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Leading the digital transformation toward “Made in China 2025”

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Companies around the world are engaging in digital transformations that create substantial impact across the value chain



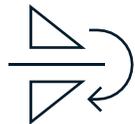
Connectivity

Connectivity groups Digital Manufacturing solutions that improve and facilitate operational performance, management, and everyday collaboration of employees (such as augmented reality and digital performance management)



Intelligence

Intelligence refers to applications around analytics and prediction models as well as digital twins of products and processes (such as predictive maintenance or demand forecasting)



Flexible automation

Flexible automation is associated with automation solutions that use new digital equipment to increase efficiency through its flexible deployment in the production system (such as autonomous guided vehicles or exoskeletons)



Digital transformation creates business values, increases productivity, and gets/stays competitive

Reduction in design and engineering cost
10-30%

Decrease in cost for inventory holding
20-50%

Reduction in time-to-market
20-50%

Reduction in cost for quality
10-20%

Increase in overall productivity
3-5%

Increase of productivity through automation of knowledge work
45-55%

Reduction of total machine downtime
30-40%

Increase in forecasting accuracy
85%+

However, many transformations have failed due to inadequate preparation

Key challenges faced by companies

B Business

- Approach digital holistically with a **clear vision** and develop a **phased road map**
- Approach the opportunity “**bottom-line value backwards**” – rather than technology forward

T Technology

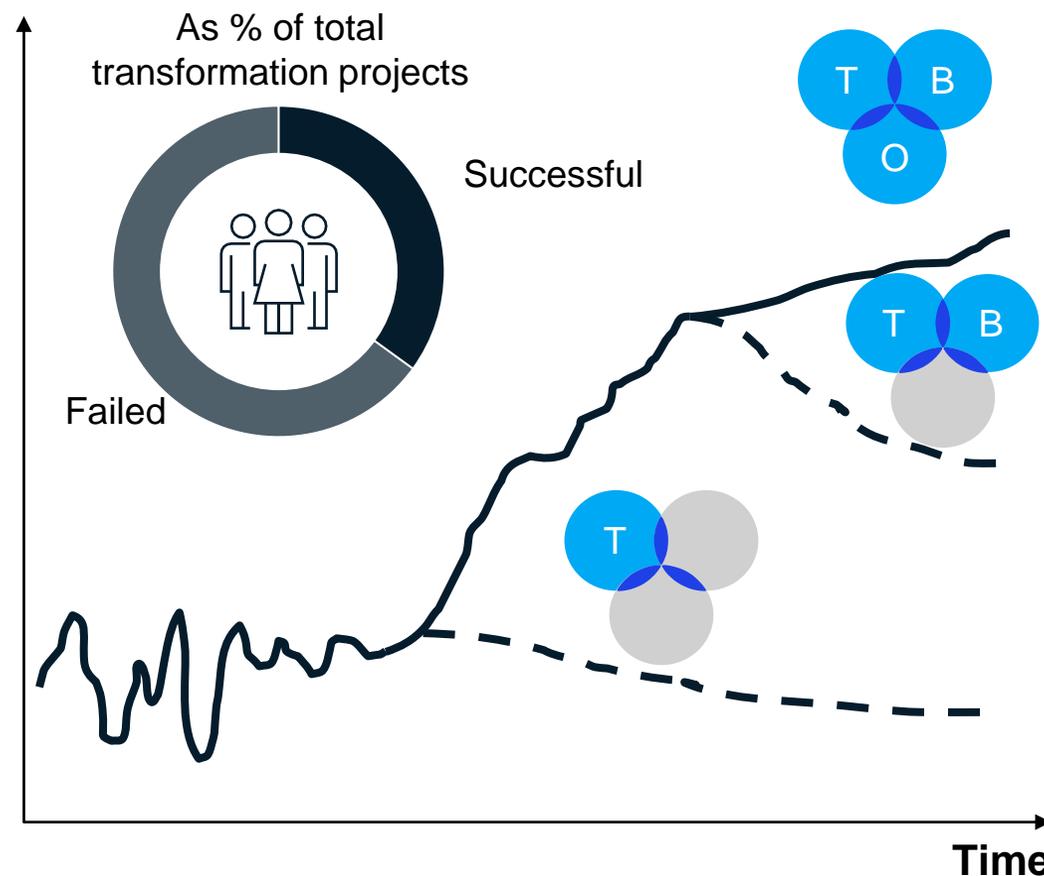
- Form the comprehensive target-state technology stack that is **scalable**
- Build and lead a **focused ecosystem of technology Partners**

O Organization

- Drive the transformation **from the top** and communicate results and success stories
- **Get ahead of the capability gap** and build the culture to sustain it



Performance



To help tackle these challenges, McKinsey has set-up a global network of Digital Capability Centers (DCCs)

Digital Capability Center Chicago

- A major manufacturing hub with 290 members:
 - Leading universities
 - Government and agencies
 - World-class industry leaders and SMEs



Digital Capability Center Aachen

- Collaboration in the advanced textile field, with partners in machine manufacturing and IoT platforms



Digital Capability Center Venice

- Joint venture with industrial associations and active collaboration with IoT partners



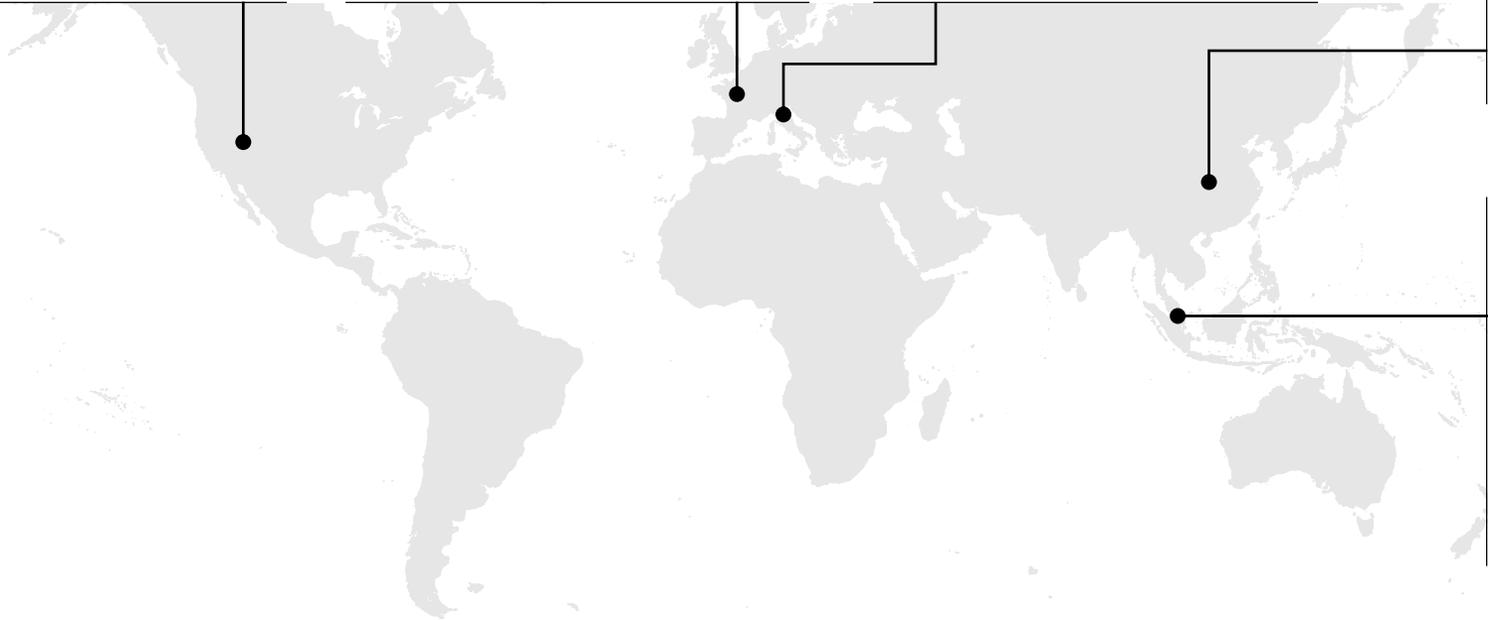
Digital Capability Center Beijing

- Partnership with Tsinghua University and active collaboration with IoT technical providers



Digital Capability Center Singapore

- Public-private partnership with 44 industry members mainly from the aerospace and machinery sectors, with expansion towards IoT



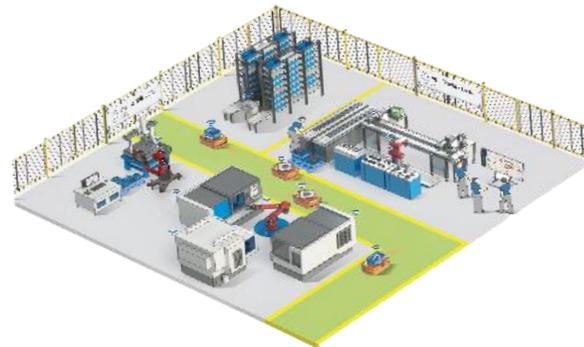
In China, DCC partners with Tsinghua University to create a best-in-class showroom and a factory enabled by digital tools and use cases



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清华大学
Tsinghua University



Key features:

- **Physical showcase** of end-to-end digital thread from product development, supply chain and manufacturing
- **Safe testbeds** for piloting industry 4.0 technologies on a real-life example
- **Capability centers** for experiential training from lean to industry 4.0

Key objective: accelerate adoption of digital transformation in China

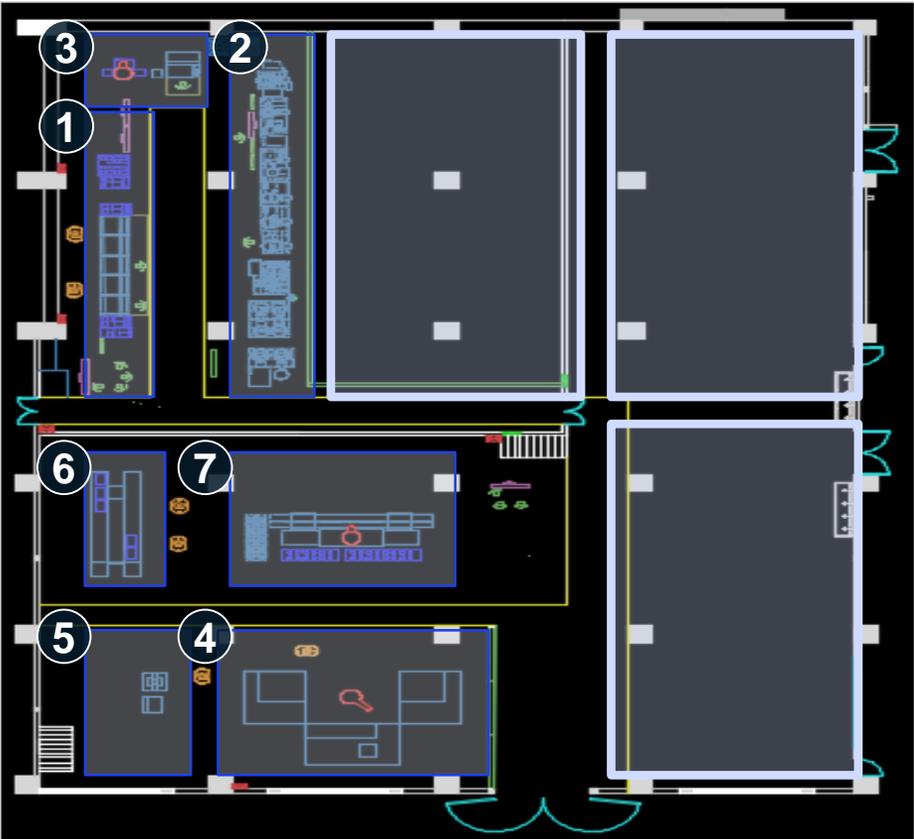
Specifically, the center is equipped with state-of-the-art disruptive technology & end-to-end digital tools for digital transformation



We demonstrated one gearbox company's digital transformation through cutting edge disruptive technologies and digital tools introduction

The center also includes digitalized lean production and smart manufacturing lines

Digital Factory Shop Floor (650 m²)



1 Digitalized Gearbox Assembly Line



2 Digitalized Tea Line



3 Predictive Maintenance



4 Robotics & CNC



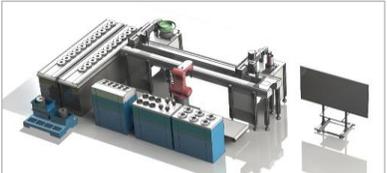
5 Digital Quality System



6 Smart Logistics



7 Auto Gearbox Assembly



The center depicts the smart manufacturing concept through simulation to create impactful learning and experiment opportunity

The Digital Capability Center in Beijing offers a unique way to prepare clients for their digital transformation journey

1 Customized Training Modules with Experimental Learning



- Illustrate the **Industrial Revolutions changes** at different configuration of the **gearbox production lines**
- Incorporate global curriculum system into **30+ digital training modules & provide tailored courses** for all levels from CxOs to frontline managers
- Establish the **digital transformation essential courses** to not only focus on **digital technologies** but also **management system**
- Achieve clarity in **digital strategy** through **field visits and exchanges with best-in class companies**

2 Advanced End-to-End Digital Solution



- Collaborate with **Tsinghua University** by harnessing its strong R&D capability and leverage **McKinsey's global digital IPs** to offer:
 - An **IoT vertical stack solution** that transfers hardware infrastructure to digital applications
 - **Digital Factory Solution Suite**, an end-to-end digital manufacturing solution
 - 100+ hands-on **digital use cases** across the value chains to realize solid business impact

3 Impact Oriented Holistic Digital Transformation



- Support clients at each stage of the **digital transformation journey** by:
 - **Diagnosing** pain points
 - **Designing** transformation roadmap
 - **Piloting** to prove concept
 - **Rolling out** digital modules across the organization

1: Various stages of the industrial revolution are illustrated at the DCC Beijing through gearbox production lines

Gearbox production lines

Gearbox product



4th Industrial Revolution

Highly automated smart manufacturing line

3rd Industrial Revolution

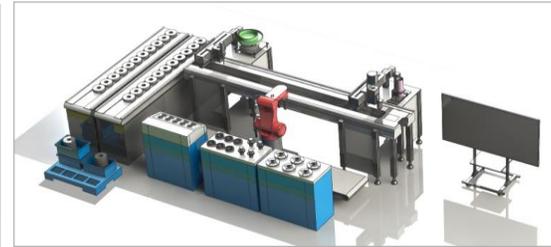
Digitalized lean line

2nd Industrial Revolution

Lean-enabled mass production cell line

1st Industrial Revolution

Small batch size manual assembly workshop



Lean Transformation



Digitalized Lean



Smart Manufacturing

1: McKinsey's capability building learning modules capture the essence of the digital transformation



Technology System

Essentials

- IoT stack configuration, platform and tools
- Cybersecurity for integrated network
- E2E product traceability and automated flow
- Digital Transformation Program to maximize impact

Resources

- Yield, energy and throughput optimization
- Energy optimization with big data and advanced analytics

Planning

- Application of additive manufacturing
- Process and layout design using digital twin
- Batch size determination and design for line flexibility
- Production planning, scheduling and demand levelling

Quality

- Optimization of equipment working parameters
- Adaptive new sensing and measuring technologies for defect identification

Assets

- Line balancing and smart routing in real time
- Predictive maintenance with big data and advanced analytics
- Remote maintenance to improve labor and maintenance efficiency
- Use of AR and VR support to improve maintenance efficiency

Labor

- Use of wearables during assembly and production
- Use of autonomous vehicles (AGV)
- Introduction of human / robot collaboration
- Workforce management

Inventory, Time to market, S/D match

- Intelligent material storage
- Use of E2E digital thread



Management Infrastructure

- digitalization of standard work
- Integrated digital performance management
- Digital root cause problem solving
- Manufacturing Organization of the future

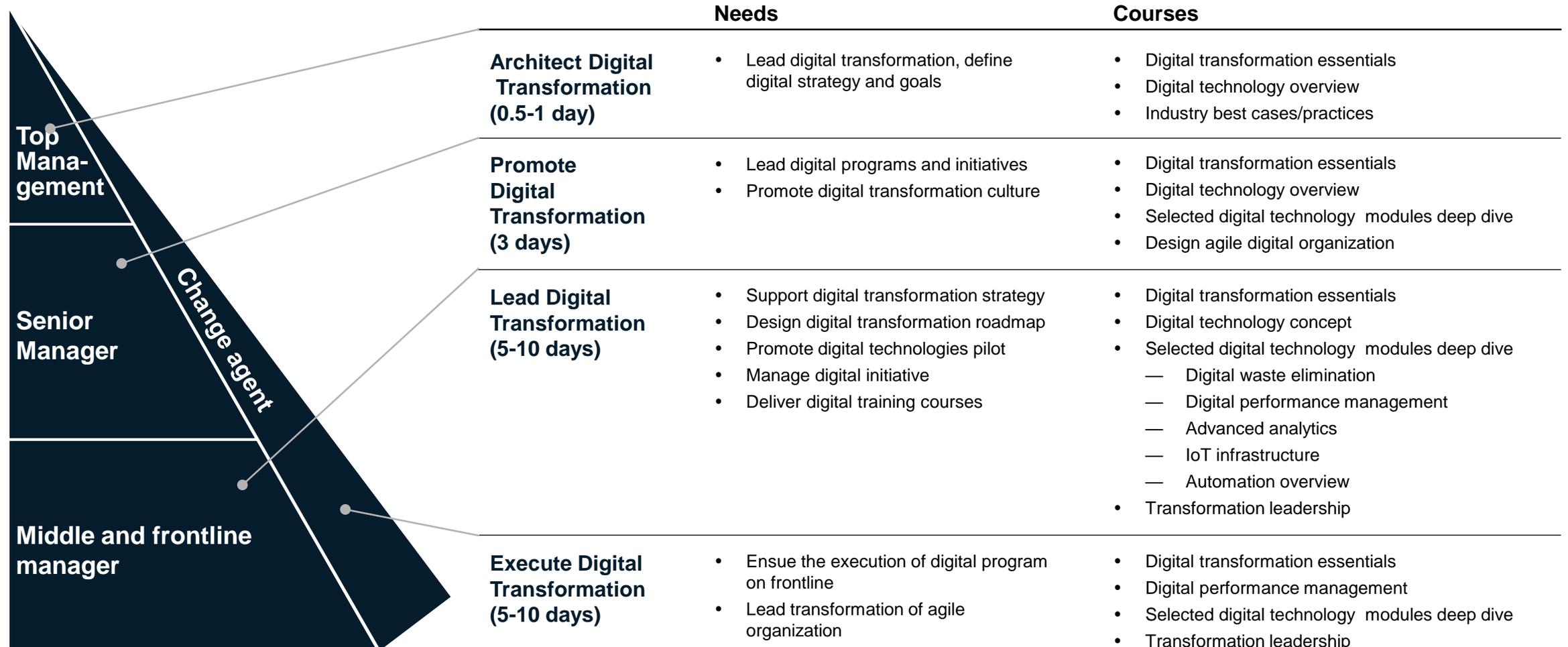


Capabilities, Mindsets and Behaviors

- Digital skills of the future and capability building
- Mindset shift to enable Industry 4.0 transformation in the workplace
- Virtual showcases on Supply Chain, Procurement, CapEx and Product Development

1: The center provides a wide range of digital manufacturing learning modules to meet the needs of leaders at various levels

NOT EXHAUSTED



1: “Go&See”: Get unparalleled clarity on digitalization through field visits and on-site interactions with benchmark companies

Why join us at Industry 4.0 "Go&See"?

Seeing is believing! Industry 4.0 “Go&See” is for you if:

- Your company is embarking on a journey of digital transformation and smart manufacturing upgrades
- You are uncertain about the impact of digitalization
- You would like to get a crash course on getting started in the digital world
- You find it difficult to find alignment on the strategic direction of digitalization within your organization

The best way to win in the world of digitalization is by going out and meeting the forerunners of digital transformation, listening to their success stories and learning from their pitfalls.

Different options available in this program:

Visit Industry 4.0 benchmark companies in Europe and the US:
1 week | Open to participation from Chinese companies

- Get valuable takeaways from leading European and US companies on their path to successful digitalization
- Get access to forward-looking insights from top leaders and scholars

Made in China 2025 Experience Day:
1–2 days | Open to participation from Chinese companies

- Experience select Chinese smart manufacturing model enterprises and demonstration centers in action
- Get to know what smart manufacturing is all about and where it is heading

Visit lean benchmark companies in Japan:
1 week | Open to participation from Chinese companies

- Learn how you can upgrade your lean management practices in the birthplace of the concept—Japan
- Experience craftsmanship and learn the nuances of focusing on tiny details

1: “Go&See”: Get unparalleled clarity on digitalization through field visits and on-site interactions with benchmark companies



Expected objectives

- Deepen your knowledge on Industry 4.0 and smart manufacturing to understand the benefits and risks associated with digital transformations
- Participate in experiential case studies to comprehend how digitalization (smart manufacturing) can deliver real financial impact for your company
- Learn about McKinsey's Digital Diagnostic Methodology to understand how you can take the first step towards your digital transformation journey



Core features

- Take advantage of high-quality experience and learning—McKinsey has partnered with Tsinghua University for this program
- Access McKinsey's powerful digital transformation insights, and analytic and diagnostic tools
- Benefit from immersive learning and hands-on experience opportunities with advanced digital use cases
- Stand on the high ground of the industry and gain an understanding of Industry 4.0 and smart manufacturing

Participant composition: **15-20** senior executives

2: The Digital Factory Solution Suite has 7 modules and 27 use cases to enable remarkable efficiency improvement

Digital Performance Management

- Digital Performance Management (DPM)
- Electrical Production Management (EPM)
- Organizational Health Index (e-OHI)
- Digitalized Way of Work (e-WoW)

Labor Management

- Electronic-SOP (e-SOP)
- Electronic Debottleneck (e-debottleneck)
- In Door Position UWB System
- Electronic Skill Matrix
- Electronic Labor Performance Management
- Electronic 5S Score Record (e-5S)

Equipment Management

- Electronic-OEE (e-OEE)
- Electric Preventive Maintenance Checklist (e-PM)
- Electronic Auto Alarm (e-alarm)
- Remote Experts Support (Remote expert)
- Predictive Maintenance (PdM)
- AR Enabled Maintenance Works

Quality Management

- Online SPC
- Automatic Problem Escalation
- Product Full Traceability

Materials Management

- Electronic Material Pull System
- Advanced Planning System(APS)
- Auto Guided Vehicle (AGV)

Energy Efficiency Management

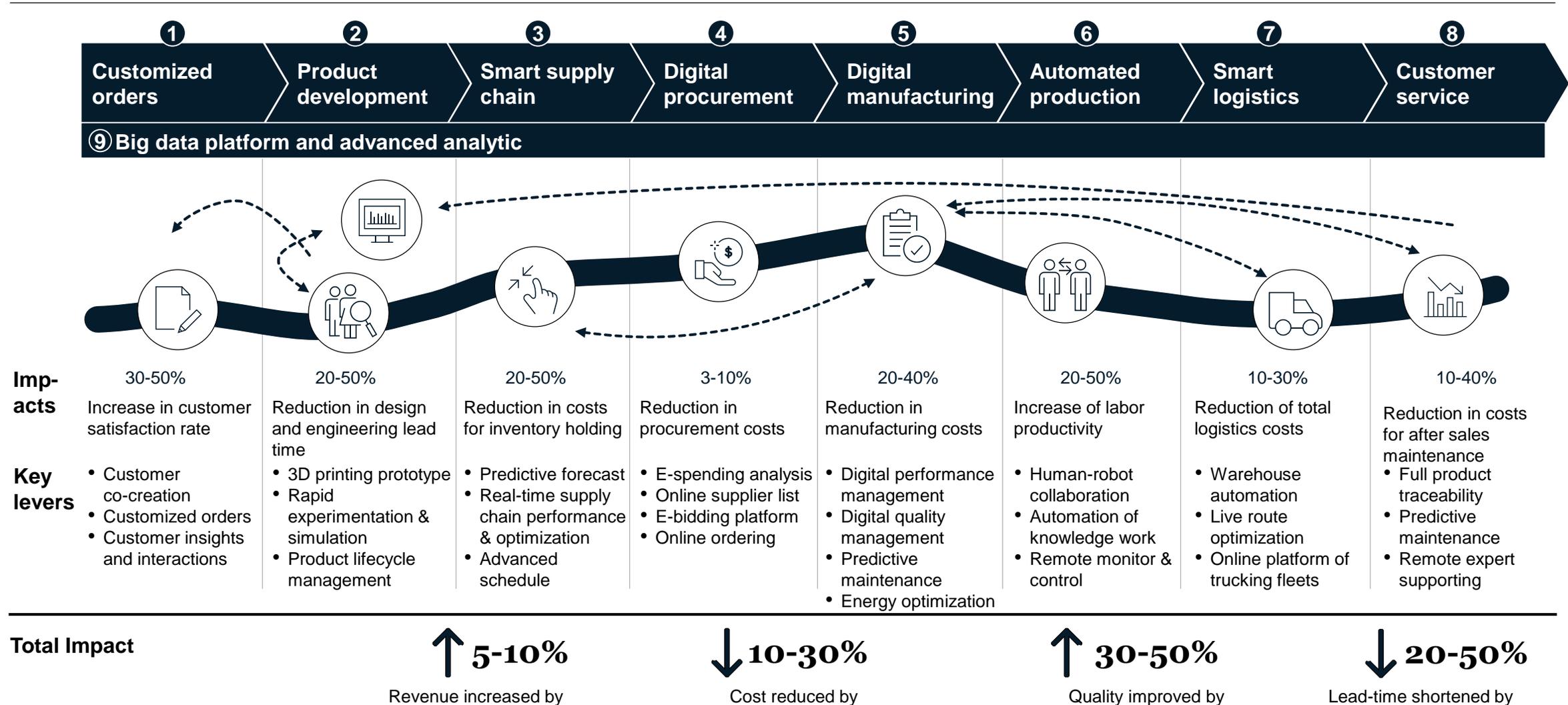
- Real-time EE management
- Real-time Energy Load Curve
- Real-time Energy Bridge

Cloud-base Benchmark & Analysis

- Cloud-based Benchmarking
- Yield, Energy & Throughput (YET)

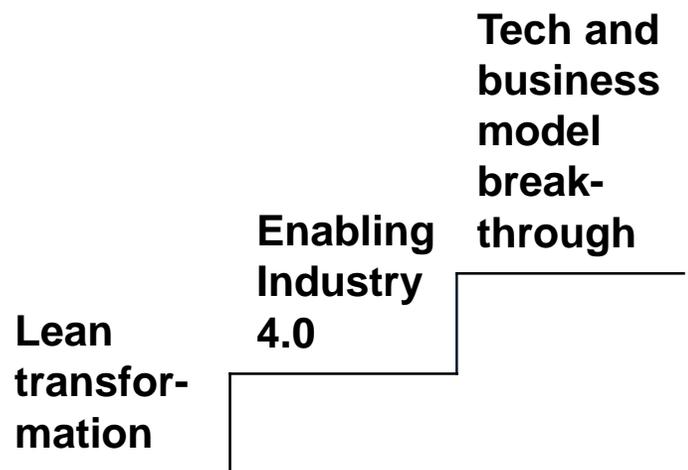
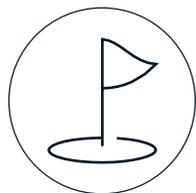


2: The Digital Capability Center helps to create significant business impact through 100+ digital use cases across the value chain



3: Companies need to develop a roadmap, introduce technology, and establish an ecosystem to prepare for their digital journey

0 Establish digital roadmap



- **High variation in capability** amongst Chinese players requires **tailored roadmap**
- **360° assessment** and evaluation of status quo to identify **key gaps**



1



Implement customer value-enabled digital operating system

- Identify key levers
- Benchmark with cross-industries
- Deploy appropriate digital tools for intelligent manufacturing

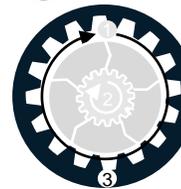
2



Transform management infrastructure and capability

- Agile org structure
- Digital business process and performance mgmt
- Invest in talent development
- Drive people change mgmt

3

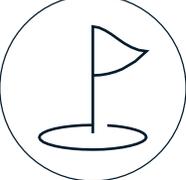


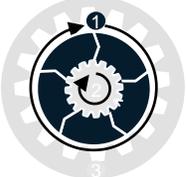
Build a sustainable ecosystem

- Joint effort among policy maker, academia, supply chain participants for optimal resource allocation and multi-wins

3: McKinsey plays an indispensable role in all 4 key steps of the digital transformation

Success factors for industry 4.0

0  Conduct a full assessment to design top-level roadmap

1  Implement client value oriented digital operating system

2  Transform management infrastructure, mindset and capability

3  Build a sustainable ecosystem

McKinsey's role

Strategy advisor

- Top-down design the digital strategy roadmap as well as the corresponding lean, automation, digital and intelligent talent development direction
- Provide third-party consulting on digitalization for government and main industries

Chief designer & transformation driver

- Technical design and mgmt implementation plan
- Lead & support diagnosis, design, pilot and rollout to speed up clients' digital transformation
- Introduce industry-/process-specific solutions

Capability builder & change implementers

- Foster tech. experts & change agents at all levels via global resources and training center
- Provide innovation test field for digital experts and innovative companies

Ecosystem integrator

- Help bridge clients(government, enterprises & tech. providers) and facilitate partnership or M&A via McKinsey's global network

Case Examples

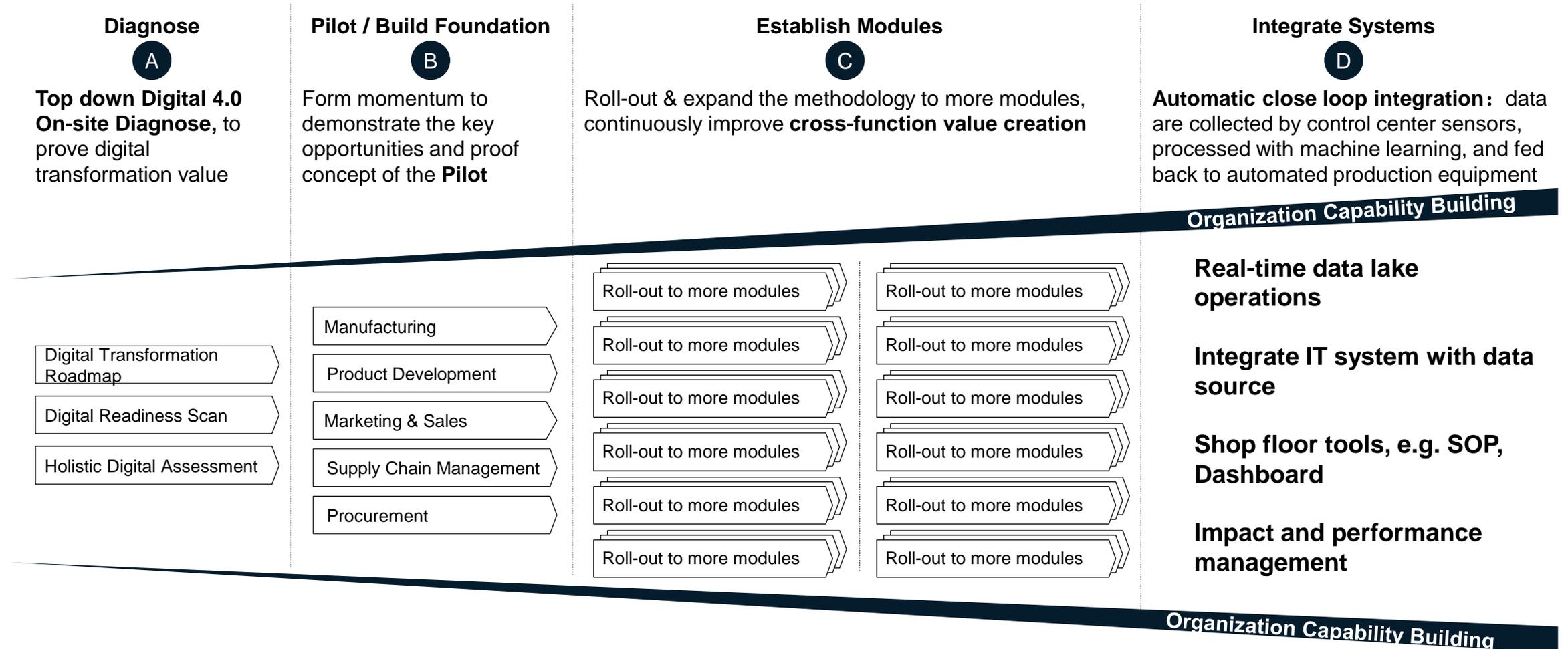
- Designed I4.0 strategy for a leading semi-conductor company
- Created a roadmap of a new digital factory in a truck OEM, including lean, digitalization, talent management etc.

- Developed a customized technical infrastructure plan, implemented talent initiatives, and set up I4.0 project mgmt. for a CE company

- Set up 4 global digital capability centers; Chinese center partnered with Tsinghua University
- Developed I4.0 training system
- Introduced best technical partners

- Helped foreign clients to design enter-China strategies and potential JV or M&A targets
- Helped domestic customers to acquire foreign technology providers

3: McKinsey helps clients to establish their transformation journey through a systematic 4-step approach



How can the Digital Capability Center in Beijing help you?

Visit the digital model factory:

- Enjoy the on-site 1 day workshop to experience smart manufacturing overview and observe transformation from lean to Industry 4.0
- Build awareness on Industry 4.0 technologies and understand key approaches to diagnose value-at-stake in your organization

Participate in digital transformation training at DCC or at your manufacturing site:

- Versatile training modules tailored for your leaders at different levels
- Help managers in your organization to build capabilities on Industry 4.0

Provide digital transformation advice and services through our DCC experts:

- Holistic digital transformation approach
- Tailored digital solution design and implementation



Please contact one of McKinsey's experts to know more about the DCC Beijing

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