

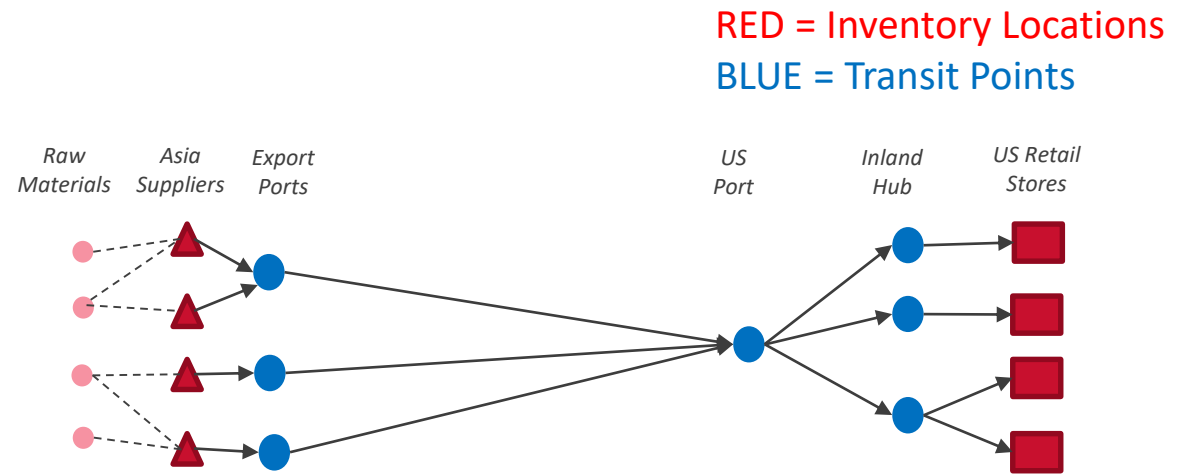
Utilizing Total Cost of Ownership



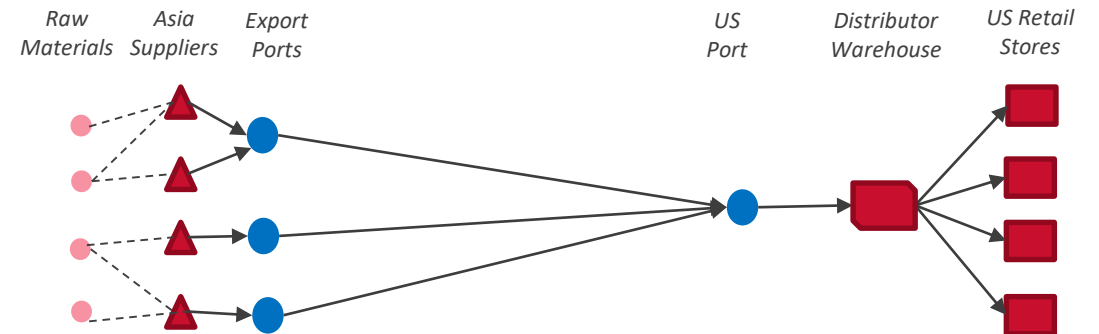
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Sourcing Options

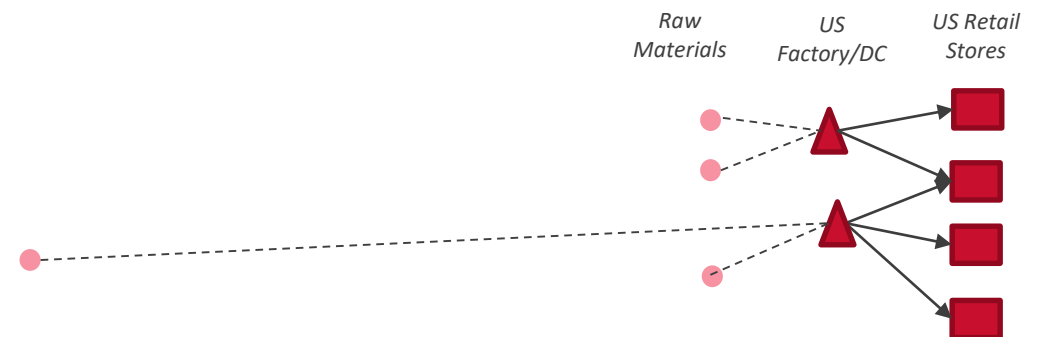
1. Traditional Overseas Suppliers



2. Foreign Sourced, Domestic Distributor



3. Locally Produced & Distributed



Sourcing Option Characteristics

1. Traditional Overseas Suppliers

- Long supply line and lead-times
- Single opportunity to order & receive stock
- Lowest price per unit (but TCO?)
- Higher risk of loss sales and/or obsolesce

2. Foreign Sourced, Domestic Distributor

- Long supply line and lead-times
- Limited opportunities to modify orders
- Multiple in-season shipments possible
- Medium risk of loss sales and/or obsolesce

3. Locally Produced & Distributed

- Short supply line and lead-times
- Best opportunity to modify orders
- Multiple in-season shipments possible
- Lowest risk of loss sales and/or obsolesce
- Potentially higher per-unit cost (but TCO?)

How Much Does a Purchased Item Really Cost?



Total Cost of Ownership

- What does TCO include?
 - Cost of Goods Sold (COGS)
 - Inventory, Purchasing, Travel and Admin Costs
 - Risk/Loss Costs
 - Strategic Costs
 - Green Costs
- TCO is more than just the cost to purchase (or manufacture) a part



Total Cost of Ownership

Cost of Goods Sold

- COGS Cost Elements
 - Product Price
 - Packaging
 - Duty & Taxes
 - Freight/Transport
 - Related Fees (clearance, forwarding, port, etc.)

Total Cost of Ownership

Other Hard Costs

- Inventory Costs
 - Carrying costs (transit & stocking)
 - End-of-Life/Obsolete
- Purchasing Costs
 - Prototype costs
 - PO cost per order
- Travel Costs
 - Start up travel
 - Audit / Supplier Maintenance
- Admin Costs
 - Legal costs
 - Stocking / warehousing costs

Total Cost of Ownership

Risk / Loss

- Risk / Loss Cost Elements
 - Rework costs
 - Expedite costs
 - Opportunity (market reaction) costs
 - Intellectual Property (IP) risk
 - Economic stability risk (supplier)
 - Political stability risk (country)

Total Cost of Ownership

Strategic Costs / Green Costs

- Strategic Costs

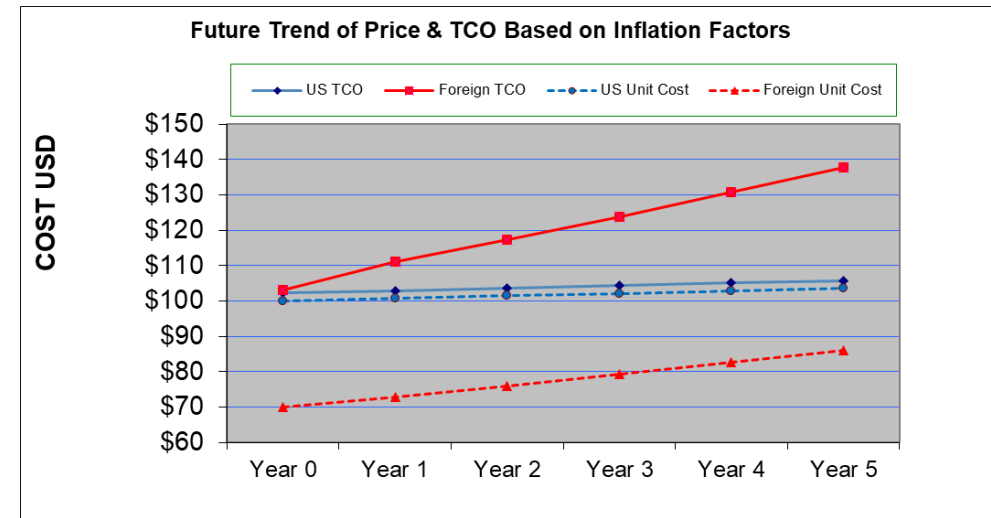
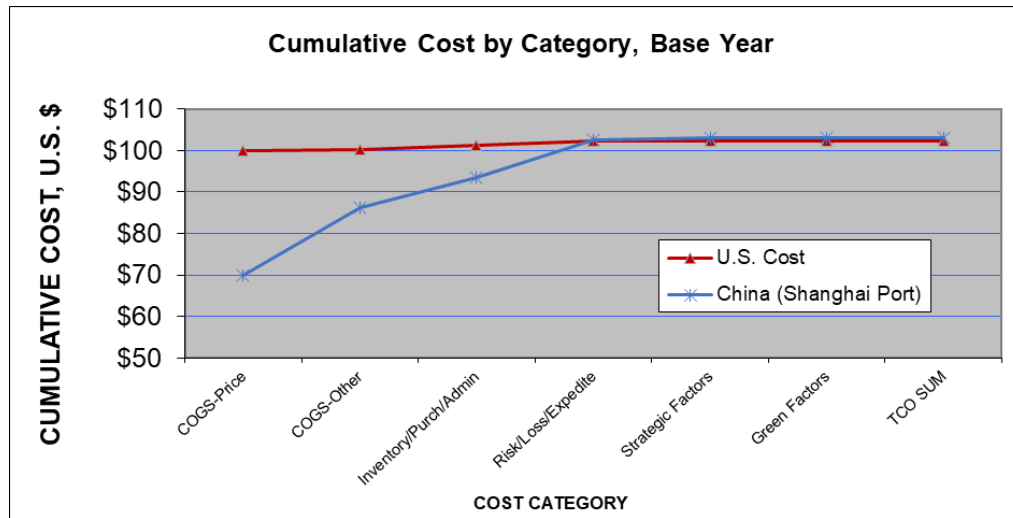
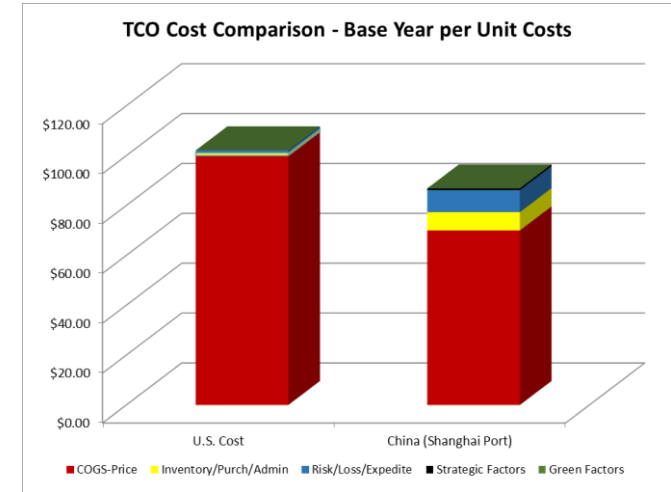
- Impact on innovation
- Impact on product differentiation
- Impact on coordination ability
- Impact on ability to react quickly to market

- Green Costs

- Carbon footprint impact
- Disposal costs related to loss/obsolescence
- Lean 7 Wastes
 - Overproduction
 - Waiting/Delay
 - Transport
 - Over-processing
 - Defects/Rework
 - Motion
 - Inventory

Example TCO Output

Base TCO Summary		Per Unit Costs		Cumulative Per Unit Costs	
Country	U.S. Cost	China (Shanghai)	U.S. Cost	China (Shanghai)	
COGS-Price	\$100.00	\$70.00	\$100.00	\$70.00	
COGS-Other	\$0.11	\$16.26	\$100.11	\$86.26	
Inventory/Purch/Admin	\$1.13	\$7.33	\$101.24	\$93.59	
Risk/Loss/Expedite	\$1.00	\$8.83	\$102.24	\$102.42	
Strategic Factors	\$0.00	\$0.70	\$102.24	\$103.12	
Green Factors	\$0.00	\$0.00	\$102.24	\$103.12	
TCO SUM	\$102.24	\$103.12	\$102.24	\$103.12	



Other Considerations

Typically we find that while the purchase price per unit is lower for items sourced from low-cost countries, the Total Cost of Ownership per unit for a domestically sourced product is similar to, or lower than, the overseas supplier. Even if the domestic sourced TCO is slightly higher there are many other risk and non-cost factors that should be considered.



Vs.

**BEST
DEAL**

Other Considerations

- Supply Chain Risk
- Rate of Labor Cost Increases
- Currency Rate Changes
- Energy Cost Advantages
- Industry Factors

Summary of Risk Impacts

- International supply is a major source of risks throughout the supply chain
- Transportation drives many of the risks
- These risks have a real cost ($\text{Probability} \times \text{Consequence} = \text{Risk}$)
- Supply Chain Risk is a Factor in Total Cost of Ownership Analysis

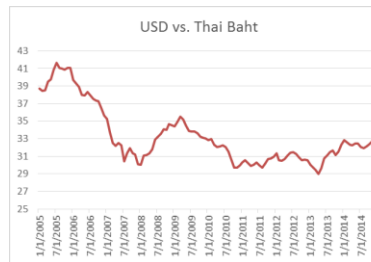
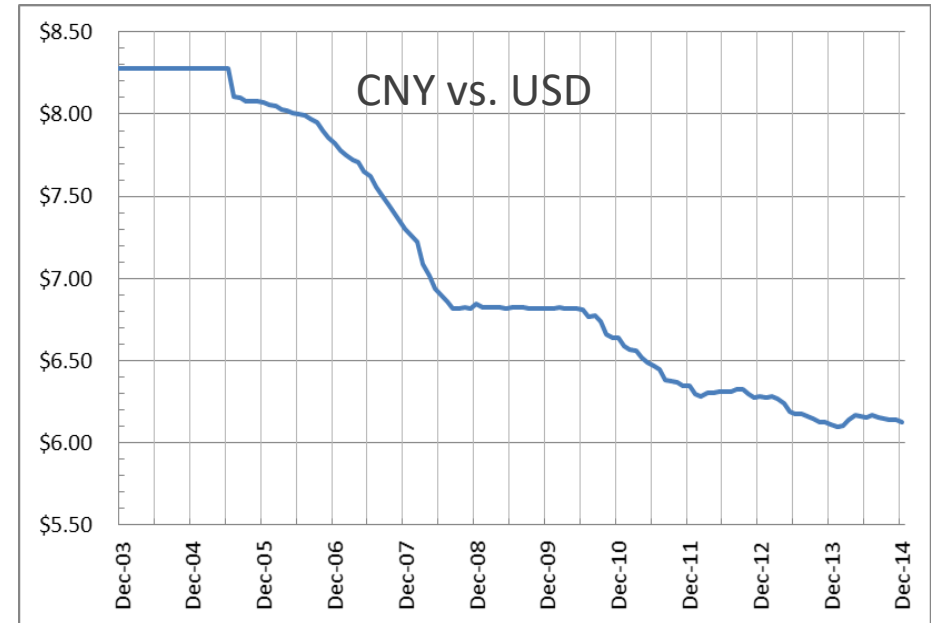
Labor Cost Changes

- Annual labor cost per hour increasing faster in developing countries versus U.S.
 - China increased average of 19% per year*
 - US rate increased 4% per year*
 - Forecast labor rate in China to be 25% of the US labor rate by 2015 (> 60% if you factor in productivity)
- Spread of automation is removing the impact of labor cost differences.

** Boston Consulting Group study 2005 to 2010 average for entire country*

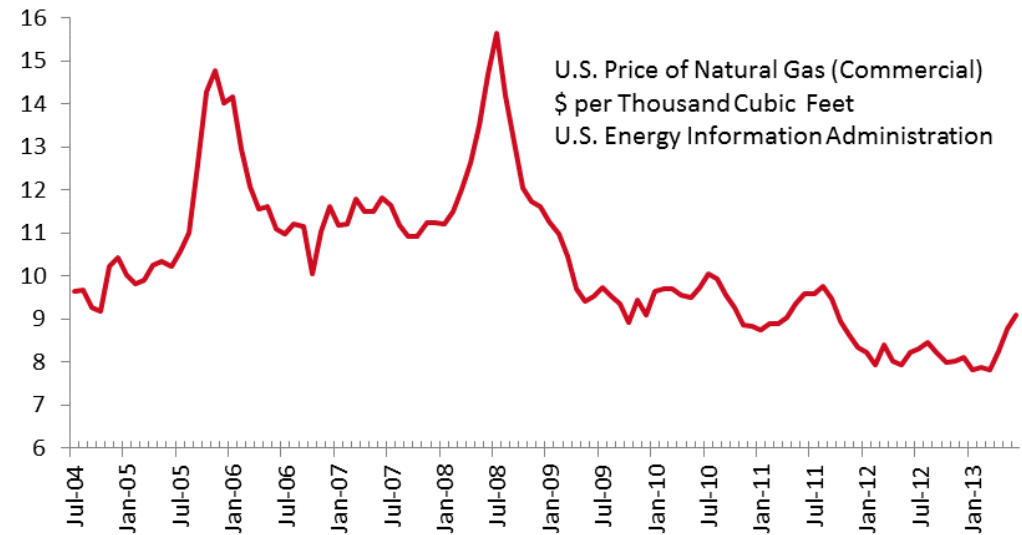
Currency Exchange Rate Trends

- China RMB de-pegged from USD in July 2005
 - RMB appreciated average of 3.6% per year the last 7 years
 - Part sold out of China at 100 USD at end of 2006 now would cost 126 USD
- Many other low-cost countries have similar trends (not all)

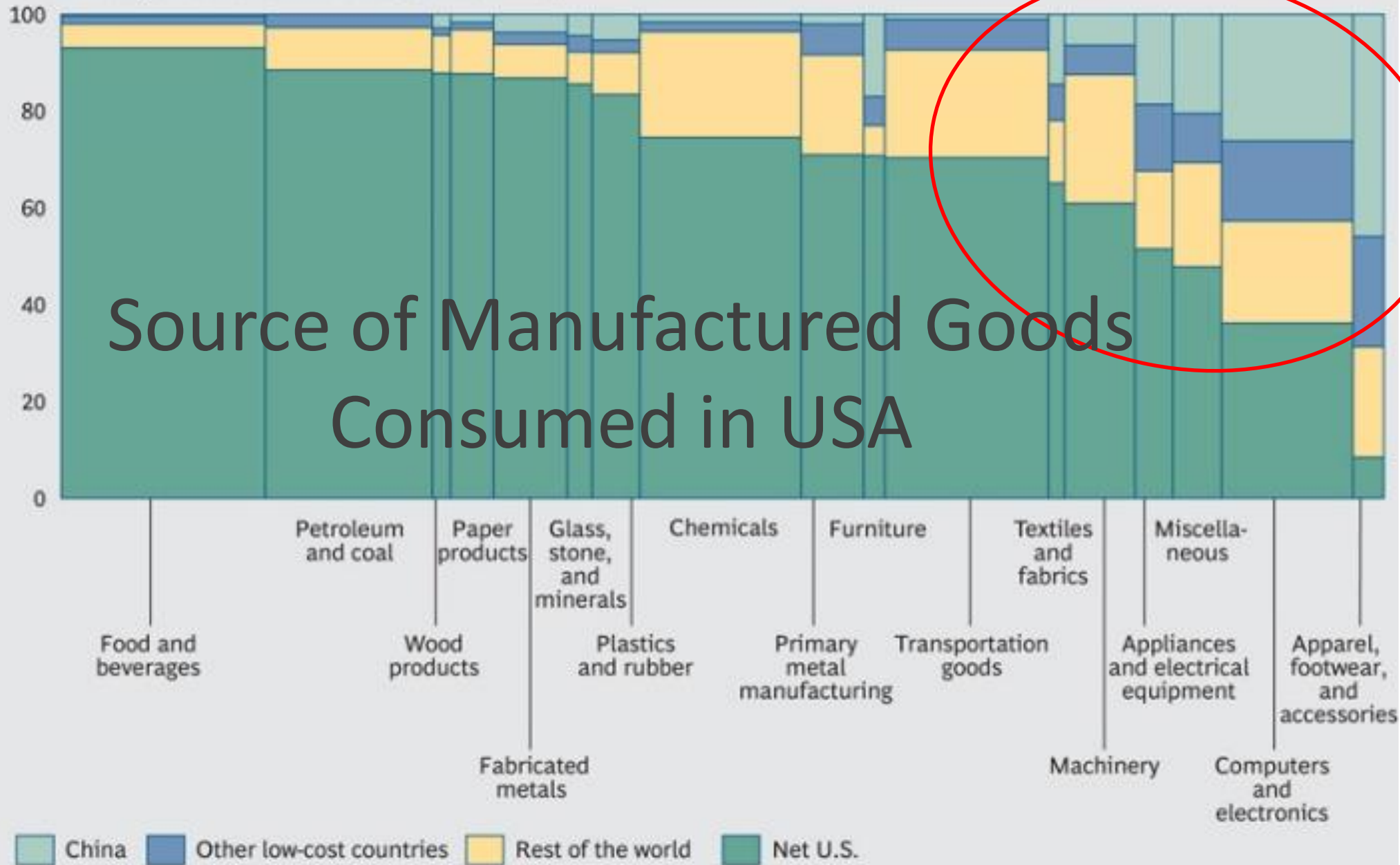


Energy Cost Reductions

- Natural Gas Price Reductions
 - Fracking process has created “cheap” source of domestic supply
 - Drives down cost of electricity production
 - Reduces cost of products made from/with natural gas (e.g. plastics)



Manufactured goods consumed in the U.S. by source, 2010 (%)



Source of Manufactured Goods Consumed in USA

Area of Risk & Opportunity

Sources: U.S. National Census Bureau; U.S. Bureau of Economic Analysis; BCG analysis.

Implementing TCO

1. Map existing supply chain versus domestic sourcing supply chain.
2. Develop comparable TCO Model:
 - Review “Quick Input” tab of TCO Model
 - Gather required data (unit data, purchasing data, & supply chain variables)
 - Determine what risk factors (if any) you want to consider
3. Run scenarios to TCO Model and compare results.
4. Review and consider other benefits or intangibles.
5. Make the best sourcing decision for your firm.

Finding New Suppliers: Supply Scouting



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What is Supplier Scouting?

- Supplier Scouting:
 - Formal effort to identify new and alternative suppliers for strategic, critical, short-supply or hard to find materials.
 - Features reaching out beyond your traditional sources.
 - Can be active need, back-up source or part of your risk management plan.
- MEP Program Definition:
 - Supplier Scouting facilitates the interaction between top supply chain companies and government agencies with US small-medium sized manufacturers (SMM) to help identify new suppliers who can product hard to source items.

Prepare Your Organization

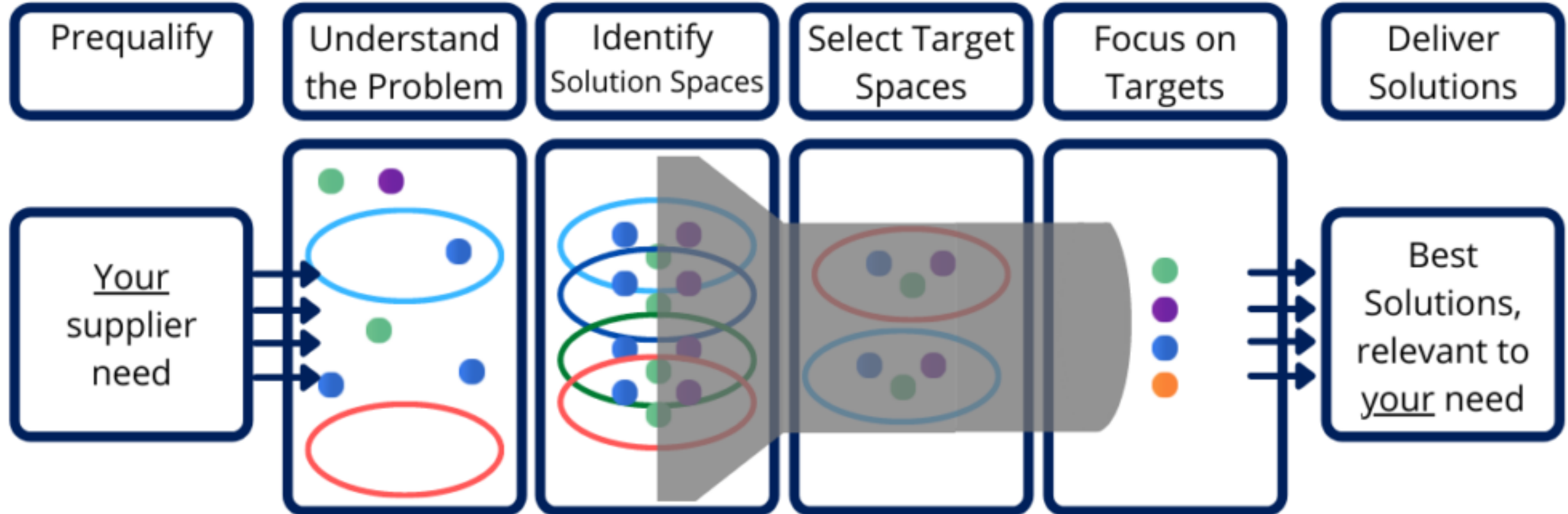
- Process to Find & Vet Suppliers in Place?
- Risk Assessment Completed of Potential Weak Areas?
- Pre-defined List of Alternative Suppliers in Place?
- Process to Plug new Supplier into your Organization?
 - Procurement
 - Logistics (shipping, receiving, warehouse)
 - Production & Engineering

Be Aware of the Environment

- Is the need for a new supplier a specific need to your firm; or an industry-wide need?
- Are suppliers concentrated in a specific geographic area (subject to a similar set of risks)?
- Are suppliers faced with similar raw material concerns?



HOW IS SUPPLIER SCOUTING EXECUTED?



Tips on finding alternate suppliers

- Look to your own supply chain first. Can you create redundancy by sharing parts among good suppliers?
-   is not a strategy!
- Look outside your supply network.
 - Focus on finding suppliers with complementary skill sets producing different products.
- IEDA's Supplier Connection Portal– COMING SOON
 - <https://www.iowamfg.com/supplier-connection-portal/>

Resources to Identify Potential Suppliers

- Iowa Association of Business and Industry
- Industry directories and guides
- Internet / Online Search Engine (Thomasnet.com)
- Sales persons
- Ask suppliers
- Trade shows
- Consultants
- MEP Supplier Scouting
- IEDA's Supplier Connection Portal – COMING SOON



Iowa Supplier Scouting

- Assist Iowa manufacturers in identifying alternate sources for products/services and develop a pipeline of suppliers and potential partners for contingencies
 - Help Identify: Technical and process capabilities; Production capacity; Ability to make products; Manufacturers to pivot production to critical supplies.
- Start in Iowa
- Ability to expand beyond Iowa to national Manufacturing Extension Partnership (MEP) Network
 - This is a good idea!
 - Creates pipeline for future use
 - Be proactive vs reactive
- Work as liaison to build networking opportunities and assist in connecting Iowa businesses to resources and potential partners/teammates

Common Search Problems

- Reaching out too late- reactive vs proactive
- Lack of well-developed website
 - Website doesn't list capabilities/certifications
 - Customers aren't looking in yellow pages.. How is your SEO (search engine optimization)?
- No response (or slow response) to inquiries, i.e., email/phone
- Identifying/working with new sources/suppliers is difficult

What's the Future Look Like?

- Increased visibility on Supplier Scouting
 - Network building is critical...we don't know what we don't know
- Opportunities to partner on projects?
- Capacity to ID and build more capability in Iowa? Or nationwide? (federal/state monies?)
- Mapping our manufacturing footprint to better understand ways we can leverage existing technology/equipment and understand where gaps exist.



Key Takeaways

- Consider Supply Chain mapping
 - Understand who your suppliers are and identify risks if one cannot deliver
 - Identify secondary sources early- begin engaging in relationship building; new sources can be difficult/time consuming to vet
 - Build awareness
- Continue to focus on building your network
 - Attend industry specific events;
 - Register in manufacturing portal;
- Starting point: Pick one thing that has been volatile the past 3-5 years..
 - Is there strategy to develop a contingency to decrease risk?
- Implement a formal Supplier Scouting program.

Questions?

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Supply Chain Risk Management



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Why Supply Chain Risk Management?



1. Create Focus
2. Generate business ROI
3. Avoid Business Death

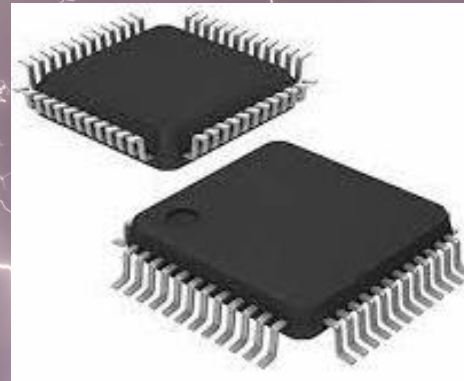
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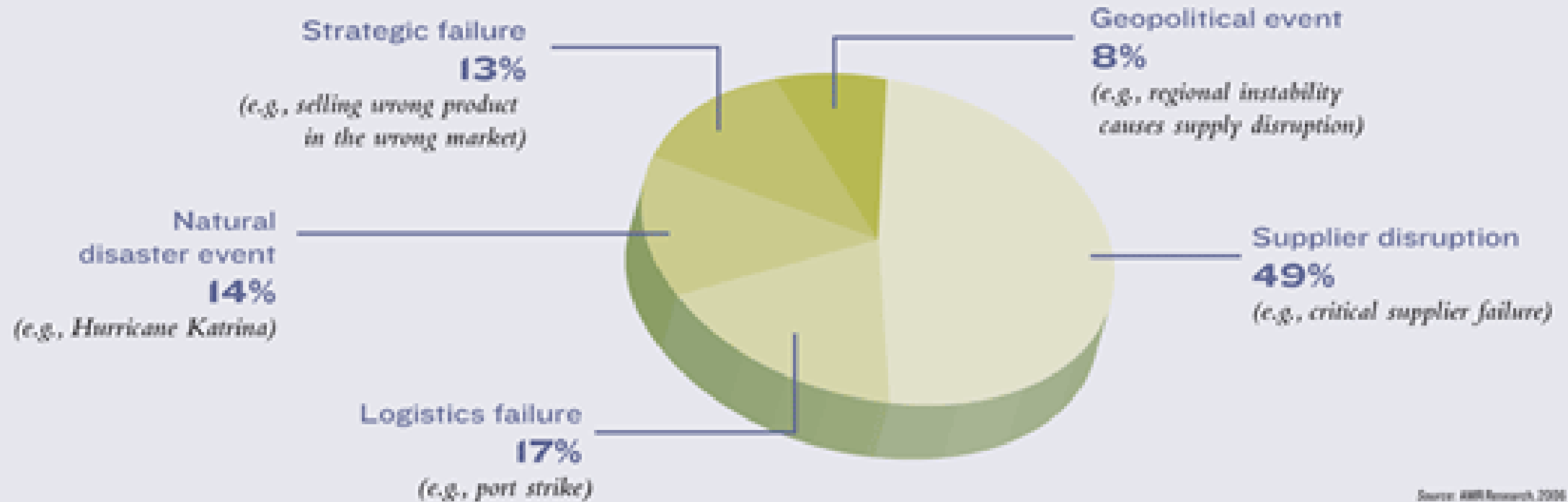
March 17, 2020
Lightning Storm
Albuquerque, NM



Supply Chain Risk

Risk Insomnia

What areas of supply chain risk keep executives awake at night?



Source: AMR Research, 2006 via Yuva, John "Mitigate Risk, Sustain Supply" September 2006, Inside Supply Management®

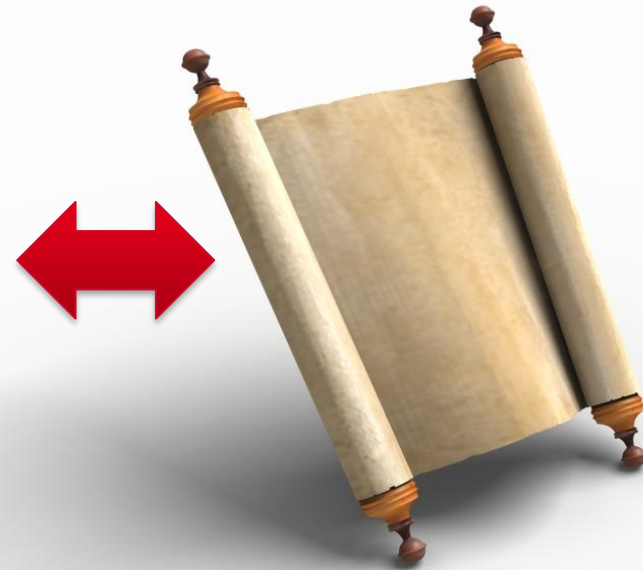
Basics of Risk Management

Step 1: Identify Risk

Step 2: Determine Probability & Consequence

Step 3: Handle Risk

Step 4: Monitor & Control



Step 1: Identify Risk

Step 2: Determine Probability & Consequence

Step 3: Handle Risk

Step 4: Monitor & Control

Risk

An uncertain event or condition that, if it occurs, has an effect on at least one project objective.

2008 Project Management Institute, PMBOK

Objectives: Scope, Cost, Schedule, Quality

If _____ happens, then our business will be impacted by _____ (\$, %, days late, etc.).

Examples: What is a Risk?

Risk Customer may cancel order

Problem There is port congestion causing late deliveries

Problem The recession has caused a supplier to go out of business

Risk Supplier may not make delivery date

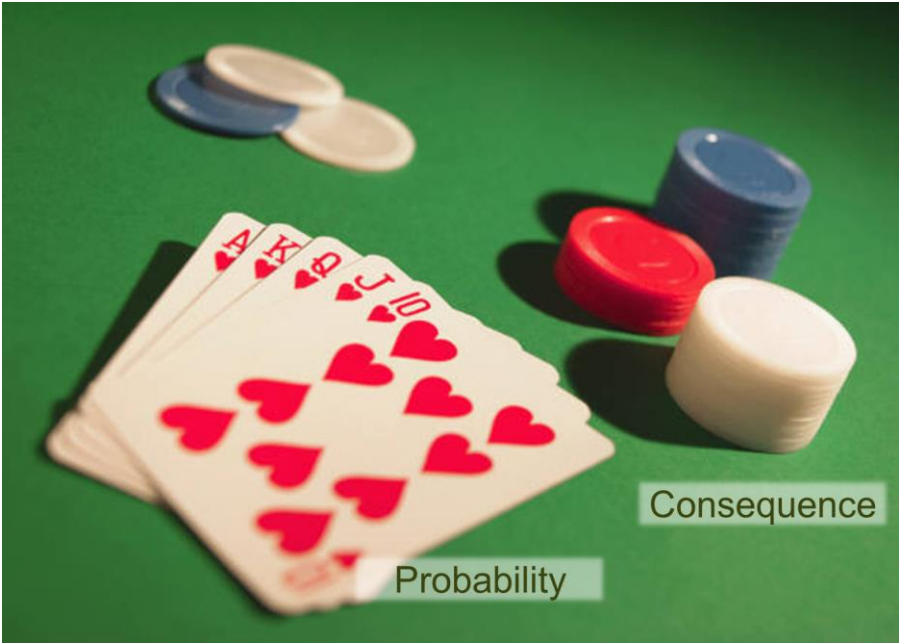
Risk If we cannot hire enough machinists, we will lose customers because of late orders

Step 1: Identify Risk

Step 2: Determine Probability & Consequence

Step 3: Handle Risk

Step 4: Monitor & Control



Odds that the risk will happen



Impact to your business if it does happen

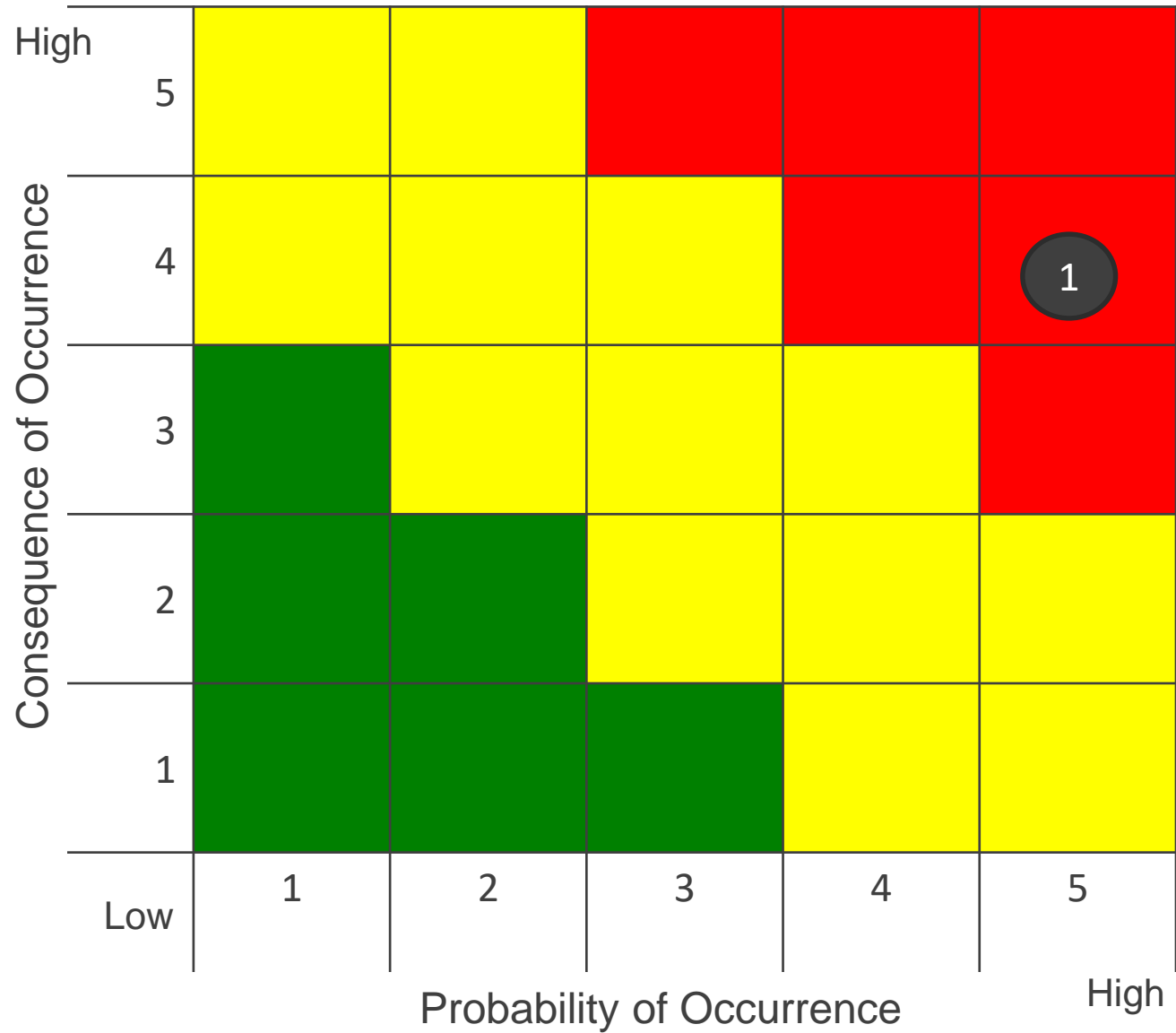


Step 1: Identify Risk

Step 2: Determine Probability & Consequence

Step 3: Handle Risk

Step 4: Monitor & Control



Step 1: Identify Risk

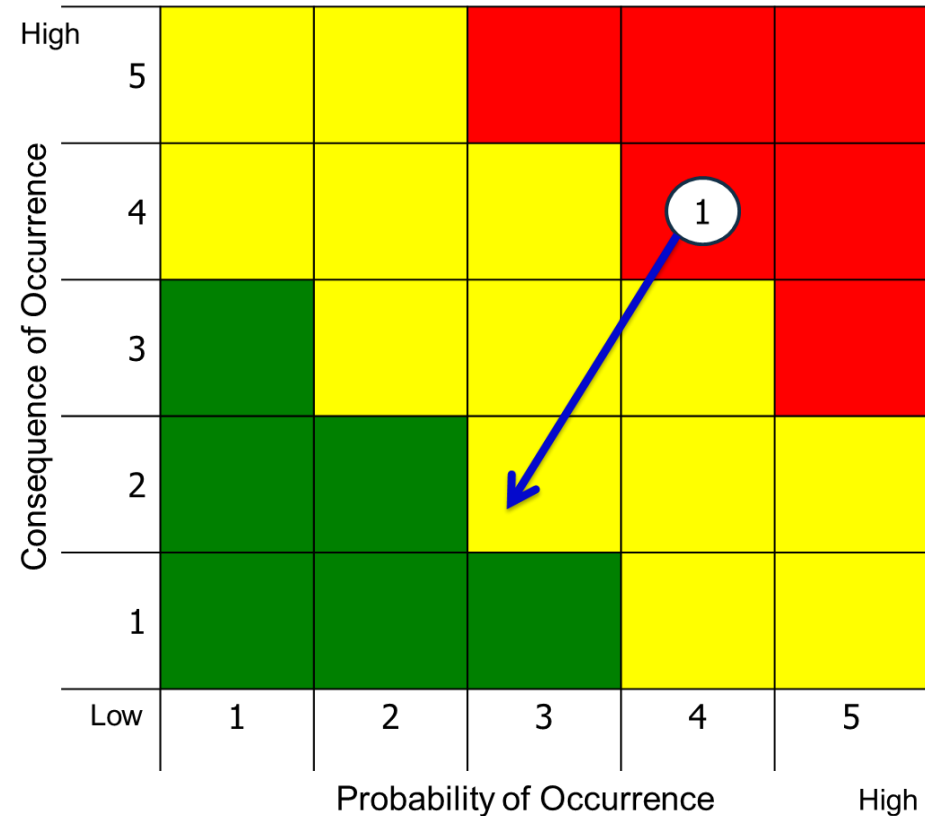
Step 2: Determine Probability & Consequence

Step 3: Handle Risk

Step 4: Monitor & Control

- Avoid
- Transfer
- Mitigate
- Assume

What to do with a Risk?



Risk Handling

Handling Strategy	Detail	Examples
Avoid	Change business plan to eliminate the risk	<ul style="list-style-type: none">• Change scope so that you are not responsible• Eliminate scope• Change plans so risk does not exist• Design part out of product• Stop selling product
Transfer	Another party accepts the risk	<ul style="list-style-type: none">• Insurance• Performance-based contracts

Risk Handling

Handling Strategy	Detail	Examples
Mitigate	Take action to systematically reduce the likelihood and impact of the risk	<ul style="list-style-type: none">• Hold extra inventory• Add additional people to production line
Assume	Take no action – “cost of doing business”	<ul style="list-style-type: none">• Wait and see

Step 1: Identify Risk

Step 2: Determine Probability & Consequence

Step 3: Handle Risk

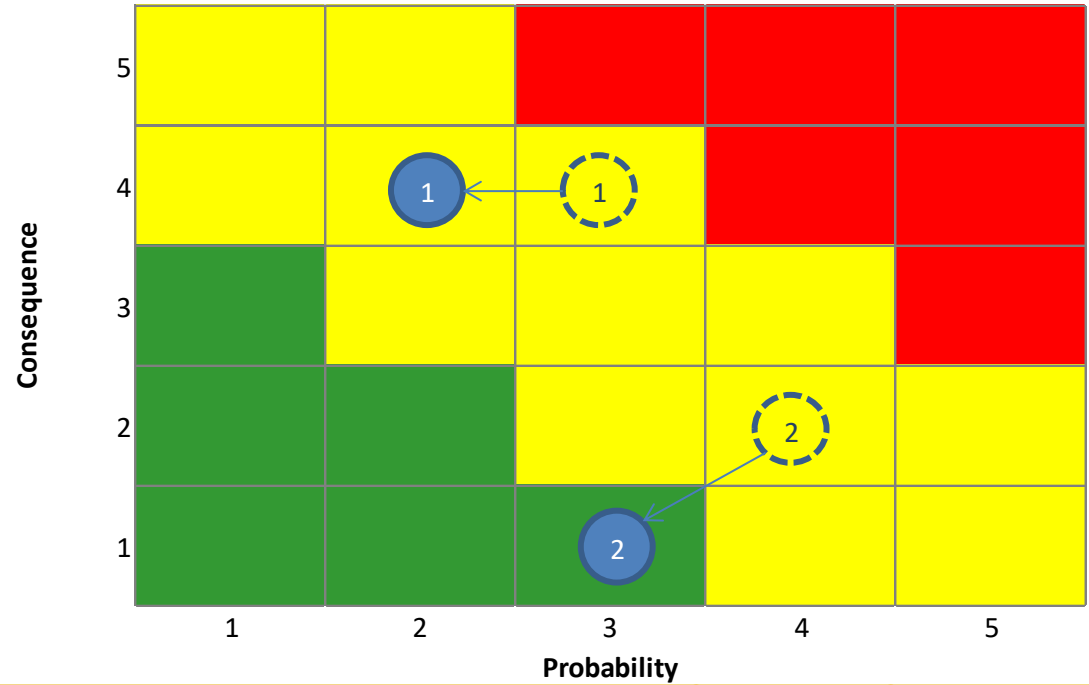
Step 4: Monitor & Control



Risk Reviews

Formal Reviews: Quarterly

Informal: High risks are top management priority



Step 1				Step 3	Step 2					
Risk ID	Type	Name	Description	Handling Strategy	Current			Previous		
					Probability	Consequence	Risk Index	Prob.	Cons.	RI
1	Delay	ABC Aero. Late	If ABC Aerospace does not improve delivery performance, we may be unable to meet customer	Mitigate	2	4	8	3	4	12
2	Svster	John's Supply	If John's supply does not buy a computer, we cannot use our MRP with them.	Mitigate	3	1	3	4	2	8

Risk Management Software

- Hundreds of sources
- Simple to complex
- Typically enterprise focused
- ROI, ROI, ROI



Risk Identification

- External lens for risk sources
- Customers & Consumers
- NGOs
- Mapping Tools
- Financial and other quantitative tools



RapidRatings



ETHISPHERE
GOOD. SMART. BUSINESS. PROFIT.



Risk Monitoring

- Time-critical & business critical elements
- High-risk product/ service categories





Risk Management Applied to the Supply Chain

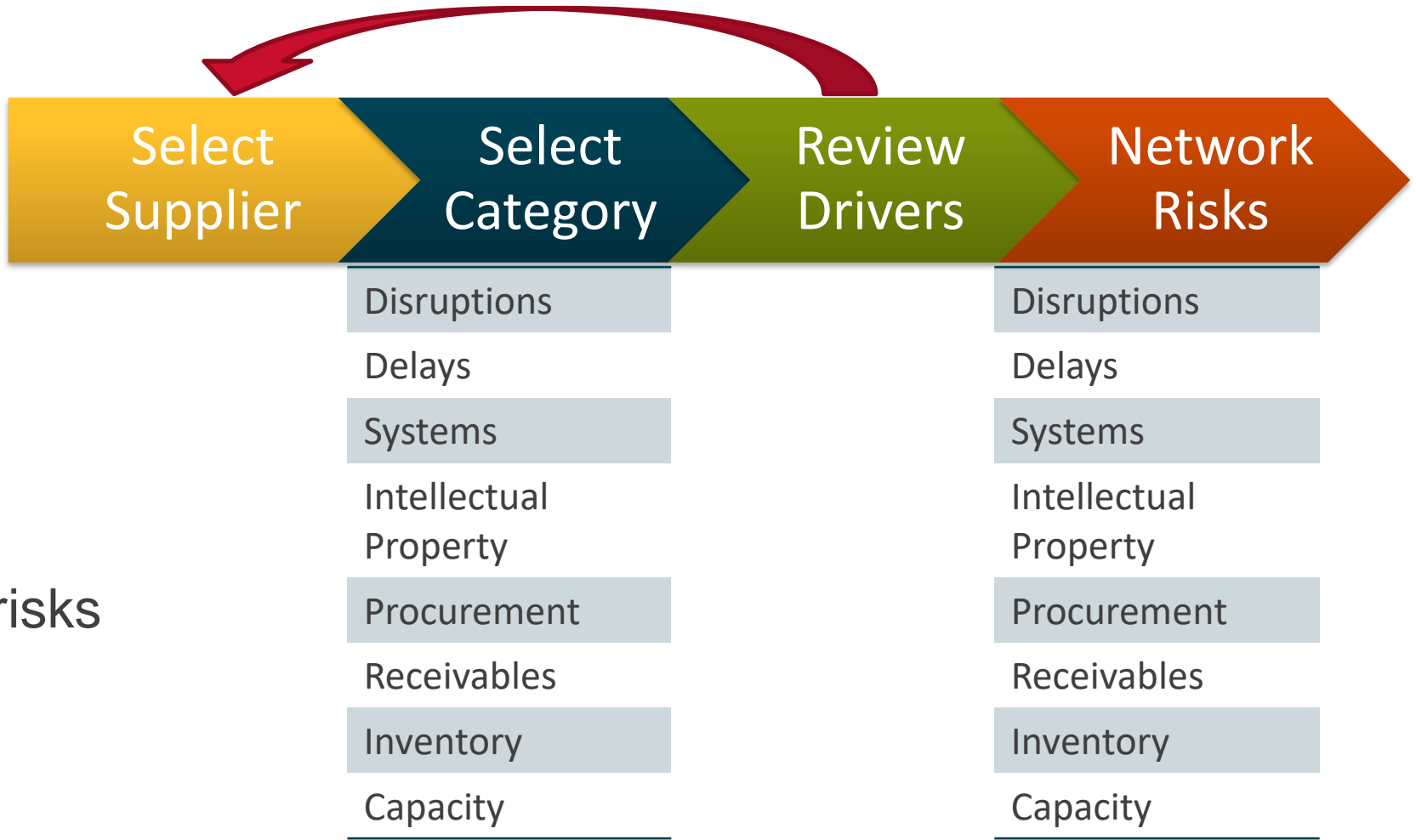
Sources of Supply Chain Risk

Category	Drivers of Risk
Disruptions	<ul style="list-style-type: none">• Natural Disaster• Labor Dispute• Bankruptcy• War and Terrorism
Delays	<ul style="list-style-type: none">• High Utilization at Supplier• Inflexibility of Source• Poor Quality at Supplier• Excessive Transportation/Border Crossings
Systems	<ul style="list-style-type: none">• IT Structure Breakdown• System Integration Issues• E-Commerce• Cyber attack
Forecasting	<ul style="list-style-type: none">• Inaccurate Forecasts• Bullwhip Effect

Sources of Supply Chain Risk

Category	Drivers of Risk
Intellectual Property	<ul style="list-style-type: none">• Vertical SC Integration• Global Outsourcing – Suppliers and Transportation
Procurement	<ul style="list-style-type: none">• Exchange Rate Variability• Raw Material Sole Source• Industry-wide High Utilization (e.g. Copper)• Long-term vs. Short-term Contracts
Receivables	<ul style="list-style-type: none">• Customer Financial Strength• Low Number of Customers
Inventory	<ul style="list-style-type: none">• Rate of Obsolescence• Holding Costs• Product Value• Supply/Demand Uncertainty
Capacity	<ul style="list-style-type: none">• Cost of Capacity• Capacity Flexibility

- Step 1: Identify Risk
- Step 2: Determine Probability & Consequence
- Step 3: Handle Risk
- Step 4: Monitor & Control



- Same Process
- Structure to source of risks
- Handle Individually or Network-wide

Implementing Supply Chain Risk Management

- Must be a cross-functional team
 - Work through 4 risk management steps
- Its ok to start small
- Need top management support
 - Risk Charts are a great communication tool
- Make risk awareness very visible
 - “watch tower” approach

Step 1: Identify Risk

Step 2: Determine Probability & Consequence

Step 3: Handle Risk

Step 4: Monitor & Control



Supply Chain Project Opportunities



CyBIZ Lab

INSERT
NAME
HERE
(.....)

Opportunity Overview

- Opportunity for companies to engage with Iowa State University on supply chain projects.
- CIRAS to coordinate projects utilizing CIRAS resources and/or CyBiz Lab.
- Projects to be completed between now and end of June 2022.
- Projects to be funded 50% by company and 50% by Iowa Lakes Corridor & CIRAS.

CyBIZ Overview

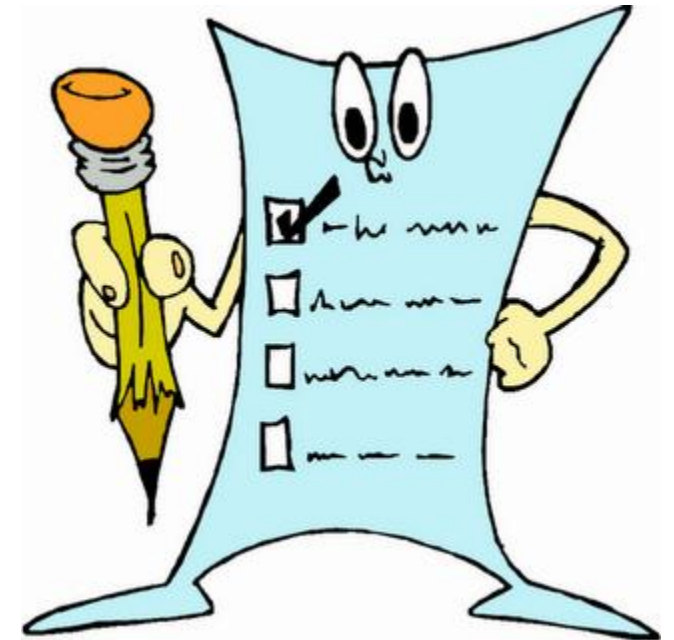
- CyBIZ Lab is part of the College of Business at Iowa State University
- Provides cross-functional teams of undergraduate and graduate students to work with industry on a per project basis.
- CyBIZ Lab Contacts:
 - Alex Andrade, Program Manager, aandrade@iastate.edu, 515-296-5302
 - Judi Eyles, CyBIZ Lab Director, eyles@iastate.edu, 515-296-6532

Examples of Potential Projects

- Total Cost of Ownership Projects
 - Identify current TCO
 - Identify alternative supply options
 - Calculate and compare TCO between options.
- Supply Chain Risk Management
 - Develop supply chain risk register for you company
 - Identify potential risk reduction strategies
- Supply Chain Mapping
 - Map your company's suppliers (and their suppliers)
 - Identify areas of risk
- Supply Chain Coaching Projects
 - Supplier sourcing
 - Inventory safety stock analysis
 - Resiliency assessment
 - Others

Project Opportunity Next Steps

- Today:
 - Meet CIRAS & CyBiz staff after this session.
 - Discuss your company's challenges and objectives & review potential project options.
- Follow-Up:
 - Finalize project scoping.
 - CIRAS will send you a formal proposal.
 - Project to start upon proposal acceptance.



Managing your Supply Chain During Chaos

Thank You !!