Long-term Turnaround Planning for Integrated Chemical Sites

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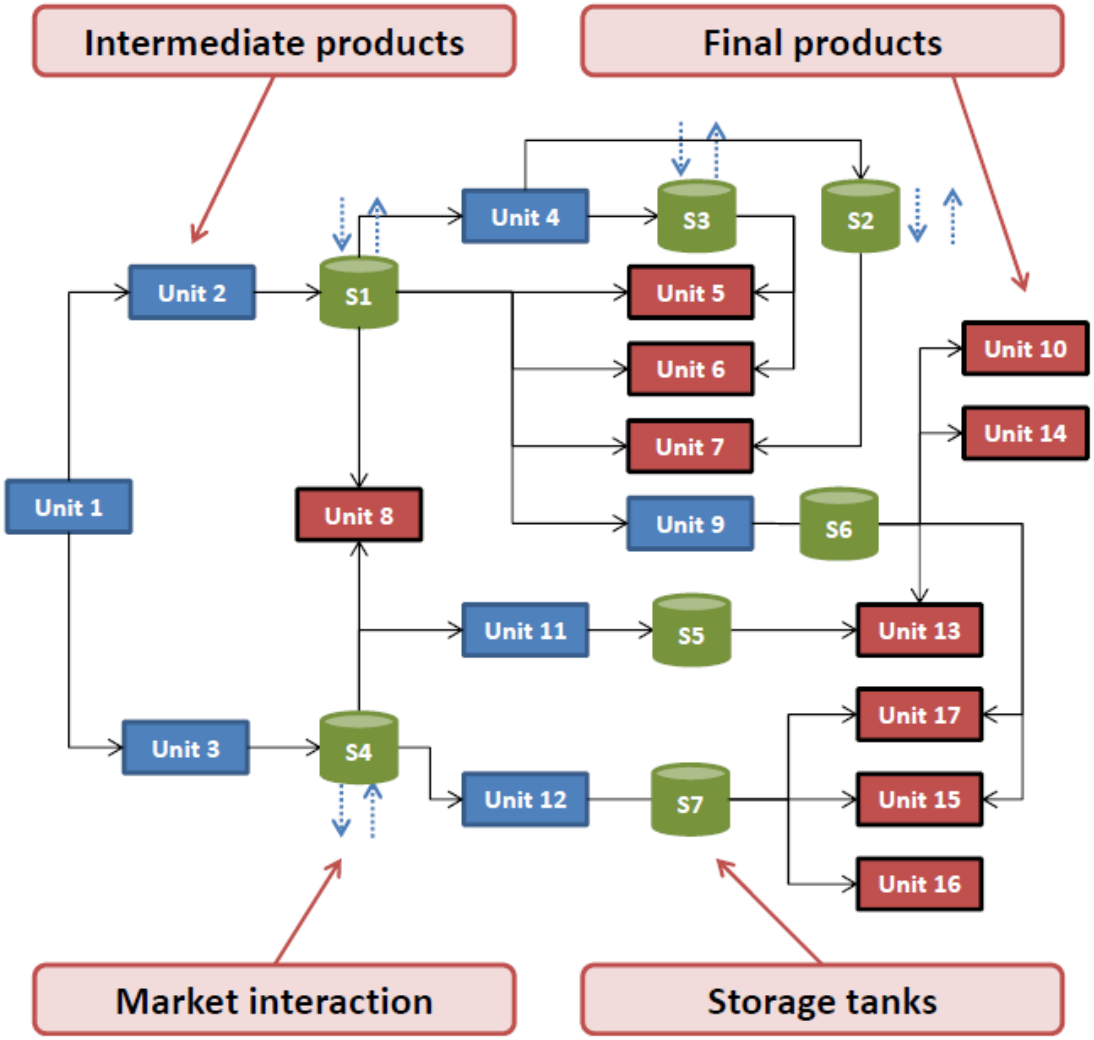
Problem Statement



- **Exploit network interactions, storage availability, and prices to schedule maintenance over a multi-year horizon**
- **Scope:**
  - **Max. profit**
  - **Continuous processes**
  - **Time horizon: 5-15 years**
  - **Site-wide (each unit is an entire plant)**

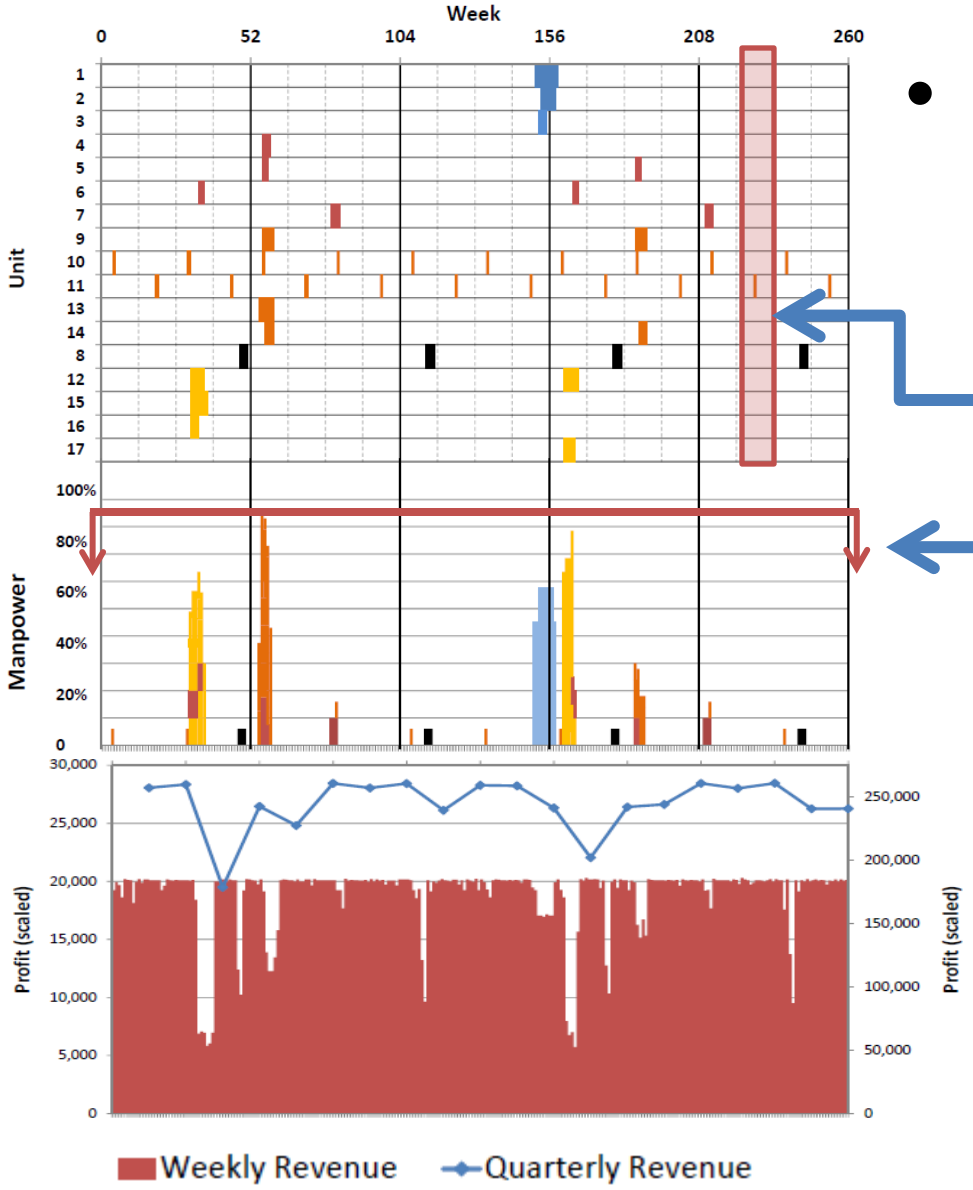
Mixed Integer Linear Programming Model

- **Objective: Max. profit**

  Revenue from sold product – maintenance costs – holding costs – demand satisfaction penalties – cost of raw materials and imports

- **Constraints**
  - **Network flow constraints**
    - **Inventory and mass balance**
    - **Nonnegativity constraints**
    - **Upper and lower bounds on inventory levels**
    - **Demands**
    - **Financial-manpower-turnaround constraints**

Novelty



- **Incorporation of three major concerns:**
  - **Avoidance of maintenance tasks in unfavorable conditions**
  - **Bringing down peak manpower requirements**
  - **Balancing quarterly financial performance**

Potential Impact

- **Successfully demonstrated**
  - **Turnaround optimization for an industrial-size network**
  - **Efficient solution while retaining key model features**
  - **Incorporation of practical considerations**

- **Future/current work**
  - **Medium-term turnaround scheduling under duration uncertainty for manpower and production planning (robust + stochastic approach)**