

A BUSINESS-ENGINEERING JOINT RESEARCH CENTER AT LEHIGH UNIVERSITY

CENTER FOR VALUE CHAIN RESEARCH



Managing your **Supply Chain** is a good idea...
Applying **Value Chain** principles creates customer value and competitive advantage.

www.lehigh.edu/cvcr

Supply Chain Response to Rapid Reductions in Demand



- Industrial gases, certain medical / specialty gases supplied to a variety of markets
- Liquid bulk, packaged gases, on-sites

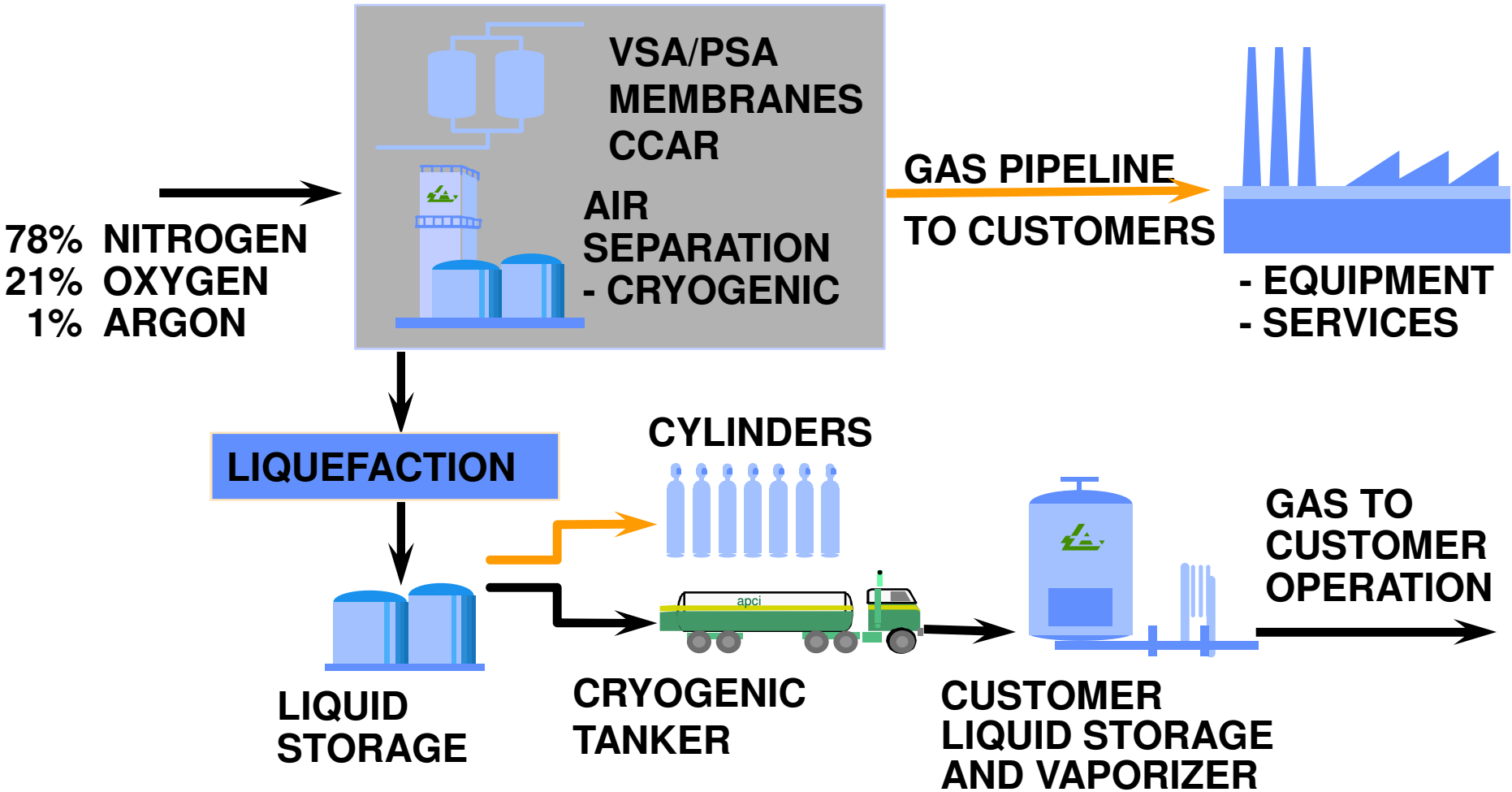
Center for Value Chain Research
21 May 2009

Overview

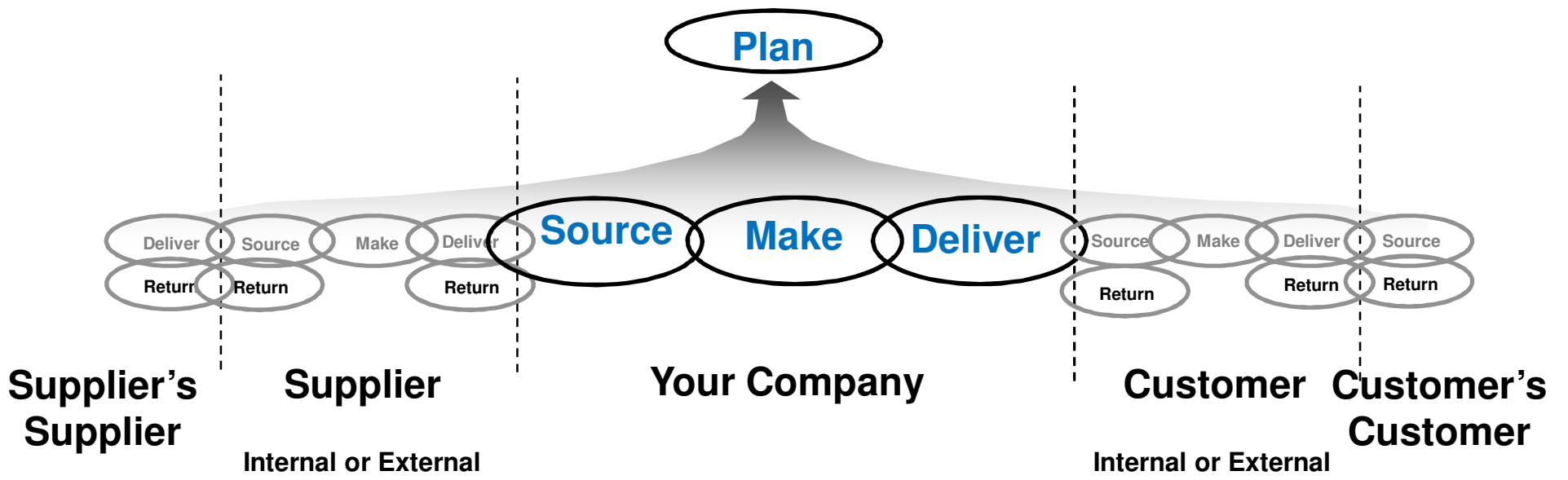
Business Dimensions

- Sales: \$3.5B
- Over 25 Countries – Americas, Asia, Europe
- Capacity: >30,000 TPD
- Major Products: Oxygen, Nitrogen, Argon, Hydrogen, Helium, Carbon Monoxide, Carbon Dioxide, Rare Gases
- ~15,000 customers
- ~500,000 deliveries annually
- 24 x 7 day operation
- Multi-local operation

Supply Tailored to Meet Customers' Needs



SCOR – Five Work Processes



Building Block Approach

Processes

Metrics

Best Practice

Technology

Economic Recession

- Significant Volume Drop over last 6 months
- Geographic Variance
 - North America 10 to 20%
 - Europe 15 to 25%
 - Asia 10 to 35%
- Spain, Taiwan, Korea particularly difficult
- Steel, Semiconductor areas hard hit

1) Immediate Reaction

- Goal: Without compromising customer supply reliability, rapidly and accurately bring variable costs in line with demand reduction
- **Customer**
 - Understand and update tank-level demand
 - Immediate (next 3 days)
 - Near-term (next 2 to 4 months)
 - Mid-term (next 3 to 6 months)
 - Monitor and manage payments, creditworthiness
 - % Current
 - Days Sales Outstanding (DSO)
 - Maintain strong relationships through hard times

Production/Plant Operations

- Evaluate and decide production mode options
 - Campaign
 - Time-of-day
 - Purchased product
- Consider maintenance needs/opportunities, resourcing, timing
- Incorporate electric power input
 - Supply contract options
 - Ad hoc opportunities
 - Suppliers' operating situations

Distribution/Logistics

- Understand and determine distribution resourcing and flexibility
 - Equipment – tractors and trailers availability
 - Driver hours
 - Purchased transportation options
 - Delivery requirements
- Incorporate geographic considerations, labor practices
 - North America
 - Europe
 - Asia

Supply Chain/Product Management

- Detail demand planning scenarios
 - 100 plants
 - 3 major regions
 - Tank-level demand, spot requirements, major customer buildup and “sense-check”
- Perform manufacturing/distribution optimization
 - Incremental cost linear programming optimization
 - Understand and solve supply/demand discontinuities, cost impacts, decide actions
 - Detail operations and distribution supply plan
- Direct and lead execution of the plan
 - Two-way matrix group communications
 - Operations, Distribution, Energy, Customer Service, Sales

2. Mid-Term Considerations

- Goal: Correct structure and activities for recession of “x” duration.
- **Business Platform Rightsizing**
 - How would we leverage resources if we knew the downturn were:
 - 6 months in duration
 - 2 to 3 years in duration
 - Longer than 3 years in duration
 - How much less in each effort area do we need to do if ...? (level)
 - If we were not already doing “x” now, why would we still need to do it? (scope)

Opportunities

- Goal: Ensure proper positioning for eventual upturn
- **Processes**
 - Exploit rare opportunity to evaluate our performance in period of significant change
 - Accelerate and deepen worldwide commonality of processes, methods and data
 - Capitalize on automation of stable, in-control work processes
- **Systems**
 - Upgrade, replace or retire plant sites, terminals
 - Continue/accelerate/delay geographic expansions
 - Improve information systems and data quality
 - Exploit procurement opportunities

People – THE Key Element

- Reinforce your **values**, reinforce **your** values, **reinforce** your values
- Support your people through difficult time
- Assess and build skills in areas needed for:
 - Continuing to manage with lower volumes
 - Returning to higher growth
 - leadership
- Embed the learnings from this rare experience