



Industry 4.0

Are you & your businesses ready?

Business & CommUNITY Services
University of Northern Iowa



Purpose of the Workshop:

To strengthen economic development BR&E visits and follow up by educating BR&E practitioners about the basics and language of Industry 4.0, how to recognize industry adoption, gauge a businesses' readiness for transformation, and share useful resources that can help your businesses prepare for disruption and opportunities.



Agenda:

1. Welcome!
2. Industry 4.0
 - a. Why should you care?
 - b. What is it?
 - c. What are the benefits?
3. Industry 4.0 Technologies – an Overview
4. Break
5. Industry 4.0 Technologies – in Practice
6. The Economic Developer's Role
7. Business Resources



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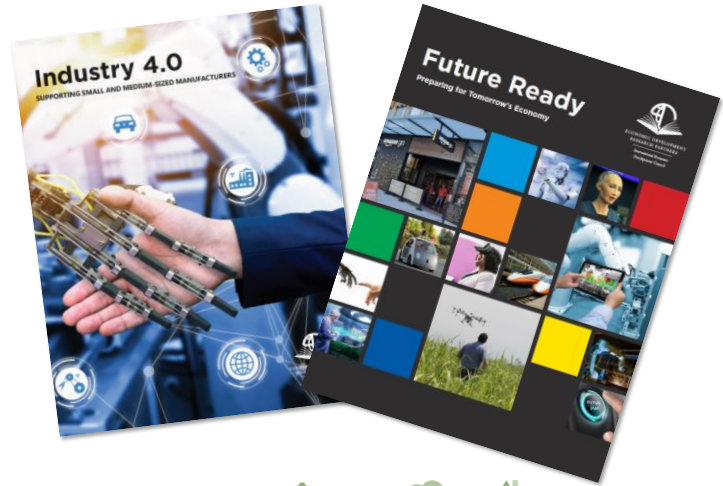
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Key References

International Economic
Development Council



Industry 4.0

Why should you care?

Impact of Inaction – On Businesses & Communities

- Job losses or gains
- Adopting these technologies will become critical to competitiveness.
- Large firms will begin to require their use among their suppliers and partners
- Seamless integration will become key – customers will begin to expect more than just the part, item or service



How the Future is Impacting Community College Workforce Development

- Automation: Training and retraining. Economic development practitioners need to evaluate their economies' potential for automation.
- The GIG Economy: defined as short-term jobs brokered via an internet platform – has several implications for economic development.
- Changing Reward Mechanisms: As automation proceeds and the gig economy disrupts how jobs are created (or even what constitutes a job), economic incentives that traditionally rewarded job creation may need to be rethought.



Plastics News

Injection molder Lomont consolidating operations in Iowa

AUDREY LAFOREST □ □

REINBECK, IA

February 28, 2019

Lomont's consolidation in Iowa, Frank said, is also **practical for its ongoing move toward Industry 4.0.**

"We are moving in the direction of a 4.0 strategy," he said. "We're not completely integrated on that by any means; however, we understand how important it is first and foremost to our customers because our customers are heading in that direction as well."

The company's primary focus is on integrating automation and robotics throughout its facilities within the next few years, he said.

"We can save ourselves money and, at the same time, gear ourselves for the future," Frank said of the 4.0 strategy. **"Within the next 10 years, I feel 4.0 will be required by all of us in the business."**

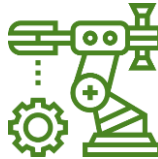


What is Industry 4.0?

Three Broad Buckets of Industry 4.0



**Designing &
Testing**



**Producing &
Performing**



**Managing
Information**



Three Broad Buckets of Industry 4.0

Designing & Testing



 Augmented Reality/
Virtual Reality

 Simulation

Producing & Performing




 Robotics &
Automation

 3D Printing –
Prototyping

Managing Information



 Big Data

 Cloud Computing

 System Integration

 Internet of Things

 Cyber Security

How did we get here?



Industry 1.0
End of 18th
century
Mechanization

(Steam...)

Industry 2.0
1870s onwards
Automation

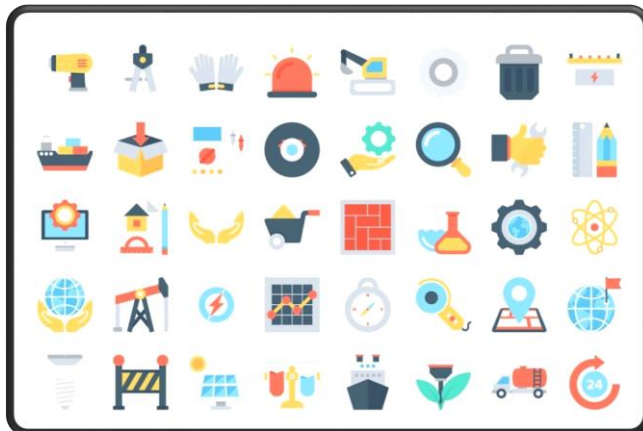
(Electricity...)

Industry 3.0
Beginning of
1950s Digital

(Computing...)

Industry 4.0
~ 2000- Today AI & ML

(Connectedness...)



Industry 4.0

Everything is Changing! Every Industry – Not Just Manufacturing!

- ✓ Health care
- ✓ Construction
- ✓ Agriculture
- ✓ Any industry that relies on/needs/uses technology, data, supply chain integrations, customer relations, cyber security



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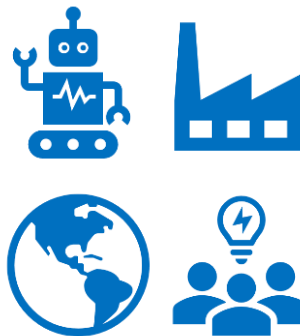
Technologies and Trends Drive Industry 4.0

Technologies:

- Advanced Sensors
- 5G
- Blockchain
- Vision systems

Socio-economic trends:

- Mass customization
- Globalization
- Taxes and trade policy
- Uberization





What are the Business Benefits of Industry 4.0?



Supply Chain Visibility – sensors, integrated systems and tracking technologies provide workers real time data to optimize outputs



Customer Value – customer data and visibility to market trends helps the supply chain adjust to demand



Mass Customization – integrated systems produce customer designed products with 3D Printing close to the customer



Waste Elimination – Supply chain data helps solve non-intuitive problems. Shop floor sensors can enable better process control



Labor efficiency – flexible automation and collaborative robots enable workers to focus on value add

- ✓ Helps collaboration with customers and suppliers
- ✓ Increases productivity
- ✓ Strengthens capacity to deal with disruptions
- ✓ Provides strategies for working through workforce shortages



Customers demand integration

- Mass customization, flexibility, visibility, speed

Workforce availability

- Automation of direct labor, reduction of bureaucracy and paperwork, appeal to new talent

Quality

- Process control, documentation and traceability

Reduced cost of 4.0 technologies

- Cloud computing, intuitive programming, IoT ready equipment, remote support

Why businesses will move to Industry 4.0



Where can businesses begin?

Start with a Phased Approach

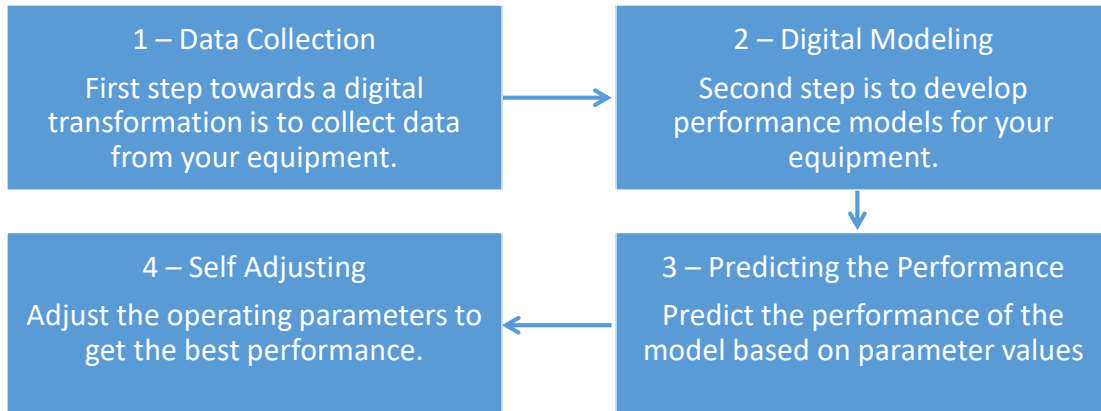
Optimize ↑	Business challenges drive data collection and optimization	
Connect ↑	Integrate data across systems and functions	
Digitize	Convert manual systems with software and apps	
Managing Information	Designing & Testing	Producing & Performing

4.0 Check In

- Digitize, Connect then Optimize
- Take product specifications and order data straight into your system
- Reduce data reentry and paper over time



Steps to Optimization



Invest where the customer will see or feel it



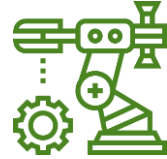
4.0
Check In

- ✓ Become easy to find and a valued design partner
- ✓ Create systems that can readily react to order changes
- ✓ Increase process control and automation to reduce costs
- ✓ Use customer data to improve product and process design



Understanding Industry 4.0 Technologies

Producing & Performing



Robotics &
Automation



3D Printing –
Prototyping & Tooling



Managing Information



Big Data



Cloud Computing



System Integration



Cyber Security



Internet of Things



Internet of Things (IoT)

“A global infrastructure for the information society that provides advanced services by interconnecting objects (physical or virtual) with existing or evolving interoperable information and communication technologies.”



Internet of Things (IoT)

- The IoT refers to the self-configuring wireless network of identifiers such as sensors, RFID tags, and IP addresses for the networked interconnection of all the everyday objects – from the sophisticated to the mundane



Pros and Cons of IoT

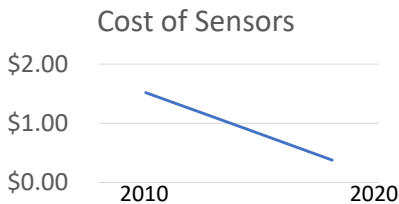
- Accessing information is easy and you can control a device that is miles apart in real time.
- Communication between the connected devices becomes more transparent and easier.
- Transferring data packets over a network reduces both time and money.
- Reduces human intervention and increases efficiency of services.
- Risk of leakage of confidential data when sent over network.
- Due to its complex network, a single loophole can put the entire system down, affecting everyone.



Sensors & Connectedness

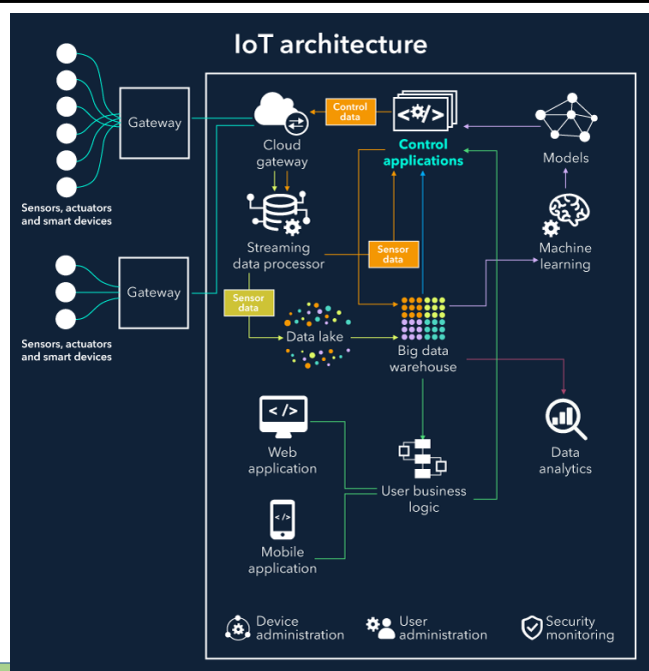
a.k.a. Where the data comes from

- Pressure
- Vibration/Sound
- Torque
- Flow
- Proximity
- Ion/Smoke
- Position
- RFID

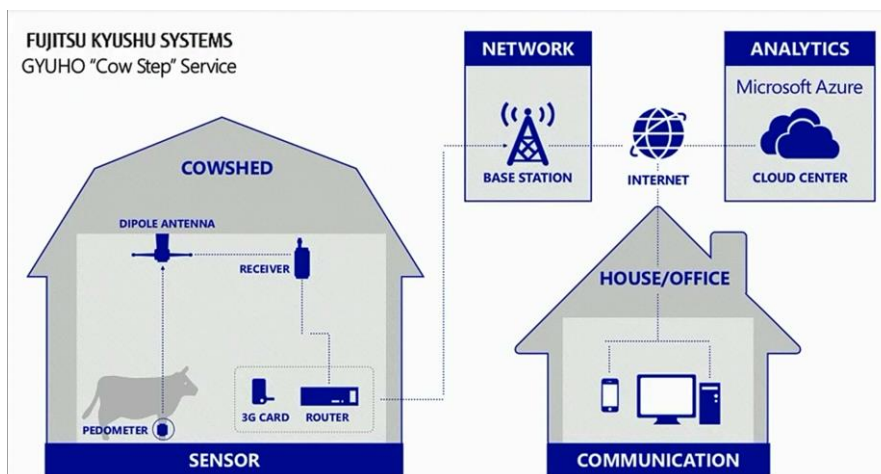


- Gateway
- Cloud gateway
- Data lake
- Big data warehouse
- Data analytics
- Machine learning (ML)
- Model building
- User application

<https://www.scnsoft.com/blog/iot-architecture-in-a-nutshell-and-how-it-works>

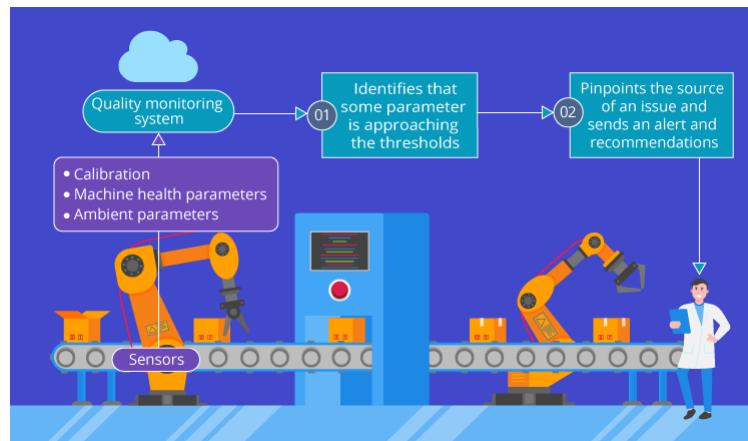


Can A Cow be an IoT Platform?



<https://www.iotcentral.io/blog/can-a-cow-be-an-iot-platform>

Product Quality Control based on Condition Monitoring



<https://www.scnsoft.com/blog/iot-in-manufacturing>

Drivers for IoT adoption in Manufacturing

- Cost reduction.
- Shorter time-to-market.
- Mass customization.
- Improved safety.
- IoT-driven manufacturing operations
 - According to an IDC research, in 2016, IoT-enabled manufacturing operations accounted for a total spend of \$102.5 billion, being the largest use case area across all industries.
 - The researchers estimate that by 2025, the improvements in operations driven by IoT applications could be worth more than \$470 billion per year.



Questions?

*** Quick Break ***



What Industry 4.0 looks
like in practice



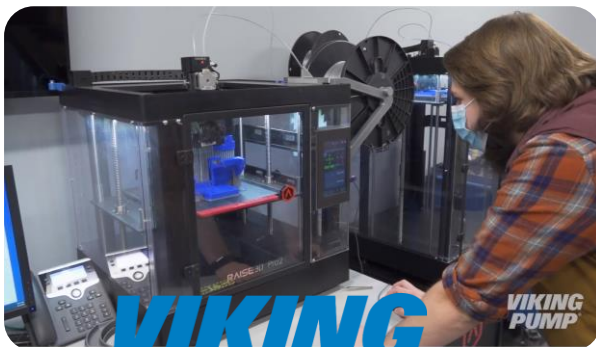
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Industry 4.0 in Action



Geater Machining & Manufacturing Co.

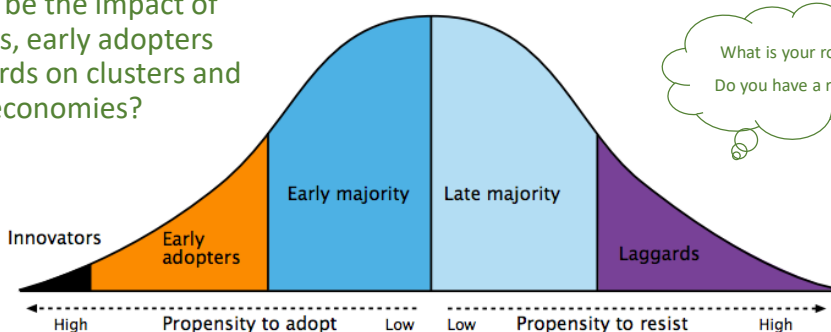




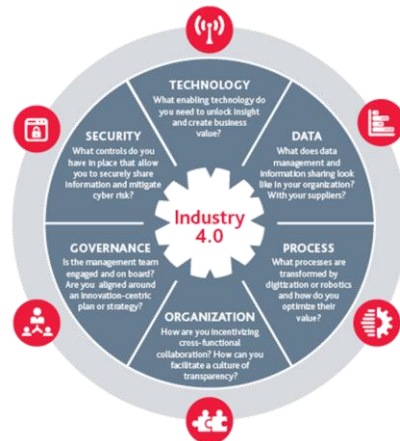
The Role of the Economic Developer

Where are your businesses now?

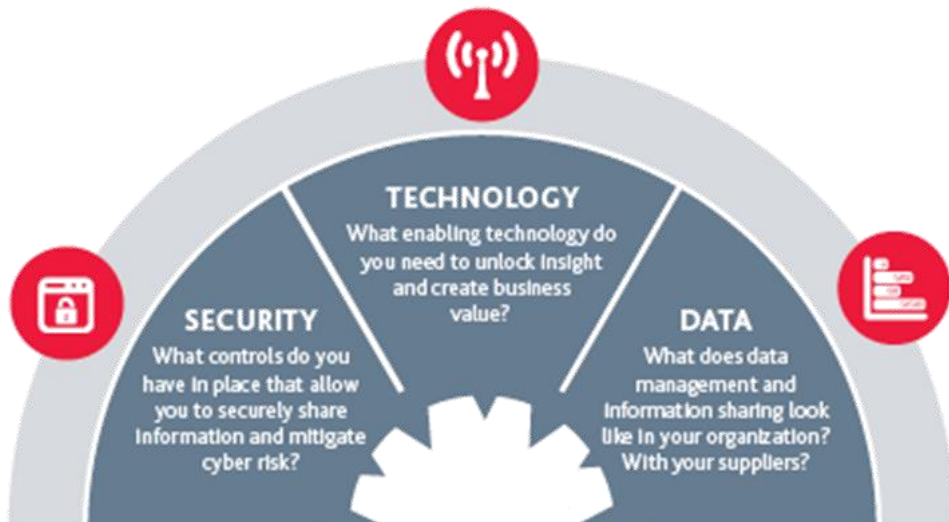
- What will be the impact of innovators, early adopters and laggards on clusters and regional economies?



BRE & Industry 4.0 Requires Economic Developers to be inquisitive but not judgmental or easily impressed

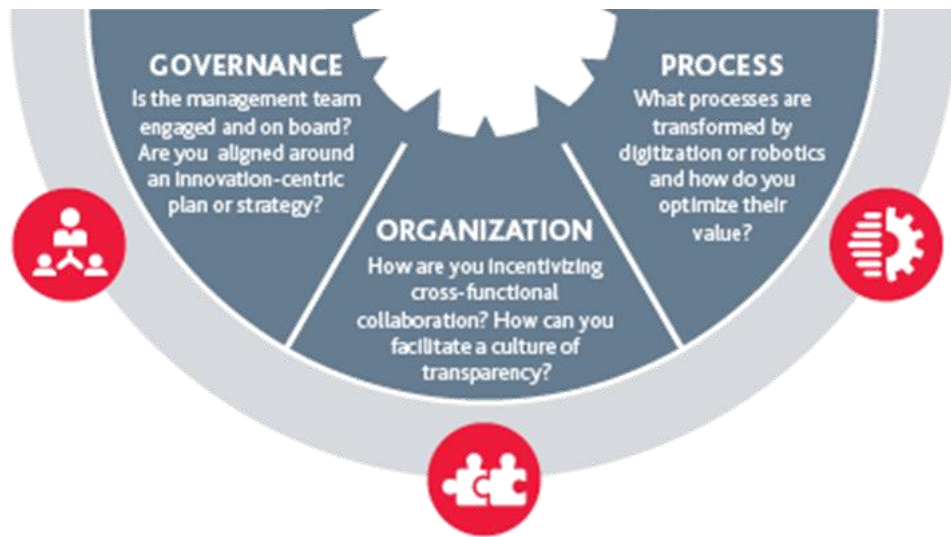


4.0 Check In



Level One Questions

4.0 Check In



Level Two Questions

4.0
Check In



Follow up:
What to do with observations?



Work with your large companies to provide direction to the supply chain, but also work to educate all types of companies on the capabilities of new technologies.



Identify the expertise of the dozens of agencies, services and providers tasked to support manufacturers – and make referrals.



Provide career awareness and guidance to students, parents and educators



Form local User Groups, Meetups or Tech Town Halls around key technologies – Ask early adopters to lead

What can economic developers do?

4.0
Check In



Resources for your Businesses

- Sharing of available technical assistance resources from various service providers
 - **Public Institutions**
 - Students – projects, internships, apprenticeships
 - Faculty/staff
 - Programs
 - Equipment
 - **Private**
- State/Regional funding support of R&D, innovation investments



Expanding Your Network of Private Service Providers

Custom Software Development

Sometimes your business processes are so unique that an off-the-shelf solution doesn't meet your needs. We specialize in designing and developing user-centric software that addresses your specific problems and opportunities, allowing you to take advantage of technology in ways you didn't know were possible. And our **proven process** helps us deliver value to you transparently and effectively. Whether you need us to tackle a whole project or to work alongside your developers to increase your team's capacity to get things done, we have you covered.

Web Applications | Mobile Apps | Desktop Applications | Cloud Strategy & Development | SaaS Products | Systems Integration | API Development | Online Portals | Blended Project Teams

CUSTOM SOFTWARE DEVELOPMENT, COACHING, & CONSULTING

Helping businesses solve problems and capture opportunities with technology.

UNIVERSAL ROBOTS

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Maintenance free collaborative robots operate continuously in harsh environment

No preventive maintenance required

Universal Robots' ActiNav Handles Challenging Picking Task at Allied Moulded
taught by touching corners

4.0

Check In

- ✓ Cobots
- ✓ Automation
- ✓ Robotics
- ✓ Machine Learning
- ✓ Connecting with Suppliers

Is your brain overflowing yet?



The Future has Arrived: Successful & Impactful Economic Developers must be Proactive & Engaged Related to the Impact, Influence & Opportunities Created by Technology

Key Action Items

1. Have a learning strategy – identify courses, magazines, webinars, media channels, events, key people (business leaders, academic experts) etc. to follow to keep abreast of emerging and projected issues.
2. Educate yourself on the terms and jargon. Whenever possible try to see these emerging technologies ‘in action’ and talk to those businesses involved for their insights.

4.0
Check In



Self Educate & Share



Bernard Marr & Co.
Intelligent Business Performance

<https://youtu.be/4xRyg5Fltul?list=RDCMUcWstLaT61QUc-TvfxOjNpFw>

The screenshot shows the Bernard Marr & Co. website. On the left is a video player with a man speaking. On the right is a navigation menu with 'About', 'Services', 'Topics & Content', 'Books', 'Podcasts', and 'Contact Us'. Below the menu is a search bar and social media icons for Forbes, LinkedIn, Facebook, Twitter, Instagram, and YouTube. The main content area features a 'Futurist' article preview with a 'Read More' button and a 'Sign up for FREE!' button in the bottom right corner.



Industry 4.0 *Thank You for Your Work!*
Are you & your businesses ready?

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