



2022 CLE WEEKS

Smart Manufacturing: IP Opportunities and Challenges

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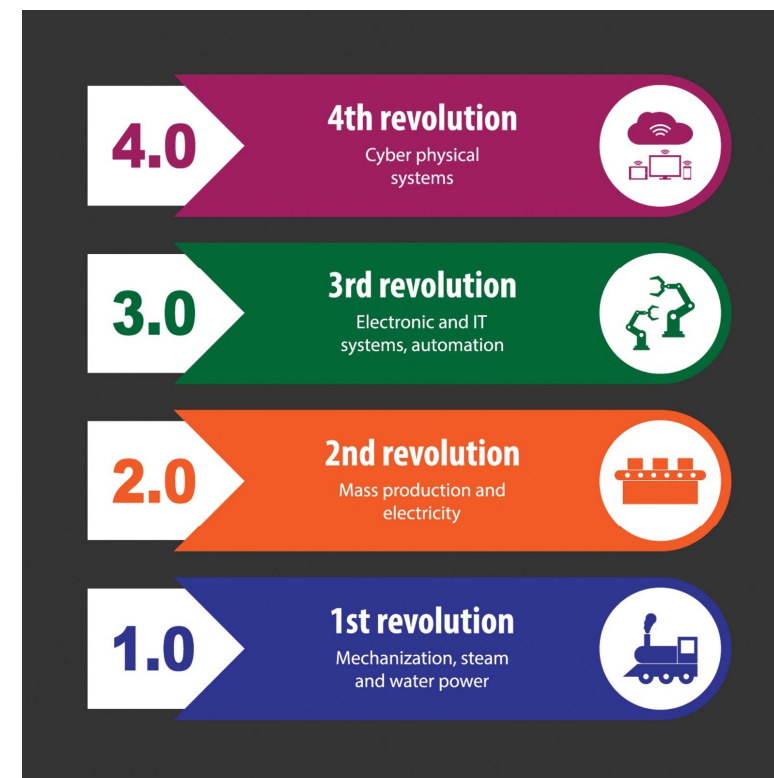
Agenda

- Smart Manufacturing Overview
- Technologies for Smart Manufacturing
- Legal Concerns for Smart Manufacturing
- Digital Transformation – Impacts and Opportunities
- Patent Trends in Smart Manufacturing



Smart Manufacturing and the Fourth Industrial Revolution / Industry 4.0

- “Developing smart factories provides an incredible opportunity for the manufacturing industry to enter the fourth industrial revolution.”¹
- “The key element in the implementation of the concepts of Industry 4.0 is the idea of cyber-physical systems.”²
- Fourth industrial revolution is leading to “emerging technology breakthroughs in fields such as artificial intelligence, robotics, the Internet of Things, autonomous vehicles, 3-D printing, nanotechnology, biotechnology, materials science, energy storage, and quantum computing.”³



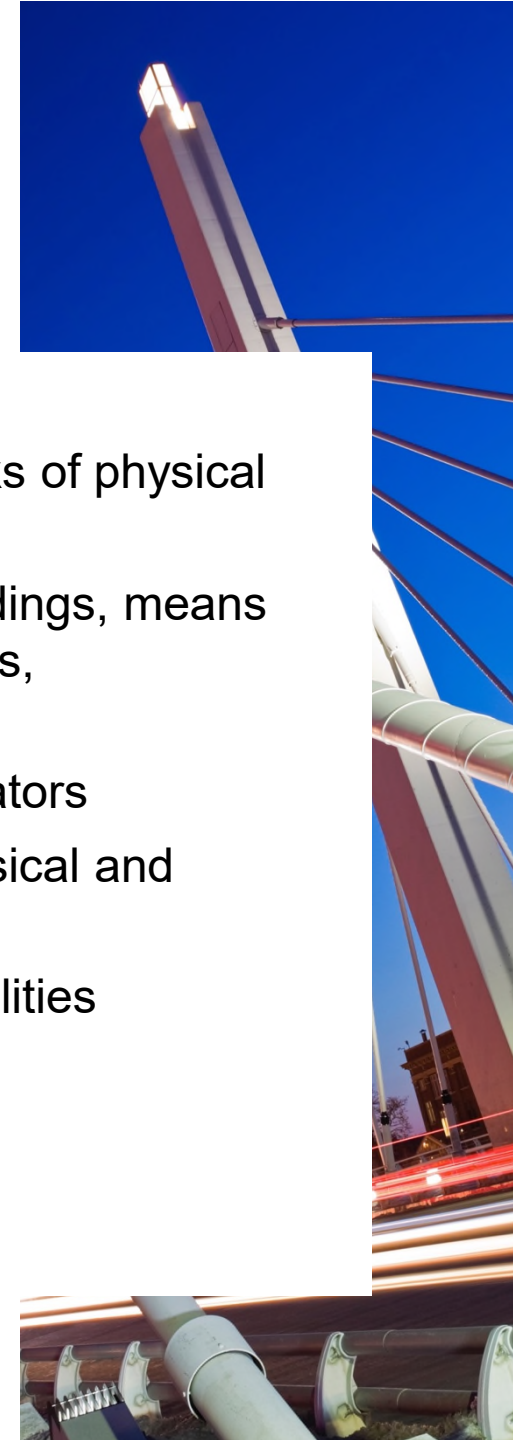
¹ <https://www.ibm.com/topics/industry-4-0>

² Arcot, R. V. *Cyber-physical systems: The core of industry 4.0*. Cyber-Physical Systems: The Core of Industry 4.0.

³ *The Fourth Industrial Revolution: What It Means and how to respond*. World Economic Forum.

Cyber-Physical Systems

- Cyber-physical systems are “smart systems that include engineered interacting networks of physical and computational components.”¹
- Cyber-physical systems are “systems with embedded software (as part of devices, buildings, means of transport, transport routes, production systems, medical processes, logistic processes, coordination processes, and management processes).” Cyber-physical systems:
 - Directly record physical data using sensors and affect physical processes using actuators
 - Evaluate and save recorded data and actively or reactively interact both with the physical and digital world
 - Are connected with one another and in global networks via digital communication facilities
 - Use globally available data and services
 - Have a series of dedicated, multimodal human-machine interfaces²



Technologies for Smart Manufacturing

- Internet of Things / Industrial Internet of Things
- Cloud Computing
- Artificial Intelligence / Machine Learning
- Big Data
- Additive Manufacturing
- Augmented Reality
- Blockchain



Legal Concerns for Smart Manufacturing

- Data Protection, Rights, and Privacy
- AI/ML Ownership and Rights to Use
- Challenges with Patenting AI
- Cybersecurity



Data Protection and Rights

- No single law regulating personal data collection and use in the U.S.
 - Mix of federal and state laws
- Europe – General Data Protection Regulation (GDPR)
- Where is data stored?
 - Where is the “cloud” (servers) actually located?
 - Where is data accessed from?
- Additive Manufacturing
 - E.g., license to and use of model file for a part



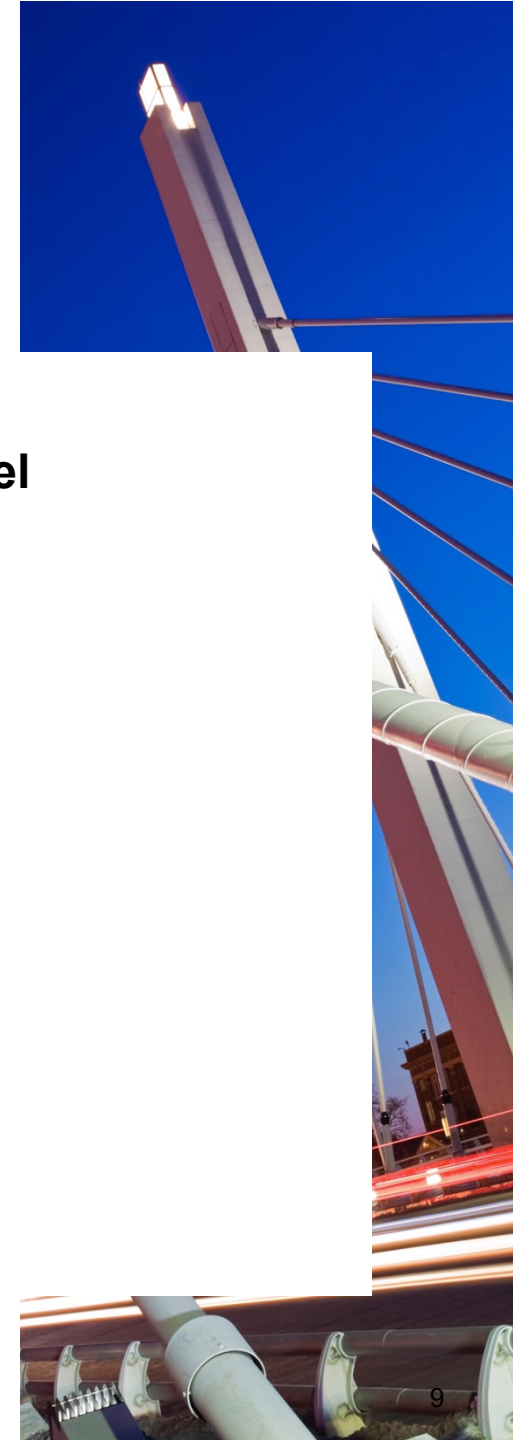
Data Privacy

Evaluating Data Privacy Risks



Maintain a Data Governance Model

- Data ownership
- Regulatory compliance
- Data breach mitigation
- Data removal request policies



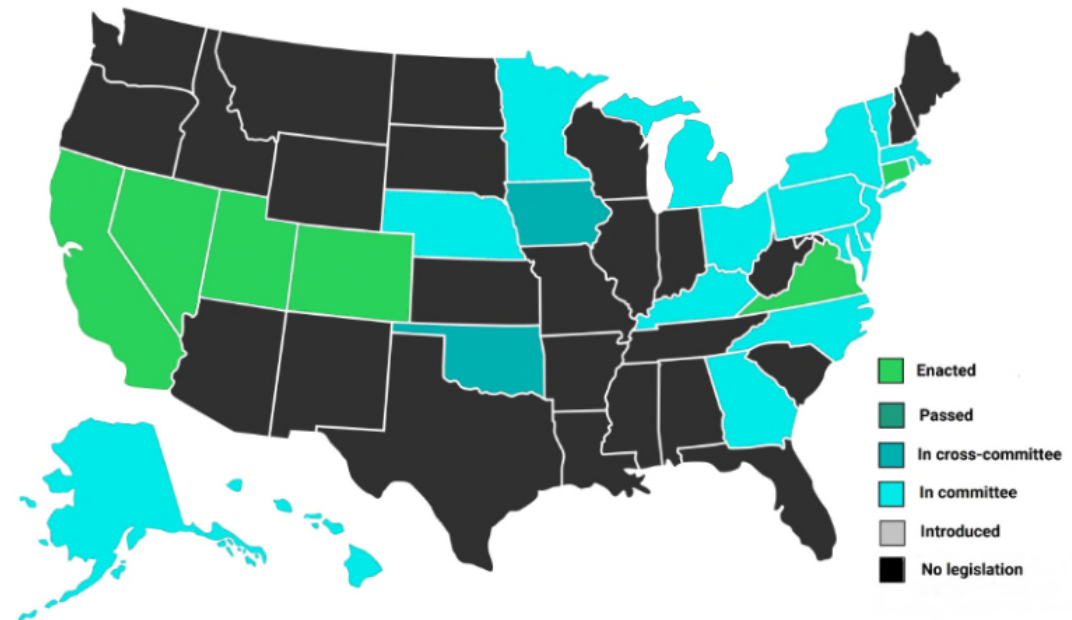
Data Privacy and AI

Common Privacy Provisions Affecting AI

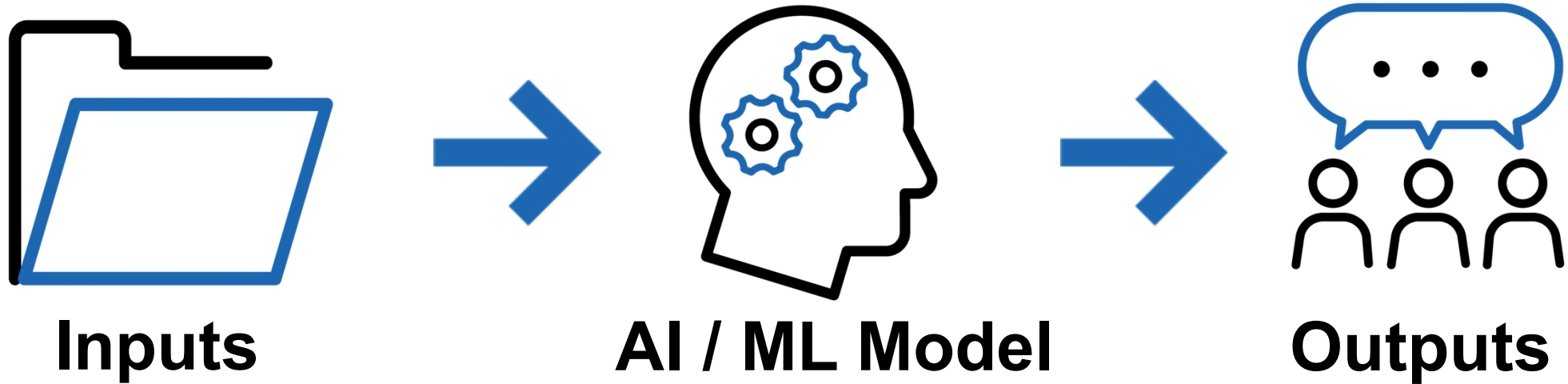
- Right to access
- Right correct
- Right to be informed
- Right to delete

General Overview of State-By-State Data Privacy Laws

US states with enacted laws or active bills relating to consumer privacy rights

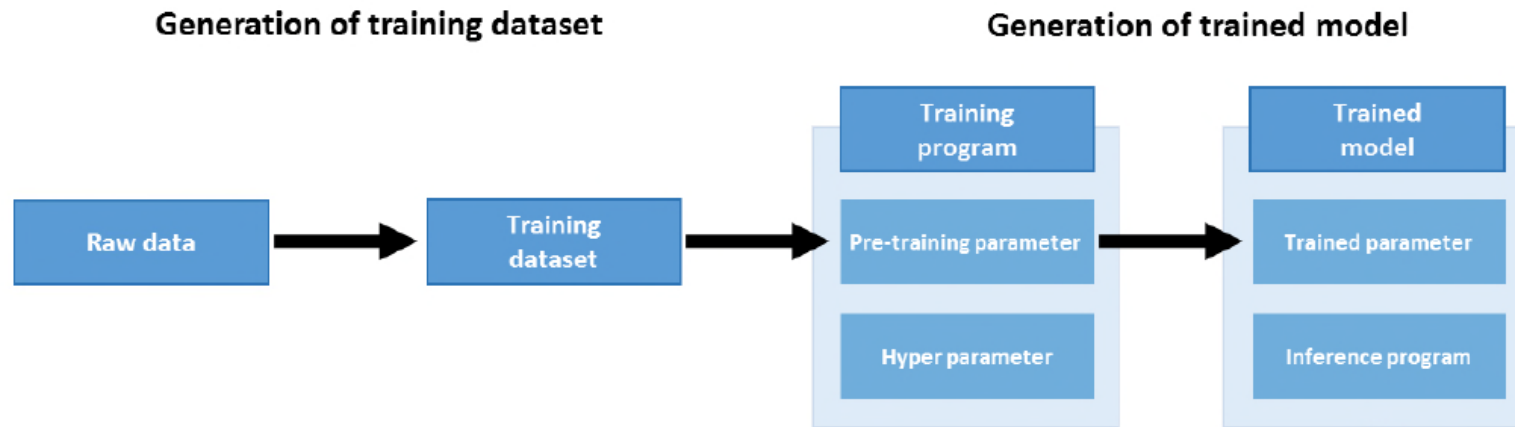


What is Artificial Intelligence?



Two Phases of Deployment and Use

Training Phase



Utilization Phase



AI/ML Ownership and Rights to Use

- Who owns and/or what are license rights to use?
 - Raw Data
 - Training Datasets
 - Training Programs
 - Trained Models
 - Know-how
- Algorithm ownership: If algorithm improves because of client data, does client have ownership rights in algorithm?
- What IP is present before and after the AI?



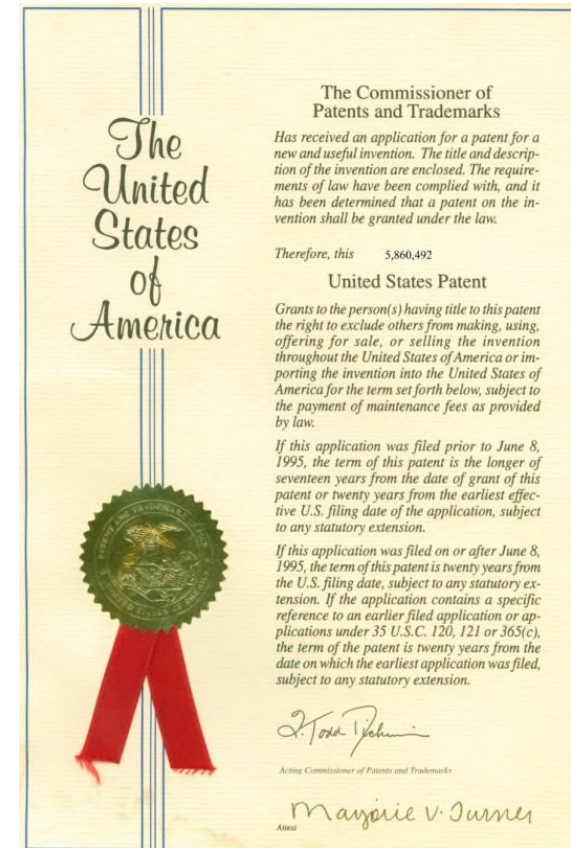
IP Ownership and Rights to Use

- Newly Developed IP
 - Ownership structures
 - Owned by both parties (joint ownership)
 - Owned by one party (e.g., specified party, creator, etc.)
 - Restrictions on use of Developed IP (field, territory, timing, product lines, etc.)
 - License of Developed IP (to the other party if solely owned, to third parties, etc.)
- Identify Background IP
 - License to Background IP
 - Perpetual, non-exclusive, royalty-free?
 - Have made / sublicense rights?
 - Ownership/rights to use improvements to Background IP



Challenges with Patenting AI

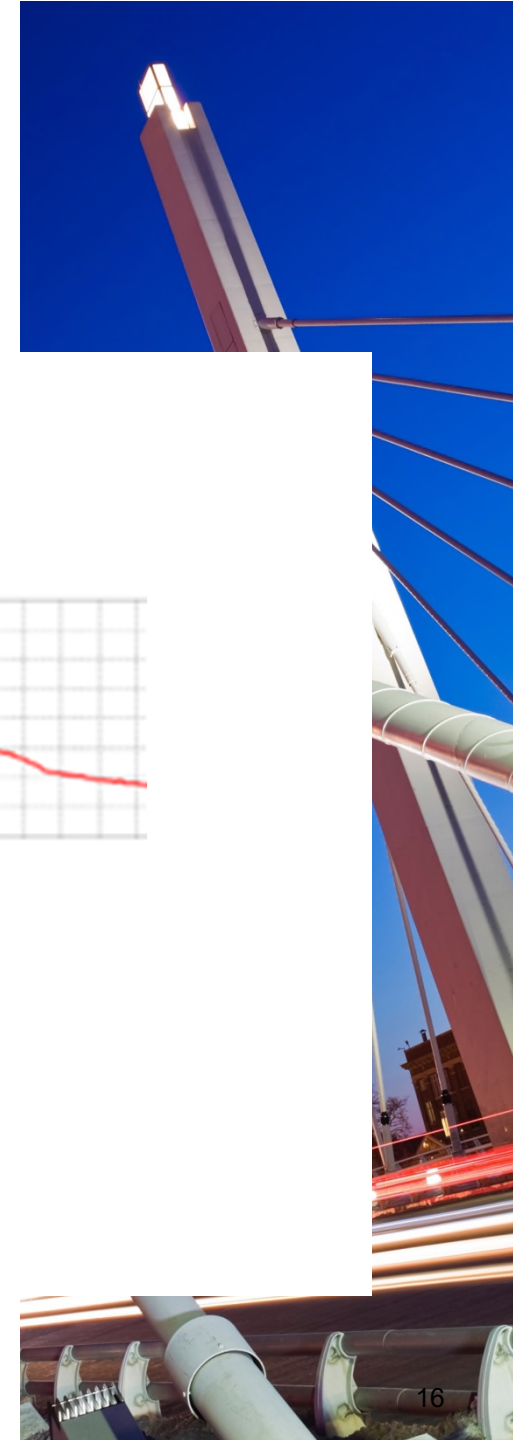
- **Detectability:** Will I know when it is infringed?
- **Novelty:** What is new?



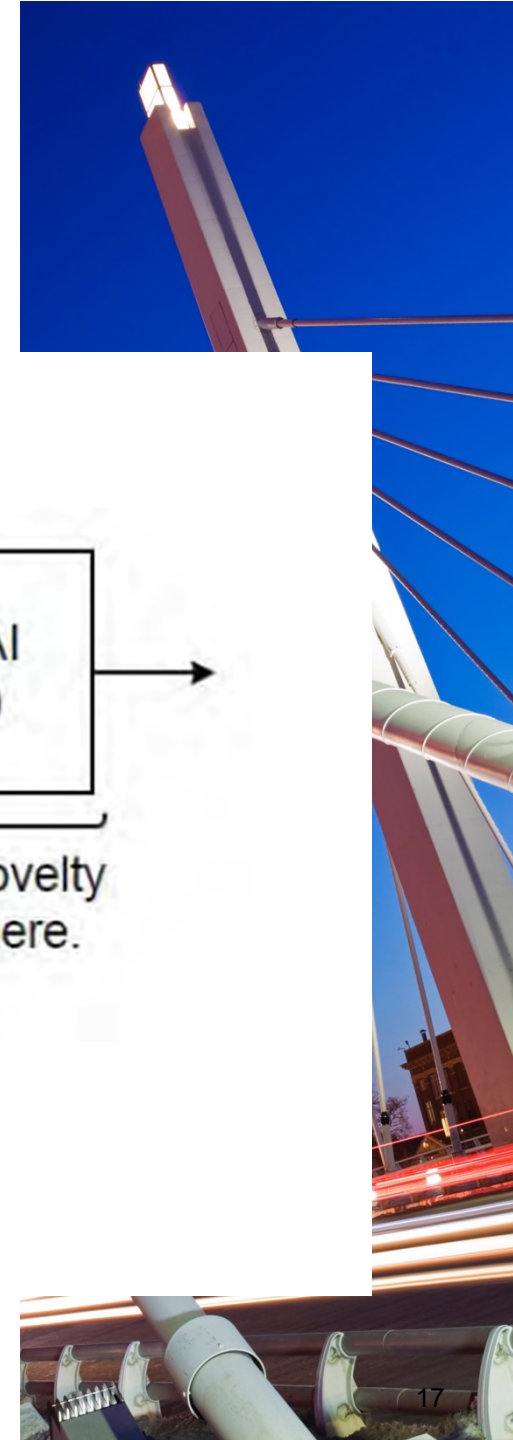
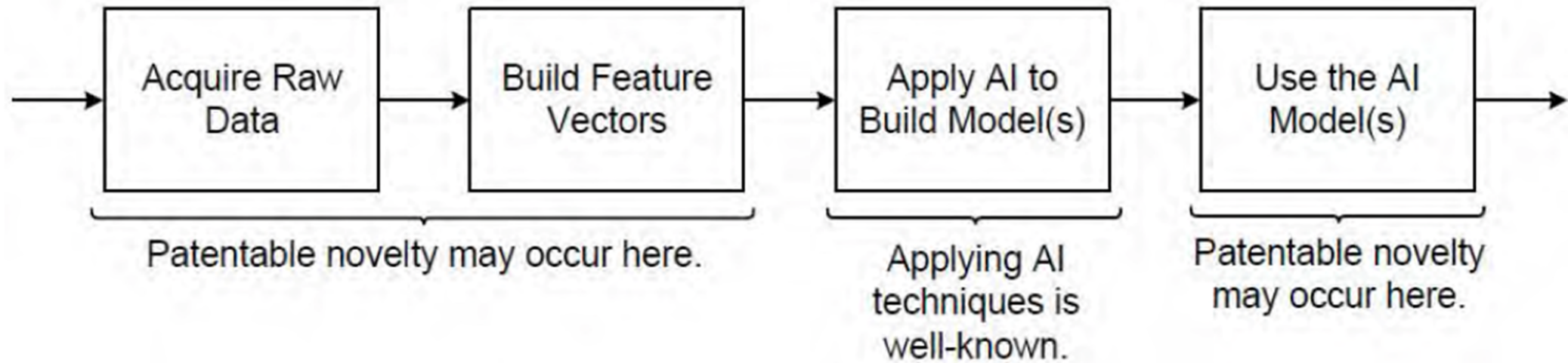
AI Detectability



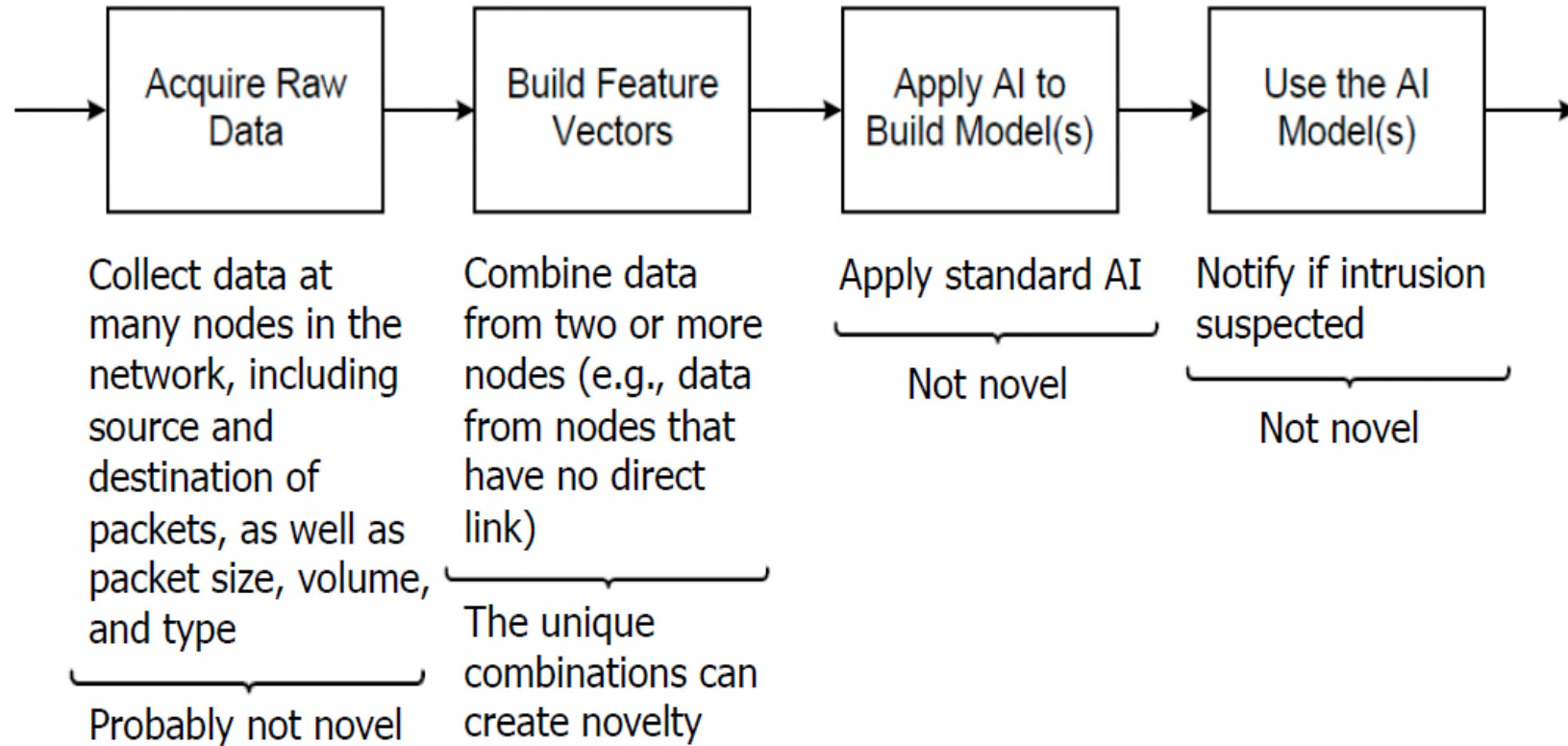
Is the invention in here?



AI Novelty



Hypothetical: Novelty of Network Security AI



Cybersecurity

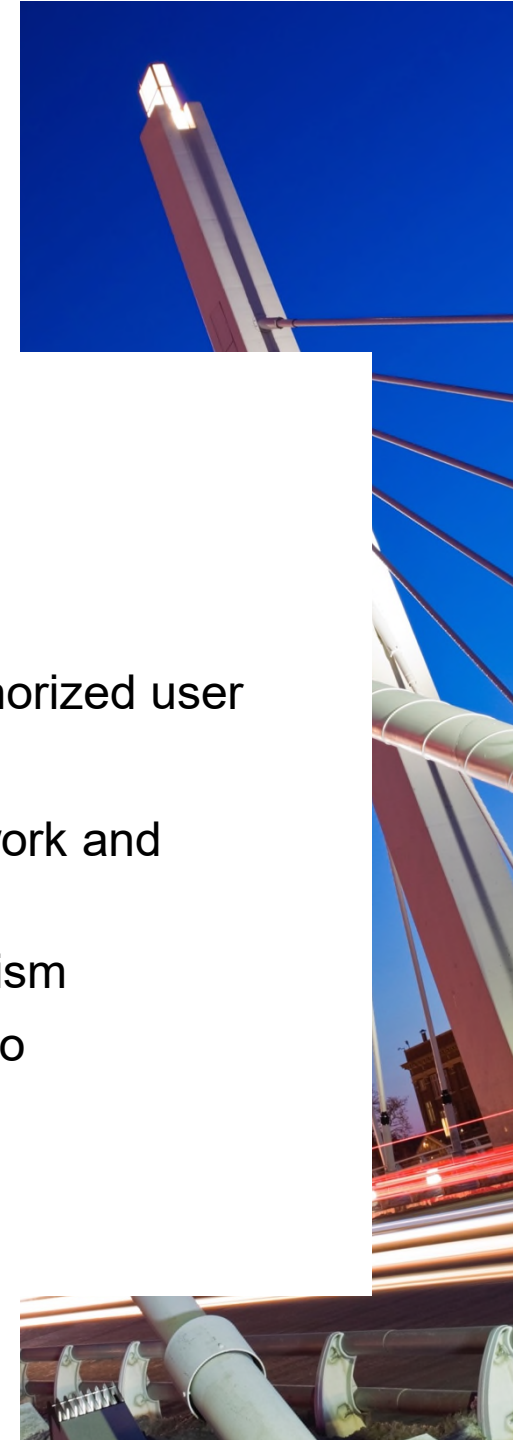
- Federal Regulation of IoT
 - National Institute of Standards and Technology (NIST)
 - Federal Trade Commission (FTC)



NIST – Recommended Criteria for Cybersecurity Labeling for Consumer Internet of Things (IoT) Products

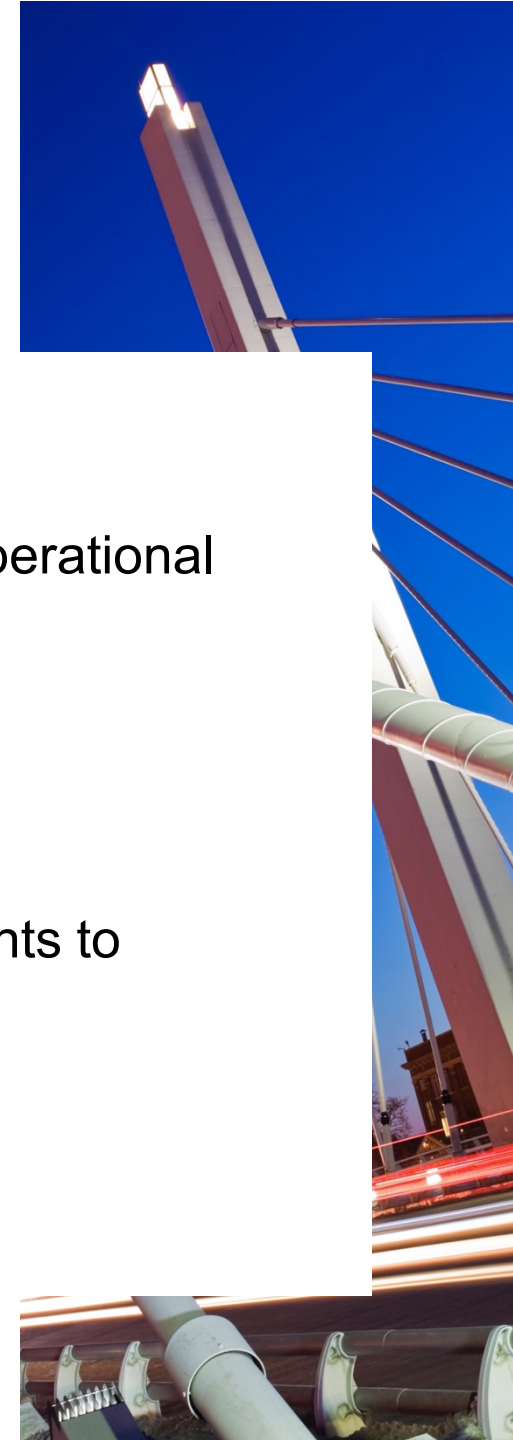
Examples of Recommended Product Criteria for Defining Cybersecurity Outcomes

- *Asset Identification*: product is uniquely identifiable
- *Product Configuration*: ability to restore to default, changes can only be made by authorized user
- *Data Protection*: device protects stored data, provides ability to delete data
- *Interface Access Control*: device controls access to and from all interfaces (e.g., network and local interfaces)
- *Software Update*: software can be updated by authorized users via a secure mechanism
- *Documentation*: product developer creates, gathers, and stores information relevant to cybersecurity



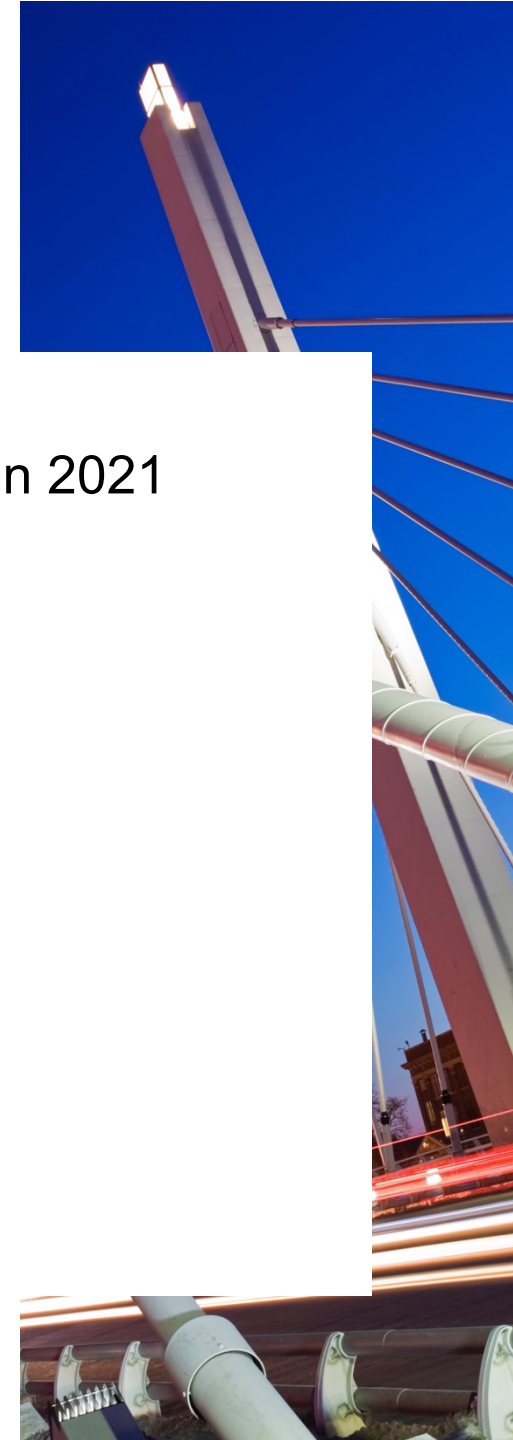
Ransomware Attacks in Manufacturing

- IT / OT Convergence
 - Eliminating or bridging the divide between information technology (IT) and operational technology (OT)
 - Legacy OT systems may not support remote security updates
- Wide Attack Surface Area
 - Large number of devices and associated software in a factory
 - IIoT devices help with IT / OT Convergence, but can provide new access points to manufacturing equipment and software

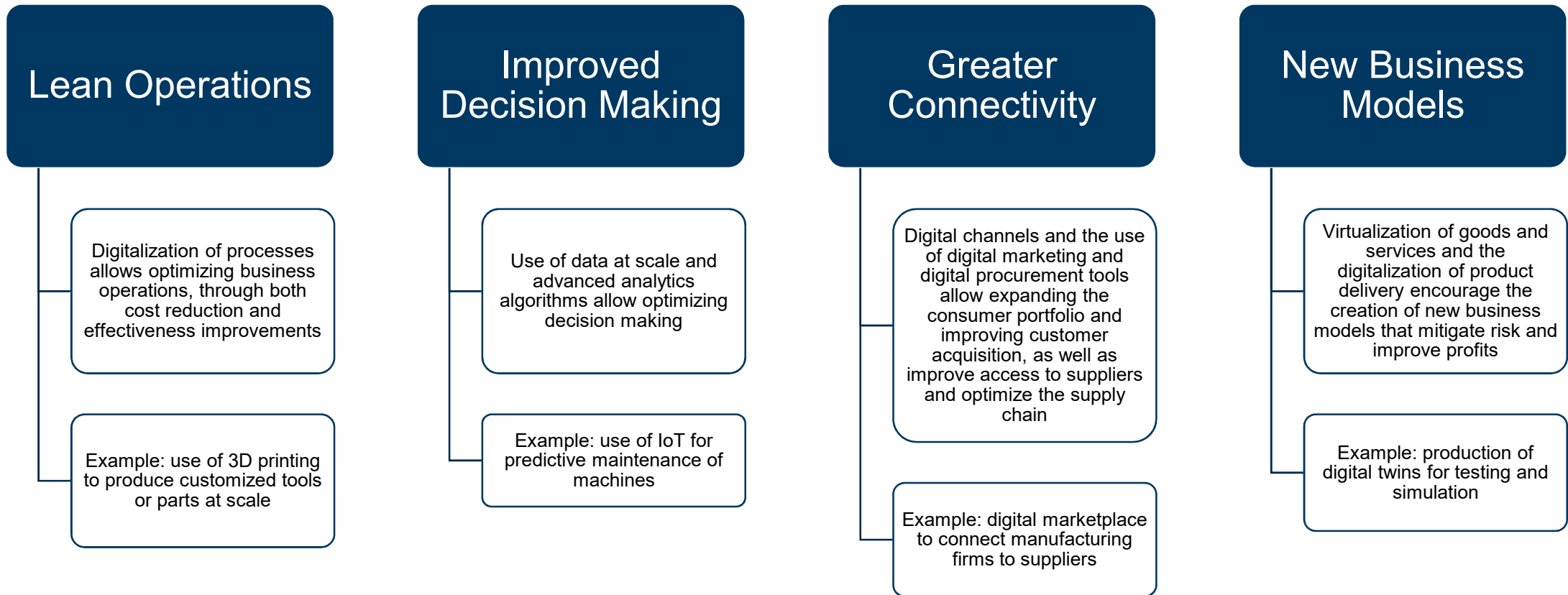


Ransomware Attacks in Manufacturing

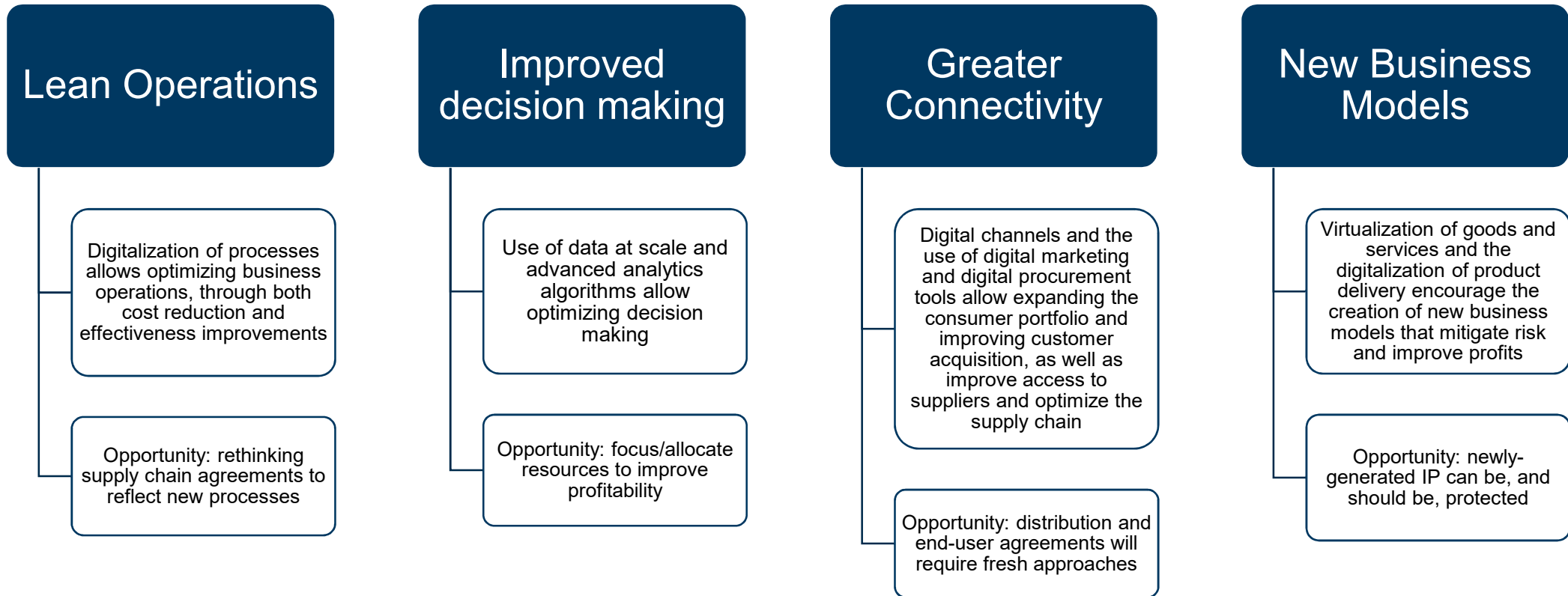
- 55% of manufacturing and production companies suffered ransomware attack in 2021
 - 77% of attacked companies had ability to operate impacted
 - 71% of attacked companies lost business/revenue
- 57% had data encrypted in the attack
 - 96% got encrypted data back
- Paid highest ransom payments (~\$2 million) of analyzed industries (based on organizations reporting exact amount paid)
 - Only 7% of ransom payers got **all** data back



The *Impact* of Digital Transformation



The *Opportunity* of Digital Transformation



Patent Trends in Smart Manufacturing

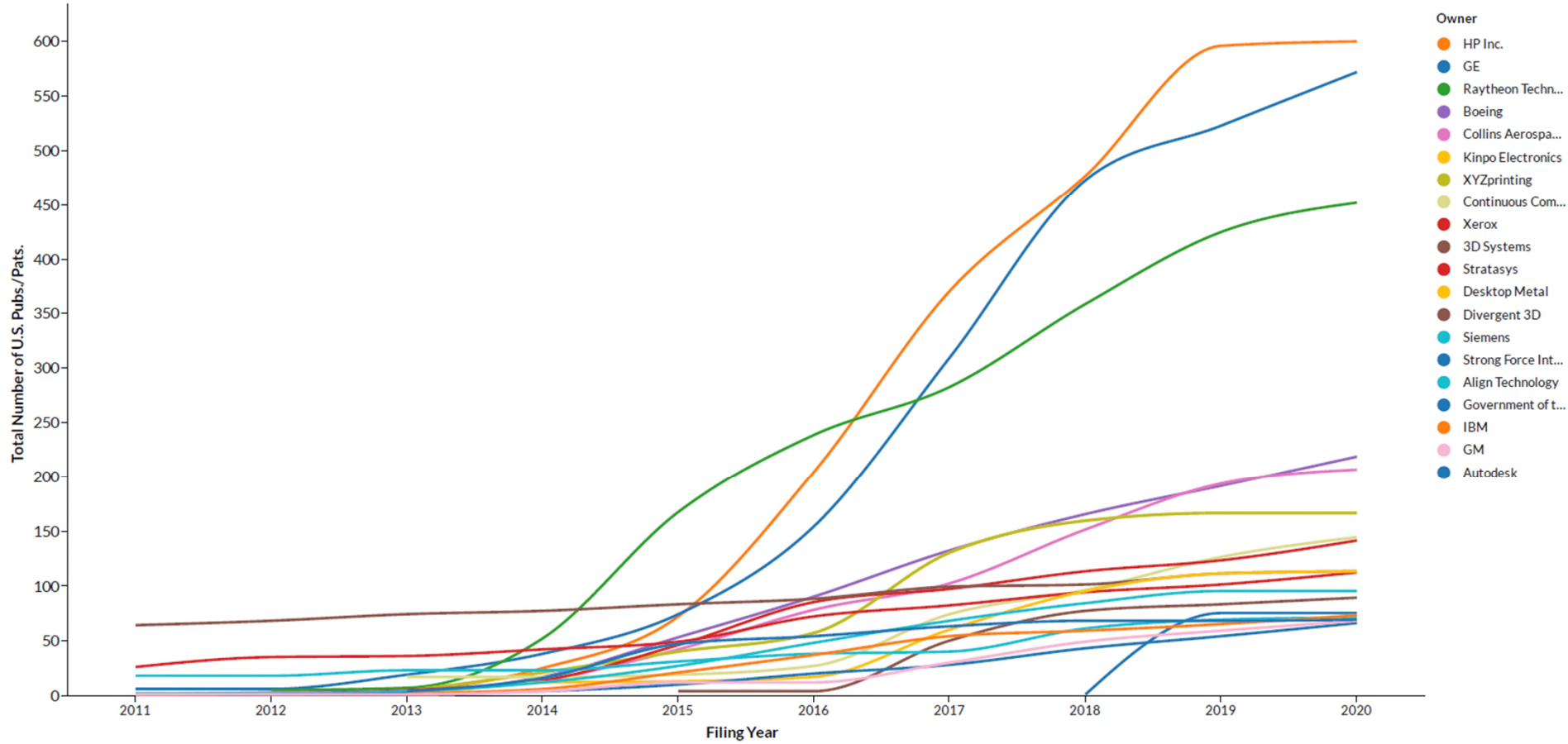
- Additive Manufacturing
- Cybersecurity
- Blockchain



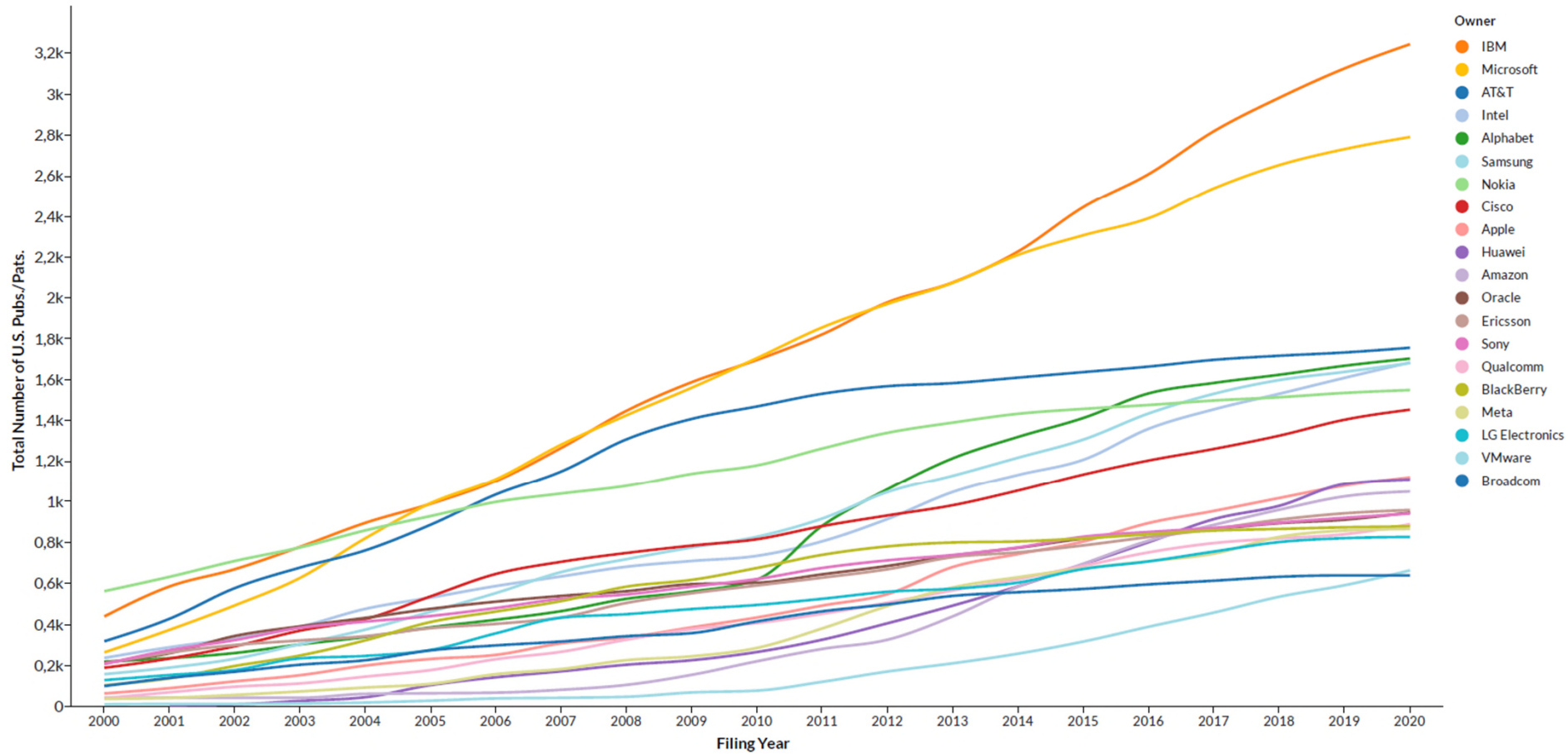


Patent Trends

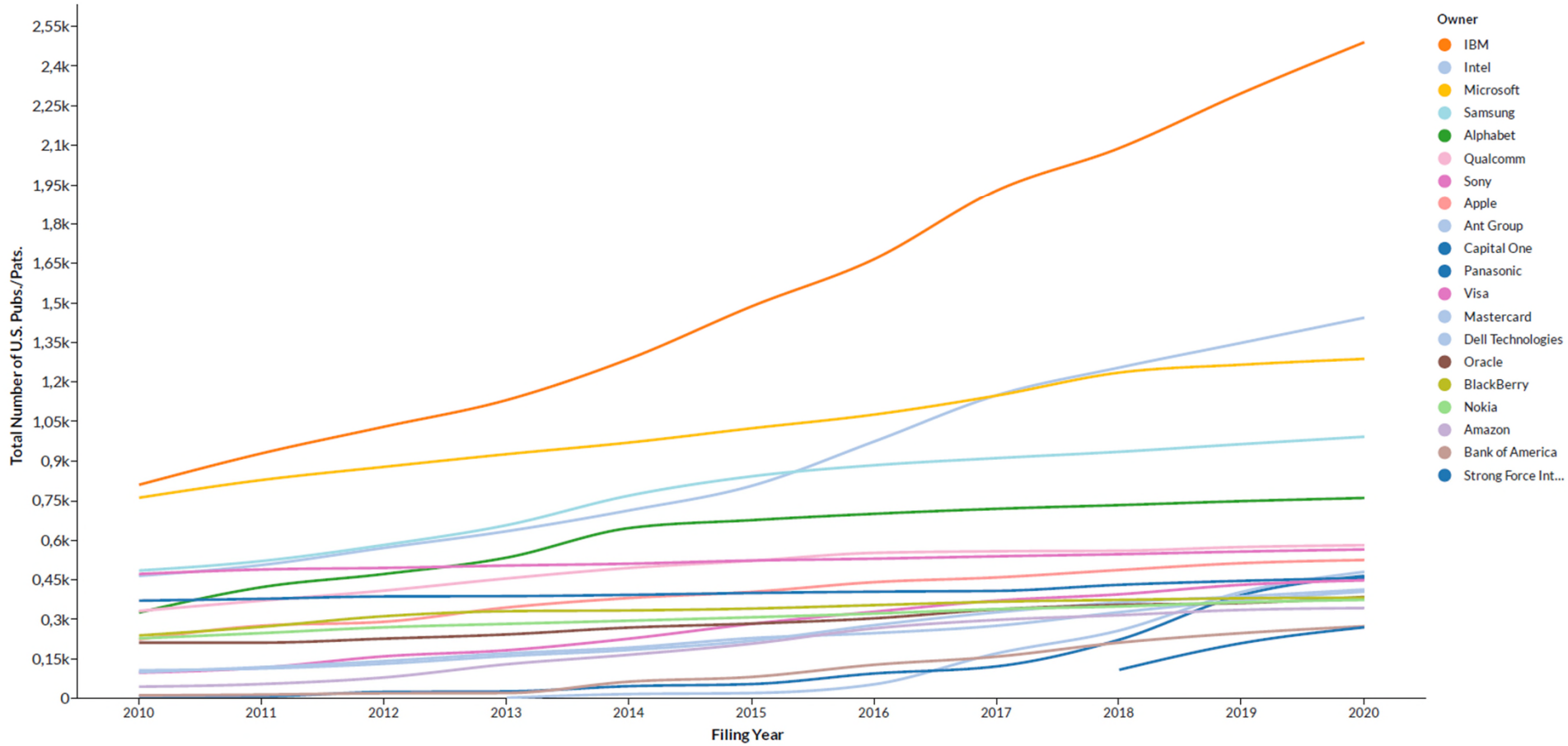
PatentSight Export: Additive Manufacturing Landscape - Portfolio Growth Trends



PatentSight Export: Cyber/Privacy Landscape - Rev - Portfolio Growth Trends



PatentSight Export: Blockchain in Manufacturing Landscape - Portfolio Growth Trends



Takeaways

- New opportunities bring new challenges
- Changing regulatory environment, with many current and potential regulators
- Take care with IP ownership and rights to use IP (including data)
- Understand data privacy risks and apply proper data governance model
- Monitor labeling requirements for IoT products
- Manufacturing is profitable target for ransomware attackers





Thank you!

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