HCP Tracker Product Requirements Document

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Status: MA Comparison Framework with Display Specifications **Current Code Version:** v6.3

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1. Executive Summary

1.1 Product Vision

The HCP Tracker is a browser-based portfolio optimization tool implementing the Humble Conviction Portfolio (HCP) Investment Policy Statement. It provides a guided 10-step workflow with ALL calculations performed client-side, using moving average comparisons for signal generation.

1.2 Key Changes in v3.3

- **Scenario Probability Color Coding**: 5-tier color system for probability ranges
- **Theme Display Colors**: Fixed colors for each theme (USD=red, AI=blue, P/E=yellow, INTL=green)
- **Confidence Labels**: Removed misleading HIGH/MEDIUM/LOW labels from probabilities
- **Data Key Specifications**: Explicit mapping between indicator names and data keys

1.3 Previous Features (Retained from v3.2)

- ALL calculations in Tracker
- MA Comparison Framework
- Fixed Tier Weights: 35% canary, 40% primary, 25% structural
- 13 unique indicators across 4 themes
- Three-tier signal framework

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2. Critical Display Specifications (NEW v3.3)

2.1 Scenario Probability Color Coding

The 16-scenario matrix uses a 5-tier color system based on probability ranges:

Probability Range	Color	CSS Class	Hex Code	Description
> 25%	Dark Green	scenario-very-high	#155724	Extremely likely scenarios
10-25%	Light Green	scenario-high	#28a745	Likely scenarios
5-10%	Yellow	scenario-medium	#ffc107	Moderate probability
1-5%	Light Red	scenario-low	#dc3545	Unlikely scenarios
< 1%	Dark Red/Gray	scenario-very-low	#6c757d	Extremely unlikely

Implementation Note: Do NOT use confidence labels (HIGH/MEDIUM/LOW) with probabilities. The color coding itself indicates likelihood.

2.2 Theme Color Assignments

Fixed theme colors for consistency across all displays:

Theme	Color Name	CSS Class	Hex Code	RGB
USD	Red	theme-usd	#dc3545	rgb(220, 53, 69)
AI/Innovation	Blue	theme-ai	#007bff	rgb(0, 123, 255)
P/E	Yellow	theme-pe	#ffc107	rgb(255, 193, 7)
International	Green	theme-intl	#28a745	rgb(40, 167, 69)

2.3 Data Confidence Indicators

Separate from probability colors, data confidence shows quality of underlying data:

Confidence Level	When to Use	Display
HIGH	All indicators fresh, complete history	Green dot
MEDIUM	Some stale data or interpolation	Yellow dot
LOW	Significant missing data	Red dot

Critical: Data confidence is about data quality, NOT probability levels.

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3. Data Key Mapping (CLARIFIED v3.3)

3.1 Required Indicator Keys

The FileHandler and data structures MUST use these exact keys:

```
javascript
```

```
// USD Theme
'dxy'          // DXY Index
'reserve_share' // USD Reserve Share
'yuan_swift'    // Yuan SWIFT Share
'gold_purchases'// Central Bank Gold Purchases

// AI/Innovation Theme
'productivity'  // Productivity Growth
'qqq_spy'      // QQQ/SPY Ratio (NOT 'qqqSpy')
'net_margins'  // S&P Net Margins

// P/E Theme
'forward_pe'   // Forward P/E
'cape'         // Shiller CAPE
'risk_premium' // Equity Risk Premium

// International Theme
'acwx_spy'     // ACWX/SPY Relative Performance
'sp_vs_world'  // S&P vs MSCI World
'tic_flows'    // TIC Net Flows
```

3.2 Sample Data Requirements

When generating sample data, ALL indicators must be present:

javascript

```
function generateSampleData(scenario) {
  return {
    indicators: {
      // USD Theme (4 indicators)
      'dxy': { current: 100, history: [...], name: 'DXY Index' },
      'reserve_share': { current: 58, history: [...], name: 'USD Reserve Share' },
      'yuan_swift': { current: 2.5, history: [...], name: 'Yuan SWIFT Share' },
      'gold_purchases': { current: 50, history: [...], name: 'Central Bank Gold' },

      // AI Theme (3 indicators) - ALL REQUIRED
      'productivity': { current: 3.8, history: [...], name: 'Productivity' },
      'qqq_spy': { current: 0.82, history: [...], name: 'QQQ/SPY Ratio' },
      'net_margins': { current: 14.2, history: [...], name: 'Net Margins' },

      // P/E Theme (3 indicators)
      'forward_pe': { current: 19, history: [...], name: 'Forward P/E' },
      'cape': { current: 32, history: [...], name: 'CAPE Ratio' },
      'risk_premium': { current: 3.5, history: [...], name: 'Risk Premium' },

      // International Theme (3 indicators)
      'acwx_spy': { current: 0.95, history: [...], name: 'ACWX/SPY' },
      'sp_vs_world': { current: 1.02, history: [...], name: 'S&P vs World' },
      'tic_flows': { current: -20, history: [...], name: 'TIC Flows' }
    }
  };
}
```

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4. Calculation Framework (from v3.2)

4.1 MA Comparison Approach

javascript

```
const maComparisons = {
  'dxy': {short: 200, long: 400},
  'qqq_spy': {short: 150, long: 300},  // Note: underscore in key
  'yuan_swift': {short: 12, long: 36},
  'gold_purchases': {short: 4, long: 12},
  'cape': {short: 'current', long: 240},
  'risk_premium': {short: 6, long: 18},
  'productivity': {short: 2, long: 8},
  'net_margins': {short: 4, long: 12},
  'reserve_share': {short: 4, long: 8},
  'sp_vs_world': {short: 6, long: 12},
  'acwx_spy': {short: 30, long: 90}
};

// Fixed threshold exceptions:
// - tic_flows: Fixed at 0 (12-month sum)
// - forward_pe: 1Y vs 3Y MA (special calculation)
```

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5. Three-Tier Signal Framework (from v3.2)

5.1 Fixed Tier Weights

- **Canary**: 35% (early warning)
- **Primary**: 40% (core signals)
- **Structural**: 25% (confirmation)

5.2 Indicator Classification

Tier	Indicators	Weight	Per-Indicator Weight
Canary	DXY, QQQ/SPY, Risk Premium, ACWX/SPY	35%	8.75% each
Primary	Forward P/E, Net Margins, Yuan SWIFT, CAPE	40%	10% each
Structural	Productivity, Reserve Share, Gold Purchases, TIC Flows	25%	6.25% each

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6. UI Display Requirements

6.1 Step 3 Theme Display

Each theme shows:

- Theme name with theme color bar
- Percentage probability (large, bold)
- NO confidence labels on probabilities
- Theme color fill proportional to probability

6.2 Scenario Matrix Display

Grid of 16 scenarios with:

- Scenario rank (#1-16)
- Binary representation (e.g., "1101")
- Probability percentage
- Background color from 5-tier system
- Theme indicators (USD↓, AI↑, etc.)

6.3 Missing Data Handling

If indicators are missing:

- Display error message listing missing indicators
- Prevent calculation until all data present
- Show which theme is affected

Example error:

```
Missing Innovation indicators:
- qqq_spy: QQQ/SPY Ratio
- net_margins: S&P Net Margins

Please ensure data file contains all 13 indicators.
```

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7. Common Implementation Errors to Avoid

7.1 Data Key Mismatches

❌ Wrong: `'qqqSpy'`, `'netMargins'` (camelCase)
✅ Right: `'qqq_spy'`, `'net_margins'` (snake_case)

7.2 Confidence Label Confusion

❌ Wrong: Showing "HIGH" next to 5% probability
✅ Right: No labels on probabilities, only color coding

7.3 Missing Indicators

❌ Wrong: Generating only 1 of 3 AI indicators
✅ Right: All 13 indicators present in every data generation

7.4 Color Inconsistency

❌ Wrong: Using different colors for themes across displays
✅ Right: Consistent theme colors everywhere

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8. Testing Validation

8.1 Scenario Probability Colors

Test that probabilities display correct colors:

- 30% → Dark Green
- 15% → Light Green
- 7% → Yellow
- 3% → Light Red
- 0.5% → Dark Red/Gray

8.2 Theme Calculations

With tech_boom scenario data:

- AI theme should show 70-80% (blue bar)
- USD theme should show 20-30% (red bar)
- All indicators must be present

8.3 Data Completeness

FileHandler must generate:

- Exactly 13 indicators
- All with correct keys
- Proper history arrays

- Realistic trending values for scenarios

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9. Version History

Version 3.3 (August 29, 2025)

- Added 5-tier scenario probability color coding
- Clarified theme color assignments
- Specified exact data key requirements
- Removed confidence labels from probabilities
- Added missing data error handling

Version 3.2 (August 25, 2025)

- MA comparison framework
- Fixed tier weights
- Three-tier signal framework

Previous Versions

See v3.2 document for complete history

End of Product Requirements Document v3.3