ARIZONA TECHNOLOGY COUNCIL

a place to connect and grow

ARTIFICAL INTELLIGENCE (AI) IN SUPPLY CHAIN

AI IN SUPPLY CHAIN PRESENTATION

ARIZONA TECHNOLOGY COUNCIL
a place to connect and grow

- Evolution of Industry 4.0 and SCM 4.0
- 5 Generations of SCM
- What is SCOR
- What is AI & What is Generative AI
- Todays Real Facts on SCM AI
- Where Used & Not Used
- Top Areas for AI in SCM
- Case Study #1 – S&IOP
- Case Study #2 – Spend Management
- Case Study #3 – 3PL
- AI – Now & Future
- 5 Key Take Aways from Presentation
- 5 Key Lessons Learned

NATURAL INDUSTRY EVOLUTION

INDUSTRY 4.0

- **Internet of Things (IoT**) - Networking physical objects and devices with sensors and internet connectivity.
- **Big Data and Analytics** - Large amounts of data from sensors, machines and operations is analyzed using AI and machine learning.
- **Automation and Robotics** - More processes are automated.
- **Simulation** - Virtual models of factories and production processes.
- **Augmented Reality** - AR overlays digital information and instructions onto physical environments.
- **Additive Manufacturing** - 3D printing technology allows on-demand production.
- **Cybersecurity** - With extensive connectivity and data exchange, securing networks, devices and data from cyber threats is critical.
- **Cloud Computing** - Provides scalable on-demand computing resources, storage and applications.

SCM 4.0

Internet of Things (IoT) and sensors - Using connected devices and sensors

Advanced analytics - Leveraging big data, artificial intelligence, and machine learning. Enables predictive capabilities.

Automation - Using technologies like robotics, drones, driverless vehicles to automate processes and increase efficiency.

Cloud computing - Cloud-based platforms to enable collaboration, scalability, agility.

Cybersecurity - Protecting supply chain data, technologies, and connections.

Customer-centricity - Using data and technology to better predict customer needs, respond quickly to demands, and deliver individualized customer experiences.

Sustainability - Leveraging technology and data to optimize supply chain sustainability.

Agile, adaptable networks - Fostering supply chain agility, flexibility, and adaptation.

5 GENERATIONS OF SCM

I. The Silent Generation (born 1928-1945)
- Emergence of global supply chains and international trade after WWII
- Growth of consumerism and demand for variety of products
- Beginning of containerization improving shipping efficiency

II. Baby Boomers (born 1946-1964)
- Expansion of global supply chains with outsourcing and offshoring
- Just-in-time inventory management improves efficiency
- Supply chain automation begins with barcodes and EDI

III. Generation X (born 1965-1980)
- Supply chains become more complex and global
- Outsourcing and offshoring maturation continues
- Introduction of Enterprise Resource Planning (ERP) systems

IV. Millennials (born 1981-1996)
- Focus on supply chain agility and flexibility
- Growth of online retail and direct-to-consumer channels
- Sustainability and ethics gain prominence in supply chain

V. Generation Z (born 1997-2012)
- Emerging technologies like AI, robotics, IoT reshape supply chains
- Omnichannel supply chains emerge with growth of e-commerce
- Circular economies and sustainability drive supply chain innovation

SCOR (SUPPLY CHAIN OPERATIONS REFERENCE – 6 ELEMENTS)

- **Plan:** This process involves forecasting demand, developing supply plans, and creating financial plans. Goal: Meet customer demand.
- **Source:** This process involves acquiring the materials and services needed to produce the company's products. Source at the best possible price and quality.
- **Make:** This process involves transforming the materials and services into finished products. Products that meet customer requirements and expectations.
- **Deliver:** This process involves getting the finished products to the customer. Excellent customer service and ensure that the products arrive on time and in good condition.
- **Return:** This process involves handling customer returns and exchanges. Positive customer experience and minimize the costs associated with returns.
- **Enable:** This process involves providing the people, technology, and information needed to support the other five processes. Resources it needs to effectively manage its supply chain.

WHAT IS ARTIFICAL INTELLIGENCE (AI) ?

ARIZONA TECHNOLOGY COUNCIL
a place to connect and grow

ARTIFICAL INTELLIGENCE

Systems that can simulate human abilities , and perform an increasingly wide variety of human tasks.

The key capabilities of AI include:

- **Learning** - AI systems build knowledge and learn from data and experiences rather than being explicitly programmed. Machine learning algorithms.
- **Reasoning** - AI can reason, draw conclusions and make decisions based on its accumulated knowledge. Expert systems employ reasoning for task-specific advising and planning.
- **Perception** - AI systems can perceive their environment using computer vision, speech recognition, sensors, etc.
- **Problem-solving** - AI can apply intelligence and knowledge to solve problems in creative ways humans may not think of.
- **Language processing** - AI enables understanding, interpretation and generation of natural human languages like English. Chatbots to interface with humans.
- **Robotics** - AI enables automation of physical tasks by controlling robots and replicating human motor skills.

GENERATIVE AI

Refers to artificial intelligence capabilities that can generate new content, designs, sounds, images, videos, animations, 3D models, and other outputs from scratch.

The key characteristics of generative AI include:

- **Creative** - Generative AI can autonomously create novel, original artifacts and content that appears to reflect human-level creativity. This includes art, music, stories, designs, etc.
- **Customizable** - Many generative AI models allow customizing outputs by providing desired inputs, attributes, and directions. Users can guide the output as per their needs.
- **Data-driven** - Large datasets are used to train generative AI models on the various patterns and properties of quality output in a domain. Models generate new artifacts matching the training distribution.
- **Probabilistic** - Generative AI models generate outputs probabilistically, sampling possible outputs from the learned training distribution. Varied outputs are produced every time even for the same input.
- **Imperfect -** The outputs may not always conform to expected logical, stylistic or grammatical norms. Many generated artifacts need refinement.

WHERE IS AI IN SCM TODAY !

- **Retail:**
- Demand forecasting and inventory optimization (Walmart, Amazon)
- Personalized recommendations to customers (Starbucks, Spotify)
- Warehouse automation and robotics (Amazon, Ocado)

- **Transportation & Logistics:**
- Route optimization and fleet management (UPS, FedEx)
- Predictive maintenance on vehicles and equipment (GE)
- Automated warehouses and shipping centers (DHL, Amazon)

- **Manufacturing:**
- Production planning and scheduling optimization (BMW, Bosch)
- Predictive maintenance on machinery (GE, Siemens)
- Quality control and defect detection (Intel, Samsung)
- Inventory and parts optimization (Boeing, Airbus)

- **Consumer Packaged Goods:**
- Demand sensing and forecasting (P&G, Nestle)
- Marketing mix modeling and optimization (Coca-Cola, P&G)
- Automated ordering and replenishment (Walmart, Costco)

- Most widely deployed in supply chain planning, forecasting, logistics, warehousing, and manufacturing quality control.
- The biggest users are large retailers, consumer goods companies, and logistics providers.
- Areas like procurement and contract management are lagging in AI adoption compared to other supply chain applications.

TOP 8 AI AREAS IN SCM

- **Demand forecasting** - AI can analyze historical sales data, weather data, and other factors to generate more accurate demand forecasts. This helps companies plan production and inventory more efficiently.
- **Procurement and sourcing** - AI can identify the best suppliers and negotiate optimal pricing by analyzing factors like quality, reliability, lead times, and price history. It can also detect fraud and risk in the supply chain.
- **Supply chain visibility** - AI provides real-time tracking of inventory as it moves through the supply chain. It can identify bottlenecks, delays, or anomalies and recommend corrective actions.
- **Predictive maintenance** - By using sensor data from equipment and fleet vehicles, AI can predict when maintenance is needed before breakdowns occur. This improves uptime and lowers costs.
- **Logistics and routing** - AI can optimize delivery routes and mode selections to reduce mileage and shipping costs. It can also react to changing conditions like weather or traffic.
- **Warehouse automation** - AI powers robotics and other technologies to improve efficiency in warehouse operations like pick and pack, inventory management, and layout optimization.
- **Supply chain risk management** - AI can identify, assess, and mitigate risks of disruption across the supply chain by analyzing news, social data, and other sources.
- **Sustainability** - AI can help measure, report on, and reduce the environmental impact of supply chain operations related to waste, emissions, energy use, etc.

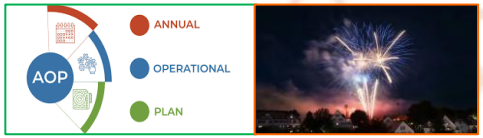
ARIZONA TECHNOLOGY COUNCIL
a place to connect and grow

CASE USE 1 – APS/Demand Planning (S&IOP)

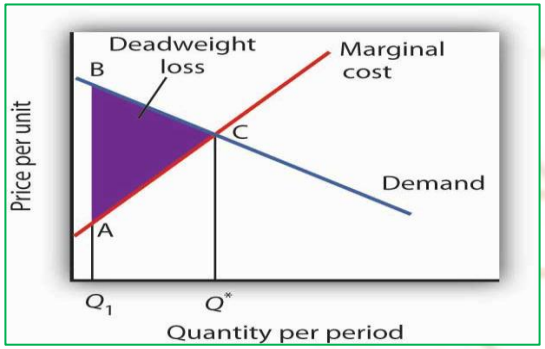
- Problem:
  - Dealer inputs (1000) for S&IOP – Lack inputs, bad data, & not timely
  - Imbalance & Excess Inventory over USA in 4 regions
    - $250M Total Inventory
    - 10,000 + SKU's
  - AOP $2B goal in jeopardy

- ACTION:
  - Re establish S&IOP with goals by area – Approval Customer Council
  - Co-ordinate "Complete" input by all areas
  - Timely **ACCURATE/CLEAN** data inputs (Sales, On hand, Warehouse, Transit, etc.)
  - Rebalance & Optimize Inventory by Region (New Model)
  - Revisit Corporation AOP – Realistic or Not

- RESULT:
  - New Integrated Network for Input – 40% faster
  - Inventory reduced $50M & $200M Optimized across 1000 sites & 5 DC's
  - AOP 100% achieved
  - New KPI's/Metrics based redesigned process



Case Use 2 – Spend Management



- Problem:
  - Units not in line Market Pricing – Overpriced!
  - Not Meeting Corporate Revenue Goals
  - Highly Complex Product to redesign

- ACTION:
  - Establish Goal for Cost Of Quality reduction – 12%
  - Supplier Day to Strategy & Timeline – Buy in
  - Develop new model for spend – Weight by area
  - Clean data send ALL suppliers for review – Price Vs. Cost Model
  - Train Corporate Commodity buyers on COQ Costing & Target Negotiations
  - New Contracts and new pricing

- RESULT:
  - Obtained 23% percent reduction vs 12%
  - $18M dropped to Bottom Line in 6 months
  - Market Leader in Product line
  - 40 Year company record for SCM

Case Use 3 – 3rd Party Logistics (3PL)

ARIZONA TECHNOLOGY COUNCIL
a place to connect and grow

- Problem:
  - Establish New Business in AZ from South America
  - Long Lead time Delivery & Not on time
  - High Cost per unit
  - Contigency Plan at Port (LA) due congestion
  - Issues due to drop ship & Liability

- ACTION:
  - Review site manufacture location and routing (LTL vs. TL)
  - Revisit 3PL - Delivery direct to DC in AZ
  - Build Fulfillment concept for orders

- RESULT
  - New Suppliers
  - New 3PL relationship = Better Routings
  - Obtained $1K reduction per pallet shipped

AI FUTURE

ARIZONA TECHNOLOGY COUNCIL
a place to connect and grow

NOW

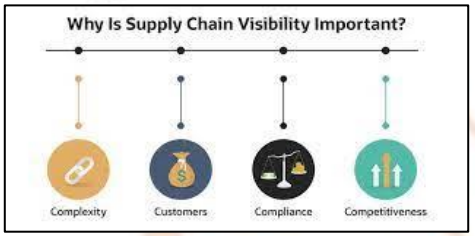
- Narrow AI predominates - Targeted at specific tasks like forecasting, not end-to-end supply chain
- PoC and pilot projects are common - Companies are trialing AI, full integration is rare
- Technical limitations persist - Data, model accuracy, explain ability, and customization issues exist
- Focus is on planning and logistics - Demand forecasting, inventory optimization, and logistics see the most AI today
- Automation is limited - Humans still required in many processes, full automation is restricted

FUTURE (6-10 years)

- Autonomous supply chain operations - AI agents managing complex end-to-end supply chains with little human input
- Continuous optimization - AI constantly optimizes supply chain configurations for maximum efficiency and adaptability
- Sustainability focus - AI helps optimize for circular supply chains, carbon footprint reduction, and resource efficiency
- Instantaneous fulfillment - With full transparency and predictive abilities, orders are fulfilled instantly across decentralized networks
- Adoption reaches tipping point - AI becomes the predominant way supply chains are architected and run, surpassing legacy approaches

5 Key Take Aways

- **AI can help improve supply chain visibility:** AI can help companies collect and analyze data from all parts of their supply chain, which can give them a better understanding of where their products are and when they will arrive. This can help to reduce uncertainty and improve decision-making.
- **AI can help optimize supply chain operations:** AI can be used to optimize a variety of supply chain operations, such as demand forecasting, inventory management, and routing. This can help to improve efficiency and reduce costs.
- **AI can help automate supply chain tasks:** AI can be used to automate a variety of supply chain tasks, such as order processing, data entry, and customer service. This can free up human employees to focus on more strategic tasks.
- **AI can help improve supply chain resilience:** AI can be used to develop predictive models that can help companies identify and mitigate risks in their supply chains. This can help to reduce the impact of disruptions and keep businesses running smoothly.
- **AI can help create a more sustainable supply chain:** AI can be used to optimize transportation routes, reduce waste, and improve energy efficiency. This can help to reduce the environmental impact of supply chains.



LESSONS LEARNED

1. **Start with focused, tactical solutions** - The most success is seen when AI is applied narrowly to targeted problems like forecasting or routing, not broad transformations. Get quick wins.

2. **Human-AI collaboration is crucial** - AI needs to augment humans, not replace them. Align AI with existing workflows and workers to get buy-in.

3. **Customization required for industry nuances** - Generic AI tools often struggle to accommodate industry-specific requirements without customization and careful training.

4. **Data infrastructure and quality are essential** - AI models are only as good as the data used to train them. Clean, well-organized data is critical.

5. **Change management matters** - AI changes processes and sometimes roles. Proactively address job impacts, training needs and organizational change requirements.

Q & A

ARIZONA TECHNOLOGY COUNCIL
a place to connect and grow

Questions or feedback?

John R. Choate

John started his Supply Chain – Manufacturing – Technology/Innovation & Finance career journey after college in combat/support units as a USAF Global Logistics-Transportation/Data System Officer. 1st USAF Officer to be ever designated a computer expert in Logistics/Transportation career field.

In the commercial/private sector, he has been in OEM/EMS companies, On/Near/Off Shore from IPO to global public/private USA/foreign corporations that were leaders and innovators in all areas of O2C Business, NPI, Supply Chain & Advanced-Digital Manufacturing, and Continuous Quality Improvement using Hardware/Software Innovation as an enabler. Some Examples include:

- Advanced planning and business systems, cell automation and process manufacturing in Telecommunications Industry/Fiber Optics. Startup to captured world market. Validated "Class A" Advanced-Digital manufacturing facility. Case study in Harvard Business Review.
- Complete end-to-end modernization of DOD factory and support facilities of global supplier for the F16 program in USA & 26 nations. DOD national award for best in class and California Environmental Compliant Recognition for Plating facility.
- Set up & managed "World Class" Lean Six Sigma SMT/Box Advanced Supply Chain- Advanced Manufacturing operations, On, Near and Off shore. IPO to $780M global public EMS corporation in 10 countries in 3 years. 36 months of consecutive profitability ,100% on-time delivery, and quality. Co-Author NPI Handbook.
- Augmented Reality development and implementation in unprofitable Mobile Telecommunications R&D unit. New software products introduced in global manufacturing schedule on time and only SBU of 5 R&D units to become fully profitable in parent global corporation.
- Predictive analytics & agile PM methodology to optimize processes and reduce inventory $50M over 1000 dealerships, 5 DC's, and 3 factories. 100% $2B AOP in down market.
- Global NPI/demand-supply integrated planning system & integrated SAP ERP for Medical Device SBU growing 15% per quarter. 14 Legacy systems integrated into one platform in one year, new S&OP, 40% reduction NPI lead times and no missed 72 hour JIT surgeries in 2 years.
- Robotic cell automation for NASA certified laser welding cell in Advanced Medical Device Manufacturing facilities for increased product and patient safety. Product world standard for new downsized medical device (ISO 13485/Class 3) that could be remotely reprogrammed via telecommunications and not on hospital site.
- Conversion to digital/visual warehouse in top Retail/Distribution global corporation for increased personnel productivity thru kit consolidation and less travel time, inventory accuracy due digital vs. analog bin tags, and increased quality. World Class solution for Supply Chain and Logistics functions.

Customer and business goals 1st, but use innovative hardware and software solutions for "VALUE" solutions to increase customer service, revenue/profit, new product introduction/manufacturability, supply chain continuity & sustainability, and team internal/external productivity.

John is currently Project Lead, Supply Chain-Advanced/Digital Manufacturing at LTTS LLC. He has a EMBA from Pepperdine University, MS (With Honors) from Troy State University , and BS from Washington State University. Certified Digital Scrum Master (CSM). Active in Greater Phoenix community thru participation in ASCM (SCOR "Make" process), ASQ (Board Leader Outreach & Publicity), ISM (Economic Survey), PMI, SCORE (Certified Mentor), and Member AZ Artificial Intelligence (AI) Committee. Featured author and presenter; globally, nationally and locally. Lives in Scottsdale, AZ.

ARIZONA TECHNOLOGY COUNCIL

a place to connect and grow

AI IN SUPPLY CHAIN

September, 2023