IBM Data Science & AI Elite Team

Sales and Operations Planning (S&OP) at ÇİMSA

3rd conference of the EURO Working Group on the Practice of OR
Challenges in the deployment of OR projects

Eray Cakici
October 12, 2020

Agenda
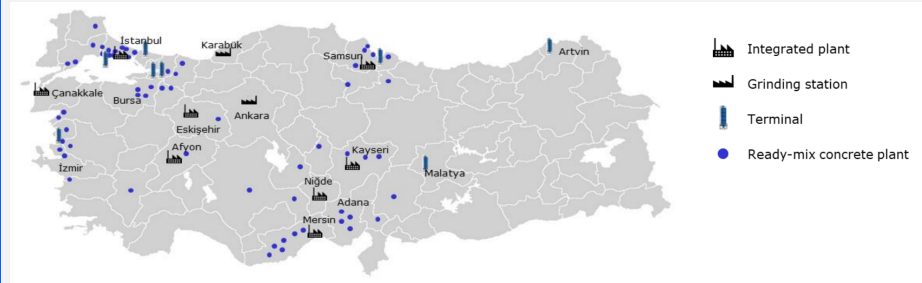
ÇimSA

- World leader in white cement

- 15+ grinding mills, 10+ kilns, 30+ silos in 15 Locations

- $400M+ revenue/year

- Core strengths in high quality special cement products and strong network structure

CimSA Supply Chain... 10.000 ft look

Sabanci Cement Group - Turkey

Supply Chain Optimization

Decisions	Solutions	Value
Strategic	Strategic Supply Chain Planning	80%
Tactical	Advanced Planning and Scheduling	
	MRP/ERP	20%
Operational	Execution	

Source: AMR Research, BCI
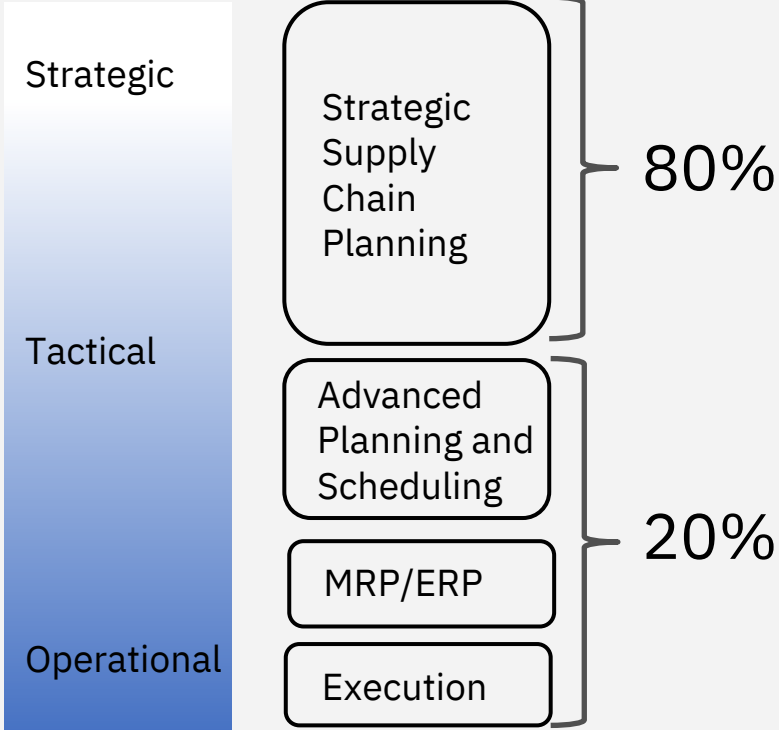
The majority of a supply chain's lifecycle costs are locked-in at the start

Such "up-front" decisions include:

- Distribution Network
- Inventory Locations
- Supplier Network
- Inventory Levels
- Logistics Suppliers

ÇİMSA & IBM Optimization Use Cases

Strategic Problems (Years-Months)

Tactical Problems (Months - Weeks)

Operational Problems (Days - Real-time)

S&OP

Fuel Mix Optimization

Inventory Planning

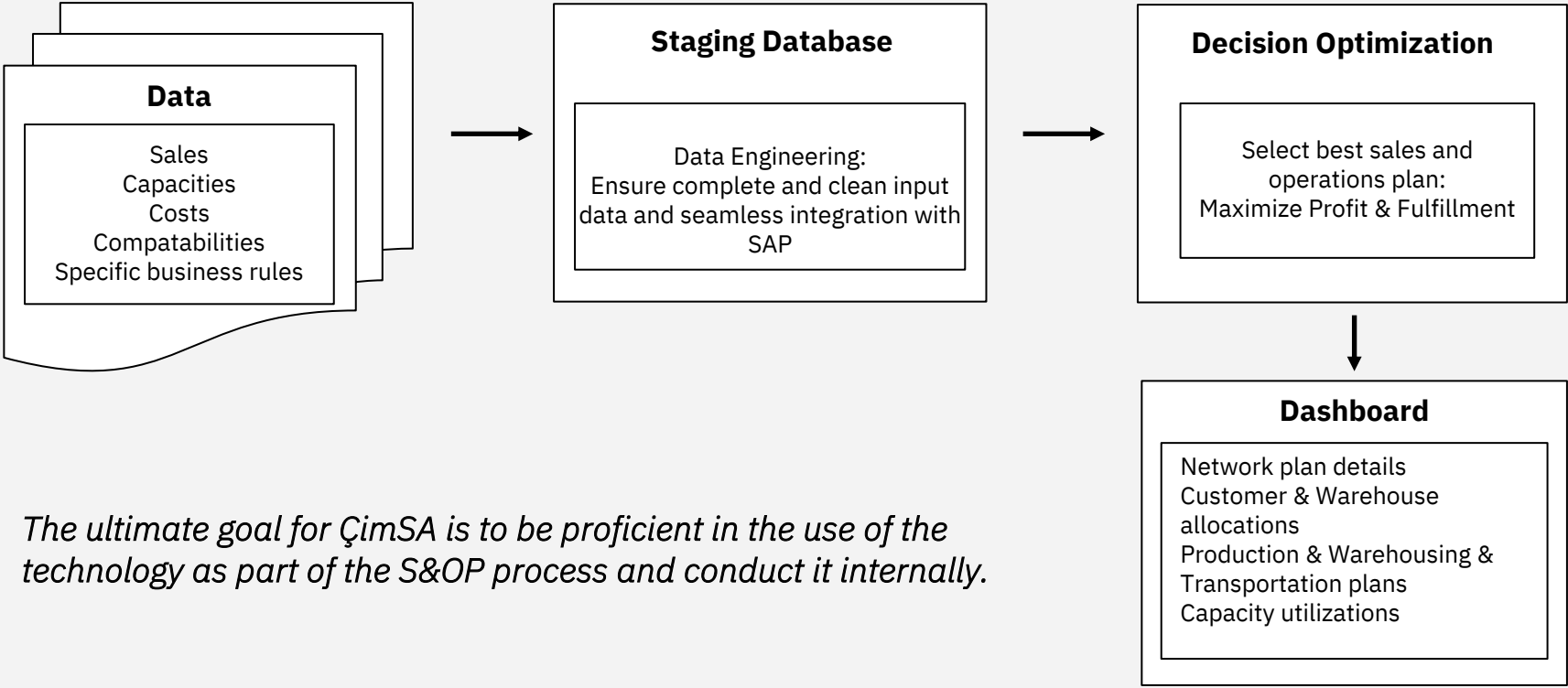Integrated Supply Chain Scheduling
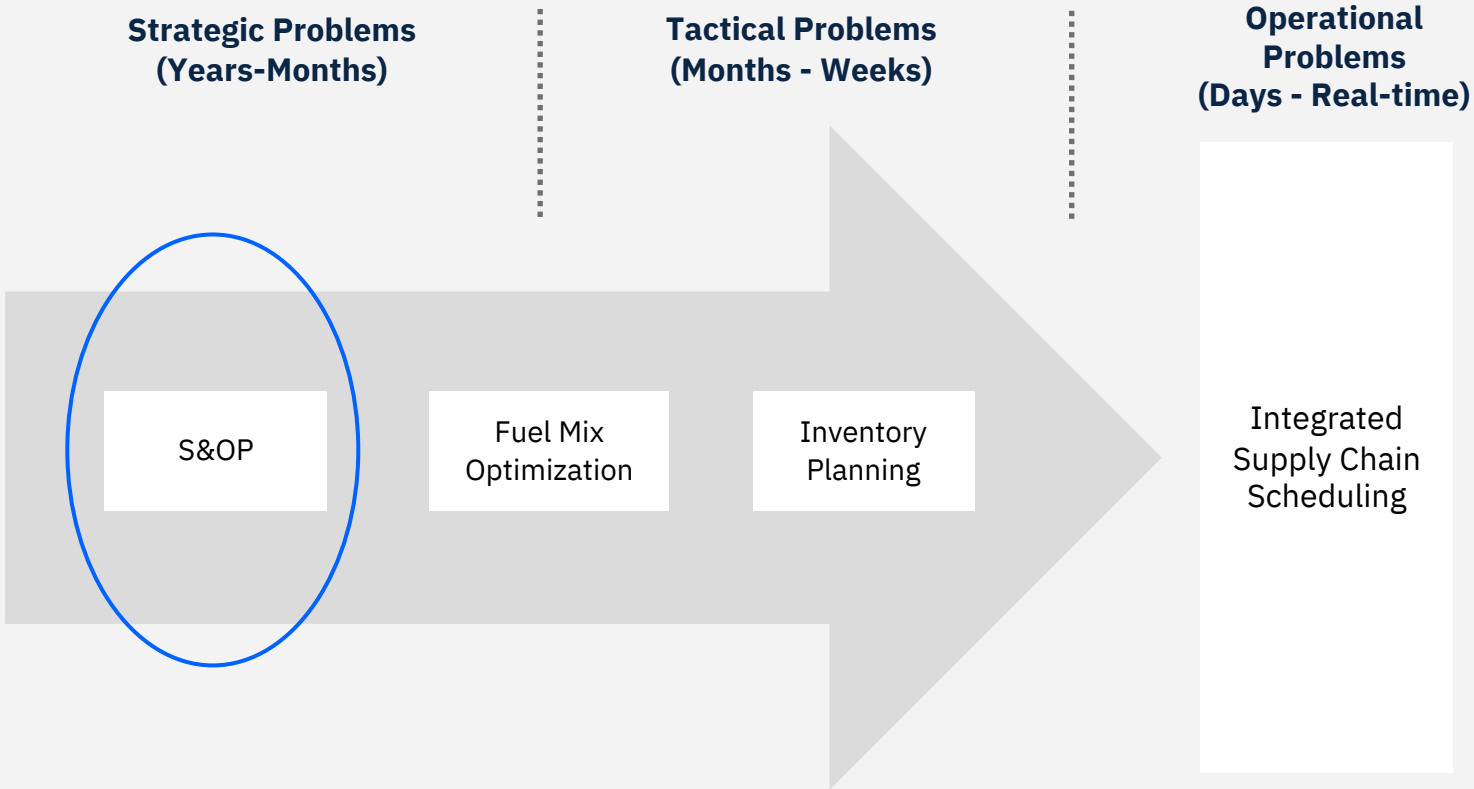
Sales and Operations Planning at ÇİMSA

CimSA S&OP team meets with executives every week to decide on:

- Sell / Not to Sell Decisions

- Order-Facility Assignments

- Customer Service Levels

- Inventory Levels

- Production Modes (High/Medium/Low speed)

- Line Conversions (white vs gray in certain kilns)

- Maintenance & Balancing Stops

- Plan for Next 24 Months

Solution Approach

```
┌─────────────────────┐        ┌─────────────────────────┐        ┌─────────────────────────┐
│   Data              │        │   Staging Database      │        │   Decision Optimization │
│ ┌─────────────────┐ │   →    │ ┌─────────────────────┐ │   →    │ ┌─────────────────────┐ │
│ │  Sales          │ │        │ │ Data Engineering:   │ │        │ │ Select best sales   │ │
│ │  Capacities     │ │        │ │ Ensure complete and │ │        │ │ and operations plan:│ │
│ │  Costs          │ │        │ │ clean input data and│ │        │ │ Maximize Profit &   │ │
│ │  Compatabilities│ │        │ │ seamless integration│ │        │ │ Fulfillment         │ │
│ │  Specific       │ │        │ │ with SAP            │ │        │ └─────────────────────┘ │
│ │  business rules │ │        │ └─────────────────────┘ │        └─────────────────────────┘
│ └─────────────────┘ │        └─────────────────────────┘                    │
└─────────────────────┘                                                       ↓
                                                                   ┌─────────────────────────┐
                                                                   │   Dashboard             │
                                                                   │ ┌─────────────────────┐ │
                                                                   │ │ Network plan details│ │
                                                                   │ │ Customer & Warehouse│ │
                                                                   │ │ allocations         │ │
                                                                   │ │ Production &        │ │
                                                                   │ │ Warehousing &       │ │
                                                                   │ │ Transportation plans│ │
                                                                   │ │ Capacity            │ │
                                                                   │ │ utilizations        │ │
                                                                   │ └─────────────────────┘ │
                                                                   └─────────────────────────┘
```

The ultimate goal for ÇimSA is to be proficient in the use of the technology as part of the S&OP process and conduct it internally.

Model Design Details
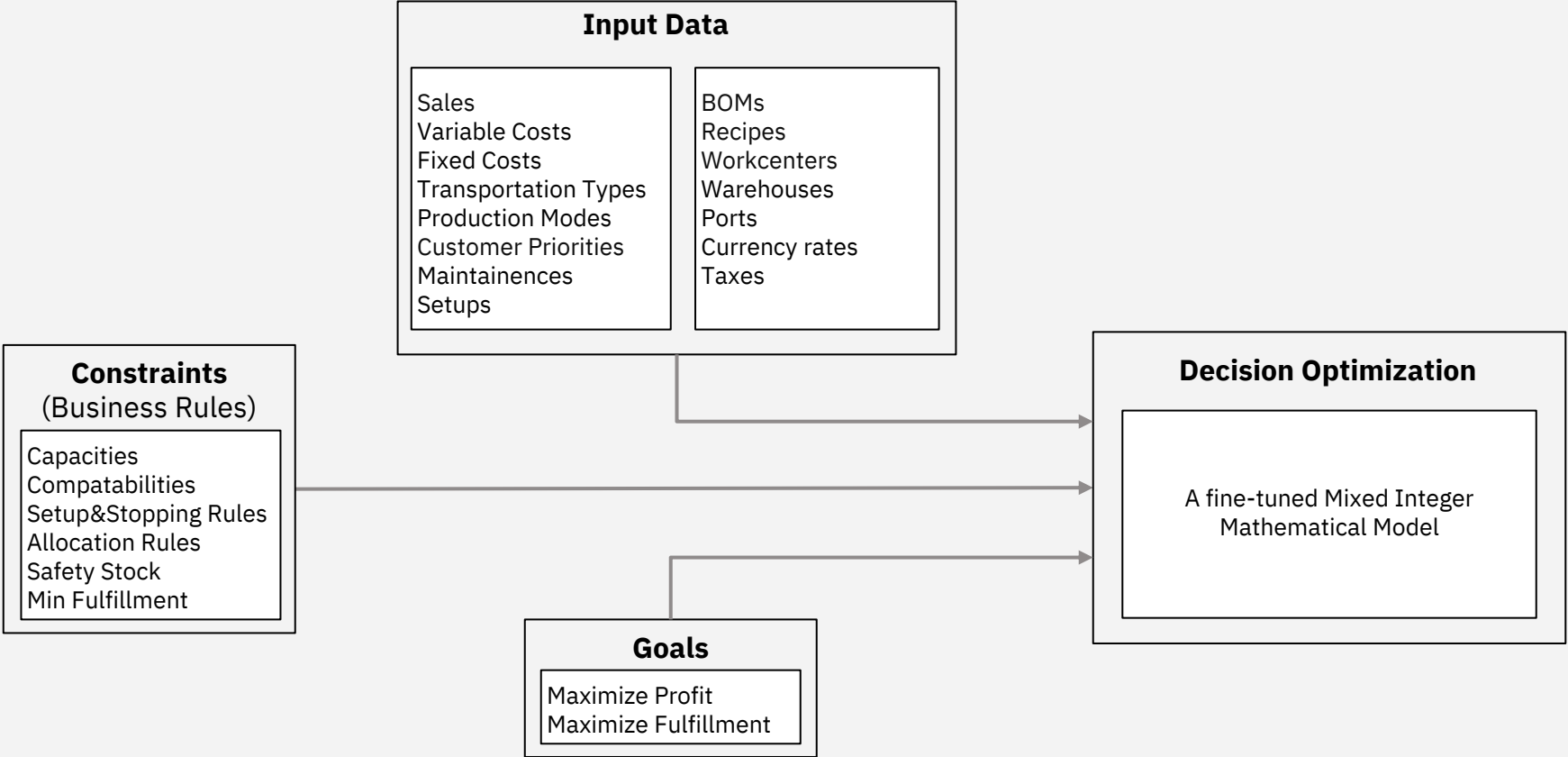
Managing Supply Chain Risk
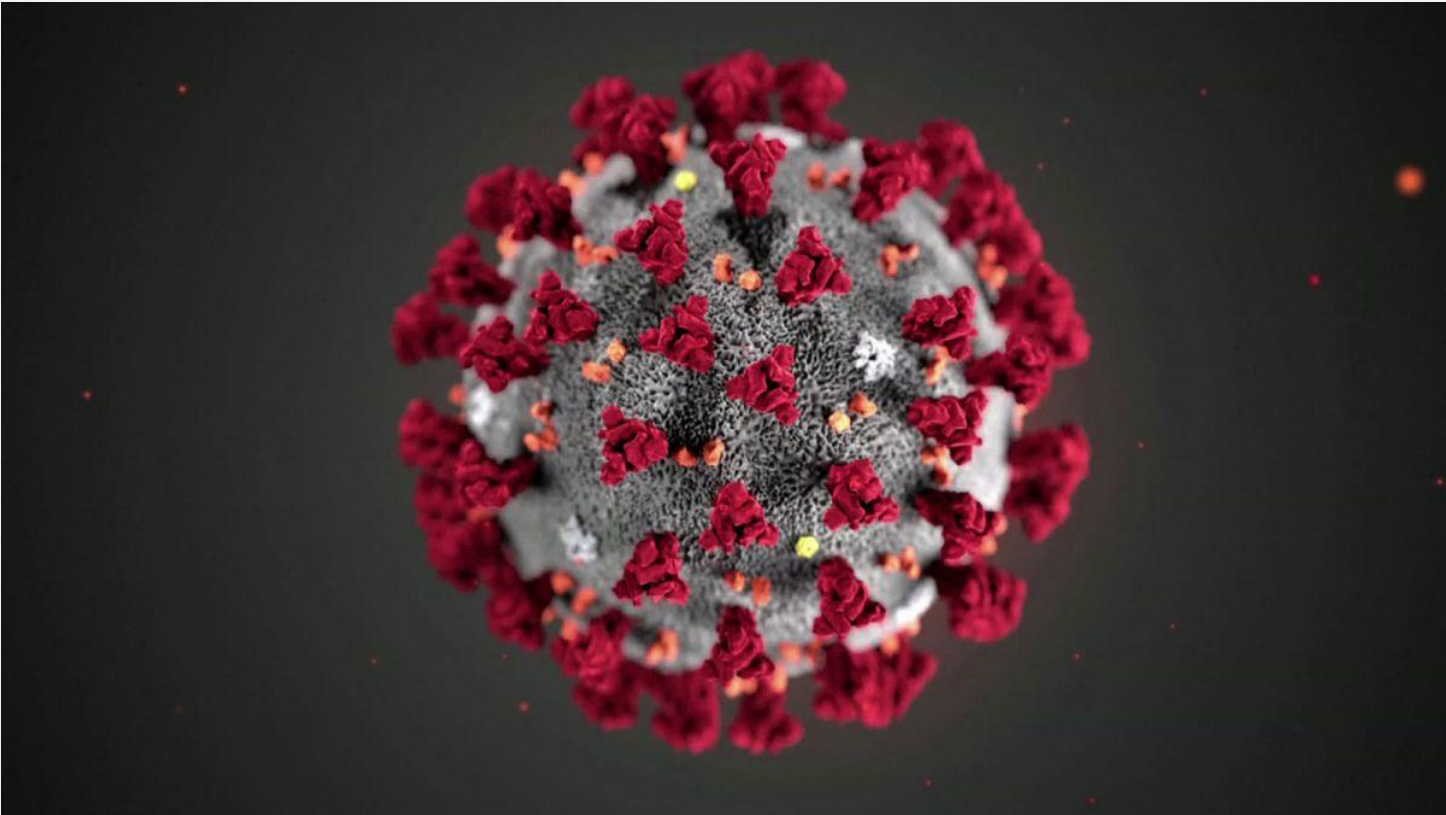
We've to do more with less

and we've to run many "what-if" scenarios

Business challenges

- Integrated production and distribution decisions

- Multiple-objectives

- Complex business rules

- Capacity bottlenecks

- Dynamic market conditions

- Manual processes

Business benefits

- Supply chain cost reduction expected by 5-10%

- Better customer service

- Visibility of planning results

- An automated and optimized decision support system with what-if scenario analysis capabilities

Developed solution

Technical perspective:

- A staging database is fully integrated with Cimsa's SAP system

- Custom web-based user interfaces

- Cplex is embedded into the custom developed application

Model perspective:

- A mixed integer mathematical programming model

- Parameter tunings

- Warm-start and new multiple-objective features

Challenges in the deployment of OR projects – CimSA case

DATA 💾

Collection ✓

Validation ✓

Preparation ✓

Generation ?

SCOPE 🩺

Optimize ALL

or at least MORE

TRUST

How do I know your solution is optimal?

DURATION ⏱

- Political Movements i.e. Arab Spring 2010-2012

- Floods i.e. 2011 Thailand

- Pandemics i.e. 2020 Covid

- Team Changes i.e. Ginni Rometty retirement

SOLUTIONS

- AI/ML → Data Cleanness & Completeness & "Generation"

- Decomposition → Scope

- Visualization & Reporting & What-If Analysis → Trust

- Stay Calm → Duration

Wrap Up

We had challenges AND

- We've got the right "team"
  - The right "approach"
    - The right "optimization tool"
      - There continue to be great opportunities…