



Resilient and Sustainable Supply Chain

September 30th 2015

Resilient and Sustainable Supply Chain

Welcome

The presentation will begin promptly at noon Eastern.

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Housekeeping

- All phones will automatically be muted upon entering the meeting. Please also place your phone on mute if that feature is available to you.
- An email will be sent tomorrow with links to a recording of the webinar, presentation handouts, and topic-related thought leadership.
- Please submit questions or comments through the Q&A function at the right-hand side of your screen.
- Questions will be addressed throughout the presentation and as time permits at the end of the presentation. We are committed to getting back to everyone about any questions we cannot respond to during the presentation.

Housekeeping (cont'd.)

You will be eligible for Continuing Professional Education (CPE) credit if you:

- Log in individually to the session
- Successfully complete at least 75 percent of the polling questions
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You will not be eligible for CPE credit if you:

- Join only the conference call
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- Fail to remain logged in to the session for the minimum required time
- View a recording of this session (CPE credit is awarded only for live sessions)

Evaluation:

- Upon completion of this program, you will receive an event evaluation.

CPE Certificate:

- The certificate will be emailed to you within two weeks.



Resilient and Sustainable Supply Chain

September 30th 2015

Today's Presenters



**Mike Varney, CIA – Partner, Risk Consulting Group
Crowe Horwath LLP**

Mike has over 20 years of experience in internal audit, risk management, accounting and financial reporting for manufacturing companies. He is currently focused on consulting with clients on addressing their risk and internal audit needs with a focus on Supply Chain related issues.



**Bart Kelly, Principal, Advisory Services
Crowe Horwath LLP**

Mr. Kelly's >20 years of experience includes a wide variety of businesses ranging from \$10 million to \$20 billion. He is responsible for developing client opportunities, determining overall financial impact, designing targeted improvement plans, and ensuring successful execution of engagements that drive measurable bottom line performance improvements.

Learning Objectives

After this session, you should be able to:

- Better identify the critical elements an organization should have in place to achieve a sustainable supply chain. During the webinar will focus and discuss the following areas :
 1. Provide a definition of a sustainable supply chain and review each critical element
 2. Review an approach for analyzing inventory activity to identify supply chain improvements
 3. How to leverage a robust supply chain risk assessment to drive internal audit activities relating to supply chain

Agenda

- Resilient and Sustainable Supply Chain Framework
- Supplier Segmentation
- Risk Assessment and Internal Audit Activities
- Questions

Ever Changing Supply Chain Structures



Source: Crowe analysis

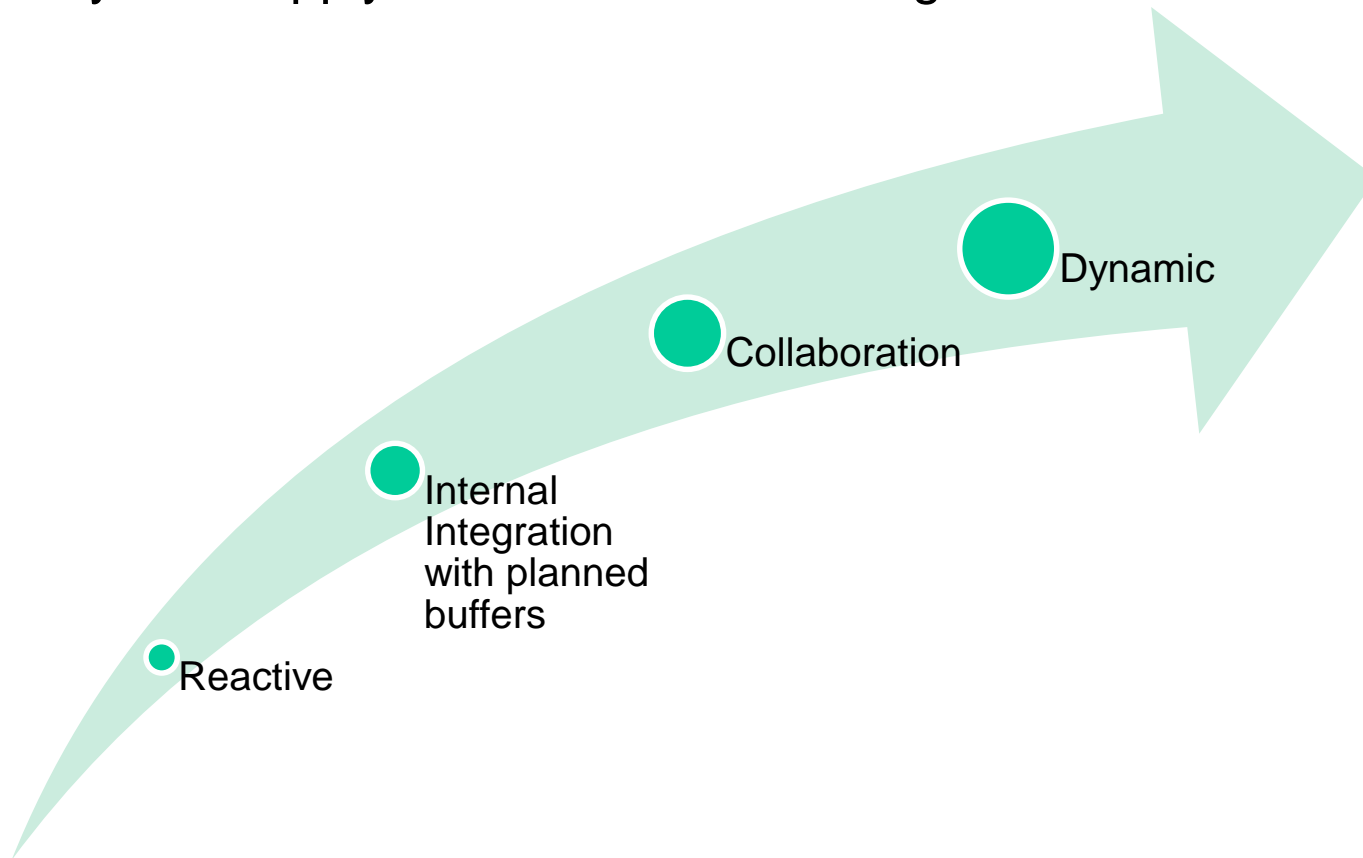
Ever Changing Supply Chain Structures



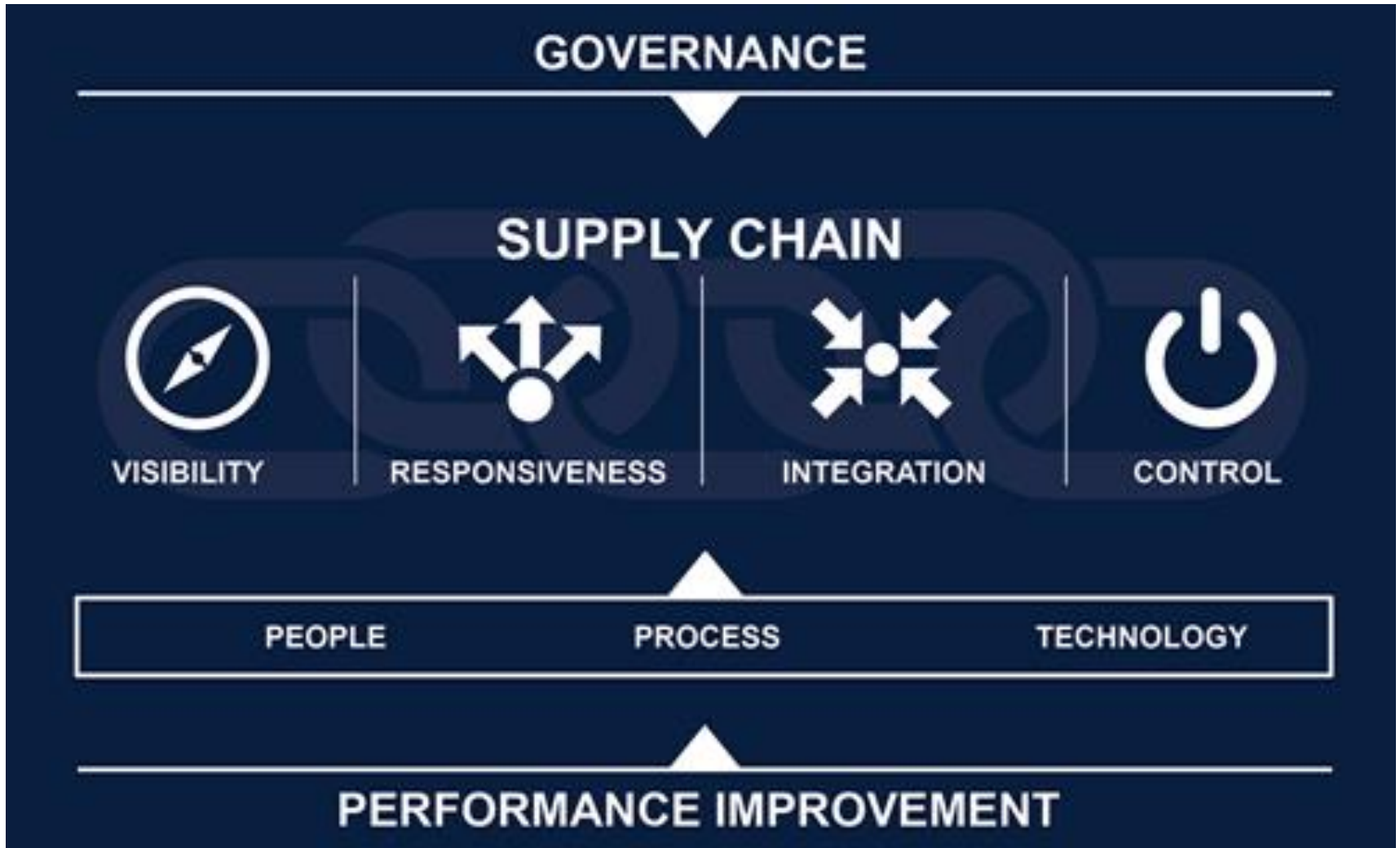
Source: Crowe analysis

Supply Chain Resiliency Defined

The ability of a supply chain to react to change



Sources: GT Nexus, Wieland, A. & Wallenburg, C.M. (2013): The influence of relational competencies on supply chain resilience: a relational view. *International Journal of Physical Distribution & Logistics Management*. Vol. 43, No. 4, pp. 300-320



Source: Crowe Horwath LLP

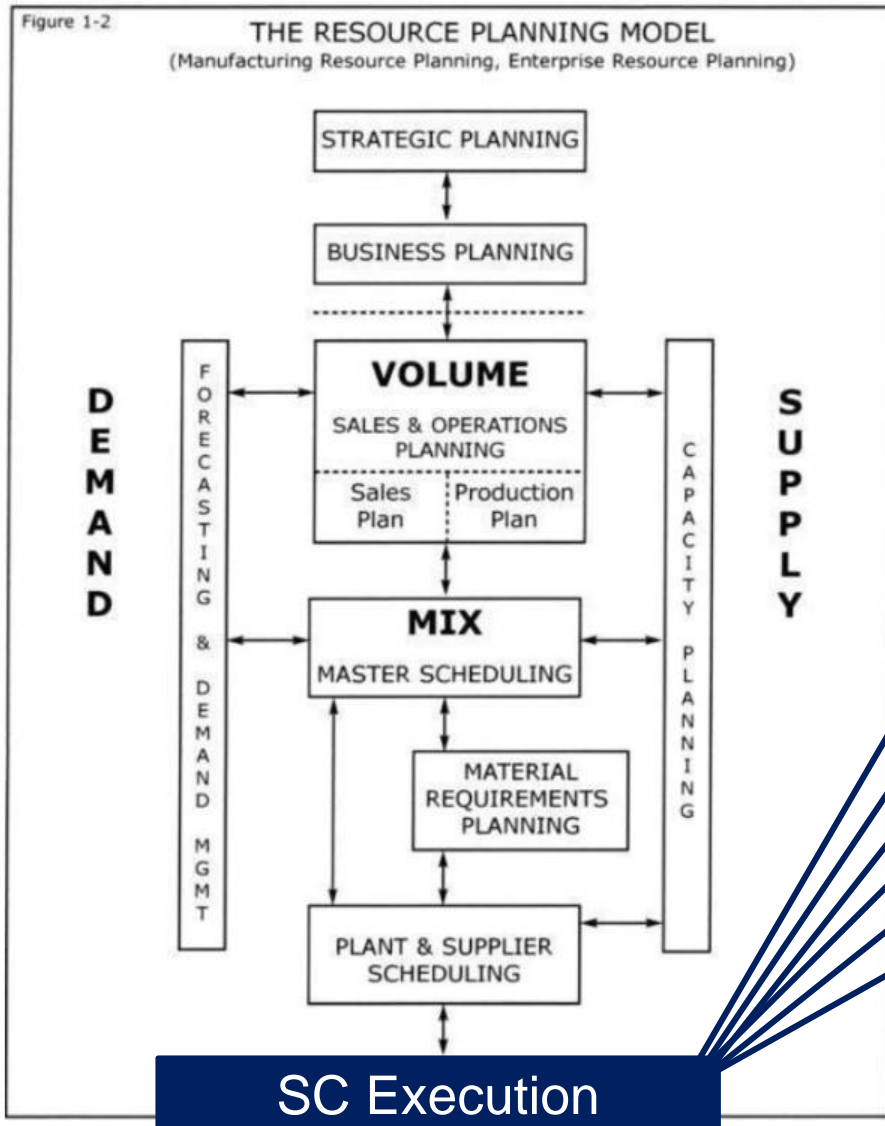
Polling Question 1

What is most likely to affect your supply chains resiliency?

- a. Lack of visibility across the Supply Chain
- b. Responsiveness of suppliers to changing demand
- c. Old or outdated technology tools
- d. Lack of internal integration between Sales, production, procurement, and distribution
- e. Control environment not aligned to complexity of organization
- f. Unsure/don't know

SIOP and Supply Chain (SC) Value Stream

Where do you begin?

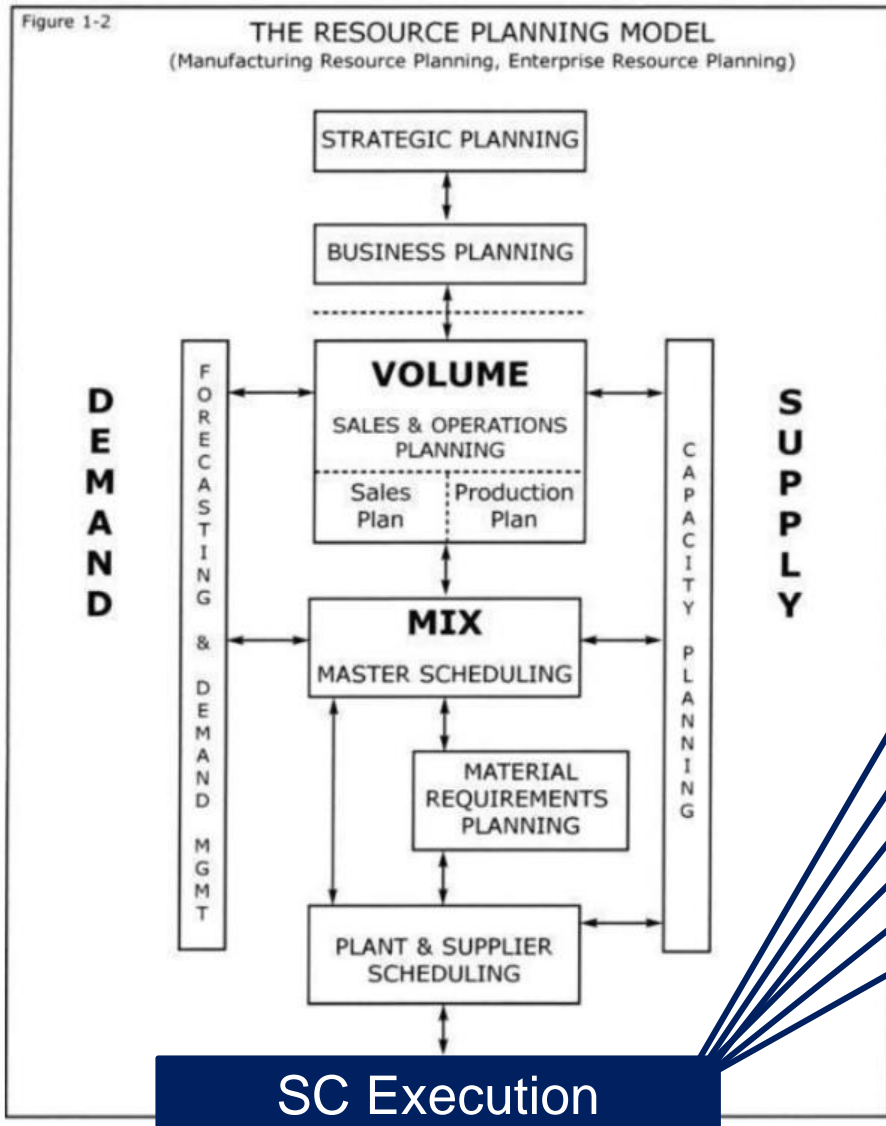


- Executing POs
- Inventory Management
- Expediting/Tracing
- Production Control, etc.
- System Parameters
- Supplier Performance

Source: Crowe analysis

SIOP and Supply Chain (SC) Value Stream

Where do you begin?



- Executing POs
- Inventory Management
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- Production Control, etc.
- System Parameters
- Supplier Performance

Source: Crowe analysis

System Parameters

- What drives internal and external supply chain performance?
 - Reorder points
 - Safety stock level
 - Minimum order quantities
 - Economic order quantities
 - Planning lead times
 - Supplier lead times
 - Processing lead times

What role do each of these play in driving performance and inventory?



Purchasing, Planning & Scheduling

- With this level of impact, who sets, maintains, and updates these critical drivers?

Purchasing, Planning & Scheduling

- With this level of impact, who sets, maintains, and updates these critical drivers?



Source: Google Images

Purchasing, Planning & Scheduling

- With this level of impact, who sets, maintains, and updates these critical drivers?



The vast majority of organizations rely on individual Purchasing personnel to maintain the drivers for the products for which they maintain responsibility.

How does this conflict with the overall goals of the organization?

Source: Google Images

Case Study – Industrial Products

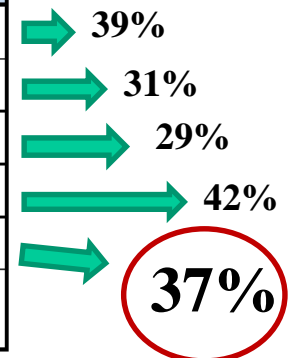
- Manufacturing organization
 - Highly engineered products
 - Acquired and grown
 - Approximately two inventory turns annually
 - Lack of ERP system usage and adherence – heavy Excel
 - No visibility or transparency
 - Inadequate platform for growth

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MRP Parameter Overview						
Count of RM & WIP SKU's with Inventory On Hand (Total SKU's = 3,600)						
Class	MRP Minimum Order Level	MRP Order Up To Level	MRP Safety Stock Level	MRP Planning Lead Time	MRP Reorder Level	Total SKU's By Class
A	0	5	0	383	130	626
B	0	6	0	546	157	794
C	0	2	0	558	140	784
D	0	3	0	808	124	1,396
Total	0	16	0	2,295	551	3,600
Percent of RM & WIP Portfolio	0.0%	0.4%	0.0%	63.8%	15.3%	100.0%

Percent of Items Without Lead Times



Inventory Summary – Raw Material and WIP

RM & WIP Inventory Aging - Date of Last Receipt								
Aging: Count of SKU's								
Class	<10	11 to 30	31 to 60	61 to 90	91 to 180	>180	Blank	Grand Total
A	9	13	16	27	39	147	375	626
B	13	23	28	46	69	270	345	794
C	21	26	26	47	83	350	231	784
D	214	328	379	497	981	9652	7368	19,419
Total	257	390	449	617	1,172	10,419	8,319	21,623
Aging: Percentage of SKU's								
Class	<10	11 to 30	31 to 60	61 to 90	91 to 180	>180	Blank	Grand Total
A	0.0%	0.1%	0.1%	0.1%	0.2%	0.7%	1.7%	2.9%
B	0.1%	0.1%	0.1%	0.2%	0.3%	1.2%	1.6%	3.7%
C	0.1%	0.1%	0.1%	0.2%	0.4%	1.6%	1.1%	3.6%
D	1.0%	1.5%	1.8%	2.3%	4.5%	44.6%	34.1%	89.8%
Total	1.2%	1.8%	2.1%	2.9%	5.4%	48.2%	38.5%	100.0%
Aging: Inventory Dollars								
Class	<10	11 to 30	31 to 60	61 to 90	91 to 180	>180	Blank	Grand Total
A	\$ 46,701	\$ 33,329	\$ 75,931	\$ 149,277	\$ 222,166	\$ 529,339	\$ 2,299,467	\$ 3,356,210
B	\$ 10,235	\$ 18,775	\$ 23,394	\$ 36,222	\$ 53,795	\$ 205,306	\$ 281,540	\$ 629,266
C	\$ 4,762	\$ 6,444	\$ 6,333	\$ 10,855	\$ 19,486	\$ 82,121	\$ 58,922	\$ 188,922
D	\$ 1,748	\$ (1,221)	\$ 2,253	\$ 2,994	\$ 7,277	\$ 30,047	\$ (22,263)	\$ 20,835
Total	\$ 63,446	\$ 57,327	\$ 107,910	\$ 199,348	\$ 302,723	\$ 846,812	\$ 2,617,666	\$ 4,195,232
Aging: Inventory Dollars Percentage								
Class	<10	11 to 30	31 to 60	61 to 90	91 to 180	>180	Blank	Grand Total
A	1.1%	0.8%	1.8%	3.6%	5.3%	12.6%	54.8%	80.0%
B	0.2%	0.4%	0.6%	0.9%	1.3%	4.9%	6.7%	15.0%
C	0.1%	0.2%	0.2%	0.3%	0.5%	2.0%	1.4%	4.5%
D	0.0%	0.0%	0.1%	0.1%	0.2%	0.7%	-0.5%	0.5%
Total	1.5%	1.4%	2.6%	4.8%	7.2%	20.2%	62.4%	100.0%

Polling Question 2

Does your organization leverage formalized segmentation methodologies to drive focus, action, and priorities?

- a. Not at all
- b. On an Ad Hoc basis
- c. All the time
- d. Unsure/don't know

Supplier Performance

Methodology based on segmenting suppliers based on multiple factors including:

- Sales
- Criticality
- Size
- Lead-times
- Sole customer/Sole supplier
- Locale
- Overall risk factor
- Relevant business driver, etc.

Then leveraging this methodology to drive targeted improvements based on a surgical view of impact.

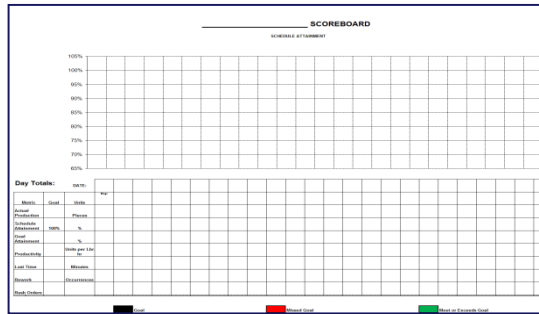
Not all suppliers are created equal.

Supplier Performance

1 Supplier performance and incidents tracked at a base level

LINE:	SHIFT:	DATE:						
H O U R	AREA	GOAL	GOOD	ACCUM GOOD	SCRAP	ACCUM SCRAP	LOST TIME	COMMENTS
1								
2								
3								
4								
5								
6								

2 KVIs, KPIs are rolled up against goals and trended on scoreboards



3 Performance is monitored and reviewed vs. SLAs

Production Weekly Operating Report												
		Period Ending										
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Components	Schedule Attainment (%)	100	93.7	92.9	100	96.1	98.9	97.4	97.4	97.4	97.4	97.4
	Earned Efficiency (%)	89	73%	70%	89%	94%	94%	94%	94%	94%	94%	94%
	Total Labor Hours	4688.25	4748.25	4696.6	4696.6	4696.6	4696.6	4696.6	4696.6	4696.6	4696.6	4696.6
End Bearing	Full-time Equivalents	28.7	25.9	27.2	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6
	Standard Hours	4033.5	3927.3	3969.6	4021.9	4021.9	4021.9	4021.9	4021.9	4021.9	4021.9	4021.9
	Over-time Hours	124.75	120.9	127.0	127.0	127.0	127.0	127.0	127.0	127.0	127.0	127.0
Packaging	Vacation Hours	54	54	54	54	54	54	54	54	54	54	54
	Sick Hours	93	64	12.0	30.25	12.25	12	12	12	12	12	12
	Other Hours	276	68	176.0	176.0	176.0	176.0	176.0	176.0	176.0	176.0	176.0
Components	Schedule Attainment (%)	100	96.1	95.1	114.0	97.2	88	89.3	88.3	88.3	88.3	88.3
	Earned Efficiency (%)	85	48%	50%	81%	71%	77%	74%	74%	74%	74%	74%
	Total Labor Hours	4802.25	5022.75	5274.6	4389.75	4389.75	4389.75	4389.75	4389.75	4389.75	4389.75	4389.75
Water ops	Full-time Equivalents	25.4	28.3	32.0	34.5	39.9	37.2	37.2	37.2	37.2	37.2	37.2
	Standard Hours	3472.25	3802.75	4109.6	4644.6	4288	4288	4288	4288	4288	4288	4288
	Over-time Hours	18.5	78.7	66.3	205.75	184.75	149	149	149	149	149	149

5 Top-down, bottom-up goal alignment drives supply chain decisions

Key Performance Goals and Indicators															
	2010	2011	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTD
Safety (Incident Rate)	0.1	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Material Variances (\$)	\$X	Goal	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
External Quality (PPM)	150	Goal	140	140	140	140	140	140	140	140	140	140	140	140	140
Labor Productivity	210	Goal	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Customer Complaints	9	Goal	6	6	6	6	6	6	6	6	6	6	6	6	6
Operating Income %	12%	Goal	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%
OEE	85%	Goal	75%	75%	75%	80%	80%	80%	80%	85%	85%	85%	85%	85%	85%
On-time Delivery	98%	Goal	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
Inventory Turns	12.3	Goal	13	14	14	14	14	14	14	15	15	15	15	15	15

4 Supply chain activities are tied to vendor objectives/performance

Production Planning Worksheet																
	Ag Daily	Days	Projected	Current	Next 3	Current	Target	On	Inventory	Ending	Total	Current	Daily	Current	Proposed	
																Forecast
BLOWERS	15	21	310	430	225	225	225	74	79	150	484	23	16	19.3	31	15
CAMTOLBLOWERS	100	21	3780	4371	1977	1977	1977	1977	1977	1977	1977	1977	1977	1977	1977	1977
END BEARINGS	26	21	546	793	207	207	207	207	207	207	207	207	207	207	207	207
FUEL PUMPS	52	21	1092	1241	573	573	573	573	573	573	573	573	573	573	573	573
NETCUTTERS	1298	21	27399	31313	10966	10966	10966	10966	10966	10966	10966	10966	10966	10966	10966	10966
RELIEF VALVES HEADS	19	21	398	425	229	229	229	229	229	229	229	229	229	229	229	229
ROCKER ARMS	281	21	5801	7103	2610	2610	2610	2610	2610	2610	2610	2610	2610	2610	2610	2610
CONN RODS	112	21	2302	2229	961	961	961	961	961	961	961	961	961	961	961	961
CONN RODS SERIES 60	104	21	2184	1879	577	577	577	577	577	577	577	577	577	577	577	577
TURBOS	196	21	4158	3807	1584	1584	1584	1584	1584	1584	1584	1584	1584	1584	1584	1584
TURBOS SERIES 60	108	21	2268	1807	718	718	718	718	718	718	718	718	718	718	718	718
WATER PUMP	48	21	996	1361	497	497	497	497	497	497	497	497	497	497	497	497
WATER PUMP SERIES 60	9	21	180	210	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
PLIE HEADS	14	21	294	429	149	149	149	149	149	149	149	149	149	149	149	149
MFL HEADS	9	21	180	210	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
OL PUMPS	31	21	651	862	344	344	344	344	344	344	344	344	344	344	344	344
OL PUMPS SERIES 60	9	21	180	210	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
AIRLIFT	2	21	42	3	1	1	1	1	1	1	1	1	1	1	1	1
MFL ENGINES	9	21	180	210	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
CYL HEADS SERIES 60	6	21	126	168	63	63	63	63	63	63	63	63	63	63	63	63
ENGINES SERIES 60	9	21	180	210	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
CAMSHAFTS	2	21	42	56	28	28	28	28	28	28	28	28	28	28	28	28
CAMSHAFTS SERIES 60	6	21	126	168	63	63	63	63	63	63	63	63	63	63	63	63
GOVERNORS	6	21	126	168	63	63	63	63	63	63	63	63	63	63	63	63
CAMSHAFTS	6	21	126	168	63	63	63	63	63	63	63	63	63	63	63	63
LOW BLOCKS	3	21	63	84	42	42	42	42	42	42	42	42	42	42	42	42
CAMSHAFTS	9	21	180	210	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
CRANKSHAFTS	9	21	180	210	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
CRANKS	6	21	126	168	63	63	63	63	63	63	63	63	63	63	63	63
BULL HEADS	6	21	126	168	63	63	63	63	63	63	63	63	63	63	63	63

Source: Crowe analysis

Polling Question 3

How focused are continuous improvement efforts in your supply chain activities?

- a. Not at all
- b. As needed to address issues
- c. Activities are critical to success
- d. Unsure/don't know

Sustainable Risk Management



ORGANIZATION

Succession and continuity plans-move to strategy	Formalized business continuity and staffing plans
Roles and accountability	Three lines of defense accountability plan

CULTURE

Supply chain risks Identified and monitored	Defining and communicating risk
Relationships among stakeholders	Formalized communication plans
	Suppliers recognized as full partners

CHANGE MANAGEMENT

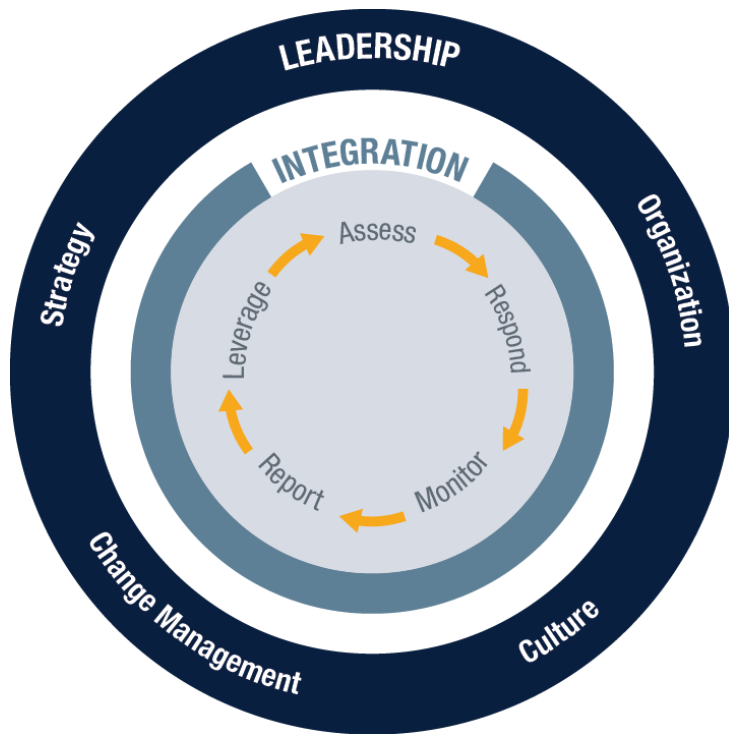
Mobilizing for changes	Prescriptive event response
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STRATEGY

Business opportunity	Defined risk appetite and tolerance thresholds
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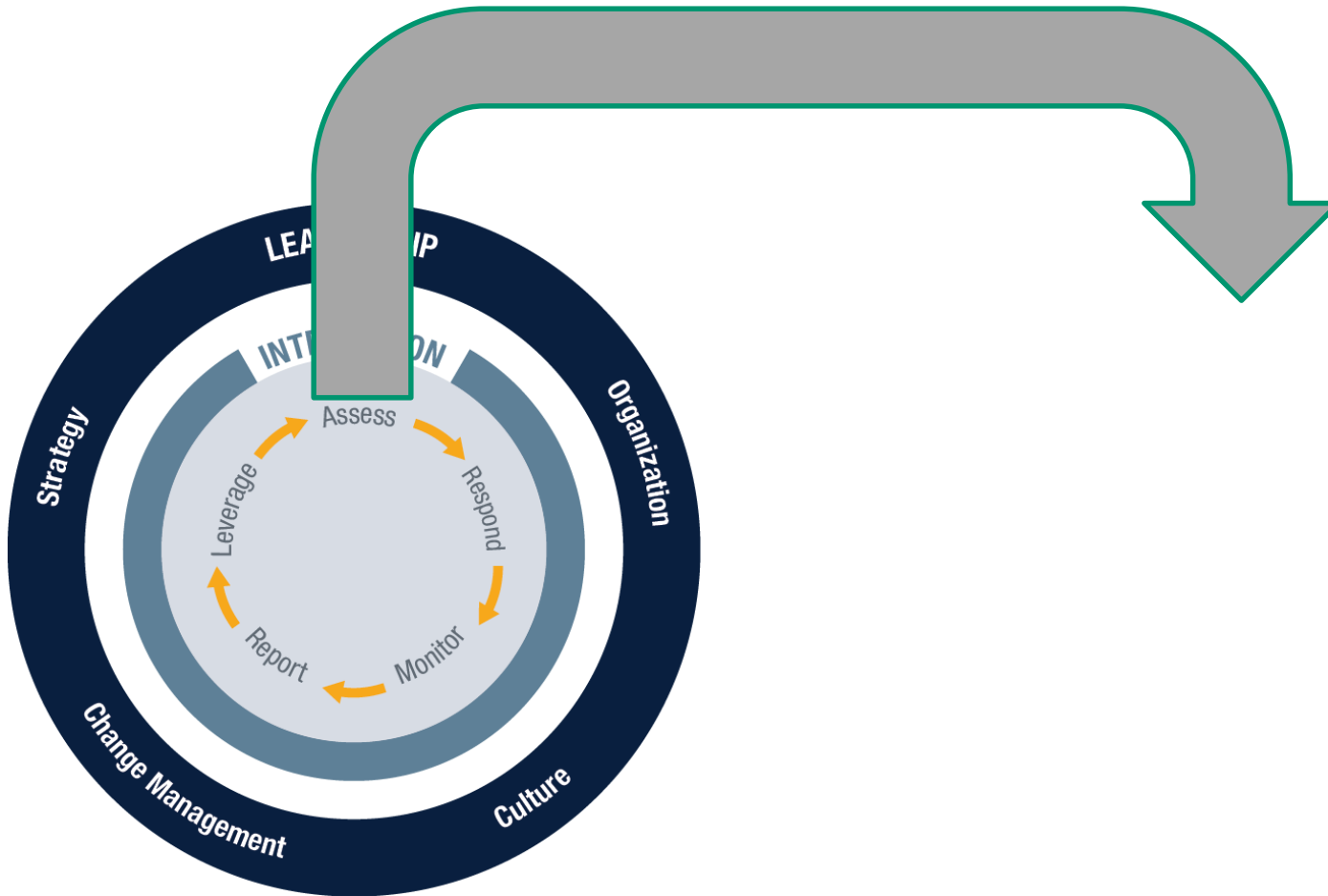
Source: Crowe Horwath LLP

Assessment of Supply Chain Risks



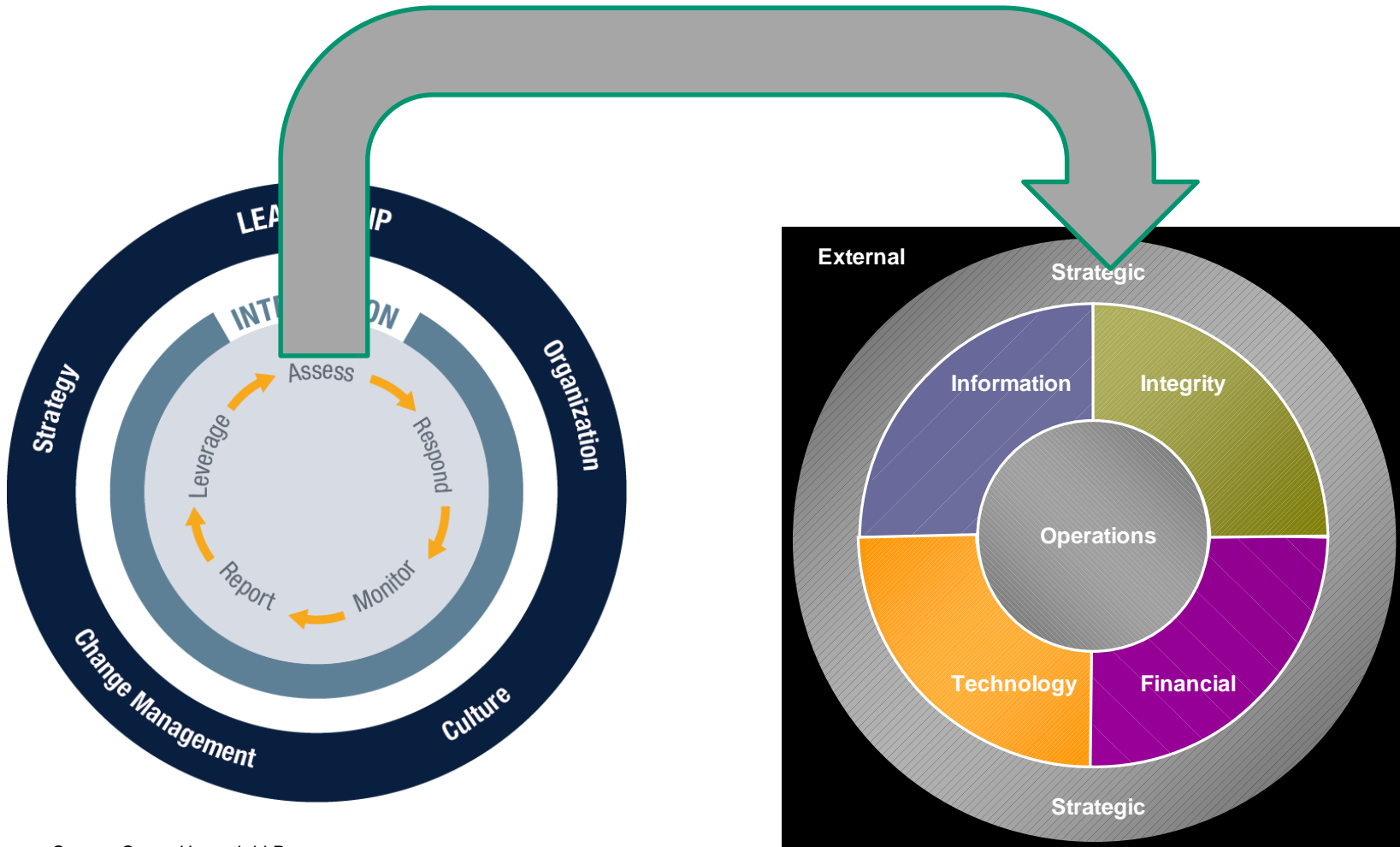
Source: Crowe Horwath LLP

Assessment of Supply Chain Risks



Source: Crowe Horwath LLP

Assessment of Supply Chain Risks



Source: Crowe Horwath LLP



Source: Crowe Horwath LLP

External Risks:

Regulatory / Legal
Public Interest Groups
Country/ Political

Strategic Risks:

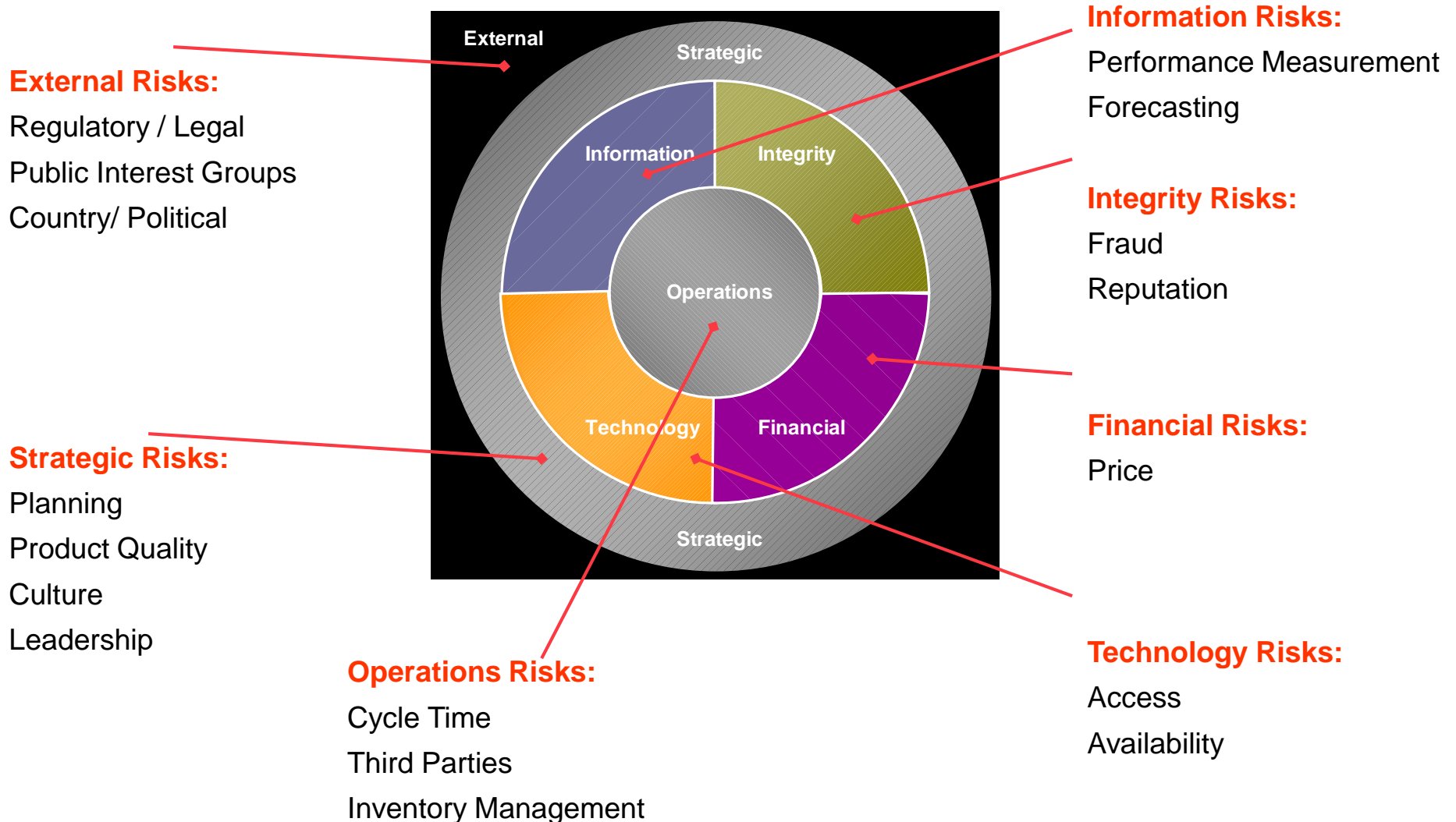
Planning
Product Quality
Culture
Leadership

Operations Risks:

Cycle Time
Third Parties
Inventory Management



Source: Crowe Horwath LLP

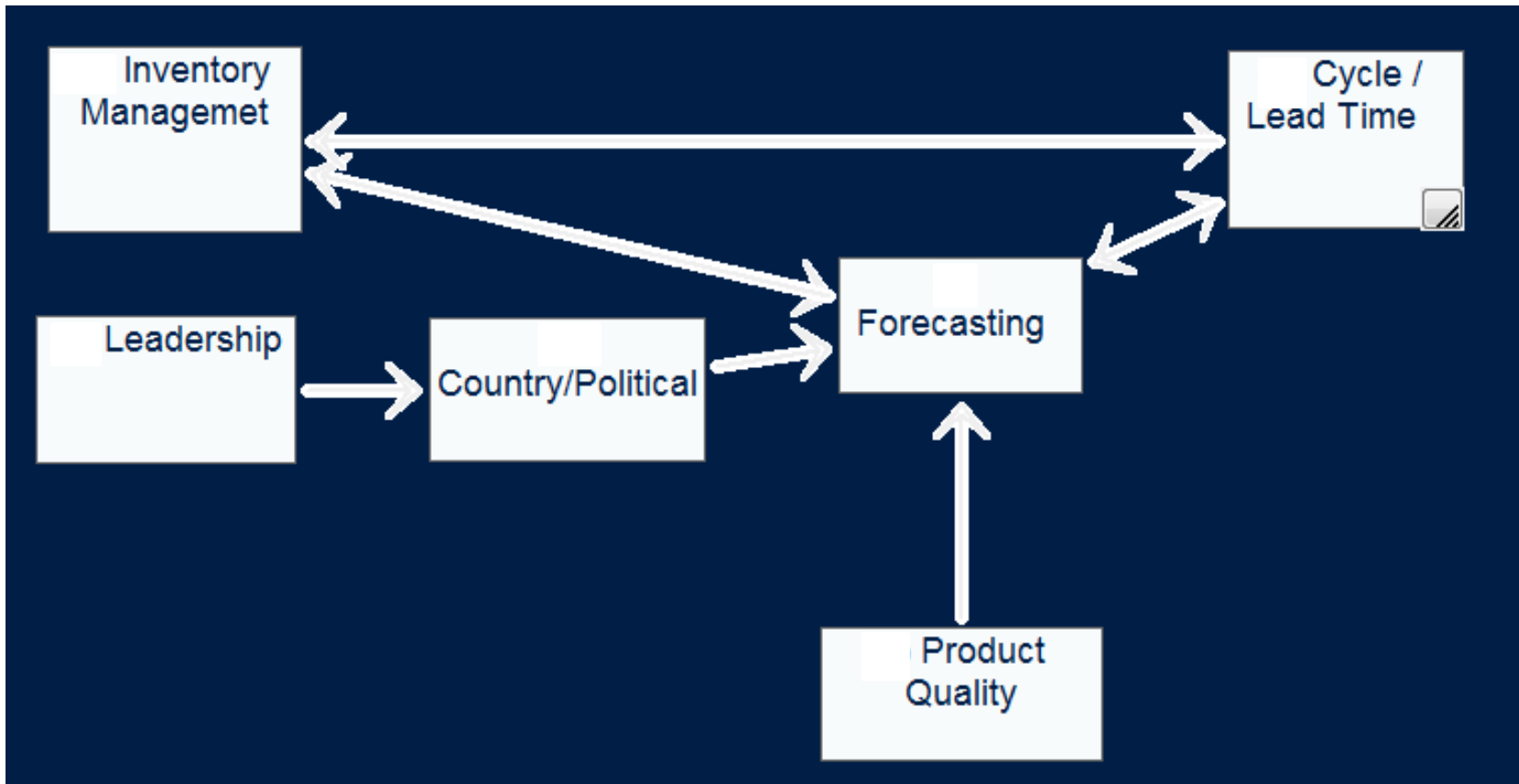


Source: Crowe Horwath LLP

Polling Question 4

What does your organization believe is the greatest risk to your supply chain?

- a. Outsourcing/use of third parties
- b. Regulatory pressure
- c. Political/Country unrest
- d. Public interest group pressure (Sustainability)
- e. Quality
- f. Natural disasters
- g. Unsure/don't know



Source: Crowe analysis

Areas Internal Audit may focus

- Outsourced activities
 - What do you outsource
 - How is it outsourced
 - Risk to the supply chain
- Forecasting and impact to supply chain
- ERP System Drivers
 - How are they controlled
 - How are they monitored
 - Risk to supply chain and overall business performance
- Sustainability issues
 - Ethical sourcing
 - Conflict minerals
- Trade compliance

Questions

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