

ECI N95 Respirator Project

Manufacturing Reimagined: New Supply Chains

6 October 2020



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Presentation Goals

- Supply chain risk management
- N95 respirators and why we didn't make them 'yesterday'
- Lessons learned



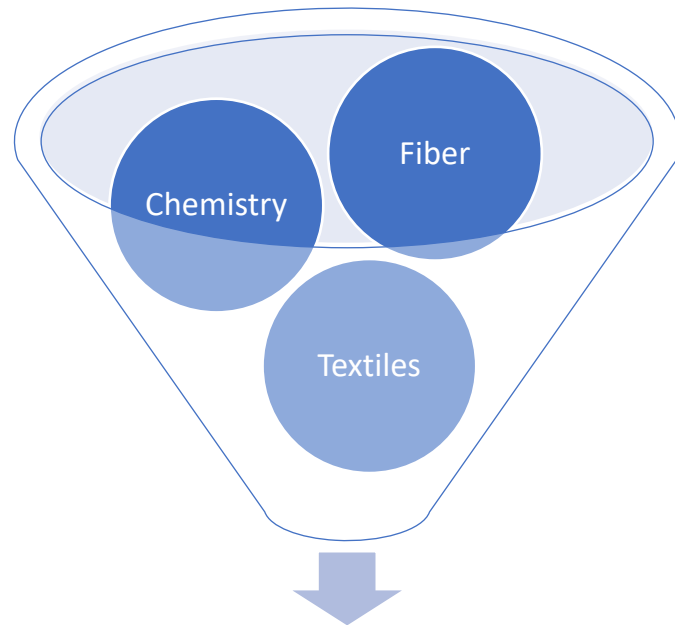
What is Supply Chain Risk Management?

Our Definition:

System to eliminate or minimize supply chain issues on product quality and customer impact.

Question:

How do these systems serve us during a pandemic?



Where we fit in the Supply Chain



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(Advanced Textiles)



Raw Materials



Finished Goods



N95 Respirator Production Startup

Project Goals to Complete Development of N95 Design

- ✓ Acquire domestically sourced specialty fiber
- ✓ R&D and production trials
- ✓ Acquire specialty equipment for 'tuning' electrostatic charge of filter
- ✓ Perform certified lab testing to evaluate filter efficiency and breathing resistance



What is an N95 Respirator?

- Filter which seals on face
- Filters 95% of particles at 0.3 micron
- Able to breathe comfortably
- FDA/NIOSH certified

Simple looking product...

...complex technology and manufacturing

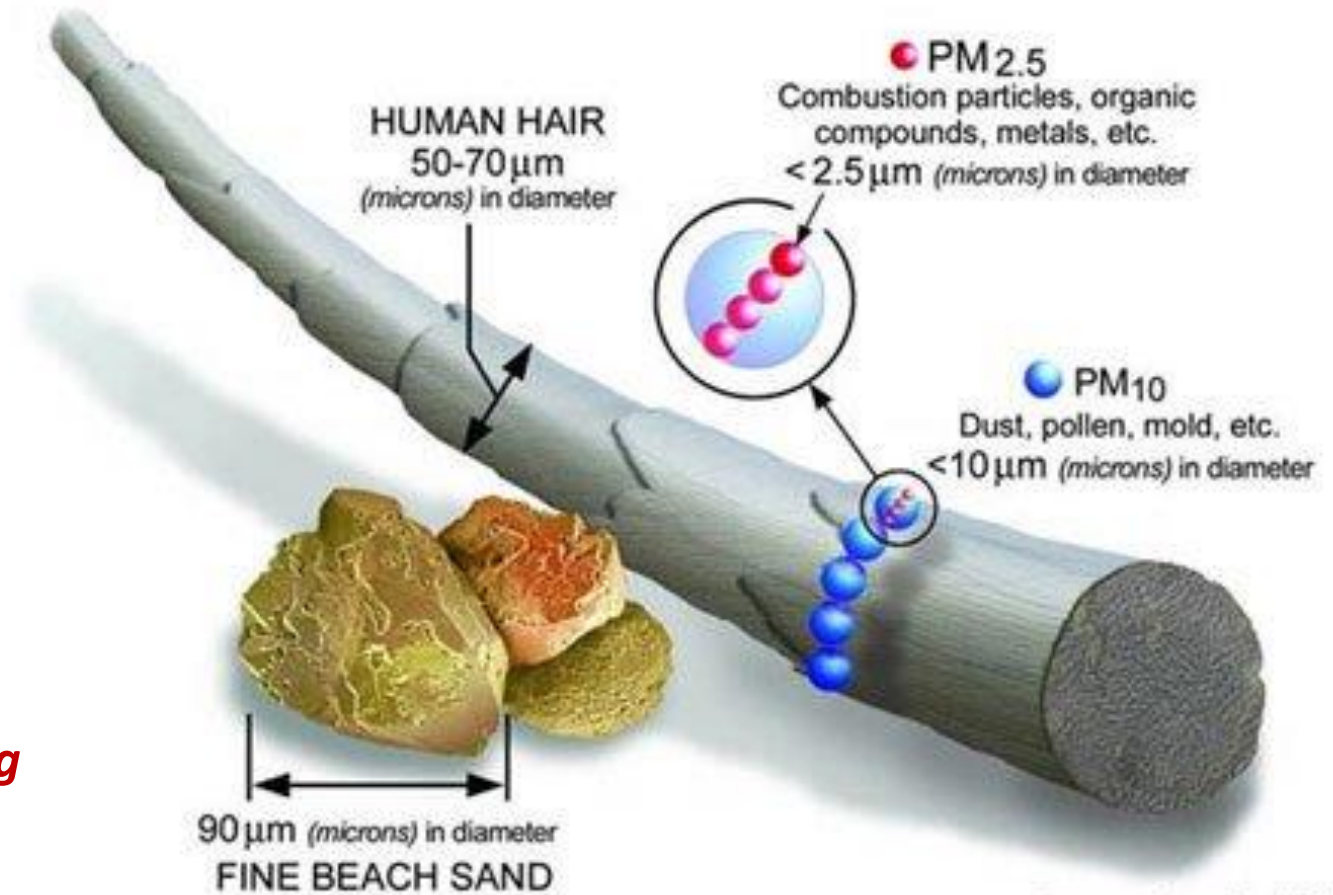
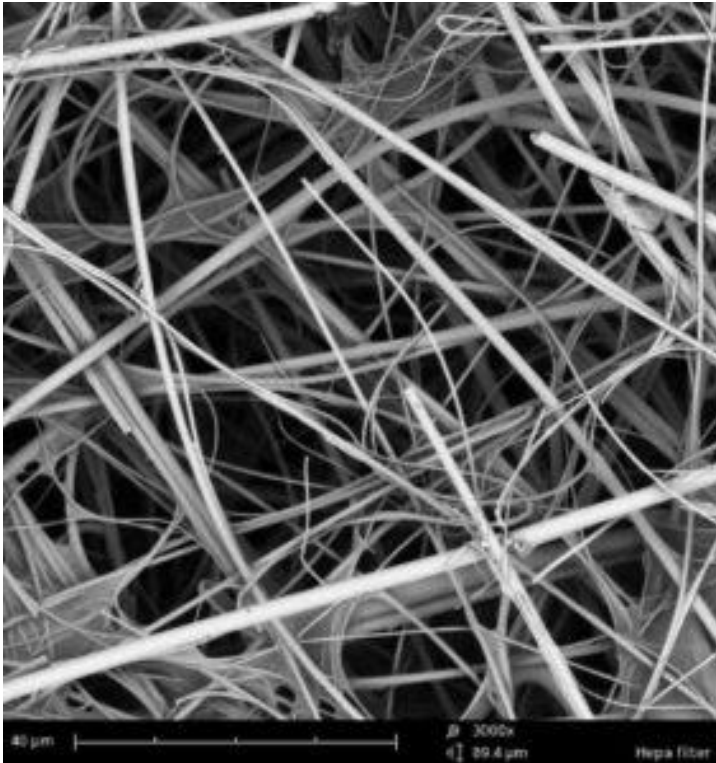


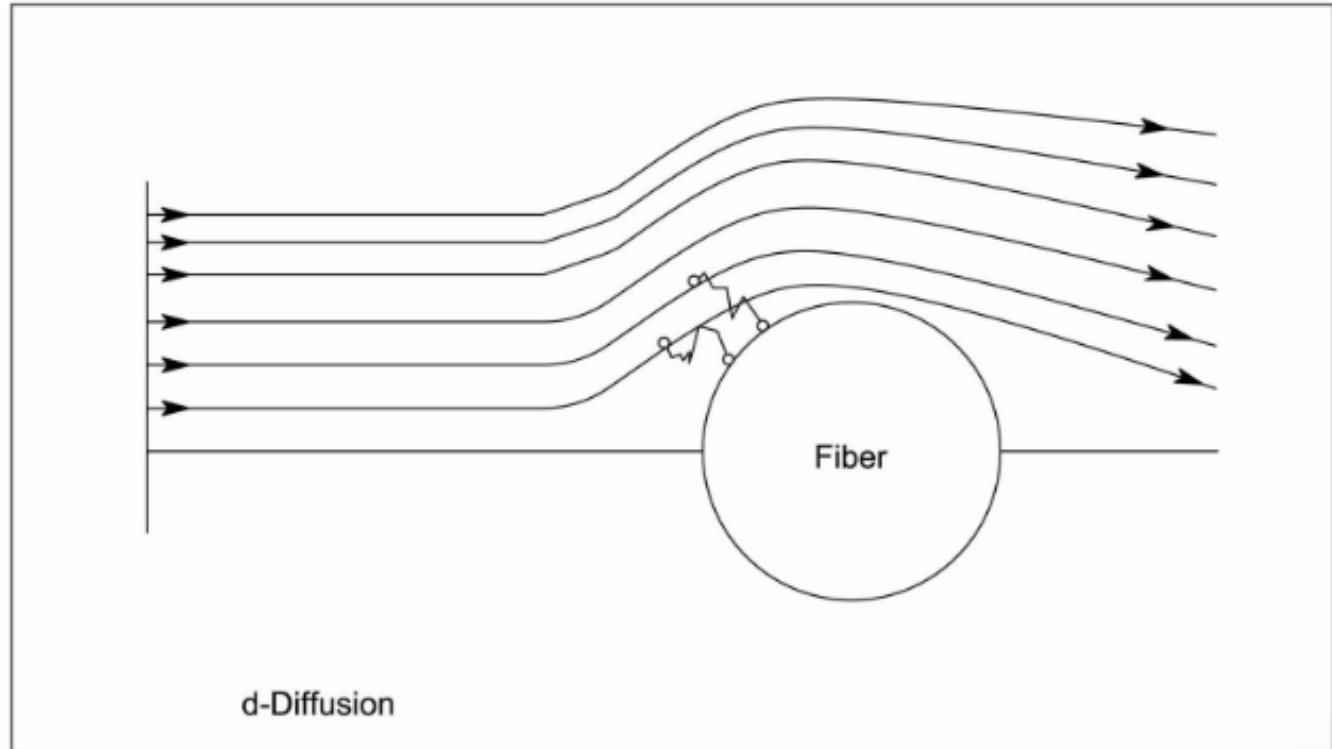
Image courtesy of the U.S. EPA



What do filters look like – how do they work?



HEPA Filter



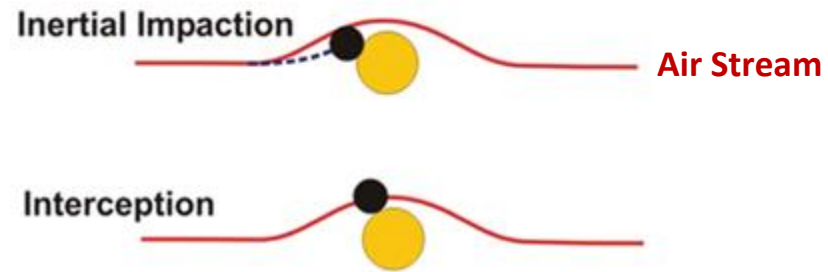
Air streamlines carrying particles



How to filter submicron particles (sarscov-2)

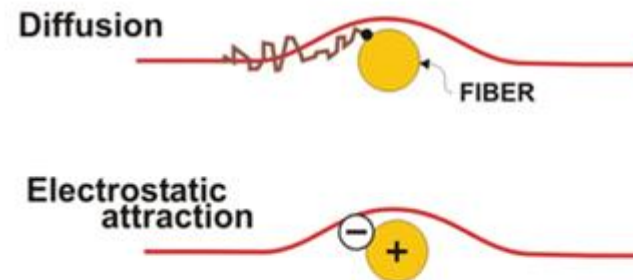
Large to Small Particles

(200 microns to 3 microns)



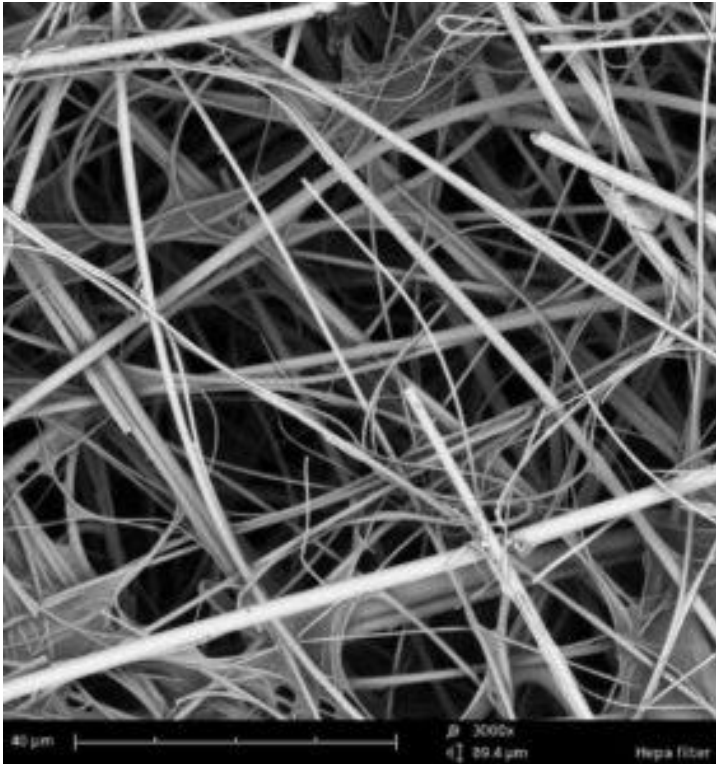
Submicron Particles

(< 1 micron)





Achieving balance between filtering and breathing

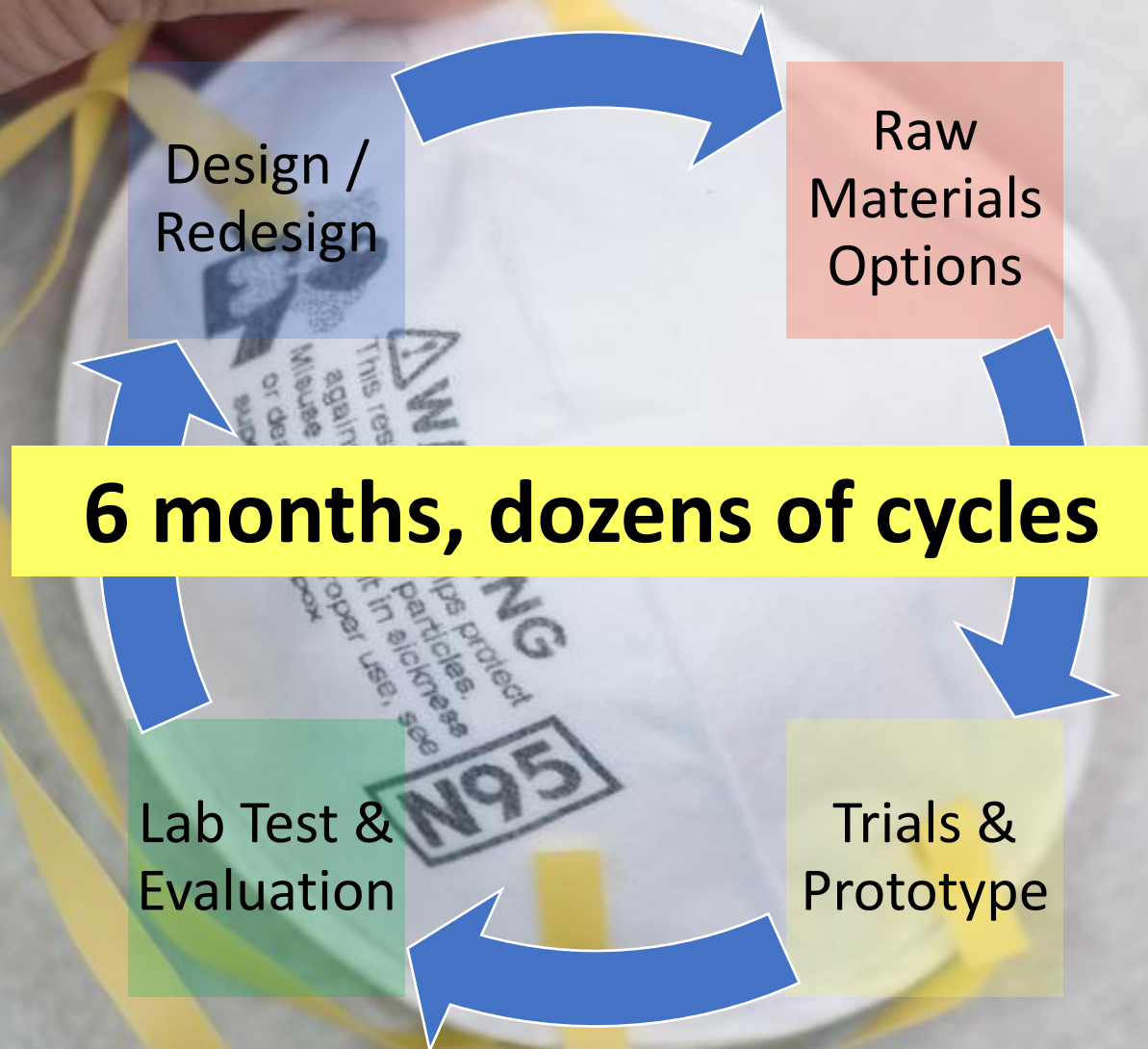


HEPA Filter



Electrostatic
attraction

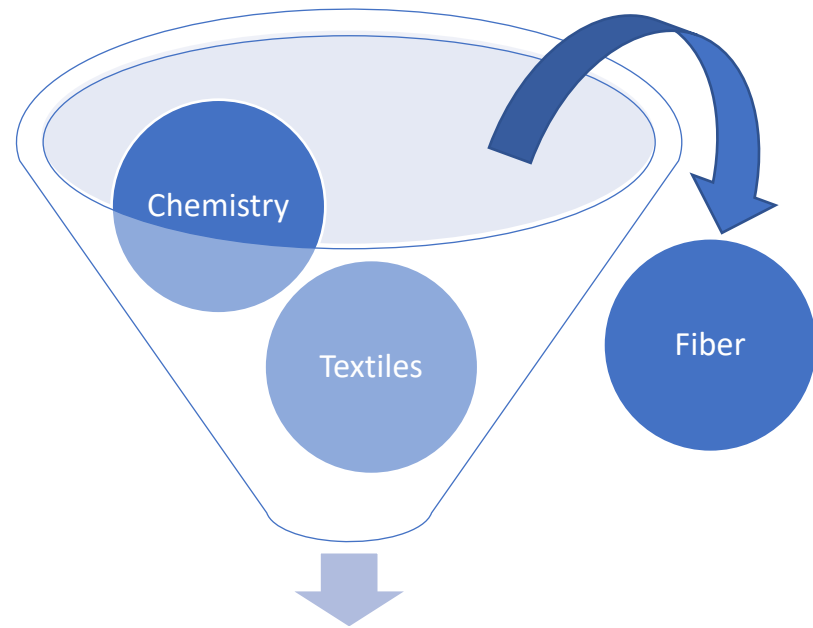




Development Cycle

- ✓ Identifying new raw material sources
- ✓ Supplier development time
- ✓ Interrupted shipping
- ✓ Purchase and installment of new equipment
- ✓ Manufacture of trial materials
- ✓ Prototype forming of mask
- ✓ Identification and evaluation of test labs
- ✓ Test lab lead times

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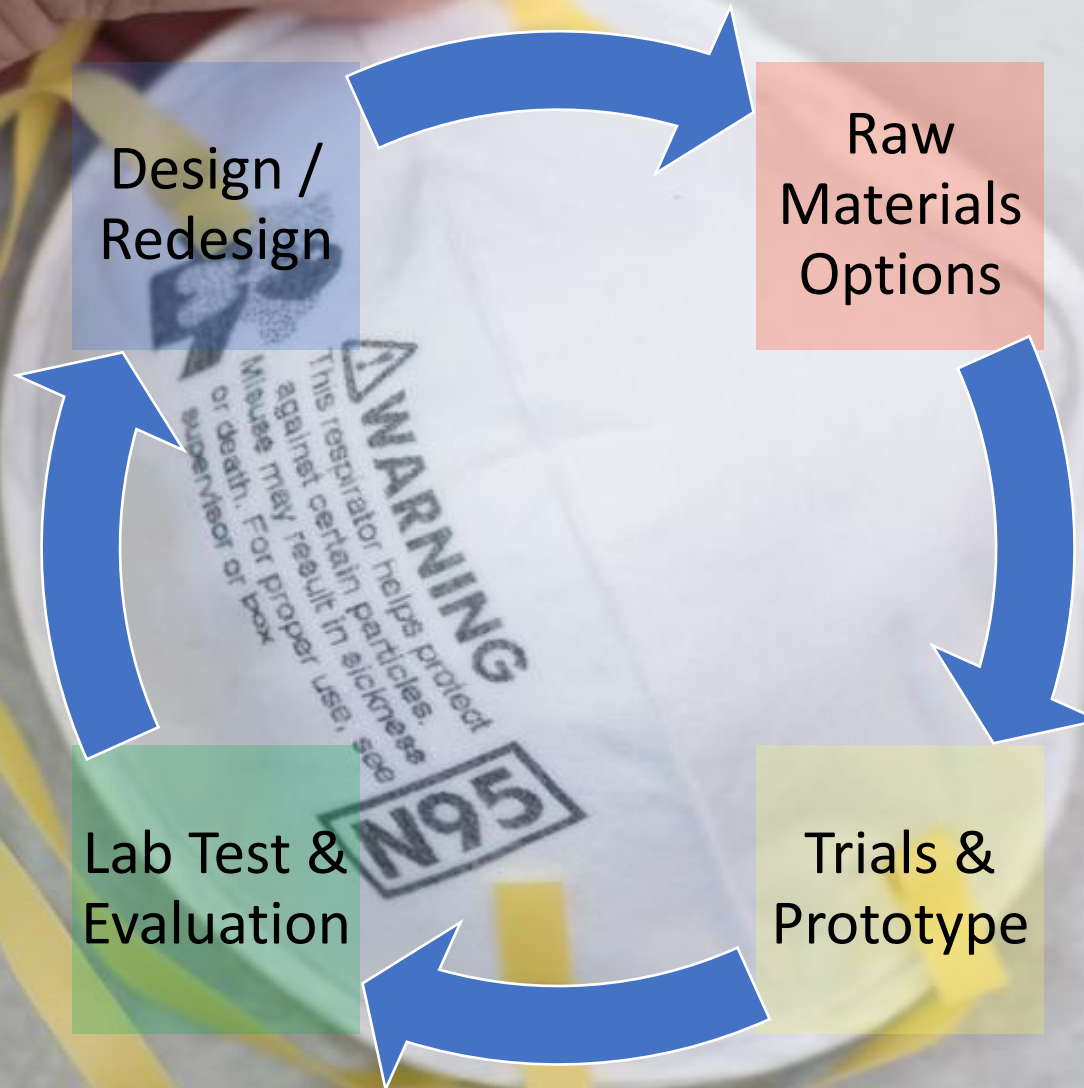
Raw Materials



Finished Goods



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***OUR* supplier's cycle**

- ✓ Identifying new raw material sources
- ✓ Supplier development time
- ✓ Interrupted shipping
- ✓ Purchase and installment of new equipment
- ✓ Manufacture of trial materials
- ✓ Prototype & lab feedback



Supply Chain Interruption: A disaster waiting to happen





Know your pain threshold

- What percentage of business, by product line, can your business afford to lose due to supply chain interruption?
- What products does your business produce that are potentially critical during a time of crisis?

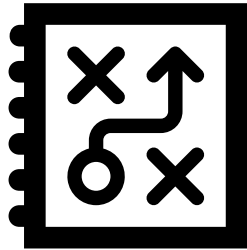




New Formula?

Establish Domestic Sources + Geographic Diversity

How this affects...



Businesses

- ✓ Minimizes trade and travel interruptions
- ✓ More robust domestic supply chain through long-term investment
- ✓ More protected from location specific natural disasters



Local/Domestic Economy

- ✓ Ability to sustain normal activity during crisis
- ✓ Improve readiness to increase production of critical items
- ✓ Job creation and technology/manufacturing ownership

~~Global Economy Model~~ → Global Hybrid Model



Thoughts on the NEW Global Economy

You cannot source from that which does not exist. *If you haven't invested in a domestic source it will not be available when you need it.*

Even seemingly simple products are born from complex manufacturing processes. *Manufacturing startups are complicated and timelines to commercialize products and source materials/equipment for the first time will cause significant delays.*

Foreign sourced products and subcomponents create vulnerability. *Instead, find a balance that meets your company's goals and responsibilities to create long-term stability.*



THANK YOU!



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