

Supply Chain Management Strategy

Aerospace Industry

Commercial Aircraft

OEM* Development Phase

NAGOYA UNIVERSITY

VALERIA MUCCIACITO

February 6th, 2021.



Agenda

1. BIO
2. Definitions
3. Before COVID-19
4. After COVID-19
5. Opportunity or Threat
6. 5 Strategies
7. Industrial Base Workforce



1. BIO





Valeria Mucciacito



- ❖ Master in Business Administration *Stricto Sensu*
Fundação Instituto de Administração (FIA) Sao Paulo - Brazil
Project: “Leadership Competences for Innovation”-
12/2016

- ❖ Executive MBA – *Lato Sensu*
Executive Master of Business Administration
Business School São Paulo &
Laureate International Universities, 1998

- ❖ Managing in the Global Economy EMBA
University of Toronto, Canada, 1999

- ❖ Bachelor of Business Administration

- ❖ Over 25 years of experience in the Business Management industry, and significant contributions as a Supply Chain/Procurement Leader.
- ❖ 17 years in Aerospace.
- ❖ Implemented a competitive business model strategy for alternative procurement functions which resulted in ~17% cost reduction in the E-jets commercial business.
- ❖ Managed high-value contracts (RR, GE, Honeywell and P&W) over USD\$1B/year Powerplant purchasing, for all Programs: Commercial, Executive and Defense segments.
- ❖ Managed high-performance team and monitored high performance suppliers.



2. Definitions



Definitions (1/3)

Supply Chain:

“...is a set of organizations directly linked by one or more of the upstream and downstream flows of products, services, finances and information from a source to a customer. [1]”

“... is the process through which a company creates and distributes its products and services to the end user. It includes several specific elements; production planning, material sourcing, transportation management, warehouse management and demand management. These functions are tightly integrated to provide the products and services to the end user in an efficient, timely and profitable manner. [2]”

Source:

[1] T. Mentzer et.al., Defining Supply Chain Management, in Journal of Business Logistics, Vol. 22, No.2,2001.

[2] W. Scott and Ch. Oldfield, The Nine Basic Rules of a Successful Supply Chain URL: <http://www.aia-aerospace.org/assets/smc_wp-nine.pdf>



Definitions (2/3)

Supply Chain Management:

“...is the integration of key business processes across the supply chain for the purpose of creating value for customers and stakeholders. [3]”

“... is a set of approaches utilized to efficiently integrate suppliers, manufacturers, warehouses and stores, so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time, in order to minimize system-wide costs while satisfying service level requirement. [4]”

In a general, SCM is an action based on the integration of organizational units that compose the supply chain and coordinates material, information, performance measurement, compliance, governance and financial flows in order to meet requirements from the perspective of end users throughout the supply chain to increase its competitiveness.



Aviation Industry (3/3)

“Aviation is a vital enabler of economic activity by providing defense services through military aviation and transport and related services through civil aviation. Civil aviation covers not only the commercial air transport of passengers and freight, but also include all related industries such as general aviation, airports, air navigation service providers and those activities directly serving passengers or providing air freight services. These aviation related industries form together the civil aviation industry.”



Aviation Industry

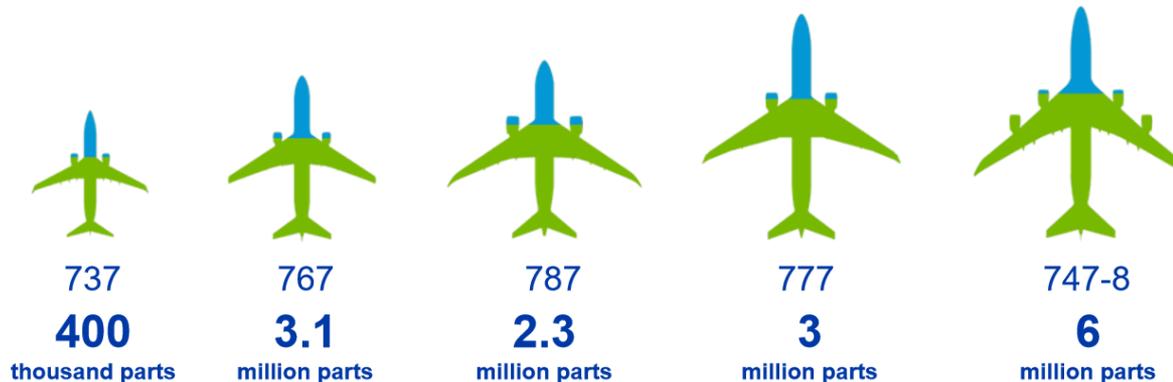
Commercial Aircraft

- Complex and Expensive.
- Its high technology is one of the major contributors to the economic development.
- Flight safety and reliability of the aircraft.
- Certified by Authorities with full traceability back to origin.
- Requires high standards for production and approval of parts, as well as other quality regulations for suppliers.
- Stakeholders must comply with all Compliance and Governance rules.



Relevance of the SCM in the Aerospace

Boeing will not be successful if our supply chain partners are not successful



\$43 billion spend • 5,400 factories • 500,000 people

65% Suppliers ■ Boeing

Percent of Boeing airplanes cost that comes through the supply chain



Supply Chain Management



The **aviation**, space and defense industry **by nature of the complexity** of its products **is highly dependent** on the supply chain having a complete and comprehensive understanding of the product and process requirements that are meant to assure product conformance and control.



Contractual requirements review and management are important elements of a **Quality Management System (Reference: IAQG 9100:2016)** and will enhance overall supply chain performance with regards to On-Time-On-Quality Delivery (OTOQD).



Procurement Categories

Structures

- Major assemblies
- Body sections
- Movable wing sections
- Doors
- Flight Control Surfaces
- Fuselage



Systems

- Avionics
- Flight Systems
- Hydraulics
- Wheels & Brakes
- Landing Gear
- Environmental Control Systems
- Electrical Systems



Services

- Materials Management & Spares
- Technical & Engineering Services
- Customer Support
- Internal
- Non-Production



Interiors

- Passenger Seats
- Cabin Systems
- Galley Inserts
- Interiors
- Cargo Systems



Propulsion

- Engines
- Struts
- Nacelles



Common Commodities

- Machined parts
- Sheet metal parts
- Assemblies
- Tubing
- Wiring
- Tooling
- Raw materials
- Standards



Boeing categories present opportunities across the corporation



Engine

- It represents around 25% of the cost of the Aircraft.
- A new engine development investment is over USD 1Bi.
- Engine must perform accordingly to the market segment requirements.
- Modern Powerplant encompasses high complexity technology and expertise.
- Long Term development.
- It helps to sell the aircraft.
- Greener: less fuel consumption, less noise, less maintenance cost.
- Customer support through the life of the Aircraft accordingly to the market standards.



Market Information

GE's Jet Engine Business Continues Its Dominant Run

GE and its CFM joint venture reeled in tens of billions of dollars of orders in the first two days of the 2019 Paris Air Show.



 Adam Levine-Weinberg (TMFGemHunter)
 Jun 19, 2019 at 8:24AM
 [Author Bio](#)

While **General Electric** ([NYSE:GE](#)) has struggled mightily over the past two years, its jet engine business has been a [steady source of strength](#). Last year, GE Aviation surpassed the company's troubled power segment to become the conglomerate's largest division, with annual revenue of more than \$30 billion and an enviable 21.2% operating margin.

GE Aviation has been reporting strong revenue growth in recent years, due to the rapid growth of commercial aviation and the company's dominant market share. (GE and its CFM joint venture with **Safran** ([OTC:SAFRY](#)) account for about two-thirds of the commercial jet engines in service around the world today.)

At this week's Paris Air Show, GE Aviation paved the way for its strong growth to continue, logging numerous engine orders -- including one huge victory.

CFM lands a massive conquest order

CFM has an exclusive contract for its LEAP engines to power **Boeing's** ([NYSE:BA](#)) 737 MAX family jets. That exclusivity gives CFM a big share of the narrow-body jet engine market by default. However, the LEAP-1A engine is also an option for **Airbus'** ([OTC:EADSY](#)) popular A320neo family of jets, competing with a geared turbofan (GTF) offering from **United Technologies** subsidiary Pratt & Whitney.

While Pratt & Whitney's engine is slightly more fuel-efficient than the LEAP-1A, CFM has still managed to win a majority of the Airbus business. The GTF engine has suffered [a string of reliability issues](#), reducing its attractiveness.

MOTLEY FOOL RETURNS

	Stock Advisor	S&P 500
5 Years	52% ▲	36% ▲
17+ years	336% ▲	93% ▲

Stock Advisor launched in February of 2002. Returns as of 11/14/2019.

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STOCKS



General Electric
[NYSE:GE](#)



Engine

→ ↻ 🏠 🔒 <https://www.globenewswire.com/news-release/2020/05/25/2038178/0/en/Aircraft-Engine-Market-Size-to-Reach-USD-97-12-Billion-by-2026-Integration-of-Hi-tech-Systems-in-Aircraft-to-Propel-Market-states-Fortune-Business-Insights.html> 📖 ☆ ⋮ 📄 📧



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Aircraft Engine Market Size to Reach USD 97.12 Billion by 2026; Integration of Hi-tech Systems in Aircraft to Propel Market, states Fortune Business Insights™

Key players covered are CFM International SA, General Electric Co, International Aero Engines AG, MTU Aero Engines AG, Rolls-Royce Holdings Plc, Safran SA, Textron, Inc, United Technologies Corporation and more players profiled in aircraft engine market research report

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May 25, 2020 | 1:05 ET | Source: Fortune Business Insights

Pune, May 25, 2020 (GLOBE NEWSWIRE) – The global **aircraft engine market** size is predicted to reach **USD 97.12 billion by 2026**, exhibiting a **CAGR of 4.16%** during the forecast period. The introduction of fuel-efficient and cost-effective engines will bolster healthy growth of the market during the forecast period, states Fortune Business Insights in a report, titled *“Aircraft Engine Market Size, Share & Industry Analysis, By Engine Type (Turboprop, Turboshaft, Turbofan, Piston Engine), By Technology (Conventional Engine and Electric/Hybrid Engine), By End-user (Commercial, Military, and General Aviation), By Component (Compressor, Turbine, Gear Box, Exhaust Nozzle, Fuel System, and Others), and Regional Forecast 2018-2026”* the market size stood at USD 70.10 billion in 2018. The growing technological advancements in aircraft engines will bode well for the market.

Global COVID-19 Impact on Aircraft Engine Industry:

The emergence of COVID-19 has brought the world to a standstill. We understand that this health crisis has brought an unprecedented impact on businesses across industries. However, this too shall pass. Rising support from governments and several companies can help in the fight against this highly contagious disease. There are some industries that are struggling and some are thriving. Overall, almost every sector is anticipated to be impacted by the pandemic.

We are taking continuous efforts to help your business sustain and grow during COVID-19 pandemics. Based on our experience and expertise, we will offer you an impact analysis of coronavirus outbreak across industries to help you prepare for the future.

To Get The Short-Term and Long-Term Impact of COVID-19 on this Market,

Please Visit:

<https://www.fortunebusinessinsights.com/enquiry/request-sample-pdf/aircraft-engine-market-101766>

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3. Before COVID-19

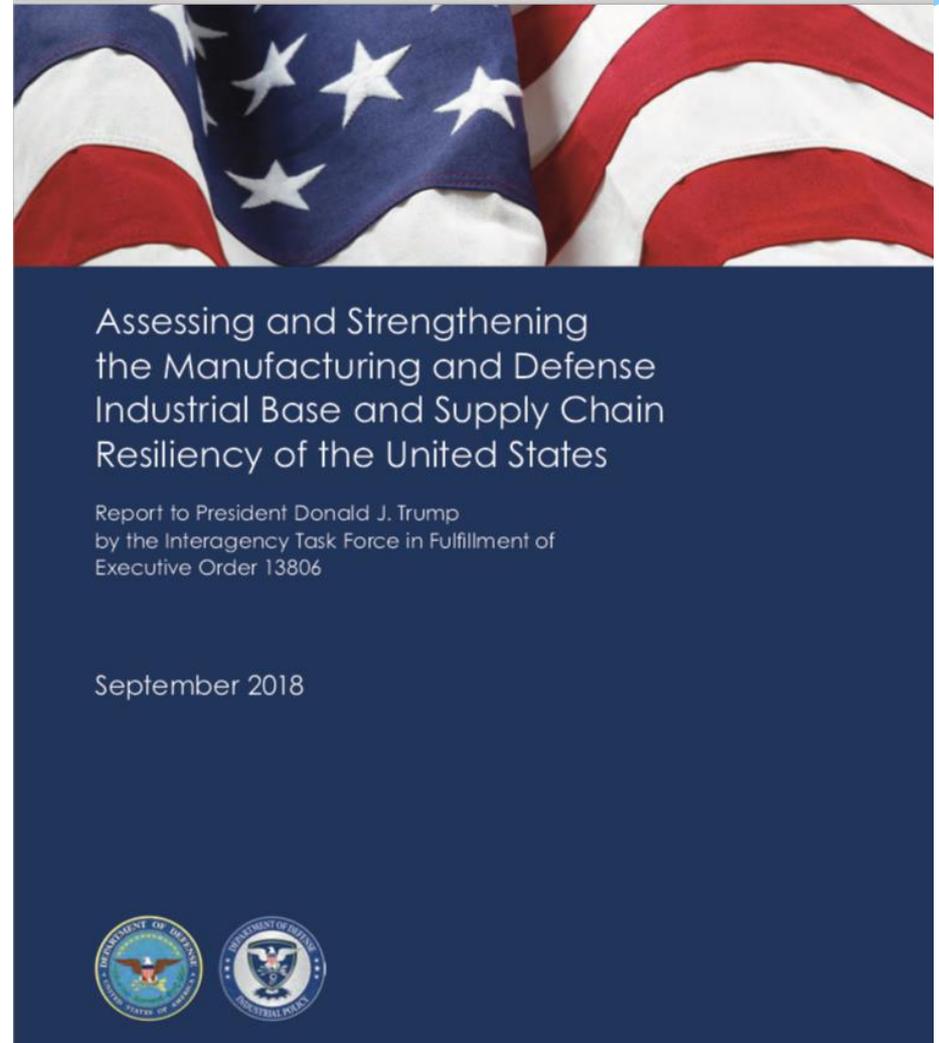


Challenges in the Supply Base

U.S. Manufacturing Base Capabilities and Capacity.

As a Risk to the Industrial Base:

1. Commercial Industry Volumes;
2. Shrinking Supply Chain;
3. Adequate Visibility Into Lower Tier;
4. Capitalization with Uncertain Demand.



1. Industry Volume (1/2)

Commercial Aircraft

- In 2018, the global aerospace industry recuperated and experienced a solid year as passenger travel demand strengthened;
- The industry is expected to continue its growth trajectory in 2019 led by growing commercial aircraft production backlog remains at an all-time high as demand for next-generation, fuel-efficient aircraft continues to surge with the rise in oil prices;
- The commercial Aircraft order backlog is at its peak of more than 14,000 with about 38,000 aircraft expected to be produced globally over the next 20 years.

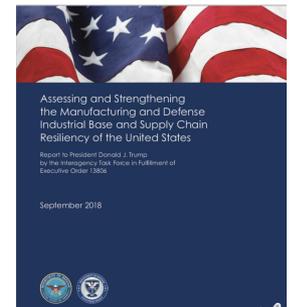


1. Industry Volume (2/2)

Commercial Aircraft

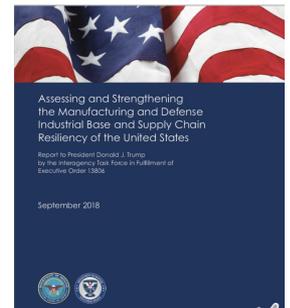
Japan

- Japan's passenger traffic growth over the next 20 years is expected to be sluggish at about 3.2%, much below the Asia Pacific passenger growth of 5.3%.
- The country's domestic market is dominated by two major Japanese airlines, but their market share has decreased over the past decade.
- The recent surge in low-cost carriers (LCCs) is likely to drive commercial aircraft demand in the future.
- Aiming to increase traffic from the high-growth Asia Pacific region by collaboration with other airlines.



2. Shrinking Supply Chain

- With the aircraft backlog at its peak, manufacturers are expected to ramp up production rates, hence, driving growth in the sector. However, manufacturers could experience supply chain interruptions as some suppliers may struggle to increase production to keep up with the growing backlog.
- OEMs continued to put pressure on suppliers to reduce costs and increase production rates, which, in turn, pushed many suppliers to consolidate for scale, cost-effectiveness, and higher negotiating power.
- This trend is likely to continue as OEMs focus on expanding their margins.
- Megadeals as bigger players focus on vertical integration.



3. Adequate Visibility into Lower Tier

- Setting up Suppliers for Success:
 - building a collaborative environment based on trust.
 - evaluating alternatives for supplier's strategic partnership.
 - respecting lead time to place a PO.
 - practicing a real root cause analysis.
- Implementing Risk Assessment to manage potential supply chain risk.
- Focus on Risk Reduction & Reward Performance.
- Strong Supplier Performance Management by a pre-agreed KPIs Definition.



4. Capitalization with Uncertain Demand

- Billions of USD in investment.
- Long Term Development.
- Additional impacts in the schedule or cost.





4. AFTER COVID-19

2020





Aerospace Impact after COVID-19

- The dramatic drop in demand for passenger air transport due to the COVID-19 pandemic and containment measures is threatening the viability of many firms in both the air transport sector and the rest of the aviation industry, with many jobs at stake:
 - Uncertainty.
 - Social Distance.
 - Lockdowns.
 - Business Volume Reduction.
 - Unemployment.
 - Bankruptcy.



Supply Chain Management

Aerospace Industry

Commercial Aircraft



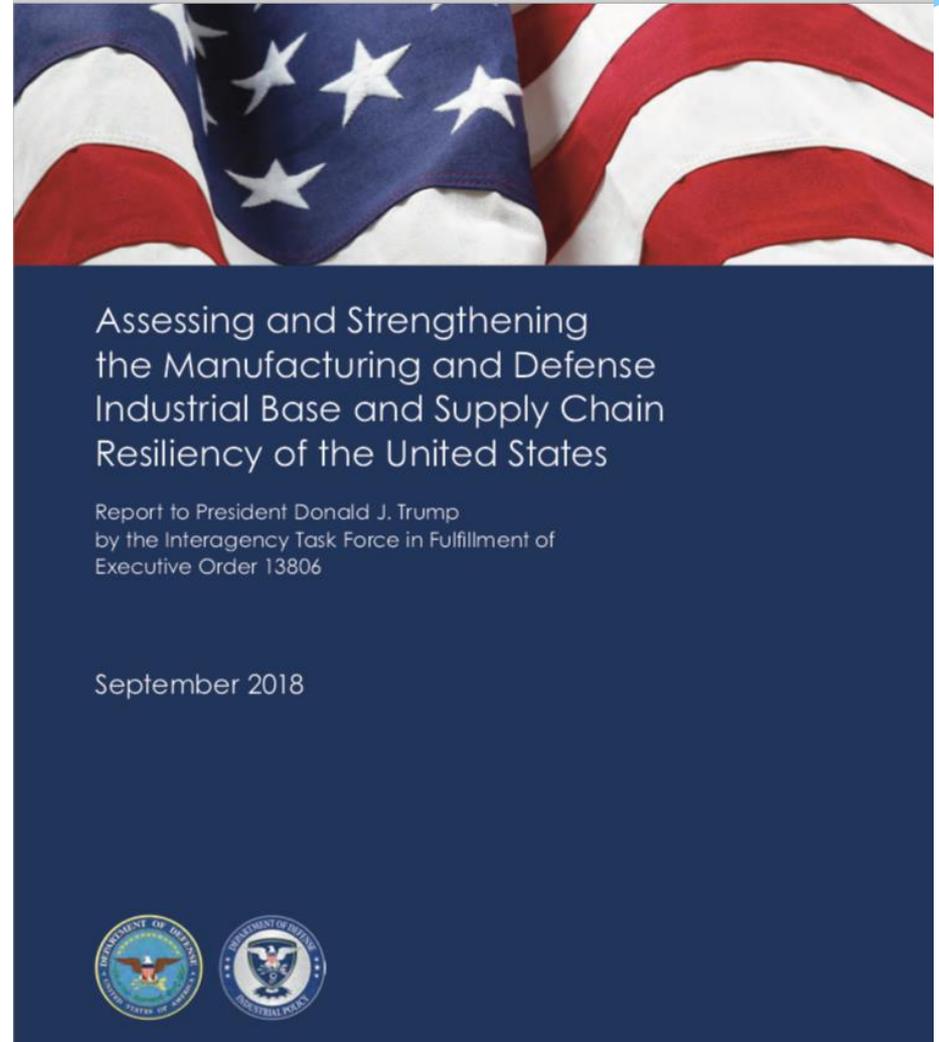
Challenges in the Supply Base



U.S. Manufacturing Base Capabilities and Capacity.

As a Risk to the Industrial Base:

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New Normal



https://www.rolandberger.com/ja/Insights/Publications/How-the-Covid-19-crisis-is-expected-to-impact-the-aerospace-industry.html

Roland
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最新の知見

会社概要

採用情報



> Jobs

THE AEROSPACE INDUSTRY

2020年6月10日

By [Manfred Hader](#), [Robert Thomson](#) and [Holger Lipowsky](#)

Latest update: The coronavirus pushes the airline and aerospace industry into the era of "new normal"

GLOBAL TOPIC

[Managing the Coronavirus Crisis](#)

With its rapid global spread, massive death toll and resultant lockdowns and border closures, Covid-19 has devastated demand for travel globally. Indeed, Covid-19 is a "perfect storm" for the travel sector due to a combination of changes in passenger behaviour, government restrictions on travel, and the broad economic downturn which it seems to have triggered globally.

In our [April 2020 study on Covid-19's impact on aerospace](#), we elaborated on "How we will need to rethink the Aerospace industry", formulating 3 key scenarios for the industry through the crisis and how it may recover.



New Normal Inputs



https://www.rolandberger.com/ja/Insights/Publications/How-the-Covid-19-crisis-is-expected-to-impact-the-aerospace-industry.html



専門知識

最新の知見

会社概要

採用情報



> Jobs

What can aerospace suppliers do to thrive through the crisis?

A clear playbook to master the crisis has emerged – Preparing for the "new normal" is the next priority

I. Crisis Management

Immediate future

- Operational measure: Establish a crisis mgmt. taskforce to manage/monitor crisis response
- Operational measure: Implement hygiene measures, ramp down operations, secure continuity of critical functions
- Operational measure: Secure and monitor ongoing liquidity position
- Operational measure: Monitor health of critical suppliers, and provide necessary support
- Operational measure: Compress spend without destroying the basis to recover
- Operational measure: Ensure commercial continuity and link with the customer

LARGELY DONE

Operational measure Strategic measure

Source Roland Berger

II. Transition

Rest of 2020 & 2021

- Essential focus area now: Revisit and revise corporate strategy to fit with the 'new normal'
- Operational measure: Realign production and supply chain planning in line with revised demand signal
- Operational measure: Begin shifting operations and resources back to new normal mode
- Operational measure: Secure operational ramp-up in a timely and cost-controlled manner in both MAKE and BUY
- Operational measure: Implement "No Regret" resizing and efficiency measures

→ Prepare efficient re-start after crisis

III. "New normal"

2021+

- Strategic measure: Review supply chain strategy and configuration to fit with the defined corporate strategy
- Strategic measure: Assess and revise operating model in line with changes in strategy
- Operational measure: Monitor health and longevity of business & supply chain operations
- Operational measure: Optimise existing footprint in line with changes in industry demand/landscape
- Operational measure: Implement restructuring and operations efficiency programmes

→ Emerge stronger out of the crisis



✓ Review
✓ Revise

Over the past few weeks and months, most suppliers have managed to secure liquidity, manage their workforce, and undergo an effective production ramp-down.

Next, while companies must of course continue managing the key operational basics – keeping an eye on cash flow, tracking demand signals (such as airline



Revise & Review



<https://www.pwc.com/us/en/library/covid-19/coronavirus-impacts-aerospace-and-defense.html>



Operations and supply chain

Issues:

Commercial aircraft producers should expect continued weakening links in their supply chain, as some vendors and suppliers will likely face operational or financial struggles of their own. Brace for continued supply chain bottlenecks, both nationally and internationally.

Because of existing regulations and controls, US defense companies can expect their supply chains to be less vulnerable to global disruptions compared to producers of commercial aircraft.

As in previous downturns, the industry will likely move quickly to cut discretionary and capital spending to support operations. A key question for all A&D companies will be: Do you have the financial reserves to successfully ride out — or even capitalize on — the tumult in the industry?

Steps to consider:

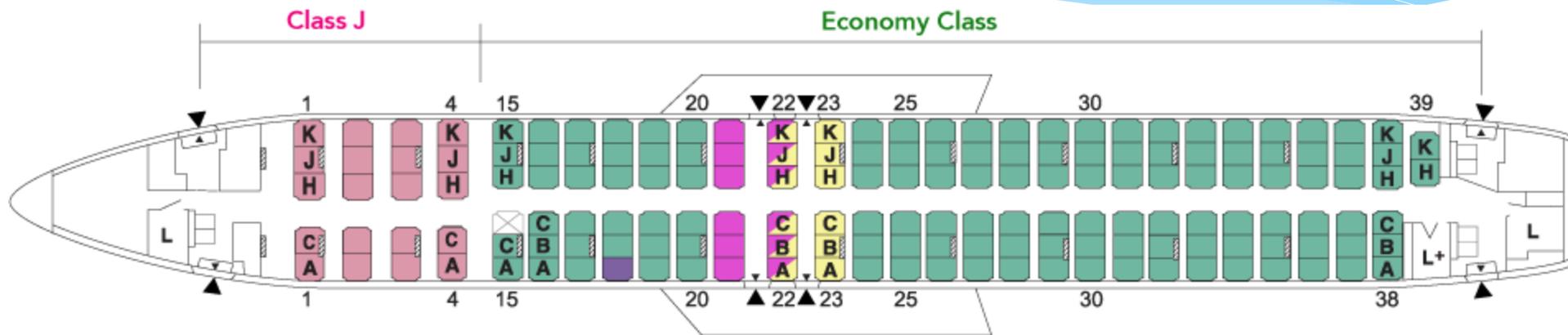
- Gain a keener, more real-time situational awareness of your supply chains. Assess all links in your supply chain and identify potentially weak ones — especially in geographies now affected and those that are prone to be impacted by COVID-19.
- Prepare for supply chain pivots that could mean identifying alternative suppliers.
- Improve your supply chain visibility and lines of communication to help detect and remediate potential problems early. If you don't have digital supply chain transparency solutions in place, create greater transparency through daily self-reporting with all critical suppliers.
- Keep an open and regular dialogue with your suppliers and customers on how they're being impacted by COVID-19 and how their experiences could affect your business.
- Seek alternatives that allow you to preserve relationships, co-create solutions and sustain both businesses. It's possible that a third-party provider may prove to be a critical point of failure in creating a response to COVID-19.



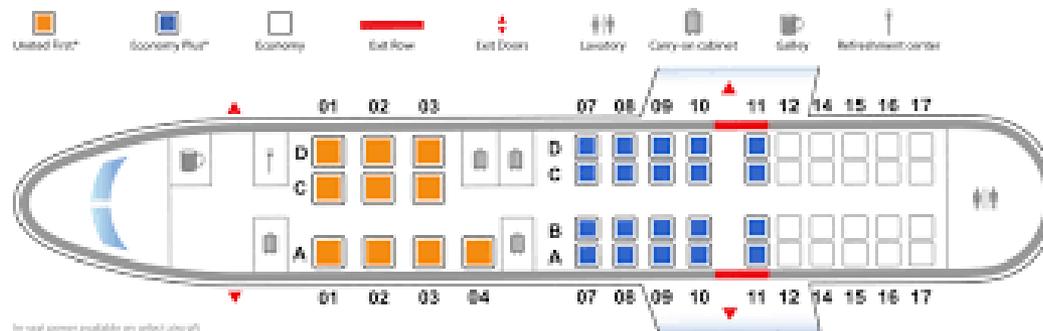
“New Normal”



[5] Boeing 737-800



[6] Bombardier CRJ 900



Source:

[5] www.being.com

[6] www.bombardier.com



“New Normal” (2/2)



Social Distance



Implications:

- Cost Increase.
- New certification.
- Evacuation procedure.
- Extra weight.
- Less Passengers.



5. Opportunity or Threat?



STOP **COVID** **19**



Aerospace Industry

Commercial Aircraft

Connectivity and mobility are essential to humanity, this unprecedented crisis calls for a stronger action in support of the aviation sector's transformation than there has been to date.



Aerospace Industry

Commercial Aircraft

Besides COVID-19:

- The aviation industry's contribution to economic growth is well recognized.
- While already subject to intense and increasing global competition, there is now an urgent need to address the developing climate emergency.
- To avoid jeopardizing its role and foregoing the benefits to citizens, the aviation sector has a duty to act:
 - A new breed of aircraft with entirely new configurations allowing significantly lower environmental impact will be required strongly amplifies the issue of aviation's emissions and its impact on the environment and climate.
 - Research indicates that of aviation's emissions, CO₂ and NO_x form the sector's main contributors to global warming, even if other emissions species contribute as well.



First Things, first...

Product Strategy



Segment Defined



Budget



Concept



Conception Phase



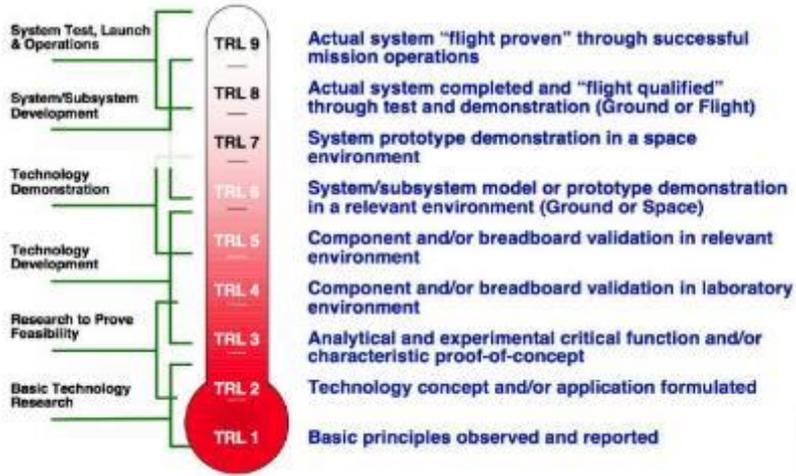
Project Study



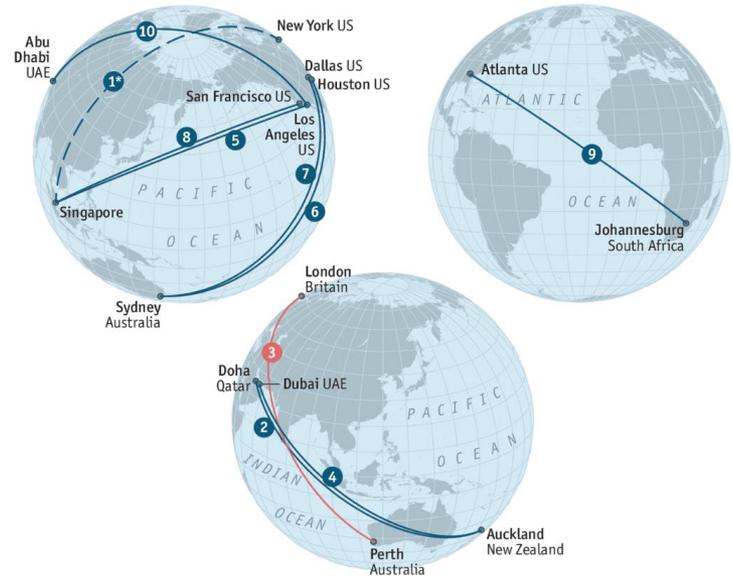
Project Concept

Product Strategy

NASA/DOD Technology Readiness Level



Segment



Budget



Rank	Route	Airline	Distance (km)
1	Singapore-New York*	Singapore Airlines	15,345
2	Doha-Auckland	Qatar Airways	14,556
3	London-Perth	Qantas Airways	14,500
4	Dubai-Auckland	Emirates	14,201
5	Singapore-Los Angeles	United Airlines	14,114
6	Sydney-Houston	United Airlines	13,993
7	Sydney-Dallas	Qantas Airways	13,805
8	Singapore-San Francisco	United/Singapore	13,593
9	Atlanta-Johannesburg	Delta Air Lines	13,581
10	Abu Dhabi-Los Angeles	Ethihad Airways	13,502

Sources: FlightAware; OAG Economist.com

*Route planned for later this year; a similar route ran from 2004 to 2013



6. Strategies



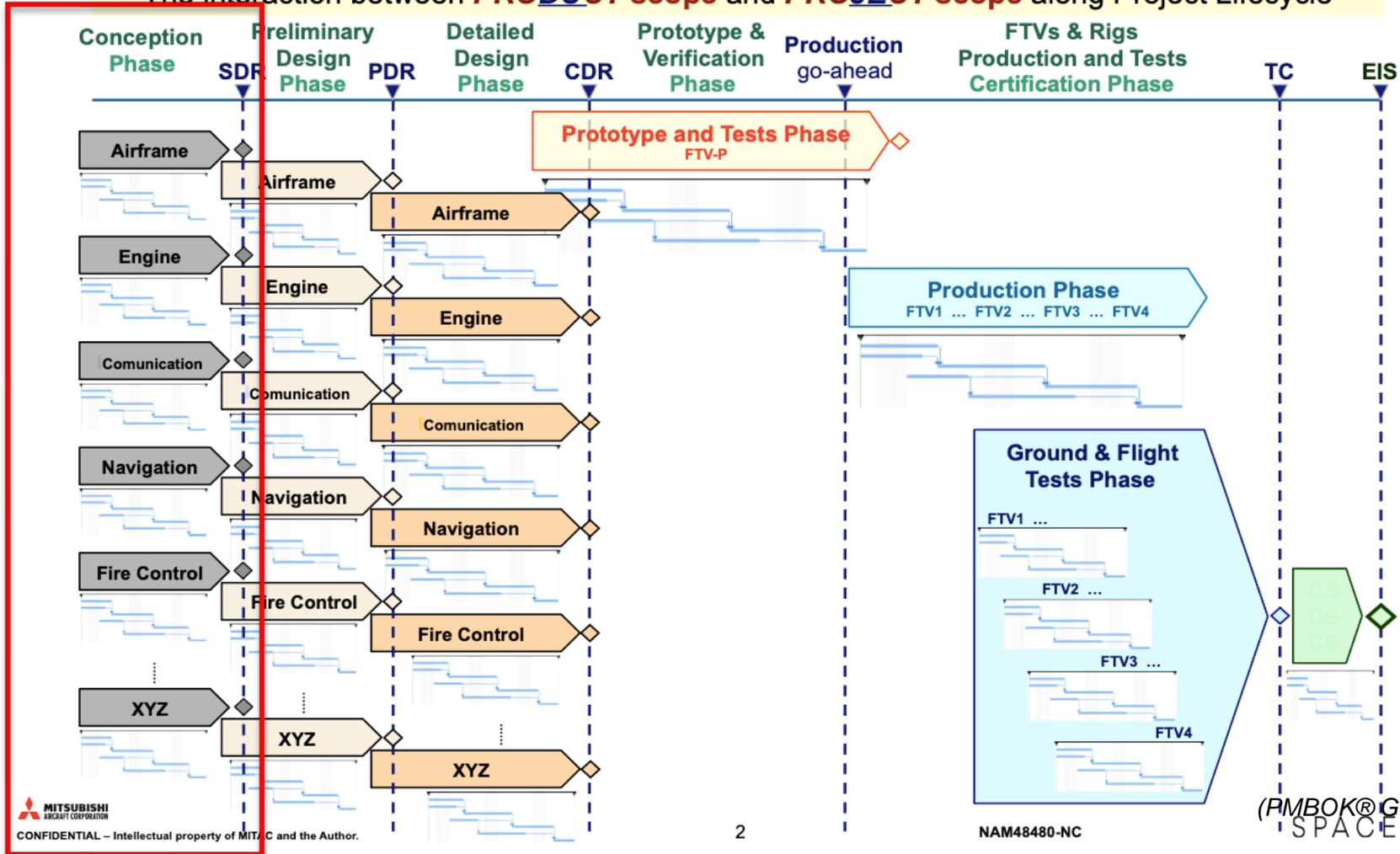
Strategy 1: Supply Chain Management

Multiproject Management (Program and Portfolio)

Multiproject Scheduling for Aircraft System Development Integration

The interaction between **PRODUCT** scope and **PROJECT** scope along Project Lifecycle

SCM ENGAGEMENT



Supply Chain Management

- Deals with ways to effectively use information and communication technologies to support supply chain, which can lead **to benefits for all participants** in the supply chain.
- Aims to build a **competitive infrastructure**, ensuring synchronization of supply with demand and performance measurement.
- It is an action based on the **integration of organizational units** that make up the supply chain and coordinating material, information and financial flows in order to meet requirements from the perspective of end users throughout the supply chain and increase the competitiveness of the supply chain.
- Every step of the supply chain there is a requirement for **Traceability and Compliance**.





Value Proposition

- ✓ It should explain what the business will offer, who will buy it and why.
- ✓ Is it Viable?
- ✓ Is it Sustainable?

Get Board Approval



Defining SCM Scope in the WBS

(Work Breakdown Structure)

When the project is initiated, the project team will focus on defining the overall scope for the product and project in WBS.

The project team must develop a plan to deliver the product and its deliverables.

Then proceed through phases to execute the plan within that scope.[1]



Strategy 2: Collaboration in the Selection Process



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YEAR 0 CONCEPT
M0
▲ 1. Set Based Design. 2. Technologies Defined. 3. Bidder's Defined. 4. NDA Signed. 5. Contract & Exhibits concluded. 6. Technical MOA Concluded. 7. Commerical MOA Concluded.

During Conception Studies:

- * Invite Bidders for a Collaborative Study for a certain period of time.
- * Best Technical TRL Solution.
- * Market Standard Terms and Conditions.
- * Bidder's adherence to the business model (**PMD**) and contract (**SCM**);
- * Bidder's performance during collaborative phase.

Outcome:

- * The final deliverable from the team is a contract negotiated ***** NOT SIGNED *****, which includes a detailed specification with associated drawings that clearly define all characteristics, requirements and systems.

Collaboration During Selection Process

- * A **collaboration** involves cooperation in which parties **are not** necessarily **bound contractually**.
- * There is a relationship, but it is usually less formal than **a binding, legal contract** and responsibilities may not be shared equally.
- * A collaboration exists when several people pool their common interests, assets and professional skills to promote broader interests for the common benefit.
- * The most important thing to remember is:

Organizations don't collaborate – **people** collaborate.



Strategy 3: Contract Management Process

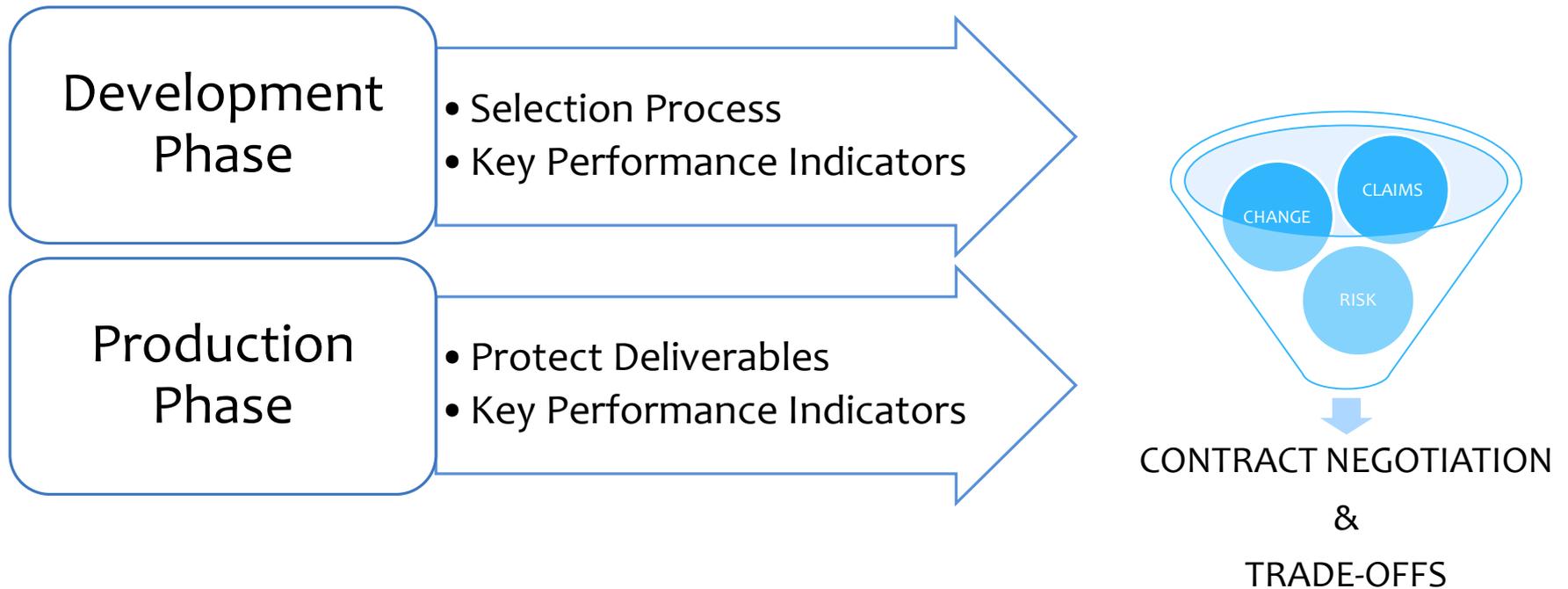


Contract as Strategy

- Maximize results following Market Standards.
- Must follow the premises and Operational Directives from the Business Plan.
- Product Strategy as innovative solution.
- Collaborative Selection Process.
- No obligation to launch the program, minimum sales or schedule;
- Avoid providing Exclusivity:
 - Funding return conditions, in case it happens.



Supply Chain Management Procurement



Business Plan

SCM is the face to the Supplier.
SCM represents all departments inside a company.



*Develop a **collaborative** network to create better solutions for the Aircraft and services, explore new opportunities and so increase business margins to all stakeholders while improving customer results with enhanced performance and lower operating costs.



SCM Role in the Business Plan

1. Executive Summary: Commercial Aviation Marketing, Product Strategy and Segmentation, Investment, etc;
2. Business Strategy: Product Development, Manufacturing & Quality, SUPPLY CHAIN, Aftermarket and Sales;
3. Financial Analysis: Volume, Recurring and Non-Recurring Costs, Cash Flow, Financial Indicators/Indexes, Sensitive Analysis;
4. Company Impacts: Image, other business, Human Capital, Infra-Structure, Profit & Value;
5. Risk Assessment: Market, Product, Schedule, SCM, Aftermarket, Manufacture, Costs;



Strategy 4: Escalation Formula (1/2)

Financial Hedge Strategy

- ✓ BLS indexes.
- ✓ Escalation Formula.
- ✓ Business Plan Approval.

An official website of the United States government [Here is how you know](#) ▼ United States Department of Labor

U.S. BUREAU OF LABOR STATISTICS

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Announcements

Bureau of Labor Statistics Security Statement [Full Story »](#)

BLS COVID-19 Questions and Answers Updated January 12, 2021 [Full Story »](#)

JAN 12 **Job openings and hires little changed in November; total separations increase**
Job openings were little changed at 6.5 million on the last business day of November. Total separations increased to 5.4 million; hires were little changed at 6.0 million.
[HTML](#) | [PDF](#) | [RSS](#) | [Charts](#)

01/08/2021 **Payroll employment declines by 140,000 in December; unemployment rate unchanged at 6.7%**

01/05/2021 **Nov. jobless rates up over the year in 386 of 389 metro areas; payroll jobs down in 242**

12/22/2020 **Civilian workers spend 4.25 hours of the workday standing in 2020**

12/18/2020 **Nov. jobless rates down in 25 states, up in 7; payroll jobs up in 17 states, down in 3**

[All Releases »](#)

BEYOND THE NUMBERS



A look at employer-provided bonuses

This article examines the types of businesses that provide nonproduction bonuses and which employees have access to them. [read more »](#)

1 2 3 4 5

LATEST NUMBERS

Consumer Price Index (CPI): +0.2% in Nov 2020

Unemployment Rate: 6.7% in Dec 2020

Payroll Employment: -140,000(p) in Dec 2020

Average Hourly Earnings: +\$0.23(p) in Dec 2020

Producer Price Index - Final Demand: +0.1%(p) in Nov 2020

Employment Cost Index (ECI): +0.5% in 3rd Qtr of 2020

Productivity: +4.6%(r) in 3rd Qtr of 2020

U.S. Import Price Index:

GEOGRAPHIC INFORMATION »

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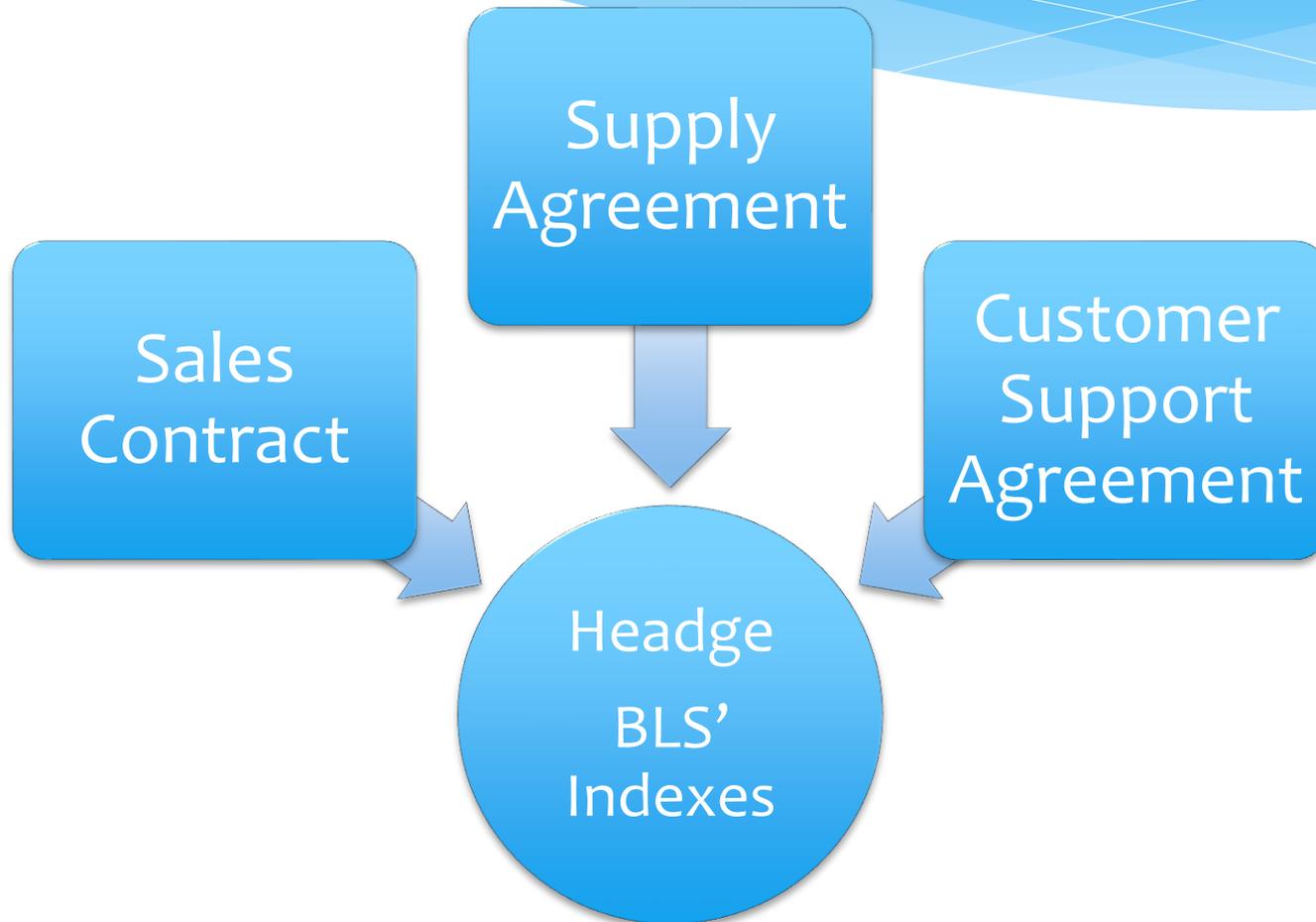
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Escalation Formula as Strategy (2/2)



Strategy 5 Customer Support

It is a contract inside another contract.

- 24/7/365 Services.
- High system reliability and quick return to service.
- Material, services and support promptly and globally available.
- Easy to operate and maintain systems, with no demand for specialized resources.
- Comprehensive aircraft condition monitoring.



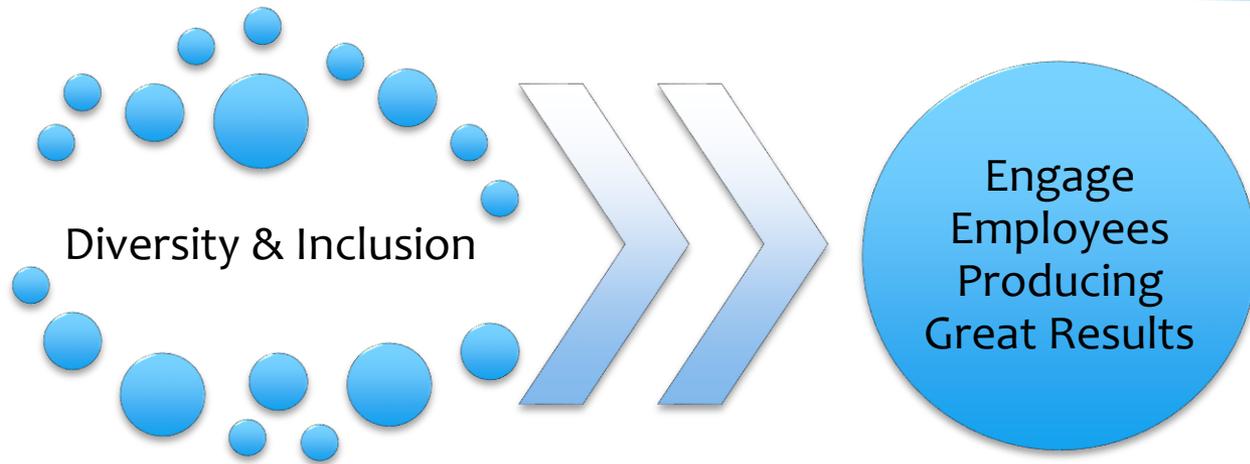
7. Industrial Base Workforce



Industrial Base Workforce Challenges 1/2

- Diminishing Trade Skills – (Negotiation).
- Growth & Market Forces Driving Broad Opportunities Across Industries.
- Retention Strategy.
- Attract & Retain a Quality Workforce with Changing Demands.
- Strong partnerships with Colleges and & Local High Schools.

Industrial Base Workforce Challenges 2/2



Treat your Employees
in a Way to make
them want to Stay

Being Valued and
Having Opportunity
to Grow.



THANK YOU!

