NGen Next Generation Manufacturing Canada

NGen Operational Excellence / Supply Chain Review Country Leaders and Followers

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Building World Class Supply Chains through Operational Excellence Round Table

Join us **Thursday January 14th at 10am EST** for a round table discussion on Building World Class Supply Chains..

We'll be discussing several of the strategies from our presentation today by Jay Davis, sharing best practices and strategies to ensure the long-term resilience of manufacturing in Canada.

This will be a facilitated discussion, and is open to senior manufacturing leaders.

Watch your email for further details, and to register!

Agenda

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- Background / Context
- Approach / Assumptions
- Country Rankings
- Good Practices
- Next Steps

Background / Context

- Who are the best manufacturing countries in the world and why?
- Where does Operational Excellence (OE) fit
- Examples of good Innovation, Digitization and OE practices
- Next Steps for NGen
  - How NGen will support

What is an Operational Excellence (OE) System ?

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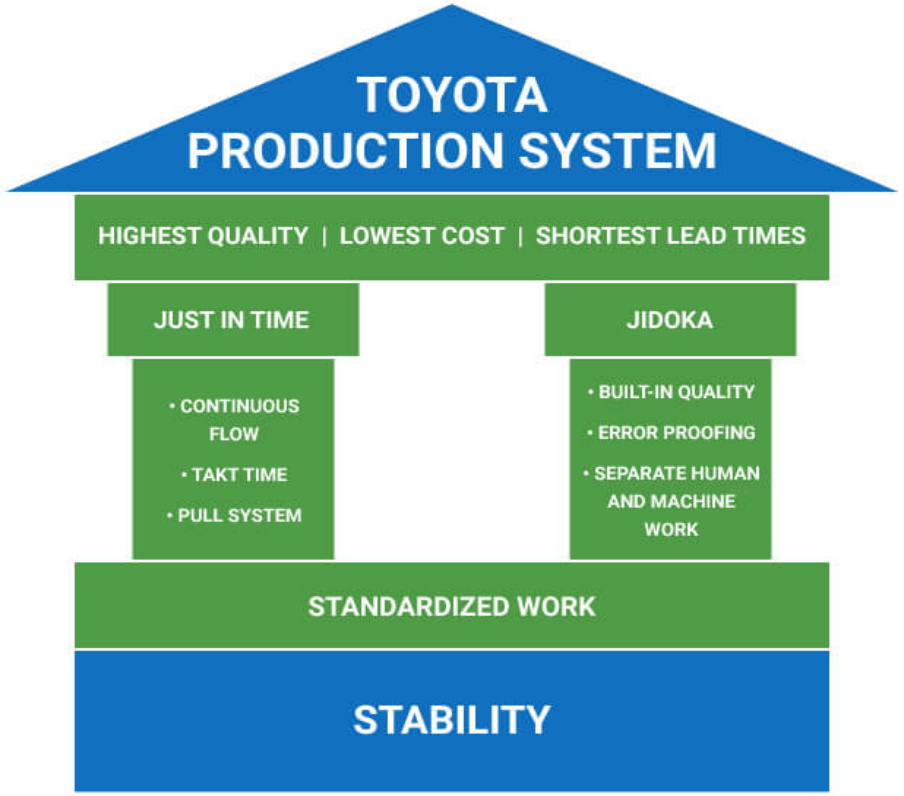

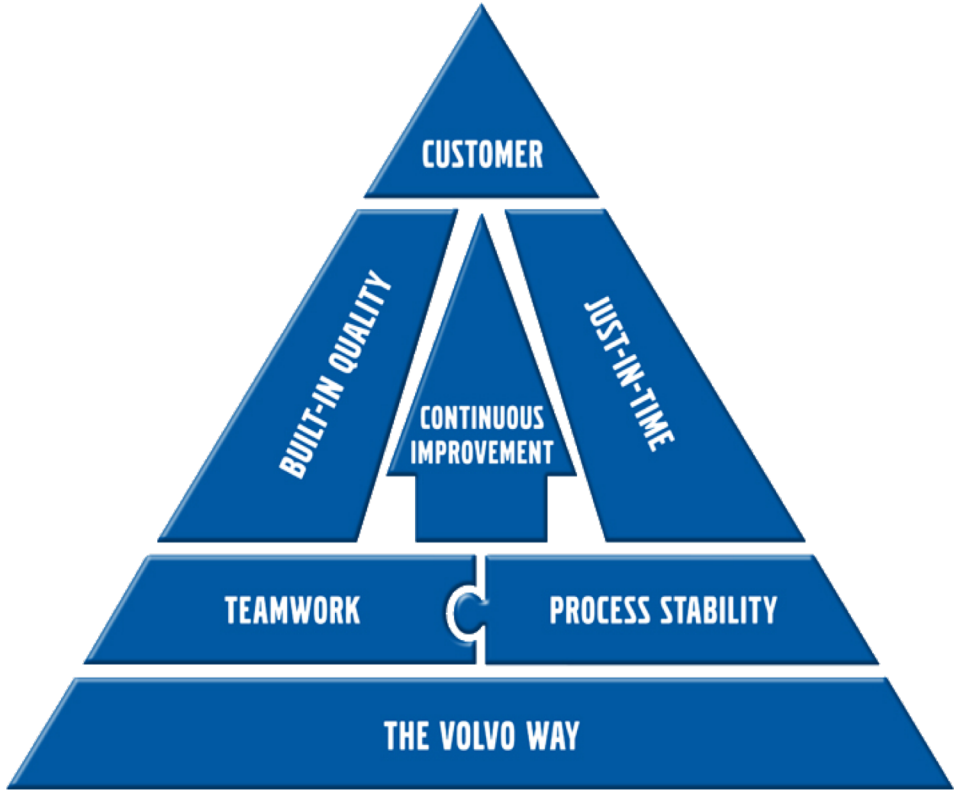

A Structure that Connects JIT, 6 sigma, Lean Processes Together Is a System

Where does OE Fit ?

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RUN THE BUSINESS
Job 1 – Hit your numbers

GROW THE BUSINESS
Job 2 – Make it easier to hit your numbers

TRANSFORM THE BUSINESS
Job 3 – Hit a Home Run

Operational

Operational Excellence (OE)

Strategic

Operational Excellence Makes Job 1 Easier and Job 3 Possible

Approach - Assumptions

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- Canada ranked in comparison to 7 other top manufacturing countries in the world (US / NA Market)
  - Economic Key Performance Results (KPRs), reflects the overall economic state of the manufacturing sector .
  - Key Performance Indicators (KPIs) reflect the operational state of the manufacturing companies
  - Process Indicators reflect the health of the processes that is responsible for producing the KPIs

- Results were discussed with industry experts.

Approach / Assumptions - KPI Tree

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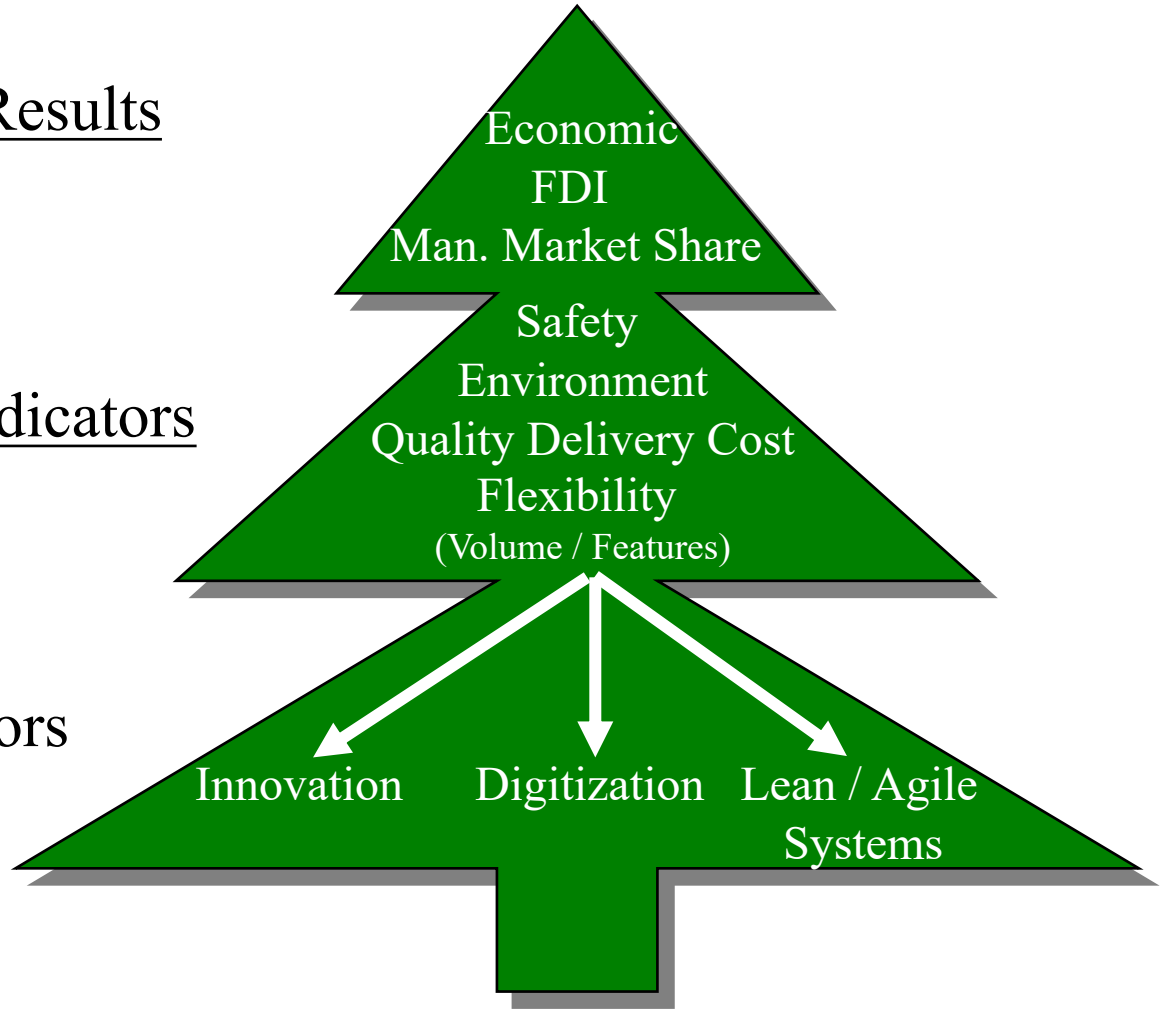
Key Performance Results (KPRs)

Lagging Indicators

Key Performance Indicators (KPIs)

Process Indicators (PIs)

Leading Indicators (Levers)



Hard Work Happens in the Processes

Country Rankings – Economic KPRs

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	Employment Growth	Market Share of US Imports	Foreign Direct Manufacturing Investment	United Nations CIP	GDP Value Add in Manufacturing	Overall
Leaders	Mexico	US	Mexico	China	China	**US**
	Germany	China	US	South Korea	Japan	**Mexico**
	Japan	Mexico		Mexico	US	**Japan**
Followers	US	**Canada**	**Canada**	Germany	**Canada**	**China**
	Canada	Japan		Japan		South Korea
	UK	Germany		**Canada**	South Korea	**Canada**
	South Korea	South Korea		US - NA	Germany	Germany
	China	UK		UK	UK	UK

US, China, Japan, Mexico …… South Korea

Country Rankings – Operational KPIs

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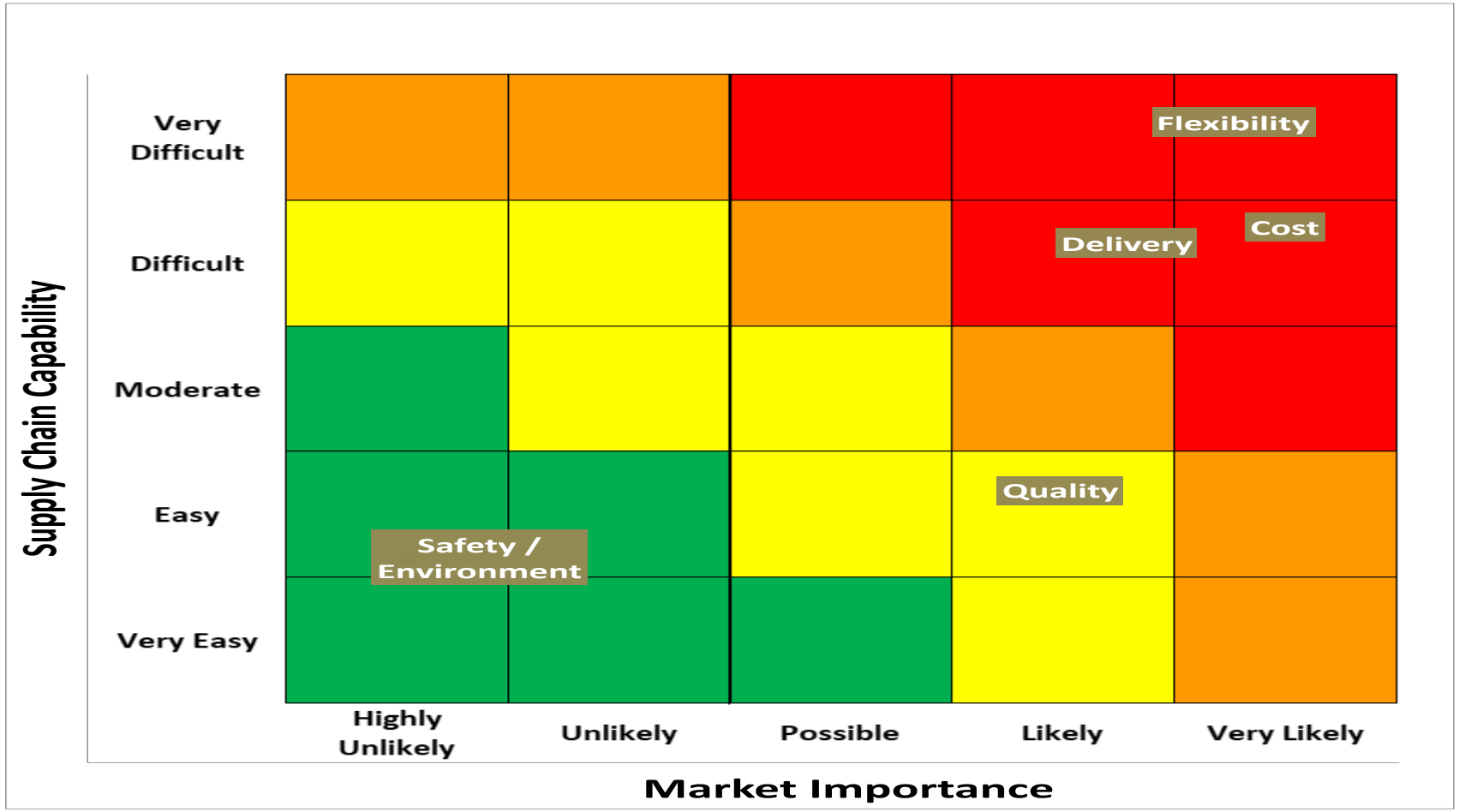
	Safety	Environment	Quality	Delivery OtD	Cost	Flexibility Volume/ NPD
Leaders	**Canada**	Germany	Germany	US	Mexico	US
	Germany	Japan	US	**Canada**	China	Japan
	UK	UK	Japan	Mexico	South Korea	China
Followers	Japan	**Canada**	**Canada**	China	US	South Korea
	US	South Korea	China	Japan	**Canada**	Mexico
	South Korea	US	South Korea	UK	Japan	**Canada**
	China	Mexico	UK	South Korea	UK	UK
	Mexico	China	Mexico	Germany	Germany	Germany

US, China, Japan…..Mexico, South Korea

Differentiator Matrix



US, China, Japan…..Mexico, South Korea
Do What Matters Most to Customers

Country Rankings – Operational KPIs

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	Safety	Environment	Quality	Delivery OtD	Cost	Flexibility Volume/ NPD	Overall
Leaders	**Canada**	Germany	Germany	US	Mexico	US	**US**
	Germany	Japan	US	**Canada**	China	Japan	**Japan**
	UK	UK	Japan	Mexico	South Korea	China	**China**
Followers	Japan	**Canada**	**Canada**	China	US	South Korea	**Mexico**
	US	South Korea	China	Japan	**Canada**	Mexico	**South Korea**
	South Korea	US	South Korea	UK	Japan	**Canada**	**Canada**
	China	Mexico	UK	South Korea	UK	UK	UK
	Mexico	China	Mexico	Germany	Germany	Germany	Germany

US, China, Japan…..Mexico, South Korea

Country Rankings – Process Indicators

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	Operational Excellence System Deployment	Innovation	Digitization
Leaders	**Japan**	**US**	**Germany**
	US	UK	**South Korea**
	South Korea	**Germany**	**Japan**
Followers	Mexico	South Korea	UK
	Canada	China	China
	China	Japan	US
	Germany	**Canada**	**Canada**
	UK	Mexico	Mexico

US, Japan, South Korea, Germany do well in 3 critical areas

Industry Good Processes

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- Operational Excellence Systems
  - Connect and Measure
- Innovation Process
  - Fail Fast
- Digital Transformation
  - Measure and have an end date.

Good Processes, Not Best Practices

OE System Deployment

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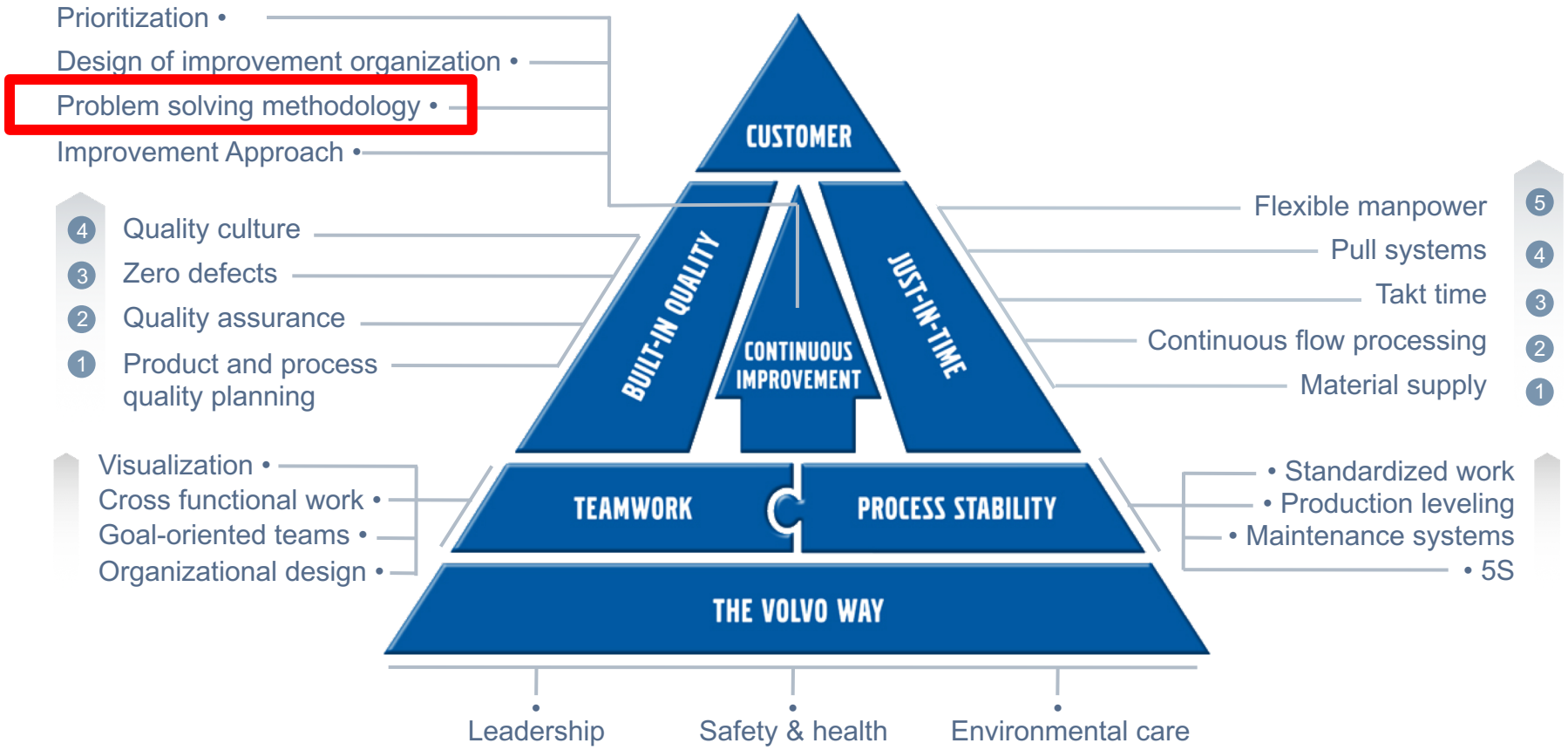
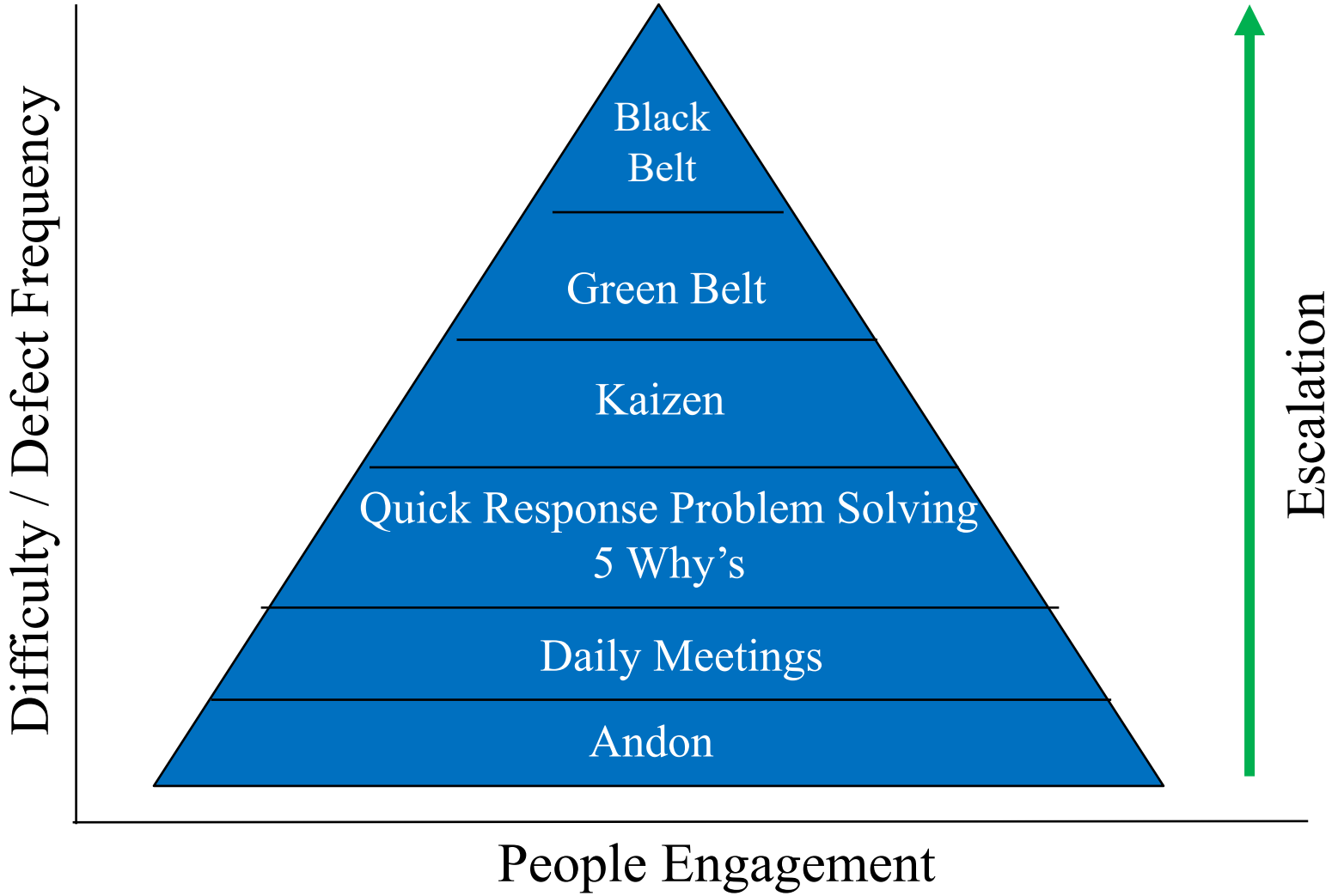


Systems that Connect and Measure
Allow you to Understand Your Supply Chain Risks

OE System Deployment – Problem Solving



Connecting Methods to a System - Flexible and Cost Efficient

Problem Solving - 5 Why on Steroids

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Quick Response Problem Solving (QRPS)

Step 1. General Descriptions / Identifying the current problem : at the point of cause

Plant / Site		**Date of Incident**			Document NO.
Area / Department		**Process/Station**			
Categories	**S (Safety) , Q (Quality) , D (Delivery) , C (Cost) , E(Environment) , P (People)**				
	(Who, What, When, Where, Why & How)				
State Problem / Incident Description					
Issued by		Telephone		Issued Date	
Repeat problem?	* **If Yes**, what were the prior actions to solve the problem?				
Yes, No					

Flexible but Structured - Saves Time on Analysis

Problem Solving – 4 M Principles

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Step 2. 4M check and Quick containment (4M : Man, Machine, Material, Method)					
4M Check	No Indicates likely cause for failure Yes No				Yes No
Man	1. Standardized work followed?		**Machine**	1. Right tool / Jig / Program used?	
	2. Trained for the work ?			2. Equipment / Systems operating OK?	
	3. Experienced employee?			3. Equipment / Systems not recently changed.	
Method	1. Right standardized work?		**Material**	1. Correct parts used?	
	2. Right Work instruction?			2. Parts meet quality specifications?	
	3. Process has not recently been changed			3. Parts have not recently been changed.	
Employee Statement					

Quick Containment	Actions	Dept	Resp. Name	Target date	Status	
					A	P
					C	D

Build Employee Capability

Problem Solving – 5 why

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Step 3. Root causes analysis		
5- Whys	*Why 1*	
	Why 2	
	Why 3	
	Why 4	
	Why 5	
Root cause cannot be reached, level 2 support needed, problem solving has stopped. Name_____Date _____		

Build Employee Capability

Problem Solving – Poke Yoke

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Step 4. Root Cause Solutions (Process , Engineering, tooling changes, etc) / Results

Solutions Approach - Cirlce the solution that will be used to solve root cause of problem

Best Solution *Worst Solution*

Poka-Yoke Mod Standard Work Mod Work Instruction Visual Aid Inline Quality √ End of line Quality √ Employee Training

Items	Actions	Dept	Name	Date (Target/Actual)	Status	
					A	P
					C	D
					A	P
					C	D
					A	P
					C	D

Build Employee Capability

Innovation Pipeline – Outside NPD Process

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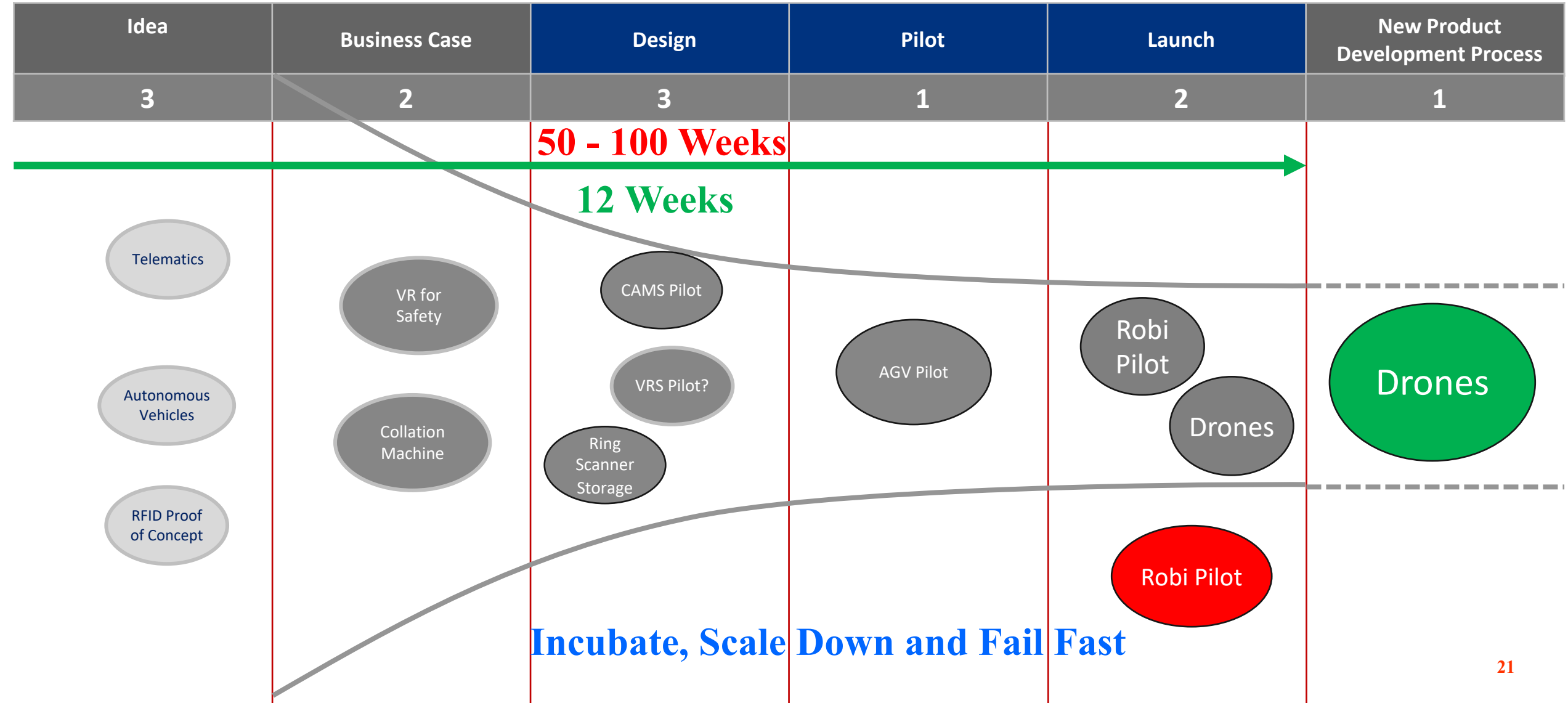

Innovation – Inside NPD Process

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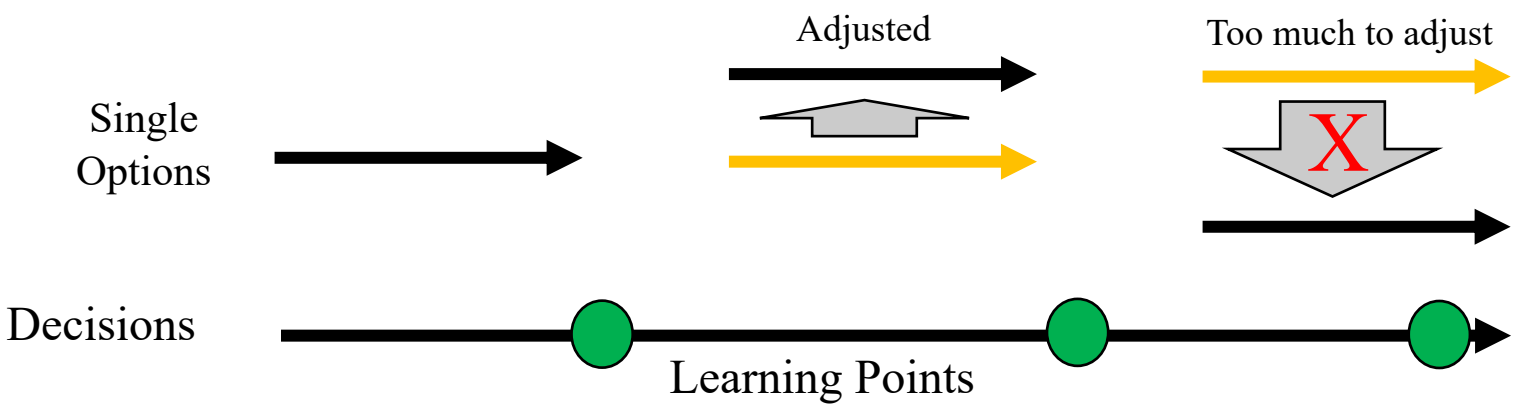
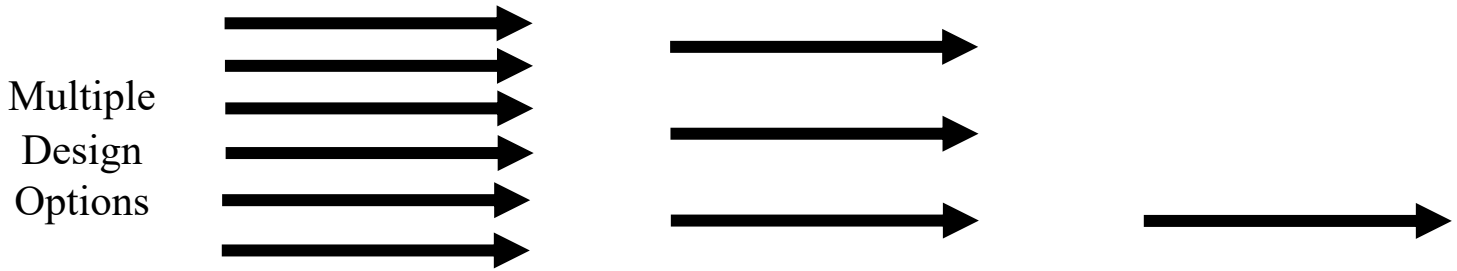
Point Based New Product Development



1. Invest quickly into a risky design
2. Have to rework parts of the design
3. Have longer cycle times due to lack of efficiency

Set Based / Concurrent New Product Development



1. Designs stay flexible
2. Costs stay low - test before they invest.
3. Teams move faster – more focused
4. Data used to select best options.

Learn, Combine and Innovate

Digitization – Where to start ?

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With a Measurement and at the Top

Digitization – Dashboards are at the Top

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What data is the most important

Digitization – Dashboards, Systems & Robots

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Dashboards

IT Systems

Automation

Working From the Top Down will help to Prioritize what you Digitize & Automate

Digitization – Measure the transformation

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Percent of the Data Digitized, # of Dashboard Hits

Take Aways

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1. We can learn from other countries and companies
2. We can be the best if we focus on the right processes
3. Successful countries have been successful because of their focus on cost, flexibility and delivery using digitization, operational excellence systems and innovation

Next Steps

- Evolve the NGen Manufacturing Supply Chain Dashboard with a balanced scorecard (economic & manufacturing) to better understand:
  - Where we rank amongst other countries
  - What countries should we benchmark
  - What should we do to improve our manufacturing supply chain position globally
  - What countries should Canadian companies target when entering the Asian or European market

- Q&A

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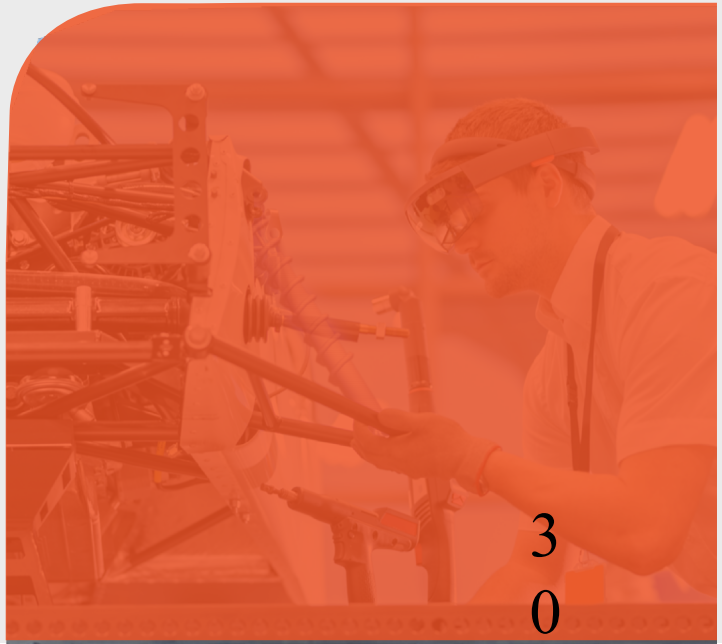
What's Next Thought Leadership → January 28th Event

Join us **Thursday January 28th at 11am EST** for our next *What's Next Through Leadership* series event.

Topic: Creating Value for Business through Artificial Intelligence

We'll be joined Chloe Durand Gonzalez, from CreaBox to discuss strategies and case studies on how AI is transforming Canadian manufacturing.

Watch your email for further details, and to register!



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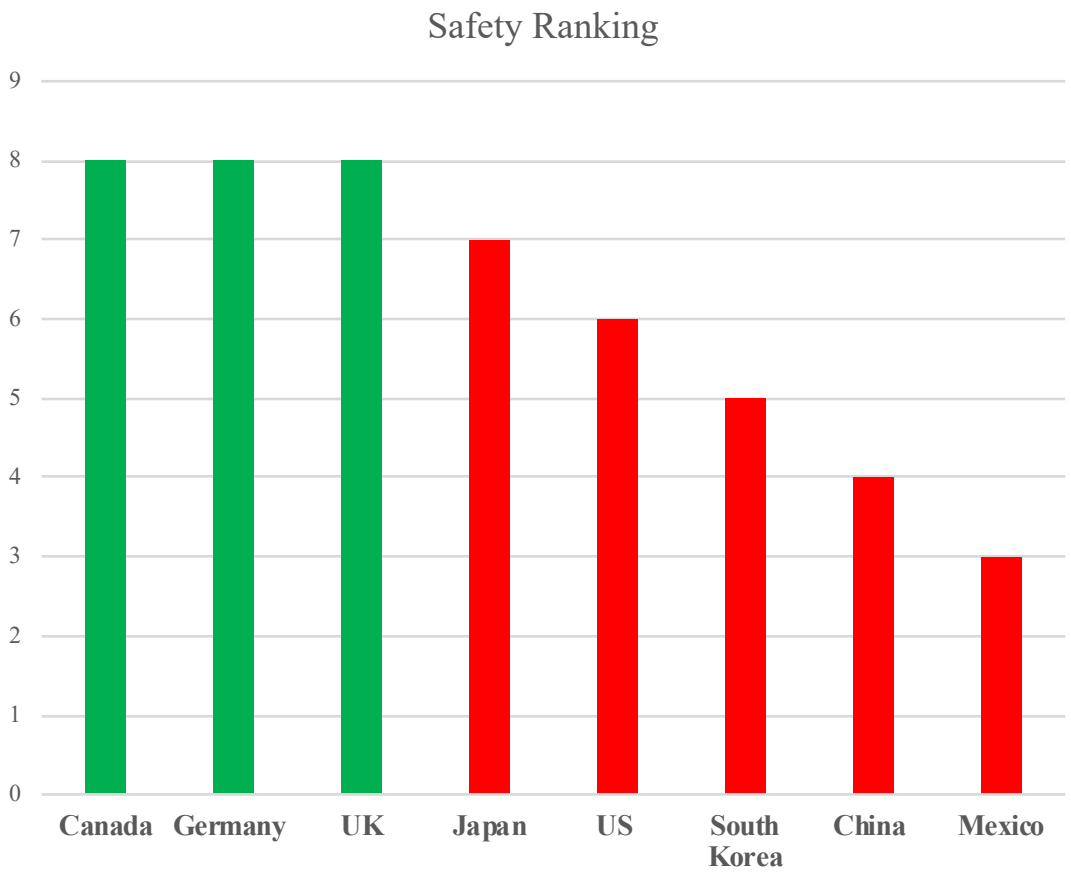
- Thank you

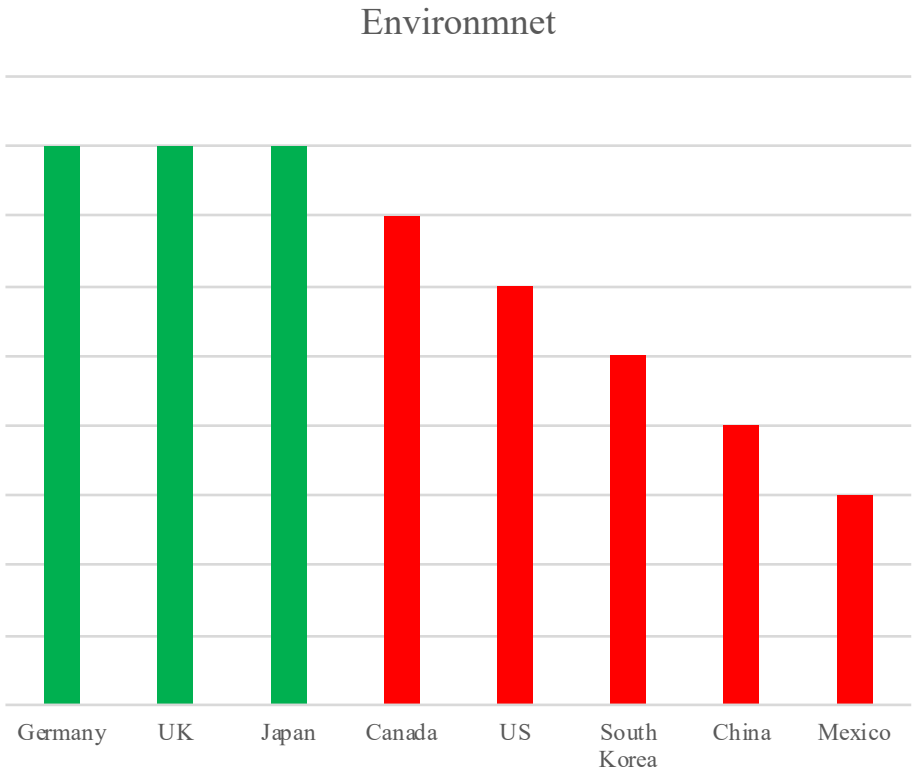
Safety



Leaders Followers

- **Indicators**
  - Operational Excellence Deployment
  - Low Level of Corruption
  - Peace Index
  - Union Density
- **Leader Strengths**
  - Peace index, Low level of corruption, Union density
- **Risks / Opportunities**
  - RTW flexible labour agreements
  - Operational excellence system deployment - US and Japan focus will reduce .
- **Opportunities**
  - Operational excellence systems (7) Focus on standardized work, design in safety
  - Union Density (8) – RTW flexible labour agreements

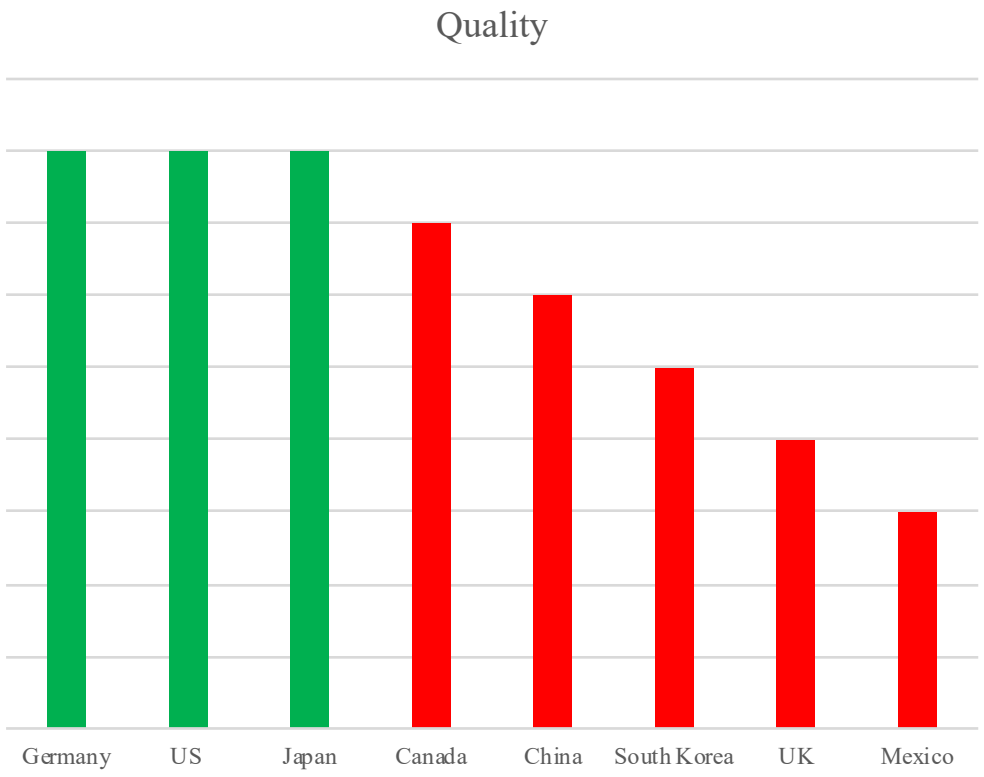
Environment



Leaders Followers

- **Leader Strengths**
  - CO2, pollution and black carbon emissions management - UK
  - Canada considered top tier despite lagging amongst comparative country leaders
- **Risks**
  - No risks identified
- **Opportunities**
  - CO2 Neutrality (33)
  - Identify end to end manufacturing ecosystems that can support the global focus on environment (nickel, batteries, OEM's) as compared to our emissions which is ranked in top tier globally

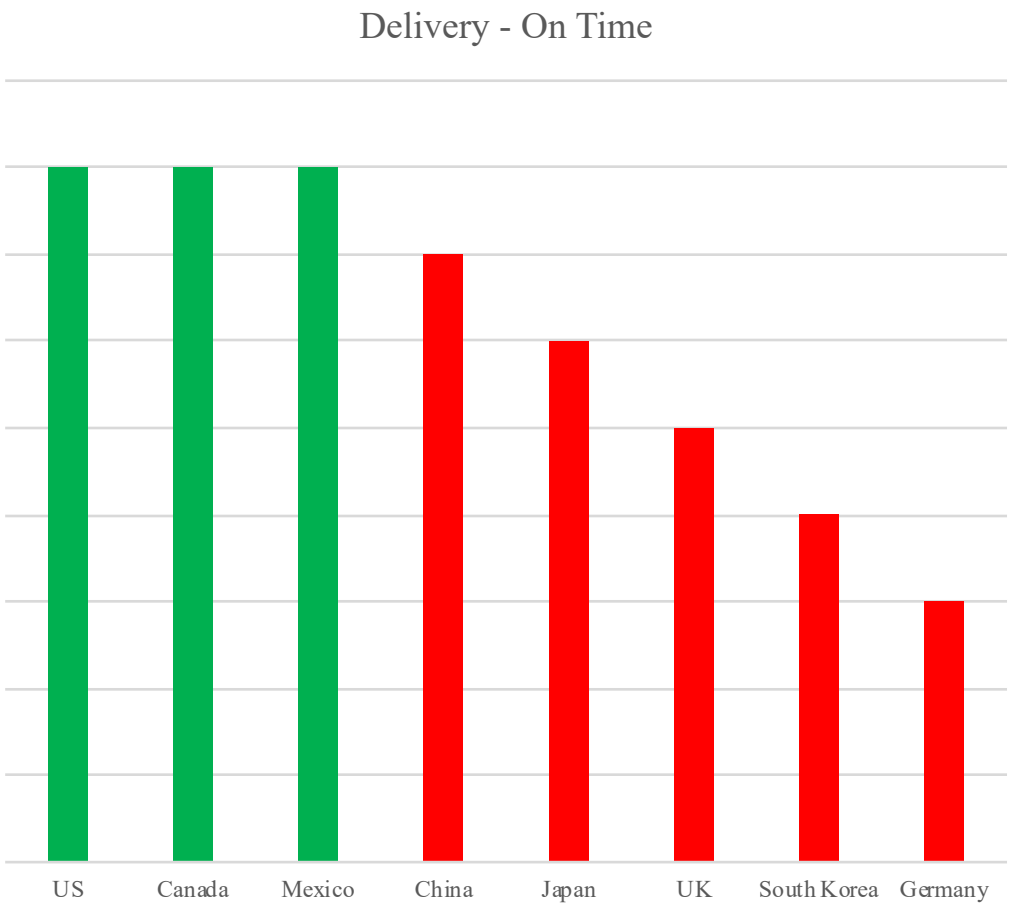
Quality



Leaders Followers

- Leader Strengths
  - JD Power – Germany, US and Japan
  - Brand reputation – Germany, US, Japan.
  - Operational Excellence systems – China, US, Japan
  - Industrial digitization – Germany, Japan, South Korea
  - All comparative countries have achieved minimum customer quality thresholds
- Risks
  - Lack of focus on operational excellence systems to achieve quality. (Process vs System)
- Opportunities
  - Operational Excellence Systems – (7) Focus on operational excellence system vs a quality process.

Delivery – On Time Delivery

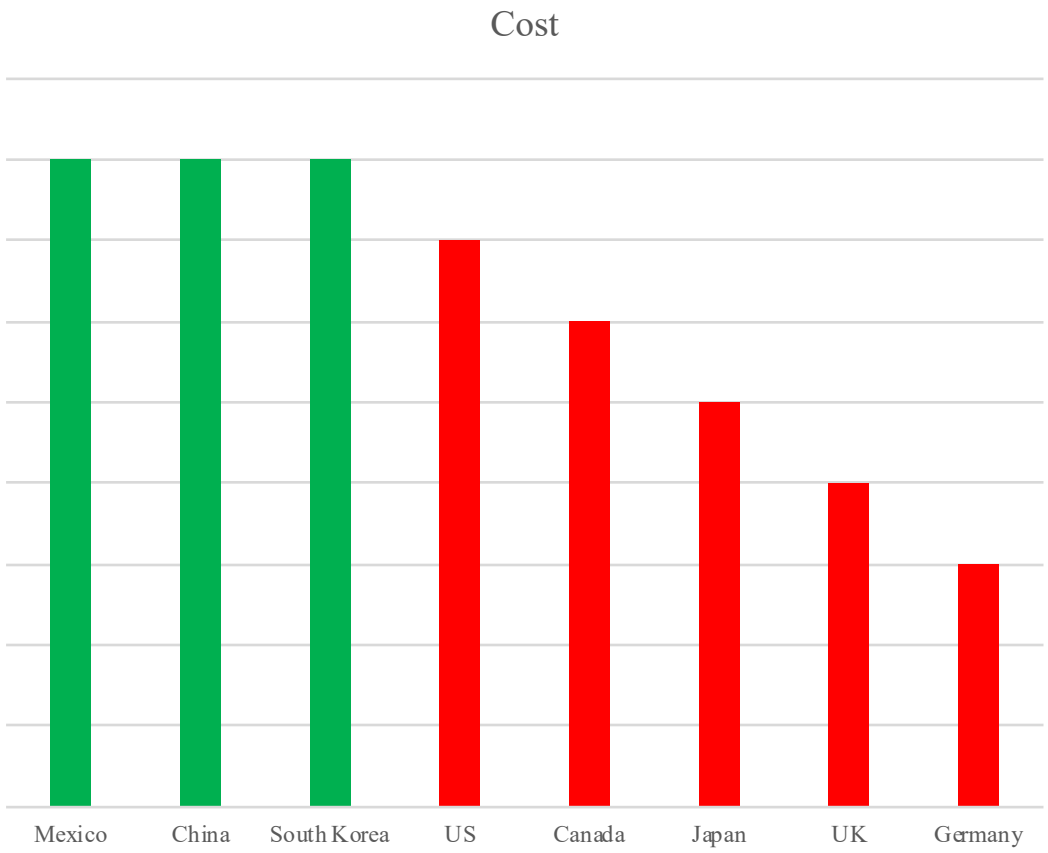


- Leader Strengths
  - Border crossings – Canada and Mexico, proximity and quantity
- Risks
  - Border crossings - bottle necks at US borders. Dis-proportionate volume in Southwestern Ontario.
  - Air travel - Japan / China could leverage lower fairs due to COVID-19 travel bans.
- Opportunities
  - Border crossings (1) - investments to ensure no bottlenecks

Delivery – New Product Lead Time

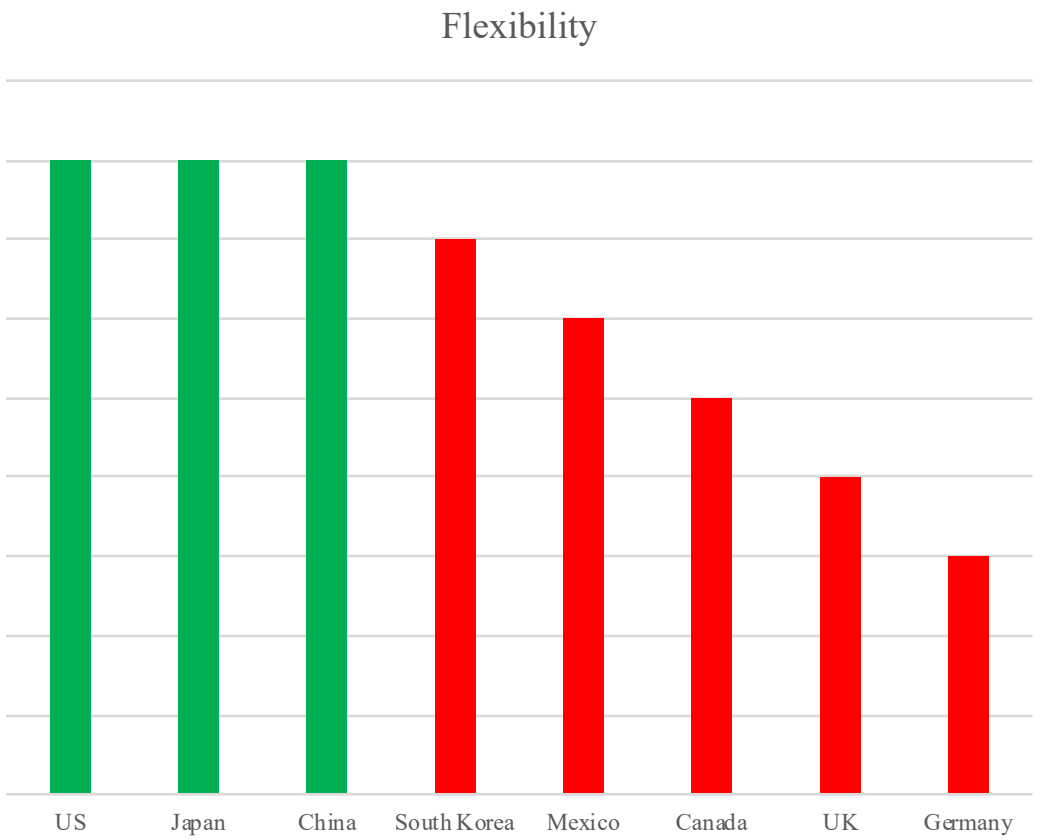
- Leader Strengths
  - Ease of Doing Business – US, South Korea, UK. Less regulations required to design and build..
  - JD Power Quality – Germany, US, Japan. Good enough quality and strong digitization
  - Sense of urgency built into Japan and South Korea culture due to political pressures.
- Risks
  - Union Density - Nonflexible labour agreements
  - Digitization – Challenge managing new product complexity and information.
- Opportunities
  - Industrial digitization (7)
  - Ease of doing Business (5)
  - Flexible labour agreements (8)

Cost



- Leader Strengths
  - Operational excellence systems – China, US, Japan
  - Flexible labour agreements – China, US, South Korea
  - Tax support - Mexico, China.
- Risks
  - Innovation – weak in Canada
  - Digitization – weak in Canada
- Opportunities
  - Operational Excellence Systems (7)
  - Flexible labour agreements (8)
  - Industrial digitization (7)- reduce costs associated with complexity / data
  - Innovation (6) – Manufacturing focus and proliferation

Flexibility



Leaders Followers

- Leader Strengths
  - Operational excellence systems – US, Japan, China, Mexico. Knowledge and proliferations
  - Digitization – US and South Korea
  - Innovation – US, South Korea and Germany
- Risks
  - Union Density - Nonflexible labour agreements
- Opportunities
  - Operational excellence systems (7)
  - Innovation (6)
  - Digitization (7)
  - Union Density – (8) Nonflexible work agreements

Manufacturing Sector Performance

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	US	Japan	Mexico	China	South Korea	Germany	Canada	UK
Predictors								
Safety								
Environmnet								
Quality								
Delivery - On Time								
Delivery - New Product Lead Time								
Cost								
Flexibility								
Results								
Manufacturing Employment Growth								
Market Share of US								

- Leader Strengths
  - USLeaders are strong in competitive differentiators (delivery, cost and flexibility)
  - GDP Value Add - China, Japan and US
- Risks
  - Followers are strong in non-competitive - differentiators (safety, quality and environment)
  - Small companies don't often get big and stay in Canada
- Opportunities
  - New Product Lead Time
  - Flexibility, innovation and digitization.
  - Maintain, defend good safety, environment and quality standards.
  - Re-focus innovation and digitization on creating a flexible and leaner manufacturing sector

Manufacturing Sector Performance

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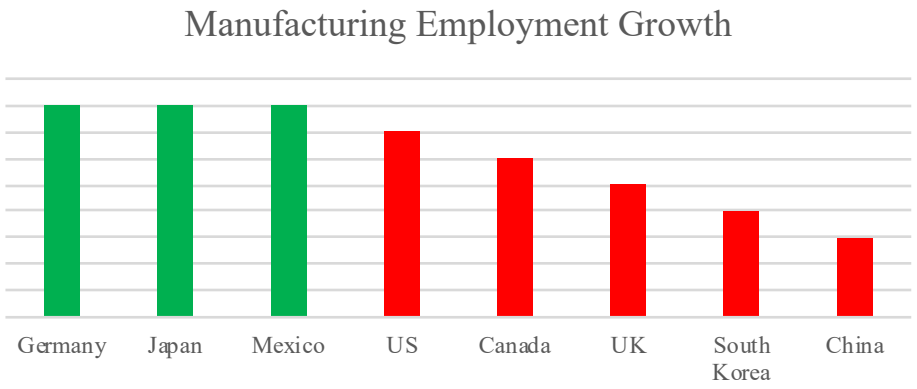

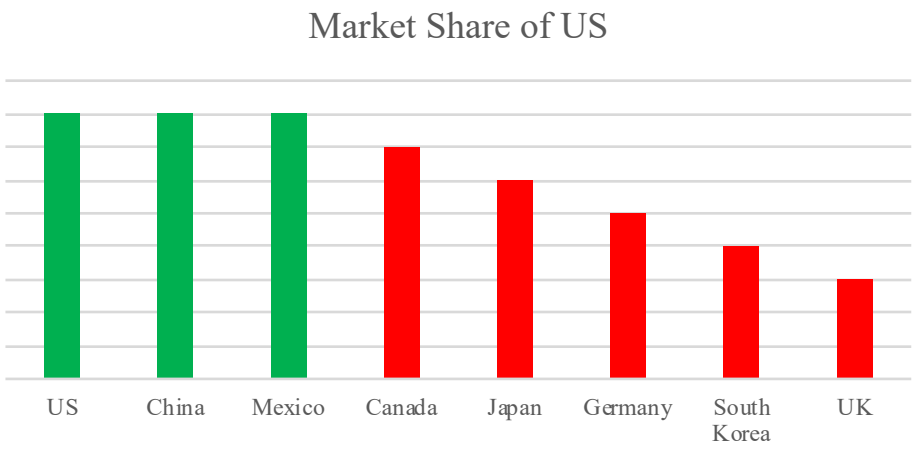

Leaders Followers

- Leader / Follower Strengths
  - Foreign Direct Investment - Mexico
  - GDP Value Add - China, Japan and US
- Risks
  - Mexico, US, China and Japan.
  - Small companies don't often get big and stay in Canada
- Opportunities
  - Foreign Direct Investment (3)
  - Flexibility, innovation and digitization.
  - Maintain, defend good safety, environment and quality standards.
  - Re-focus innovation and digitization on creating a flexible and leaner manufacturing sector