

Improvements on STOX.AI

Tile Architecture Analysis & Working Capital Framework

Executive Summary

This report identifies critical gaps in the current STOX.AI tile implementation and introduces a **Working Capital optimization framework** that transforms Mantrix from an inventory tuning tool into a **CFO-grade capital optimization platform**.

Key Finding: Current tiles show parameter changes but don't connect them to cash impact. Every recommendation must answer: "How much cash do I free, and what do I risk?"

Core Addition: Working Capital Baseline tile + Cost Configuration + Cash Release Timeline

Part 1: Tile Architecture Gaps

1.1 Current vs. Original Specification

Original Spec	Implemented As	Status
Tile 0 - Command Center	Tile 01 - Data Hub	■■ Misaligned
Tile 1 - Plant Health	Tile 02a - Plant Intelligence	■ Good
Tile 2 - Policy Audit	Tile 02b - Inventory Health	■■ Partial
Tile 3 - Demand Reality	Tile 3a/3b - Demand + Forecast	■ Excellent
Tile 4 - Supply Reality	Tile 04 - Supply Lead Time	■■ Partial
Tile 5 - Service Level Truth	Tile 05 - Cost Policy	■■ Misaligned
Tile 6 - SKU Optimization	Tile 06/07 - MRP Optimizer	■ Good
Tile 7 - What-if Simulation	Tile 7b - What-If Simulator	■ Good
Tile 8 - Recommendations	Tile 08 - Recommendations Hub	■ Good
Tile 9 - Learning Loop	Tile 10 - Performance Monitor	■■ Partial

1.2 Critical Missing Tiles

- **Command Center (Tile 0):** Chat + KPIs + Top Exceptions — the planner's front door
- **Service Level Truth:** Achieved vs implied service gap — kills fake targets
- **Policy Audit:** What SAP is configured to do per SKU — exposes mismatches
- **Contract Constraints:** MOQ, pack sizes, supplier calendars — real-world limits

1.3 Redundancies to Merge

- **Tile 06 + 07:** Both optimize MRP parameters — merge into single tile with Monte Carlo detail view
- **Tile 02a + 02b:** Clarify roles — 02a = Plant aggregate, 02b = SKU drill-down

Part 2: Working Capital Framework

First Principle

Inventory optimization is **not** about lot size or safety stock.
It is about **cash trapped on shelves because of planning policies**.

Mantrix must explicitly answer:

"If I accept this recommendation, how much cash do I free, and what do I risk?"

2.1 What's Currently Missing

Missing Concept	Impact	Where to Add
Working Capital Decomposition	Can't see cash by inventory type	New Tile 2.5
Cycle Stock vs Safety Stock split	Can't attribute WC to policy	Tile 06 detail
EOQ Cost Curve (Hold vs Order)	Lot size changes not grounded	Tile 06 detail
Δ Working Capital per Recommendation	No cash translation	Tile 08 columns
Cash Release Timeline	When does CFO see impact?	New panel
Supplier Payment Terms Impact	WC optimization beyond inventory	New Tile 4.5
Working Capital Productivity (ROI)	Can't prioritize SKUs by capital efficiency	Tile 2.5, 08
Risk-Adjusted WC Savings	Not all savings are equal	Tile 08

2.2 NEW: Tile 2.5 — Working Capital Baseline

This tile establishes today's cash position by SKU x Plant and becomes the baseline against which every recommendation is measured.

Working Capital \neq Inventory Value

True Net Working Capital (Inventory) =

- Inventory Value (On-hand + In-Transit + WIP)
- Consignment Stock (supplier-owned)
- Accounts Payable (unpaid invoices for this inventory)

Inventory Decomposition per SKU:

- **Cycle Stock:** Lot size driven — $\text{Avg} = \text{Lot Size} / 2$
- **Safety Stock:** Variability driven — buffer against demand/supply uncertainty
- **Pipeline Stock:** Lead time driven — $\text{Lead Time} \times \text{Daily Demand}$
- **Excess/Obsolete:** Policy error — shouldn't exist

2.3 Cost Model Components

Holding Cost (Carrying Cost)

Annual cost of keeping one unit in inventory:

- Cost of Capital (WACC): 8-12%
- Warehousing & Handling: 2-4%
- Obsolescence Risk: 2-5%
- Insurance & Taxes: 1-2%
- Shrinkage: 0.5-1%
- TOTAL CARRYING RATE: 15-25% of inventory value

Ordering Cost

Cost incurred each time a PO is placed:

- Procurement Labor: \$30-60/PO
- Receiving & Inspection: \$20-40/PO
- AP Processing: \$15-25/PO
- System/Overhead: \$10-20/PO
- TYPICAL TOTAL: \$75-150/PO

Stockout Cost

Cost when demand cannot be fulfilled:

- Lost Sales x Gross Margin (if customer walks)
- Expedite Freight Premium (\$200-1000/event)
- Customer Penalty / OTIF fines
- Production Downtime (if raw material shortage)
- Backorder Admin Cost (\$50-100/event)

2.4 EOQ Economic Trade-off

The Economic Order Quantity (EOQ) minimizes Total Cost = Holding + Ordering. Mantrix should show where current policy sits vs the optimal point on the cost curve.

EOQ Formula: $EOQ = \sqrt{2 \times D \times K / H}$

Where D = Annual Demand, K = Ordering Cost, H = Holding Cost per unit

2.5 Working Capital Impact per Recommendation

Every recommendation in Tile 08 must show the cash translation:

Change	Δ Units	Δ WC (\$)	Δ Annual Cost	Service Risk
SS 500 → 420	-80 EA	-\$15,600	-\$2,340/yr	Low (+0.3%)
Lot 500 → 340	-80 avg	-\$15,600	-\$1,315/yr	None
ROP 800 → 720	-80 EA	-\$15,600	-\$2,340/yr	Med (+0.8%)
TOTAL	-240 EA	-\$46,800	-\$5,995/yr	—

2.6 NEW: Cash Release Timeline

CFOs need to know WHEN cash is freed, not just how much:

- **Month 1:** Safety Stock reductions — immediate as inventory depletes
- **Month 2:** Lot size changes — gradual over multiple order cycles
- **Month 3:** Pipeline reductions — after lead time drains
- **Month 4+:** Ongoing benefits from policy changes

2.7 NEW: Supplier Terms Impact (Tile 4.5)

Working capital optimization isn't just about inventory levels. Payment terms matter:

If you hold \$100K inventory from a supplier with Net-30 terms, your actual WC tied up is less than \$100K. Negotiating Net-60 frees working capital **without touching a single unit**.

2.8 NEW: Working Capital Productivity (WCP)

A new metric to prioritize SKUs by capital efficiency:

$$\text{WCP} = \text{Gross Margin \$} / \text{Average Working Capital Tied Up}$$

WCP Range	Interpretation	Action
> 2.0x	Efficient — capital working hard	Maintain or grow
1.0 - 2.0x	Average — room to improve	Optimize parameters
< 1.0x	Poor — capital underperforming	Reduce inventory or exit SKU

2.9 Risk-Adjusted WC Savings

Not all WC savings are equal. A high-risk recommendation should be weighted down:

$$\text{Risk-Adjusted Savings} = \text{WC Freed} \times \text{Confidence} \times (1 - \text{Service Risk Penalty})$$

This ensures planners prioritize high-confidence, low-risk opportunities first.

Part 3: Competitive Differentiation

Competitor	What They Do	Mantrix Advantage
Celonis	Process mining, finds waste	No WC translation
o9 Solutions	Demand sensing & planning	Planning-focused, not capital
Kinaxis	Supply chain planning	No economic model built-in
Blue Yonder	Forecasting + replenishment	Black box, not WC-aware
Palantir	Data platform	Requires custom WC build

What Makes Mantrix Defensible

- 1. Policy-to-Cash Traceability:** Every dollar freed is traceable to lot size, SS, lead time, or supplier behavior
- 2. SKU-level Capital ROI:** Which SKUs give the biggest cash return per unit of planning effort?
- 3. CFO + Planner Alignment:** Planners see less firefighting; CFO sees cash released without revenue risk
- 4. Not Just Signals — Cash:** Most tools optimize planning signals. Mantrix optimizes cash embedded in signals.

Part 4: Implementation Roadmap

Phase 1: Critical Gaps (Weeks 1-4)

- NEW: Command Center (Tile 0) — Chat + KPIs + Top Exceptions
- NEW: Working Capital Baseline (Tile 2.5) — Cash position by SKU x Plant
- ENHANCE: Recommendations Hub (Tile 08) — Add WC Freed, Annual Savings, Risk-Adjusted columns

Phase 2: Cost Model (Weeks 5-8)

- NEW: Cost Configuration panel — Holding rate, ordering cost, stockout model
- ENHANCE: MRP Optimizer (Tile 06) — Add EOQ cost curve visualization
- ENHANCE: MRP Optimizer (Tile 06) — Add Cycle Stock vs SS decomposition

Phase 3: CFO Layer (Weeks 9-12)

- NEW: CFO Rollup Dashboard — WC freed by plant, category, buyer
- NEW: Cash Release Timeline — When does CFO see balance sheet impact
- NEW: Supplier Terms Impact (Tile 4.5) — Payment terms optimization

Phase 4: Polish (Weeks 13-16)

- Add Service Level Truth tile
- Add Policy Audit tile
- Global navigation across all tiles
- Cross-tile linking

Summary: Key Metrics to Surface Everywhere

Metric	Definition	Why It Matters
Working Capital Freed (\$)	Inventory reduction x unit cost	Headline number for CFO
Annual Carrying Cost Saved	WC freed x carrying rate	Recurring P&L benefit
DIO Improvement (days)	$(\Delta \text{ Inventory} / \text{COGS}) \times 365$	CFO benchmark metric
Working Capital Productivity	Gross Margin \$ / Avg WC	ROI on inventory capital
Risk-Adjusted WC Savings	WC x Confidence x (1-Risk)	Prioritization metric
Cash Release Timeline	When cash is actually freed	Balance sheet timing

Recommended Next Steps

1. Validate Working Capital framework with pilot customers
2. Build Tile 2.5 (Working Capital Baseline) — highest differentiation value
3. Add WC columns to Recommendations Hub — immediate credibility boost
4. Design Cost Configuration panel — allows customer-specific economics

This framework transforms Mantrix from "inventory tuning" to "capital optimization" — a CFO conversation, not just a planner tool.