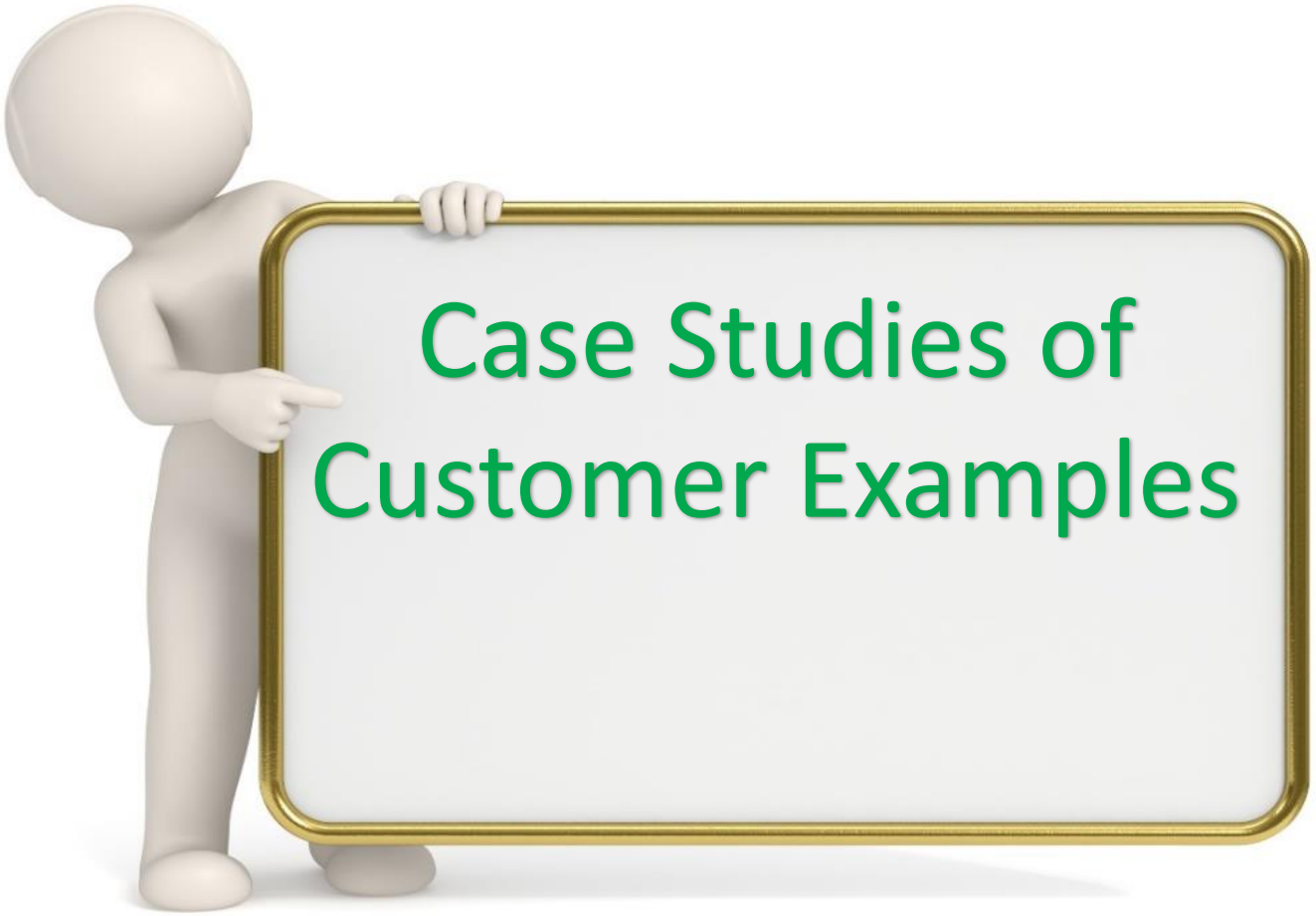
# Module 6



# Shell Vessel Scheduling

**Challenges**

Size of scope and complexity of the environment.
Weather and delivery constraints.
Equipment availability.
Delivery performance to offshore facilities.

**Solution**

Sequences that respect all process constraints.
Quick and efficient re-planning and scheduling.
Discrete event simulation.
Awareness of all variability in the process.

**Value**

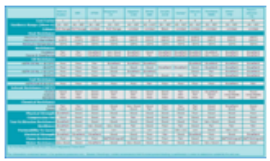
Measure the quality of the schedule.
Allow users to react to changes in the system.
Schedule visibility to all parties in the supply chain.
Visibility allows running tighter operation.
One tool for LT planning and ST scheduling

# Shell Gulf of Mexico Vessel Planning Demands

# SYSTEM ARCHITECTURE

Daily Start State

Triton or STAR for Vessel Status and Activity Tracking



Daily position and current activity of each vessel

Demand Profile

WellOffice.net For Order Management of Near Term Wells

2014-15

Vendor ERP Systems

E2Open (Middleware)

Latest material delivery requirements

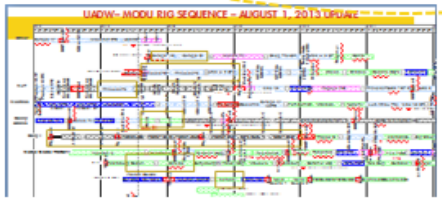
SAP MM for MIE materials

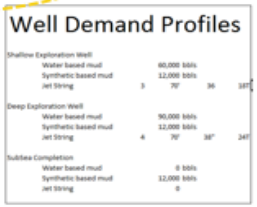
Estimated future well delivery requirements

Simio for Vessel Scheduling / What If's

Demand Generator For Future Wells

At least daily revised schedule with probabilities


UA Logistics

RESTRICTED

# John Deere

**Challenges**
Ineffective planning in Excel.
Infeasible production schedules.
Schedules are disconnected from the MES and ERP.
Poor production performance and throughput.

**Solution**
Integrated scheduling and MES solution.
Sequences that respect all process constraints.
Quick and efficient re-planning and scheduling.
Schedule presented on the MES operator screens.

**Value**
Greater production stability.
Improved production throughput and efficiency .
Data integration and integrity.
Time feedback and re-planning.

# Sequencing & Scheduling Constraints

1. Priority Orders
   - Want the ability to manually indicate the sequence of certain orders
2. Gantry Space
   - Do not schedule 2 double gantry jobs back to back
3. Core Availability
   - Orders with same Material ID must be spaced apart by at least 800 (variable for future) molds to ensure core availability
   - Does not apply to a few mold IDs, such as wheels
4. Iron Flow
   - Sequence heavy molds on A and light molds on B to optimize iron flow and minimize # of times pressure pours need to switch
5. Core Setters (Labor)
   - Molds cannot be sequenced in a way that will require more than 6 (variable) workers to load A & B at the same time
6. Pattern Groups
   - Molds that are in the same Pattern group must be sequenced with one shuttle space (A&B) in between them to accommodate for additional prep work
7. Matching Material IDs
   - Different orders with the same material ID should not be sequenced on both A & B at the same time
8. Balancing Iron Type M
   - Strive to minimize the number of wheel weights at the end of each iron type campaign by balancing the quantities specifically on Iron type M

# F35-Joint Strike Fighter

## Problem Statement

- Ramping up production of the F-35 Joint Strike Fighter from 1 aircraft per month to 1 per day.
- Response time and accuracy of decision support techniques is insufficient to evaluate the outcomes of complex and highly interconnected operations environments.

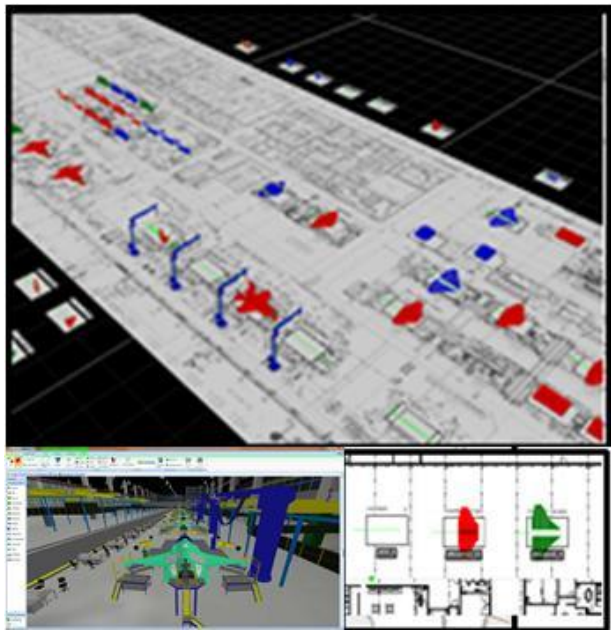
## Business Rationale

- Mitigates risk to production cost and schedule by providing increased visibility of potential production problems and the ability to judge the effectiveness of possible solutions.

## Expected Results

- Reduce lost days 50%
- Less workstation delays $3.67M/yr.
- Less rescheduling review $173K/yr.
- 5-Year NPV ROI 18.6 : 1

F-35 Joint Strike Fighter



# Industrial Manufacturing

**The Company**: $34B multinational corporation operating mainly in robotics, power, heavy electrical equipment and automation technology areas.

**The Challenges**:

- Integrated complex manufacturing operations requiring specific machines, tooling and skilled operators to complete tasks.
- Long lead-time items that can cause delay in production if not ordered on time.
- Critical customer testing and final delivery dates causing heavy penalties when delivered late.
- Synchronization issues between engineering and production for planning material and resources to meet delivery dates.
- Disconnect between master planning and detailed production scheduling for material and product delivery..

**The Solution**: Simio provides a single model (digital twin) to plan and schedule all activities for both tenders and fixed orders to ensure synchronization between all the various production departments, engineering and master planning.

**The Results**: Total transparency between all steps in the design and manufacturing process. Align the master plan with the detail production schedule to ensure material availability and OTD.

# Consumer Goods

**The Company**: $10B company producing personal care consumer goods.

**The Challenges**:

- Manual, iterative, weekly scheduling process using Microsoft Excel for tracking and communicating
- Experienced-based application of rules, constraints, priority, and sequencing
- Difficult to predict synchronization delays, leading to unplanned downtime
- Time consuming (e.g., days), multi-pass, scheduling of each operational area with back-end feasibility checking

**The Solution**: Concurrent, single pass scheduling of all operational areas with automatic feasibility checking

**The Results**: Increased throughput to support over $20M in annual profit at a single plant.

# Metal Production

Simio
Forward Thinking

**The Company**: $11B company producing aluminum which operates in 10 countries

**The Challenges**:

- Manual planning of the pot pairing and the movement and processing of crucibles between the Potroom and the Casthouse, which is not only challenging but is suboptimal in its results.
- Scheduling the "pot pairing" is the decision of which pots to pull metal from and put into crucibles so the overall chemistry of all the crucibles that make up a furnace order meet the chemistry requirements of that order.
- Because of the manual decisions involved with the movement of the crucibles in the facility, the casthouse and the potroom do not have enough visibility into upcoming tasks in their area.

**The Solution**: Simio produces a pot pairing and a furnace filling schedule, along with all the tasks of each truck, which are sent automatically to the facility from Simio to the MES and to each truck. Ten different events within the facility can cause Simio to automatically reschedule, upwards of every 15 mins, if needed.

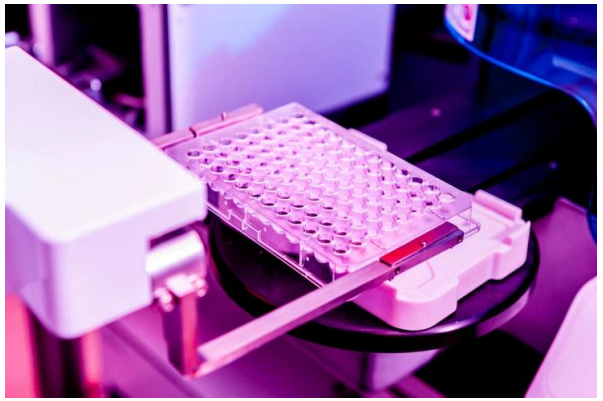
**The Results**: Increased visibility and synchronization between the casthouse and potroom, increasing asset utilization and throughput.

# Life sciences/Pharma

**The Company**: Pharmaceuticals company producing products from live biological samples

**The Challenges**:

- Highly complex combination of hundreds parallel and sequential tasks (each with unique resource requirements)
- Because samples are live, WIP inventory has a very limited shelf life. Products cannot wait for the next step in the process to become available, or they will expire and create waste
- Scheduling requires look ahead and resource reservation for continuity of processing



**The Solution**: Conditional release of orders based on resource reservations guarantees continuity of processing while considering all tasks and sharing of resources

**The Results**: Observed reduction in waste caused the company to redesign their MES system to scale the solution across all manufacturing operations

# Denmark Capitol Region

**Challenges**

Size of scope and complexity of the environment.
No compromise environment.
Sterile equipment availability.
Delivery performance to other hospitals.

**Solution**

Sequences that respect all process constraints.
Quick and efficient re-planning and scheduling.
Fully automated solution.
Awareness of all variability in the process.

**Value**

Meet committed performance targets.
Real-time integration to the execution systems.
Optimized resource schedules.
Forward visibility based on expected demand

# BAE Defense Contractor

**Challenges**

Difficulty meeting delivery goals for gun barrels, especially dealing with equipment reliability problems.
Previous system could not handle schedule constraints.

**Solution**

Customized interface for generating schedules and performing risk and cost analysis.
Explore assess changes in equipment and employee assignments.

**Value**

Meet production deadlines.
Decreased overtime.
Managing equipment reliability.
Forecasting/evaluating capital investments.

# Examples Of Realized Value

Simio
Forward Thinking

## Design Successes

- Vancouver Airport – Simio saved $100 million by avoiding unnecessary terminal expansion
- Retirement Clearinghouse – Simio shows Americans can add $115 billion to their savings with auto portability
- KCS Rail improved throughput by 13% across a bottleneck resource
- John Deere – Simio forecasted a savings of $240,000 by re-assigning tasks to workers across floor
- Cosan - Simio predicted unnecessary sugar cane transport purchases that saved $550,000
- Virgin Airlines - Simio discovered in time that a new gate plan would decrease on time performance by 50 points and drop them from 1st place market leader to 2nd place

## Scheduling Successes

- Royal Dutch Shell – Simio is at the core of a system that saves $300 million per year with logistics efficiency
- Air Force – Simio increased process output 30% that increased revenue $10.35 million
- John Deere - Simio production scheduling tool was used to create a feasible schedule with WonderWare MES
- BAE Systems – Simio helped meet production deadlines and decrease overtime
- Alcoa –Simio is used for their smelter (Potroom and Casthouse) and generates good, feasible schedules
- Denmark Hospitals - Simio handles detailed planning because it calculates an optimal plan for execution, based on a simulated model of the facility, with WonderWare MES

**For more information:**

www.simio.com

Dave Sturrock
dsturrock@simio.com
Linkedin.com/in/sturrock/