HCP Portfolio Tracker Product Requirements Document

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Status: Production Ready - Clean Architecture

Version Compatibility Matrix

Component	Current Version	Compatibility
Tracker Release	6.5.x series	Production
Core Architecture	1.x series	Stable
Data Collector	3.8+	Independent
IPS Framework	v3.10	Current

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1. Executive Summary

1.1 Product Vision

The HCP Portfolio Tracker is a browser-based portfolio optimization tool that implements systematic, probability-weighted investment allocation based on macro regime analysis. It guides users through a structured 10-step workflow from investment philosophy acknowledgment through portfolio rebalancing.

1.2 Key Value Propositions

- **Systematic Decision Making**: Removes emotional bias through probability-based allocation
- **Macro Regime Analysis**: 16-scenario framework covering major economic themes
- **Transparent Methodology**: All calculations based on documented IPS v3.10 framework
- **Single-File Deployment**: No external dependencies or server requirements
- **Data Sovereignty**: All processing occurs locally in the user's browser

1.3 Success Criteria

- **Usability**: Non-technical users can complete full workflow in under 30 minutes
- **Accuracy**: Theme probabilities show meaningful differentiation across market scenarios

- **Reliability**: Consistent results across browser sessions and platforms
- **Maintainability**: Modular architecture supports independent component updates

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2. User Workflow Requirements

2.1 10-Step Process Overview

The tracker guides users through a sequential workflow with validation gates preventing forward progress until requirements are met.

2.2 Step Definitions

Step 1: Investment Philosophy

- **Purpose**: Acknowledge HCP investment framework and methodology
- **Requirements**: User must check acknowledgment box
- **Validation**: `state.philosophyAcknowledged = true`
- **Success Criteria**: User demonstrates understanding of probability-based approach

Step 2: Data Import & Edit

- **Purpose**: Import macro indicator data and allow manual overrides
- **Requirements**: Upload monthly data file OR generate sample data
- **Features**:
  - File upload for Data Collector output
  - Sample data generation (5+ market scenarios)
  - Manual override system with change tracking
  - Data quality indicators and validation
- **Success Criteria**: Valid indicator data available for 13+ indicators

Step 3: Theme Analysis

- **Purpose**: Calculate theme probabilities using IPS v3.10 methodology
- **Requirements**: Valid data from Step 2
- **Features**:
  - Real indicator-based calculations (not random)
  - 4 investment themes with probability scores
  - Momentum-aware calculations using 6-period baselines

    - Enhanced probability framework showing realistic differentiation
- **Success Criteria**: Theme probabilities show meaningful variation (not uniform)

Step 4: Scenario Analysis

- **Purpose**: Generate 16-scenario probability matrix
- **Requirements**: Theme probabilities from Step 3
- **Features**:
    - Binary scenario representation (0000-1111)
    - Probability ranking with color coding
    - Scenario descriptions and implications
- **Success Criteria**: All 16 scenarios generated with probabilities summing to 100%

Step 5: Portfolio Optimization

- **Purpose**: Mean-variance optimization across scenarios
- **Requirements**: Scenario probabilities from Step 4
- **Features**:
    - Probability-weighted optimization
    - Risk constraints and bounds
    - Asset allocation recommendations
- **Status**: Planned for future release

Step 6: Current Positions

- **Purpose**: Input current portfolio holdings
- **Requirements**: User manual input
- **Features**:
    - Portfolio position entry interface
    - Current allocation analysis
    - Drift calculation from optimal
- **Status**: Planned for future release

Step 7: Rebalancing Trades

- **Purpose**: Generate specific trades to reach optimal allocation
- **Requirements**: Current positions and optimal allocation

- **Features**:
  - Trade list generation
  - Tax optimization considerations
  - Execution priority ranking
- **Status**: Planned for future release

Step 8: History

- **Purpose**: Historical tracking and audit trail
- **Requirements**: Previous tracker usage
- **Features**:
  - Change log and decision history
  - Performance attribution
  - Scenario accuracy tracking
- **Status**: Planned for future release

Step 9: Report

- **Purpose**: Generate comprehensive analysis report
- **Requirements**: Completed analysis
- **Features**:
  - PDF report generation
  - Executive summary
  - Detailed methodology appendix
- **Status**: Planned for future release

Step 10: Export

- **Purpose**: Export data and results
- **Requirements**: Completed tracker workflow
- **Features**:
  - CSV exports for trades, indicators, scenarios
  - JSON backup of complete state
  - Integration with external portfolio systems
- **Status**: Planned for future release

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3. Theme Analysis Requirements

3.1 Four Investment Themes

1. **USD Dominance Decline**: Weakening USD enables international rotation
2. **AI Productivity Boom**: Technology-driven productivity acceleration
3. **P/E Mean Reversion**: Valuation normalization pressure
4. **International Outperformance**: Non-US markets outperform US

3.2 Indicator Framework

- **13 macro indicators** across 4 themes
- **Three-tier signal classification**: Canary (35%), Primary (40%), Structural (25%)
- **Momentum-aware calculations**: 6-period baseline methodology
- **Enhanced probability framework**: Realistic probability ranges (5%-95%)

3.3 Calculation Requirements

- **No random or simulated values**: All calculations based on real indicator data
- **Consistent methodology**: IPS v3.10 mathematical specifications
- **Validation bounds**: Theme probabilities must show meaningful differentiation
- **Error handling**: Graceful degradation when indicators are missing

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4. Data Integration Requirements

4.1 Data Collector Integration

- **File format**: JSON output from HCP Data Collector v3.8+
- **Dual-mode support**: Initialization files (extended history) and monthly files
- **Backward compatibility**: Support for existing monthly file formats
- **Quality indicators**: Data freshness and completeness scoring

4.2 Sample Data Generation

- **Market scenarios**: Tech Boom, USD Strength, P/E Reversion, International, Mixed
- **Realistic patterns**: Momentum-aware data generation with meaningful differentiation
- **Testing support**: Consistent sample data for validation and demonstrations

4.3 Manual Override System

- **Edit capability**: All indicator values can be manually overridden
- **Change tracking**: Manual overrides highlighted and tracked
- **Audit trail**: Reason codes and timestamps for all manual changes
- **Validation**: Reasonable bounds checking on manual inputs

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5. User Experience Requirements

5.1 Navigation

- **Sequential workflow**: Users progress through steps in order
- **Validation gates**: Cannot advance until current step requirements met
- **Progress indicators**: Clear visual feedback on completion status
- **Flexible movement**: Can return to previous steps to make changes

5.2 Data Display

- **Theme probabilities**: Large, bold percentage displays with color coding
- **Scenario matrix**: All 16 scenarios in consistent binary order (0000-1111)
- **Data tables**: Sortable, editable tables with quality indicators
- **Error handling**: Clear messaging when data is missing or invalid

5.3 Browser Compatibility

- **Modern browsers**: Chrome, Firefox, Safari, Edge with ES6 support
- **No external dependencies**: Single-file deployment with embedded modules
- **Offline capability**: Full functionality without internet connection
- **Local storage**: Persistent state across browser sessions

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6. Integration Requirements

6.1 Data Collector Integration

- **Input format**: JSON files from HCP Data Collector
- **Independence**: Tracker operates independently from Data Collector
- **Version tolerance**: Graceful handling of different Data Collector versions

6.2 Future Integrations

- **Portfolio systems**: CSV export format for external systems
- **Reporting tools**: Structured data export for analysis
- **API readiness**: Modular design supports future API development

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7. Quality Requirements

7.1 Accuracy

- **Calculation validation**: Theme probabilities show realistic market differentiation
- **Data integrity**: Manual overrides properly tracked and applied
- **Consistency**: Identical inputs produce identical outputs

7.2 Reliability

- **Error recovery**: Graceful handling of missing or invalid data
- **State persistence**: Progress saved automatically and restored on return
- **Browser tolerance**: Consistent behavior across supported browsers

7.3 Usability

- **Learning curve**: New users complete workflow within 30 minutes
- **Error messaging**: Clear, actionable error messages and warnings
- **Documentation**: Built-in help and methodology explanations

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8. Success Metrics

8.1 Functional Metrics

- **Steps 1-3**: Fully functional with high reliability
- **Theme differentiation**: Probabilities show >30% spread in realistic scenarios
- **Data quality**: >90% of indicators successfully processed
- **User completion**: >80% of users complete Steps 1-3 without assistance

8.2 Technical Metrics

- **Load time**: Initial page load under 3 seconds

- **File size**: Single-file deployment under 200KB
- **Memory usage**: Stable memory usage during typical sessions
- **Error rate**: <1% of sessions encounter unrecoverable errors

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9. Future Development Priorities

9.1 Immediate (Next Release)

- **Steps 4-6**: Scenario analysis through current positions
- **Enhanced validation**: Improved error checking and user guidance
- **Mobile optimization**: Responsive design improvements

9.2 Medium-term

- **Steps 7-10**: Complete workflow through export
- **Advanced features**: Historical tracking and performance attribution
- **API development**: Programmatic access to calculations

9.3 Long-term

- **Cloud integration**: Optional cloud sync and sharing
- **Multi-portfolio**: Support for multiple investment strategies
- **Real-time data**: Integration with live data feeds

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10. Risk Mitigation

10.1 Data Quality Risks

- **Mitigation**: Comprehensive validation and fallback procedures
- **Monitoring**: Data quality indicators and user feedback

10.2 Calculation Accuracy Risks

- **Mitigation**: Extensive testing with known scenarios
- **Validation**: Cross-checking against manual calculations

10.3 User Experience Risks

- **Mitigation**: Progressive disclosure and clear error messaging

- **Testing**: Regular user testing and feedback incorporation

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End of Product Requirements Document v4.0