

# Digitalization and U.S. Competitiveness in the Global Economy

MAPI June 2018 Board Meeting

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VP, Global Innovation Policy  
ITIF

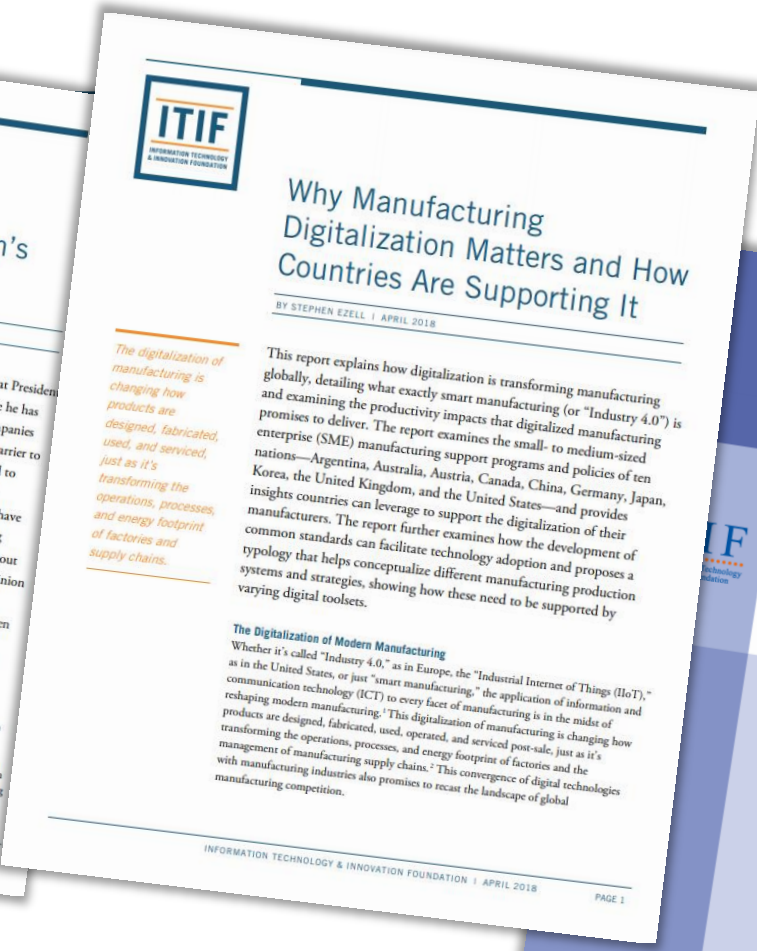
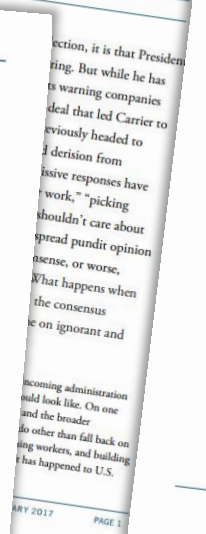
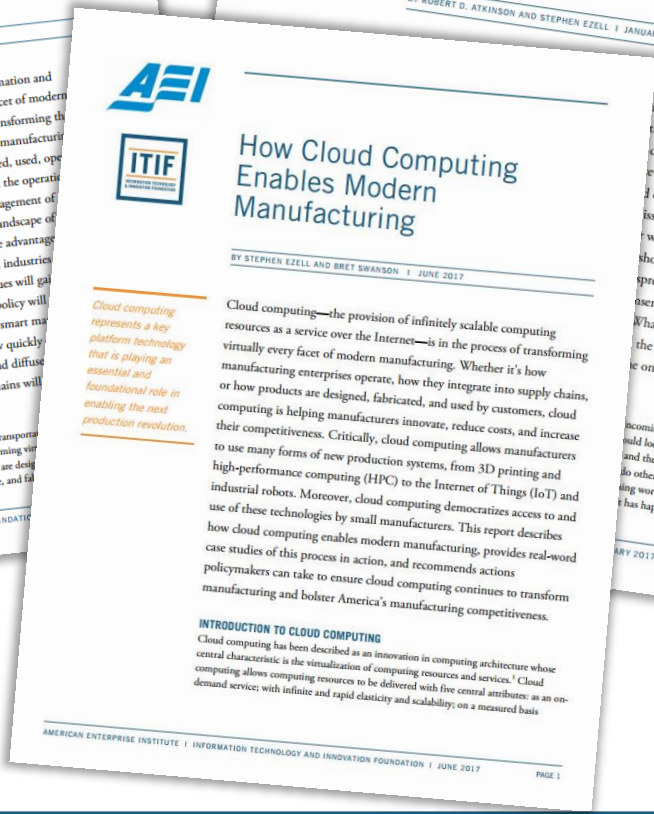
June 15, 2018

# About ITIF

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- The world's leading science and technology policy think tank.
- Supports policies driving global, innovation-based economic growth.
- Focuses on a host of issues at the intersection of technology innovation and public policy across several sectors:
  - Innovation and competitiveness
  - IT and data
  - Telecommunications
  - Trade and globalization
  - Life sciences, agricultural biotech, and energy

# MFG Reports



# Today's Presentation

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- 1 Manufacturing Digitalization and Why It Matters
- 2 Government's Roles and Responsibilities

# Increasingly Digitalized Global Economy

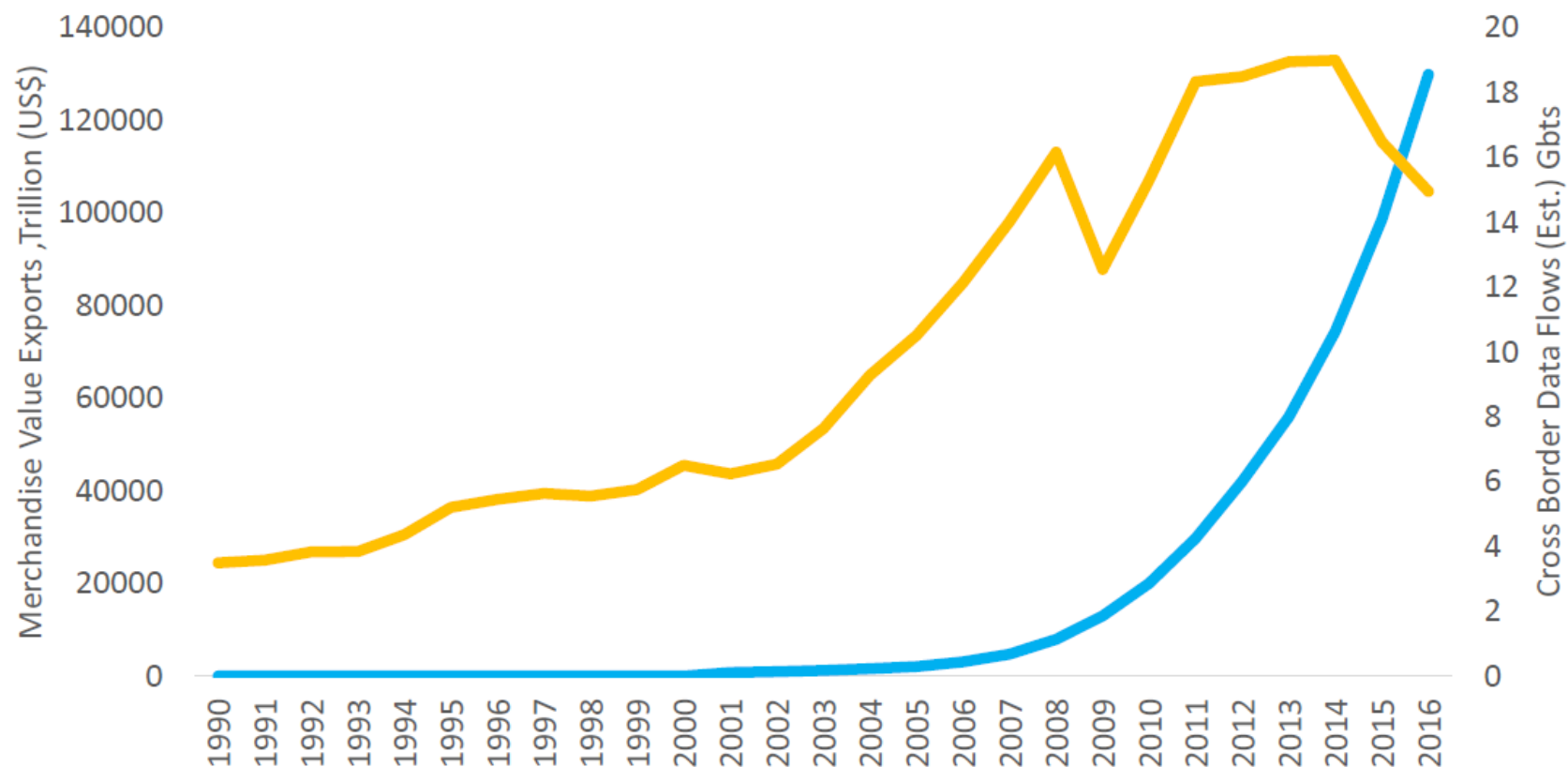
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- Digital economy accounts for 25% of global GDP.
- Half of all value created in the global economy over the next decade will be created digitally.
- 75% of the value of data flows over the Internet accrue to traditional industries.



Sources: Accenture, "Digital Disruption: the Growth Multiplier"; McKinsey Global Institute, "Digital globalization: The new era of global flows"

# Cross-Border Data Flows Have Surpassed Merchandise Trade



Source: Victor Mulas, The World Bank

# Digitalization Transforming Manufacturing

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- “Smart manufacturing”: The application of information and communications technologies to manufacturing processes.

Enabling technologies: IoT, sensors, wireless, cloud computing, data analytics, CAD/CAE software, robotics.

- Digital services account for 25% of manufacturing inputs.

Source: Sherry Stephenson, “The Linkage Between Services and Manufacturing in the U.S. Economy”

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# “Digitally Enabled” at Each Step of Manufacturing

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1. Product Design
2. Fabrication and Assembly
3. Factory Integration
4. Supply Chain Integration
5. Product Use and Consumption

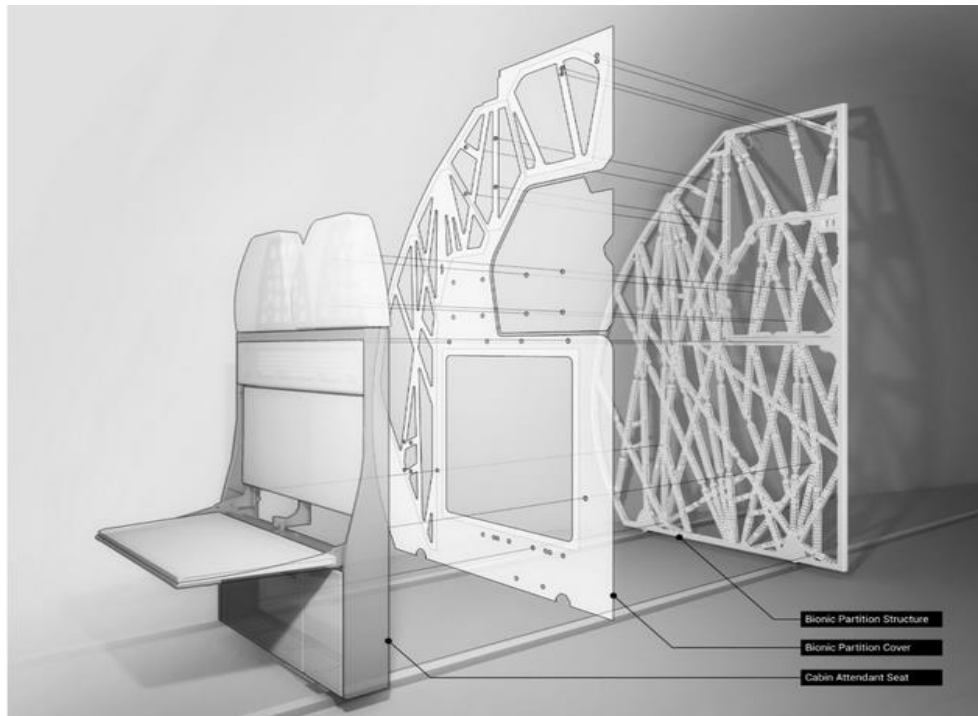




# Product Design

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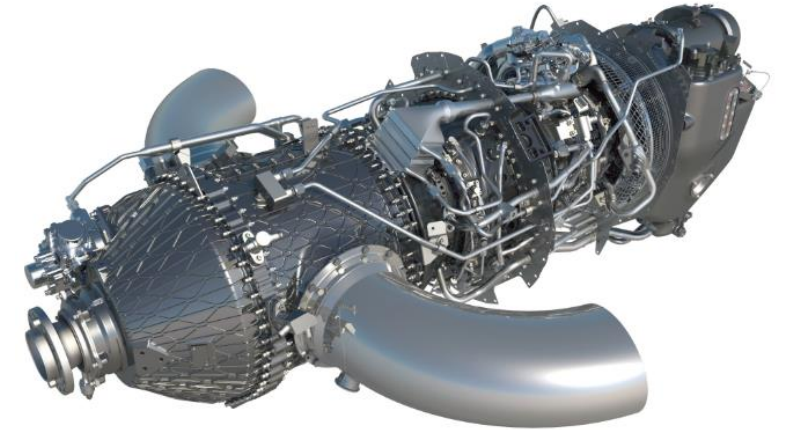
- CAD leverages generative design techniques to herald a new era of how products are designed.



# Fabrication and Assembly

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- 3-D printing could affect up to 42% of production in aerospace, automotive, industrial, automotive,, and medical device sectors.
- Increasingly capable industrial robots adapt in real-time to support flexible manufacturing systems.



Source: AT Kearney, "3D-Printing and the Future of the U.S. Economy"

# Factory Integration

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- Sensor-enabling equipment generates a comprehensive, real-time view of the status of machines, work cells, and systems.



# Factory Integration



Courtesy: Rold Group, Milan, Italy

# Factory Integration



## All the data and factory alerts in real-time and ready-to-use

Real-Time Notification to the



Timely Problem Solving



Instant Feedback to the Manager



Courtesy: Rold Group, Milan, Italy

# Supply Chain Management

- Real-time visibility into every machine making every component across supply chains.

## Suppliers to the new BMW i8

ONE-WAY CLUTCH - 6 SPEED AUTOMATIC TRANSMISSION  
BORGWARNER

COOLING FAN MODULE (TIER 2)  
JOHNSON ELECTRIC

ENGINE & GEARBOX BRACKETS  
FEMALK

FRONT BRAKE CALIPER  
BREMBO

SOUND DEADENERS  
FAIST CHEMTEC

PEDAL SENSORS  
HELLA

ELECTRO-COAT  
PPG INDUSTRIES

LASER LIGHT  
OSRAM

FRONT GRILLE  
SOLE SPA

STEERING WHEEL  
TAKATA

SHOCK ABSORBERS  
THYSENKRUPP

TIMING DRIVE SYSTEM  
IWIS

GRILL SHUTTER ACTUATORS  
BROSE

GEAR SHIFT ACTUATOR (TIER 2)  
NIDEC MOTORS & ACTUATORS

HEATING/COOLING/TURBOCHARGER LINES  
CONTITECH



## Automotive News Europe

ELECTRONIC CONTROL UNITS FOR BATTERY MANAGEMENT  
PREH

PORTABLE ELECTRIC VEHICLE CHARGER  
DELPHI

RGB LED PUDDLE & ENTRY LAMP  
GRUPO ANTOLIN CML

DECOUPLING ELEMENT  
TRELLEBORG/VIBRACOUSTIC

BODY CASTING STAMPINGS  
MAGNA

FPC-ECU BRUSHLESS  
OMRON

LOCKSETS  
U-SHIN

TWO SPEED E-AXLE  
GKN DRIVELINE

COLD & HOT GASKETS  
FEDERAL-MOGUL

GULLWING DOOR STRUTS  
STABILUS

CV-JOINTS (HALFSHAFTS)  
HIRSCHVOGEL

ELECTRIC MOTOR HOUSING  
NEMAK

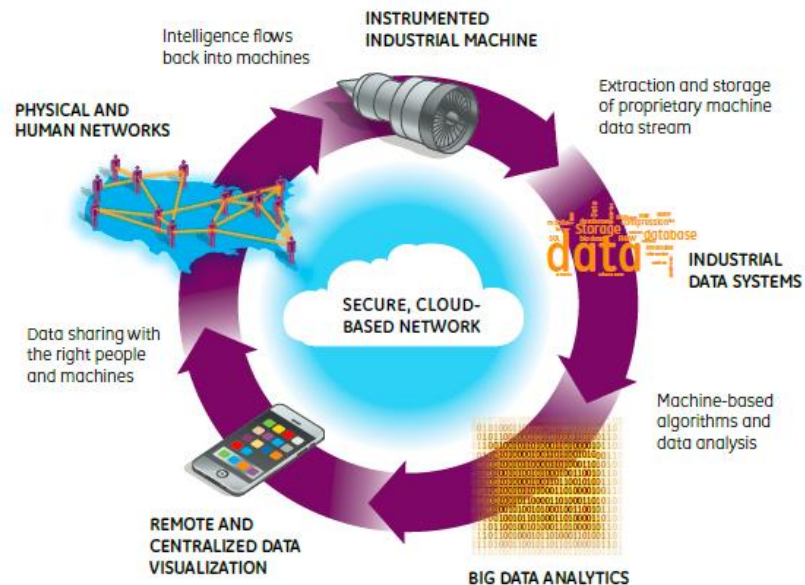
HYBRID STEEL PRESSURE TANK  
MAGNA

TRANSMISSION OIL COOLING MODULE  
MAHLE

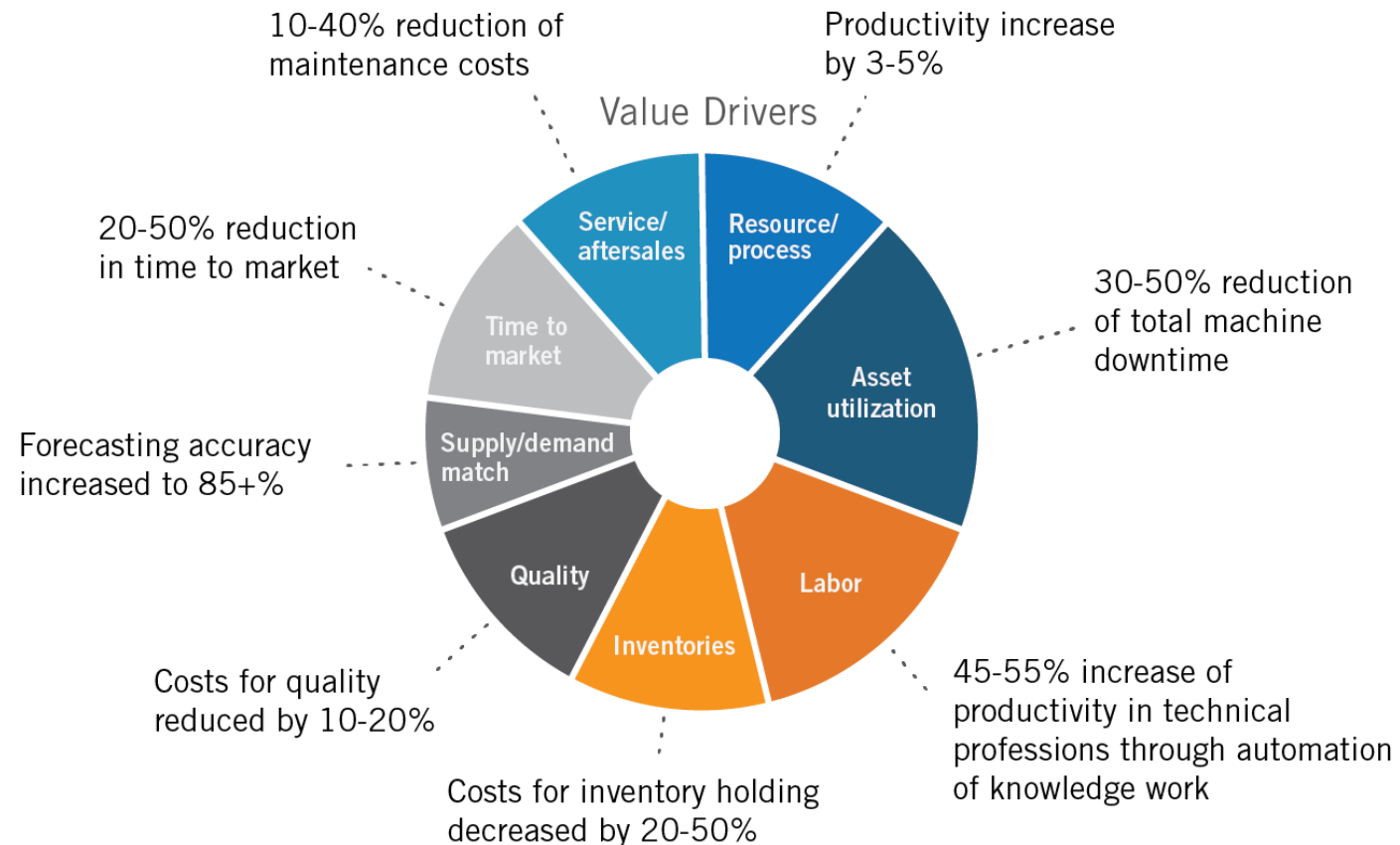
SPECIALITY GASKETS - EXHAUST SYSTEM  
ELRINGKLINGER

# Product Use and Consumption

- “Product servicification”: Selling products as services.
- Delivering cloud-based, value-added services through products.



# Digital Manufacturing Can Drive Productivity Growth



Source: McKinsey Global Institute, "Industry 4.0 How to Navigate Digitization of the Manufacturing Sector"



# Digital Manufacturing Can Drive Productivity Growth

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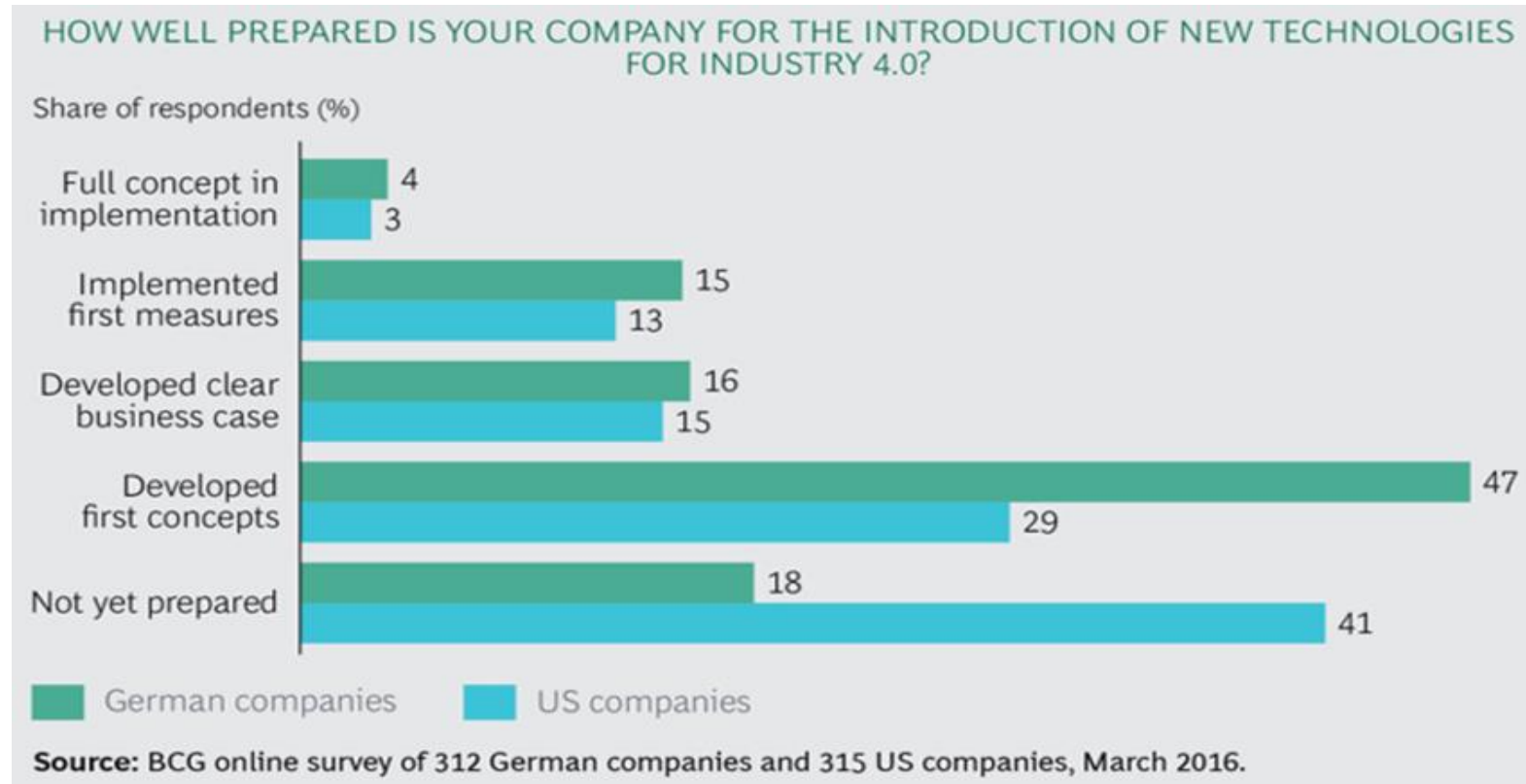
- Increase productivity of world's factories by 10 to 25%.
- IoT applications will generate \$1.2 to \$3.7 trillion of economic value annually by 2025.
- Could add 1-1.5% to a nation's annual productivity growth.



Sources: McKinsey Global Institute, "The Internet of Things: Mapping the Value Beyond the Hype"  
GE, "Industrial Internet: Pushing the Boundaries of Minds and Machines"

# Yet Progress Has Been Slow

- 77% of U.S. SMEs have no plans to implement IIoT within 3 years.



Sources: Sikich, "2017 State of Manufacturing Report"

Markus Lorenz et al., Boston Consulting Group, "Time to Accelerate in the Race Toward Industry 4.0," May 2016

# Why Has Digital Manufacturing Progress Been So Slow?

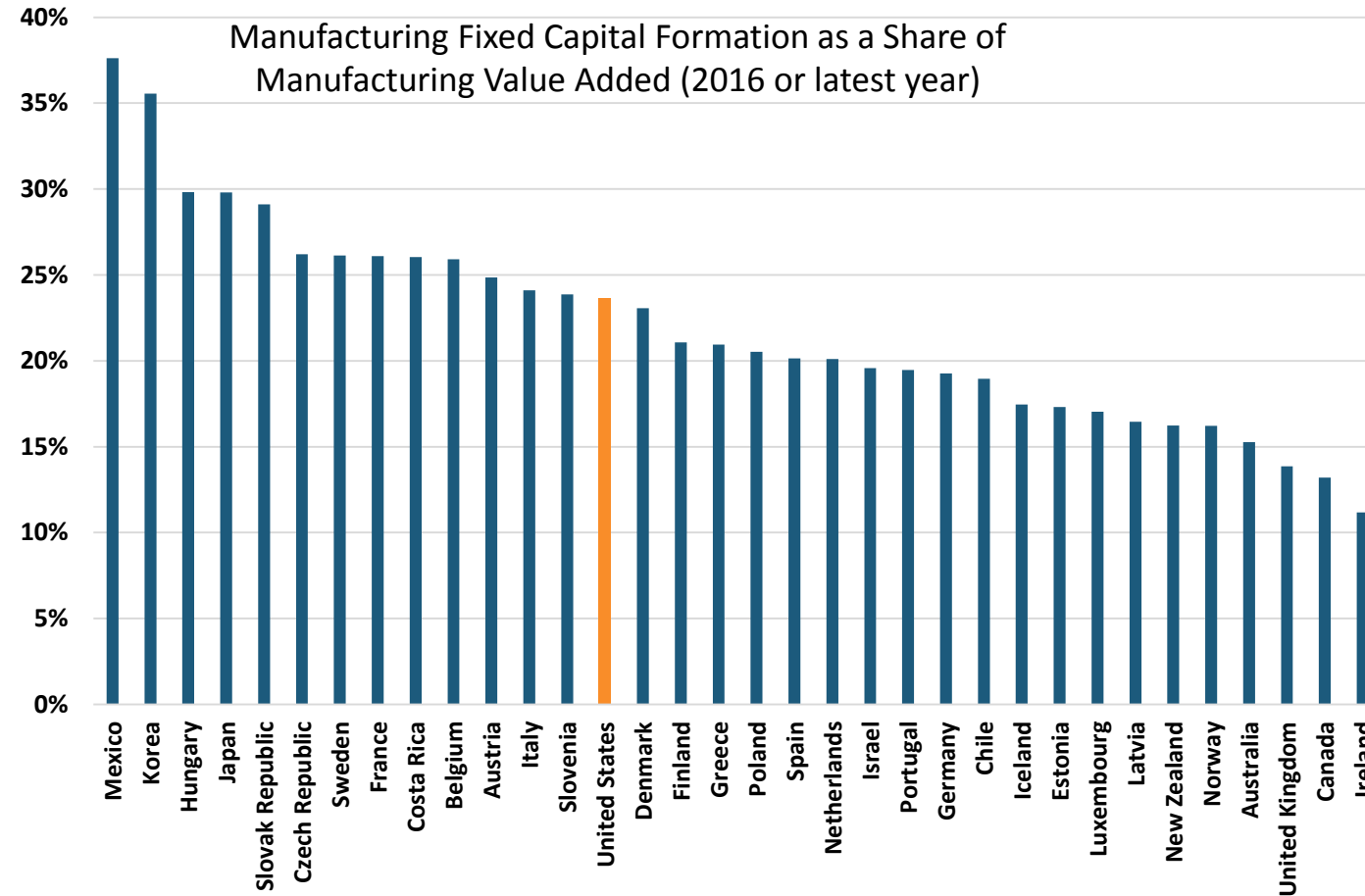
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- Supply
  - Technology not yet fully mature.
  - Fragmented providers/lack of interoperable standards.
- Demand
  - Lack of clarity on how to proceed (especially for SMEs).
  - Lagging employee skills and competencies.
  - Underinvestment in capital equipment.

Source: Stephen Ezell, ITIF, "U.S. Manufacturing Digitalization – Extent of Adoption and Recommendations for Increasing Penetration" (Forthcoming July 2018)

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# U.S. Mfg. Underinvestment Relative to Peer Nations

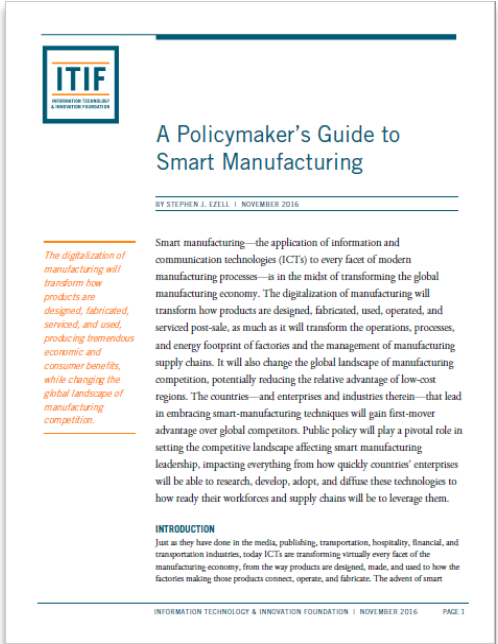


Source: OECD Stat, (Structural Analysis Database; accessed June 12, 2018)

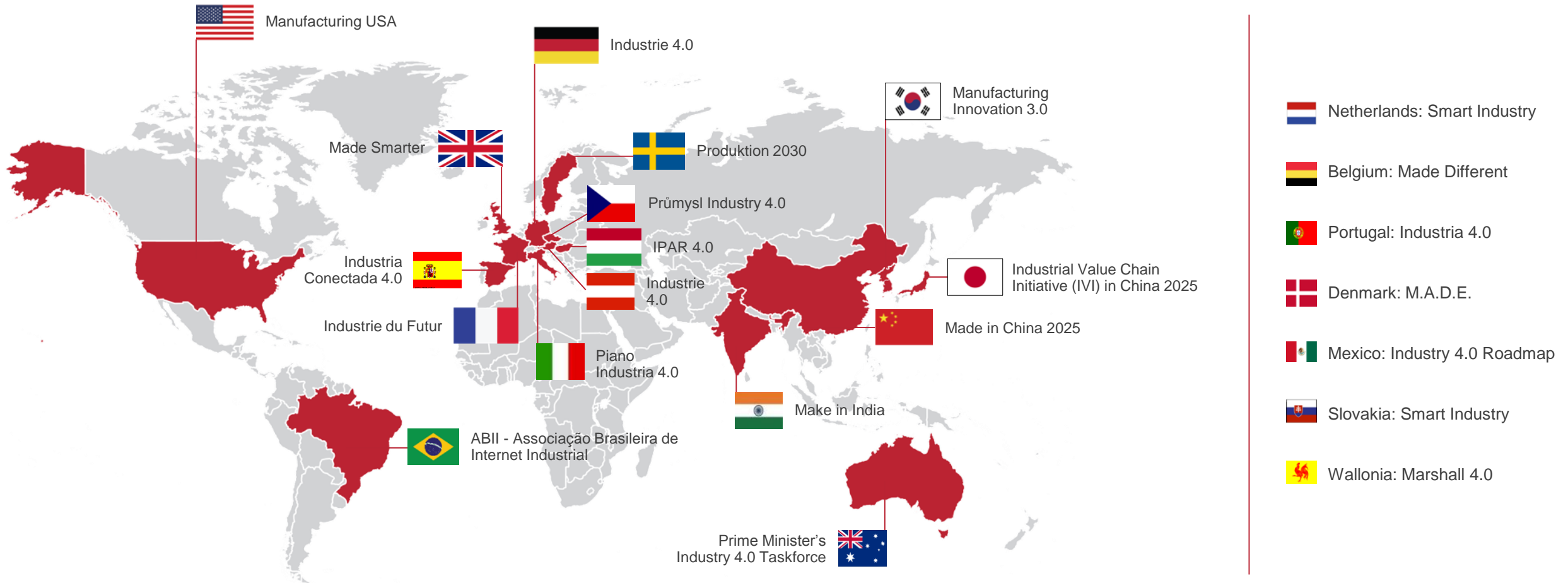
# Today's Presentation

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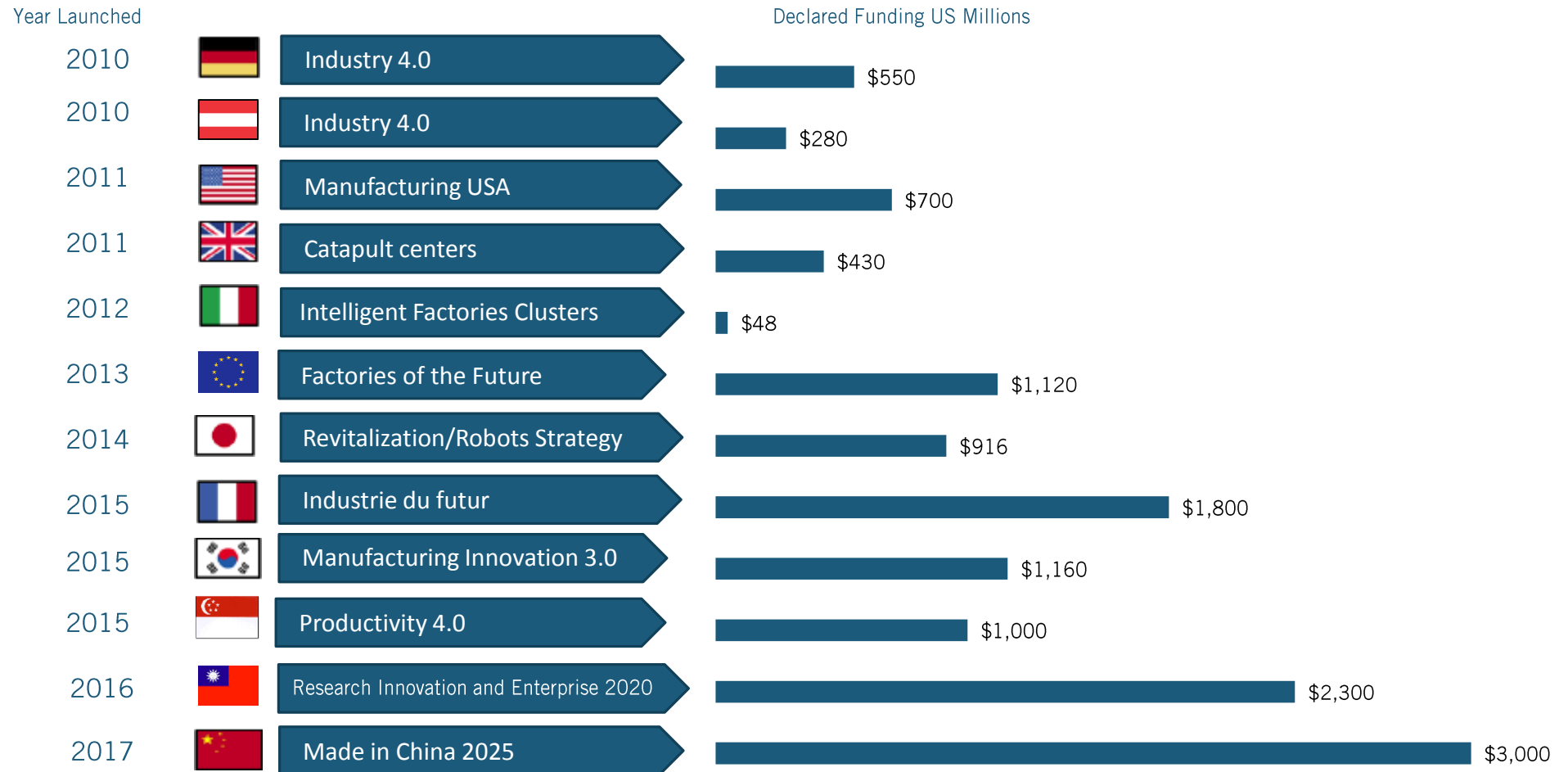


# Over 30 Countries Have Introduced “Industry 4.0” Initiatives



Courtesy: Dave Vasko, Rockwell Automation

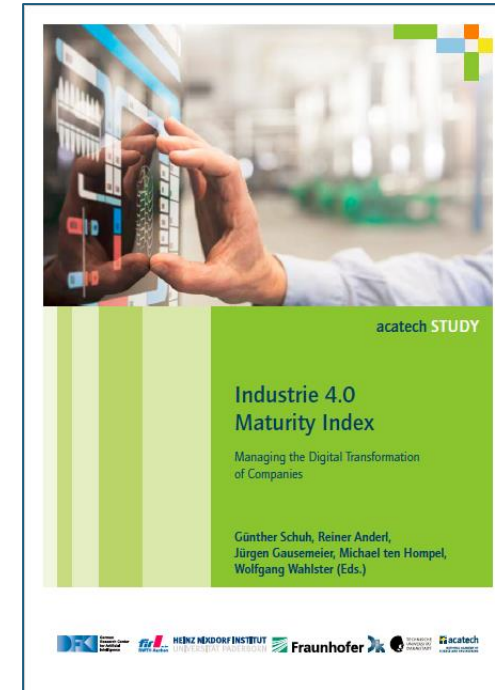
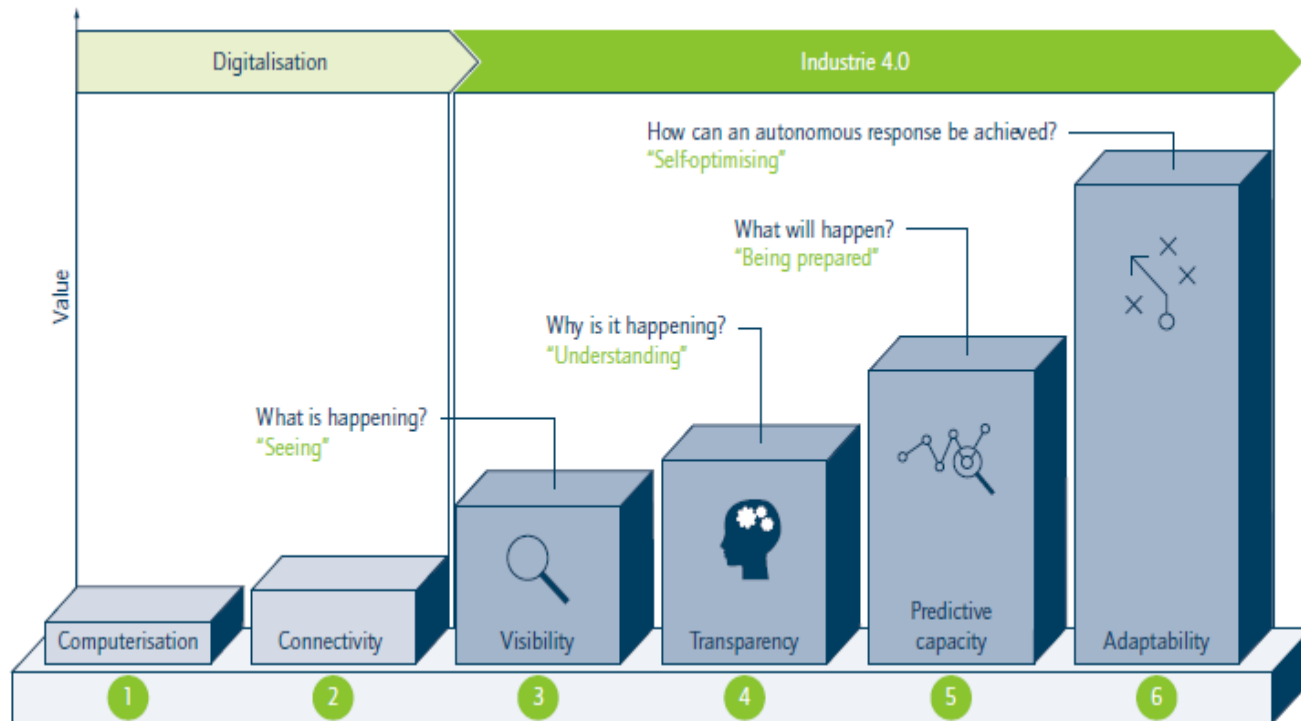
# Countries Aggressively Implementing Policies to Achieve Digital Manufacturing Leadership



Source: Roland Berger; ITIF Analysis

# What Countries' Industry 4.0 Policies Are Doing

1. Building “Maturity Indices” and “Model Use Cases” to facilitate manufacturers’ digital transformation journeys. (E.g. Germany)





# What Countries' Industry 4.0 Policies Are Doing

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2. Launching “pilot fabs” that demonstrate smart-manufacturing techniques on active production lines. (Germany/Austria)
3. Providing SMEs tax credits to facilitate equipment upgrades. (Austria/Italy)
4. Providing SMEs access to cloud-based, HPC-powered design, modeling, and simulation software. (Korea)
5. Developing smart manufacturing workforce training/credentialing programs and supporting enterprises' investments therein. (Germany)

# U.S. Policy Recommendations

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1. Leverage DMDII by creating regional digital manufacturing hubs.
2. Launch a “Manufacturing Digitalization Fund.”
3. Incentivize OEMs to launch a “digital supply chain integration initiative” that gets 10,000 SMEs IoT-enabled within five years.
4. Provide a permanent share of federal funding for Manufacturing USA Institutes, including DMDII.
5. Support investment in digital manufacturing workforce and skills.

# Supporting Talent Development

## Solutions:

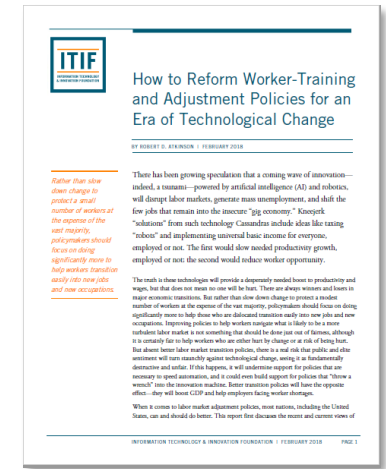
- Expand MOOCs, like Tooling U-SME: Provides 500+ online manufacturing technology classes.
- Leverage the Digital Manufacturing and Design Roles Taxonomy.



Source: Digital Manufacturing and Design Innovation Institute (DMDII) and Manpower Group, "The Digital Workforce Succession in Manufacturing"

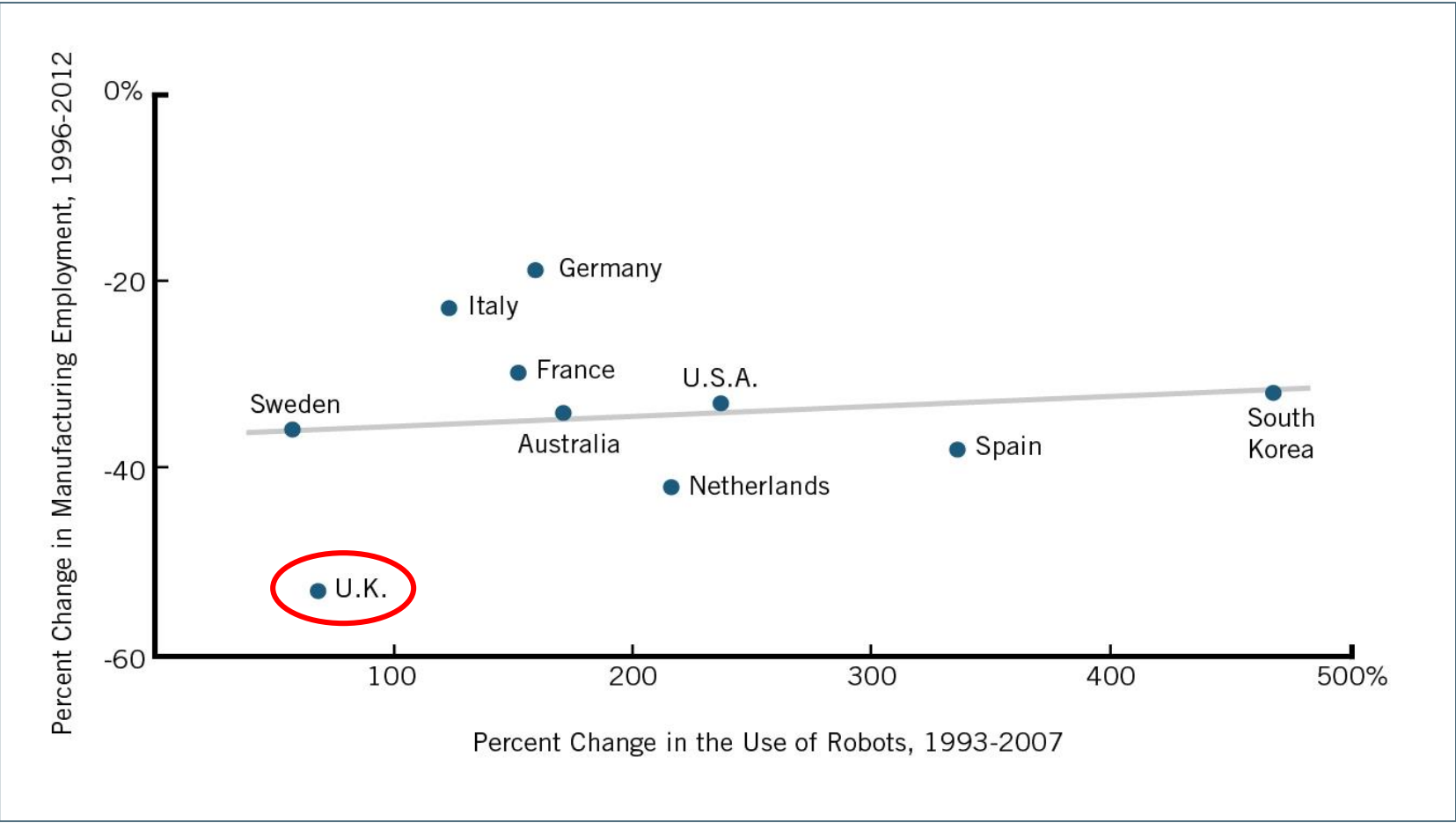
# U.S. Policy Recommendations - Talent

- Expand use of industry-defined, nationally portable skills credentialing.
- Increase availability of apprenticeship/on-the-job training programs.
- Broaden the Manufacturing Engineering Education Grant program.
- Expand Section 127 tax benefits for employer-provided tuition assistance.
- Launch a “knowledge tax credit.”



Source: Robert D. Atkinson, ITIF, “How to Reform Worker-Training and Adjustment Policies for an Era of Technological Change”

# Don't Fear Job Loss from Digital Manufacturing



Source: George Graetz and Guy Michaels, "Robots at Work"; Muro and Andes, "Robots Seem to Be Improving Productivity, Not Costing Jobs"

# Thank You!

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