



# NORTH CAROLINA

Department of Transportation



## The Supply Chain for Economic Development

Dana Magliola  
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NCDOT Supply Chain SME  
September 14, 2021

# Introduction

## Dana Magliola

- Program Manager, Freight & Logistics, NCDOT Rail Division
- NCDOT Supply Chain SME
- Maritime, freight forwarding, applied research background
- *Connecting transportation strategy, planning and investment to commerce and industry*



*If you have questions, please type them into the chat and I'll keep an eye on it. We'll have time for questions at the end.*

# Objectives

- To strengthen the supply chain, freight, and logistics expertise and capabilities of the business development and industry recruiting professionals in the North Carolina Economic Development Association
- To introduce key supply chain concepts, current issues, best practices, trends and future developments in the sector

# Agenda

- Defining + illustrating the supply chain
- Making the economic development connections
- Understanding the economic impact of the supply chain
- The supply chain lexicon: buzzwords

Now, we all know about the supply chain →





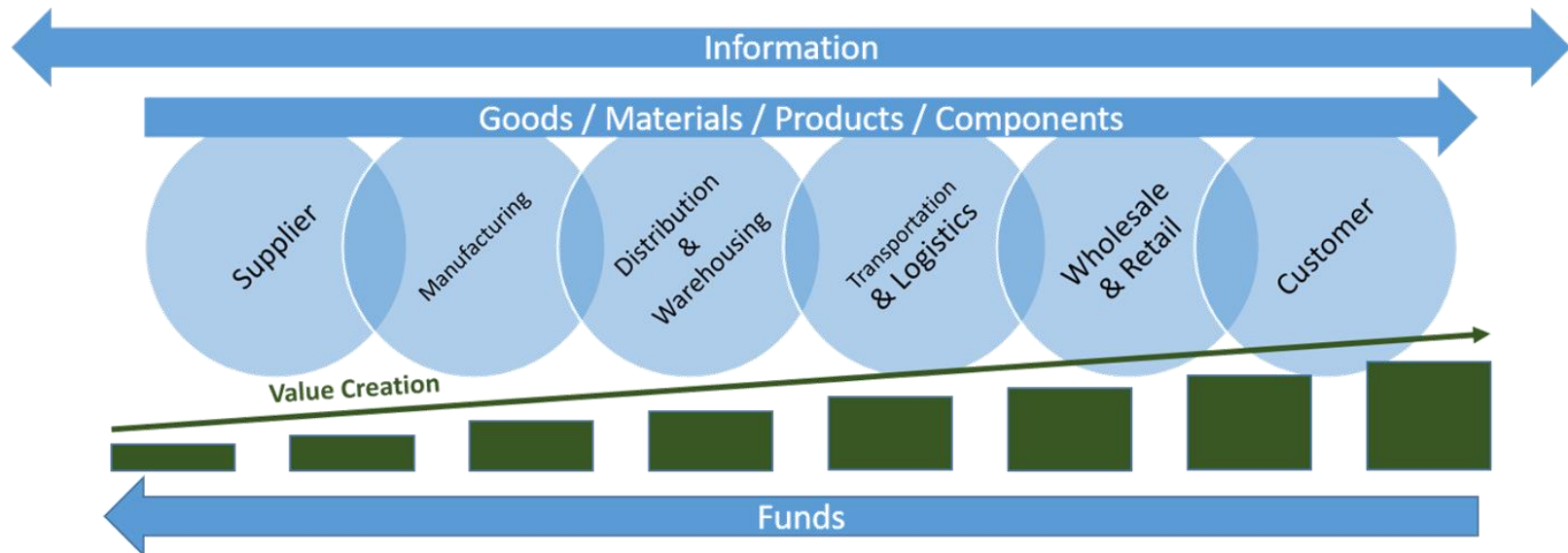
## Defining & Illustrating the Supply Chain





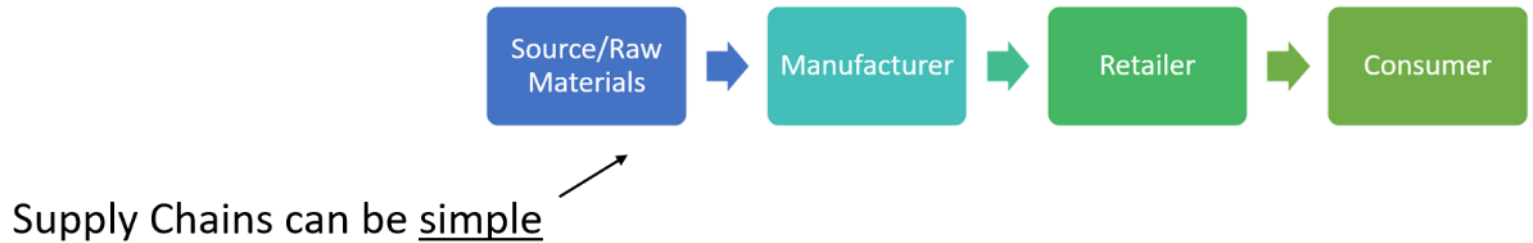
- Focused on successive steps of value creation versus final output
- North Carolina's supply chain may be different than other states

# Defining the Supply Chain

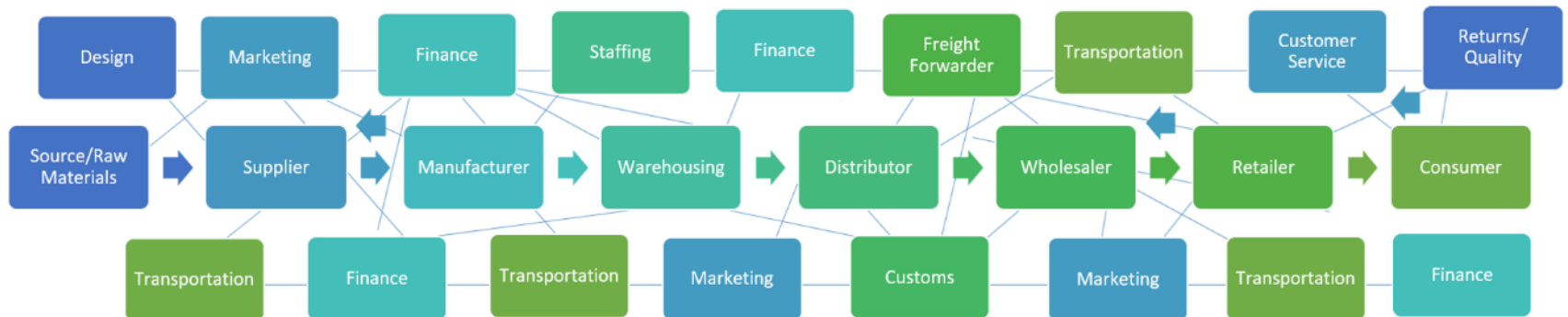


The flow of  
**Information, Goods, & Funds.**

# Illustrating the Supply Chain



or very complex.





# Elements of the Supply Chain



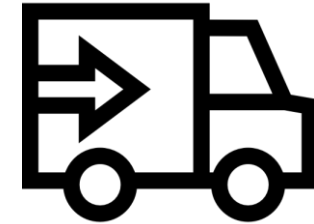
## Procurement

- Sourcing
- Forecasting
- Vendor Qualification
- Negotiation
- Contracting
- Purchasing
- Cost Control & Analysis
- Quality
- Finance



## Production

- Manufacturing & Assembly
- Process Improvement
- Forecasting
- Inventory Control
- WIP Management
- Data Collection & Analysis
- Capacity/Utilization Management
- Quality



## Distribution

- Storage/Warehousing
- Transportation Management
- Material Handling
- Logistics
- Customs & Trade Management
- Inventory Management
- Customer Relations
- Return Logistics

KEY ACTIVITIES

← COMMUNICATIONS & INFORMATION SHARING →

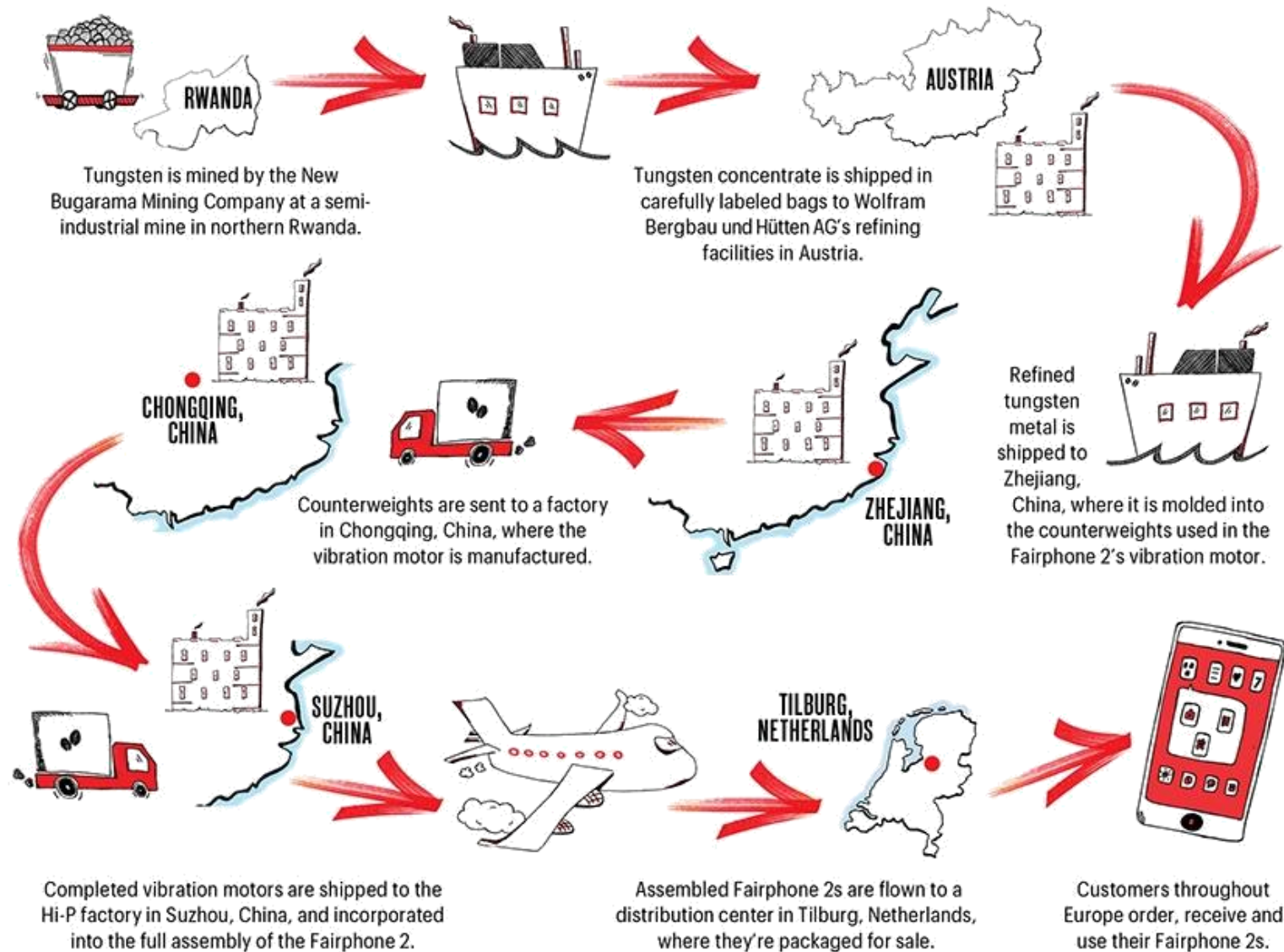
...more on this in Session 2

*\* These are only some of the key activities in the supply chain. Each company's supply chain is unique.*



# SUPPLY CHAIN ILLUSTRATED



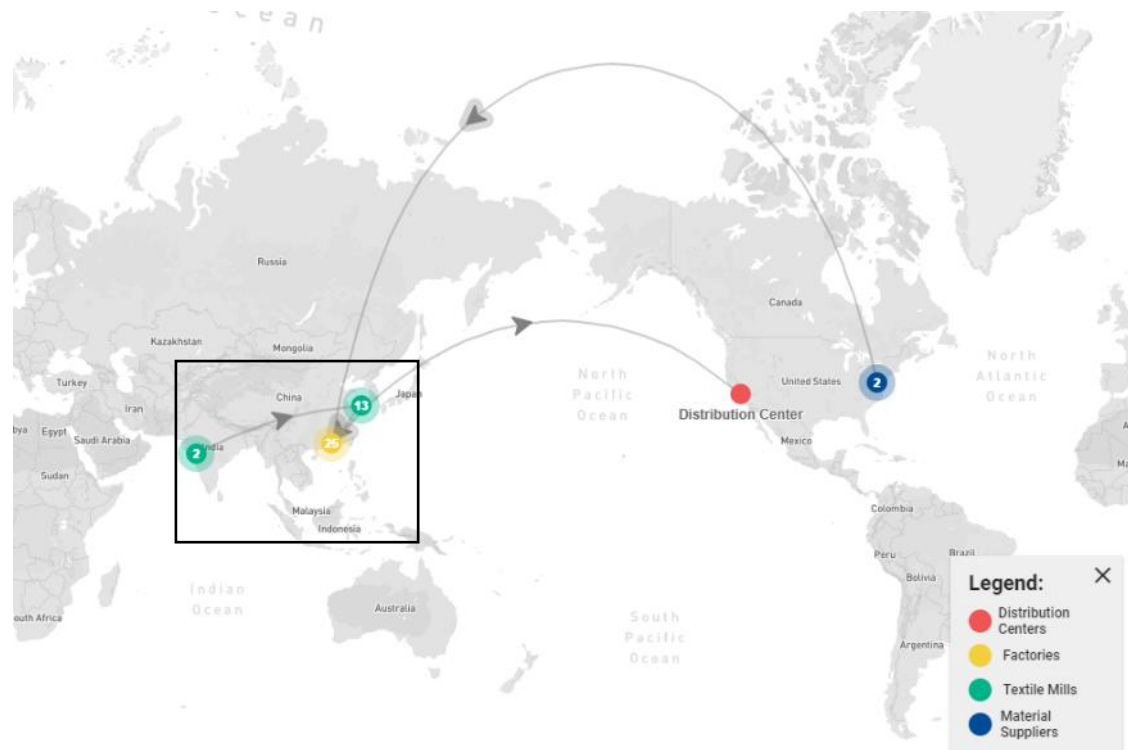


# Supply Chain Structure

- What does a supply chain really look like?



Men's Thermoball™ Eco-Hoodie





# Supply Chain Structure

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Men's Thermoball™ Eco-Hoodie



Vietnam

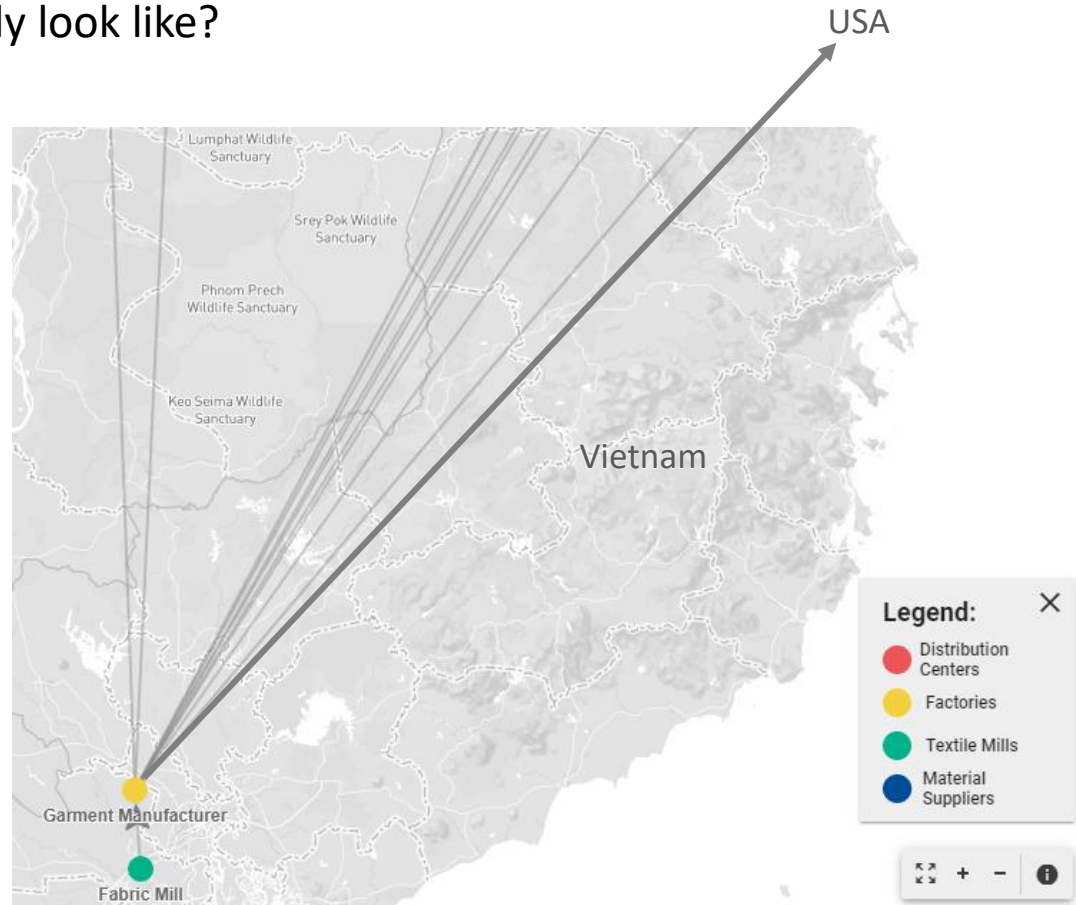


# Supply Chain Structure

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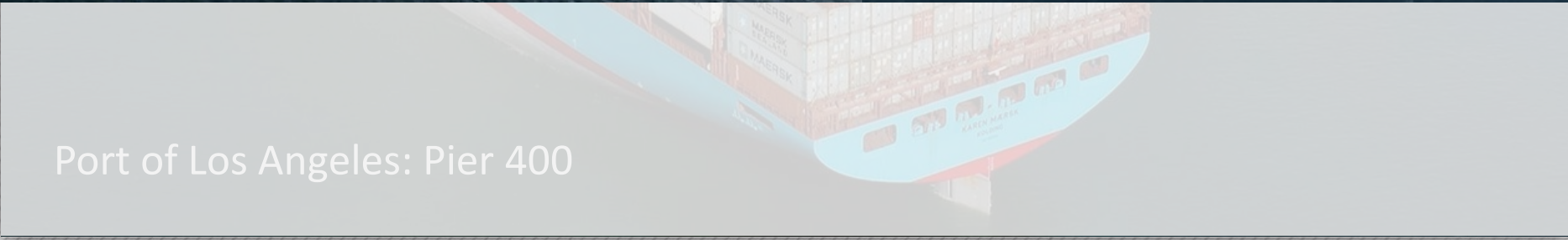






Port of Los Angeles: Pier 400





Port of Los Angeles: Pier 400



## Understanding the Economic Impact of the Supply Chain in NC

# North Carolina's Industrial Sectors



Pharmaceutical, Biologics & Medical Products



Communications & Computer



Chemical Manufacturing



Textiles



Industrial Machinery



Household Goods & Furniture



Tobacco & Foodstuffs



Building Materials



Transportation, Distribution & Logistics



Paper Products



Metal Products



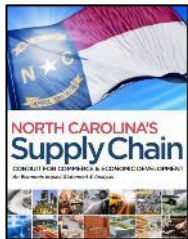
Wood Products



Electronics



Manufacturing N.E.S

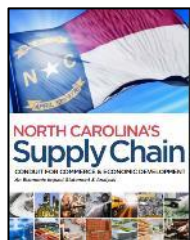
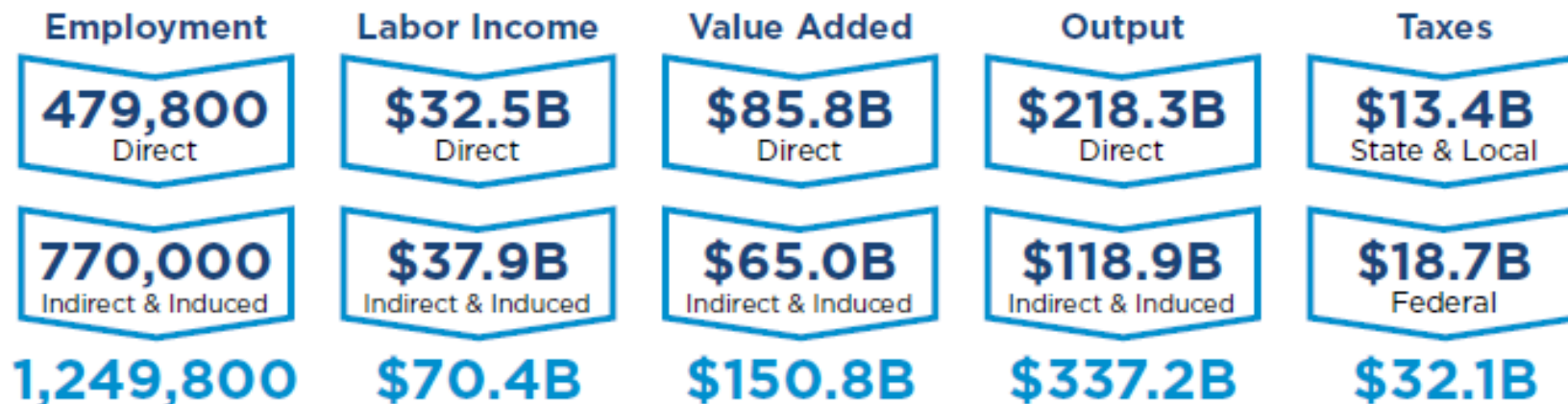


- Listed in order of Value Added (GDP contribution)
- Grouped based on similar industry codes, supply chains, production activities

*North Carolina's Supply Chain: Economic Impact Statement & Analysis (2016)*

# Overall Supply Chain Impact

## TOTAL ECONOMIC IMPACT OF THE SUPPLY CHAIN

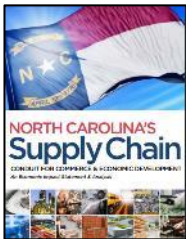
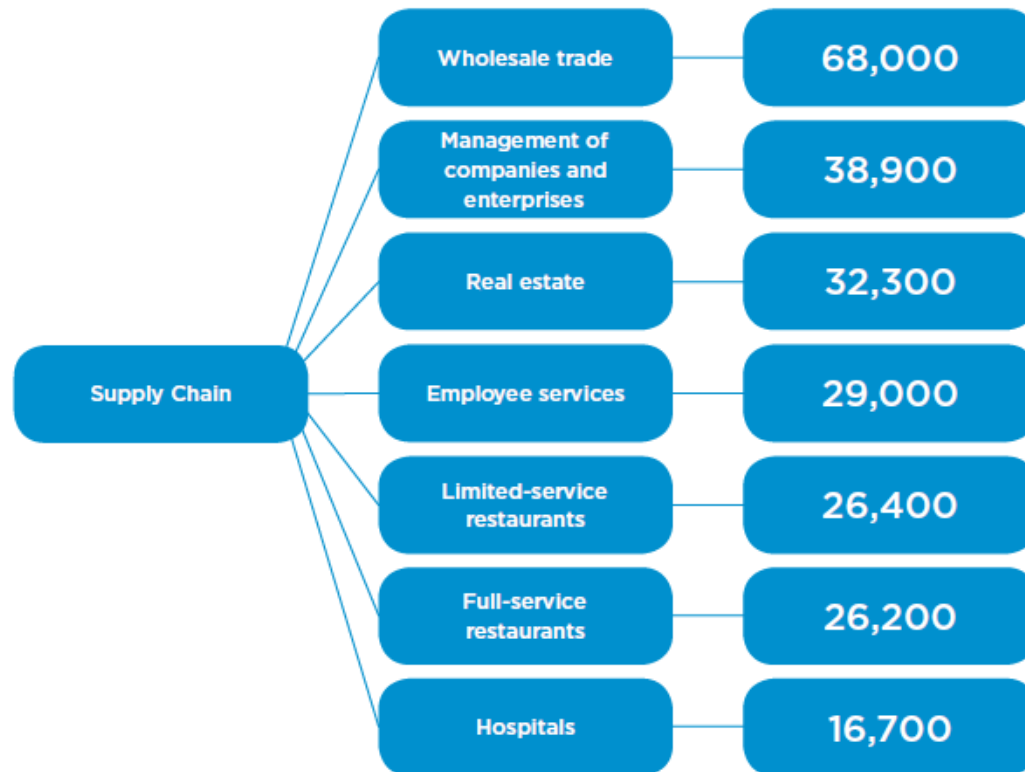


*North Carolina's Supply Chain: Economic Impact Statement & Analysis (2016)*



# Overall Supply Chain Impact

## JOBS CREATED IN NON-SUPPLY CHAIN INDUSTRIES



*North Carolina's Supply Chain: Economic Impact Statement & Analysis (2016)*

## The Numbers Don't Lie

- **One of every 4** employed North Carolinians in supply chain
- Present in **every** county
- Average annual labor income: **\$67,780**
  - **156%** of NC average annual wage of \$43,280
  - **52%** more than US average annual wage of \$44,888
  - **58%** of all supply chain employees earn below average manufacturing wage of \$66,630
- Total paid state taxes equal about **58%** from all sources (2013)





## Making the Economic Development Connections



## 3 Factors for Success



If you can connect to any marketplace efficiently, affordably, equitably, and sustainably, **why not make North Carolina home?**



Amazing Quality of Life

World-class trade growth + compliance support

Outstanding Education

Strong OTR + drayage trucking sector

Highly Skilled Workforce

Quality multimodal infrastructure

Well-built + Maintained Highways

Top Tier Health Care

Low Cost of Doing Business

Statewide transit + mobility networks

Innovation + Technology Powerhouse

Pro-business Policy

Effective Workforce Development Resources

Diverse Population

Engaged state government

Beautiful Environment

Competitive commercial + industrial real estate

Bojangles + Cookout

# Making the Connections

- Freight is the physical manifestation of economic activity; output of an active supply chain
- Transportation enables efficient market access + supports economic activity
- Infrastructure remains one of the most important factors of economic development
- North Carolina's multimodal network supports an evermore dynamic social, commercial + industrial ecosystem





# Supplier Development

- Manufacturers (and even service providers) seek to optimize their supply chain by increasing efficiency and productivity while reducing costs or delay
- A healthy *ecosystem* of suppliers, customers, transportation providers, and infrastructure will:
  - Provide resiliency and predictability
  - Help reduce OEM total cost of ownership (TCO) for capital investment

## Critical

1. Better Total Cost of Ownership decisions
2. Increase effectiveness of ERP/MRP
3. Mitigate global risks
4. Reduce/manage volatility
5. Expand supplier matching capabilities to source for emergent needs
6. Improve OEM/Supplier product development collaboration

## Highly Important

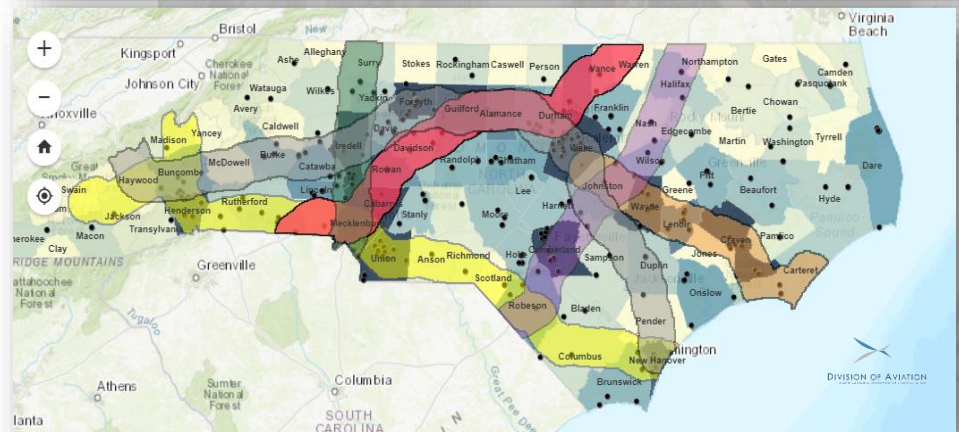
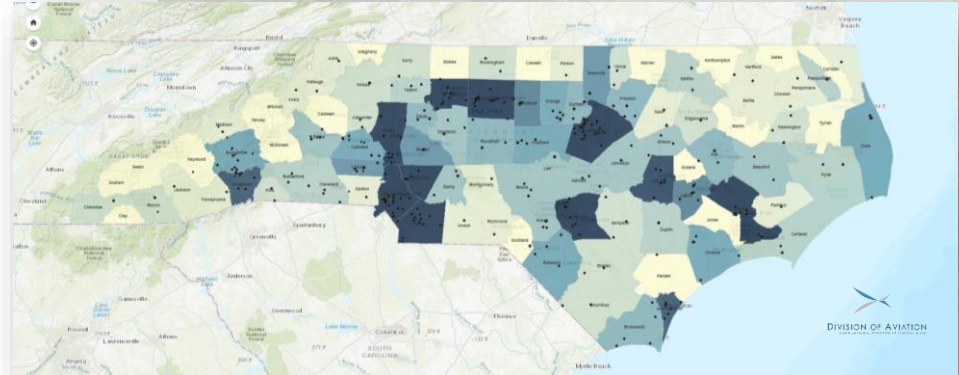
7. Document supply chain strategy
8. Align supply chain metrics with long-term business focus
9. Identify and address choke points in a sustainable manner
10. Optimization of supply chain
11. Recognize the emergent needs for future capabilities and technology
12. Enhance value chain collaboration among suppliers, OEMs and customers

*“Manufacturers with optimized supply chains are more inclined to innovate and grow, further stimulating local, regional and global economies.”*

*- Hollings/NIST MEP*

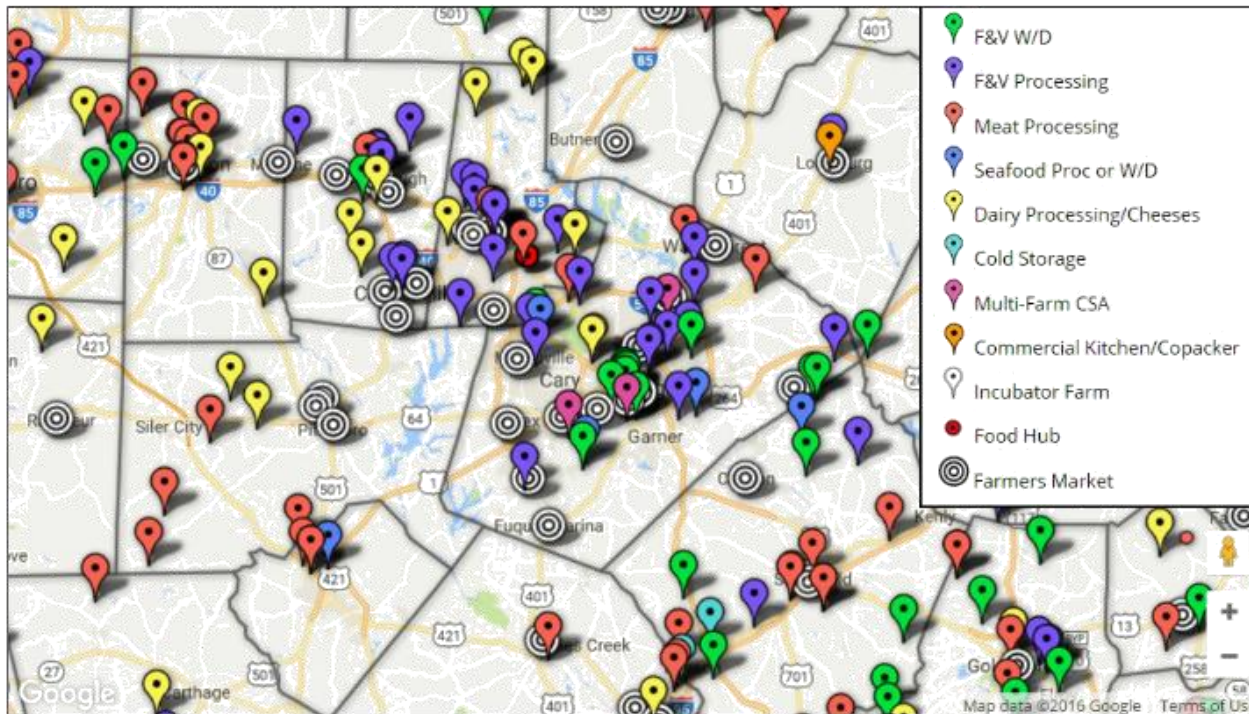
# Cluster/Corridor Approach

- Cluster or industry vertical approach aligned with industry supply chain practices
- Supply chain clusters reduce operating cost, risk
- **Supplier development is economic development for OEMs**



# Supply Chain Ecosystems

## Map



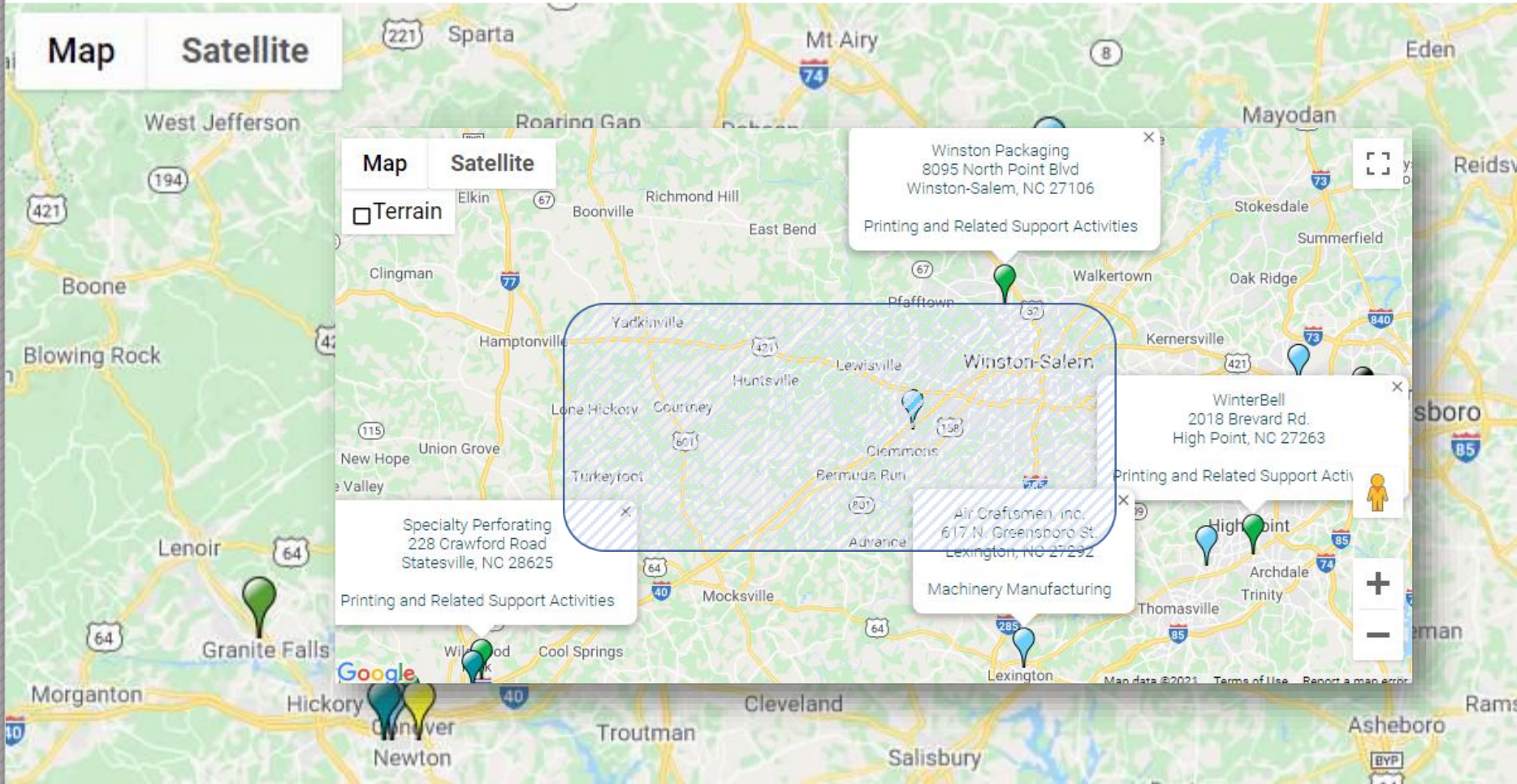
Business Type:  NC Extension District:  County:



NCSU | NCA&T | NCDA&CS



# Supply Chain Ecosystems

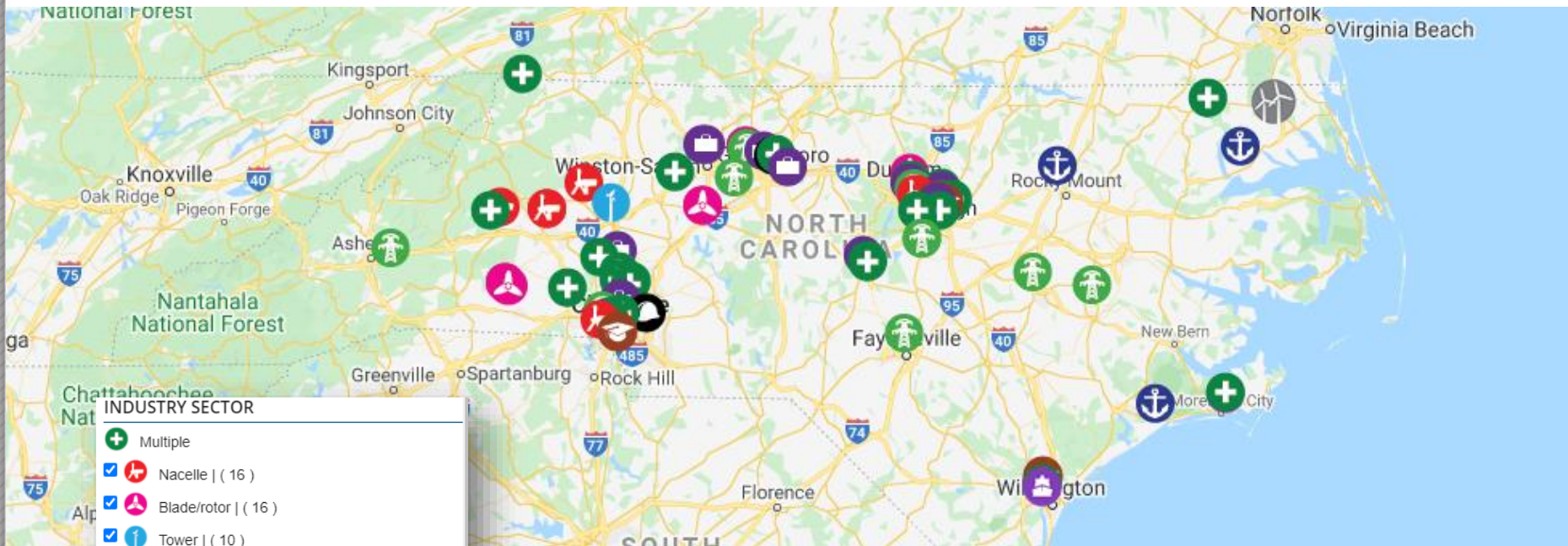


Finding the supply chain sweet spot:



- Machinery
- Paper Product and Packaging
- Printing and Related

# Supply Chain Ecosystems



**INDUSTRY SECTOR**

- Multiple
- Nacelle | ( 16 )
- Blade/rotor | ( 16 )
- Tower | ( 10 )
- Foundation | ( 4 )
- Transmission/Electrical | ( 19 )
- Offshore Services | ( 7 )
- Professional Services | ( 29 )
- Field Services | ( 12 )
- Research/workforce dev | ( 11 )

**SHOW FACILITIES THAT**

- Currently supply the industry | ( 80 )



**SOUTHEASTERN**  
WIND COALITION



# Supply Chain Ecosystems

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**Building North Carolina's Offshore Wind Supply Chain**  
The roadmap for leveraging manufacturing and infrastructure advantages  
March 2021

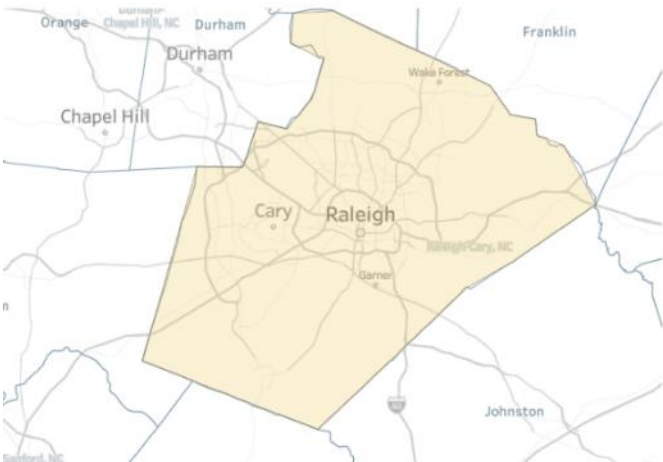
**SOUTHEASTERN WIND COALITION**

[www.nccommerce.com/documents/report-building-north-carolinas-offshore-wind-supply-chain](http://www.nccommerce.com/documents/report-building-north-carolinas-offshore-wind-supply-chain)



# Resources for Geographic Context

NC Economy	State Profile	County Profiles	National Trading Partners	International Trading Partners
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Select County  
Wake

**28,643**  
Thousand Tons (2012)

Includes all freight traffic originating in or destined for the selected county, including intracounty traffic. Year 2015 rail data from 2014.

Commodity Type  
Commodity data for rail traffic is suppressed due to confidentiality requirements.



Domestic Mode



Flow Direction

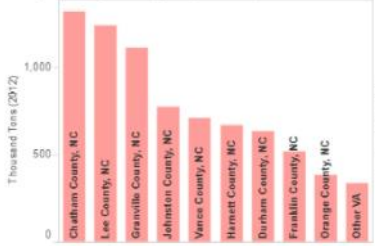


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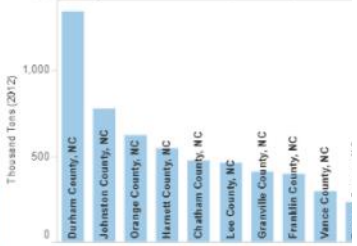
**Chemicals, Pharma, Plastics & Rubber**  
Million Dollars (2015): **\$11,284 (28.57%)**

**Truck**  
Million Dollars (2015): **\$34,620 (86.91%)**

Top 10 Import Origins (Domestic)

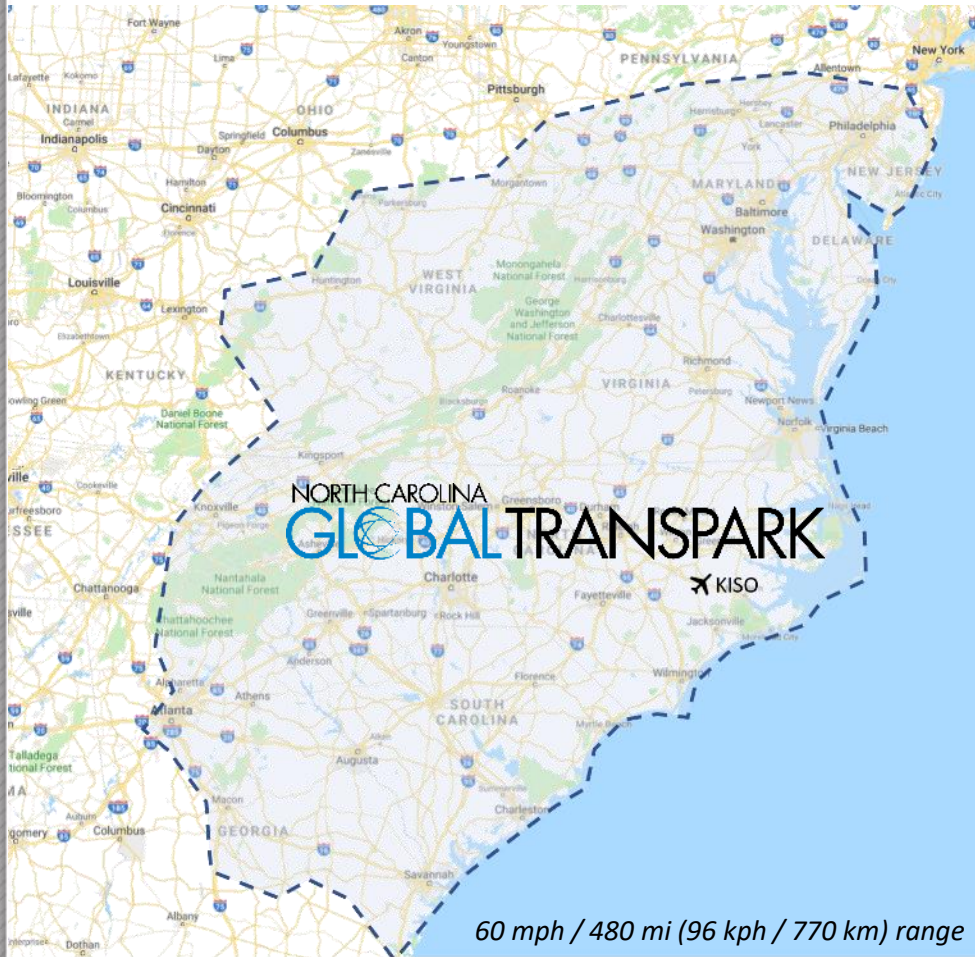


Top 10 Export Destinations (Domestic)



<http://bit.ly/NCfreightflow>

# Articulating *Location, Location, Location*



## Population within 8 hour drive of Kinston, NC

*60 mph / 480 mi (96 kph / 770 km) range*

<b>District of Columbia</b>	693,972
<b>Delaware</b>	961,939
<i>Georgia</i>	7,941,990
<i>Kentucky</i>	552,023
<b>Maryland</b>	6,052,177
<b>North Carolina</b>	10,273,419
<i>New Jersey</i>	2,428,265
<i>Pennsylvania</i>	6,257,472
<b>South Carolina</b>	5,024,369
<i>Tennessee</i>	1,560,855
<b>Virginia</b>	8,470,020
<i>West Virginia</i>	1,690,741
Subtotal	51,907,242
Total US	325,719,178
% of US	15.94%

**BOLD = all of state**

*Italics = calculated by county*



# The Ecosystem of Support for Economic Development

## Workforce Development resources

- Community college system
- Trade schools
- Universities + colleges
- Research agencies + organizations

## Supply chain assets + transportation infrastructure:

- Highways, rail, aviation + pipeline
- NC Ports' current operational capabilities
- NC Ports' investment + strategy
- Inland ports, intermodal facilities, transload
- Leveraging ILM, SAV, CHS, NFK





## The Supply Chain Lexicon: Buzzwords



# The Supply Chain Lexicon: Buzzwords

- Blockchain
- Internet of Things (IOT)
- Internet of Behaviors (IOB)
- Big Data + Big Data Analytics
- Industry 4.0 + Digital Supply Chain



# Blockchain + Distributed Ledger Technologies

## BUZZWORD OF THE YEAR: 2017



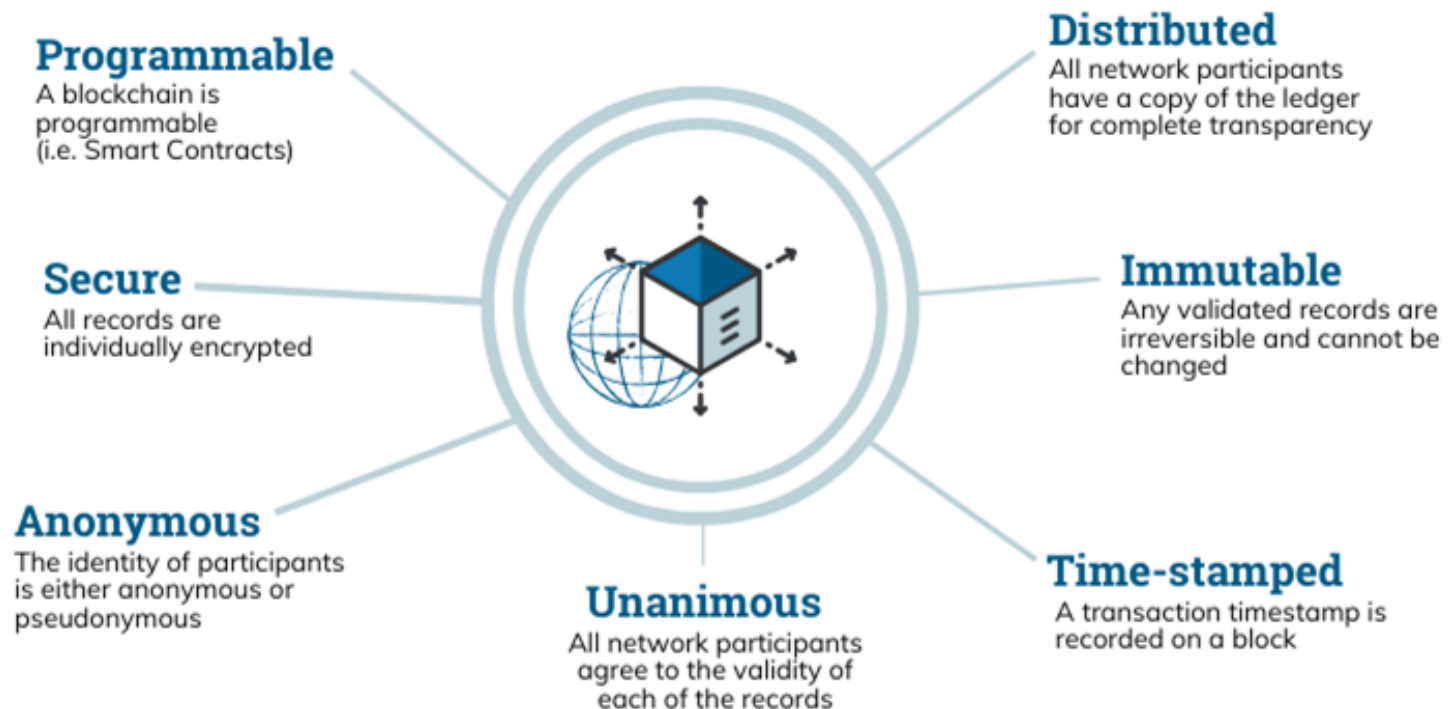
- Distributed ledger technology recording and tracking transactions/activities
- Multiple parties can update + view information
- Data stored in “blocks” or information groupings
- Non-destructive data change protocols
- Decentralized + distributed increases security/reduces tampering;
- No more intermediaries (banks, lawyers – extra step, extra cost);
- Some public, some authorized, hybrid (*fintech*, provenance, shipping)



*Originated through bitcoin/cryptocurrency technology*

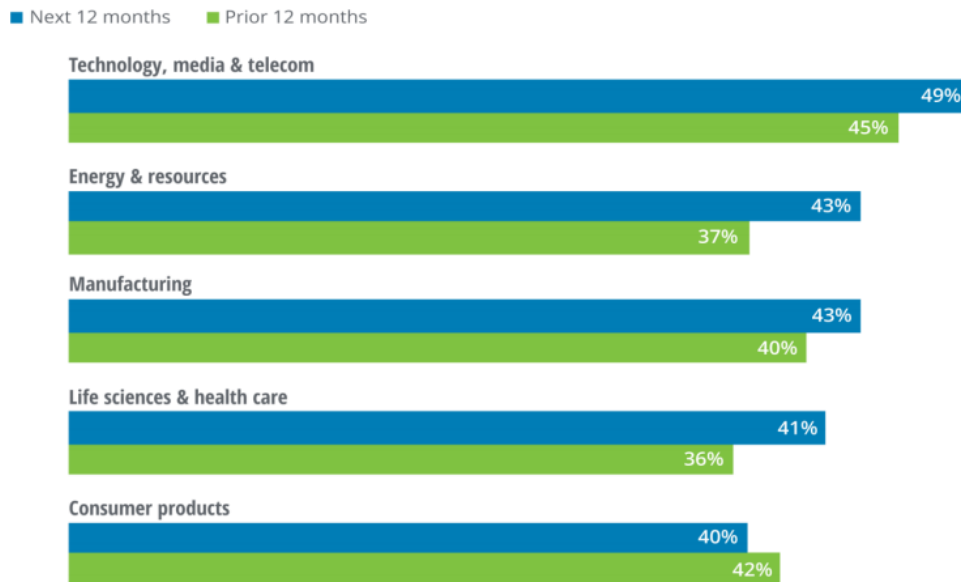
# Blockchain + Distributed Ledger Technologies

## The Properties of Distributed Ledger Technology (DLT)



# Blockchain + Distributed Ledger Technologies

Share of respondents investing at least \$5M USD in blockchain initiatives (2019)



Between 2021-2027:

- Global Blockchain Technology Market to Reach US\$ 30.7 Billion by 2027
- Short term: blockchain estimated to receive investment of \$14.4B globally by 2023
- Manufacturing estimated to register growth of 60.5% CAGR blockchain spend, followed by the distribution & services 58.7%

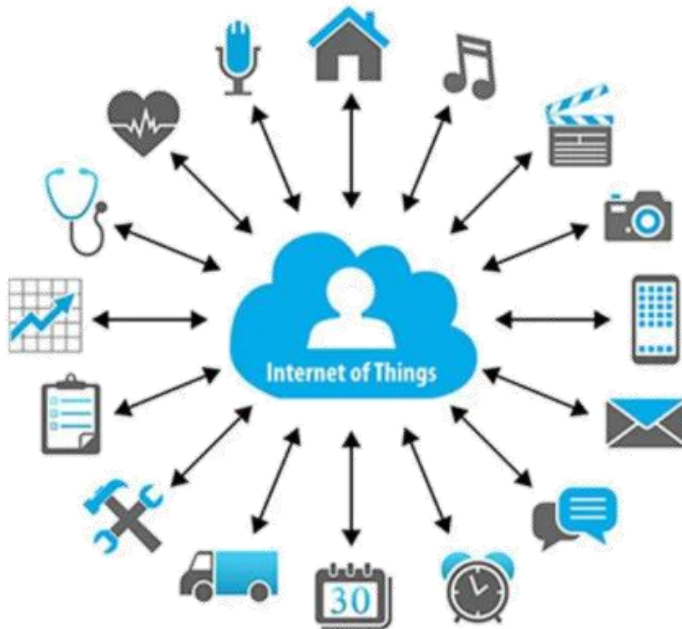
Source: 1,380+ companies surveyed; Deloitte 2019 Global Blockchain Survey

"Thinking specifically of blockchain technology, approximately how much has your organization or project invested in the next/prior 12 months?"

Source: Research + Markets "Blockchain Technology - Global Market Trajectory & Analytics"



# IOT: the Internet of Things



*Great local resources for learning + economic development*



- Connected devices like interactive appliances, smart watches, cell phones, manufacturing equipment
- Sensors in devices connected to cloud-based storage + analytics
- Improved automation capabilities + efficiencies
- Tracking, visibility + inventory applications provides real-time information to customers, vendors and the broader supply chain
- Super relevant to manufacturing, but information + analytics for nearly every sector
- By 2025, 50%+ of orgs will use a distributed cloud option at the data location of their choice

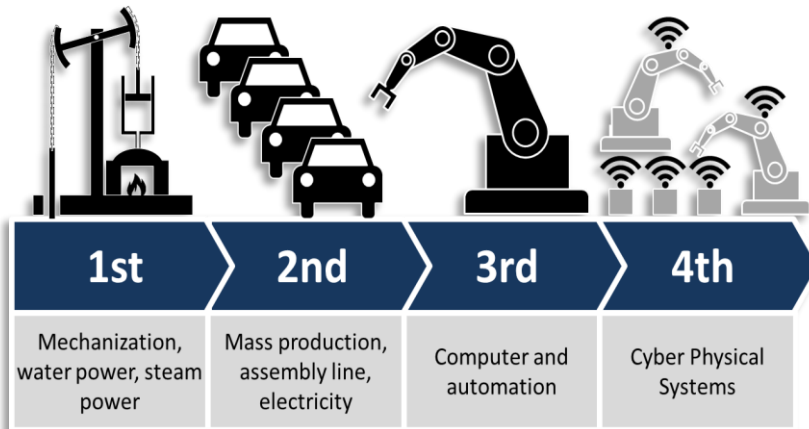
# IOT: the Internet of Things

- IOT proliferation: 22B devices by 2018 + an estimated 38.6B devices worldwide by 2025
- Global IoT application, platform and services revenue is forecast to amount to \$754B USD in 2025
- By 2026, more than half of the world's population will be subject to at least one IOB program



# Industry 4.0

*Also referred to as the Digital Supply Chain or “Smart Factories”*



- Technical framework for manufacturing leveraging technology, connectivity, and data to improve process, efficiency, accuracy, sustainability
- Digital technology, monitoring, and communications in every process across the entire organization, from product development and procurement, through production, distribution and service delivery
- Integration (and collaboration) stretches across the entire value chain internally, as well as externally from suppliers to customers

← PwC defines Industry 4.0 as *the Fourth Industrial Revolution*

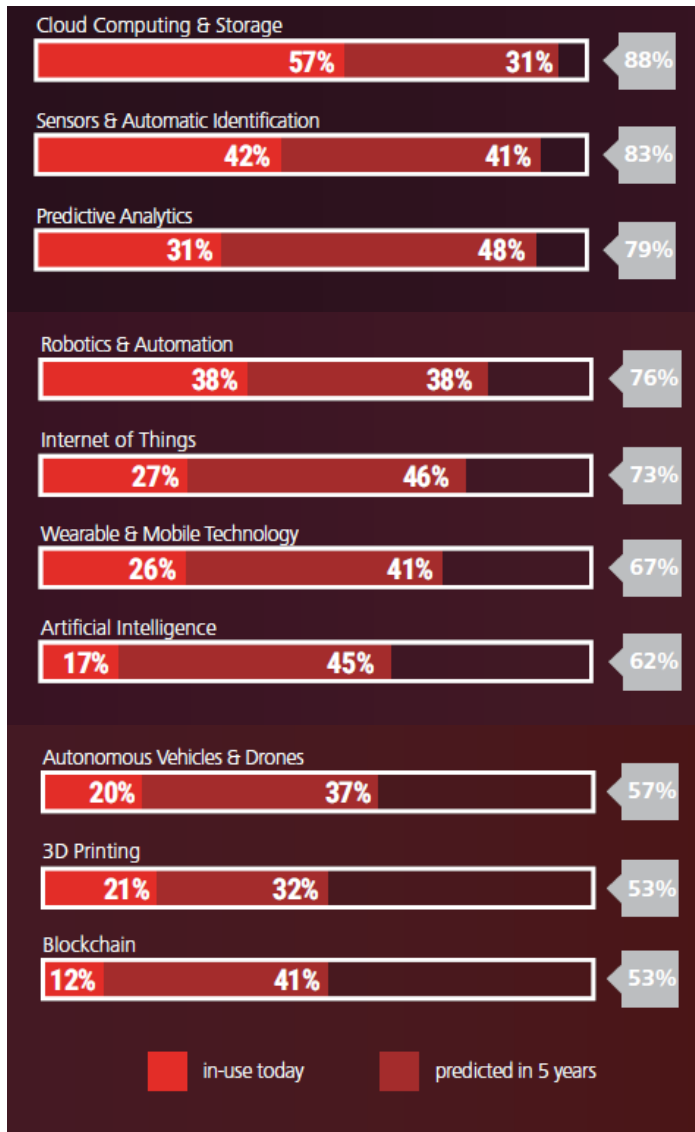
# Benefits of a Digital Supply Chain



- Enabling better data-based decision-making
- Reduction of time spent performing maintenance and administrative activities
- Increased speed of adoption for new technology and improved practices
- The ability to more accurately address demand
- Improved material planning, production efficiency and capacity
- Resiliency and strong risk management capabilities
- Improved efficiency, sustainability, profitability



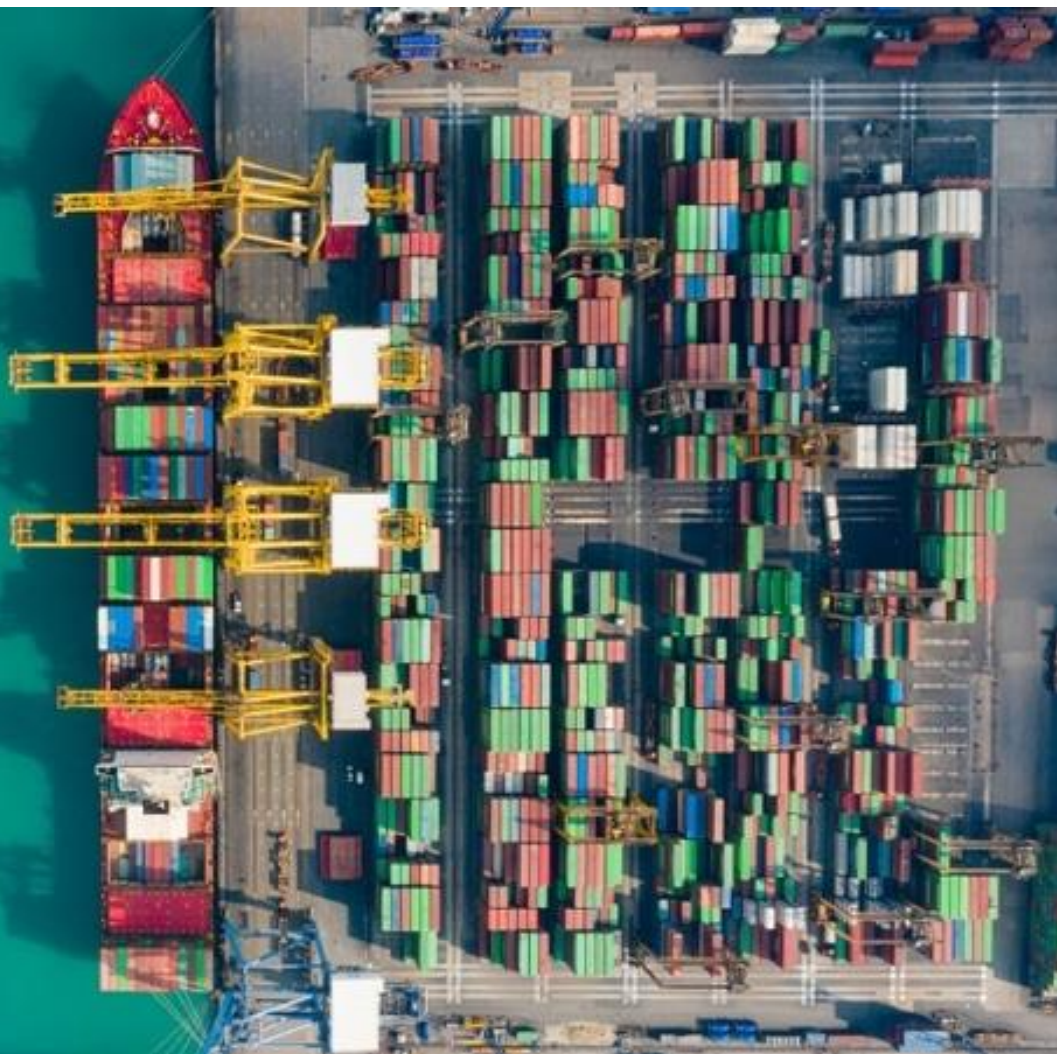
## Technology Adoption Trends



- Nearly half of the supply chain leaders surveyed (49%) say their organizations are increasing spending on supply chain innovations, spurred by the unprecedented disruptions from COVID-19.

## Buzzwords: Part 2

- Peak Season
- Bill of Lading
- Waybill
- Consignee
- Beneficial Cargo Owner (BCO)
- Ocean Carriers
- Integrators (FedEx, UPS)
- Freight Forwarder
- Customs Broker
- Incoterms
- Carnet
- Antidumping / Countervailing Duties
- *De minimus*
- Cross Docking + Transloading
- Bonded Warehouse





## Upcoming Sessions Agenda



## Agenda for Session 2

- Key focus areas within supply chain management
- Inventory + Working Capital
- Distribution, warehousing, and network design for site selection/development
- Transportation, freight + logistics: know your mode
- Buzzwords, Part 2

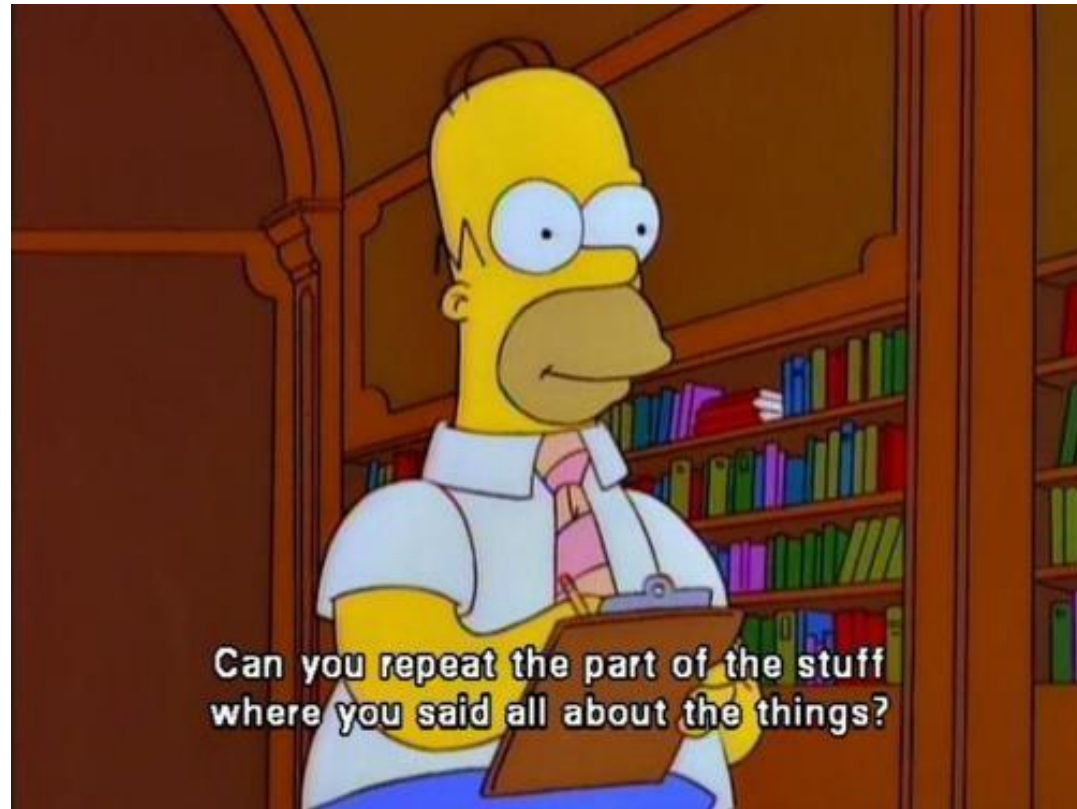
# Agenda for Session 3

- Beyond manufacturing: agriculture, energy, finance
- North Carolina, supply chain powerhouse:  
organizations + resources for supply chain development
- eCommerce revolution and the future: change agents in the supply chain

## Final Exam:

- Multiple choice, short answer
- Case study + essay

Questions?



Can you repeat the part of the stuff  
where you said all about the things?



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[bit.ly/NCDOTsupplychain](http://bit.ly/NCDOTsupplychain)

NCDOT Connect Resources:

[bit.ly/FreightConnectNC](http://bit.ly/FreightConnectNC)