SCRM--Supply Chain Risk Management:
“Designing & Planning for Resiliency”

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Emerging SCRM Planning Threads

- The FOUR Spheres of Supply Chain Risk
- Network Supply Chain Mapping/Risk Assessment
- Probabilistic Planning
- Supply Chain Maturity & Process Improvement
- Network Supply Chain Alerts in the S&OP Process
The Four Spheres of Supply Chain Risk

New Supplier Rating Tools Emerging

DEMAND MANAGEMENT---Defining How to Bring Scenario Planning to an Actionable Level

Application: clarity on how to apply and the level of planning capability needed to support. Define as future “what if,” not variations on plans

Control plan: how to maintain scenario integrity, ensure they are executable, and there is a continuous improvement process.

Plan variation

What if

Worldwide Strategic & Tactical Risk Event Alerts

Supply Chain Risk Assessment—"Heat Map"

Supply Chain Risk Assessment

- SCRM Risk ‘Heat Map’ Assessment
- Supply Use Fulfillment Assessment
- Non-Orderable品 Asses....
The Consortium Advocates Supply Chain Mapping... *Gather Data*

Our Perspective - Designing Distribution Networks

Designing the distribution network will require tremendous discipline, analytical skill, business sense, and creativity to master the various tradeoffs that need to be considered.

- **Service Levels**
- **Variable Warehousing Costs**
- **Outbound Transportation**
- **Inbound Transportation**
- **Fixed Warehousing Costs**
- **Inventory**
Then, **Build Out a Supply Chain Map**....
And Superimpose Risk Across the Chain, Node by Node
Node Vulnerability Drivers Landscape

![Diagram showing the node vulnerability drivers landscape.

- X-axis represents different categories such as EQUIP, HR, UPSET, DATA, FCST, NATURE, UPSTREAM, DISTRIBUT, WHSE, ACCESS, DOWNSTREAM, GOVT, NEIGHBOR, BANK, COMPETITION.
- Y-axis represents the V-Score.
- The chart uses different colors and symbols to indicate the frequency of vulnerability drivers, with categories ranging from RARE to MANY.

9/15/2014

SUPPLY CHAIN RISK MANAGEMENT
CONSORTIUM™
DEMAND MANAGEMENT---Defining How to Bring Scenario Planning to an Actionable Level

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Plan variation

What if

Scenarios for uncertain future conditions

Probability of plans and assumptions

Cumulative Probability
APICS Dictionary Definition: Stochastic & Probabilistic Modeling

- **Stochastic models:**
  - *Models where uncertainty is explicitly considered in the analysis*

- **Probabilistic demand models:**
  - Statistical procedures that *represent the uncertainty of demand* by a set of possible outcomes (*i.e.*, *a probability distribution*) and that suggest inventory management strategies under probabilistic demands
The New Probabilistic Modeling Approach

Now emerging in supply chain and operations management
The New Face of Probabilistic Risk Mgmt

“The cone of uncertainty”

Note: The cone contains the probable path of the storm center but does not show the size of the storm. Hazardous conditions can occur outside of the cone.
NEXT GEN Scenario Planning

Supply chain Flow model

Base case data

Decision Logic

Probability Distributions of uncertain factors

Probability of occurrence & magnitude of disturbing events

Design of Experiments

Probabilistic Simulation

Performance Measures

Feasible Tactical Plans

Strong Statistics?

No

Yes

Prioritized Scenarios

Risk Response Plan

Scenario Outcomes/Dashboards
Predictability & Resiliency

Scenario/Risk Response Planning

Scenario Probabilities of Occurrence

HIGH

LOW

Risk Associated with Occurrence

LOW

Occurrence

Severity

Detection (FMEA)

Risk Response Plan

Scenario 1.....

*Severity

*Detection (FMEA)

Risk Response Plan
INTERNAL PROCESS ANALYSIS
### Heat Map Tool Rating Example

<table>
<thead>
<tr>
<th>[ChemCo]</th>
<th>Valuation Factors</th>
<th>Average Raw Score</th>
<th>Valuation Rating</th>
</tr>
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<tbody>
<tr>
<td><strong>Supplier Proximity</strong></td>
<td>Critical suppliers are on other continents</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td><strong>Supplier Co-Location</strong></td>
<td>Critical suppliers are in-country</td>
<td>7</td>
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</tr>
<tr>
<td><strong>Diversity of Modes</strong></td>
<td>All critical suppliers are intentionally dispersed, or backups are dispersed</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td><strong>Supplier Diversity</strong></td>
<td>Suppliers are concentrated and backups in place</td>
<td>6</td>
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</table>
The SCRM "Heat Map" Assessment……

<table>
<thead>
<tr>
<th>RISK</th>
<th>GRADIENT</th>
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<tbody>
<tr>
<td>Low Risk</td>
<td>1-to-4</td>
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<tr>
<td>Medium Risk</td>
<td>5-to-7</td>
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<tr>
<td>High Risk</td>
<td>8-to-10</td>
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Oil & Gas Risk Seminar Response
Environmental Threats.....
Worldwide Strategic & Tactical Risk Event Alerts

You Choose

**Incident Type(s):**
- Advisory
- Aviation
- Fire
- Geophysical
- Hazmat
- Health
- Infrastructure
- Meteorological
- Security
- Structural
- Terrorism
- Transportation

**Alert Perimeter**
- Set distance by severity:
  - Extreme: 250 miles
  - Severe: 50 miles
  - Moderate: 10 miles
  - Minor: 0.5 miles

**Delivery Devices**
- Email
- Blackberry
- iPhone
- Smart Phone
- Cell Phone
- Pager

YOUR RELEVANT INCIDENT ALERTS
- Asset Location
- Alert Perimeter
- Incident Type
- Incident Severity

MINOR ALERT
- CLOSE BY: 1 ALARM FIRE

SEVERE ALERT
- 42 MILES OUT: EXPLOSION

NC4
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Cisco’s Story about SC Mapping….

- Chengdu, China earthquake event, magnitude 7.9: May 12, 2008
- Within 48 hours, Cisco was able to conduct a full impact analysis, which included evaluating affected supplier sites, parts, and products
- Within **two** days of the earthquake, SCRM group initiated a crisis survey targeted at the suppliers’ emergency contacts
- Assessments after 24 hours of event revealed Cisco had 20 suppliers in the affected area
- Two suppliers were at risk: supplier X, which represented a significant revenue risk/single-sourced, and Supplier Y, smaller revenue risk but damage to its buildings
- Supplier X was already under review and Cisco had a second source
- With Supplier Y, Cisco’s crisis management team was deployed to assist the supplier mitigate any production delays and the risk was minimized
This New Methodology Leveraged at Bayer

- Combining Predictive Analytics and Risk Management with Digital Modeling leveraged the power of three methods.
- Bayer utilized innovative predictive manufacturing technology to support Scenario Planning.
- A cross-functional team, in collaboration with SherTrack, configured a digital model to simulate customer demand, scheduling and production output of a very complex compounding facility.
  - Could reduce lead times by 45% without service issues
  - Could gain planned market share by lead time reduction/no capacity issues
  - Could improve capacity throughput without capital equip
  - Could reduce inventory by over 25% AND reduce production costs as well

Validate Model
Design DOE
Run 44 Scenarios
Evaluate Model Predictions
Business Leader Review
Modify Supply Chain
Flextronics’ SCRM-- Visibility & Control …

VISIBILITY,

- “Visibility refers to the ability of all members of a chain to see from one end of the pipeline to another.”
- Lack of SC visibility forces supply chain members to rely on forecasts and to build buffers, thus increasing the network risk
- Unfortunately, most supply chain members do NOT have detailed knowledge of what is happening in the rest of the chain!

CONTROL

- “Supply chain control refers to the ability to respond to disturbances in appropriate ways.”
- Problems arise when disturbances are not recognized in time and when there is a time lag for the remedial action to take effect.
- “Almost all supply chain organizations maintain a certain amount of visibility and control, However, successful organizations in the 21st century need to be aware of WHERE there are vulnerabilities in their supply chains that create risk and HOW they can manage/or mitigate risk wherever possible.”

Caroline Dowling, President-Integrated Network Solutions, Flextronics
Flextronics’ SCRM “War Room”
## Network Vulnerability Matrix

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<thead>
<tr>
<th>SKU</th>
<th>Node</th>
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<th>DRIV VE&lt;sub&gt;1-N&lt;/sub&gt;</th>
<th>∑ V&lt;sub&gt;DRIV&lt;/sub&gt;</th>
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<th>∑V</th>
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