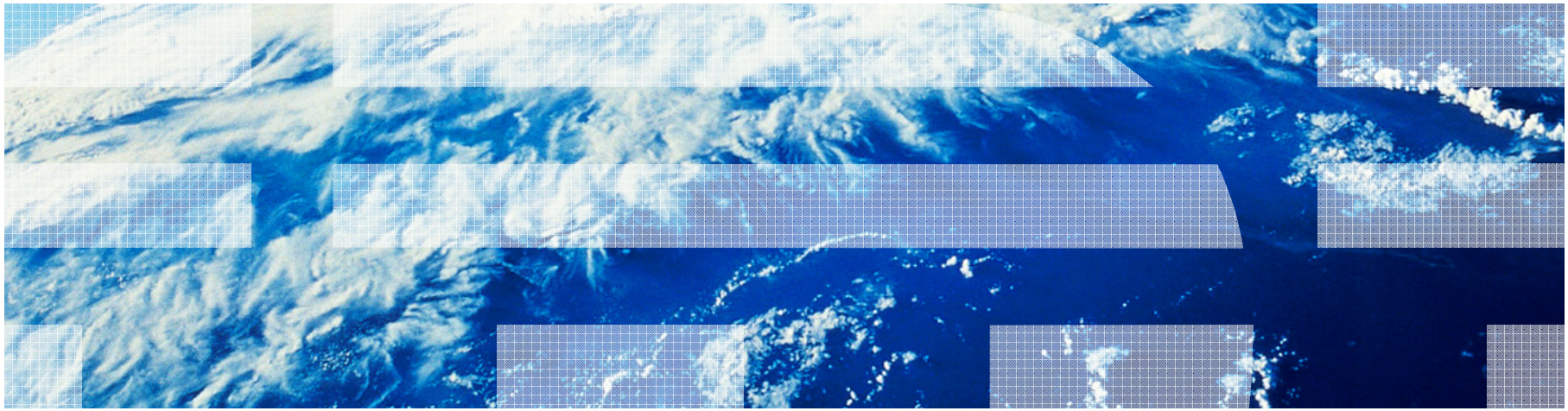
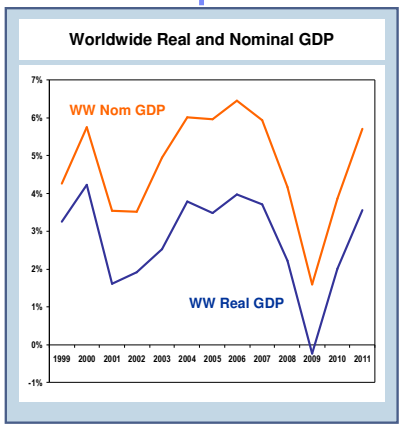
獲利新經濟
國際企業生產力最佳化趨勢及案例分享

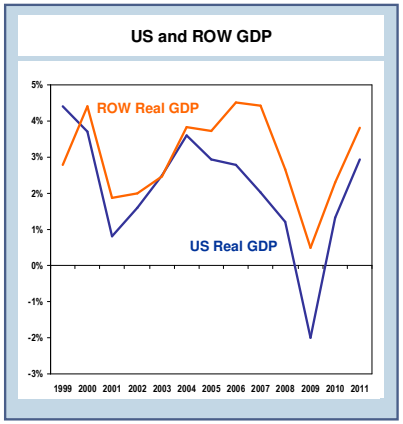


Agenda

- Today's Supply Chain Challenges
- *Better. Faster. Greener. Smarter:* Success Stories
- Optimization: The Science of Better Decisions
- Building Smarter Supply Chains: Get started today!

Economic Volatility... The best summary of today's global marketplace.





The global recession will result in -1% real GDP 2009 growth with -2% US growth and the "Rest of World" slightly positive

Source: Economic Assessments from Global Insight, IBM Finance and IPR, December 2008

Supply chains continue to become more global and complex...

Going Global

Businesses and supply chains are becoming more global over the last decade

3X Between 1995 and 2007, ***foreign subsidiaries*** nearly tripled, from 265,000 to 790,000

2X ***Transnational companies*** more than doubled, from 38,000 to 79,000[1]

Increased Network Complexities

Supply chains are involving more companies

80% Nearly 80% of executives expect number of ***collaborative relationships*** with third parties to increase[2]

65% Between 2007 and 2010, R&D ***outsourcing*** is forecast to increase by 65%

80% Engineering ***services*** and product-design projects are forecast to increase by 80%[3]

Product Portfolio Turmoil

Supply chains must contend with rapidly expanding and contracting portfolios

17%
- In consumer products industry, ***production introductions*** increased by 17% in 2006, more than double the 2005 rate[4]
- Portfolio rationalization is ***eliminating SKUs*** almost as fast

Today's Supply Chain Challenges

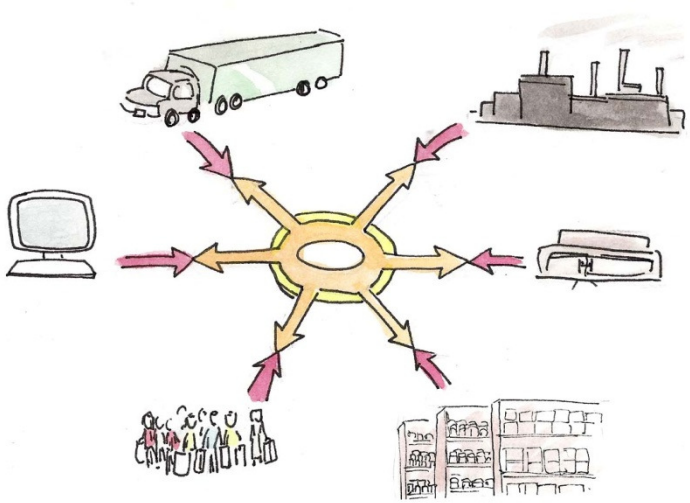
- Global supply chain with long lead times
- Rising and shifting customer expectations
- Increase in labor costs in developing countries

The Average Annual Wage Increase between 2003 and 2008 in different Countries

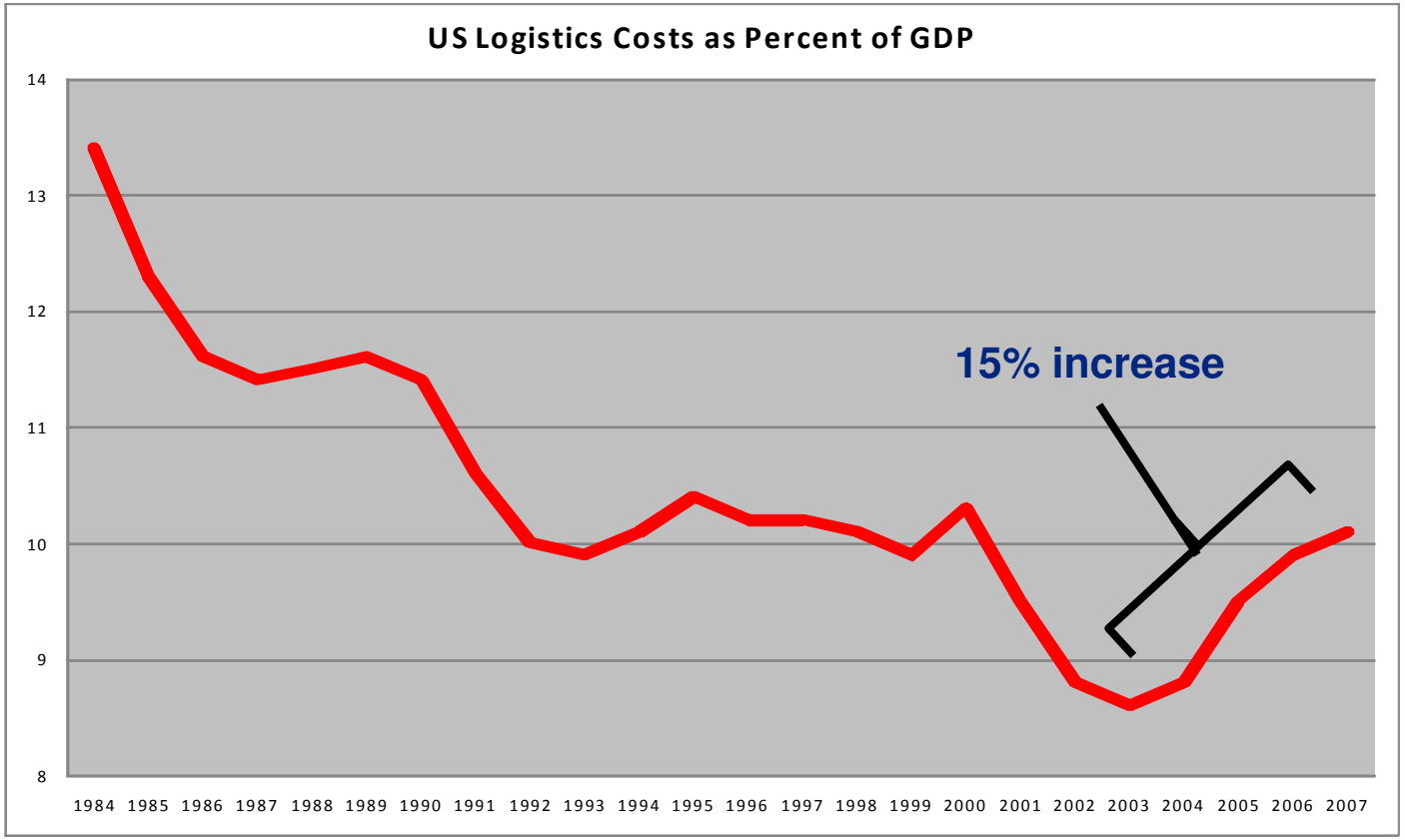
Country	Brazil	China	Malaysia	Mexico	US
Average Annual Wage Increase	21%	19%	8%	5%	3%

Today's Supply Chain Challenges

- Global supply chain with long lead times
- Rising and shifting customer expectations
- Increase in labor costs in developing countries
- ***Increase in logistics costs***

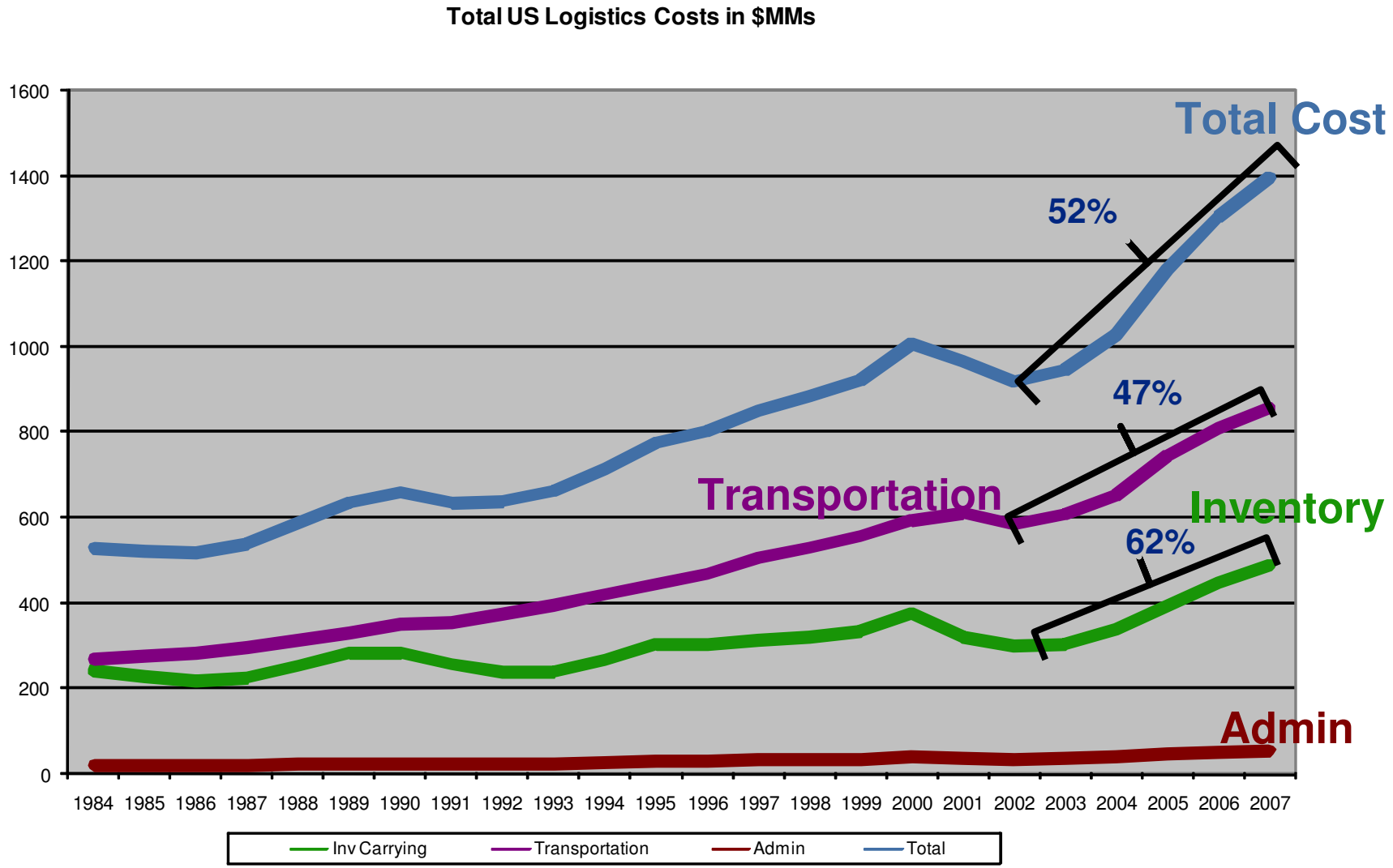


Increase in Logistics Costs



- Rising energy prices
- Rail capacity pressure
- Truck driver shortage
- Security requirements

Total US Logistics Costs 1984 to 2007 ($ Billions)



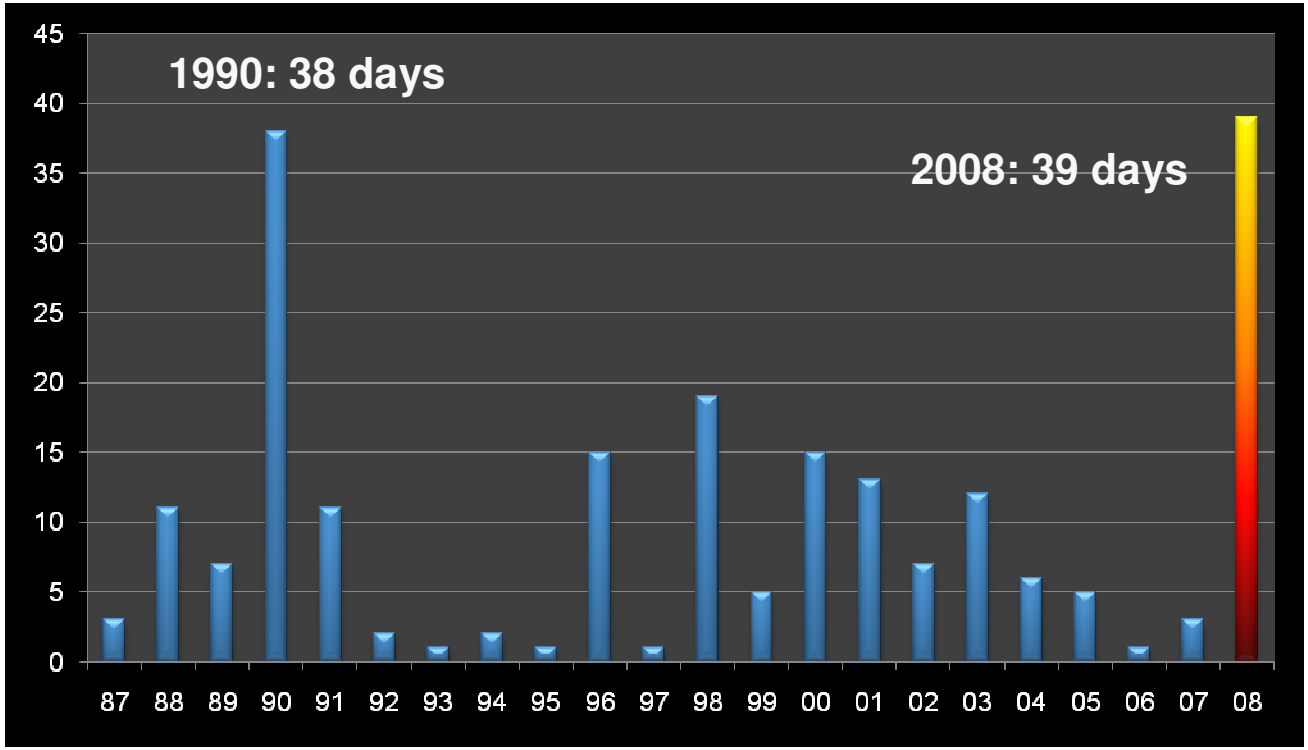
Source: 19th Annual Logistics Report

Today's Supply Chain Challenges

- Global supply chain with long lead times
- Rising and shifting customer expectations
- Increase in labor costs in developing countries
- Increase in logistics costs
- ***Increase in risks***
- ***Importance of sustainability***
- ***Unprecedented Volatility***

Unprecedented Volatility

Number of days the price of oil changed 5% or more

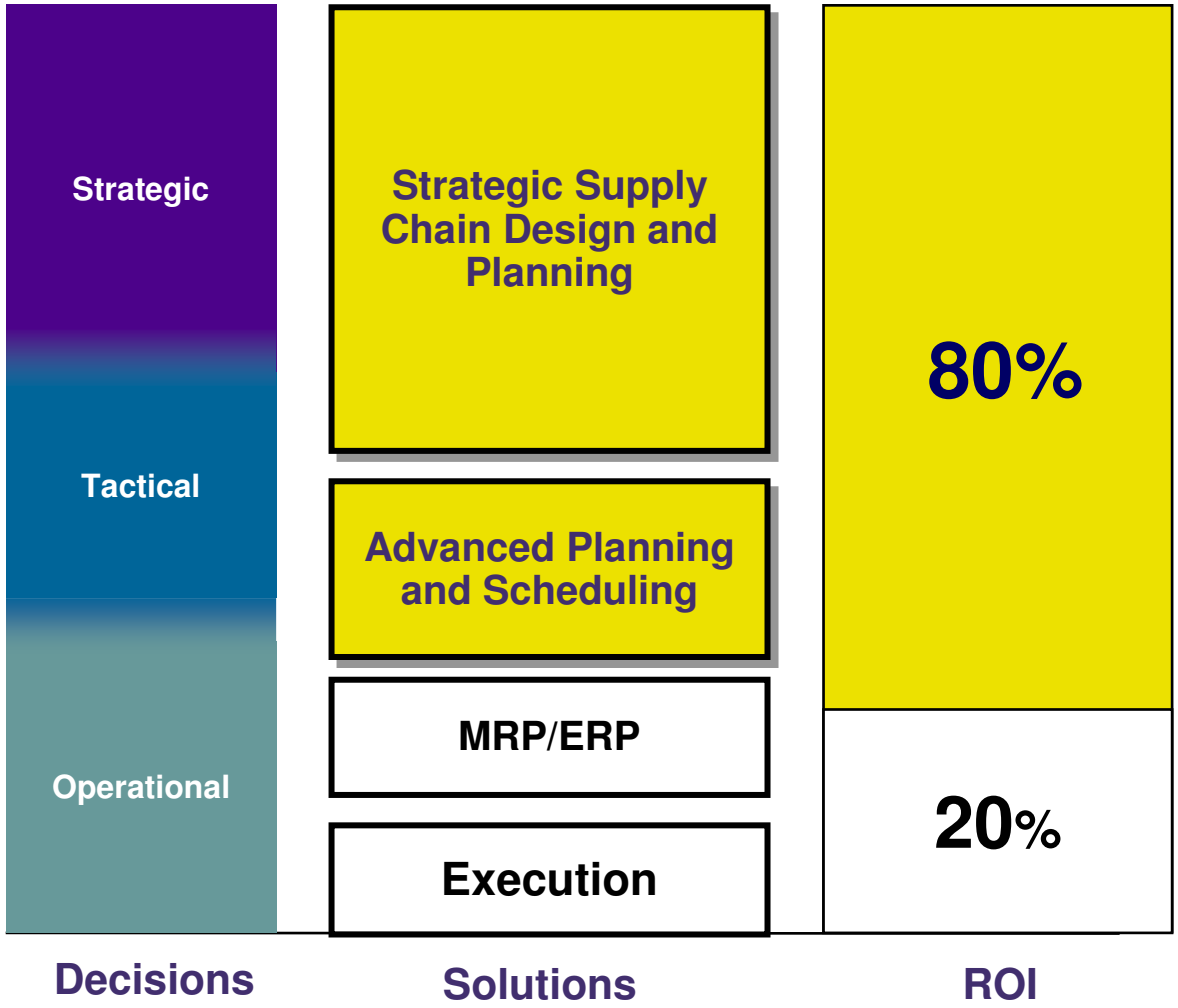


In 2008 the price of oil changed 5% or more from its previous close on 39 days making it the most volatile year since 1990.

Source: NYT

Scope of SCM Decisions & Savings

- Next generation optimization and supply chain solutions help organizations support strategic, tactical, and operational decisions to manage during downturns as well as plan for future growth.



Better.

Case #1: Production Sourcing at Pepsi Bottling Group

Case Study recently published in Consumer Goods Technology Magazine

- **Challenge:** New demand patterns suddenly left PGB bottle lines operating at capacity and the peak demand outstripping instantaneous production capacity
- **Goal:** Create a process which continually improves the production sourcing strategy by minimizing system-wide costs, providing better customer service and creating a competitive advantage
- **Benefits:** Their goal was achieved with specific results including:
  - An increase in number of cases available to sell due to reduced out of stocks
  - Reduction in raw material and supplies inventory from $201 to $195 million
  - A 2% decline in the growth of transport miles even as PBG revenue grew
  - Increase in the return on invested capital

"ILOG supply chain applications provided us the means to implement a 21st century supply chain by optimizing inventory, reducing costs and increasing sales" -- Paul Hamilton, VP Global Supply Chain, Logistics and Strategy

11

Better.

Case #2: Inventory Optimization in the Pharmaceutical Industry

- **Challenge:**
  - Too much working capital invested in inventory
  - Global supply chain with long lead times
  - Wanted to evaluate where to reduce inventory levels
- **Goal:**
  - Determine the optimal inventory levels at all echelons of the network.
  - Evaluate inventory impact of supplier and network changes.
  - Understand the drivers behind inventory in the network.
- **Benefits:**
  - Identified $16 million of inventory savings (21% reduction) for one product line.
  - Similar analyses for other product lines provided the similar benefits,

Faster.
Case #1: Network and Inventory Optimization in Retail

- **Challenge:**
  - Needed to improve the ability to react to demand signals
  - Wanted to minimize incremental cost
  - Demand attributes: highly seasonal products, high product variability/uncertainty, short product lifecycle

- **Goals:**
  - Model the supply chain network
  - Calculate working capital impact on a SKU-by-SKU basis for each stocking strategy. This information is used by the Operations Team for peak fulfillment strategy
  - Determine the optimal stocking location for every SKU at every node.

- **Benefit:**
  - Provide better service to the stores
  - Reduce peak-season congestion
  - Minimized incremental cost

Faster.
Case #2: Inventory Target setting at Apparel Manufacturer

- **Challenge:**
  - Low inventory turns throughout the network
  - Required a formalized process and system for setting 'Target Inventory Levels' across all the divisions and brands of manufacturer for all SKUs

- **Goals:**
  - Create target Inventory Levels
  - Manage exceptions with the ability to override/approve values
  - Create a central repository for Inventory Targets
  - Feed targets to multiple ERP planning systems including SAP, Manugistics and i2

- **Benefits:**
  - Reduction in Inventory Levels
  - Improved customer service
  - Standardized, formalized process for setting Target Inventory Levels
  - Solution can be rolled out with minimal training for users

Greener.

Case #1: IBM ILOG Helps Fonterra Streamline the Dairy Supply Chain

This New Zealand Dairy Cooperative was faced with a number of challenges:

- **Challenge:**
  - Multi-echelon supply chain
  - Spanned multiple countries
  - Extended transit times
  - Limited shelf life and seasonal production

- **Goals:**
  - Reduce costs
  - Reduce the firm's carbon footprint
  - Discover interactions among environmental impacts and business drivers
  - Realize opportunities to more efficiently operate business

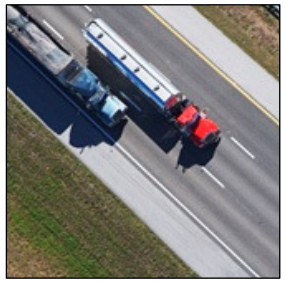
- **Benefits:**
  - Reduced movement of product between plant and off-site stores
  - Network cost savings from removing 4,000 truckloads off the road annually
  - Potential to exit around 12 third-party warehouses
  - Operational efficiency gains as a result of consolidating to a single location, i.e. access to more vessels
  - Greater reliability of supply
  - Integrity of product temperature

- Reference: Whitepaper

Greener.

Case #2: Network Design & CO2 Reduction in Transportation Industry

- **Challenge:**
  - Leading express delivery company in and out of Europe, complex over-the-road and air distribution networks
  - Multiple service level offerings: Next Day AM, Next Day, Two Day, Ground Delivery
  - Multiple modes of transportation, including vans, full truckload and air carriers
- **Goals:**
  - Plan the network for the next 5 to 10 years accounting for different demand forecasts and different growth-rates across geographies
  - Assess the impact of potential European environmental legislation
  - Use scenario analysis to assess the impact of different business rules



- **Benefits:**
  - Identified network savings
    - In Europe, current network can operate efficiently with two fewer distribution hubs
  - Developed Network Expansion for Demand Forecasts
    - Anticipated high Eastern European growth rates require additional hub openings
    - Determined optimal gateways for additional international air service offerings
  - Environmental legislation impact now well understood

Smarter.

Case #1: Yogurt Production Planning & Scheduling at Danone

Challenge:

- Yogurt production requires an intermediate product
- Danone could not successfully model its production planning and scheduling process with SAP's PP/DS due to tank constraints, cleaning-in-place and changeovers

- **Goals:**
  - Determine daily production schedules to meet demand
  - Augment SAP's PP/DS through tight integration between the two technologies
  - Implement in plants in Argentina, Mexico, Russia and US

- **Benefits:**
  - Improved operation efficiency/utilization, service levels and inventory coverage
  - Executable plans for finished and intermediate products incorporating constraints relating to cleaning-in-place and changeovers
  - Can schedule down to the minute while plan for the next few weeks/months
  - Improved reactivity via daily or more frequent planning
  - Full SAP integration
  - Easy to learn, easy to use and very good acceptance by users

Smarter.
Case #2: Real Time Scheduling at Samsung

Challenge:

- Needed to reschedule 5-10 times/hr
  - Address production delays, equipment coming off line, unexpected wafer quality issues, etc.
- Solution not available in any package

- **Goals:**
  - To be able to rapidly reschedule to react to changes
  - Implement across multiple fabs

- **Benefits:**
  - Reduced product cycle time over 50% from 70 to 30 days
    - In a market where prices often fall dramatically, faster production means higher prices
    - Estimated gain: net prices averaged 4% higher than they would have been
  - Increased on-time delivery & customer satisfaction
  - Huge decrease in WIP levels
    - Lower inventory carrying costs
    - Decreased obsolescence
  - In operation at multiple fabs

What's behind these successes?

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

Progress of Mathematical Programming

Example: A Production Planning Model

401,640 cons. 1,584,000 vars. 9,498,000 nzs

Solution time line (2.0 GHz P4):		**Speedup**
▪ 1988 (CPLEX 1.0):	29.8 days	**1x**
▪ 1997 (CPLEX 5.0):	1.5 hours	**480x**
▪ 2003 (CPLEX 9.0):	59.1 seconds	**44000x**

Progress of Mathematical Programming

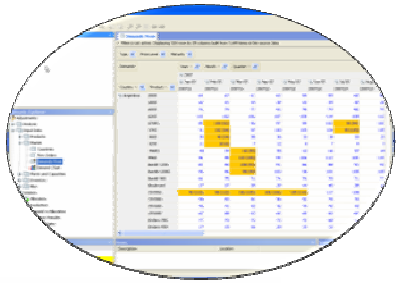
Average improvement: 1988 → 2003

(Operations Research, Jan 2003, pp. 3--15)

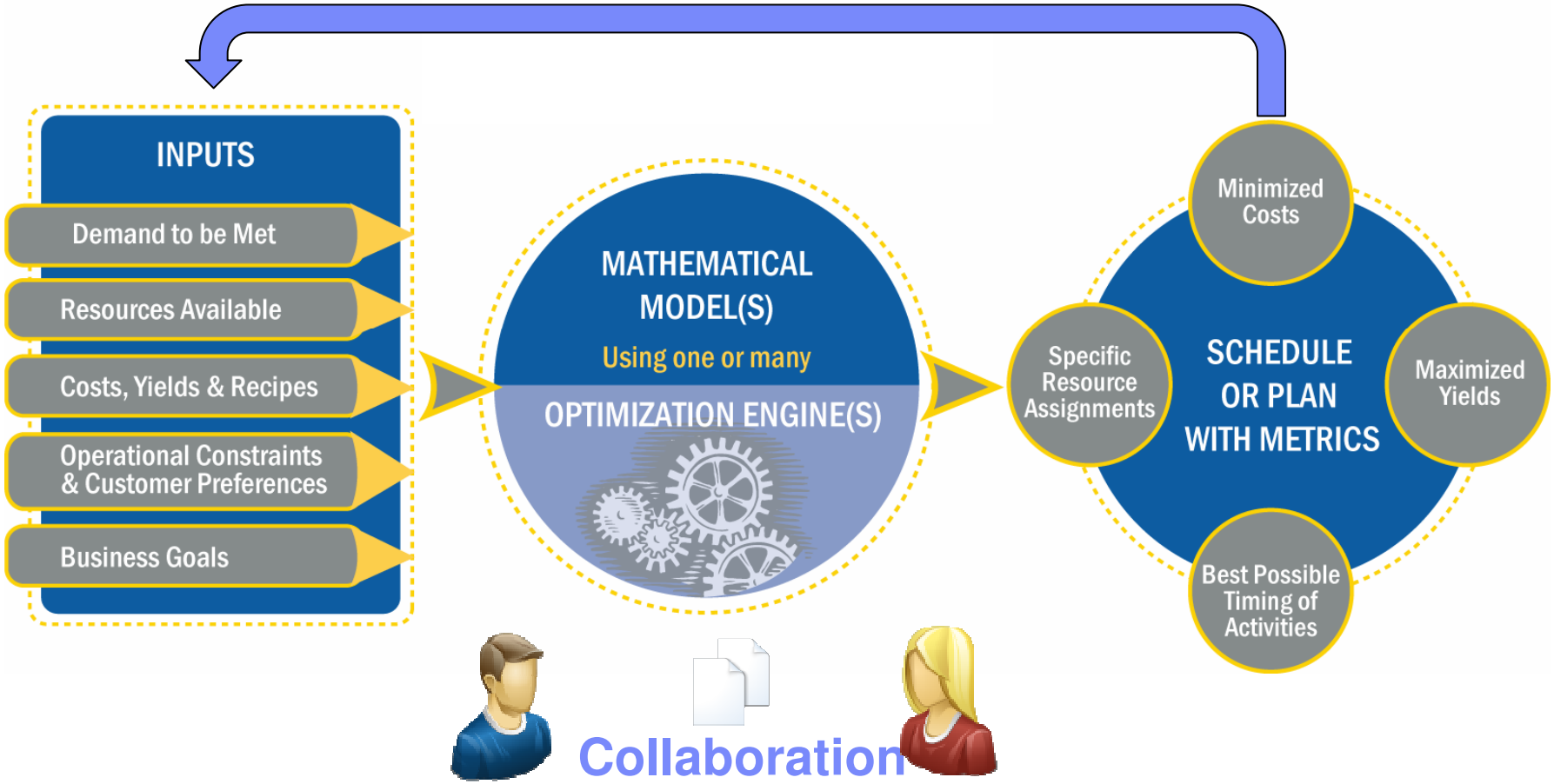
- Algorithms (*machine independent*): 2360x
- Machines (workstations →PCs): 800x
- NET: Algorithm × Machine 1 900 000x

Note: Moore's Law predicts 2x every 18 months ⇒
1024x over 15 years.

How does optimization support decision making?



What-If Analysis



ILOG Optimization and Supply Chain Solutions

- ILOG Optimization Solutions
  - Leader in optimization and performance- IBM ILOG CPLEX is the gold standard in optimization
  - Used by over 50% of the world's largest companies, 1000s of Universities, and 1000s of application providers
  - Over 1,000 commercial customers under maintenance
  - One third of Global 500 have built custom applications using ILOG Optimization engines and tools
  - Major software companies reach thousands more :
    - SAP, Oracle, Infor, JDA, Manhattan Associates, Red Prairie
  - Focus: ILOG Optimization solutions tackle the world's toughest problems allowing firms to gain a unique competitive advantage

- ILOG Supply Chain Applications
  - LogicTools products first released in 1997 based on the thought leadership of David Simchi-Levi, MIT professor and world renown supply chain practitioner
  - Used by over 50% of the world's largest supply chain and over 50% of AMR's top 50 global supply chains
  - Focus: easy-to-use, optimization-based decision support solutions to solve complex supply chain and production problems

- Proven Ability to Deliver
  - Rapid return on investment
  - Many very long-term, satisfied customers
  - Access to best of breed technology and R&D processes
  - Worldwide support and services capability

Well-Documented Optimization ROI Cases

2 Chilean Forestry firms*	Timber Harvesting	$20M/yr + 30% fewer trucks
UPS*	Air Network Design	$40M/yr + 10% fewer planes
South African Defense*	Force/Equip Planning	$1.1B/yr
Motorola*	Procurement Mgmt	$100M-150M/yr
Samsung Electronics*	Semiconductor Mfg	50% reduction in cycle times
SNCF (French RR)*	Scheduling & Pricing	$16M/yr rev + 2% lower op ex
Continental Airlines*	Crew Re-scheduling	$40M/yr
AT&T*	Network Recovery	35% reduction spare capacity
Grant Mayo van Otterloo*	Portfolio Optimization	$4M/yr
Pepsi Bottling Group	Production Sourcing	$6M inv reduction + 2% fewer miles
Fonterra	Dairy Distribution	$15M annual savings
NA Brewing Company	Mfg Sourcing + Distribution	$150M/yr transportation savings
US Water Products Mfg	Inventory Optimization	$6.2M working capital reduction

*Franz Edelman Competition Finalists, Science of Better, http://www.scienceofbetter.org , Published Case Studies

The Value of IBM ILOG Optimization and Supply Chain Solutions

Smarter Decisions for a Smarter Planet

- **Better.**
  - Get better performance for lower cost
  - Find non-obvious solutions for complex decisions
  - Produce quantifiable benefits to the bottom line
- **Faster.**
  - Automate decision processes consisting of many alternatives
- **Greener.**
  - Discover interactions among environmental impacts and business drivers
  - Realize opportunities to more efficiently operate a business in a better way
- **Smarter.**
  - Turn information and insights into action
  - IBM ILOG Optimization and Supply Chain Solutions leverage the investments you are making in enterprise information technology and business automation

Turn Insights into Action

- Start building your Smarter Supply Chain today!
  - Benchmark your organization
    - Take the Chief Supply Chain Officer Study Quick Assessment
  - Ask your Supply Chain executives to participate in our new global executive study:
    - *A New Decade for Smarter Supply Chain Management*
  - Download the 2009 Chief Supply Chain Officer Executive Summary and related Industry reports

- Follow us on twitter
  - twitter.com/ibmilogoptiscm

- Visit us online to discover how we can help your organization become:
  - **Better. Faster. Greener. Smarter.**
    - **IBM ILOG Optimization**
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