

Dr. Hans Schlenker
Client Technical Professional, ILOG Optimization
hans.schlenker@de.ibm.com

IBM ILOG Optimization

Introduction and Overview



Optimization – The Science of Better Decisions



How to best allocate aircrafts and crews?



Inventory cost vs. customer satisfaction?



What to build, where and when?

Optimization helps businesses:

- create the best possible plans*
- explore alternatives and understand trade-off*
- respond to changes in business operations*



Risk vs. potential reward?



Cost vs. carbon emission?

Analytics landscape: from reporting to optimization



Based on: Competing on Analytics, and Harris, 2007

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What is optimization all about

Complex decision support

Business value

Projects and references

Many different customers and application areas

Huge ROI

Product portfolio

CPLEX components, ODME platform, SCM packages

ILOG Optimization: **Complex Decision Support**

Optimization **solves business problems!**

·Automated

- thru mathematical optimization

·Planning

- or scheduling, dispatching, yield management, risk management, etc etc.

Business Value

- Cut operating costs
- Avoid capital expenses
- Shorten delivery times
- Offer flexible, precise customer service
- Provide personalized work schedules
- Manage risk
- Create better products
- Maximize profitability
- Etc etc etc

Optimization: What is so special about it.

·Scenario: create a timetable for a small school

- 5 days, 6 hours each, 10 classes, 10 teachers, 10 courses
- Possibilities for a plan:
 10^6
 - $(10 * 10)^{(5 * 6 * 10)} = 100^{300} = 10^{600}$
- Number of atoms in the universe:
 10^{80} (roughly)

·Deterministic heuristic would probably find you a good solution, but to find (one of) the optimal solution, you need a better approach!

·Optimization takes into account *the space of all possible solutions*

- not each and every individual one!
- and selects good ones or the best!

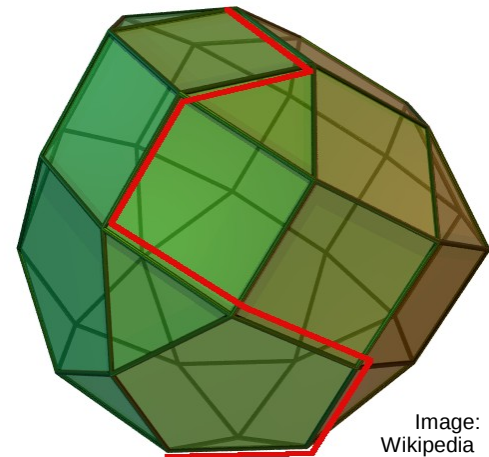
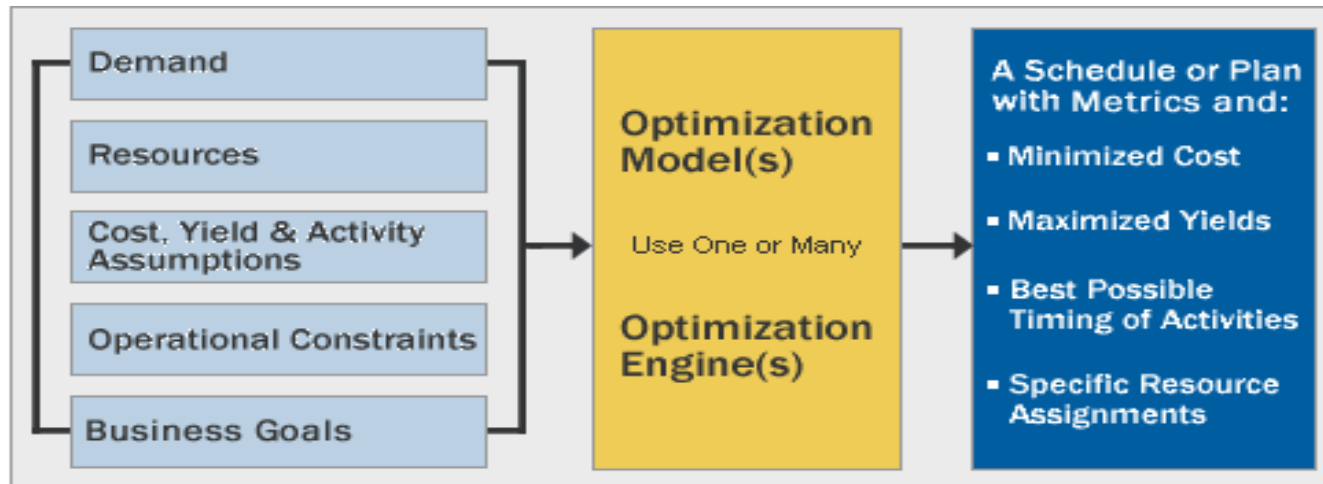


Image:
Wikipedia

Optimization: What is so special about it.



- *Model* specifies the *problem*
 - variables, constraints, goals
 - generic model is filled with application data
- ILOG *engine* solves it with special algorithms
- *Solution*: a plan or schedule

Optimization basics: TLC+D

- TLC+D: Targets, Limits, Choices + Data

- Data (input)
 - demand, products, costs, lead time, production recipes

- Choices
 - What to produce, where, when, how to transport, to which customer

- Targets
 - Minimize costs, maximize plant throughput, maximize yield

- Limits
 - Production capacity, storage capacity, supplier capacity, physical constraints

Optimization example: Pasta production

- Data (input)

Products				Resources		Consumption		
Name	Demand	InCost	OutCost	Name	Capacity	Prod \ Re	flour	eggs
kluski	100	0.6	0.8	flour	80	kluski	0.5	0.2
capellini	200	0.8	0.9	eggs	50	capellini	0.4	0.4
fettucine	300	0.3	0.4			fettucine	0.3	0.6

- Choices

- What products to produce internally, what to buy from external supplier

- Target

- Minimize costs: production+sourcing

- Limits

- Resource capacity (here: raw material)
- Recipe constraint
- Demand fulfilment

Optimization example: OPL model

• Data (input)

```
tuple product {
    key string name;
    float demand;
    float insideCost;
    float outsideCost;
}
{product} Products = ...;
tuple resource {
    key string name;
    float capacity;
}
{resource} Resources = ...;
float Consumption[Products][Resources] = ...;
```

• Choices

```
dvar float+ Inside[Products];
dvar float+ Outside[Products];
```

• Target

```
dexpr float InCost[p in Products] = p.insideCost * Inside[p];
dexpr float OutCost[p in Products] = p.outsideCost * Outside[p];
dexpr float OverallCost = sum( p in Products ) (InCost[p] + OutCost[p]);
```

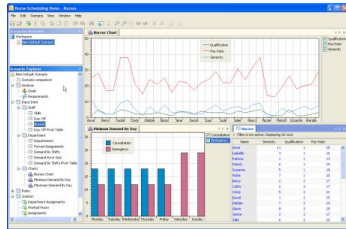
• Limits

```
minimize OverallCost;

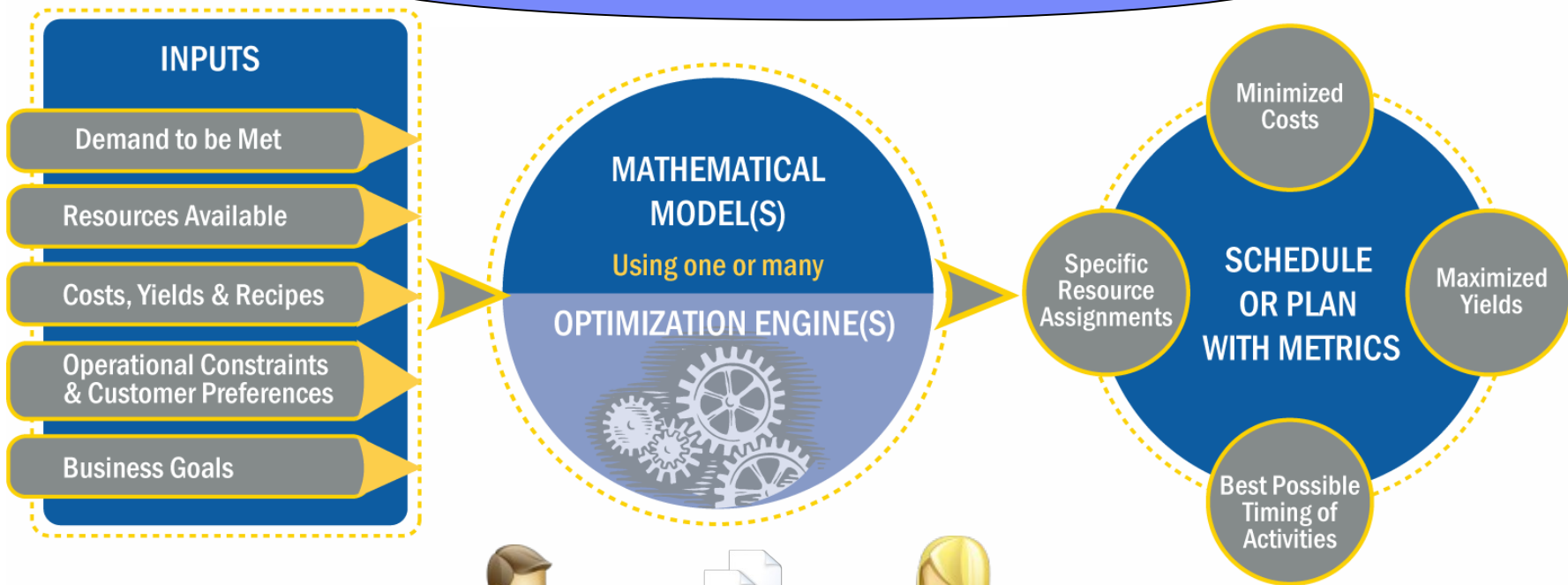
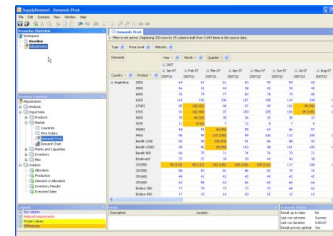
subject to {
    forall( r in Resources )
        sum( p in Products )
            Consumption[p][r] * Inside[p] <= r.capacity;

    forall( p in Products )
        Inside[p] + Outside[p] >= p.demand;
}
```

How does optimization support decision making?



What-If Analysis



Collaboration

Hans Schlenker – IBM ILOG

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What is optimization all about

- Complex decision support

- Business value

Projects and references

- Many different customers and application areas**

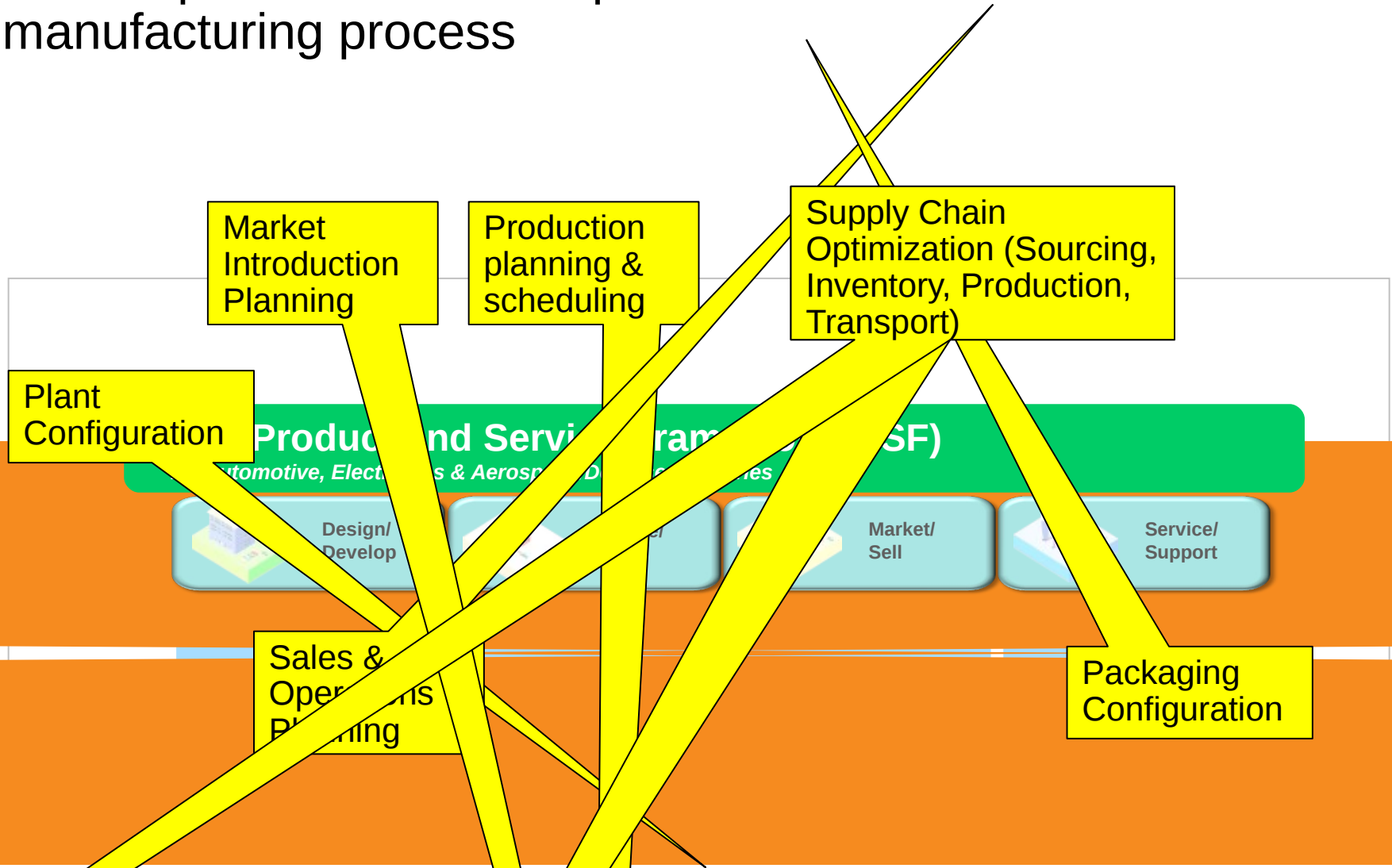
- Huge ROI**

Product portfolio

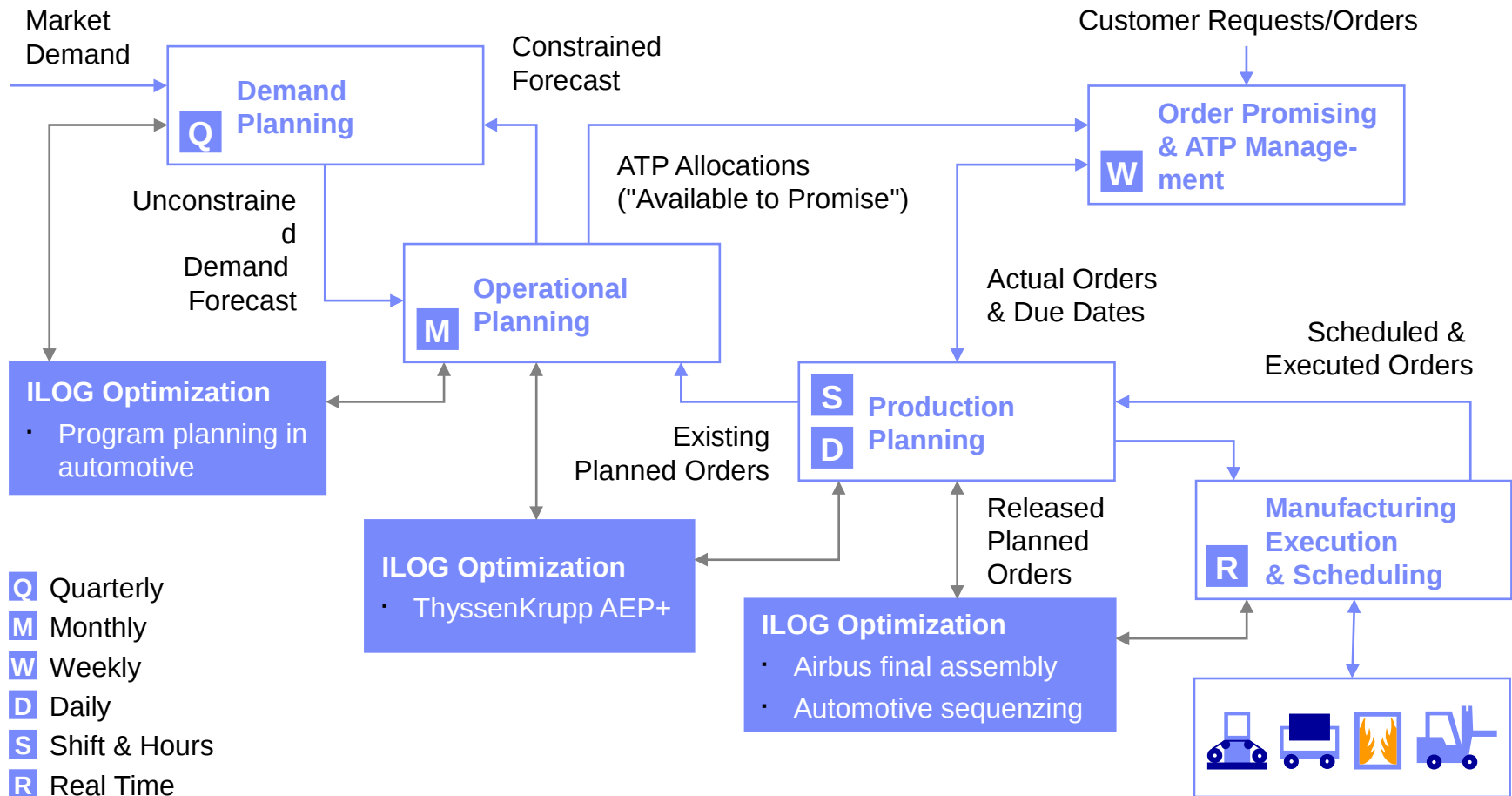
- CPLEX components, ODME platform, SCM packages

Optimization applies everywhere

ILOG Optimization solves problems in the whole manufacturing process



Optimization in production planning: ILOG supports all planning steps and horizons



Automotive Sales & Operations Planning: Overview



2164
types

**Major Car
Manufacturer**

How many cars of
each type?

110
countries



Delivered to what
market?

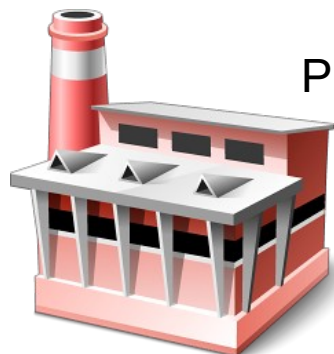
1000's critical decisions
... each month



10 collaborating planners



Produced where?



12
plants

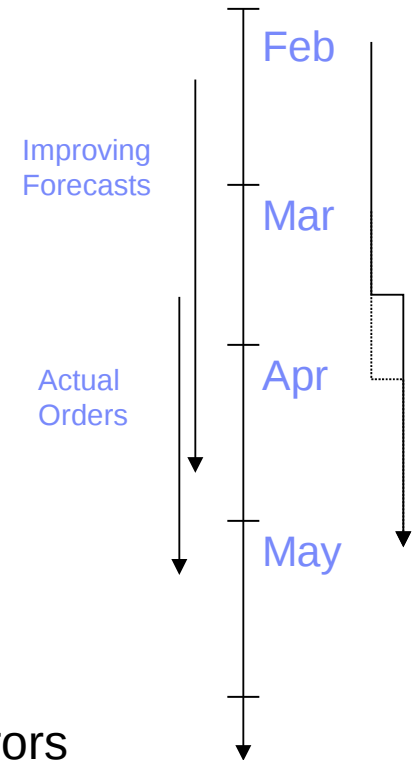
At what time?

24
months



Automotive Sales & Operations Planning

- Business needs
 - Efficiently allocate production capacity to market demand
 - Make difficult supply-demand trade-offs
- Current issues
 - Lacks agility (planning 3 months in advance)
 - Continuous re-adjustments of plan
 - Planning was very inaccurate
 - very detailed forecast: on most detailed level
 - many small figures -> many errors



Example:

Before: planning on most detailed level, led to many planning errors

After: p

Belgium	E220 (car type)	Diesel	Oct 2011	+3%
Belgium	E230	Diesel	Oct 2011	+2%
Belgium	E230	Gasoline	Oct 2011	+4%

Europe	all car types	Diesel engine	2H 2011	+5%
France	E class	any engine	2H 2011	+8%
France	E220	Diesel	June 2011	+3%

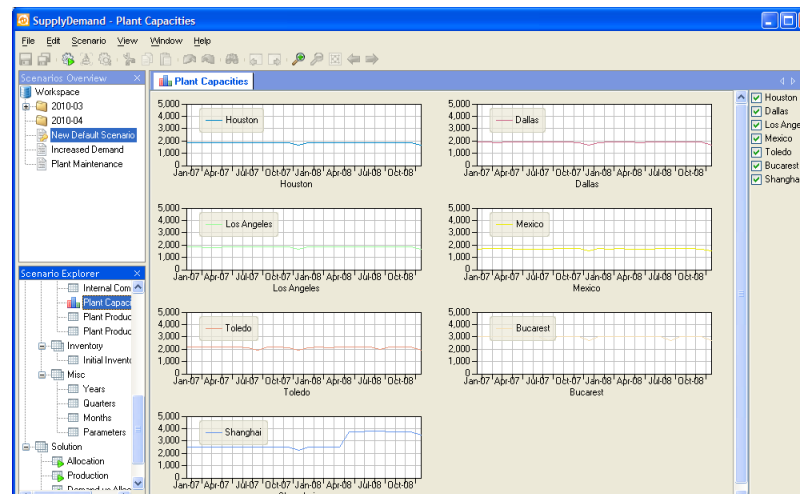
Automotive Sales & Operations Planning

• Solution

- Solution based on IBM ILOG ODME optimization platform
- Supports many collaborating planners
- Optimization for efficient supply-demand balancing

• Benefits

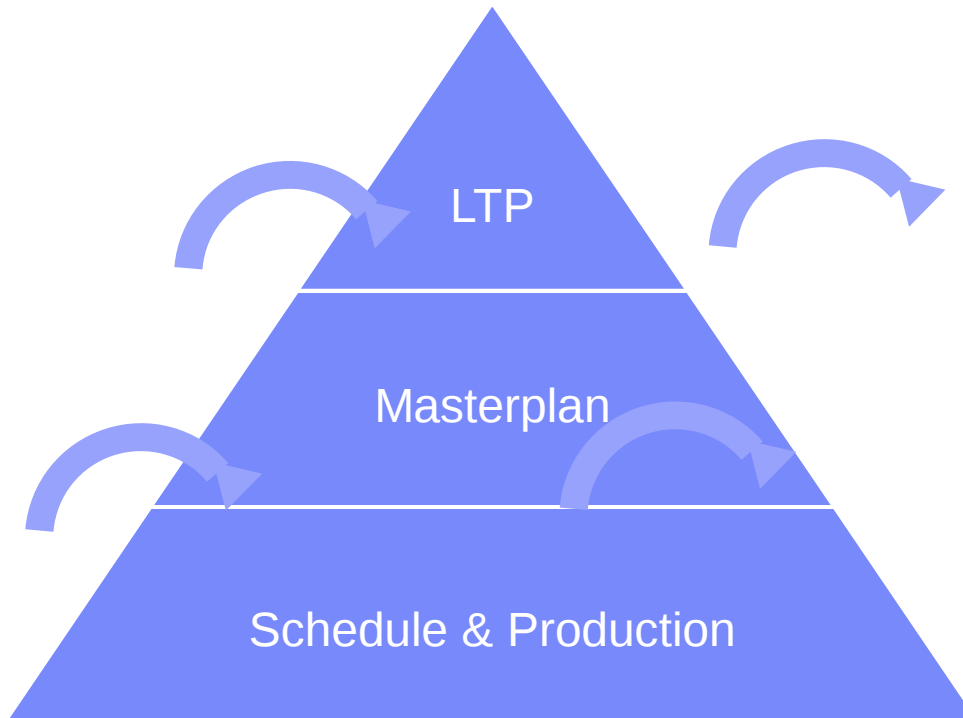
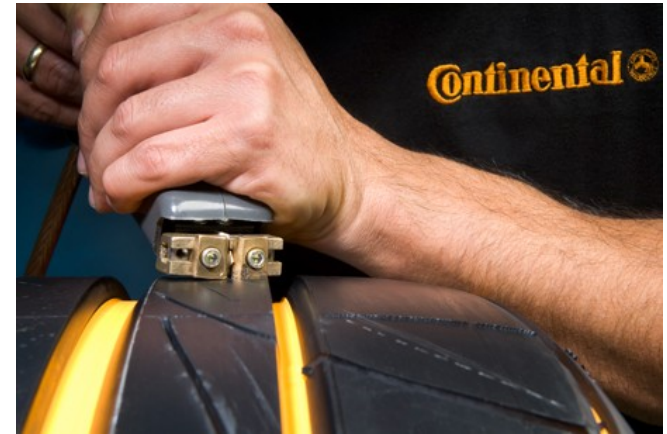
- Increased agility: saved 1 month planning time
- Reduced planning effort: 75% less planning figures
- Better planning accuracy: 50% less plan changes



Car tire production planning

Customer:

- 10000 products
- 20 plants world wide
- each ~10M tires / year

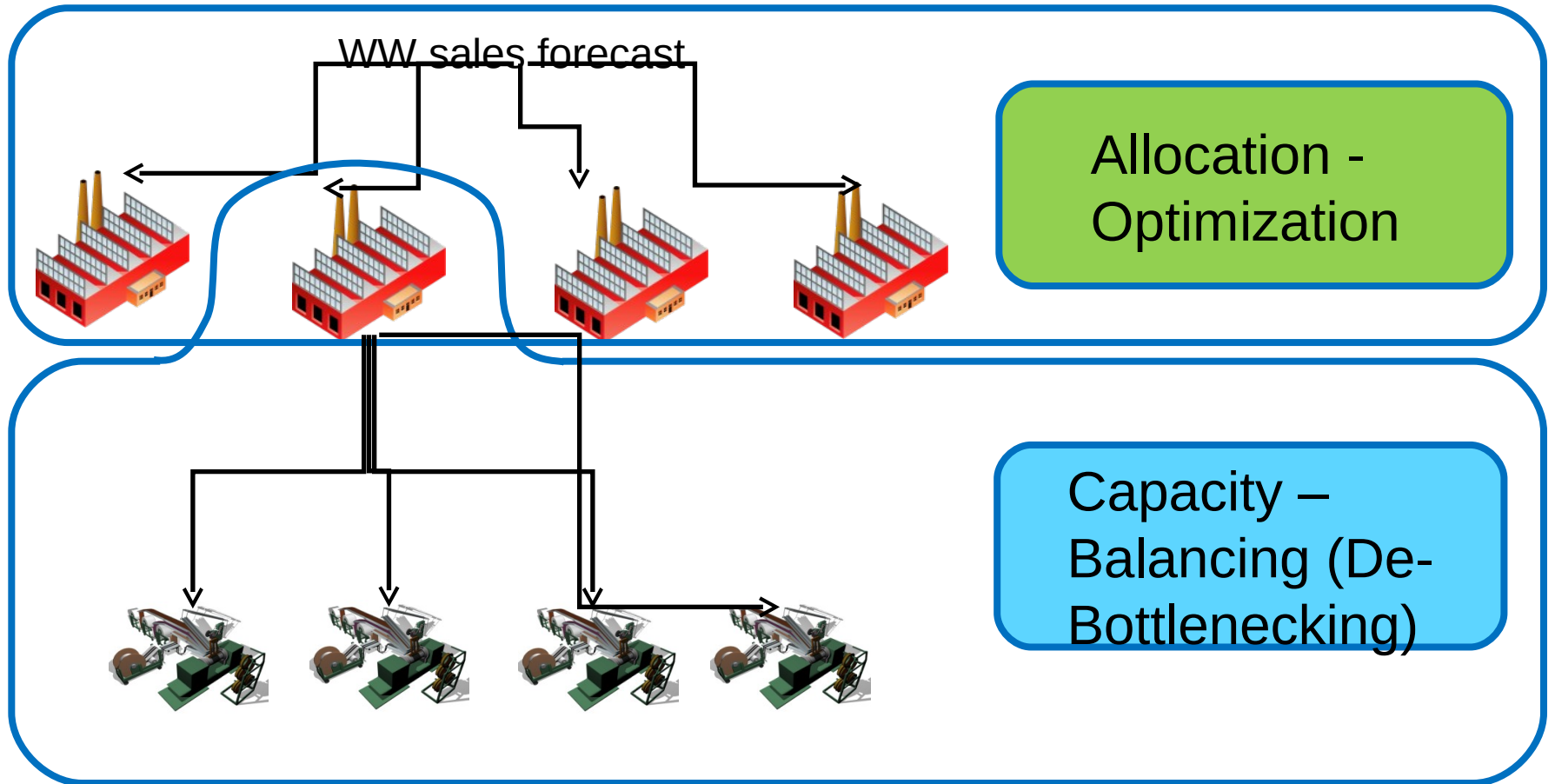


Long term planning (LTP)
1-5 years

12 month supply chain planning
incl production planning (i2)

Production scheduling,
sequencing and manufacturing
executing (SAP)

Car tire production planning: Allocation & Capacity Planning



Car tire production planning: One approach supports different planning goals

Allocation

- WW network
- 1 period
- All products
- Ressources
 - Plants (incl calendar)
 - Some others (like tire size)
- BOC
 - Wrt ressources
- Production complexity
 - Wrt different products
- Transportation

Capacity Planning

- Per plant
- 12 months
- Plant's products
- Ressources
 - Machines (incl calendar)
 - Many others
- BOM
 - Incl materials

Planning Process: Allocation first (centrally), then Capacity (distributed)

Market Introduction Planning

• Situation

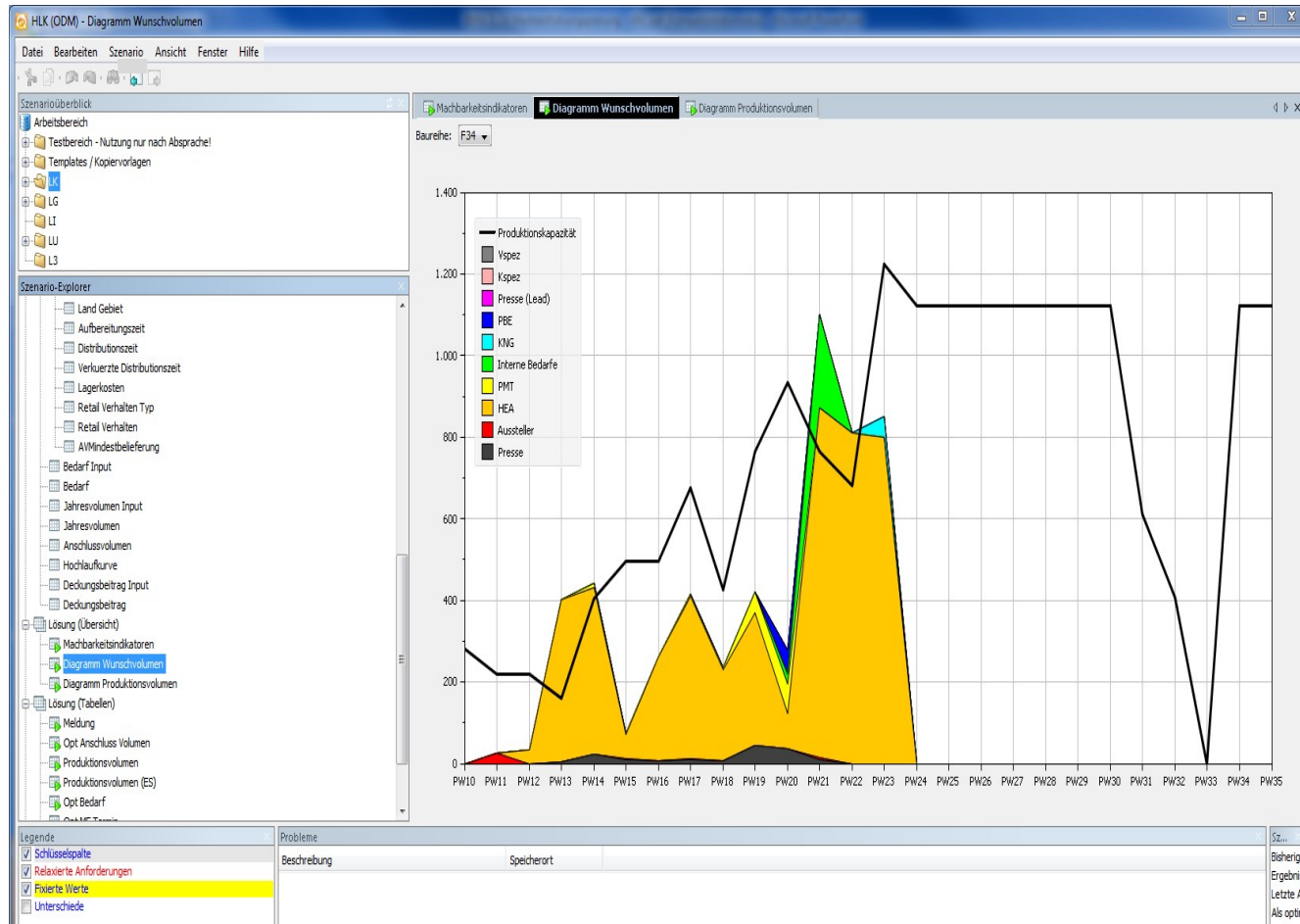
- Client seeks to improve market introduction planning for new car models
 - Some years before the introduction of a new model, initial production and introduction dates have to be planned
- Solution has to take into account
 - Demands by

Markets	e.g. US, Asia, Europe
Car type	e.g. sedan, convertible, coupé
Category	e.g. for trade show, press, dealers

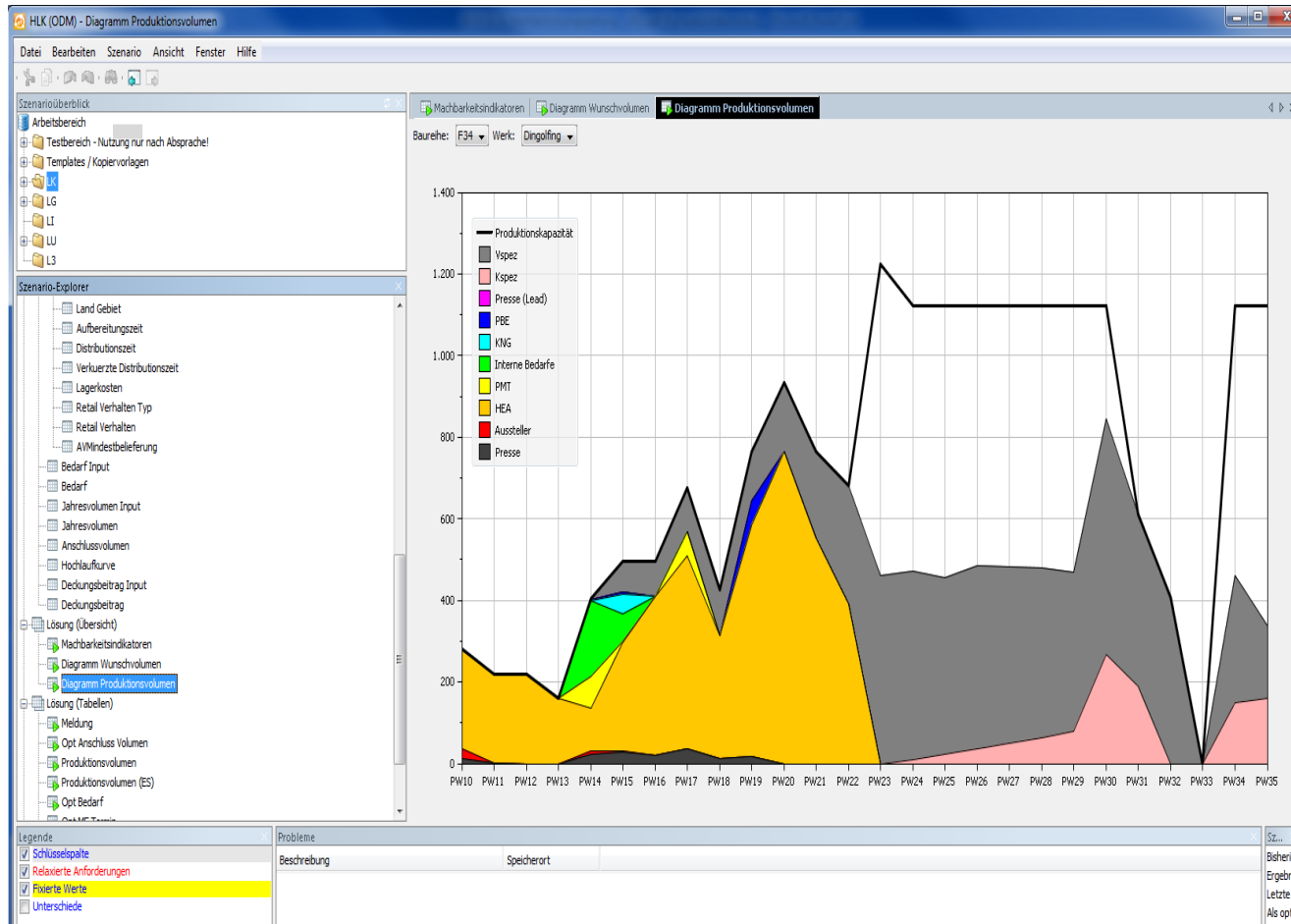


- Different market introduction dates
- Category specific production sequences
- Type and market specific sales margins
- Planning goals
 - Find earliest market introduction dates
 - Balance production costs / delivery costs / market specific profit
 - Maximize retail volume to produce after market introduction
- No standard package exists that provides all required functionality

Market Introduction Planning: Manual planning



Market Introduction Planning: Automated optimization

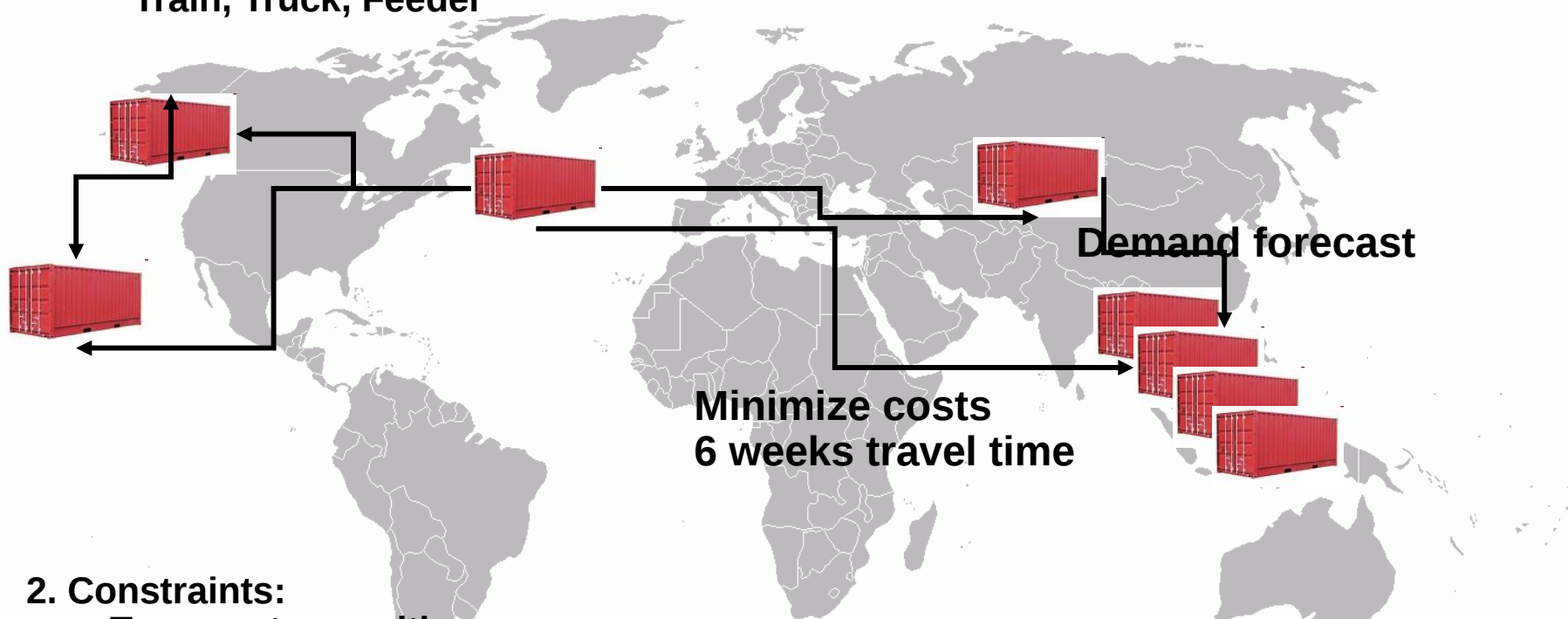


Empty Container Re-Positioning System

2 Million Empty Container moves per year
Cost: ~ 500 M€

1. Decision variables:

Chose transport modes and time
Company vessel
Train, Truck, Feeder






2. Constraints:

Transport capacities
Container demand for each location
Storage capacities
Business rules (e.g. Jone's act)

3. Optimize cost function:

Transport costs
+ Storage costs
+ On / Off hire

Banking+Finance: How Optimization Addresses Hot Button Issues

	 <p>Risk Management</p>	 <p>Operational Efficiency</p>	 <p>Client Service</p>
<p>Portfolio Optimization</p> <p>Investment Banking</p> <p>Retail Services</p>	target return		Tailor portfolios for individual clients and market segments
<p>Trade Matching</p> <p>Investment Banking</p>		Reduce transactions costs	Efficiently manage large clients' portfolios
<p>Settlement and Clearing</p> <p>Exchanges</p>	Faster settlement, less exposure	Reduce carrying charges	
<p>Managing Cash</p> <p>Retail Services</p>		Reduce operations costs	Provide more flexibility for customers' accounts
<p>Product Configuration</p> <p>Retail Services</p>		Respond more quickly to customer requests	Provide more flexibility in customer offers

Some further applications in various areas

- Crew-Scheduling (Airlines, Rail, etc)
- Power Plant Scheduling
- Production Scheduling (Steel, Food/Beverage, Aerospace)
- Online Optimization (Car Service Personell)
- Transport Optimization (Banks)
- Network Optimization (Telco)
- Sports Scheduling
- TV Ads Scheduling

Selected projects in network optimization: Huge benefit /

ROI	Customer	Industry	Application	Benefit (ROI)
	Leading US local phone provider	Telecommunications	Network performance optimization	Savings of U.S. \$1.5 million 2000 Wagner Prize for excellence in OR
	Major retailer, USA	Retail	Inventory Optimization	U.S. \$.15 million inventory costs saving
	Food supplier, USA	Wholesale Distribution	Post-Merger Network Optimization	Reduced transportation costs by U.S. \$8 million
	Supplier of printing systems, USA	Wholesale Distribution	Network Design and Planning	Over U.S. \$5 million in annual savings
	Computer parts manufacturer, Singapore	Wholesale Distribution	Optimized Distribution Strategy	Savings of up to U.S. \$4 million annually
	Electronics Supplier, USA	Wholesale Distribution	Supply Chain Redesign and Inventory Optimization	Reduced safety stock by 60%
	Consumer packaged goods maker, USA	Consumer Products	Global Sourcing and Manufacturing Network Rationalization	Savings of U.S. \$15 million
	US Dairy Industry Leader	Consumer Products	Supply Chain Strategy and Network Optimization	Cost reduction by more than U.S. \$300 million
	Metal Parts Manufacturer, USA	Industrial Products	Global Inventory Positioning	Reduced inventory costs by 11%
	Plastic Goods Maker, USA	Industrial Products	Production Planning	U.S. \$6 million through dynamic reassignment of customers among plants
	Maker of Industrial and Farm Machinery	Industrial Products	Parts Distribution Network design	Cut distribution costs by U.S. \$17 million annually
	Two Chilean Firms	Industrial Products	Planning and Scheduling of Forestry Operations	U.S. \$20 million annually + 30% fewer trucks
	Leading Global Logistics Provider	Travel & Transportation	Shipment Consolidation and Routing	Save app. 3000\$ per day for one of its customers

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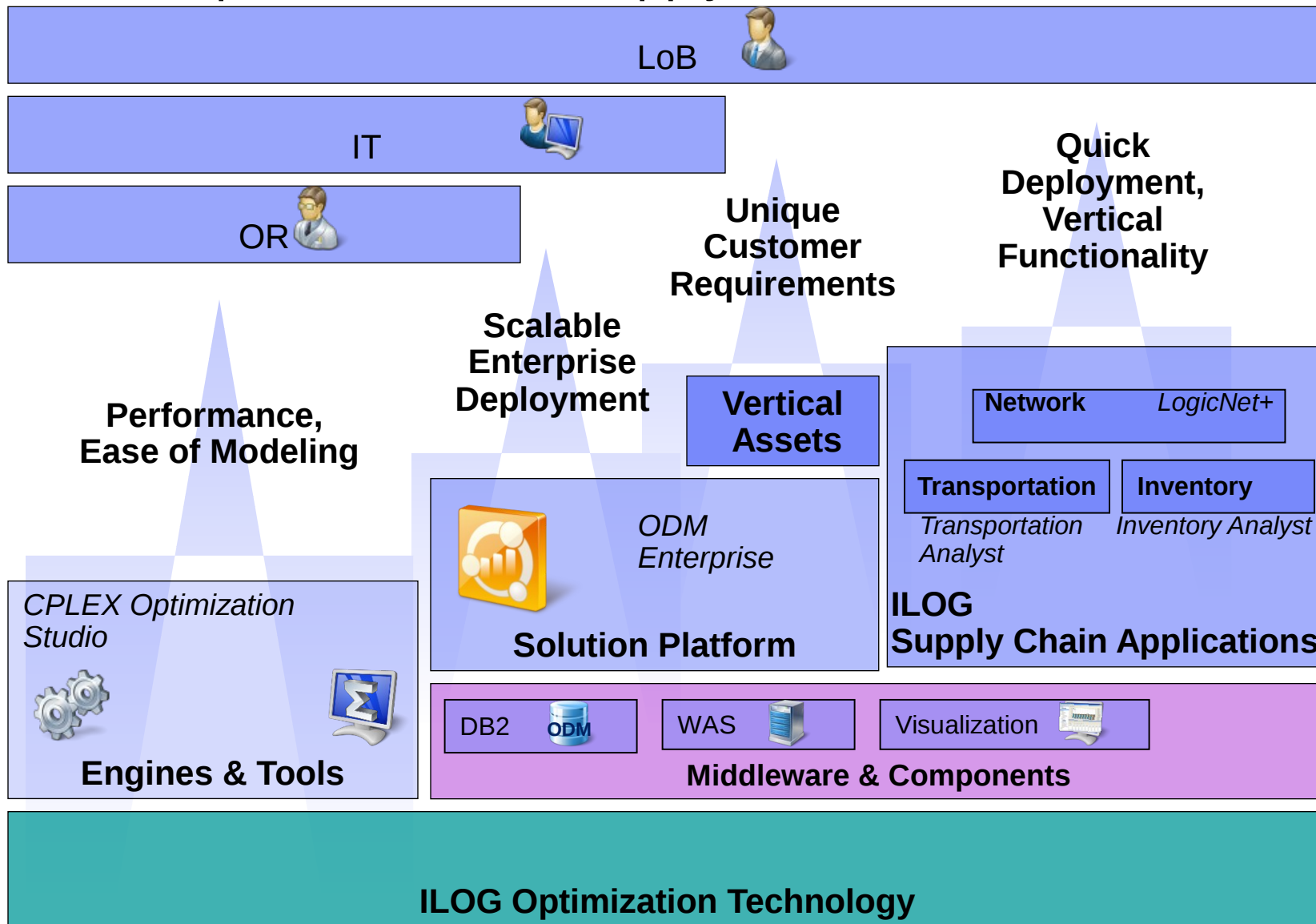
Product portfolio

- CPLEX components, ODME platform, SCM packages**

ILOG Optimization Product Portfolio: we offer the full range

the whole range

IBM ILOG Optimization and Supply Chain Products



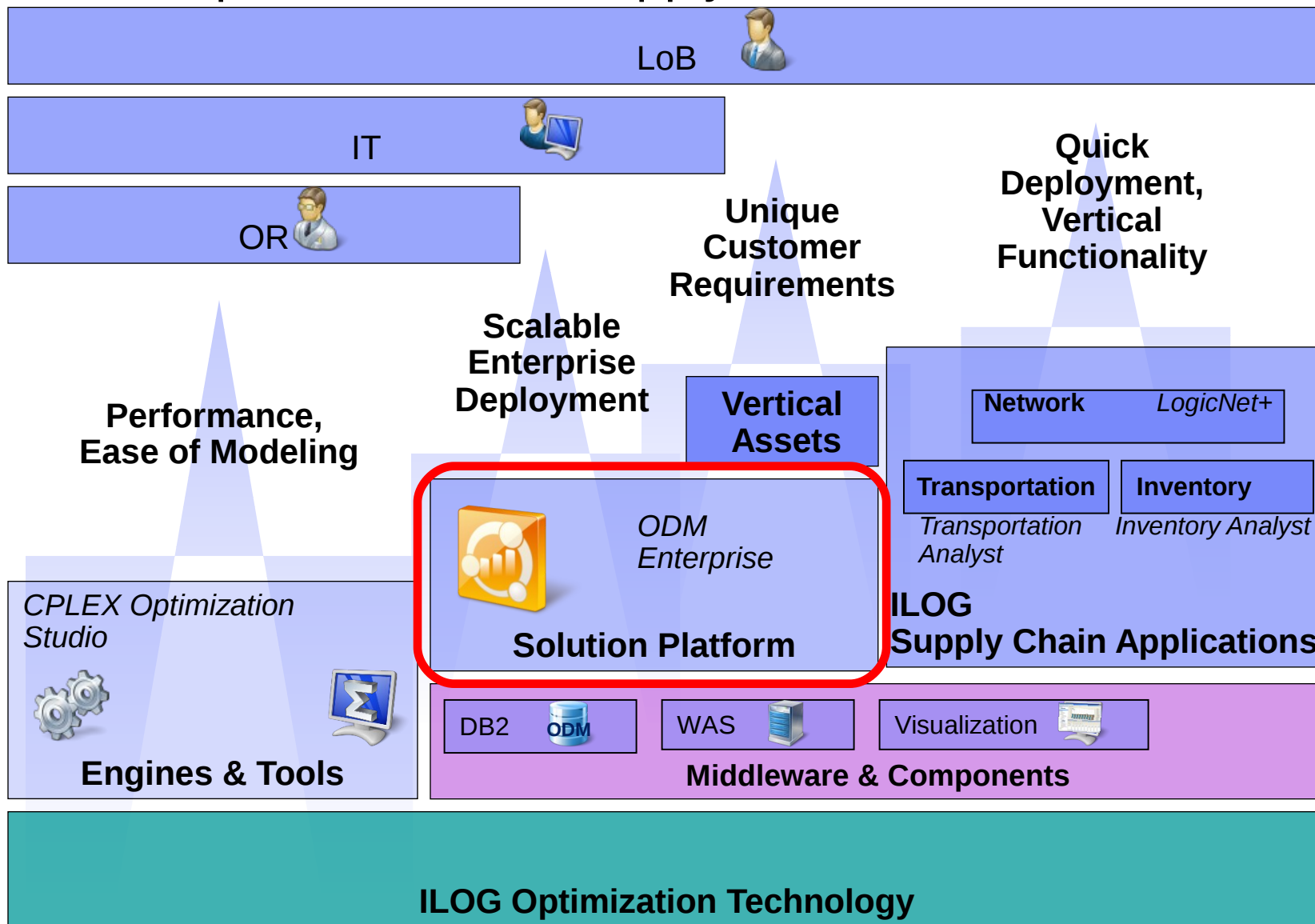
CPLEX's History of Performance Enhancement

CPLEX is the optimization core component of ODME

- CPLEX 7 (2000): 60% on “hard mixed integer problems”
- CPLEX 8 (2002): 40% overall, 70% on “difficult problems”
- CPLEX 9 (2003): 50% on “difficult customer models”
- CPLEX 10 (2006): 35% overall, 70% on “particularly difficult models”
- CPLEX 11 (2007): 15% under one minute, 3X on 1-60 minutes, 10X on one hour and up
- IBM ILOG CPLEX 12.0 (2009): 30% overall, 2X on 1000 seconds and up ODME 3.3
- IBM ILOG CPLEX 12.2 (2010): 50% overall, 2.7X on 1000 seconds and up ODME 3.4
- IBM ILOG CPLEX 12.3 (2011): 20% overall, 2X on 1000 seconds and up ODME 3.5
- IBM ILOG CPLEX 12.4 (2011): 15% overall, 1.4X on 1000 seconds and up ODME 3.6
- IBM ILOG CPLEX 12.5 (2012): **1.6X on 100 secs, 2.8X on 100 secs and up**

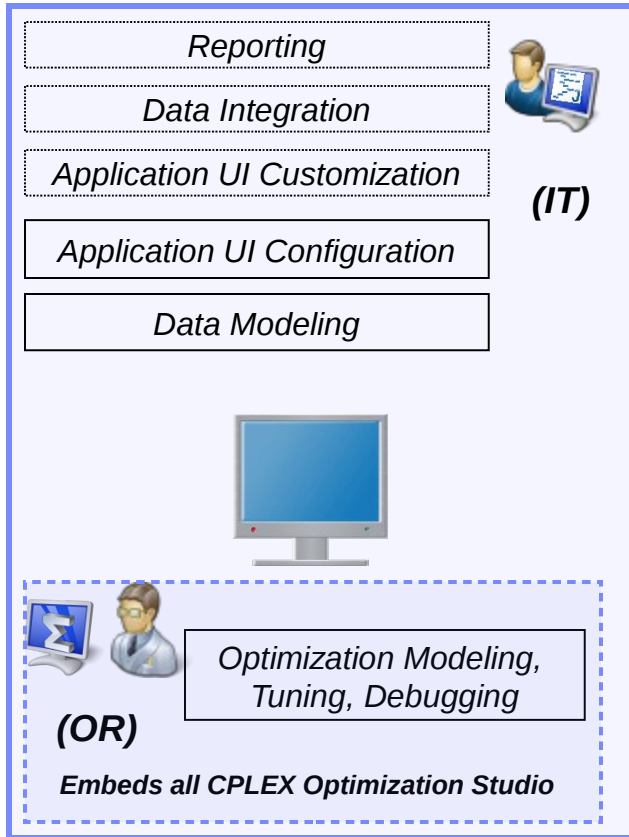
- Drivers:
 - Improved heuristics
 - Improved cuts
 - Reduced parallel overhead
 - General software engineering

IBM ILOG Optimization and Supply Chain Products



ODM Enterprise - Architecture

ODM Enterprise IDE



Development

ODM Enterprise Optimization Server

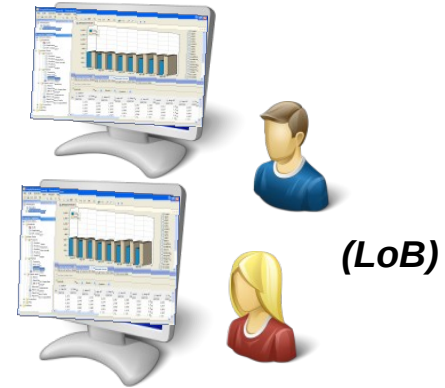


ODM Enterprise Data Server

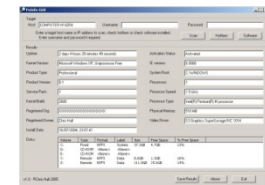


Deployment

ODM Enterprise Client



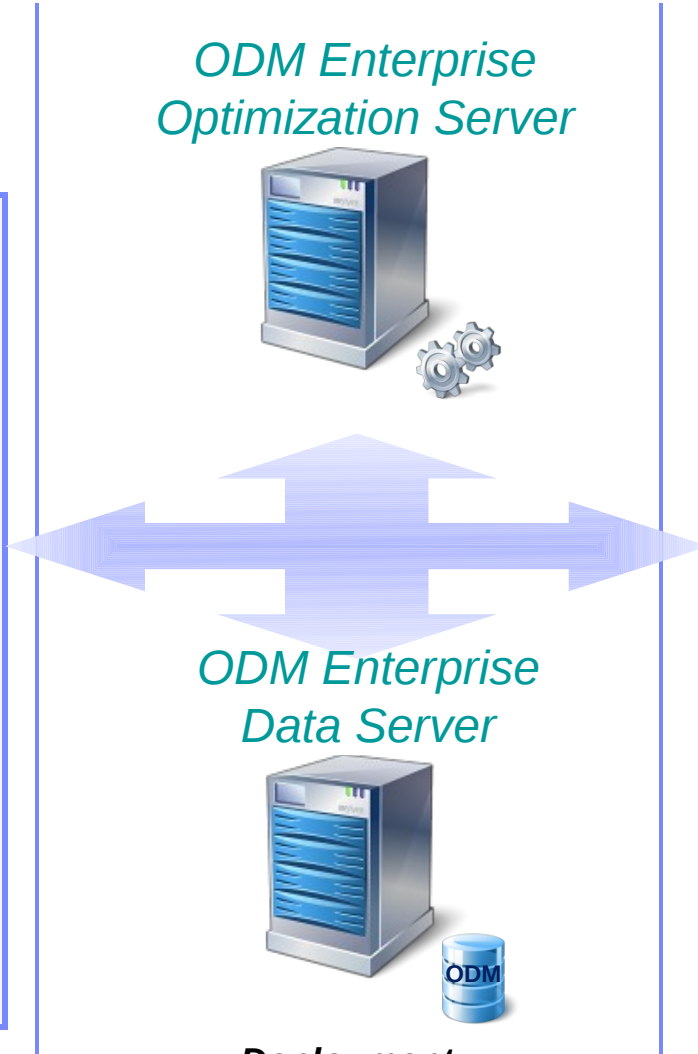
Rich client



Custom Web Frontend or Batch Process

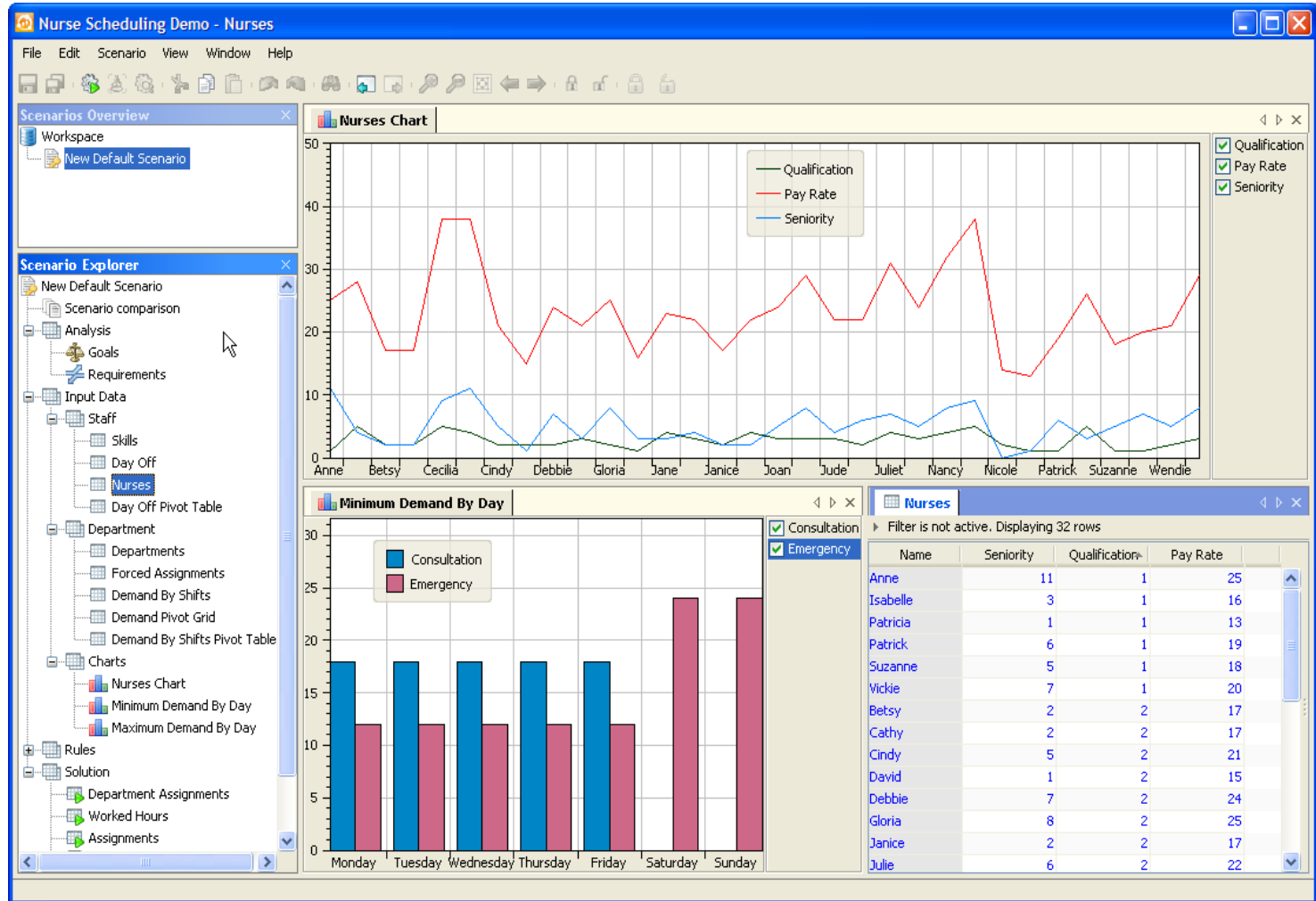


Business Use



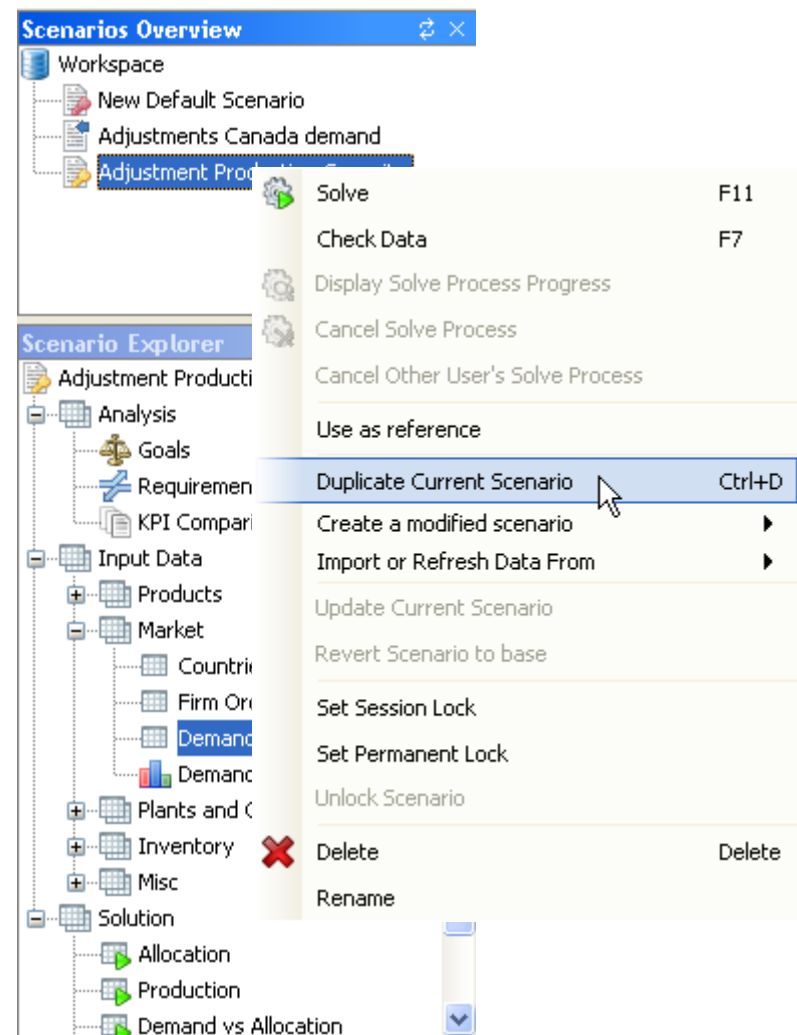
ODM Client – Generic Planning Cockpit

- Rich, configurable GUI



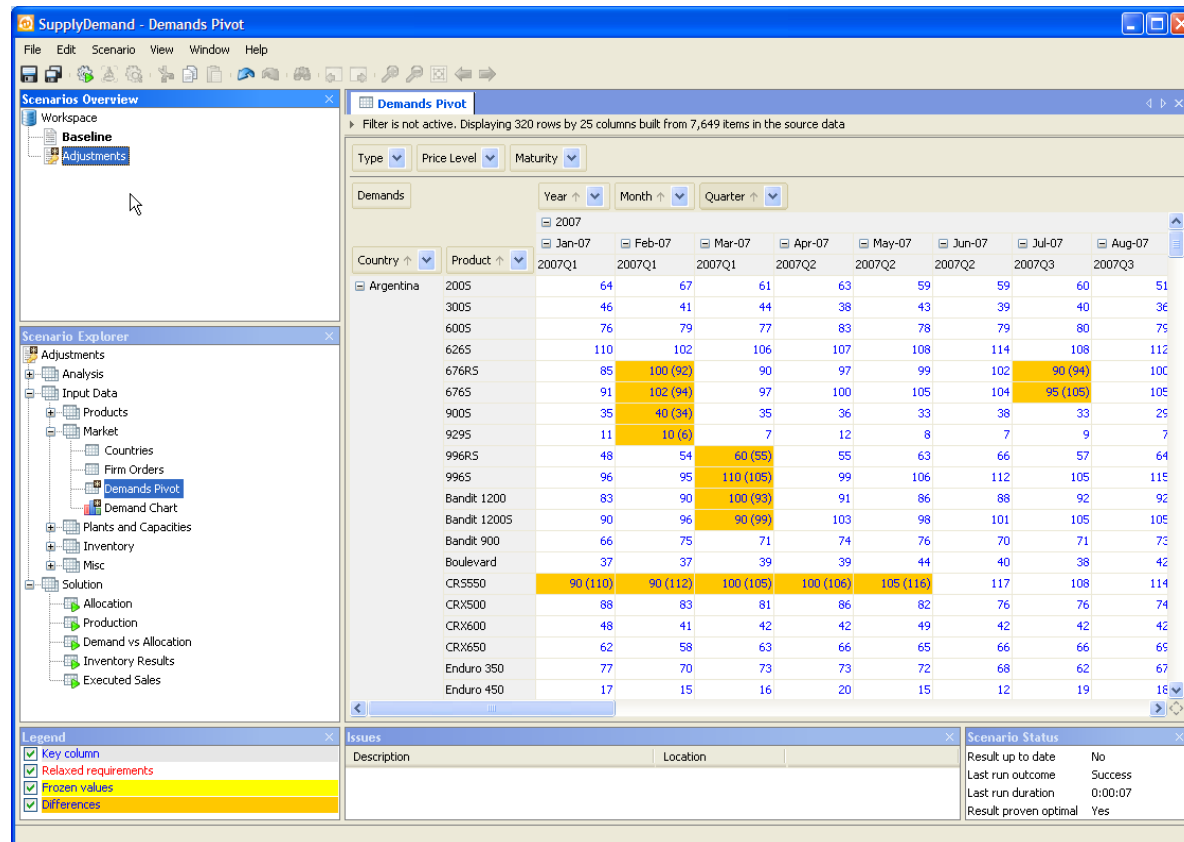
ODM Client – Generic Planning Cockpit

- Rich, configurable GUI
- Scenario-based planning, what-if simulation
 - Scenario:
 - master+transaction data
 - parameters
 - results



ODM Client – Generic Planning Cockpit

- Rich, configurable GUI
- Scenario-based planning, what-if simulation
- Data editing and analysis
 - E.g. simple tables, pivot tables
 - Scenario comparison: detailed highlighting



SupplyDemand - Demands Pivot

File Edit Scenario View Window Help

Scenarios Overview

Workspace

- Baseline
- Adjustments

Scenario Explorer

- Adjustments
- Analysis
- Input Data
 - Products
 - Market
 - Countries
 - Firm Orders
 - Demands Pivot
 - Demand Chart
 - Plants and Capacities
 - Inventory
 - Misc
 - Solution
 - Allocation
 - Production
 - Demand vs Allocation
 - Inventory Results
 - Executed Sales

Demands Pivot

Filter is not active. Displaying 320 rows by 25 columns built from 7,649 items in the source data

Type Price Level Maturity

Demands Year Month Quarter

2007

Country	Product	2007Q1	2007Q1	2007Q1	2007Q2	2007Q2	2007Q2	2007Q3	2007Q3
Argentina	2005	64	67	61	63	59	59	60	51
	3005	46	41	44	38	43	39	40	36
	6005	76	79	77	83	78	79	80	75
	6265	110	102	106	107	108	114	108	112
	676RS	85	100 (92)	90	97	99	102	90 (94)	100
	676S	91	102 (94)	97	100	105	104	95 (105)	105
	9005	35	40 (34)	35	36	33	38	33	25
	929S	11	10 (6)	7	12	8	7	9	7
	996RS	48	54	60 (55)	55	63	66	57	64
	996S	96	95	110 (105)	99	106	112	105	115
	Bandit 1200	83	90	100 (93)	91	86	88	92	92
	Bandit 1200S	90	96	90 (99)	103	98	101	105	105
	Bandit 900	66	75	71	74	76	70	71	73
	Boulevard	37	37	39	39	44	40	38	42
	CR5550	90 (110)	90 (112)	100 (105)	100 (106)	105 (116)	117	108	114
CRX500	88	83	81	86	82	76	76	74	
CRX600	48	41	42	42	49	42	42	42	
CRX650	62	58	63	66	65	66	66	65	
Enduro 350	77	70	73	73	72	68	62	67	
Enduro 450	17	15	16	20	15	12	19	18	

Legend

- Key column
- Relaxed requirements
- Frozen values
- Differences

Issues

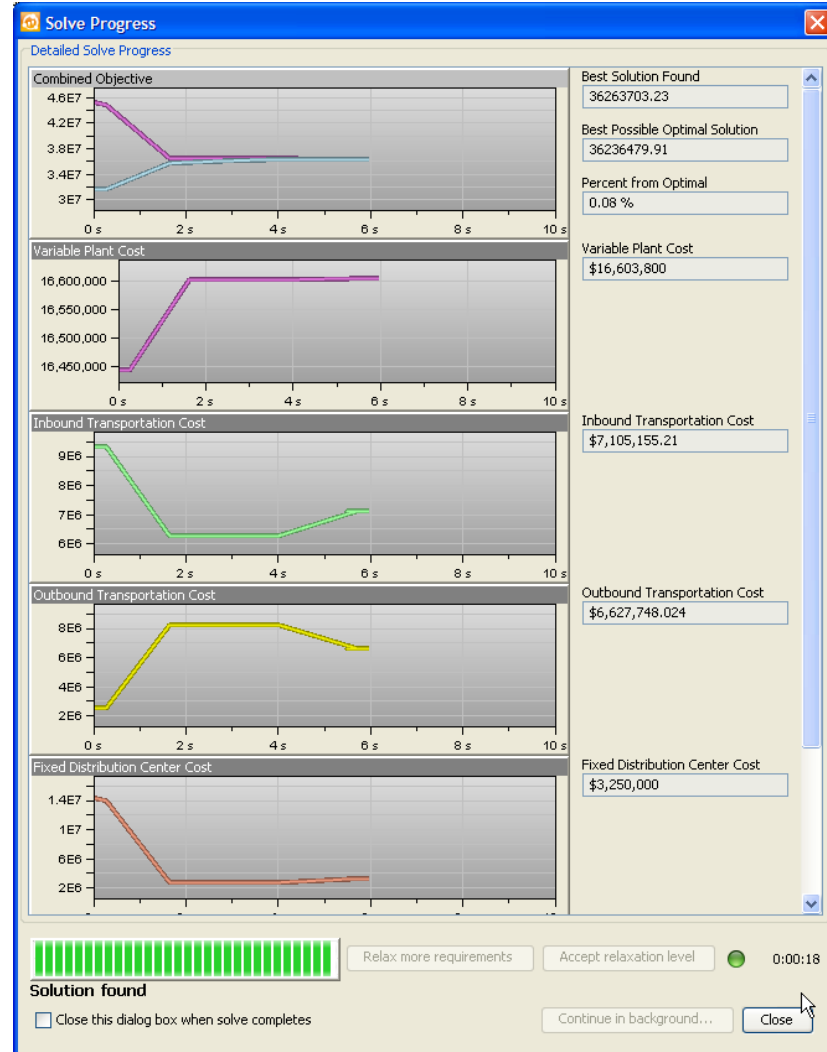
Description	Location

Scenario Status

Result up to date	No
Last run outcome	Success
Last run duration	0:00:07
Result proven optimal	Yes

ODM Client – Generic Planning Cockpit

- Rich, configurable GUI
- Scenario-based planning, what-if simulation
- Data editing and analysis
- Optimization execution+control
 - Manage business goals
 - Detailed cost analysis



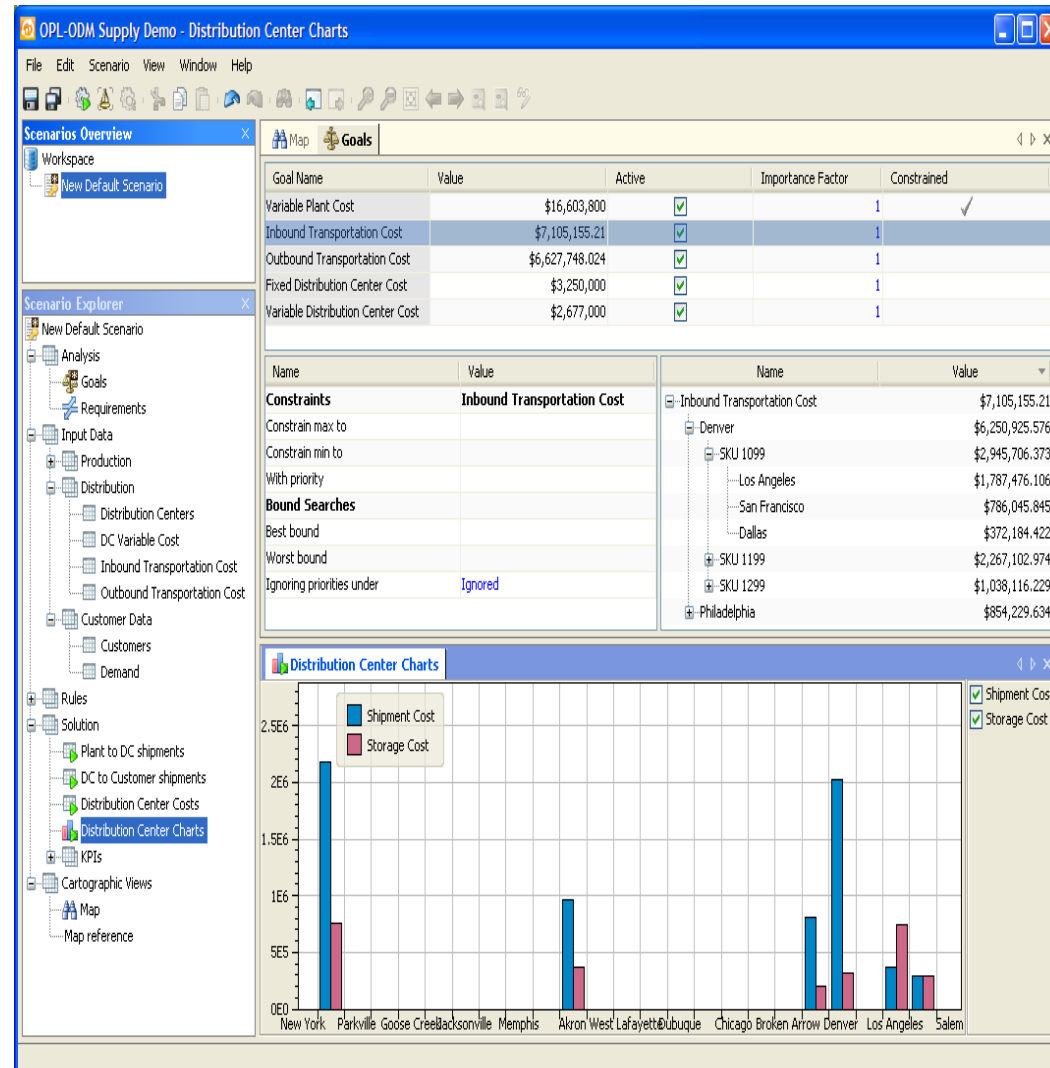
Goal Name	Value	Active	Importance Factor	Constrained
Variable Plant Cost	\$16,603,800	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>
Inbound Transportation Cost	\$7,105,155.21	<input checked="" type="checkbox"/>	1	
Outbound Transportation Cost	\$6,627,748.024	<input checked="" type="checkbox"/>	1	
Fixed Distribution Center Cost	\$3,250,000	<input checked="" type="checkbox"/>	1	
Variable Distribution Center Cost	\$2,677,000	<input checked="" type="checkbox"/>	1	

Name	Value
Constraints	Variable Plant Cost
Constrain max to	15,000
Constrain min to	
With priority	Medium
Bound Searches	Very Low
Best bound	Low
Worst bound	Medium Low
Ignoring priorities under	Medium
	Medium High
	High
	Very High
	Mandatory

Name	Value
- Variable Plant Cost	\$16,603,800
- Denver	\$9,040,900
-SKU 1099	\$5,918,400
-SKU 1199	\$1,619,600
-SKU 1299	\$1,502,900
- Philadelphia	\$7,562,900
-SKU 1099	\$5,659,500
-SKU 1199	\$782,400
-SKU 1299	\$1,121,000

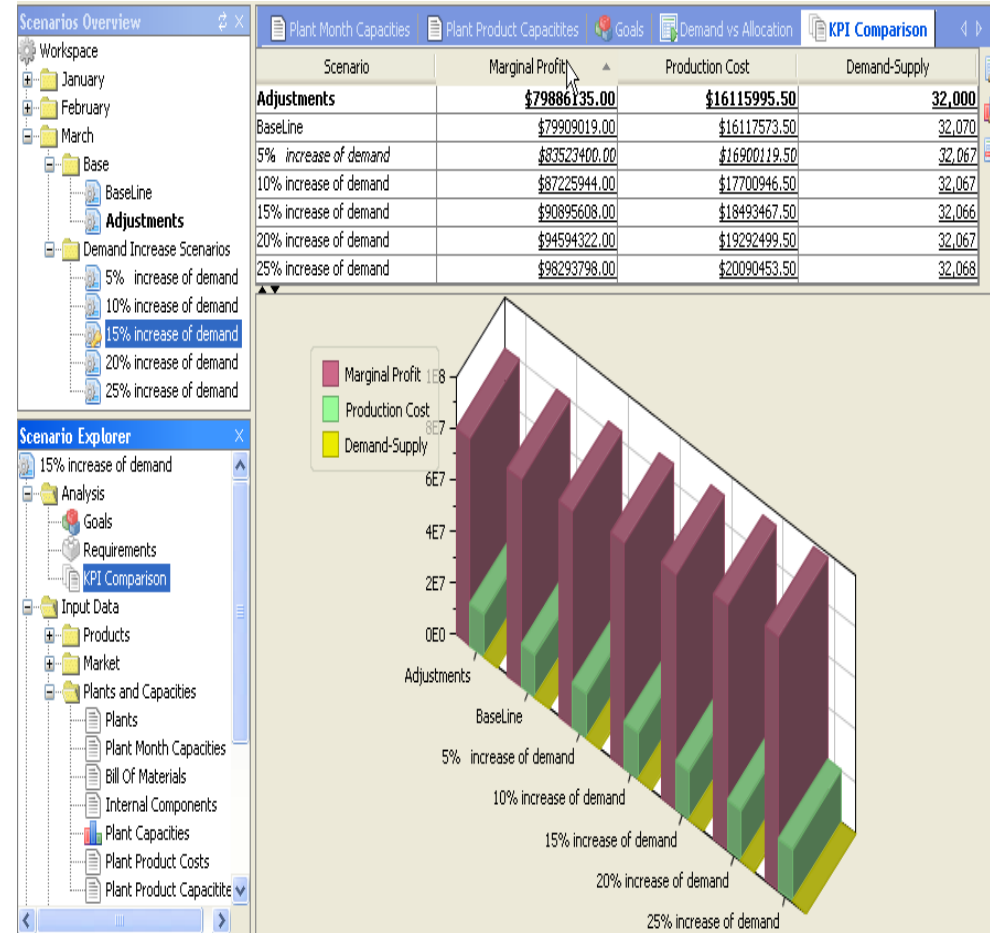
ODM Client – Generic Planning Cockpit

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- Data editing and analysis
- Optimization execution+control
- Business goals and plan overview



ODM Client – Generic Planning Cockpit

- Rich, configurable GUI
- Scenario-based planning, what-if simulation
- Data editing and analysis
- Optimization execution+control
- Business goals and plan overview
- What-if analysis: KPI comparison



ODM Client – Generic Planning Cockpit

- Rich, configurable GUI
- Scenario-based planning, what-if simulation
- Data editing and analysis
- Optimization execution+control
- Business goals and plan overview
- What-if analysis: KPI comparison
- Office integration:
 - formatted Copy-n-Paste

Email

Review of Jan-June demand for Argentina - Message (HTML)

To: Sam.Johnson@company.com

Subject: Review of Jan-June demand for Argentina

Sam,

Can you quickly review the forecasted demand below – it's in line with what we discussed?

Mark

Demands

		Year	Quarter	Month Id	Month
		2007			
		2007Q1		2007Q2	
		1	2	3	
Country	Product	Jan-07	Feb-07	Mar-	
Argentina	200S	64	67		
	300S	46	41		
	600S	76	79		
	626S	110	102		
	676RS	85	92		
676S	91	94			

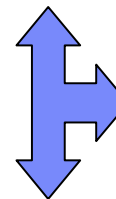
Spreadsheet

Home Insert Page Layout Formulas Data Review View

Function Library

J6 =AVERAGE(C6:H6)

Demands	Year	Quarter	Month Id	Month				Average:
2007								
		2007Q1		2007Q2				
		1	2	3	4	5	6	
Country	Product	7-Jan	7-Feb	7-Mar	7-Apr	7-May	7-Jun	Average:
Argentina	200S	64	67	61	63	59	59	62.2
	300S	46	41	44	38	43	39	41.8
	600S	76	79	77	83	78	79	78.7
	626S	110	102	106	107	130	114	111.5
	676RS	85	92	90	97	99	102	94.2
676S	91	94	97	100	105	110	95.2	



Document

Demands

		Year	Quarter	Month Id	Month		
		2007					
		2007Q1		2007Q2			
		1	2	3	4	5	6
Country	Product	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07
Argentina	200S	64	67	61	63	59	59
	300S	46	41	44	38	43	39
	600S	76	79	77	83	78	79
	626S	110	102	106	107	130	114
	676RS	85	92	90	97	99	102
676S	91	94	97	100	105	110	

ODM Client

Demands

Year: 2007, Quarter: 2007Q1, Month Id: 1, Month: Jan-07

Country	Product	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07
Argentina	200S	64	67	61	63	59	59	60
	300S	46	41	44				40
	600S	76	79	77				80
	626S	110	102	106				108
	676RS	85	92	90				94
	676S	91	94	97				105
	900S	35	34	35				33
	929S	11	6	7	12	8	7	9
	996RS	48	54	55	55	63	66	57
	996S	96	95	105	99	106	130	105
Bandit 1200	83	90	93	91	86	88	92	
Bandit 1200S	90	96	99	103	98	101	105	
Bandit 900	66	75	71	74	76	70	71	
Boulevard	37	37	39	39	44	40	38	

Context menu: Cut (Ctrl+X), Copy (Ctrl+C), Paste (Ctrl+V), Includes Headers in Copy, Clear selection (Shift+Delete)

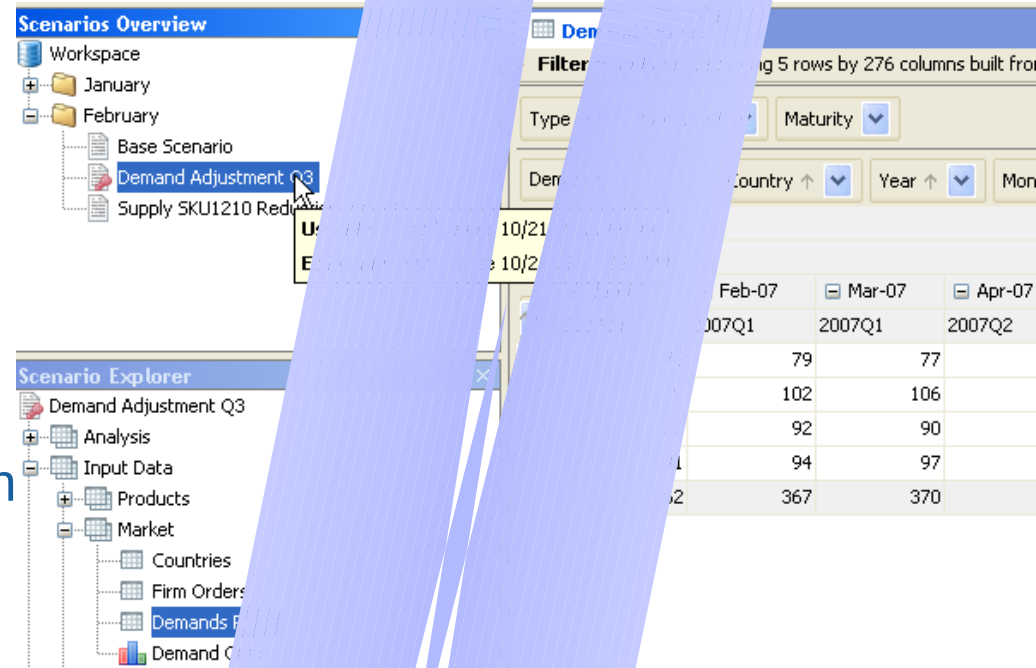
ODM Client – Generic Planning Cockpit

- Rich, configurable GUI
- Scenario-based planning, what-if simulation
- Data editing and analysis
- Optimization execution+control
- Business goals and plan overview
- What-if analysis: KPI comparison
- Office integration
- Controlled constraint relaxation

Relaxed Requirements			
Explanation	Relaxation	Priority	Priority ...
[-] Each shift should get its nurse requirements		High	<input type="checkbox"/>
[-] Demand for Emergency Room		High	<input type="checkbox"/>
Between 5 and 7 nurses required on Saturday, January 8, 2005 from 2 to 12	0 nurse(s)	High	<input type="checkbox"/>
Between 5 and 7 nurses required on Sunday, January 9, 2005 from 2 to 12	2 nurse(s)	High	<input type="checkbox"/>
[-] Pairing Rules		Medium	<input type="checkbox"/>
[-] Teams		Medium	<input type="checkbox"/>
+ Isabelle and Debbie must work in the same team		Medium	<input type="checkbox"/>
[-] Union and Clinical Care Rules		Medium	<input type="checkbox"/>
[-] Skill Rules		Medium	<input type="checkbox"/>
[-] Emergency		Medium	<input type="checkbox"/>
+ The Emergency Room department requires at least 1 nurse qualified in Cardiac		Medium	<input type="checkbox"/>
[-] nurse on vacation		Medium	<input type="checkbox"/>
[-] vacation of Jane		Medium	<input type="checkbox"/>
on Saturday, January 8, 2005		Medium	<input type="checkbox"/>

ODM Client – Generic Planning Cockpit

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- Collaboration



	Feb-07	Mar-07	Apr-07
2007Q1		2007Q1	2007Q2
	79	77	
	102	106	
	92	90	
	94	97	
2	367	370	



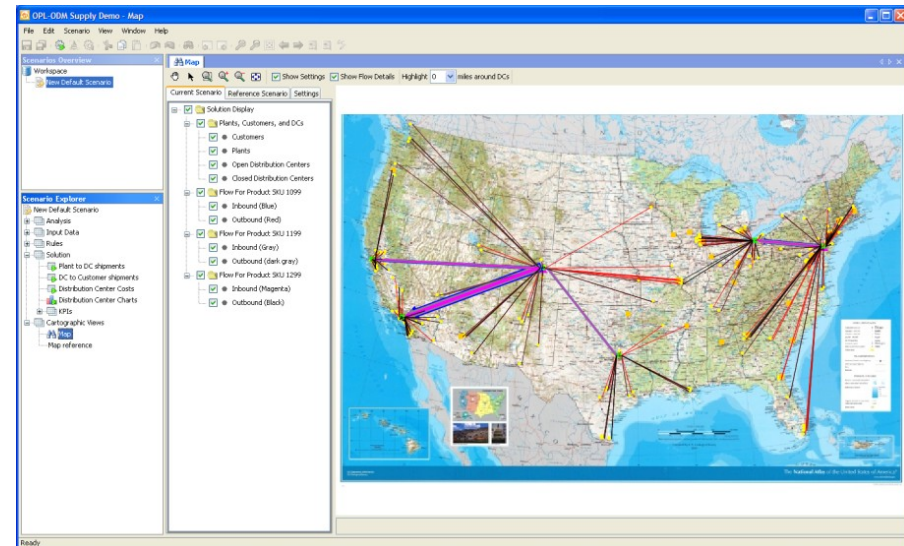
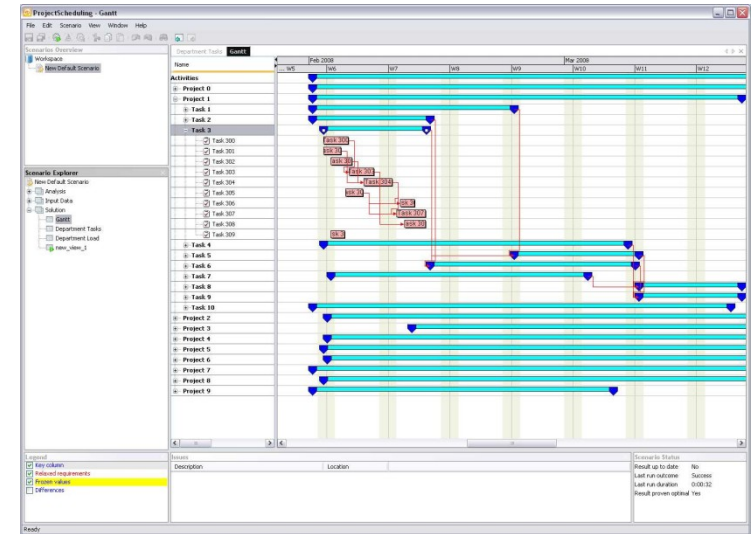
Samantha



Mark

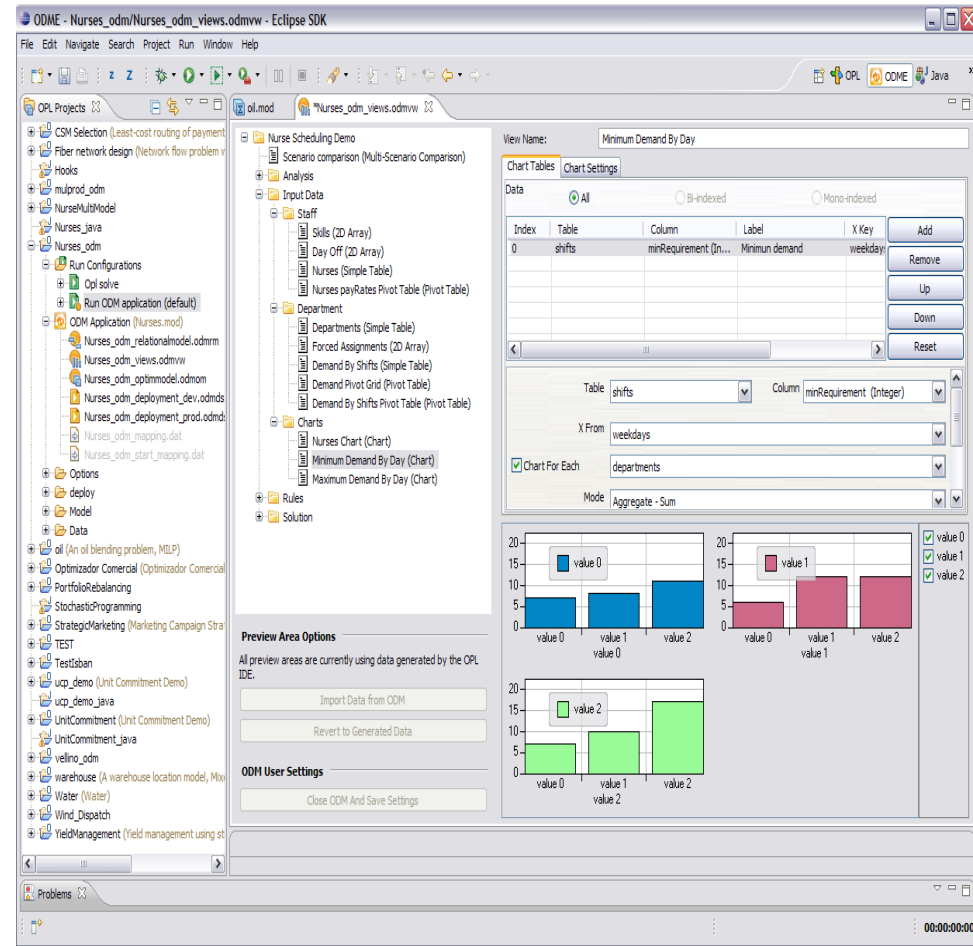
ODM Client – Generic Planning Cockpit

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- What-if analysis: KPI comparison
- Office integration
- Controlled constraint relaxation
- Collaboration
- Extensible platform
 - APIs for GUI, Server, Repository



ODM Client – Generic Planning Cockpit

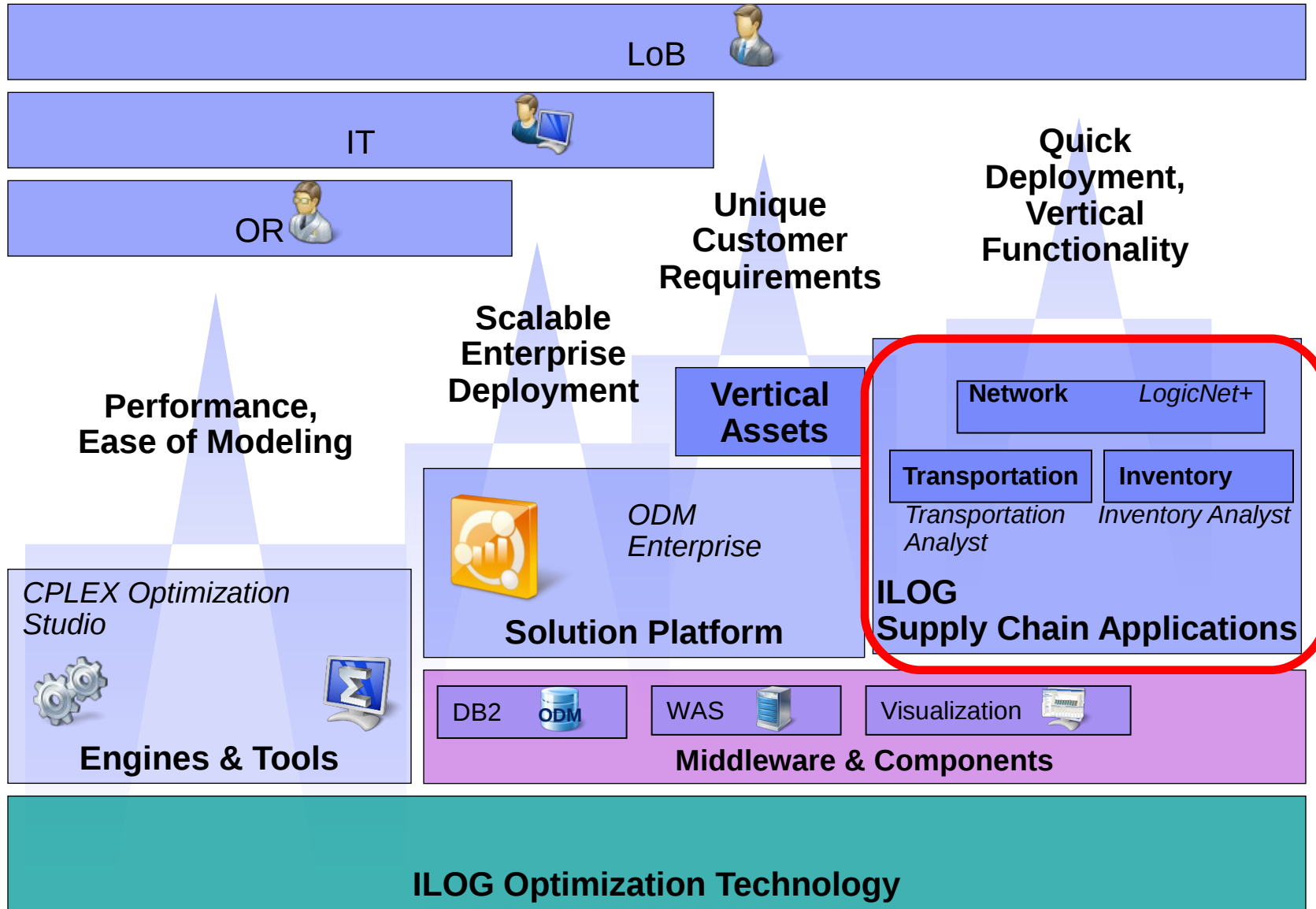
- Rich, configurable GUI
- Scenario-based planning, what-if simulation
- Data editing and analysis
- Optimization execution+control
- Business goals and plan overview
- What-if analysis: KPI comparison
- Office integration
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- Collaboration
- Extensible platform
- Tight integration with optimization model development



ODM Client – Generic Planning Cockpit

- Rich, configurable GUI
 - Scenario-based planning, what-if simulation
 - Data editing and analysis
 - Optimization execution+control
 - Business goals and plan overview
 - What-if analysis: KPI comparison
 - Office integration
 - Controlled constraint relaxation
 - Collaboration
 - Extensible platform
 - Tight integration with optimization model development
- **ODM Client**
 - **90% configuration, 10% implementation**
 - **Various applications**
 - **Small to large**
 - **Production, logistics, marketing, sports, energy, etc. etc.**

IBM ILOG Optimization and Supply Chain Products



Supply Chain Management: LogicNet Plus (LNP)

The screenshot displays the IBM ILOG LogicNet Plus XE 7.2 (64-bit Optimizer) interface. The main window is titled "Germany View" and shows a map of Germany with numerous green circular markers representing customer locations. A tooltip for a specific customer is visible, labeled "147 : Paderborn Customer".

The interface includes a menu bar with "Data", "Optimize", "View", "Solution", and "Help". Below the menu is a toolbar with icons for "Products", "Plants", "Warehouses", "Customers", "Carriers", "Lanes", "Custom Objectives", "Preferences", "Import", and "Export".

On the left side, there is a "Scenario Manager" pane with a tree view of scenarios, including "New Scenario", "New Scenario - Center of Gravity", "Sites vs 75km - Center of Gravity", "Test Max within 75km", "Test Scenario", and several "Test Scenario - Center of Gravity" variants. Below this is a "Navigation" pane with a search bar and a tree view of "Data Forms" including "Products", "Plants", "Warehouses", "Customers", "Transportation", "Custom Objectives", "Time Periods", "Groupings & Zone Definitions", "Baseline Data", "Constraints", "Pre-Defined Lane Constraints", "Zone Based Flow Constraints", "Warehouse to Customer Assig", "Sourcing Rules", "Customer Single Sourcing", "Forced Openings", "Group Constraint", "Group Comparison Constraints", and "Warehouse-Product Constrains".

The main map area has a toolbar with "Create Snapshot", "Google Earth", "Filter", "Shading", "Utilization", and "Profiles". A "Map Settings" pane is visible on the left side of the map. The bottom right corner of the map area shows a zoom slider and a page number "48".

Supply Chain Management: LogicNet Plus (LNP) – A case study

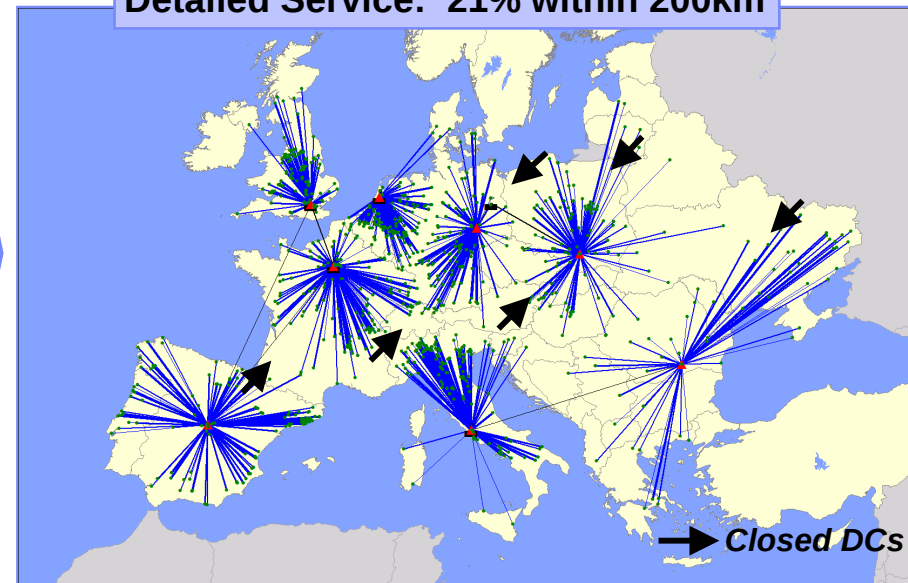
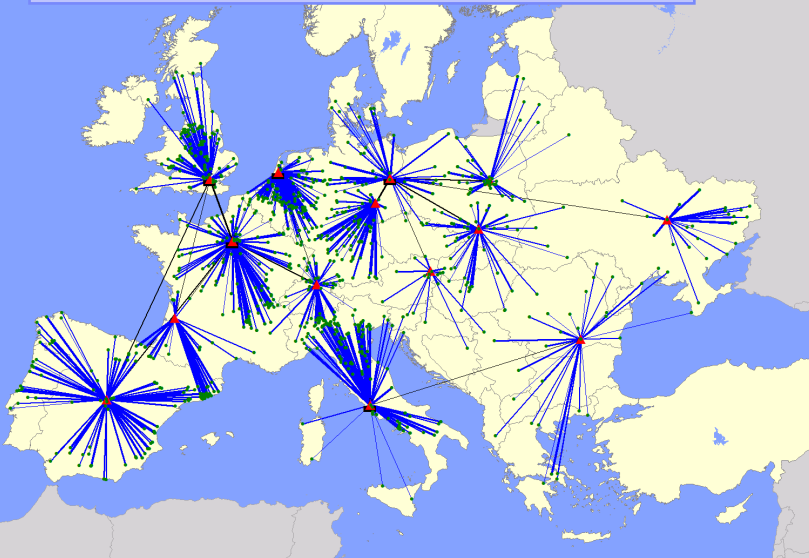
- **Business:** A European based manufacturer with 5 production facilities and 14 DCs.
- **Project Objective:** Understand the optimal number and locations of DCs for the after-market business.

Optimization Drivers

- Demand to/from matrix
- Capacity by facility
- Cost by facility
- Transportation costs
- Service constraints
- Min flows for new lanes
- Carbon emissions

Baseline Distribution: 14 DCs
 Total Cost: €22.0 M
 Avg. Service: 308 km
 Detailed Service: 29% within 200km

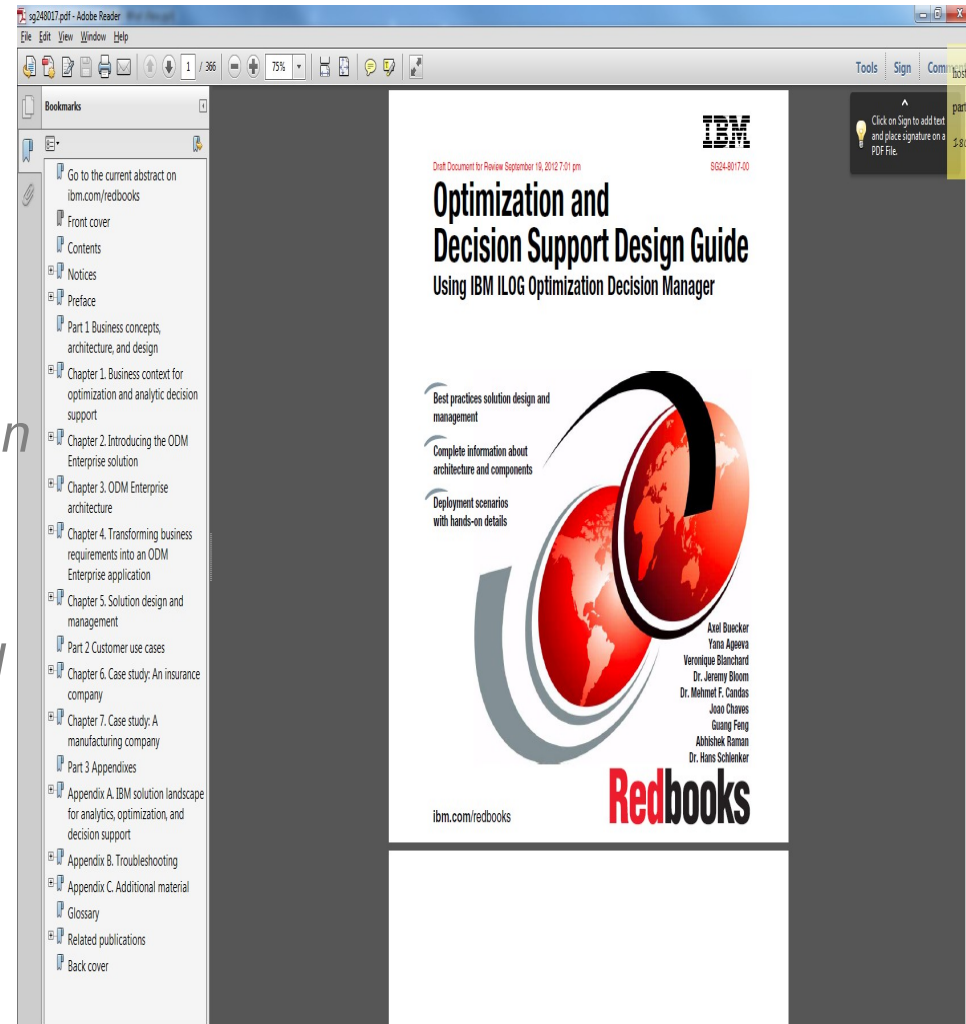
Cost Optimal Distribution: 8 DCs
 Total Cost: €20.4 M
 Avg. Service: 360 km
 Detailed Service: 21% within 200km



Which one is better?

New Redbook

- Available at <http://tinyurl.com/ODMEredbook>
- *“Like an onion, the architecture of an ODM Enterprise application has many layers to it, and peeling them one at a time is the best way to understand how they are structured and work with each other.”*



धन्यवाद

Hindi

多謝

Traditional Chinese

Grazie

Italian

ขอบคุณ

Thai

Gracias

Spanish

Thank You

多谢

Simplified Chinese

Спасибо

Russian

Obrigado

Brazilian Portuguese



شكراً

Arabic

Danke

German

Merci

French

நன்றி

Tamil

ありがとうございました

Japanese

감사합니다

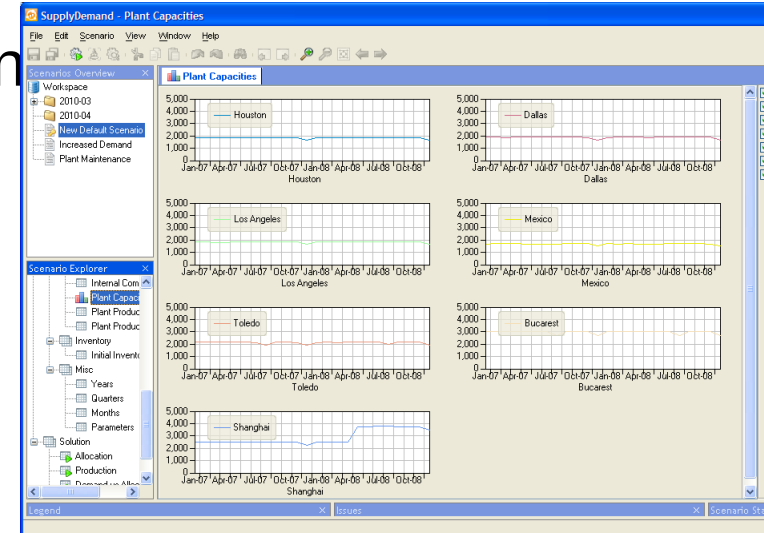
Automotive Sales & Operations Planning

• Solution

- Solution based on IBM ILOG ODME optimization platform
- Supports many collaborating planners
- Optimization for efficient supply-demand balancing

• Benefits

- Increased agility: saved 1 month planning time
- Reduced planning effort: 75% less planning figures
- Better planning accuracy: 50% less plan changes



Prospect: whom to talk to

- WW sales planning
- WW distribution planning
- Supply Chain Management
- Production Management

Project: 500k€ lic, 1000+d serv

Prospect: questions to ask

- Is your central sales planning accurate and efficient?
- Are you sure that your worldwide distribution network operates at its cost minimum?
- How do you adjust your supply chain to market changes?
- Does your production allocation planning take into account margins and transport costs?

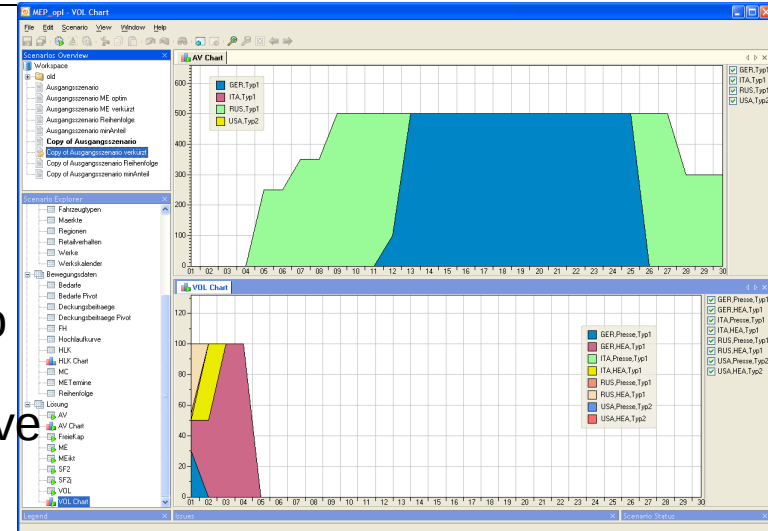
Market Introduction Planning

• Solution

- Customized planning solution based on IBM ILOG ODME platform
 - Planning and optimization model tailored to customer's requirements
 - Gives this car company a unique competitive advantage over its competitors

• Benefit

- Fast, flexible, risk-less introduction, with very low effort
- Business model can be changed by customer's experts during application's lifetime
- Planning benefit from mathematical approach and world-class CPLEX library
 - Cost minimized / benefit maximized
- Client expects **margin increase of several million Euros**
 - through earlier introduction and better assignment to high-margin markets



Prospect: whom to talk to

- WW sales planning
- WW distribution planning
- Supply Chain Management
- Production Management

Prospect: questions to ask

- How do you organize the introduction of new car models?
- Are you still using spreadsheets?
- Are you aware that other car companies use mathematical optimization and gain millions of Euros?
- Can you imagine that this can be achieved with a small project?

Project: 300k€ lic + 80d service

Feedback Mark

- Focus more on output
- Show: this is initial computation, then the following scenarios show optimized ways and you can see that
- Presentation order
 - Change of results (from initial computed, to optimized)
 - Usability of the tool
 - Process (how to get the optimized results)
- Also change different parameters, and show consequences of these different changes
- Customer's prios
 - Is the end results better?
 - Can I really change all the variables that I can change in reality
 - How easy is it
- Mozy: „As-is vs. To-be“; this is what SAP focusses on
- Manual planning: the cust already has already an existing way to do it
 - He wants to see e.g. how to reduce external capacity usage

TODO OPL example

TODO

Simple OPL model that shows that
requis are directly modelled here
The magics are behind the solve,
(usually) not in the model
Thus, the optimization results can
easily be proven to be correct