# Sawmills Operations Planning Software Solution

***Prepared for:***

***"A Wealth of Opportunities: Value Focused Forestry in British Columbia"***

*Symposium sponsored by BC Forum & FPAC*

March 01, 2006

**Alain Rousseau**

- **Research Consortium**
- **Value creation networks optimization in the forest products industry**
  - Design and planning of value creation network;
  - Improve profitability through cost reduction and increased customer satisfaction;
  - Improve the synchronization of all operations;
  - Improve the integration of information flows between all business units**.**
- **Multidisciplinary team**
- **Financed by industry & Canadian agencies**
- **10M$ for 5 years (2002-2006)**

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# Members


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Québec

- Centre de recherche industrielle du Québec
- Ministère des Ressources naturelles

Forintek Canada Corp.

# Project Objective

**To develop a software solution**
**for sawmills operations planning**
**that improve delivery performance**
**while maximizing throughput value**
**through a demand driven supply network**
**(a mixed pull-push approach)**

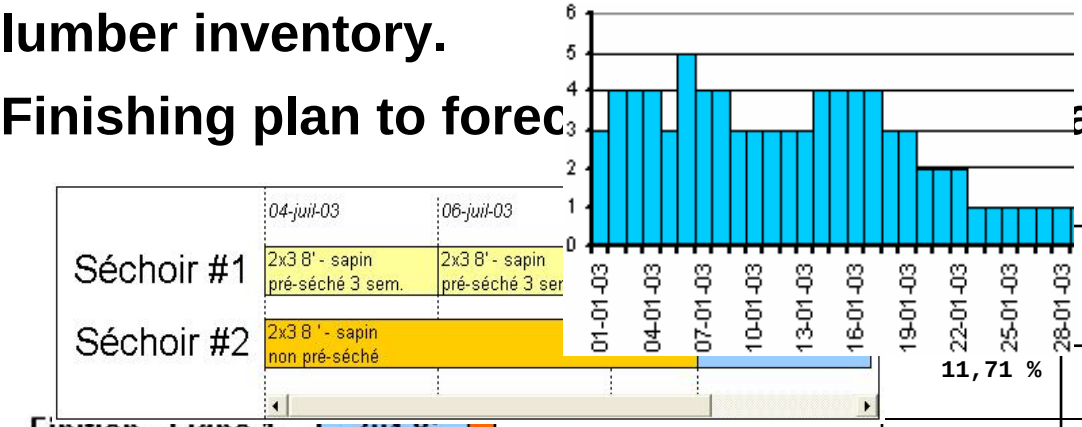
# Current motivations for planning

- **Inform salespeople of what they can sell**
  - They need end product availability forecast for 3 to 6 weeks
- **Provide a feasible production plan for sawmills managers**
  - At least for drying and finishing
  - Make sure there is enough inventory (green and rough)

# The way it's generally done!

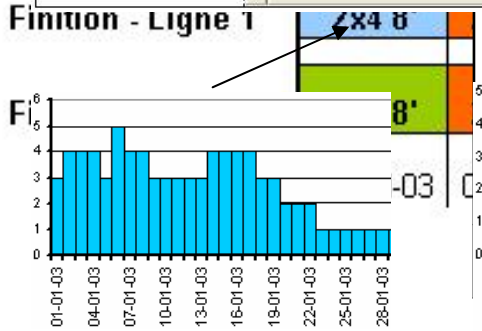
## Mainly a Push process:

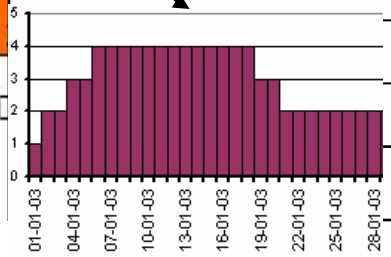
- Moving average to forecast the output of green lumber!
- Drying plan based on finished product availability and green lumber inventory.
- Finishing plan to forec ales










| | | | |
|---|---|---|---|
| 92 5/8 " | 88 " | 72 " | |
| 11,71 % | 4,93 % | - | - |
| 35,70 % | 14,15 % | 10,68 % | 6,81 % |
| 6,81 % | - | - | - |
| 4,49 % | - | 2,68 % | 1,61 % |
| 0,50 % | - | - | - |

# Pitfalls

- **Even in a pure “Push” mode, the problem is huge. It is difficult to find a feasible solution and almost impossible to manually optimize throughput value.**

- **It is even worse in a “Pull” mode where trade offs have to be made to ensure delivery performance …. and there is always a part of “Pull” mode (contracts or committed orders).**

- **Lack of reactive capacity … life is never as planned so we need a solution that can easily adapt plans.**

# Why moving to a Demand-Driven approach?

**According to AMR Research:**

- 15% less inventory
- 17% better perfect order performance
- 35% shorter cash-to-cash cycle time

That translate into:

- 10% higher revenue
- 5% better profit margin

From « Handbook for Becoming Demand Driven », July 2005

# The Handbook for Becoming Demand Driven

*by Lora Cecere, Debra Hofman, Roddy Martin, and Laura Preslan*

## The Bottom Line

**Becoming demand driven is a fundamental shift in how to do business and can improve revenue by 10% and profitability by 5% to 7%.**

## Executive Summary

In 2003, AMR Research introduced the concept of the Demand-Driven Supply Network (DDSN). While we have refined what this means to business over the past two years, the definition has remained constant. A DDSN is a system of technologies and business processes that sense and respond to real-time demand across a network of customers, suppliers, and employees.

DDSN leaders are more *demand sensing*, have more efforts for *demand shaping*, and focus on a profitable *demand response*. Based on AMR Benchmark Analytix data, the most advanced demand-sensing companies have 15% less inventory, a 17% better perfect order performance, and a 35% shorter cash-to-cash cycle time. We have also found that DDSN leaders have 10% higher revenue and 5% to 7% better profit margins than their competitors.

# Is it possible in the lumber industry?

- Demand-driven approach is the only way (apart from maintaining a huge inventory) to insure a good service level
- If this approach allows an increase of 20% of contract volume …and that contracts have 5% higher prices …we improve profits by 1%;
- And it does not take into account the other improvements (reduced inventory, reduced transportation cost, etc.).

# Operations Planning

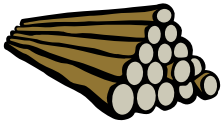
- **Decide <u>what</u> to do, <u>when</u> to do it and <u>how</u> to do it**

- **Support mixed mode: Pull & Push**
  - Satisfy demand (committed orders & contracts)
  - Maximize throughput value

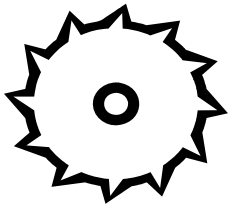
- **Constraints:**
  - Planned available inventory
  - Machine capacity (potential bottlenecks)

# Proposition

A distributed and specialized software solution



**Wood Supply**



**Sawing**

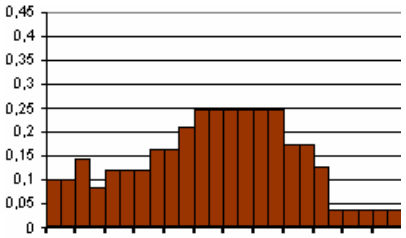
**Drying**

**Finishing**

**Sales**

# Optimized Planning

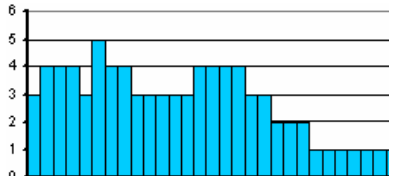
## Demand Propagation




Demand
(From Customers)

**Planning Engine**

**ILOG Solver, CPLEX or others**




Demand
(To Suppliers)

**Products**

**Starting Inventories**

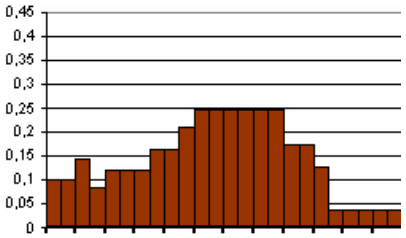
DB

**Ressources**

**Process**

# Optimized Planning

## Supply Propagation

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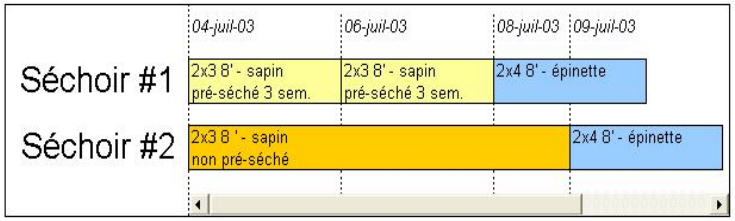
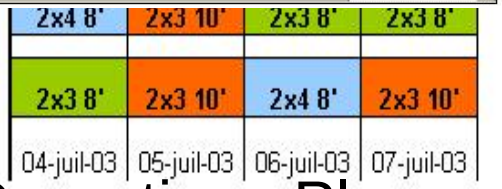
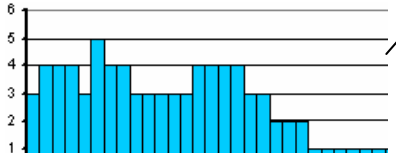
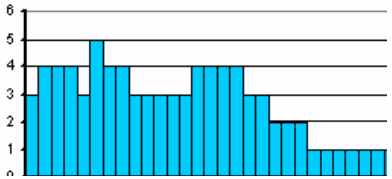



Operations Plan




Delivery
(From Suppliers)




Delivery
(To Customers)

**Products**

**Starting Inventories**

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**Ressources**

**Process**

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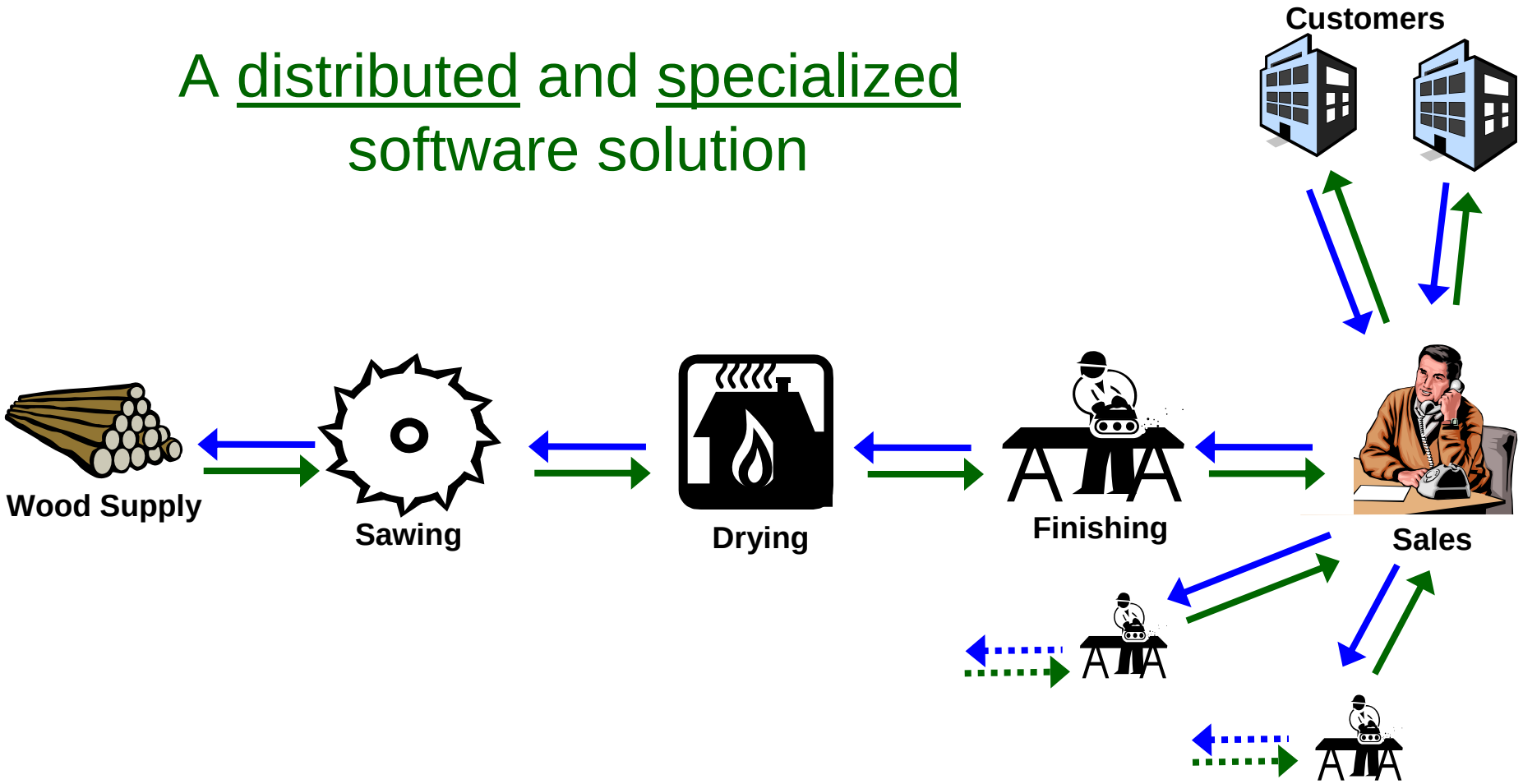
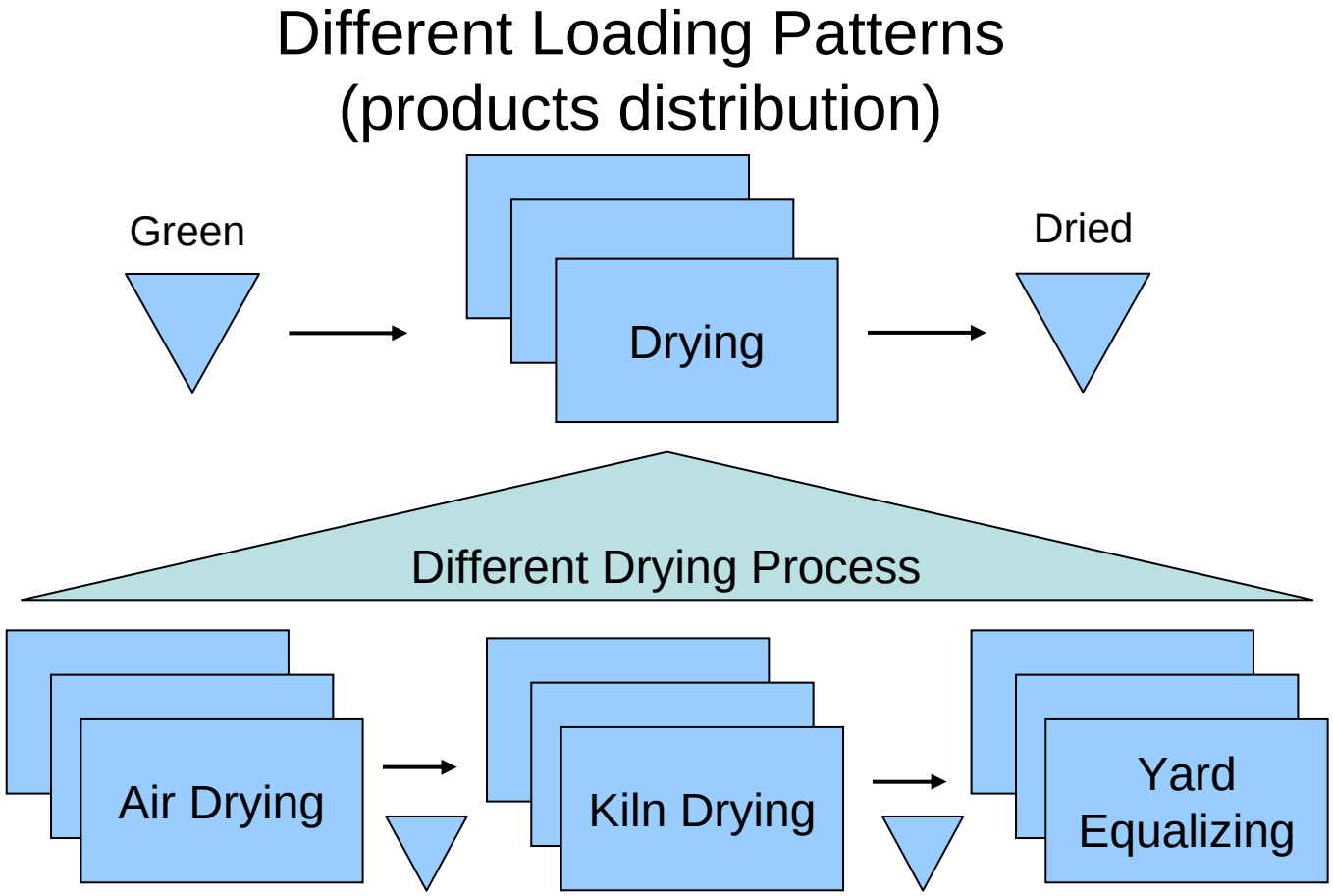


# Finishing

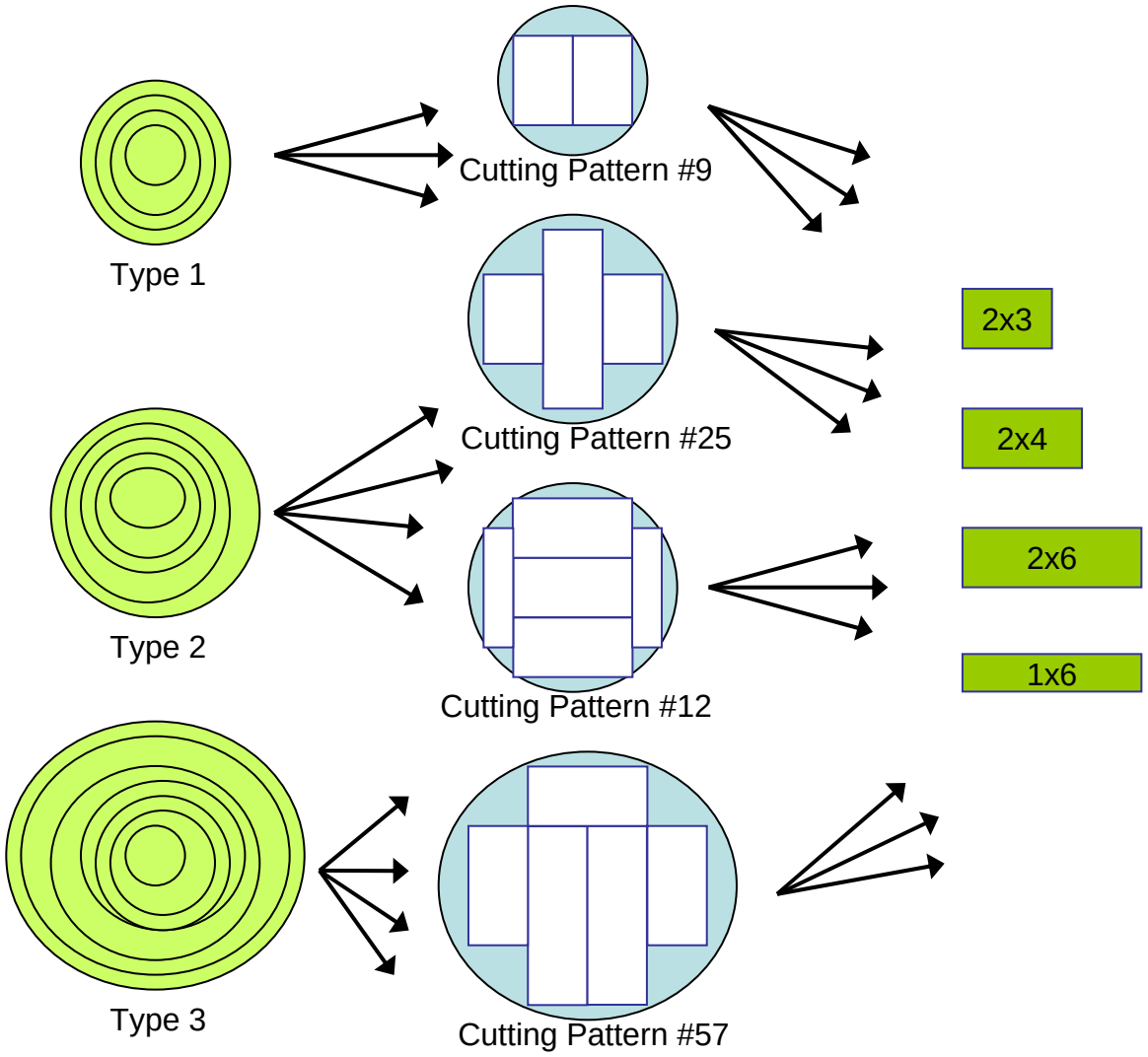
- **Co-Products Management:**
  - Finishing 1 product type can results in 11 different product types simultaneously
  - All of them can have demand: they are not by-products
- **Campaign Optimization (Setup management)**

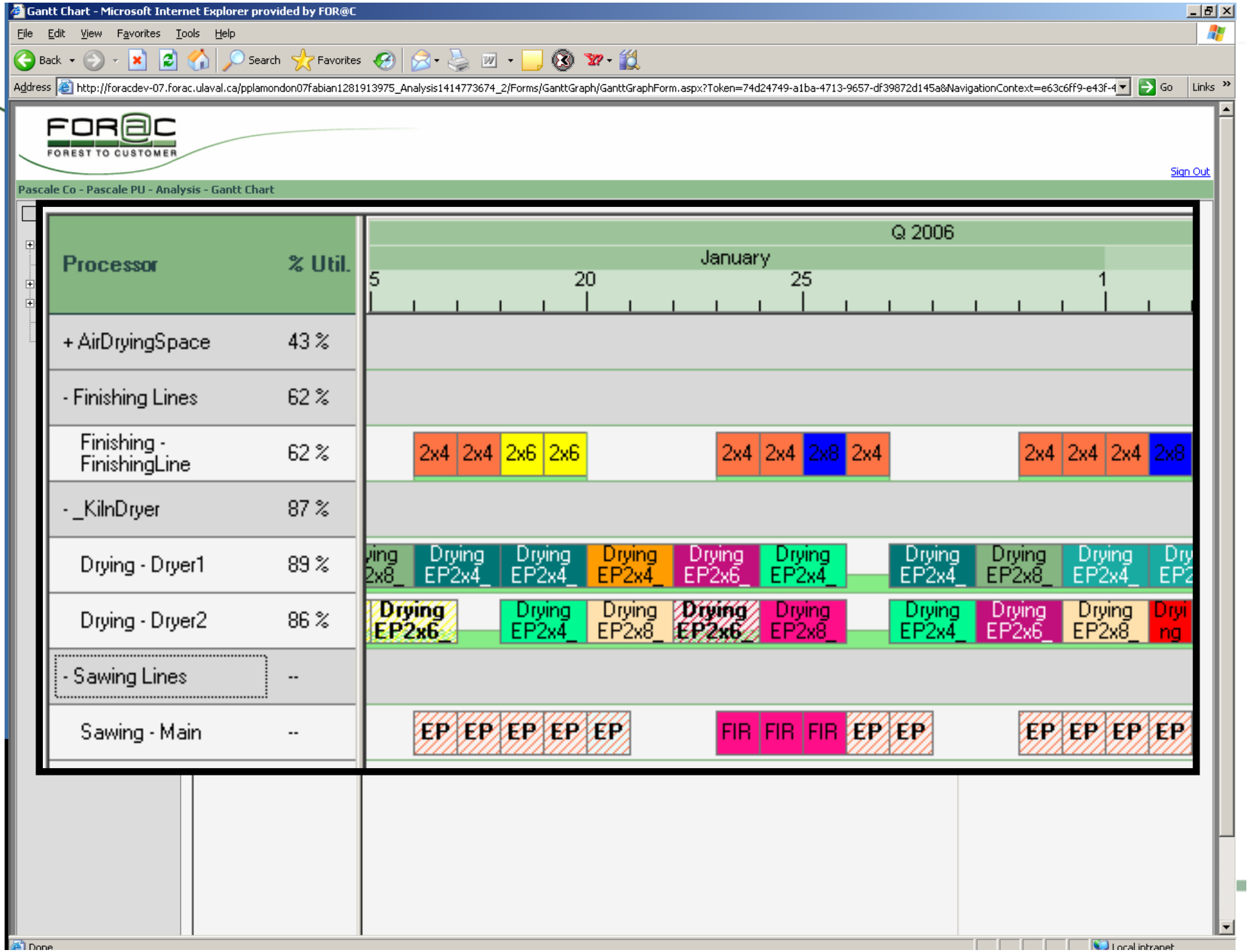
| | 96 “ | 92 5/8 “ | 88 “ | 72 “ |
|---|---|---|---|---|
| Premium | 11,71 % | 4,93 % | - | - |
| Stud | 35,70 % | 14,15 % | 10,68 % | 6,81 % |
| No 3 | 6,81 % | - | - | - |
| Economy | 4,49 % | - | 2,68 % | 1,61 % |
| Kiln wet (TH > 19 %) | 0,50 % | - | - | - |

# Drying


Different Loading Patterns
(products distribution)
Green
Drying
Dried
Different Drying Process
Air Drying
Kiln Drying
Yard
Equalizing

# Sawing


Type 1
Cutting Pattern #9
Cutting Pattern #25
2x3
2x4
Type 2
2x6
1x6
Cutting Pattern #12
Type 3
Cutting Pattern #57


Gantt Chart - Microsoft Internet Explorer provided by FOR@C
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Processor
% Util.
Q 2006
January
5
20
25
1
+ AirDryingSpace 43 %
- Finishing Lines 62 %
Finishing - FinishingLine 62 %
- _KilnDryer 87 %
Drying - Dryer1 89 %
Drying - Dryer2 86 %
- Sawing Lines --
Sawing - Main --
2x4 2x4 2x6 2x6
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2x4 2x4 2x4 2x8
Drying EP2x4_
Drying EP2x6_
Drying EP2x8_
EP EP EP EP EP
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Done
Local intranet

Inventory Analysis - Microsoft Internet Explorer provided by FOR@C

File Edit View Favorites Tools Help

Address http://aps4s.forac.ulaval.ca/pplamondon03Demo1120608195_Analysis280472180. Go

Back Search Favorites

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Sign Out

Demo Inc - Demo - Analysis - Inventory Analysis

October 6, 2005

- Agents
  - Deliver
  - Drying
  - Finishing
  - Logistic
  - Sawing
  - Source
  - Warehouse
- Data Operations
- Analysis
  - Resource Utilization
  - Delivery Performance
  - Gantt Chart
  - **Inventory Analysis**
  - Supply Network Analysis
  - Transportation Requirement
  - Material Balance
- Products
- Modeler

Forac ©2002-2005

New Analysis

Product: Lumb: 10, 2x4

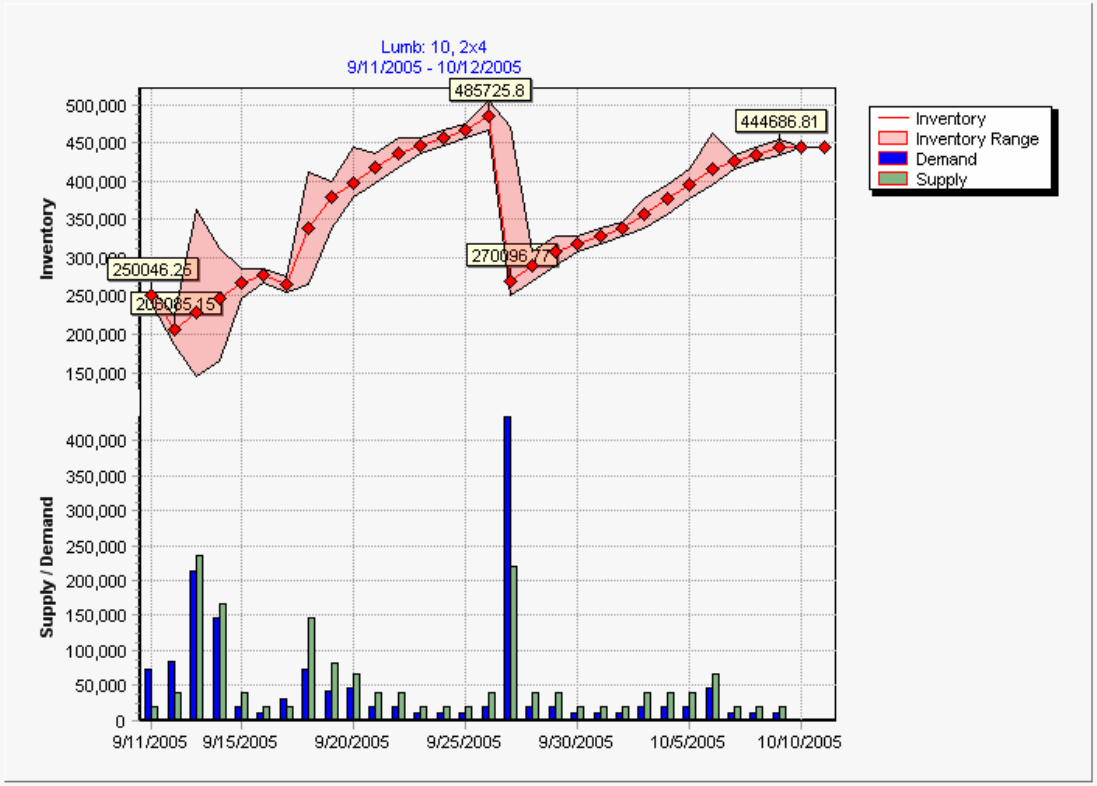
Start Date: 9/11/2005

End Date: 10/11/2005

Available Buckets: Daily

Selected Agent: All

View Graph Data




User: Alain Rousseau | Agent Type: Planning Unit Analysis

Done

Local intranet

# Anticipated Benefits

- **Optimized Production Plan**
  - Maximized delivery performance (pull mode)
  - Maximized throughput value (push mode)
  - Minimized inventory
- **Improved Customer Satisfaction**
  - Respect contract or loose it …have more!
  - Manage special demand (second transformation)
  - Faster problem detection (identify orders that will be late if any)
- **More confidence on production forecast**
  - Eliminate the different buffers
  - Take advantage of opportunity (when price is good)
- **Reduced reaction time**
  - Very fast replanning (can be done daily)
  - Easy to adapt to unpredictable events
- **Global and shared visibility**

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Kruger

# Perfect Order Policy

Selling the right product to the right customer at the right time to the right place at the right price all the time, No Exception !

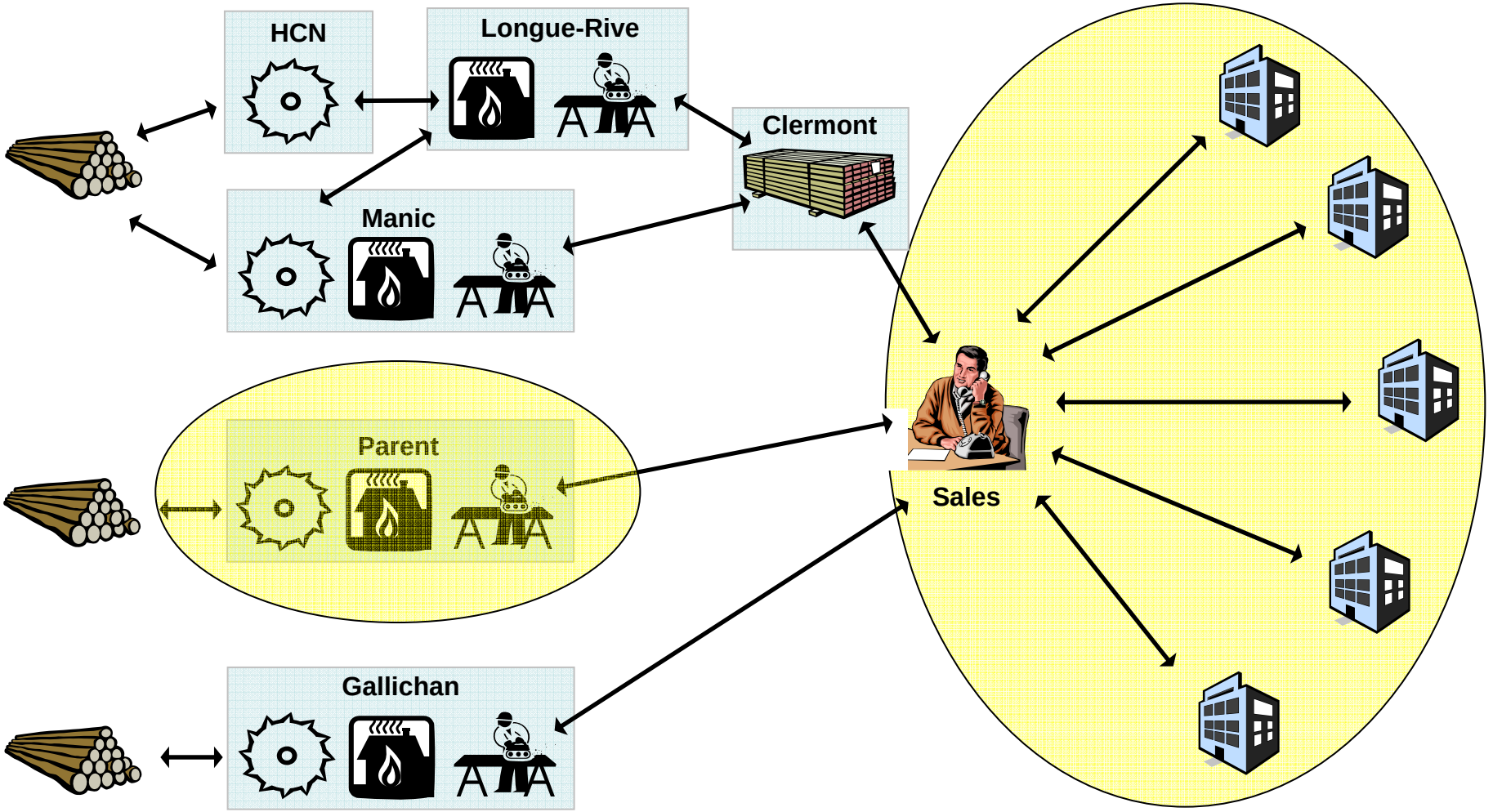
Being in a commodity segment, this is our way to be recognize as a superior supplier. To succeed we must make sure that we optimize our product mix based on production capability and market needs and to deliver a consistent product in the time frame that we promise to the customers.

With the help of Forac, we are striving to achieve our Mission, to create value for the customers and shareholder. With Forac input we have been able to improve our internal manufacturing procedures, and we believe that the best is yet to come !

Best Regards!

**Martin Boily**
General Sales Manager
Kruger

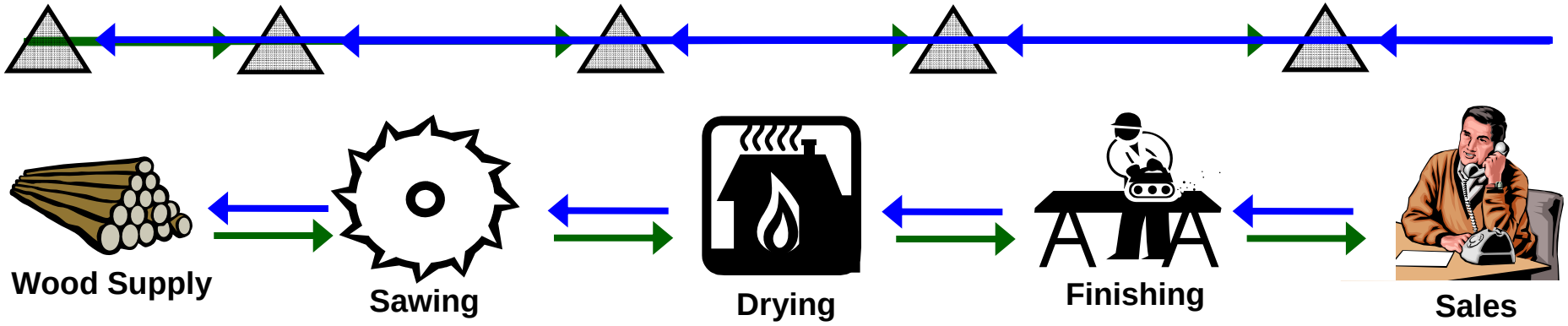
# Kruger Lumber Network



# Decoupling Point

**Order Penetration Point**

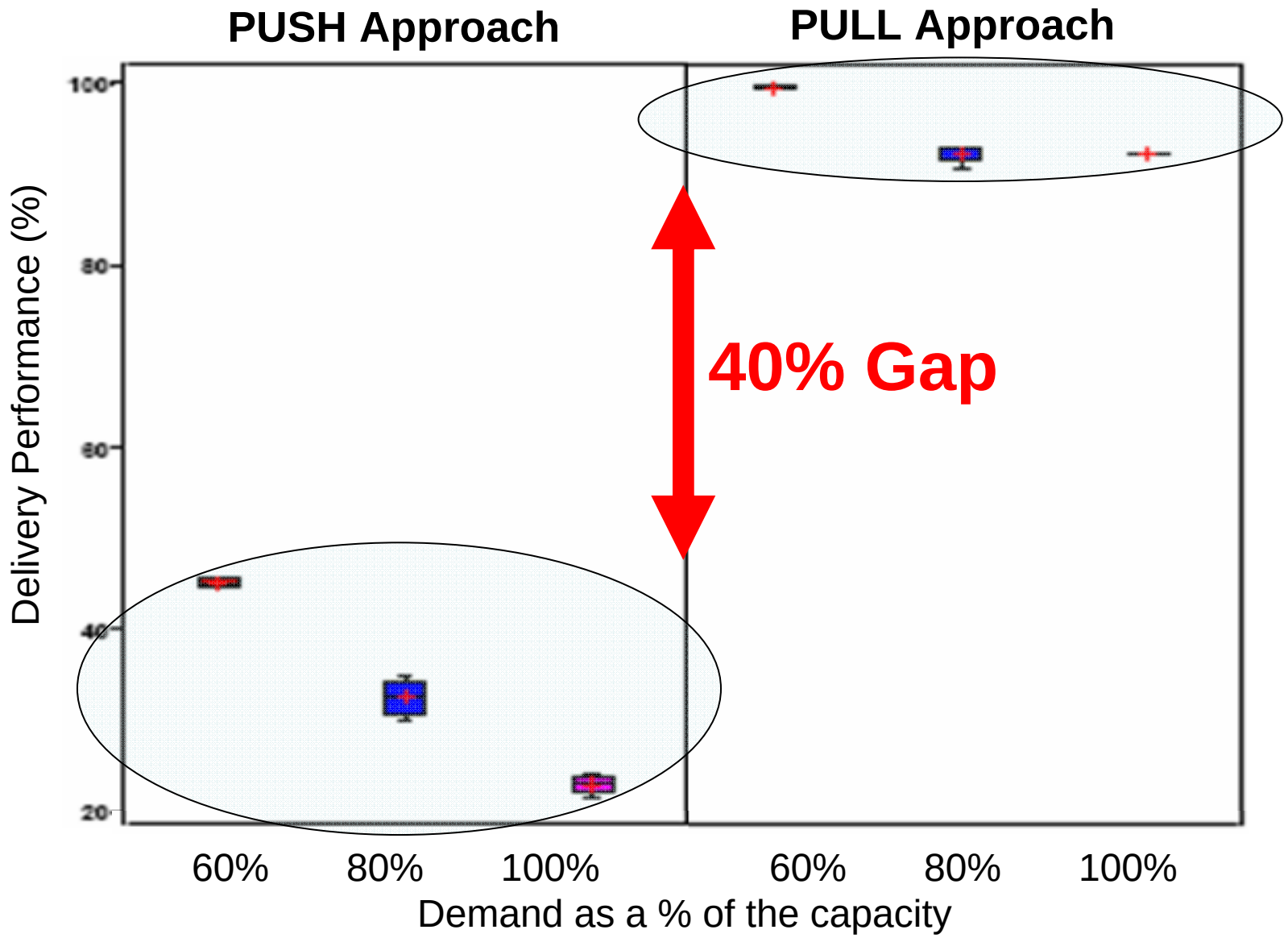
Point from which planning is taking orders into account




**Capacity to be more responsive**

- **Improved Agility**
- **Better Delivery Performance**
- **Reduced Inventory**

# Preliminary Results



# Conclusions

- **New trends in the lumber market (contracts, VMI & value-added customers) will force sawmills to move toward more agility and a demand-driven supply network approach;**

- **We demonstrated that sawmill's operations can be plan this way but it is a complex problem and optimization tools are required;**

- **Considering the complexity of the problem and the agility required, we think that it is best to use a distributed and specialized approach and we demonstrated that it is a promising avenue.**

# Thank you!

## Questions?