

# Update on Supply Chain Research

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**Joint work with Sean Willems, Boston University,  
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# Overview

- Strategic inventory placement model for optimizing safety stocks in a supply chain
- Capacity planning model for optimizing capacity investments and contracting in a supply chain
- Exploratory work on energy-related supply chains

Papers available on request!

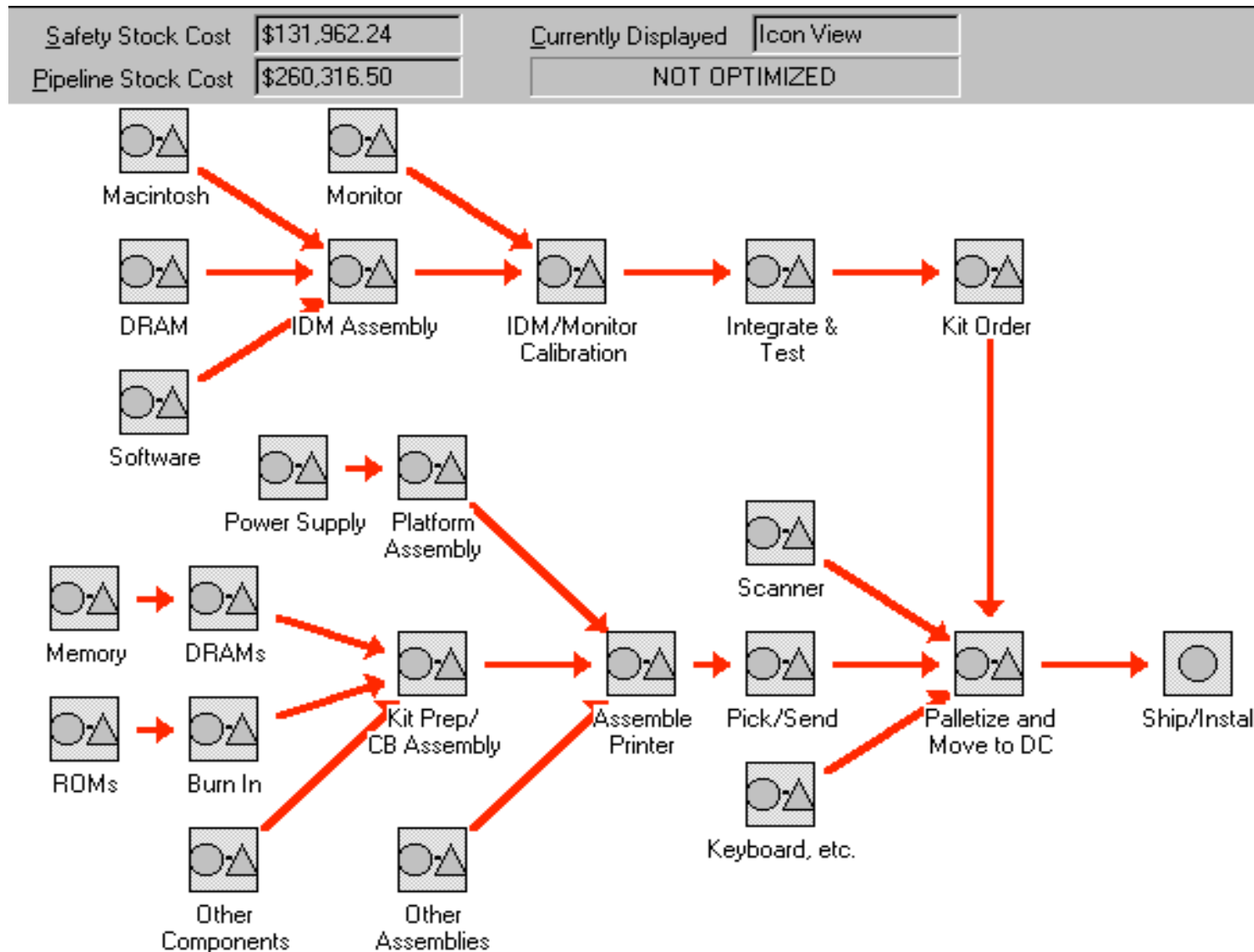
# Strategic Safety Stock Model: Intent

- Tactical model to determine the amount and positioning of safety stocks in supply chains
- Tactical model to support supply chain improvement teams
- Simple model, easily accessible, runs on PC, understandable inputs/outputs; academic version available from <http://web.mit.edu/lfmrg3/www/>
- Commercialized by Optiant; applications support both tactical and operational decisions

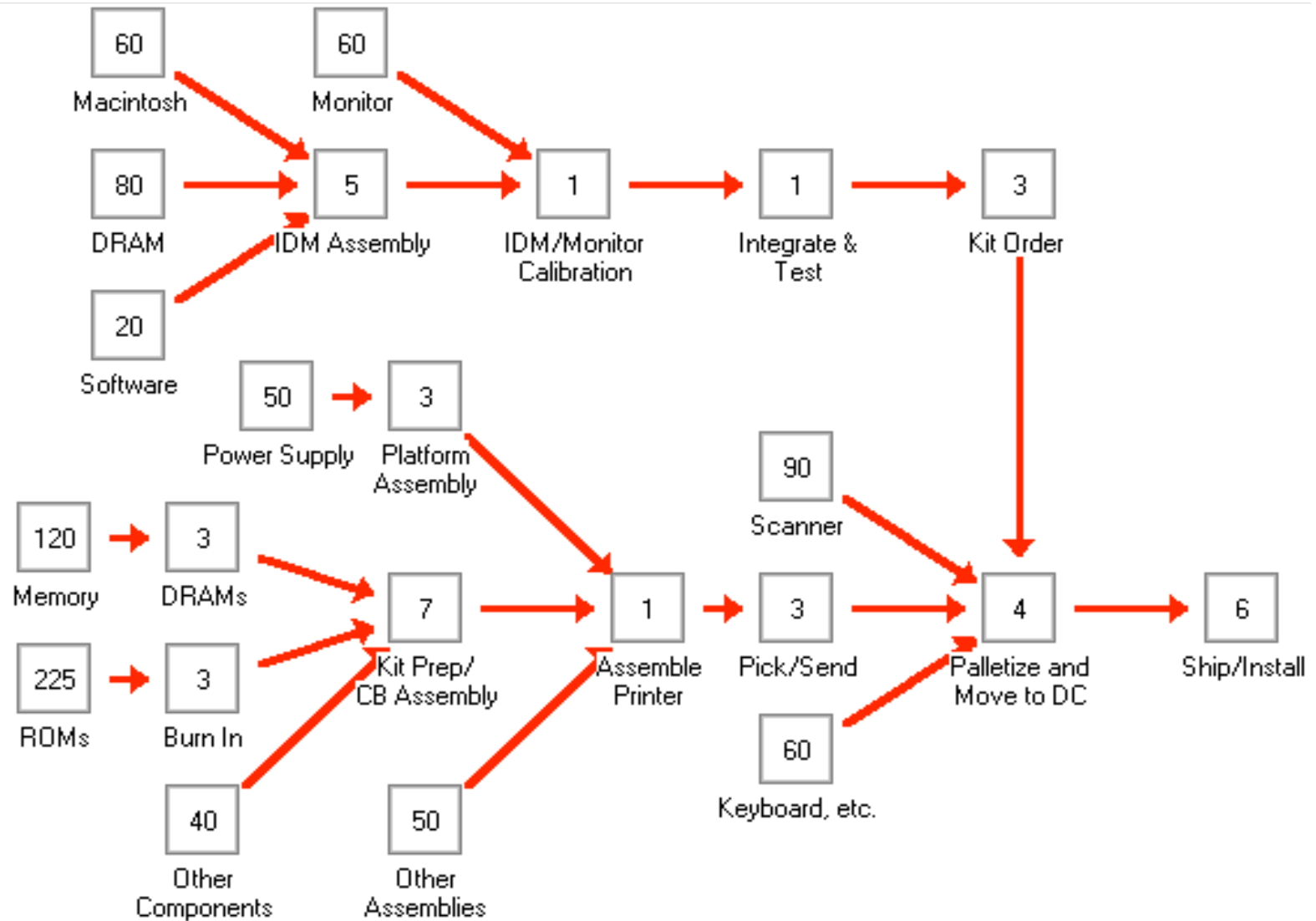
# KIMES 100



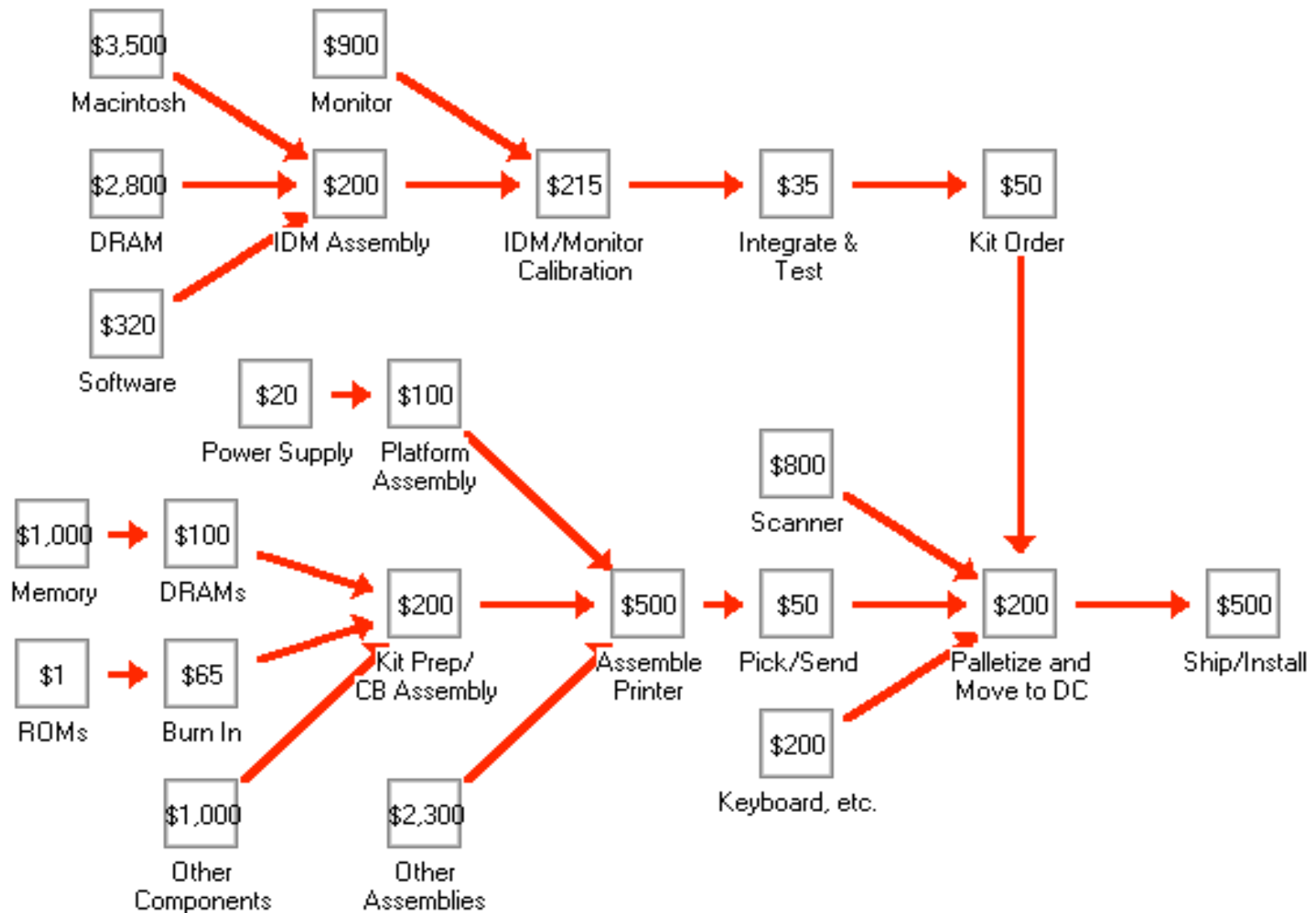
# Supply Chain: Before



# Supply Chain: Lead Times

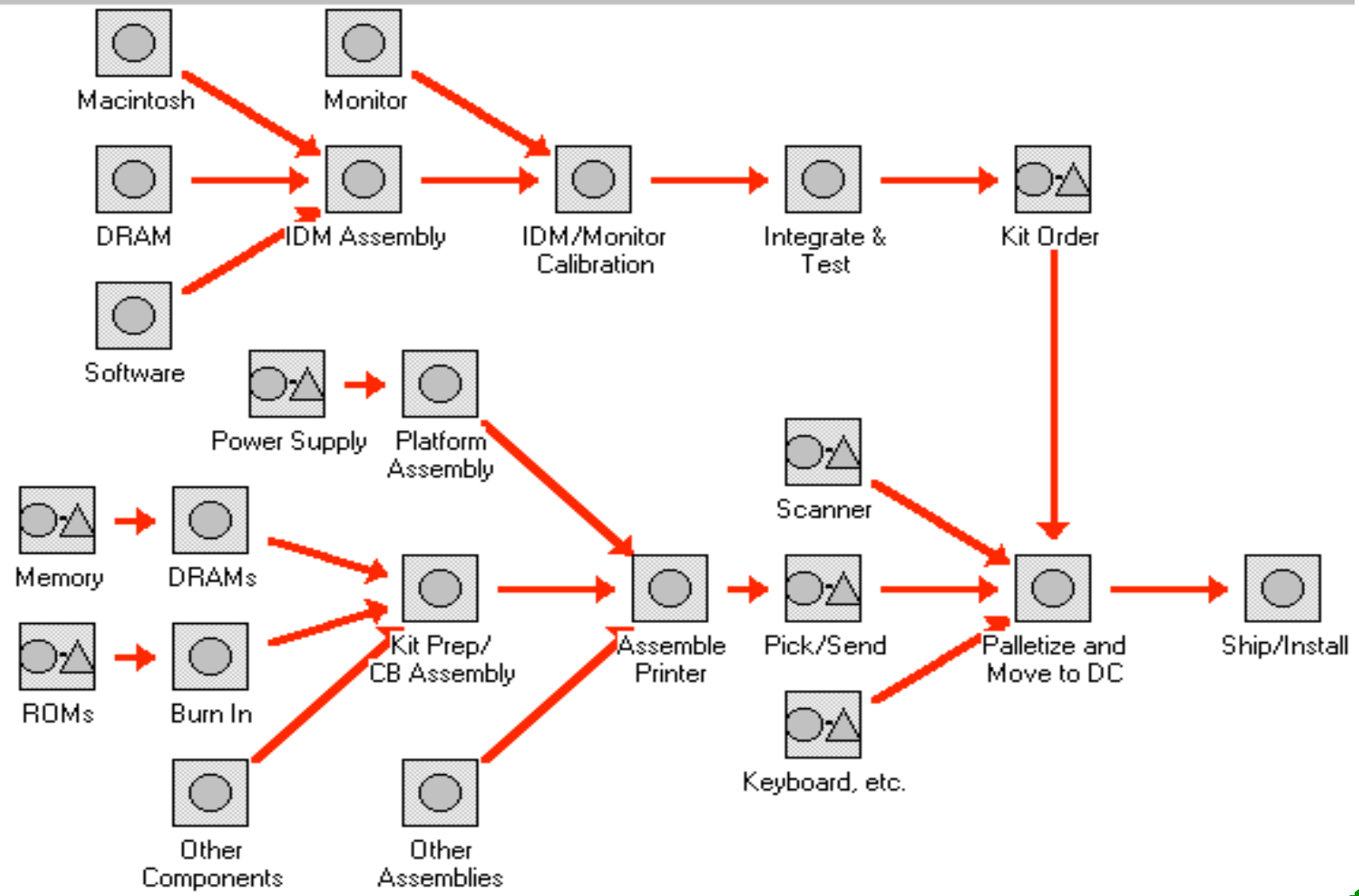


# Supply Chain: Costs

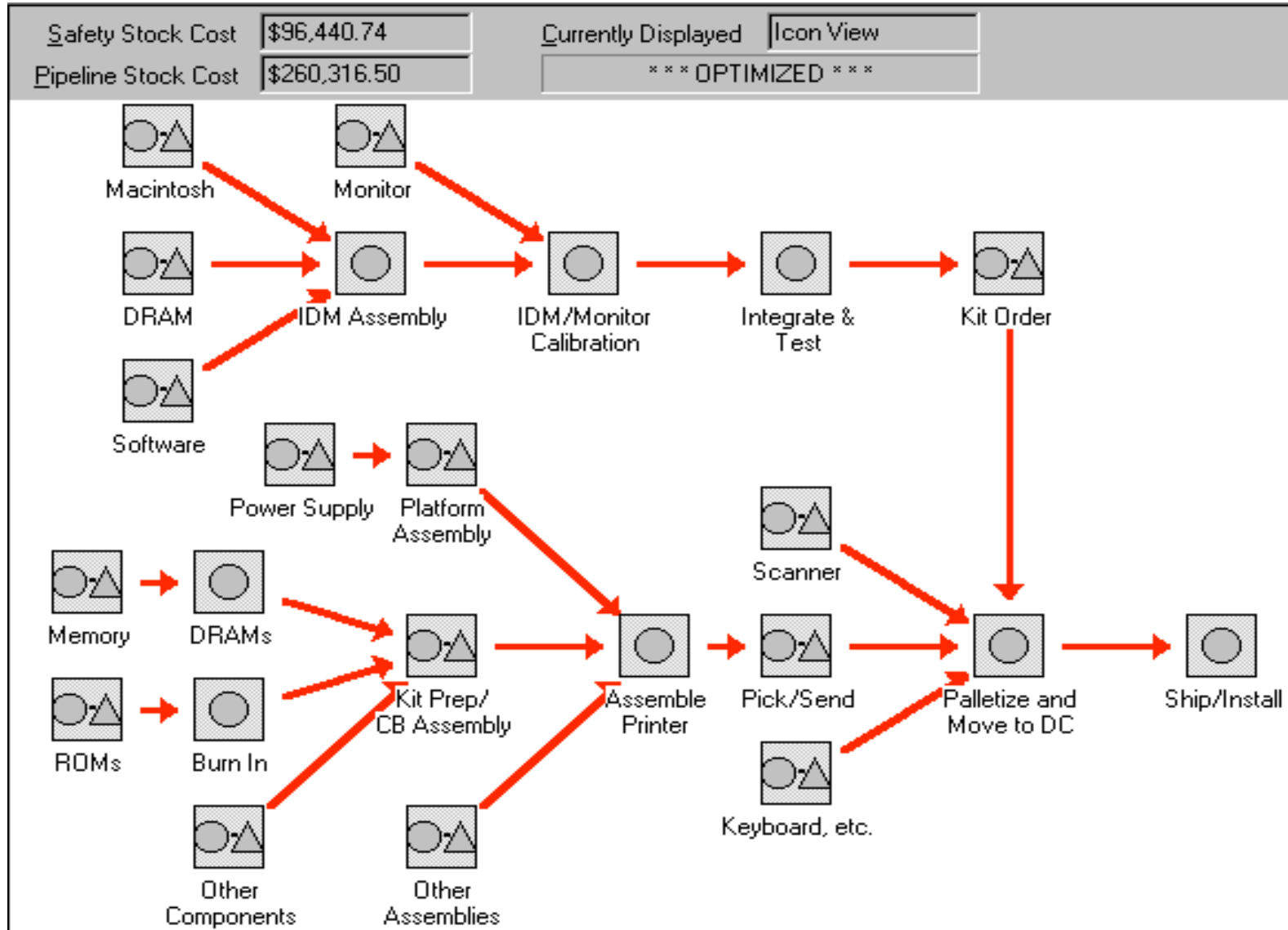


# Supply Chain: Optimized

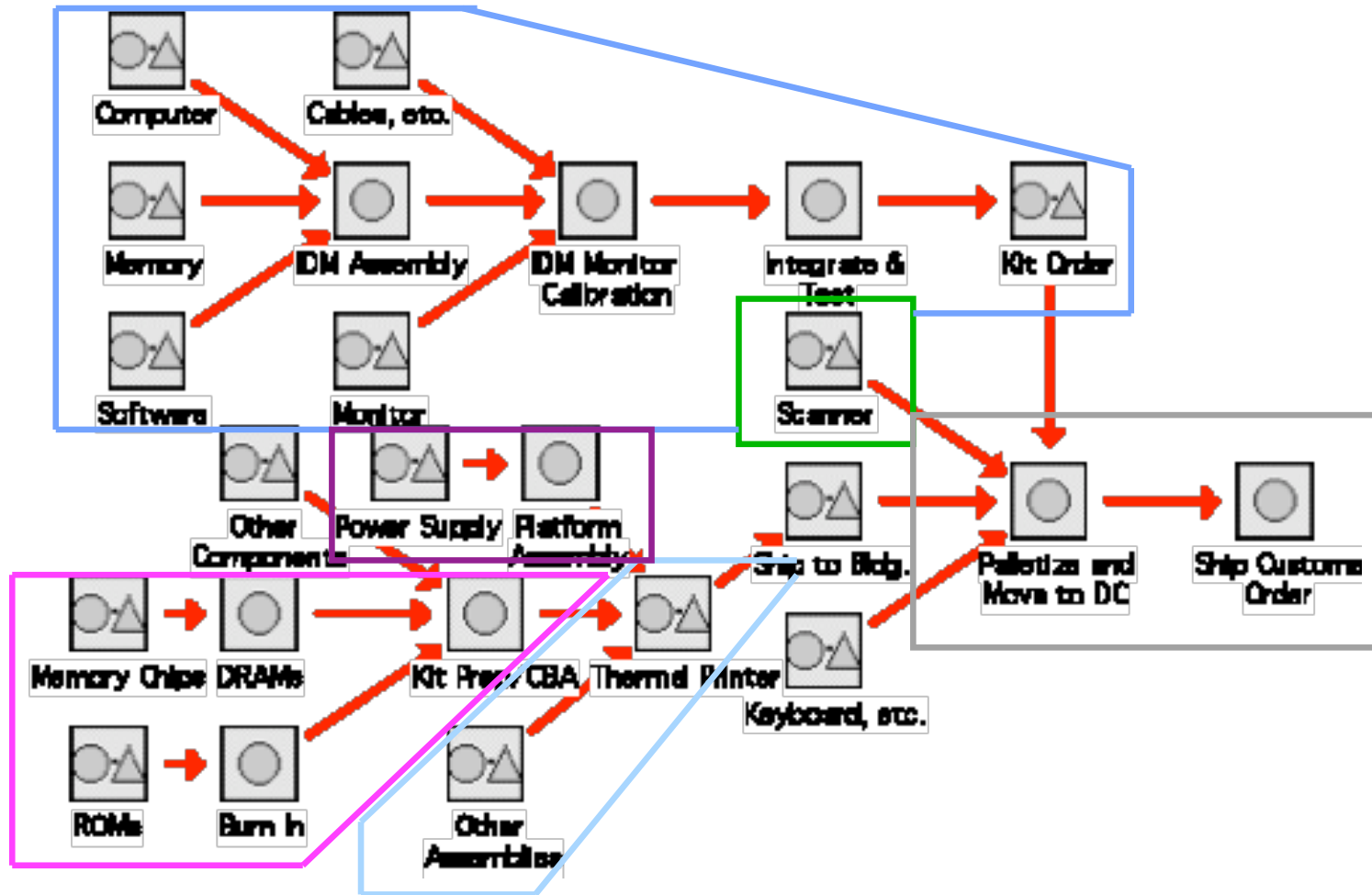
Safety Stock Cost	\$87,787.16	Currently Displayed	Icon View
Pipeline Stock Cost	\$260,316.50	*** OPTIMIZED ***	



# Supply Chain: Implemented



# Supply-Chain

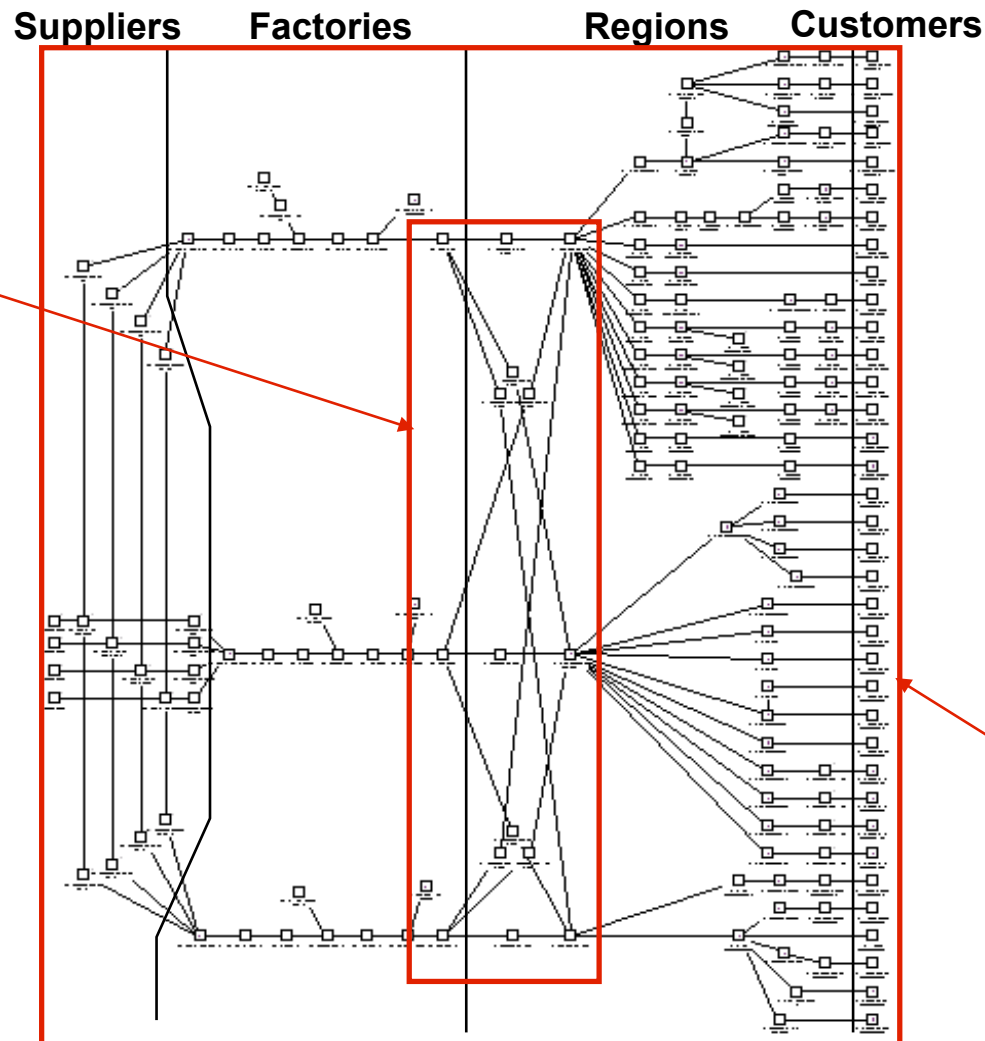


# Key Benefits & Learning

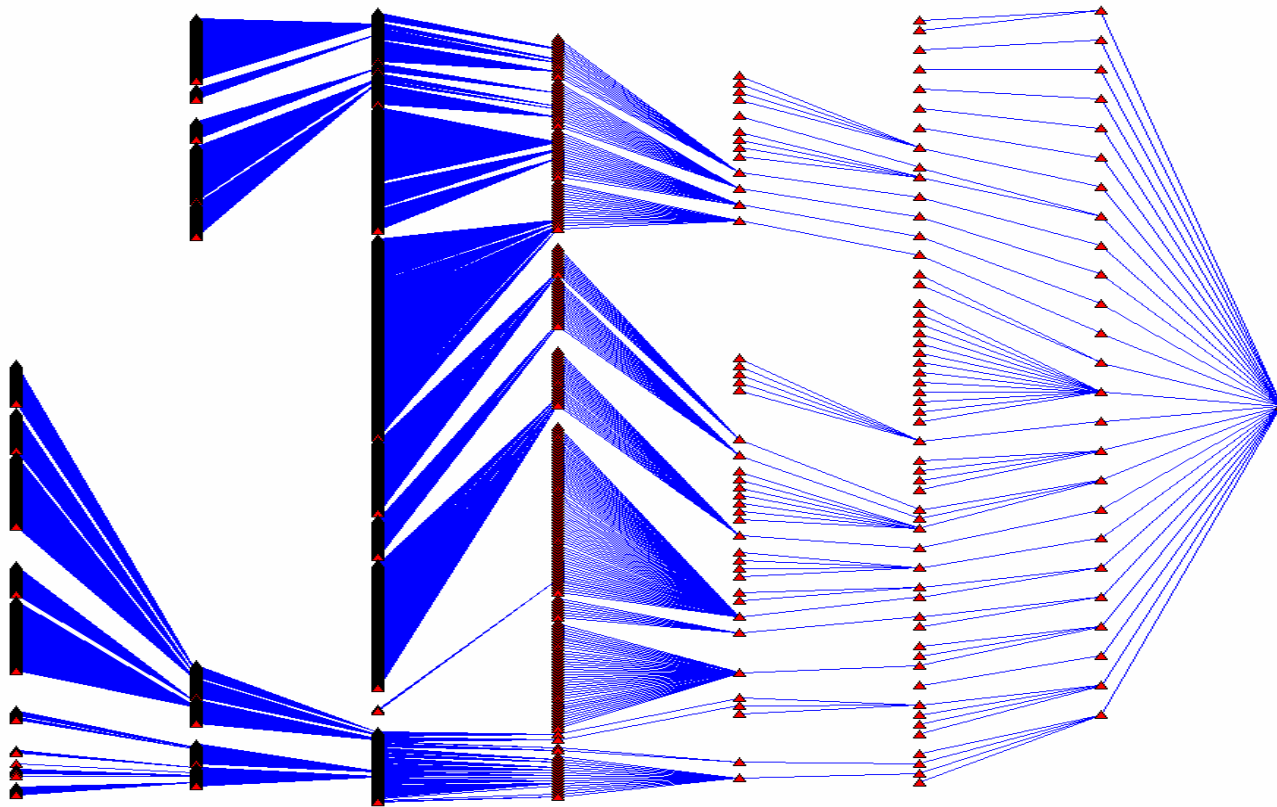
- Shows value from “holistic” perspective
- Formalizes inventory-related supply chain costs, and provides an optimal benchmark
- Provides framework and standard terminology for cross-functional debate
- Shows the effectiveness of inventory, strategically positioned in a few places to de-couple the supply chain
- De-couple supply chain prior to a high-cost added stage; and prior to product explosion
- Most leverage from lead time reduction

# HP Supplies Inventory Modeling Project

Answer the  
bulk pen  
inventory  
question...



... in the context  
of what is best  
for the system



- Electronic test system manufactured by Teradyne, Inc.
- 3,866 part/locations
- Used real data on supply chain topology, lead times, costs of parts

# Research status - accomplished

- Efficient algorithms for real-world supply chains: stationary demand, no capacity constraints
- Extend to permit
  - non-stationary demand
  - capacity constraints
  - forecast-based ordering policy (e.g., MRP)

# Research status - ongoing

- Relax assumption on common review period, so as to include lot-sizing
- Permit dual sourcing or multi-modal processes
- Examine impact from smoothing of demand signals

# New research initiatives

- Supply chain design for solar panels
- Supply chain optimization for wood pellets
- Supply chain modeling for wind energy projects
- Life-cycle analysis for remanufactured products