

# Electronics Components Markets and Supply Chain Health

**Learning from the Past; Looking to the Future**

Dale Ford – Chief Analyst

March 18, 2021



Electronic Components Industry Association



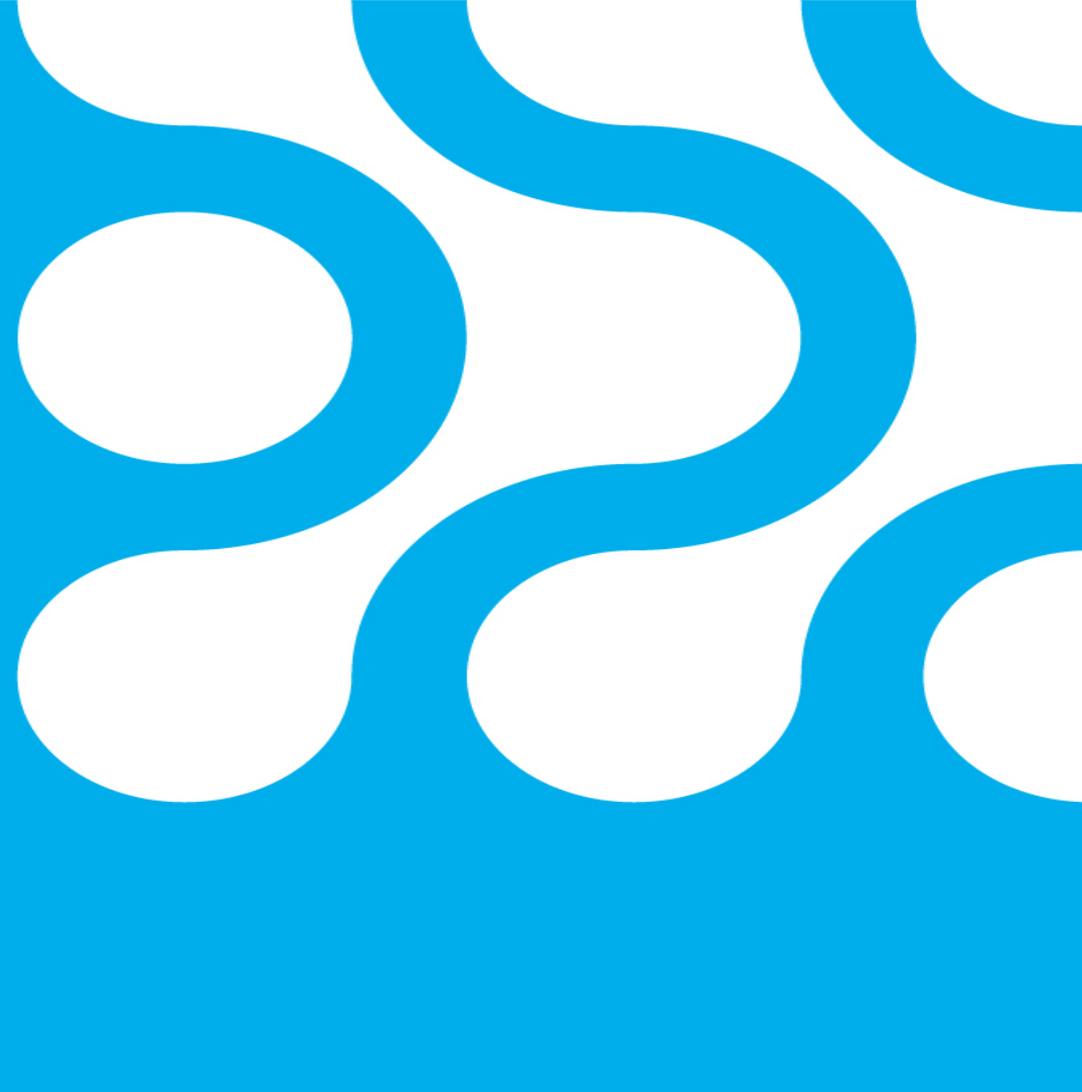
# Where Are We Going?

- Where We've Been
- Looking Forward ~ 2021
- Speaking of Technology and the Economy ...
- What About the Electronics & Components Supply Chain?
- Electronics & Components Market Drivers
- The Vision Thing

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# Where We've Been

~ Up to End 2020 ~

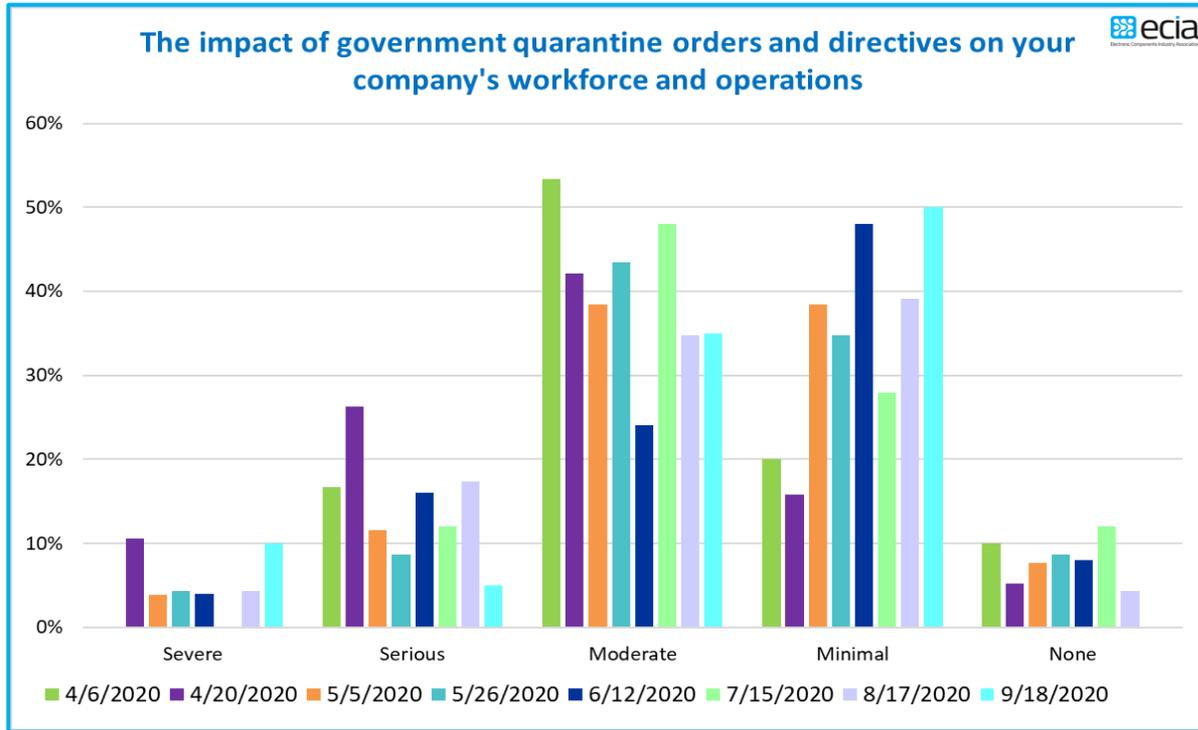


# A Whipsaw Disaster That Required a Nimble Response

Whipsaw – To beset from two or more sides at once

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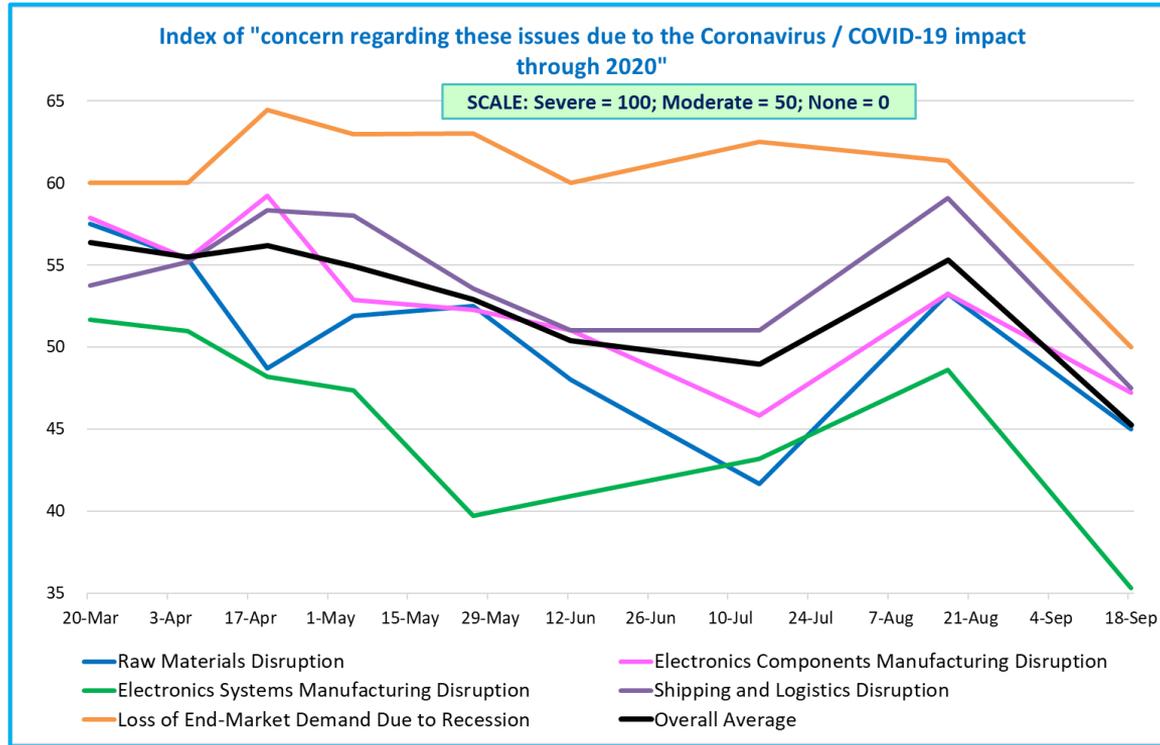
# COVID-19 Supply Chain Impact – 2020



Source – ECIA

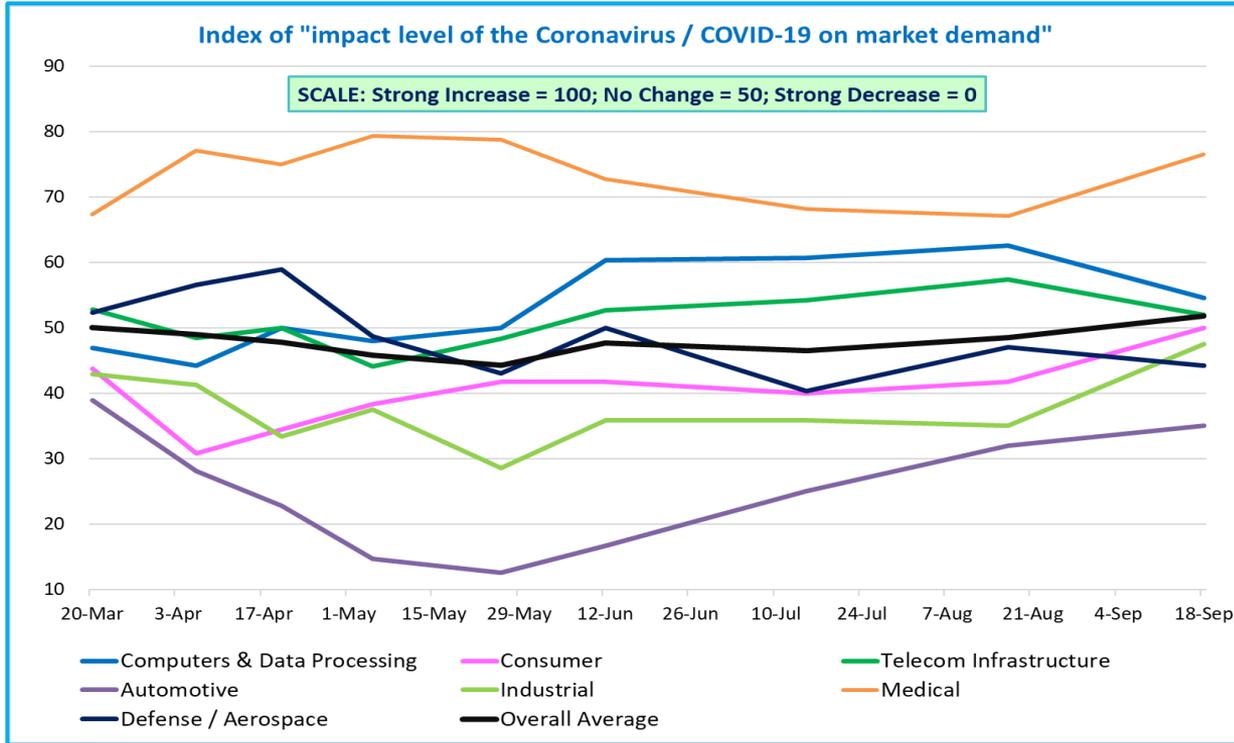
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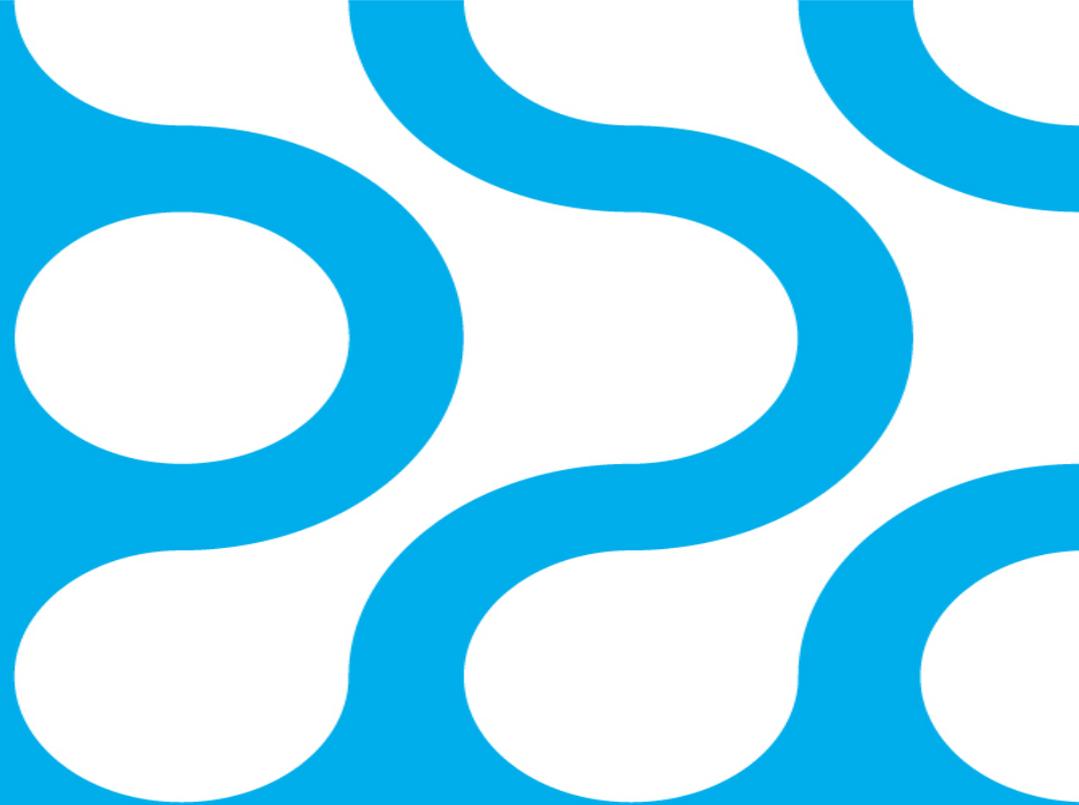
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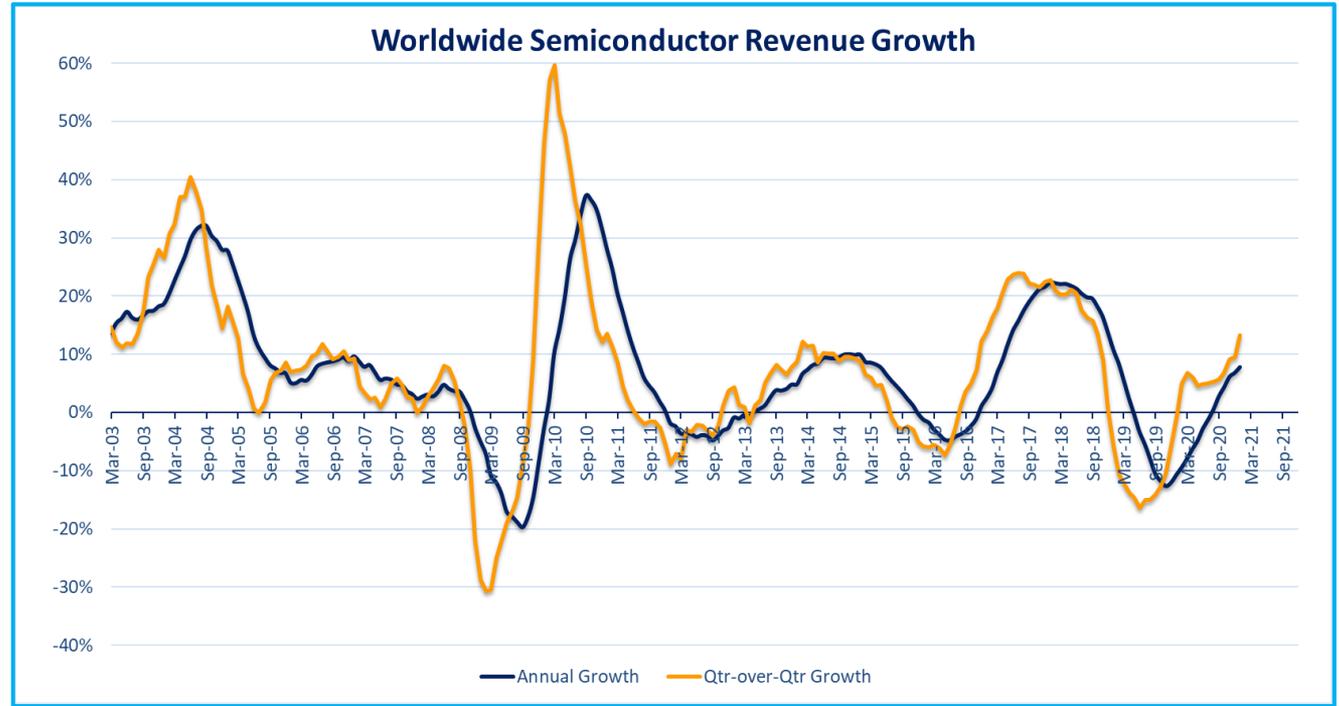
**Looking Forward**

~ 2021 ~



# Semiconductor Revenue Growth Cycle

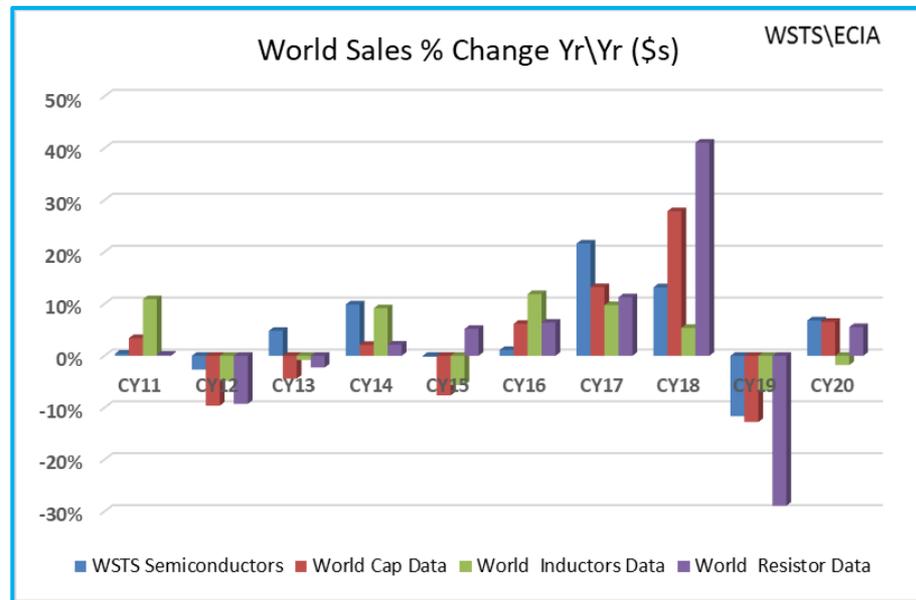
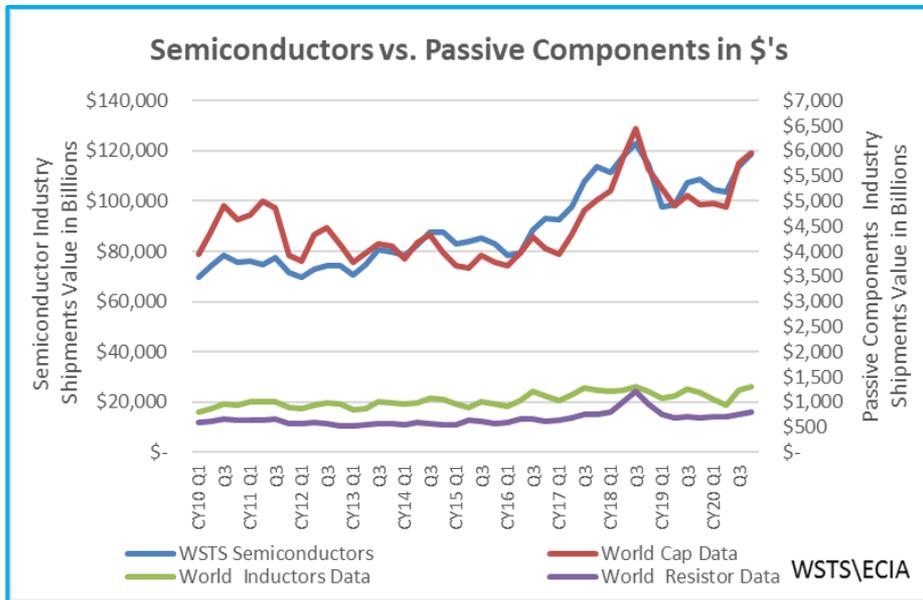
- Quarter-over-Quarter took a hit in summer 2020
- Annual revenue cycle trends up starting September 2019
- Annual revenue growth profile continued steady through 2020
- Annual revenue growth breaks positive in August 2020
- Strong demand and technology drivers
- Accelerating growth in 2021?



Source – WSTS

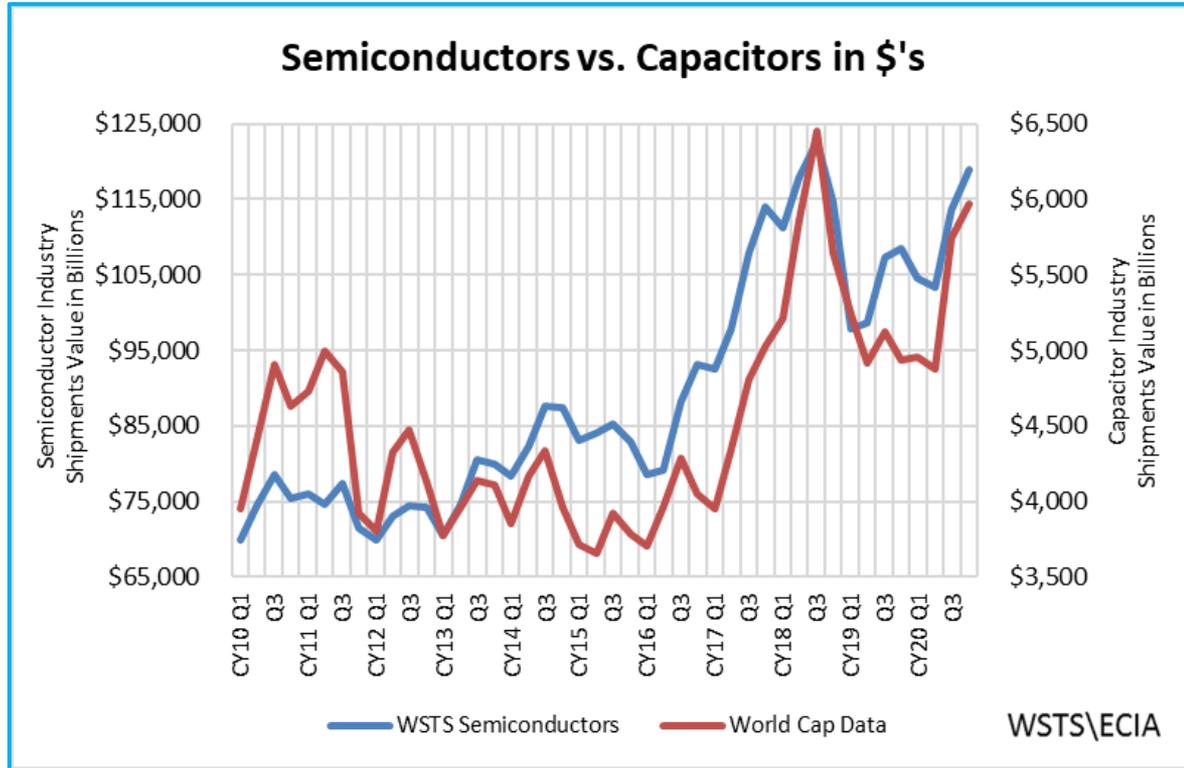
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# Semiconductor & Passive Market Correlation



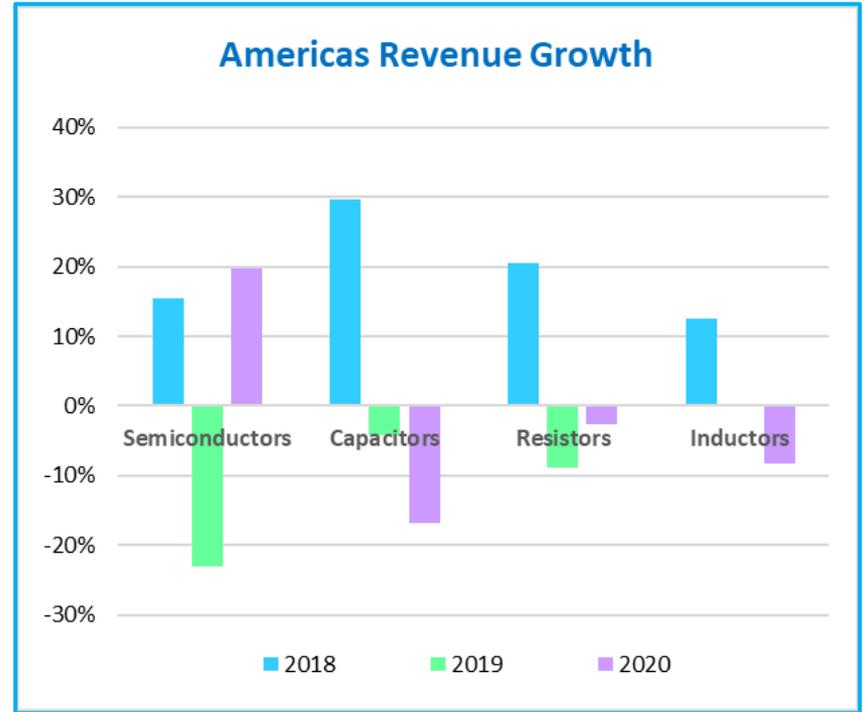
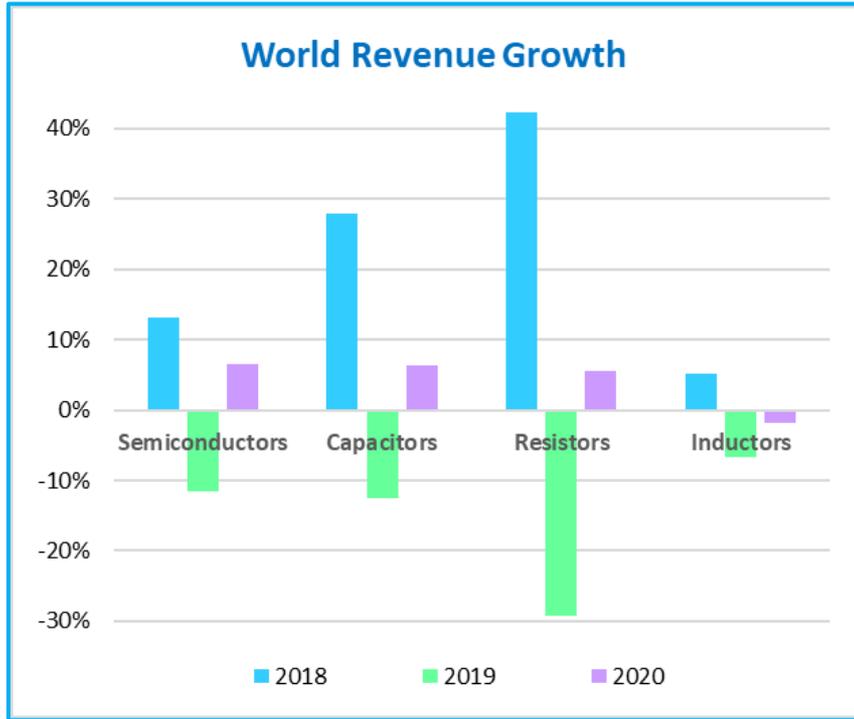
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# Semiconductors a Good Proxy for Passive Component Growth Worldwide *But NOT in the Americas*



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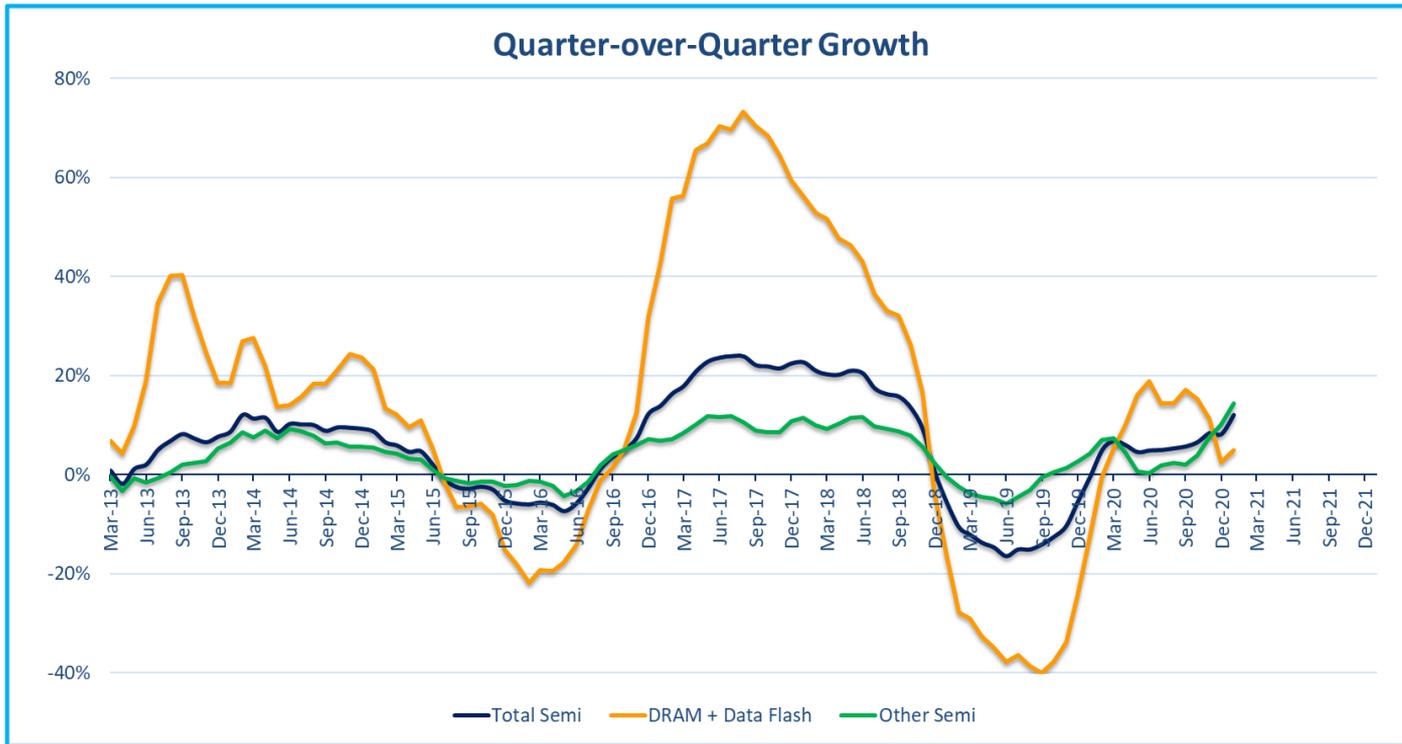
# Electronic Component Revenue Growth



Source: World Semiconductor Trade Statistics (WSTS),  
World Passive Trade Statistics (WPTS)

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# Semiconductor Growth Trends

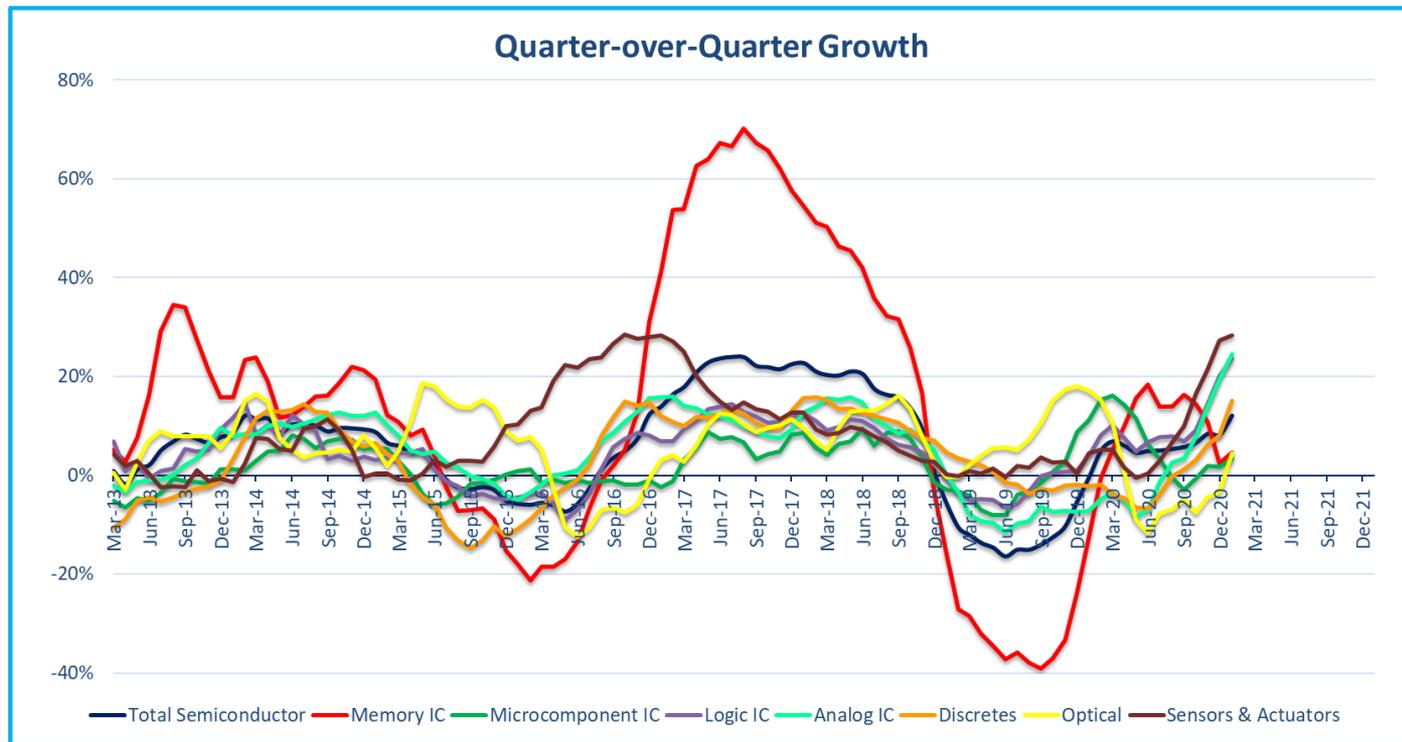


Source: WSTS

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# Different Trends for Different Markets- Alignment Diverging

- Every component category has now achieved positive qtr-over-qtr growth
- Sensors, Analog ICs, Discretes, and Logic surging
- Optical and Micros recovering
- Pricing collapse clips the wings of Memory ICs

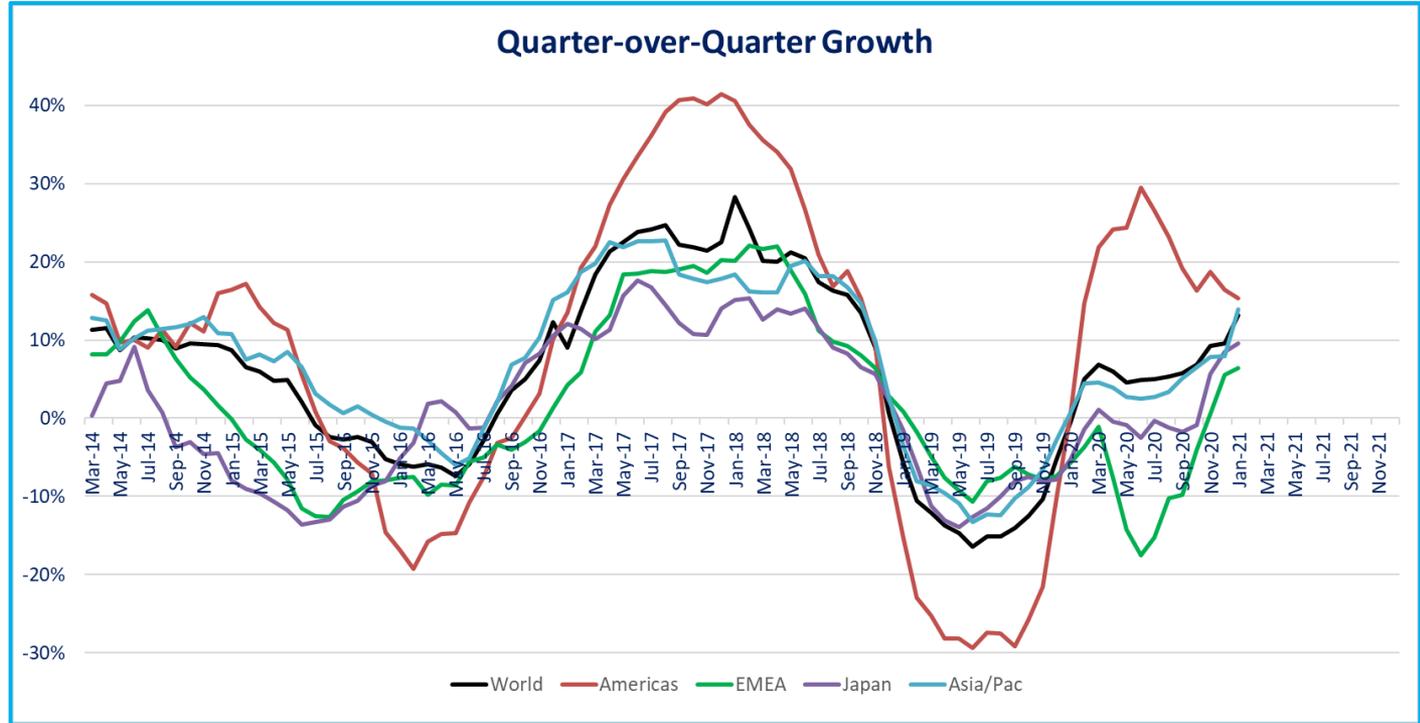


Source - WSTS

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# Americas Semiconductor Market was Surging

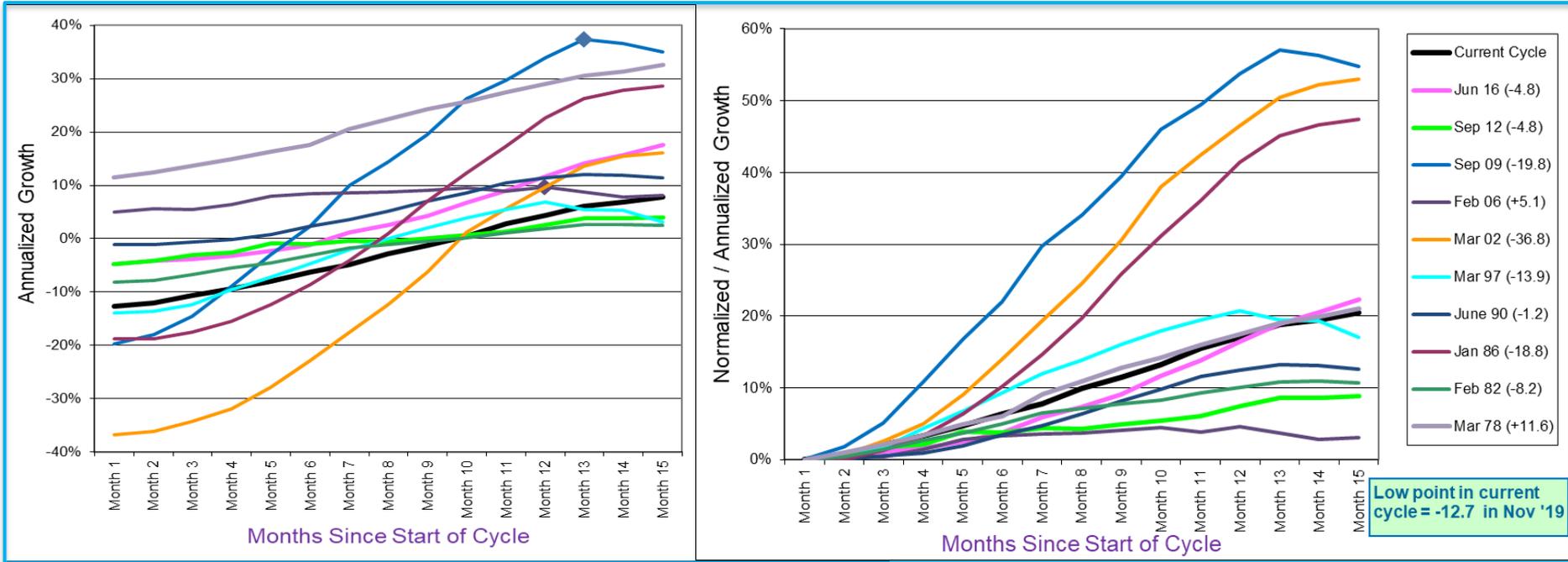
- Americas growth showing the widest swings driven by memory
- Japan moves from stagnant to growth
- EMEA achieves growth after a brutal two-year stretch



Source – WSTS

# Solid Start to Current Cycle

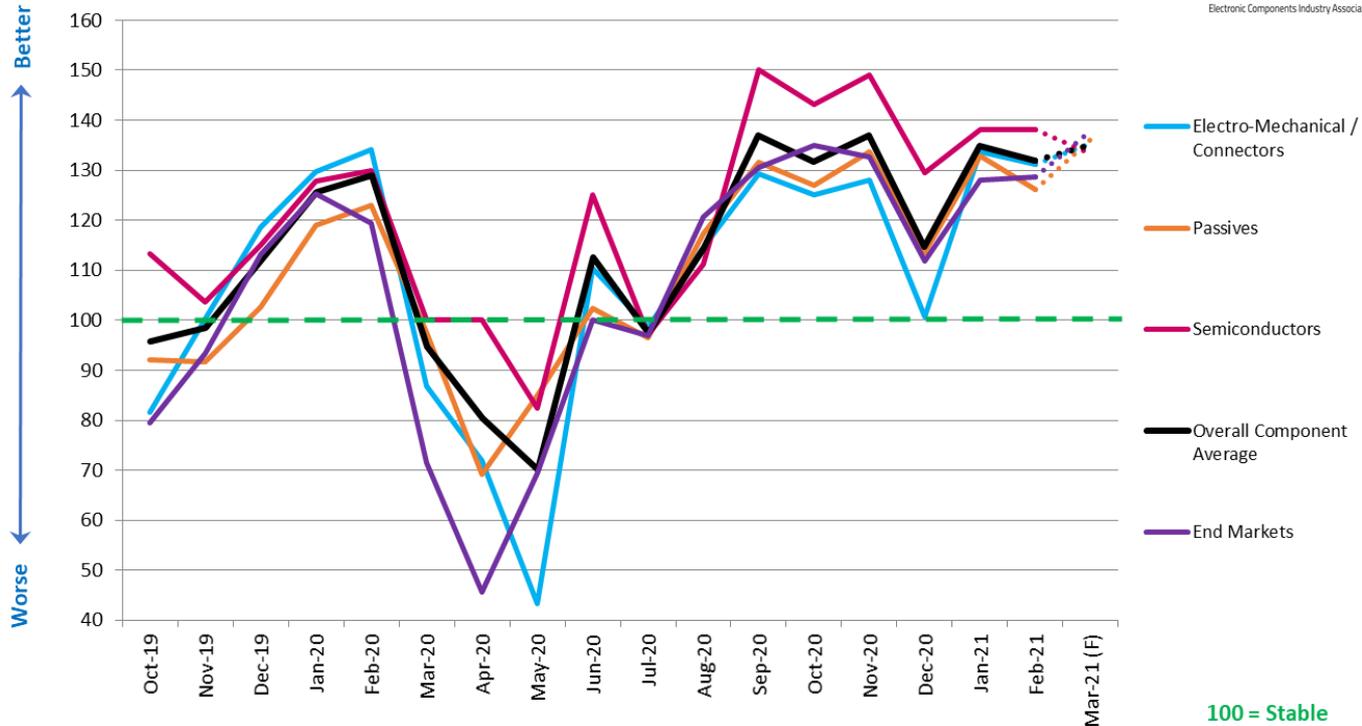
Most cycles last about four years



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# North America Sentiment Survey Trends

## North American Sales Performance Compared to Prior Month



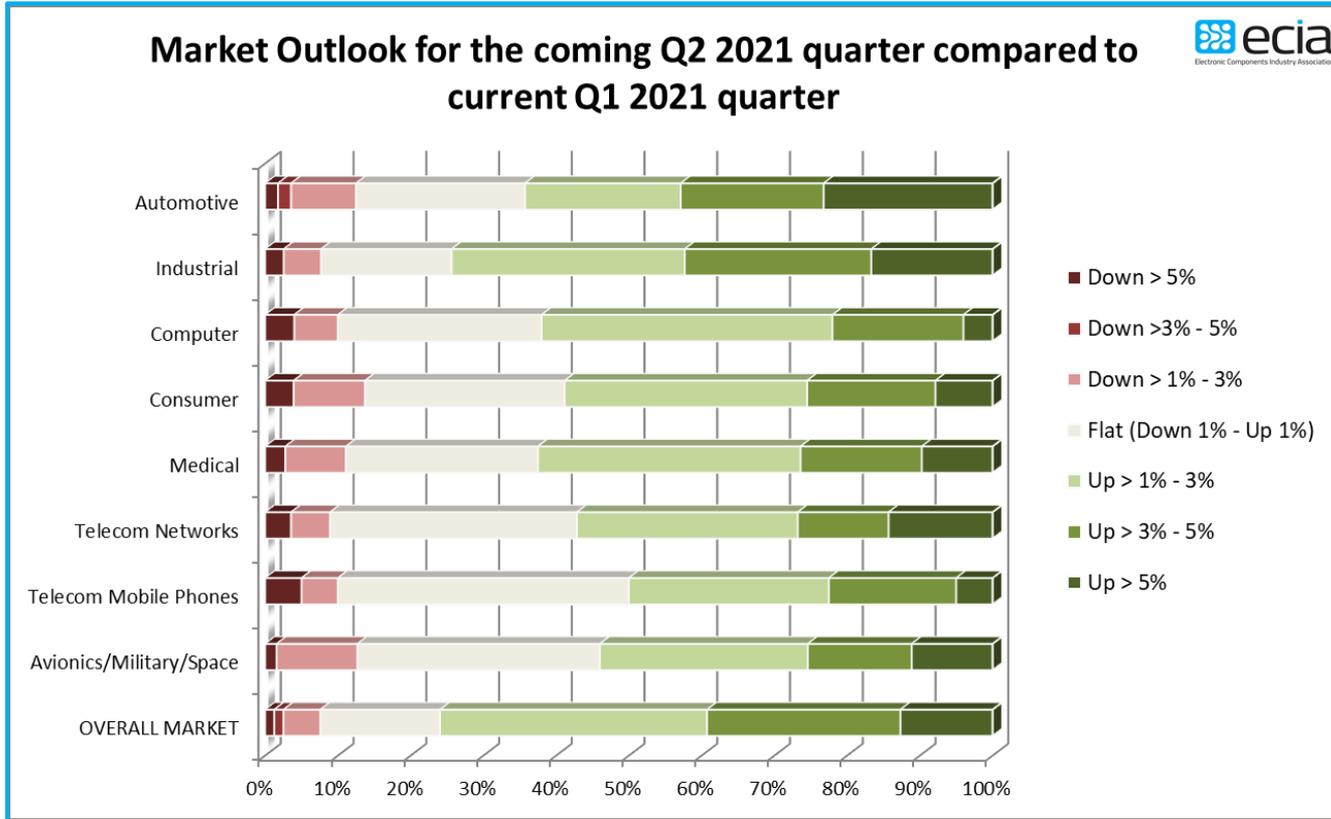
- Strong start to 2021 across all categories
- Seasonal pause in December
- Important to remember context – Month compared to prior Month
- Above 100 means continued improvement – Like keeping foot on accelerator

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Source: ECIA Electronic Component Sales Trends Survey



# North America Sentiment Survey Trends



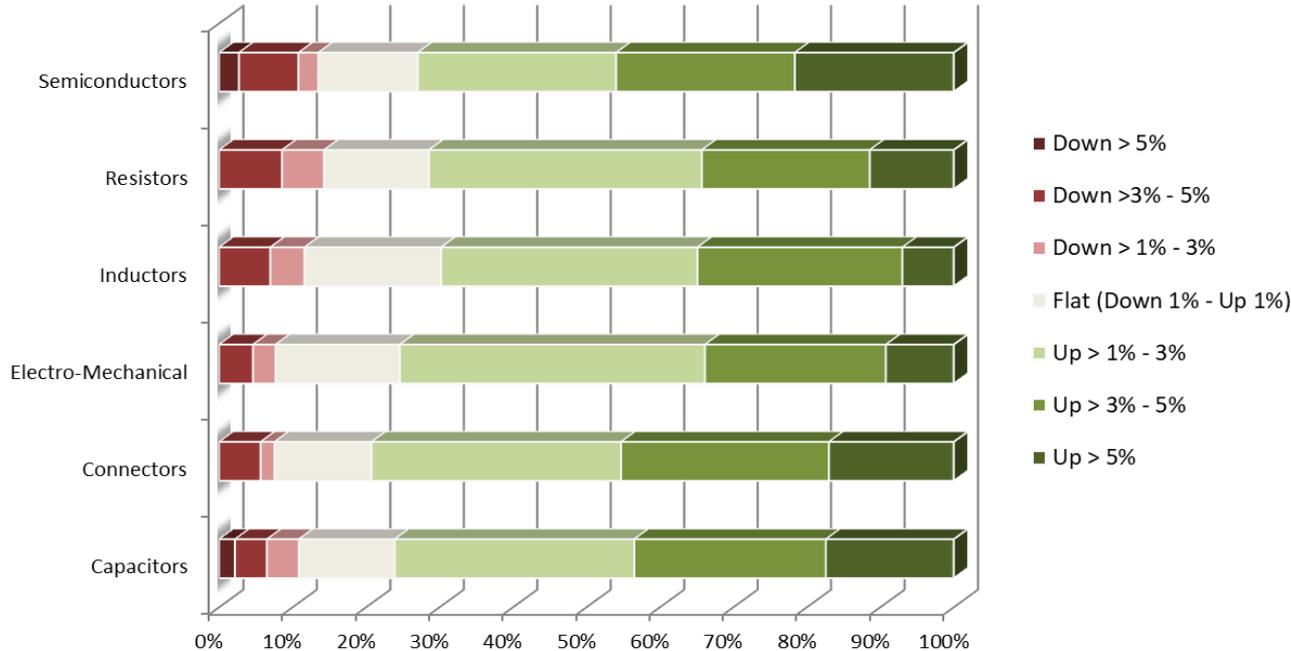
Source: ECIA Electronic Component Sales Trends Survey

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- What a difference a year makes!
- Broad-based confidence across the market
- Industrial, Medical & Automotive lead in optimism
- Even Mobile Phones & Avionics/Military/Space see over 50% growth expectation

# North America Sentiment Survey Trends

Product Outlook for the coming Q2 2021 quarter compared to current Q1 2021 quarter



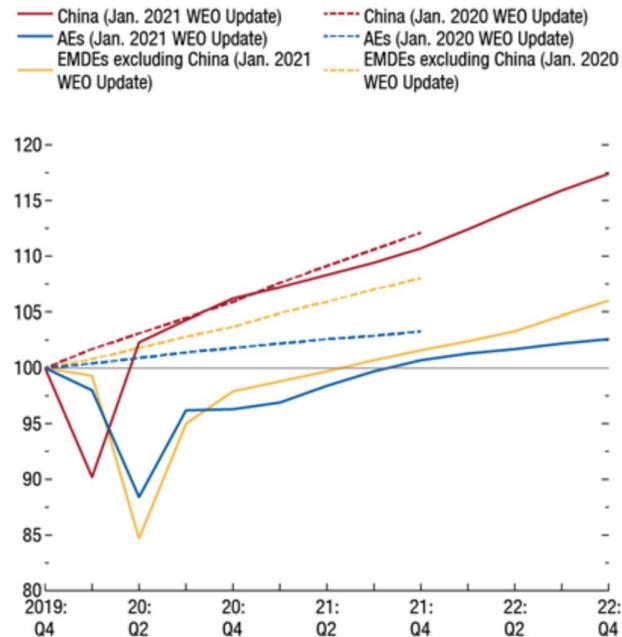
- Positive growth expectations range between 72% and 81% of survey respondents
- Semiconductors, Capacitors and Connectors see the strongest expectations in growth above 5%
- Overall strong alignment across product categories in growth expectations

Source: ECIA Electronic Component Sales Trends Survey

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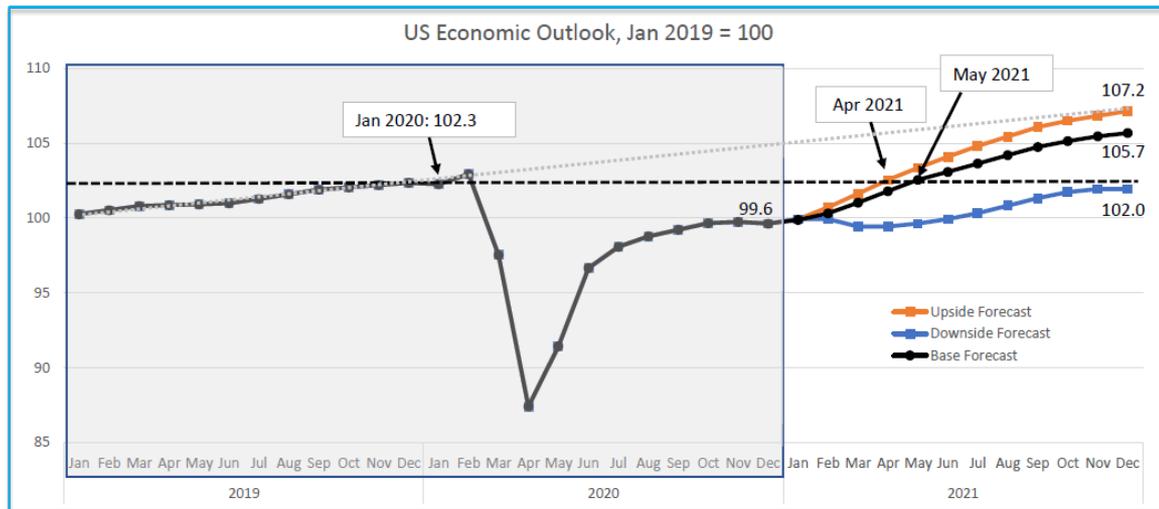
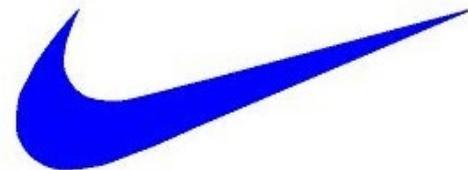
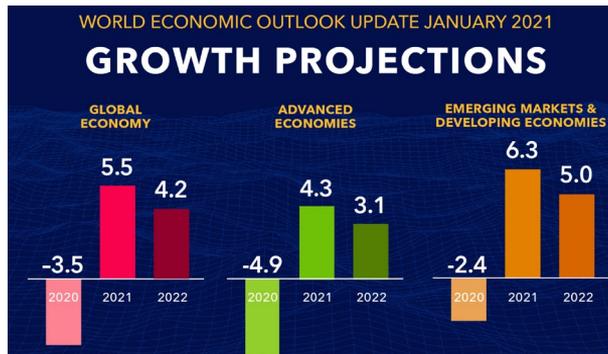
# GDP Forecast Scenarios – The Swoosh Scenario?

**Figure 1. Divergent Recoveries: WEO Forecast for Advanced Economies and Emerging Market and Developing Economies**  
(Index, 2019:Q4 = 100)



Source: IMF staff estimates.

Note: AEs = advanced economies; EMDEs = emerging market and developing economies; WEO = World Economic Outlook.



Source: The Conference Board

# Economic Risk Factors

## Economic Confrontations Between Major Powers

- World trade in manufactured goods has more than doubled between 2000 and 2017—from \$4.8 trillion to \$12.2 trillion. The U.S. share of world trade in manufactured goods has grown from 7.6% in 2002 to 8.7% in 2017. (*Source: World Trade Organization*)
- Globally Weak Investment Due to Low Expected Returns, Uncertainty About Economic Policy

## Small Business Health

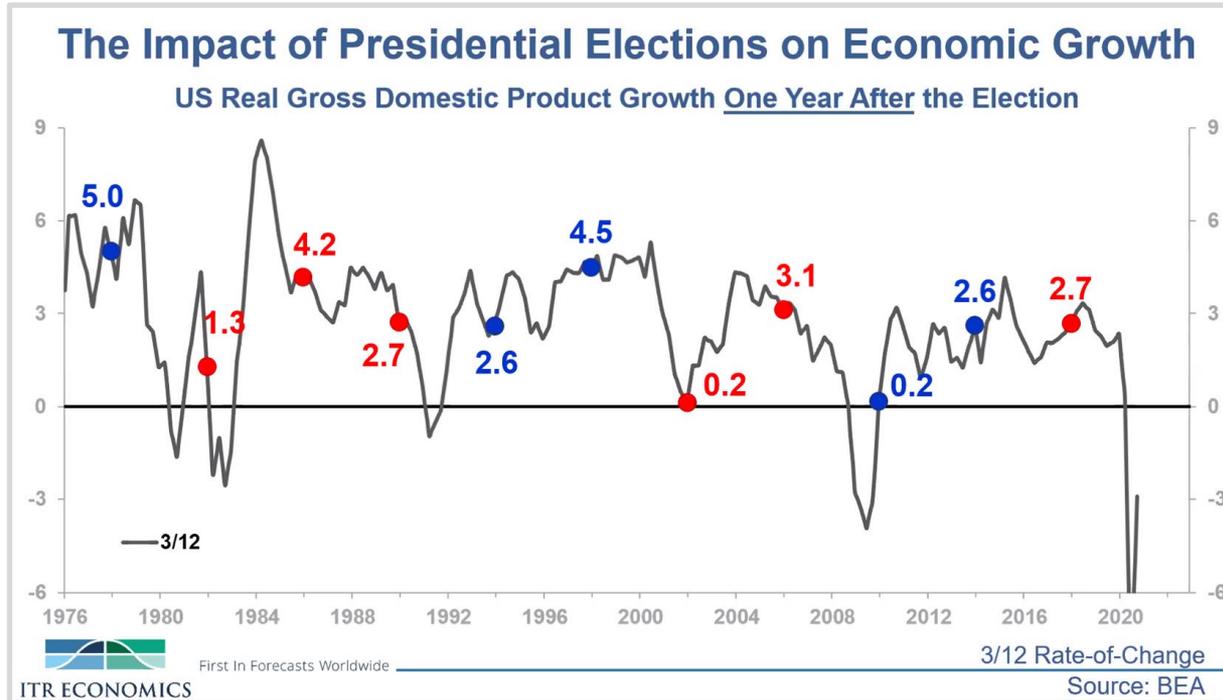
- The majority of manufacturing firms in the United States are quite small. In 2017, there were 248,039 firms in the manufacturing sector, with all but 3,914 firms considered to be small (i.e., having fewer than 500 employees). In fact, three-quarters of these firms have fewer than 20 employees. (*Source: U.S. Census Bureau, Statistics of U.S. Businesses*)
- Unemployment and State Lockdown Orders

## Energy Shocks

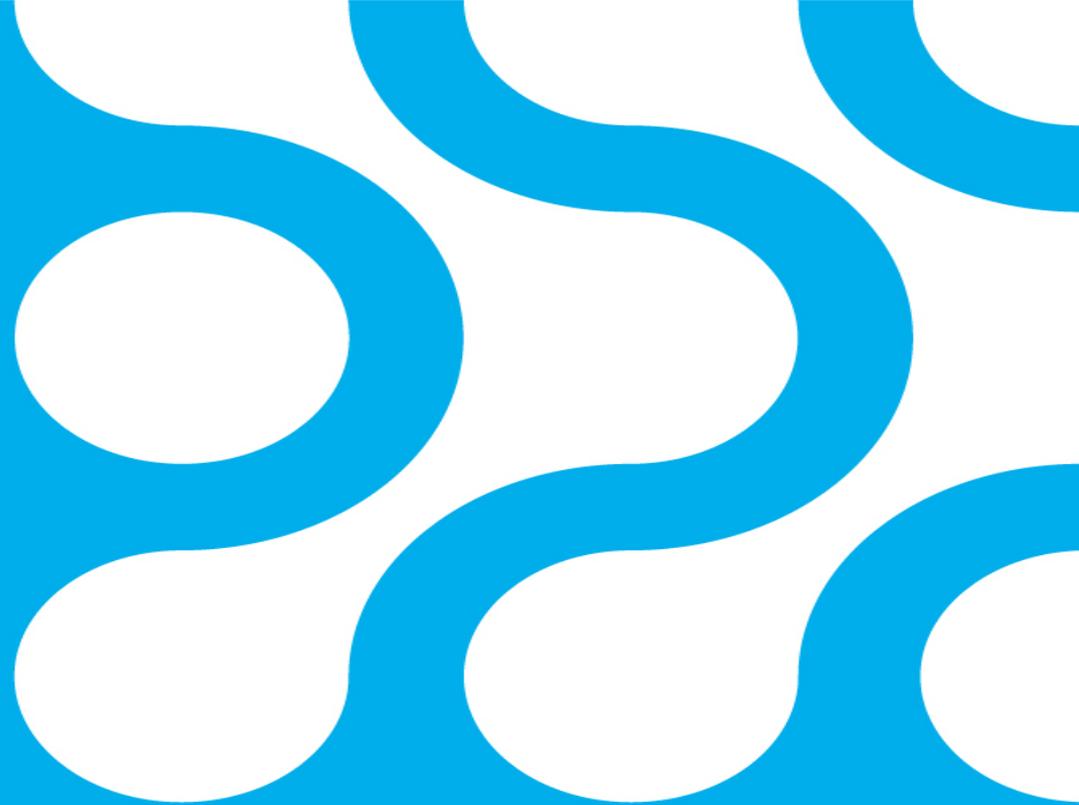
- Manufacturers consume more than 30% of the nation's energy consumption. Industrial users consumed 32.3 quadrillion Btu of energy in 2018, or 32.3% of the total. (*Source: U.S. Energy Information Administration, Annual Energy Outlook 2019*)
- A new global map being shaped by dramatic shifts in energy and geopolitics—a map defined by changing policies, technology, alliances, geopolitics, and possibly collisions in global commerce and politics.

## Societal and Political Turmoil

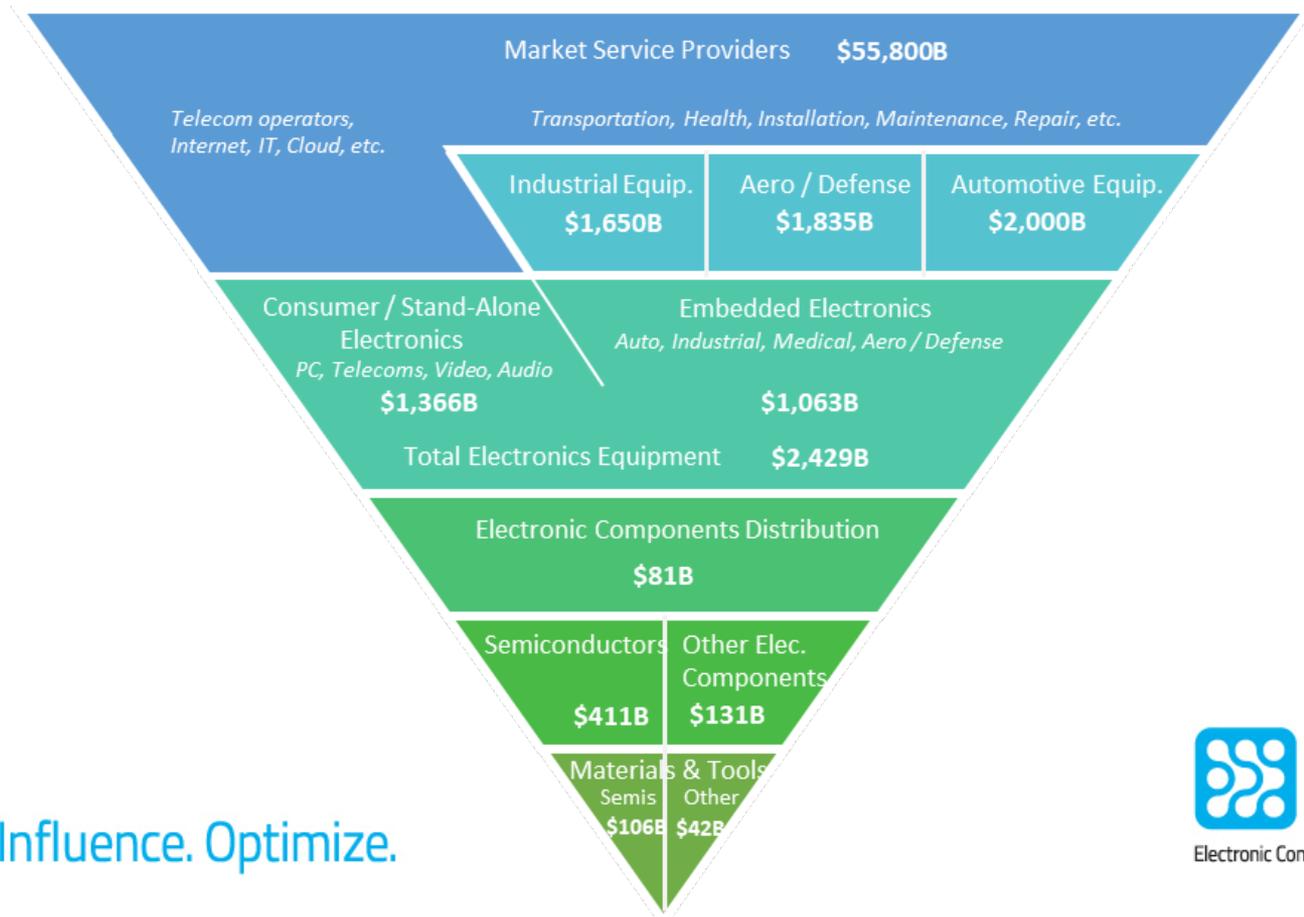
# What is the Anticipated Impact of a New Administration?



**Speaking of  
Technology and  
the Economy...**



# World Electronics Value Chain - 2019



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A Brief Message from Our Sponsors ...

**PLEASE SUPPORT THE DTAM SURVEY!**

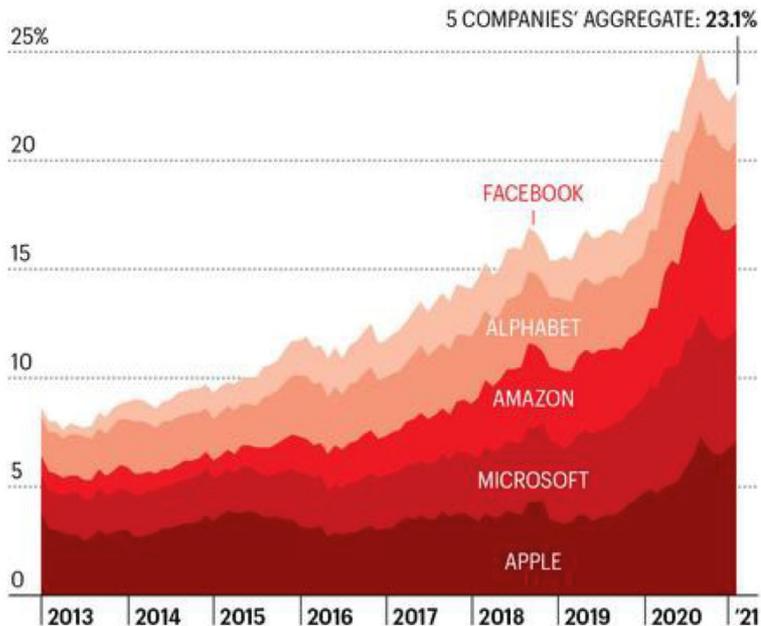
**Final Day – Thursday, March 25<sup>th</sup>**

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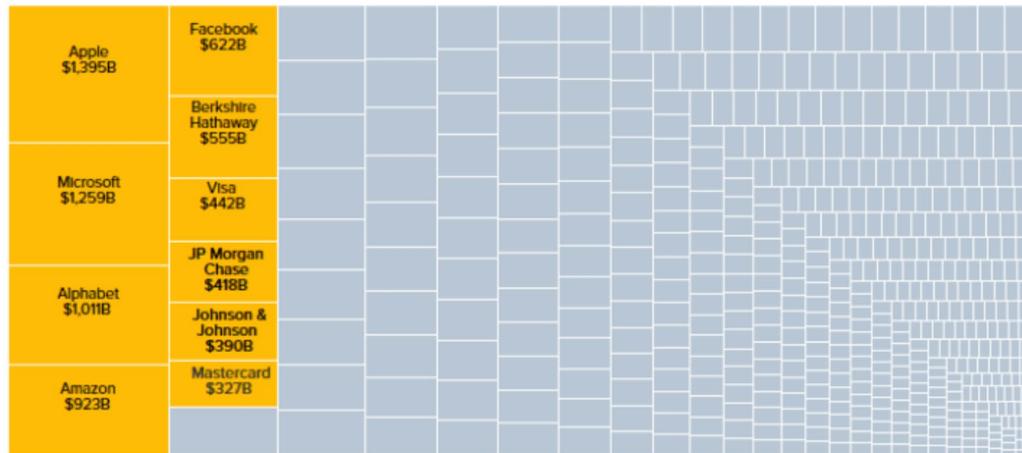


# The Increasing Economic Influence of Technology

## BIG TECH AS A SHARE OF THE S&P 500 INDEX



## S&P 500's 10 biggest market caps



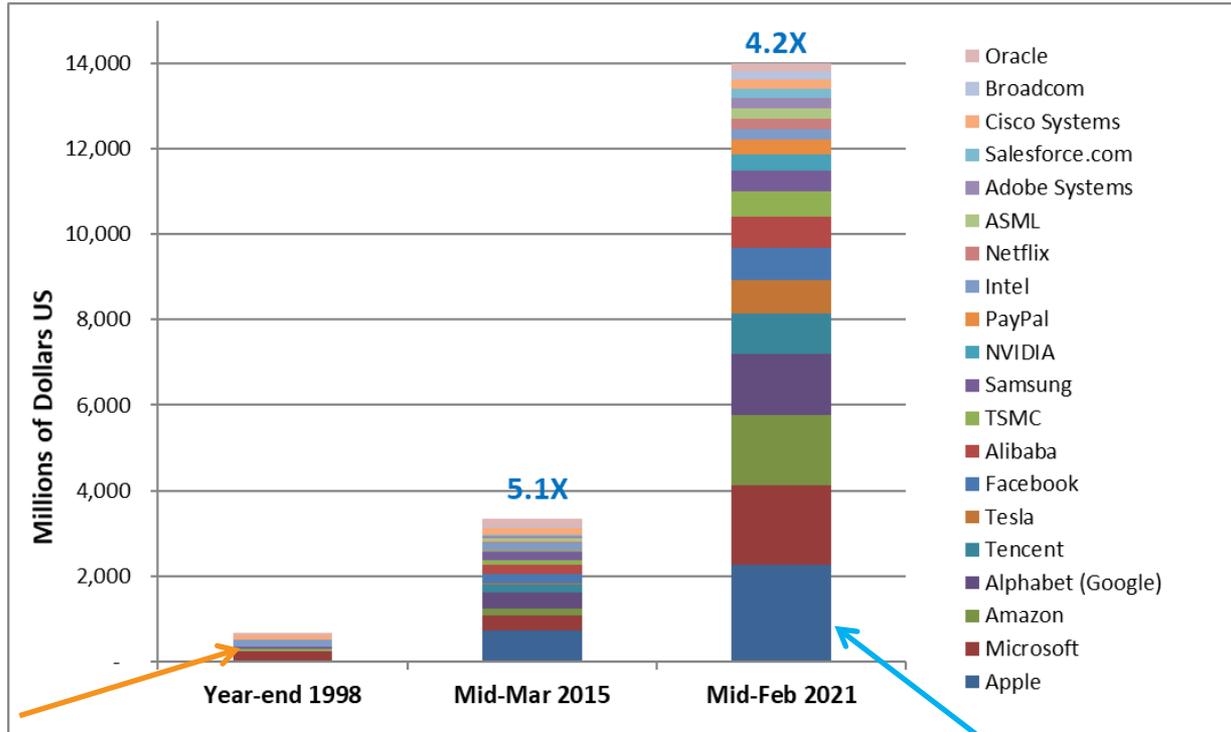
SOURCE: S&P Capital IQ, as of Jan. 27 2020



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# Top 20 Technology Companies See Market Cap 7x of 1998

## Market Capitalization



Apple \$4 B

Apple \$2.3 T

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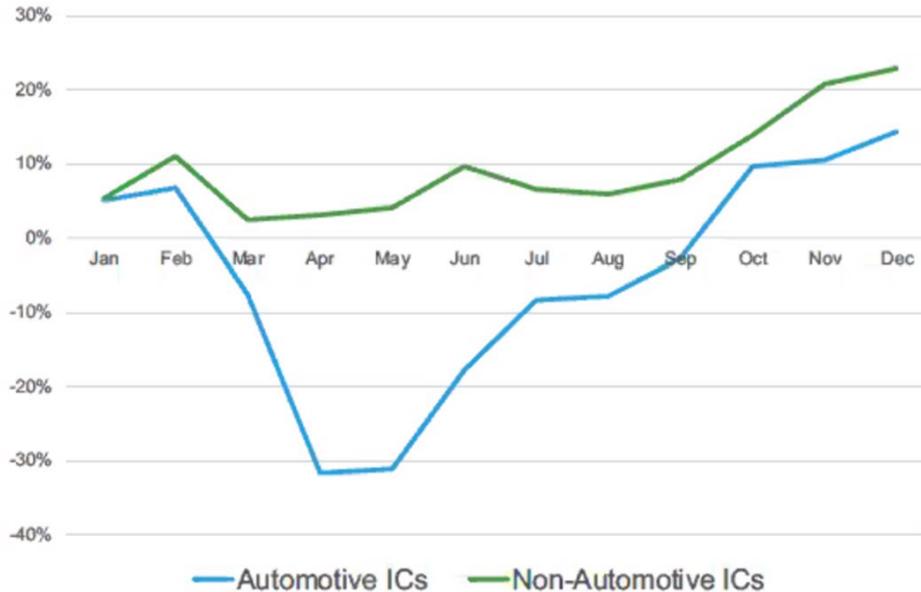
## Most Recent IPOs

1. PayPal (2015)
2. Alibaba (2014)
3. Facebook (2012)
4. Tesla (2010)
5. Alphabet/Google (2004)
6. Tencent (2004)
7. Salesforce.com (2004)
8. Netflix (2002)
9. Broadcom (1998)
10. Amazon (1997)
11. TSMC (1997)



# COVID-19's Dramatic Impact on the Auto Chip Market

Year-over-Year Monthly Sales Growth  
Percentage Change, Automotive ICs vs Non-  
Automotive ICs, 2020-2019



Source: SIA, WSTS



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- The COVID-19 pandemic created unprecedented shifts in global semiconductor demand
- Sudden and significant decrease in Automotive sales during Q2 2020
- Equally steep and sudden rise in Automotive chip demand during second half of 2020

# Automotive Chip Crunch Exposes Supply Bottleneck

- Major auto production lines shut – annual losses estimated in billions of dollars
  - Miscommunication between auto manufacturers and suppliers
  - 200 mm fabs at 100% capacity with no room for automotive upside
  - Appeals to Taiwan from government economy ministers
  - TSMC agrees to “Hot Hot Runs” – expensive and potential equipment damage.
  - Automotive market mismatched with foundries – Low Volume, Short/Bursty runs
- 200 mm capacity now impacting other markets in smartphones & computers
- ECIA CEO releases statement highlighting missed benefits of using distribution
  - “To minimize future supply chain disruptions, it is imperative for industries like automotive to efficiently and effectively employ the resources and options available to them, and a huge, under-utilized resource available today is the [authorized channel of electronics distribution](#).” – David Loftus, CEO



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## THE WALL STREET JOURNAL.

### *Big Automotive Chip Shortage Is No Surprise*

The focus on lean should have been balanced with a pragmatic view on the extreme cost of idled automotive production lines.

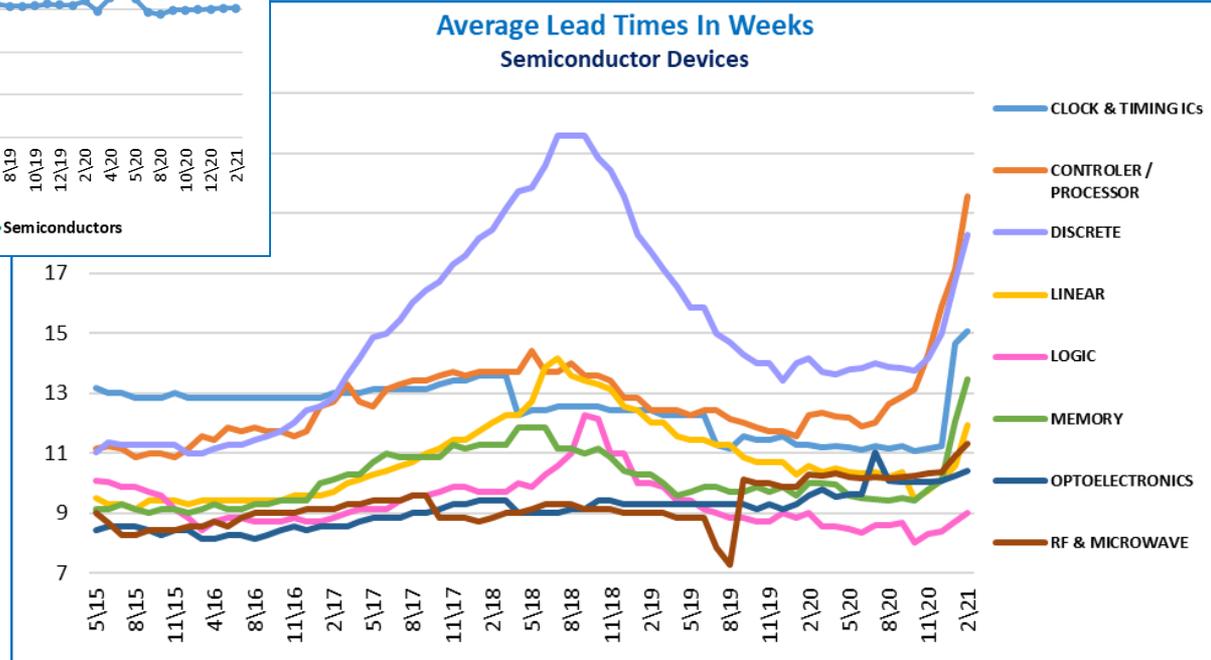
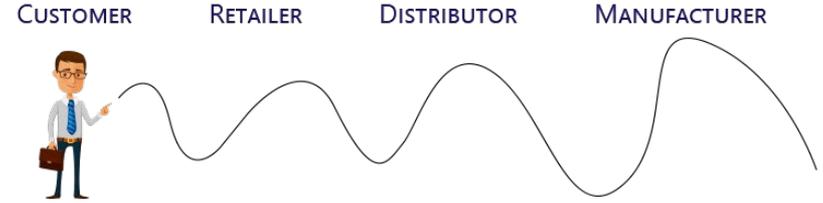
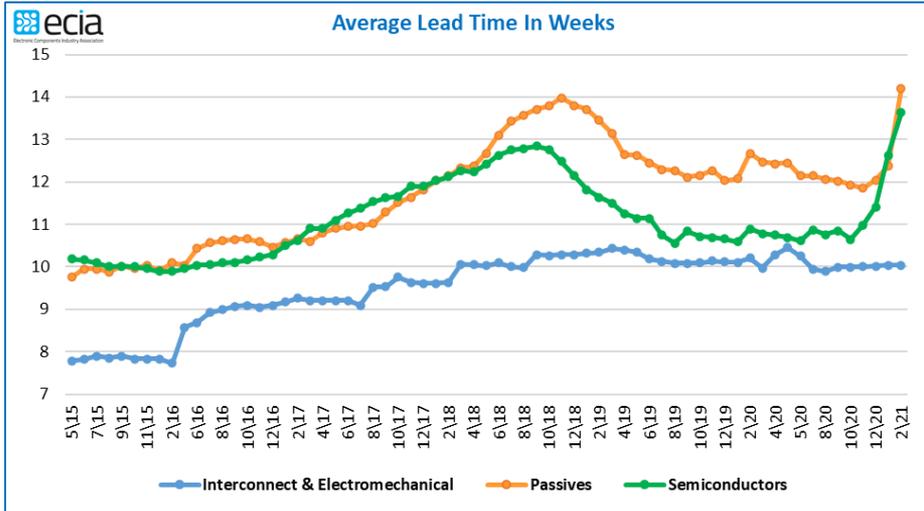
.....  
The collaboration between authorized distributors and automotive manufacturers presents a wealth of opportunity to minimize future disruptions.

David Loftus

President and CEO

Electronic Components Industry Association

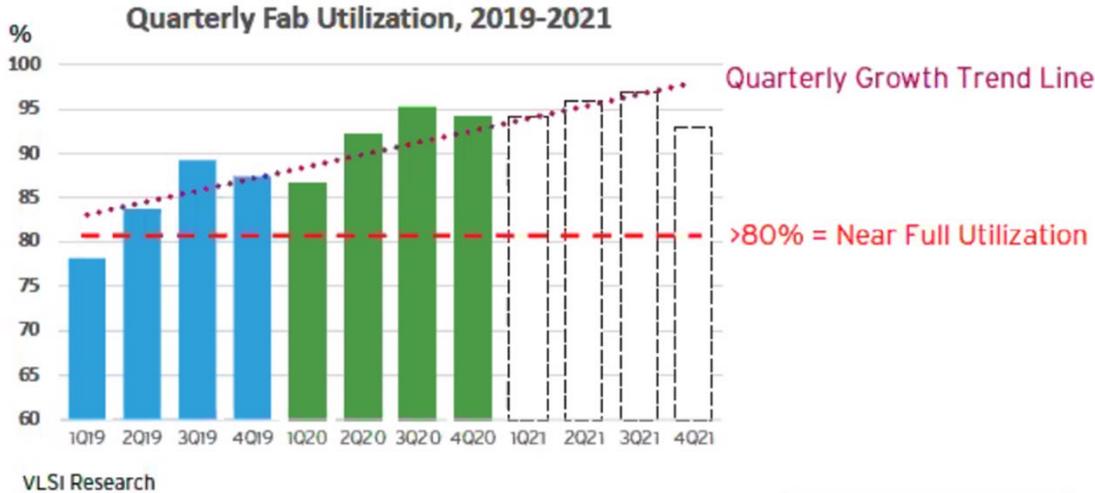
# North America Lead Time Trends – Bullwhip Effect



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# The Challenge of Balancing CAPEX

## *Surge vs Steady State*



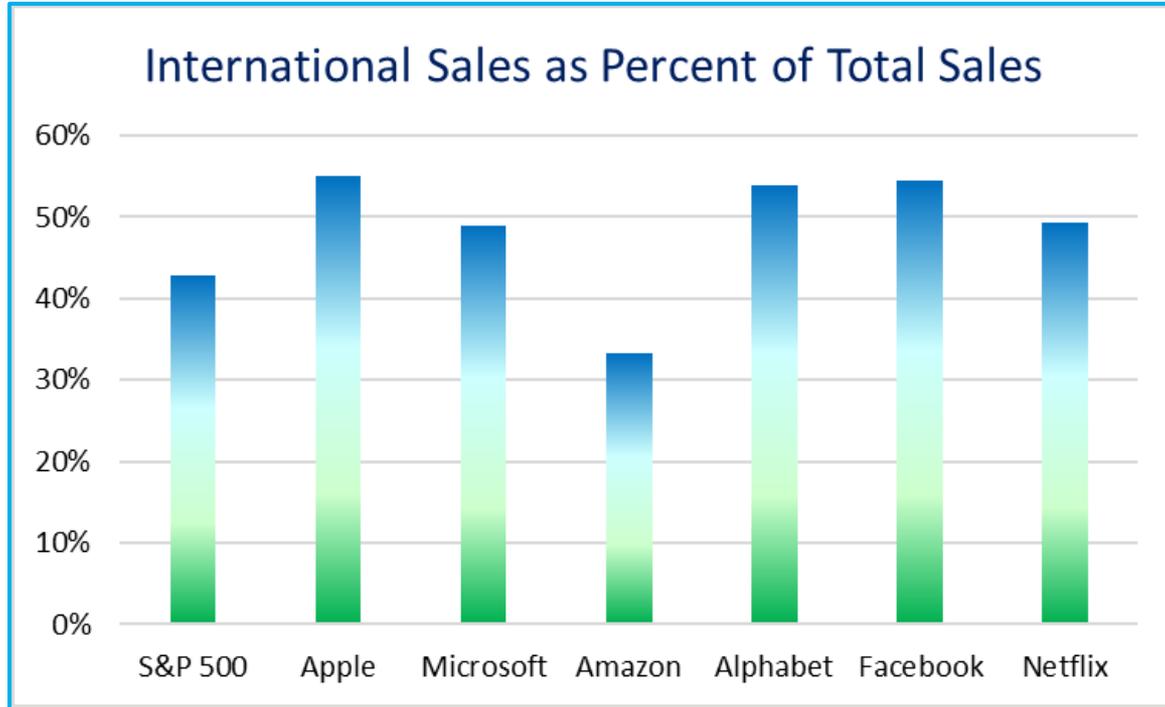
63 companies own a 200mm fab (down from 76 in 2007)

28 companies own a 300mm fab

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- Strong addition of fab capacity in 2020 still outstripped by surge in demanding starting in H2 2020
- Added CAPEX investments by major fabs announced
  - But, building new fabs typically takes 18 to 36 months
- Will steady state demand settle back and eventually leave industry with excess capacity?
- This is the continual semiconductor industry challenge and a driver of the cycle

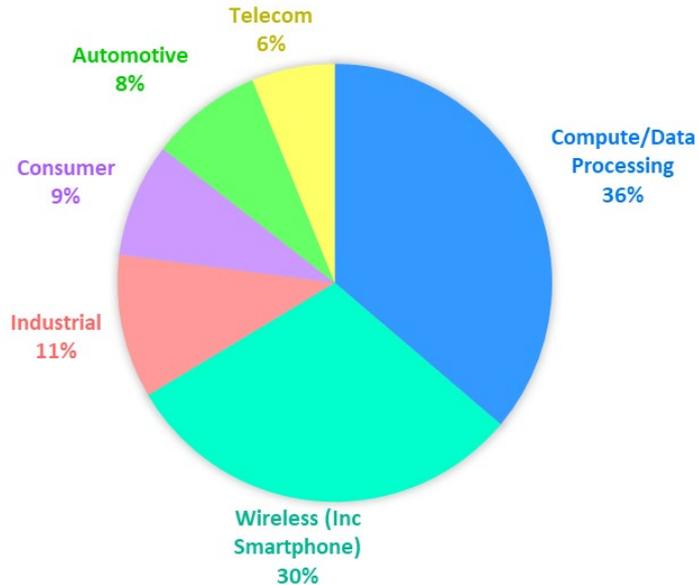
# Global Trade Critical to Healthy Tech Economy



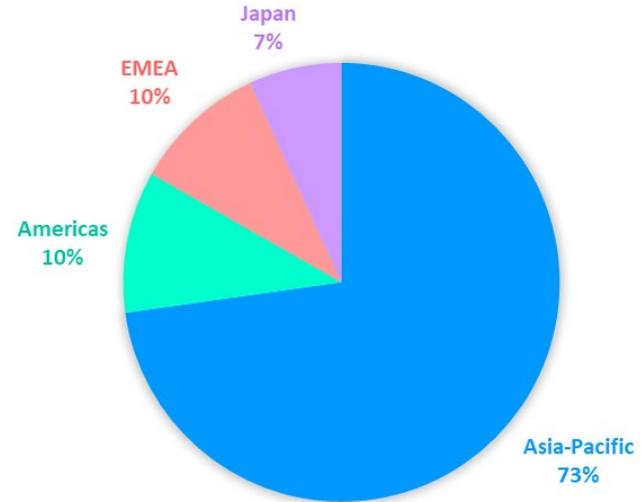
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# Electronics – Global but Concentrated

## SEMICONDUCTOR SALES BY MARKET



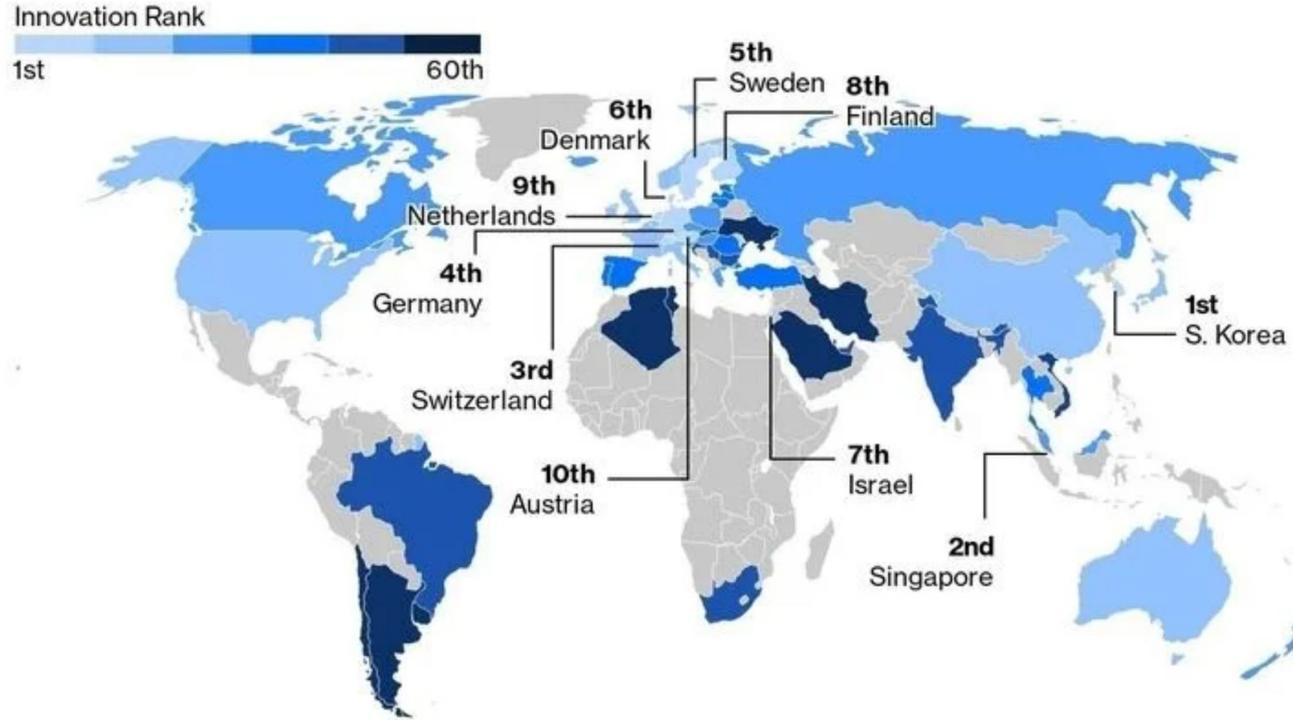
## SEMICONDUCTOR SHIPMENTS BY REGION



Source – OMDIA

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# World's 60 Most Innovative Economies



## Metrics

- R&D Intensity
- Manufacturing Value-added
- Productivity
- High-tech Density
- Tertiary Efficiency
- Researcher Concentration
- Patent Activity

Sources: Bloomberg, International Labor Organization, International Monetary Fund, World Bank, Organisation for Economic Cooperation and Development, World Intellectual Property Organization, United Nations Educational, Scientific and Cultural Organization

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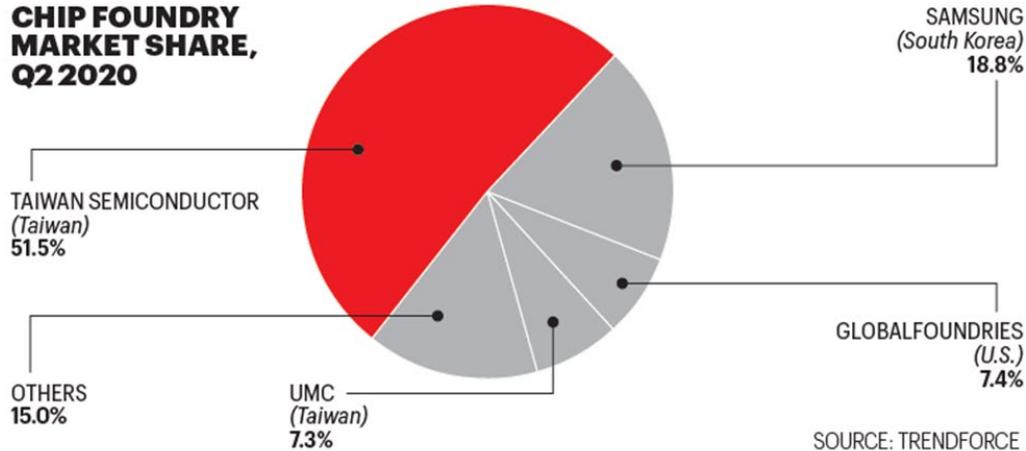
# The Push to Rebuild US Semiconductor Manufacturing

- Congressional legislation
  - Creating Helpful Incentives to Produce Semiconductors (CHIPS) Bill
  - At least \$22.75 B in funding/matching; Tax incentives; NIST/STEM/DOD initiatives and more
  - Promotion and lobbying by SIA
  - Bipartisan and Bicameral but died in last congress
  - Effort to reintroduce this congress
- Open letter from then Intel CEO, Bob Swan, to President-elect Biden
  - Urges U.S. government investment in the domestic semiconductor industry and support of immigration programs to find needed talent for the tech industry
- Recent advocacy by senators to White House in response to automotive crisis
  - Urged the White House "to support efforts to secure the necessary funding to swiftly implement the semiconductor-related provisions in the most recent National Defense Authorization Act..."
- **New Executive Order – 100 Day Critical Supply Chain Assessment**

# Semiconductors as a Weapon

TSMC Sales Profile:  
US = 60% of sales  
China = 20% of sales

## CHIP FOUNDRY MARKET SHARE, Q2 2020



“I could buy the same tennis racket as Serena Williams, but I’m not going to play as well as her.”

- Philip Wong,  
vice president of  
corporate research

## Trade headwinds creating headaches

“Our work relies on the free flow of knowledge and the free flow of trade which has no doubt been suppressed.”

- Mark Liu, TSMC Chairman

Taiwan government & industry groups take formal steps to localize semiconductor equipment production

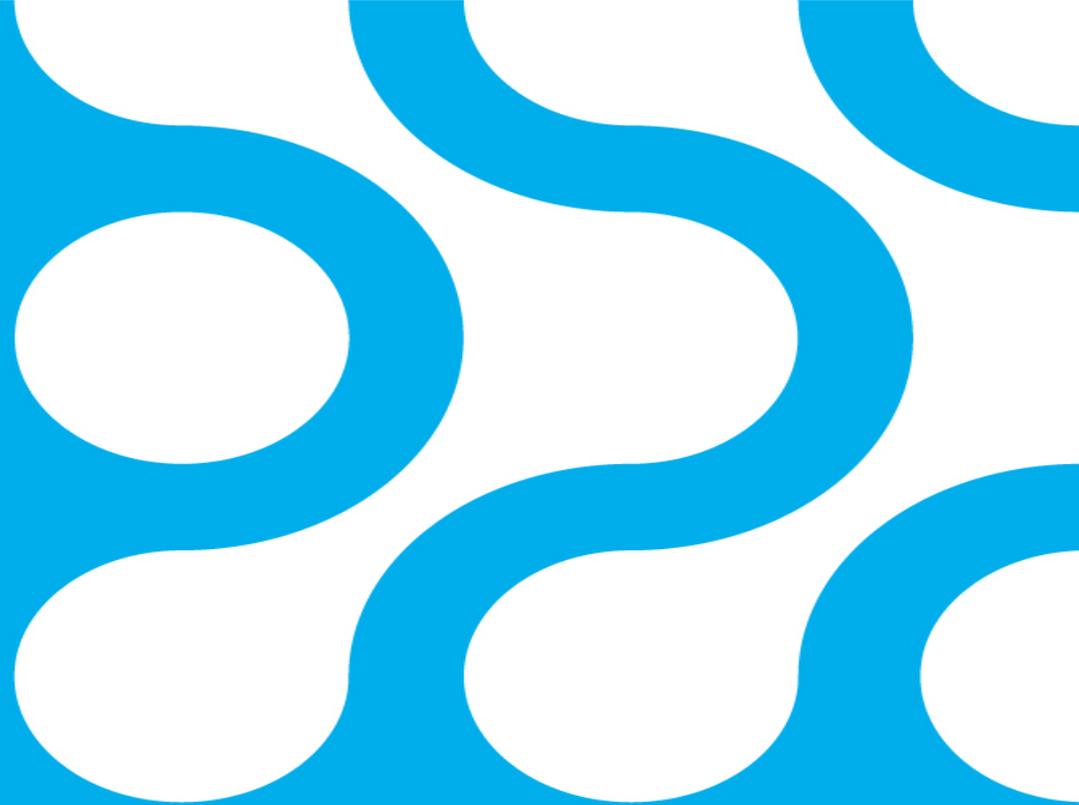
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# Will “Bifurcation” Avoid Balkanization?



- Asymmetric Competition: A Strategy for China & Technology
  - Proposal produced by group formed by Eric Schmidt and Jared Cohen
  - Schmidt refers to proposal as “Bifurcation”
- “Advances policies that position the U.S. to out-compete China without inviting escalatory cycles of confrontation, retaliation, or unintended conflict”
- Functional Capabilities a core part of proposal
  - **“Supply Chains.** Building more resilient supply chains is critical to diminishing our vulnerability to Chinese control, but will require significant investment in domestic infrastructure, ally-centric production, and advances in automation.”
- **Next Generation Chips** – Defined as “Critical Technology” in “Technological Battleground”

# What About the Electronics & Components Supply Chain?



# Lessons Learned – Proactive Risk Management

“Every 3.7 years on average, businesses can expect a supply chain disruption that lasts at least a month, and the most serious of these can have severe financial consequences”

2020 McKinsey Analysis

“Amnesia and misaligned incentives may be among our worst enemies when it comes to building supply chain resilience for the long haul.

Managers would do well to assess their top risks and understand the corresponding risk profiles for each supplier.”

Lynn Torrel, Chief Supply Chain and Procurement Officer, Flex

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# Lehigh University Supply Chain Risk Index – Q1 2021

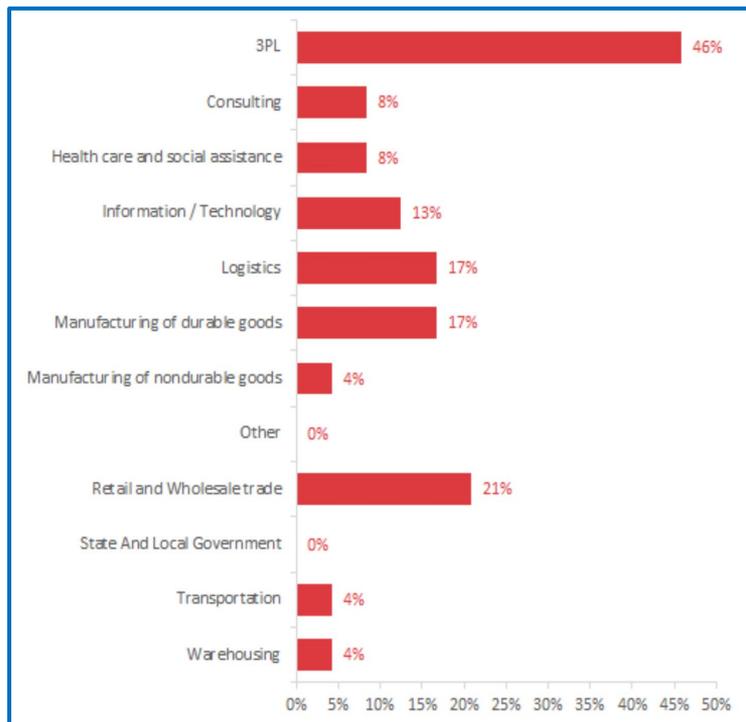
Risk Type	Current Risk Index	Last Quarter Risk Index	Trend
Transportation Disruption Risk	77.34	69.60	↑
Customer Risk	74.22	70.66	↑
Economic Risk	72.66	78.26	↓
Supplier Risk	71.88	74.38	↓
Cybersecurity and Data Risk	71.88	72.13	↓
Government Intervention Risk	71.88	70.43	↑
Operational Risk	61.72	60.00	↑
Technological or Competitive Risk	55.47	58.26	↓
Quality Risk	55.47	56.80	↓
Environmental Risk	53.91	59.13	↓
<b>Average Risk Index</b>	<b>66.64</b>	<b>66.97</b>	↓

## Four Biggest Risks – Q1 2021

- 1- Transportation Disruption + 7.74
- 2- Customer + 3.56
- 3- Economic - 5.60
- 4- Supplier - 2.50

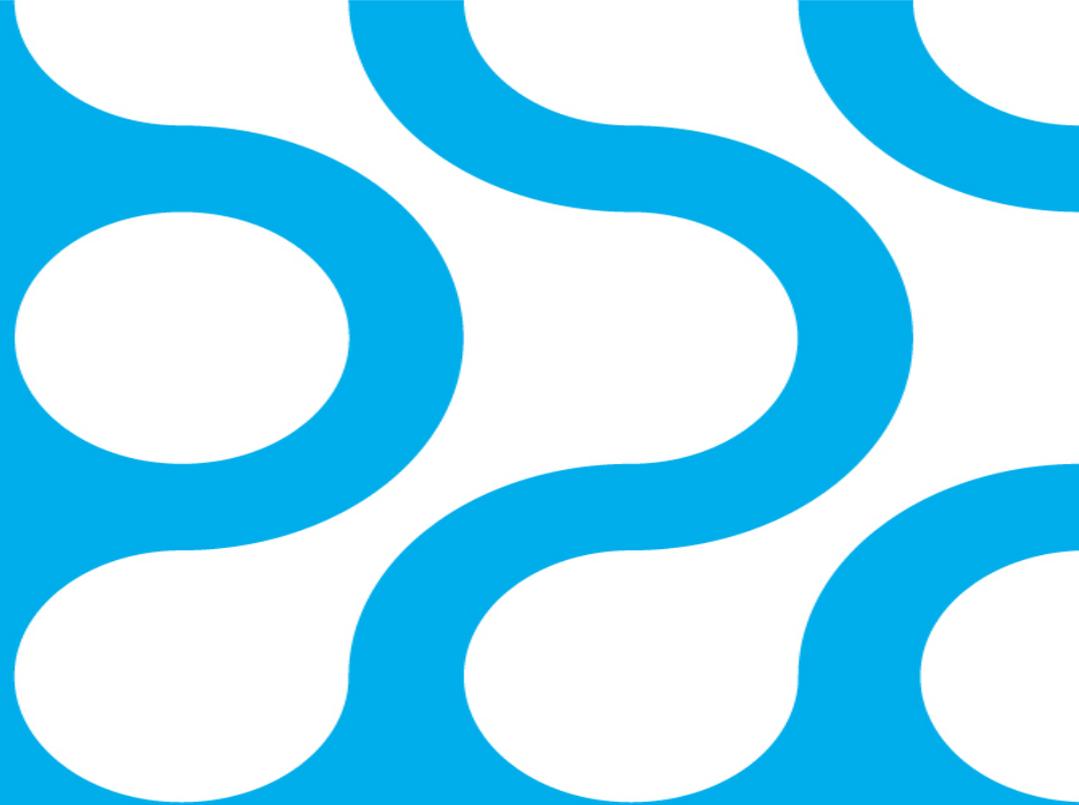
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Source: Lehigh Univ, CSCMP



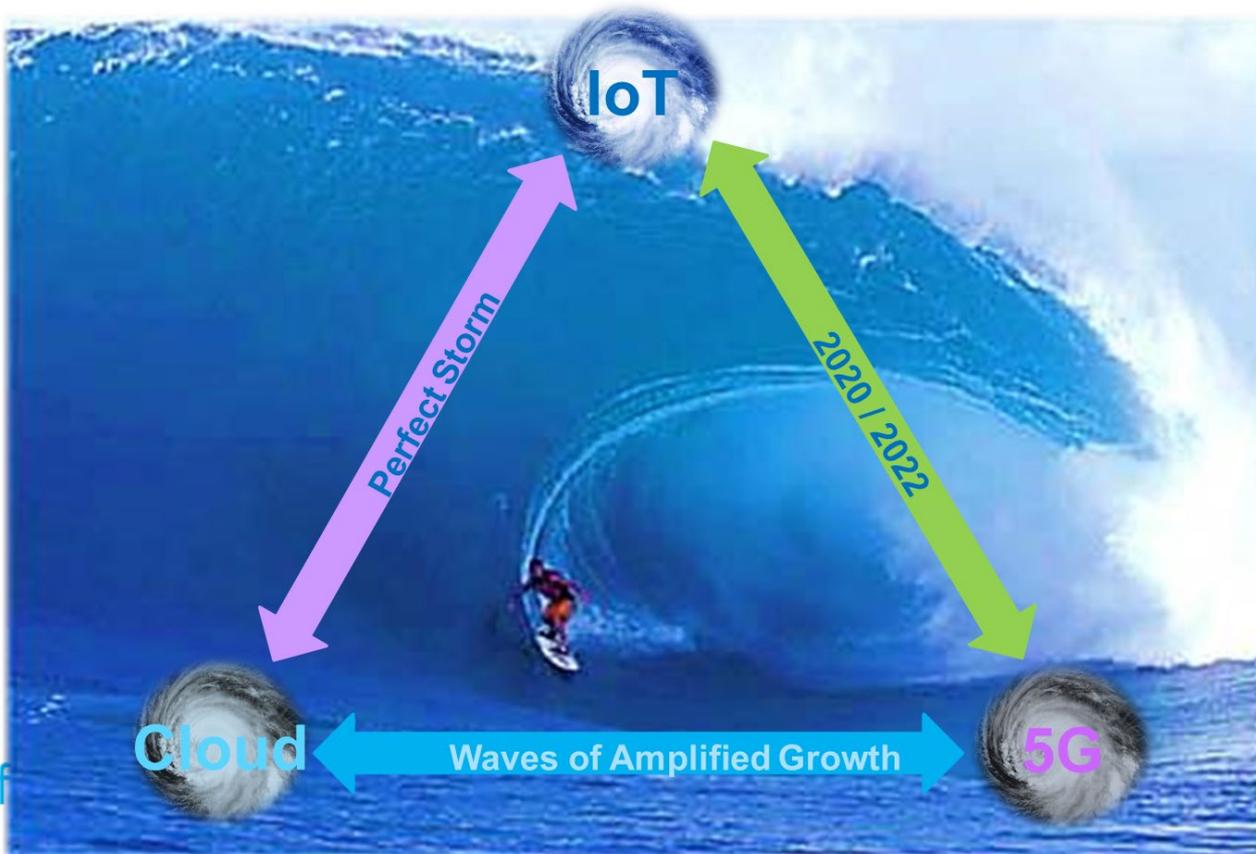
# Electronics & Components

## Market Drivers



# Market Outlook – Long Term Future Still Bright!

The Developing Technology Triumvirate



Connect. Inf

# The Technology Triumvirate

## 5G

- ❖ Global IP traffic growing > 25% per year -> IP traffic between 2018 & 2024 will be four times greater than all IP traffic before
- ❖ Spec'd to deliver 1 million connections per square KM vs. 60,680 for 4G
- ❖ By 2022, 5G will comprise 3% of total mobile connections = 422M 5G devices & M2M connections -> by 2024 +23% of handsets

## IoT

- ❖ 20B connected IoT devices in 2018 grow to 68B in 2025, 19% CAGR (source: Goldman Sachs)
- ❖ \$2.7T - \$6.2T economic impact in 2025 across all markets (source: McKinsey)
- ❖ 2020 IoT Chips = +\$40B (source: SIA)
- ❖ Drives new productivity across \$36T in operating costs in manufacturing, health care, utilities, logistics & mining

## The Cloud

- ❖ Exponential growth in data generation, processing and storage
- ❖ Enables AI and the host of XaaS

Table 1. Worldwide Public Cloud Service Revenue Forecast (Millions of US Dollars)

	2019	2020	2021	2022
Cloud Business Process Services (BPaaS)	45,212	43,438	46,287	49,509
Cloud Application Infrastructure Services (PaaS)	37,512	43,498	57,337	72,022
Cloud Application Services (SaaS)	102,064	104,672	120,990	140,629
Cloud Management and Security Services	12,836	14,663	16,089	18,387
Cloud System Infrastructure Services (IaaS)	44,457	50,393	64,294	80,980
Desktop as a Service (DaaS)	616	1,203	1,951	2,535
<b>Total Market</b>	<b>242,697</b>	<b>257,867</b>	<b>306,948</b>	<b>364,062</b>

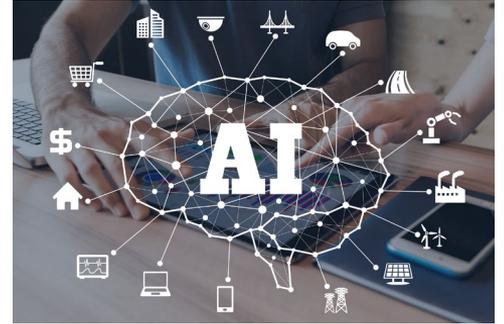
= infrastructure as a service; PaaS = platform as a service; SaaS = software as a service

Source: Gartner

# AI – Principles, Predictions, Power

- AI helps improve: Predictions, Automation, Optimization
- Prepared to Accelerate
  - Harnessing vast amounts of data
  - Huge advances in software
  - Leveraging increased power of compute
- Adding “Deep Learning”
  - Go beyond data analysis; Think like a human - unstructured data, video, images
- Ethical Issues – Tech for good and Tech for bad
  - 3 IBM AI Principles
    - AI augments the human – not replace; Designed to enhance and extend
    - Data and insights generated belong to their creator
    - Must be transparent and explainable - attempts to eliminate bias
- Prediction – AI will contribute \$16 T to economy by 2030

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# OMDIA AI Webinar Survey Results

**How confident are you that AI will deliver positive results in the next 12-24 months?**

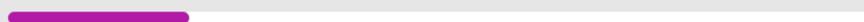
Very confident 40%



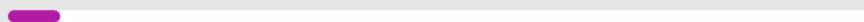
Confident 33%



Somewhat confident 21%



Not confident at all 6%



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# Market Outlook

- Technology and market drivers build momentum
- Economic stability needs to provide solid foundation
- Adoption of new technologies in systems drives expanding design opportunities
- Opportunities for new component technologies to make a mark
- But don't overlook need for legacy manufacturing capacity

## Positives

- Medical Equipment
- Data Centers
- Telecom Infrastructure
  - 5G
- Solid state drives
- “Touchless” solutions
- Memory
- Sensors

## Challenges

- Automotive Electronic Component Supply
  - Expanding to others?
- Aerospace Electronics
- Global Trade
- Inventory / Supply Chain Management



Connect. Influence. Optimize.

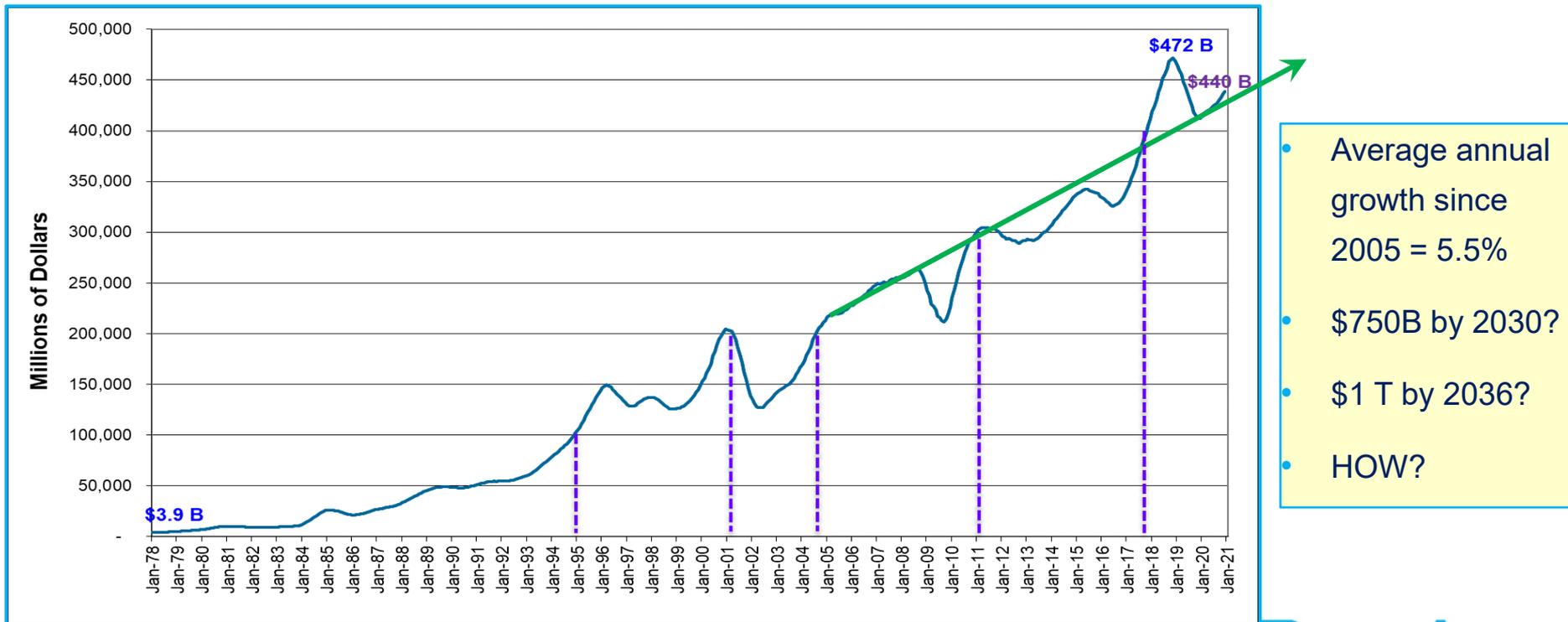
# Growth Drivers for Semis & IP&E Components

- New technologies enable/drive new system and network architectures
- Creation of new classes and categories of devices
- Motivator to upgrade and enhance current installed base of electronics
  - Commercial AND consumer / Competition
- Pressure on next level performance from devices through networks
  - GaN & SiC devices, process geometry shrinks, sensors, processing architectures, energy harvesting...

Technology / Market Disruption Will Create an Explosion in New Design Win Opportunities

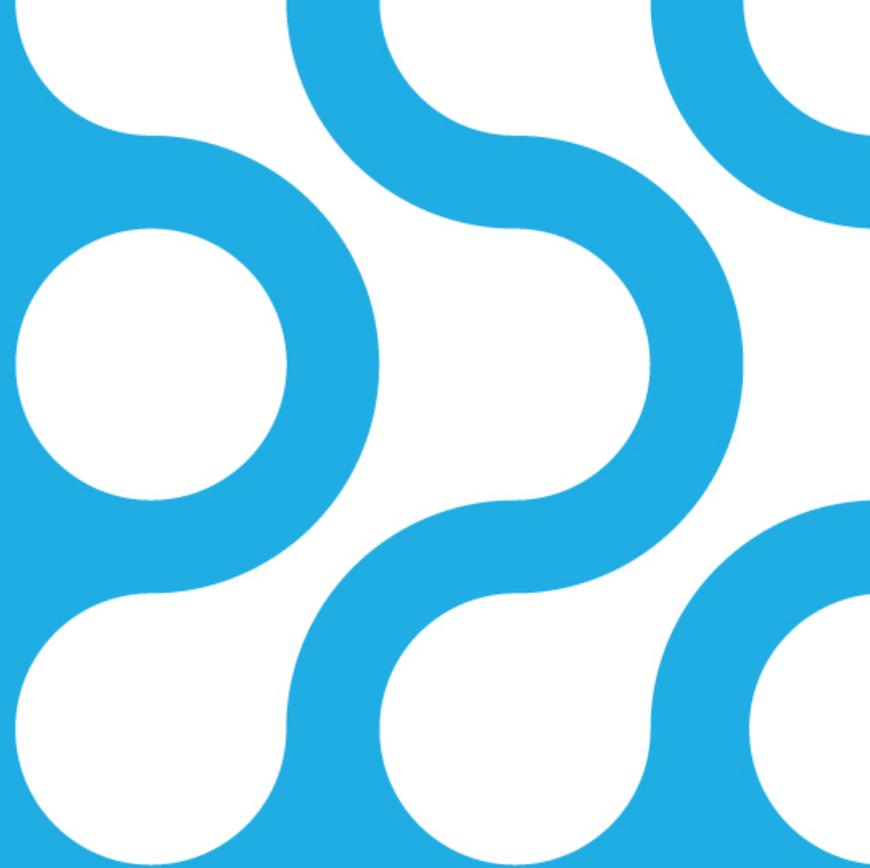
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# Long-term Semiconductor Growth Trends



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# The Vision Thing

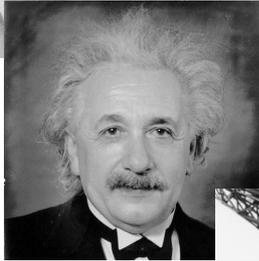


# Journey Into the Future: Elon Musk

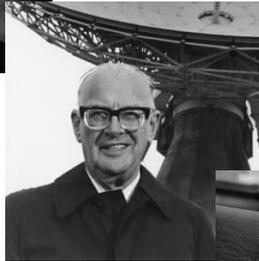
## Exploring the Tech that is Waiting for Us



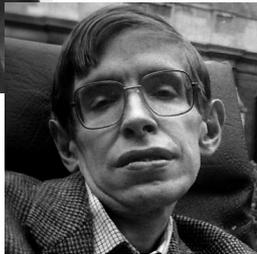
“Dream no small dreams for they stir not the hearts of men.”  
– **Johann Wolfgang von Goethe**



“To look to the future, we must first look back upon the past. That is where the seeds of the future were planted. I never think of the future. It comes soon enough.”  
– **Albert Einstein**



“Any sufficiently advanced technology is indistinguishable from magic”  
– **Arthur C. Clarke**



“Shouldn't we be content to be cosmic sloths enjoying the universe from the comfort of earth?  
The answer is: No.”  
– **Stephen Hawking**



## Vision: 2025 - 2026

Wearable tech is replaced by subdermal tech chips that are inserted beneath the skin and link users to their home and robotic devices, giving them control using verbal instructions.



People with medical issues are using Neuralink chips to make them better. The chip is able to restore eyesight and help people who are paralyzed to walk again.



Humans begin to interact with virtual reality artificial life living beings in a digital world that learn how to act, move, and interact with humans on their own, creating their own behaviors and way of life.

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# Vision: 2025 - 2026



5G networks carrying vast amounts of data take control of transportation flow systems and self-driving networks to improve urban flow.

Quantum computers are used in high-end chemical engineering. They are able to quickly design new medicines, biodegradable plastics, and building materials.



The interplanetary internet system goes online creating a computer network in space. The network is made up of landing robots, planet satellites, and earth ground stations.



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# Thank you!

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**ecia**

Electronic Components Industry Association

