AI copilot with context
- "Mark complete" with optional notes
- "Snooze" to defer task
- "Recurring" to create template

4.5 Investment Thesis Tracker `P0 - Must Have`

Timeline: Month 2, Week 7-8

User Story

As a value investor, I want to document and track my investment thesis for each position so I can validate decisions over time and know when to exit.

Thesis Creation

- Template-based editor (Buffett/Munger framework)
- Core sections:
    - Bull case (3-5 key points with metrics)
    - Bear case (risks, invalidation triggers)
    - Key metrics to monitor (with target values)
    - Stop-loss rules (hard stop, thesis invalidation)
    - Exit criteria (target price, time horizon)
- Rich text editor with markdown support
- Attach files (SEC filings, research reports)

Progress Tracking

- Quarterly AI-generated progress reports
- Metric comparison: Entry vs Current
- Thesis health score (0-100, AI-calculated)
- Visual timeline of major events
- Alerts when metrics diverge from thesis

AI Integration

- "Validate thesis against latest 10-Q"
- "Has thesis been invalidated?" (yes/no + reasoning)
- "Compare current metrics vs entry thesis"
- "Generate bear case challenges"
- Auto-update progress log quarterly

Multi-Position View

- Dashboard showing all thesis health scores
- Filter: At risk, Healthy, Invalidated
- Sortable by conviction, time held, performance
- Export individual thesis to PDF

4.6 Risk Analytics Tab   P0 - Must Have

Timeline: Month 1, Week 3-4

User Story

As a risk-conscious investor, I want to see portfolio risk metrics so I can understand volatility, drawdown exposure, and risk-adjusted returns.

Portfolio Risk Metrics

Metric	Formula	Interpretation
Sharpe Ratio	(Return - Risk-Free) / StdDev	>1.0 = Good, >2.0 = Very Good
Sortino Ratio	(Return - Risk-Free) / Downside Dev	Focus on downside risk only
Calmar Ratio	Return / Max Drawdown	Risk-adjusted return vs worst loss
Alpha	Actual Return - Expected Return	Positive = Skill-based outperformance
Beta	Covariance / Market Variance	<1 = Defensive, >1 = Aggressive

Drawdown Analysis

- Current drawdown from peak
- Maximum drawdown (all-time, 1Y, 3Y)
- Comparison vs S&P 500 drawdown
- Recovery time analysis
- Underwater chart (visual)

Stress Testing

- Historical crisis scenarios:
    - 2008 Financial Crisis
    - 2020 COVID Crash
    - 2022 Bear Market
- Custom scenario builder
- Portfolio impact vs S&P 500

Margin Monitoring

- Current margin usage percentage
- Remaining capacity
- Alert thresholds (35%, 40%, 45%)
- Historical margin usage chart

4.7 AI Copilot 2.0 `P0 - Must Have`

Timeline: Month 3, Week 9-10

User Story

As an investor, I want an AI assistant that understands my portfolio context and investment principles so I can get personalized research and decision support.

Chat Modes

- **Quick Query (DeepSeek):** Fast Q&A, <2s response
- **Deep Research (Claude):** Multi-source analysis, citations
- **Thesis Builder (Qwen Max):** Structured investment case
- **Risk Analysis (Claude):** Stress testing, scenario analysis
- **Comparison Mode (Llama):** Stock A vs B side-by-side

Context Awareness

- Knows user's investment principles (Munger/Buffett/Burry)
- Remembers portfolio positions and weights
- Understands risk tolerance (30-40% margin limit)
- Recalls past thesis decisions and rationales
- Tracks user preferences over time

Actionable Outputs

- Generate investment thesis draft
- Create checklist items from conversation
- Set portfolio alerts
- Add stocks to watchlist
- Schedule follow-up reminders

Sample Interaction

> **You:** "Should I add to my copper position?"
>
> **Copilot:**
>
> 📊 Current Exposure Analysis
> - Copper direct: 18% (COPX)
> - Energy (copper-adjacent): 15% (XLE)
> - Total thematic: 33%
>
> 🎯 Your Thesis Status (COPX)
> - Entry: $38.50 (Jan 15, 2025)
> - Current: $48.25 (+25.3%)
> - Thesis health: 92% ✅
>
> 💡 Recommendation:
> Wait for China PMI data (Friday, Nov 16). If >50, consider adding 5% position. This keeps total thematic exposure at 38%, within your 40% limit.

5. Technical Architecture

5.1 Tech Stack

Layer	Technology	Purpose
Frontend	Next.js 14 (App Router)	React framework with SSR/SSG
Language	TypeScript	Type safety
Styling	TailwindCSS + shadcn/ui	Dark theme UI components
Charts	Recharts + TradingView	Data visualization
State	Tanstack Query	Server state management
Backend	Next.js Edge Functions	API routes
Cache	Upstash Redis	Smart caching layer
Database	Vercel Postgres (Neon)	User data, theses
AI Router	OpenRouter	Multi-model access
Deployment	Vercel	Hosting + CDN

5.2 AI Models & Costs

Model	Tier	Cost (per 1M tokens)	Use Case
DeepSeek v3	1 - Fast	$0.27 input / $1.10 output	Quick queries, summaries
Qwen Plus	1 - Fast	$0.35 input / $0.70 output	Fast analysis
Llama 3.1-70B	1 - Fast	$0.35 input / $0.40 output	Fallback tier 1
Claude Sonnet 4	2/3 - Quality	$3.00 input / $15.00 output	Deep research, critical decisions
Qwen Max	2 - Quality	$0.50 input / $1.50 output	Structured analysis
Mistral Large	Fallback	$2.00 input / $6.00 output	Emergency backup

Budget Allocation ($20/month):

- 70% Tier 1 (DeepSeek/Qwen/Llama): $14/month
- 25% Tier 2 (Claude/Qwen Max): $5/month
- 5% Emergency fallback: $1/month

5.3 Database Schema

```sql
-- Users (future multi-user)
CREATE TABLE users (
  id UUID PRIMARY KEY,
  email VARCHAR(255) UNIQUE,
  name VARCHAR(255),
  created_at TIMESTAMP DEFAULT NOW()
);

-- Portfolios
CREATE TABLE portfolios (
  id UUID PRIMARY KEY,
  user_id UUID REFERENCES users(id),
  name VARCHAR(255),
  description TEXT,
  created_at TIMESTAMP DEFAULT NOW()
);

-- Holdings
CREATE TABLE holdings (
  id UUID PRIMARY KEY,
  portfolio_id UUID REFERENCES portfolios(id),
  ticker VARCHAR(10),
  shares DECIMAL(18, 6),
  entry_price DECIMAL(18, 2),
  entry_date DATE,
  notes TEXT,
  created_at TIMESTAMP DEFAULT NOW()
);

-- Investment Theses
CREATE TABLE theses (
  id UUID PRIMARY KEY,
  holding_id UUID REFERENCES holdings(id),
  bull_case TEXT,
  bear_case TEXT,
  key_metrics JSONB,
  stop_loss_rules JSONB,
  thesis_health_score INTEGER,
  created_at TIMESTAMP DEFAULT NOW(),
  updated_at TIMESTAMP DEFAULT NOW()
);

-- Checklists
CREATE TABLE checklists (
  id UUID PRIMARY KEY,
  user_id UUID REFERENCES users(id),
  date DATE,
  frequency VARCHAR(20),
  tasks JSONB,
  completed_at TIMESTAMP,
  created_at TIMESTAMP DEFAULT NOW()
);

-- AI Conversations
CREATE TABLE conversations (
  id UUID PRIMARY KEY,
  user_id UUID REFERENCES users(id),
  messages JSONB,
  context JSONB,
  created_at TIMESTAMP DEFAULT NOW()
);
```

6. User Experience Requirements

6.1 Performance Targets

Metric	Target
Initial page load (cold)	<2.5s
Subsequent loads (cached)	<1.0s
Dashboard refresh	<0.5s
Chart rendering	<0.3s
AI copilot response (P90)	<3s
Lighthouse Score	>90

6.2 Dark Theme Color System

Category	Color	Hex Code
Background Primary	True black	#0A0A0A
Background Secondary	Elevated surfaces	#111111
Text Primary	High contrast	#FAFAFA
Success (Gains)	Green	#10B981
Error (Losses)	Red	#EF4444
Accent Blue	Primary actions	#3B82F6
Fluorescent Cyan	Highlights	#00E5FF
Accent Purple	Secondary	#7C3AED

6.3 Responsive Design

- **Mobile (320-640px):** Single column, collapsible sidebar, stacked cards
- **Tablet (641-1024px):** Two columns, side-by-side cards, expandable sidebar
- **Desktop (1025-1440px):** Multi-column dashboard, persistent sidebar, advanced charts
- **Large Desktop (1441px+):** Ultra-wide optimizations, multi-chart views

7. Development Workflow

7.1 Sprint Structure (2-Week Sprints)

Sprint	Dates	Focus
Sprint 1	Nov 15-28	Foundation: UX redesign, AI router, caching
Sprint 2	Nov 29 - Dec 12	Fundamentals: 30+ metrics, risk analytics, charts
Sprint 3	Dec 13-26	Intelligence: Checklist system, event-driven tasks
Sprint 4	Dec 27 - Jan 9	Thesis Tracking: Editor, AI validation, health scoring
Sprint 5	Jan 10-23	AI Copilot 2.0: Context-aware chat, actionable outputs
Sprint 6	Jan 24 - Feb 6	Polish & Launch: Optimization, bugs, testing

7.2 AI Development Tools

Claude (via Cursor)

- Architecture decisions
- Complex algorithm implementation
- Code reviews & debugging
- Documentation writing

GitHub Copilot

- Boilerplate code generation
- Test case writing
- Type definitions
- Repetitive patterns

Quality Control:

- Always review AI-generated code
- Write tests for critical paths
- Manual testing for UX flows
- Code review before merge

8. Success Criteria & Metrics

8.1 Month 1 Goals

Category	Target	Status
AI router operational	5+ models	⏳ Pending
Cache hit rate	>70%	⏳ Pending
Monthly AI spend	<$20	⏳ Pending
Fundamental metrics	30+	⏳ Pending
Page load time	<1.5s	⏳ Pending

8.2 Month 2 Goals

Category	Target	Status
Checklist completion rate	>80%	⏳ Pending
Thesis tracker	All positions	⏳ Pending
Critical alerts	Zero missed	⏳ Pending

8.3 Month 3 Goals

Category	Target	Status
AI response time (P90)	<3s	⏳ Pending
Query success rate	>90%	⏳ Pending
User satisfaction	9/10	⏳ Pending

9. Risks & Mitigations

9.1 Technical Risks

Risk	Likelihood	Impact	Mitigation
API rate limits hit frequently	Medium	High	Multi-tier fallback, aggressive caching, monitoring
AI costs exceed budget	Medium	High	Real-time tracking, auto-throttling, tier enforcement
Data source reliability	Medium	Medium	3-tier fallback system, health checks
Security breach	Low	Critical	Vercel security, env variables, no sensitive data

9.2 Product Risks

Risk	Likelihood	Impact	Mitigation
Feature complexity overwhelming	Medium	Medium	Iterative rollout, progressive disclosure, tooltips
AI hallucinations	Medium	High	Model selection, citation requirements, validation
Checklist fatigue	Medium	Medium	Smart prioritization, gamification, optional depth

10. Future Roadmap

Phase 2: Multi-User & Monetization (Month 4-6)

- User authentication & onboarding
- Freemium pricing: $0 (basic) / $10/month (pro)
- Shared portfolios (advisors + clients)
- White-label option for advisors
- Team collaboration features

Phase 3: Advanced Features (Month 7-9)

- Mobile app (React Native)
- Email/SMS alerts
- Automated weekly reports
- Backtesting engine
- Options/derivatives tracking
- International markets support

Phase 4: AI Evolution (Month 10-12)

- Fully autonomous portfolio monitoring
- Predictive alerts (before problems occur)
- Natural language portfolio queries
- Voice interface (Siri/Alexa)
- Custom AI models fine-tuned on user data

Phase 5: Platform Play (Year 2+)

- API for third-party integrations
- Marketplace for custom indicators/strategies
- Community features (value investing network)
- Educational content (courses, webinars)
- Acquisition target evaluation 👀

11. Appendix

11.1 Competitor Analysis

Feature	Our Platform	Bloomberg	Snowball	Kubera
Price	$0	$25K/year	$15/mo	$10/mo
Fundamental Metrics	30+ (Burry-style)	100+	15	10
AI Copilot	✅ Multi-model	✖	✖	✖
Thesis Tracking	✅ Deep	✖	✖	✖
Proactive Checklists	✅	✖	✖	✖
Value Investing Focus	✅	✖	✅ Dividend	✖

Key Differentiators:

1. AI-powered personalized guidance (nobody else has this)
2. Thesis validation & tracking (unique)
3. Proactive decision support (vs reactive dashboards)
4. Value investing principles embedded
5. Cost-effective for individuals ($0 vs $180+/year)

11.2 Key Terms Glossary

Term	Definition
Alpha	Excess return above market expectations, measuring skill vs luck
Beta	Correlation to market movements (1.0 = moves with market)
CAPE	Cyclically-adjusted P/E over 10 years (Shiller P/E)
DCF	Discounted Cash Flow - valuation based on future cash flows
Graham Number	Intrinsic value formula: $\sqrt{22.5 \times EPS \times Book\ Value\ per\ Share}$
Margin of Safety	Difference between intrinsic value and market price
ROIC	Return on Invested Capital - profitability metric
Sharpe Ratio	Risk-adjusted return metric (return / volatility)
Sortino Ratio	Sharpe ratio considering only downside volatility

11.3 Document Revision History

Version	Date	Author	Changes
0.1	Nov 14, 2025	Alex	Initial draft - roadmap structure
1.0	Nov 14, 2025	Alex	Complete PRD with all sections

Document Status: ✅ APPROVED FOR DEVELOPMENT

Next Steps:

1. ✅ Review and approve PRD
2. Begin Week 1 sprint planning
3. Set up development environment
4. Start UX redesign implementation

This is a living document. Updates will be made as requirements evolve.