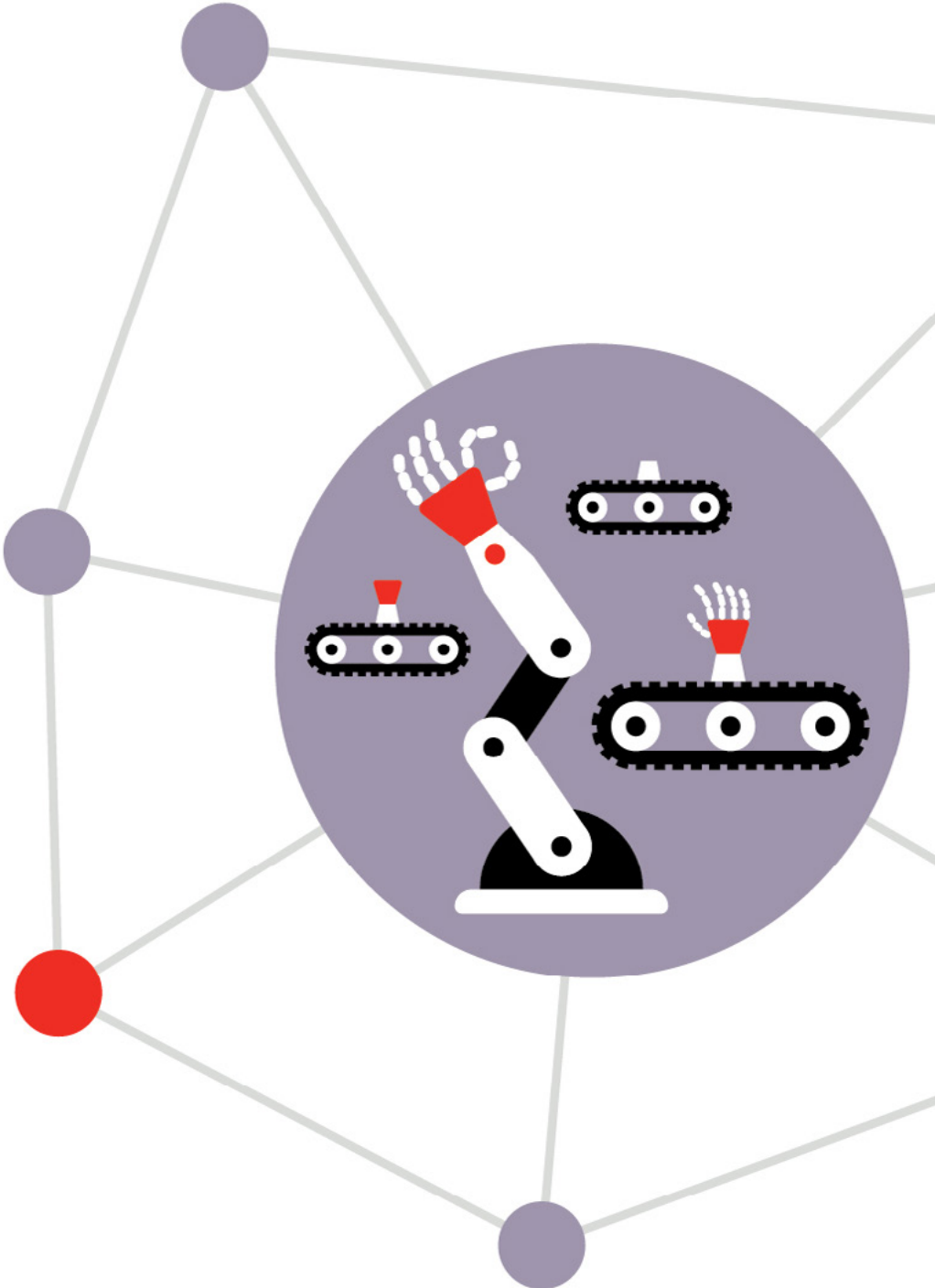# Deloitte.

Pathways to build ecosystems in the manufacturing industry

A part of the Deloitte Insights report titled
"Accelerating smart manufacturing: The value of an ecosystem approach"

Contents

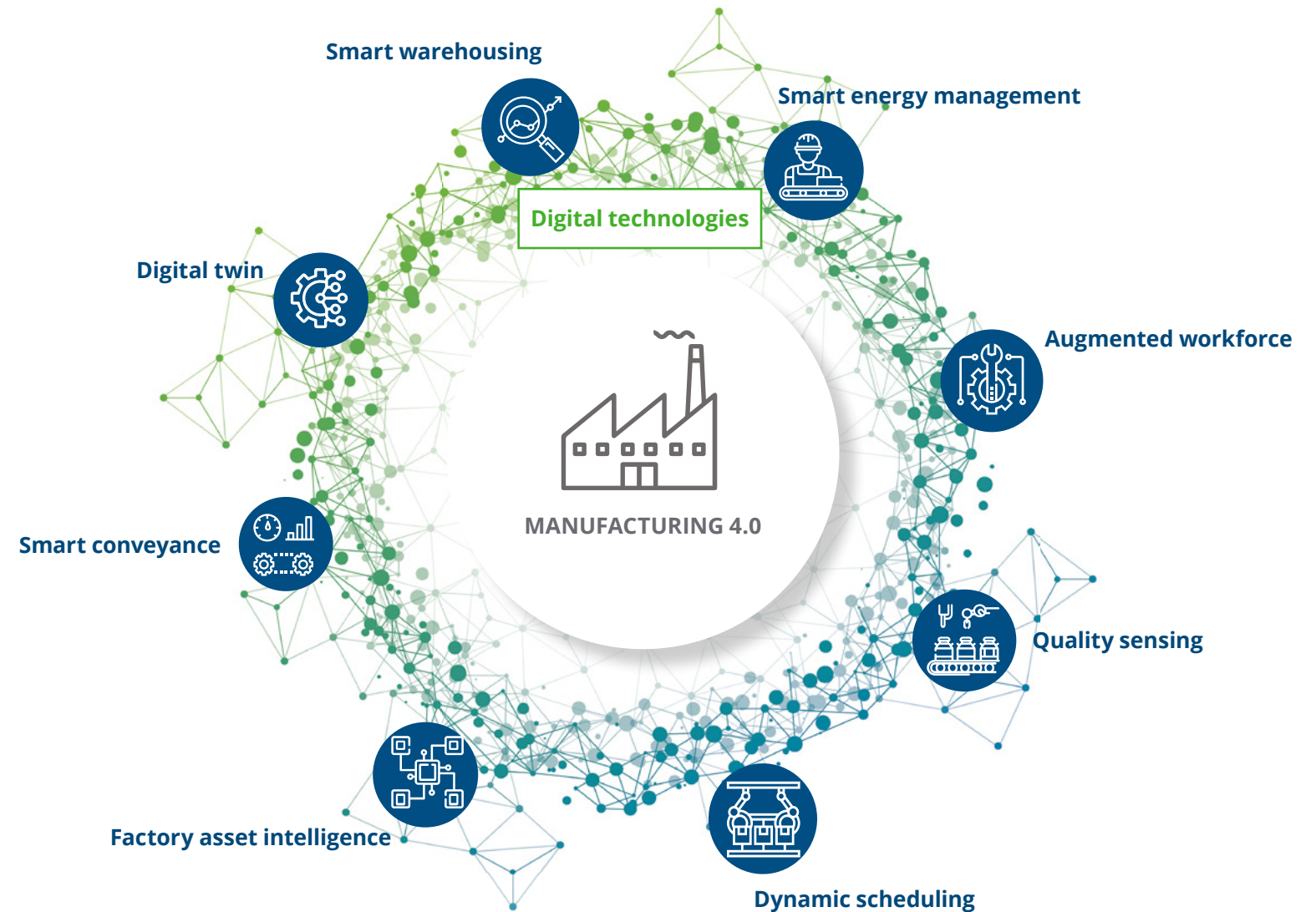# Improving return on investments

Smart manufacturing is now table stakes, but more complex than ever

To remain competitive, today's manufacturers must absorb digital and advanced technologies across their business operations, including production. However, the majority of manufacturers surveyed are still trying to develop their smart manufacturing vision and fully implement specific initiatives.

While there are many compelling use cases for digital technologies across the factory floor, without an organized approach, investments could fail to deliver results. **Deloitte and MAPI's 2020 Smart Manufacturing Ecosystem Study** has identified a path forward to accelerate progress.

Use cases for Manufacturing 4.0

Smart warehousing

Smart energy management

Digital technologies

Digital twin

Augmented workforce

MANUFACTURING 4.0

Smart conveyance

Quality sensing

Factory asset intelligence

Dynamic scheduling
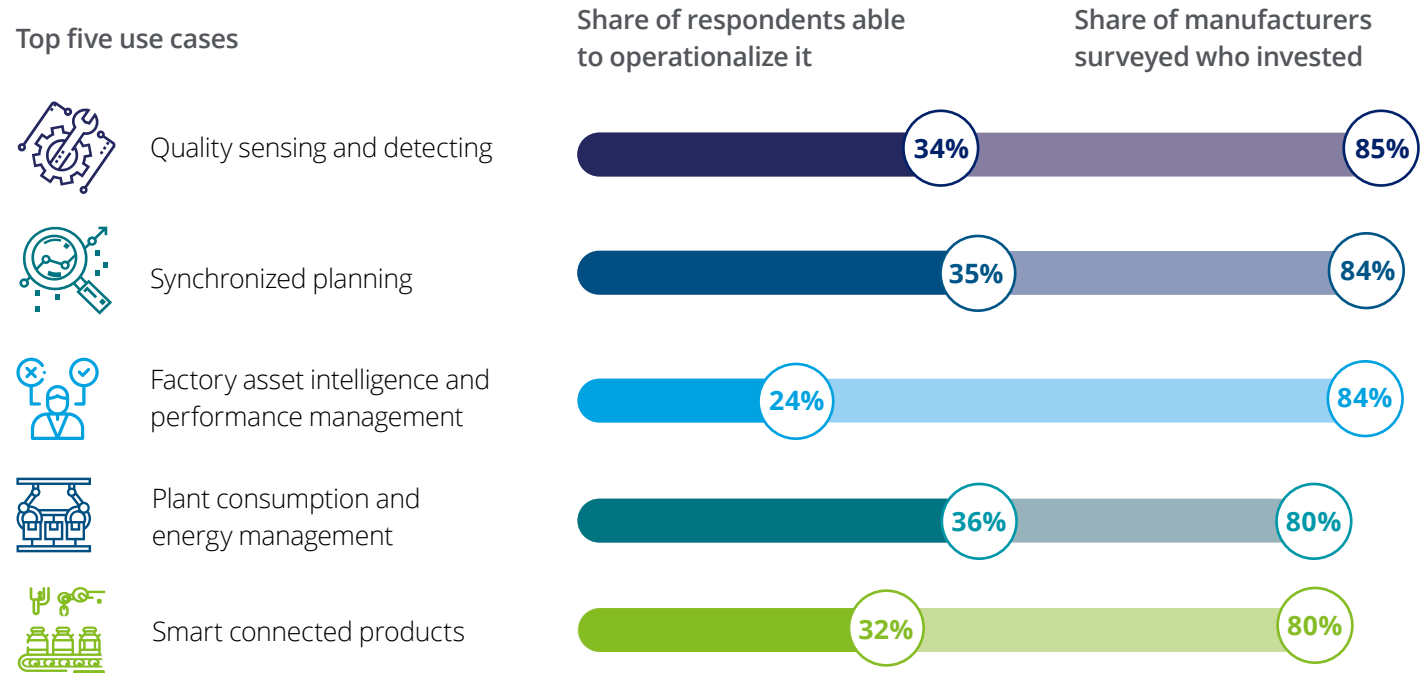
The ecosystem approach defined

Manufacturers are not operationalizing their smart manufacturing investments

Manufacturers surveyed* are allocating 38% of their overall factory budgets to digital initiatives, implementing on average more than 10 smart manufacturing use cases. However, few participants have these use cases operational at one or more facility. How are certain manufacturers able to achieve faster progress and better returns on their investments?

In the study, while 73% of manufacturers surveyed indicated value from their external alliance partners, they may not be fully leveraging the power of the network to which they are connecting. This is where an ecosystem approach can dial up the results.

*See "About the study" for methodology

A majority of manufacturers surveyed indicated their companies invested in 10+ smart use cases during the past two years ... but only a fraction were able to operationalize them

Top five use cases	Share of respondents able to operationalize it	Share of manufacturers surveyed who invested
Quality sensing and detecting	34%	85%
Synchronized planning	35%	84%
Factory asset intelligence and performance management	24%	84%
Plant consumption and energy management	36%	80%
Smart connected products	32%	80%

Among those able to operationalize, the majority of manufacturers surveyed indicated value from external alliances as the top contributor

|	
Partnerships and alliances with external vendors	73%
In-house development efforts	27%
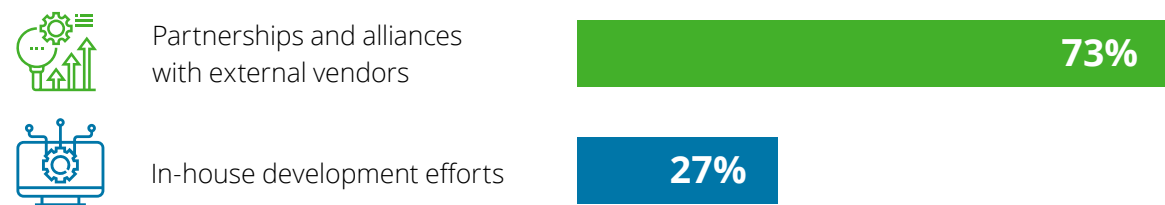
The amplifying power of ecosystems

The ecosystem approach: Amplifying collective network strength

A smart manufacturing ecosystem, similar to an innovation ecosystem, is formed when different entities come together in meaningful ways to solve shared challenges and meet shared objectives.

Ecosystems allow for greater capacity and flexibility in adapting to the new world at scale. This not only enhances competitiveness, but also helps to respond to disruptions better.

Four primary types of ecosystems support smart manufacturing initiatives: production, supply chain, customer, and talent.

Foundations to becoming a viable, digital organization
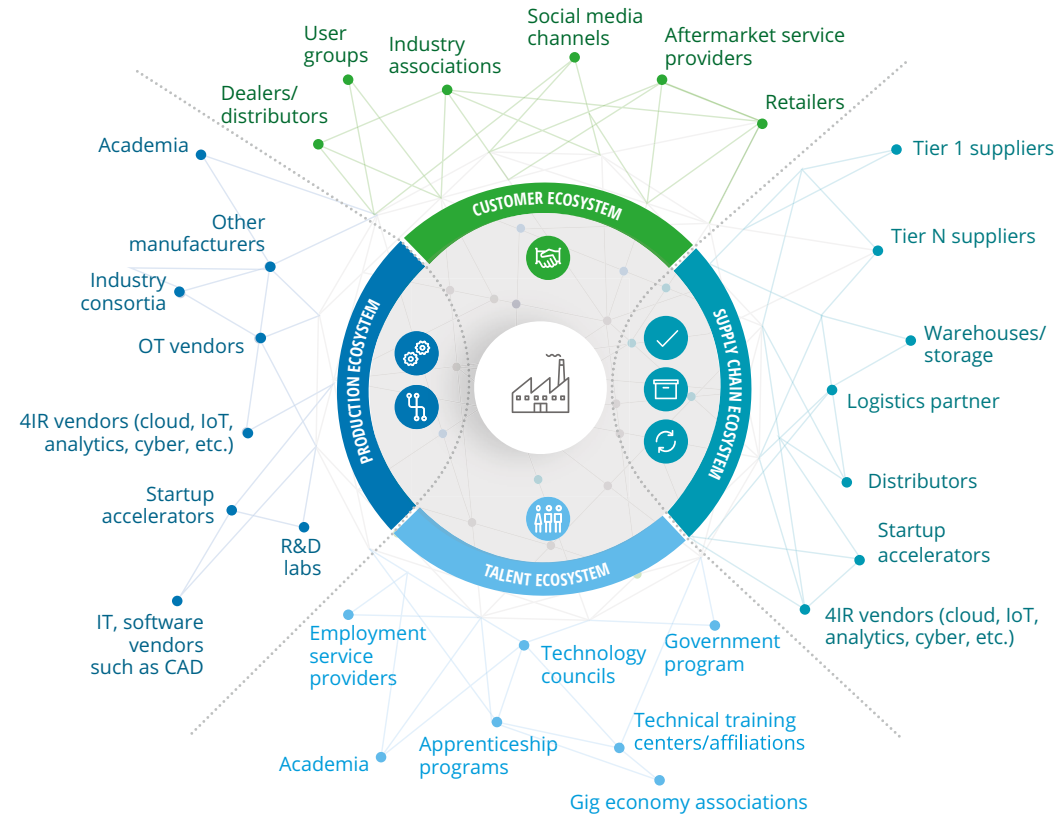
Ecosystem capabilities:*

- Connected customer
- Dynamic fulfillment
- Intelligent supply
- Synchronized planning
- Talent access
- Smart production
- Digital development/innovation

*Ecosystem capabilities are constantly developing and may not be limited to the ones mentioned above.
Source: Deloitte analysis

Smart manufacturing ecosystems provide access to unique vendors and capabilities

Ecosystems are generally driven by a convener who has the ability to connect business issues with an enabling platform. Multiple ecosystems can exist simultaneously, each with its unique vendor connections and capabilities.

Manufacturers, instead of reaching out directly to vendors, can approach such conveners of the ecosystems and gain access to specific technologies or enable certain use cases more quickly.

A manufacturing company can gain faster access to new capabilities and partners by leveraging conveners
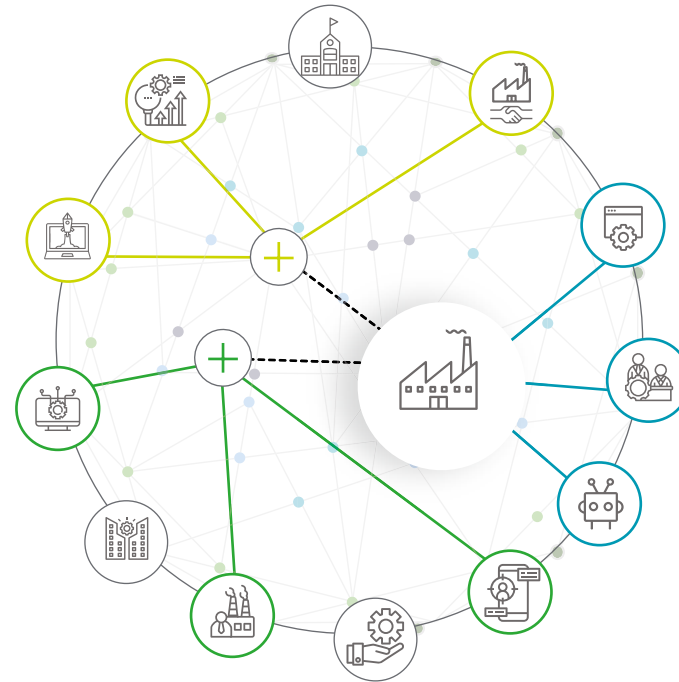
Different alliances driven by an ecosystem convener/sponsor

+ Unlocks **predictive maintenance** by bringing together edge connectivity, cloud compute, algorithms, and user interface

+ Unlocks **quality sensing and detecting** by working at the intersections of the necessary technologies and solving interoperability issues

A manufacturing company with only three existing connections

---- Potential access path to the alliances via the ecosystem convener or sponsor

Industry consortia	UX/UI design providers	Industry 4.0 technology providers
IT software vendors	Other manufacturers	Startup accelerators
Operation technologies vendors	Companies from other industry groups	National R&D provider
Physical automation/robotics vendors	Professional services	Academia

Ecosystems also help manufacturers connect to more partners

Manufacturers surveyed that joined ecosystems were able to create many more relationships, both directly and through their ecosystem conveners, and leverage them to accelerate their smart factory efforts.

These include 4x more connections with Industry 4.0 technology providers, academia, and government organizations. Respondents also identified the partners who have contributed the most value to their digital initiatives: IT software vendors, Industry 4.0 technology providers, and Operation technologies vendors.

One key to success is understanding how to effectively manage these connections to amplify their impact.
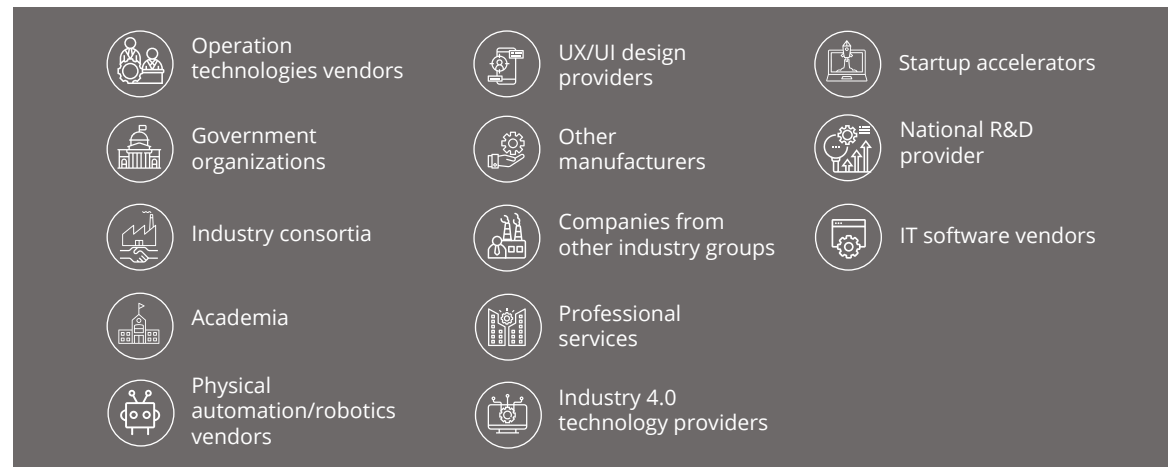
Manufacturers actively seeking ecosystem participation reported having connections with a higher number of participants when compared with those not thinking about it

Top five partners contributing the most value to manufacturers' ecosystems, according to respondents

#1 IT software vendors

#2 Industry 4.0 technology providers

#3 Operation technologies vendors

#4 Physical automation/ robotics vendors

#5 Professional services firms

— Same number of connections
— 2x connections
— 3x connections
— 4x connections

Operation technologies vendors

Government organizations

Industry consortia

Academia

Physical automation/robotics vendors

UX/UI design providers

Other manufacturers

Companies from other industry groups

Professional services

Industry 4.0 technology providers

Startup accelerators

National R&D provider

IT software vendors

Pathways to an ecosystem approach

The ecosystem approach can work, but it's not easy. It requires a deliberate method that often involves an executive commitment to solving priority business issues with smart manufacturing and the creation of a road map with important milestones.

Then, to support the road map, manufacturers often reach out to their ecosystem to build an enabling platform with an enterprise architecture. Curating connections strategically, manufacturers then accelerate their initiatives while determining which specific advanced capabilities to cultivate in-house.
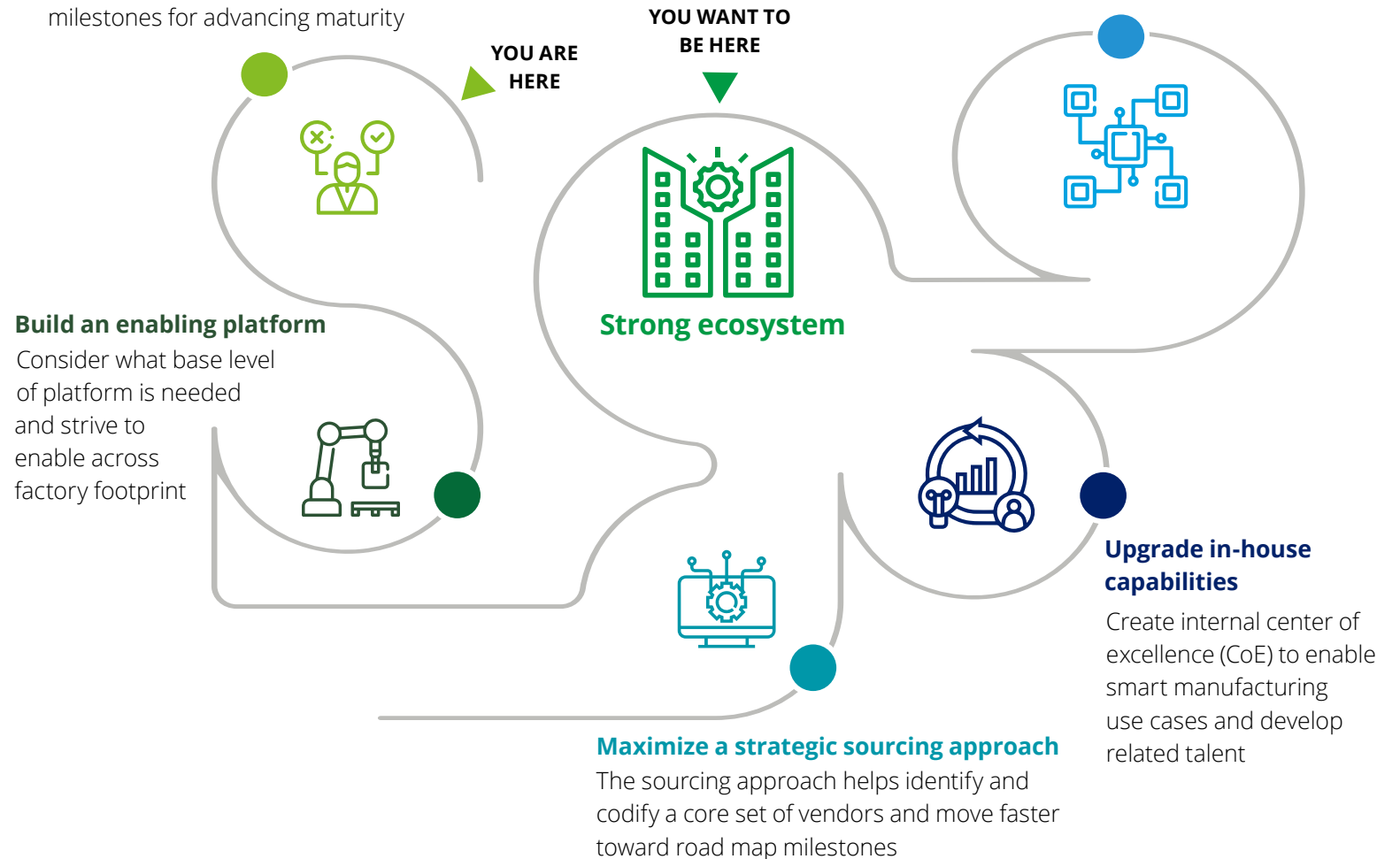
A framework to consider

Create an enterprise road map with milestones
The road map defines the core capabilities for the next three years and provides milestones for advancing maturity

YOU ARE HERE

YOU WANT TO BE HERE

Strengthen the enterprise architecture
Consider a framework that combines smart manufacturing use cases, technology, and people together

Strong ecosystem

Build an enabling platform
Consider what base level of platform is needed and strive to enable across factory footprint

Upgrade in-house capabilities
Create internal center of excellence (CoE) to enable smart manufacturing use cases and develop related talent

Maximize a strategic sourcing approach
The sourcing approach helps identify and codify a core set of vendors and move faster toward road map milestones

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Create an enterprise road map with milestones

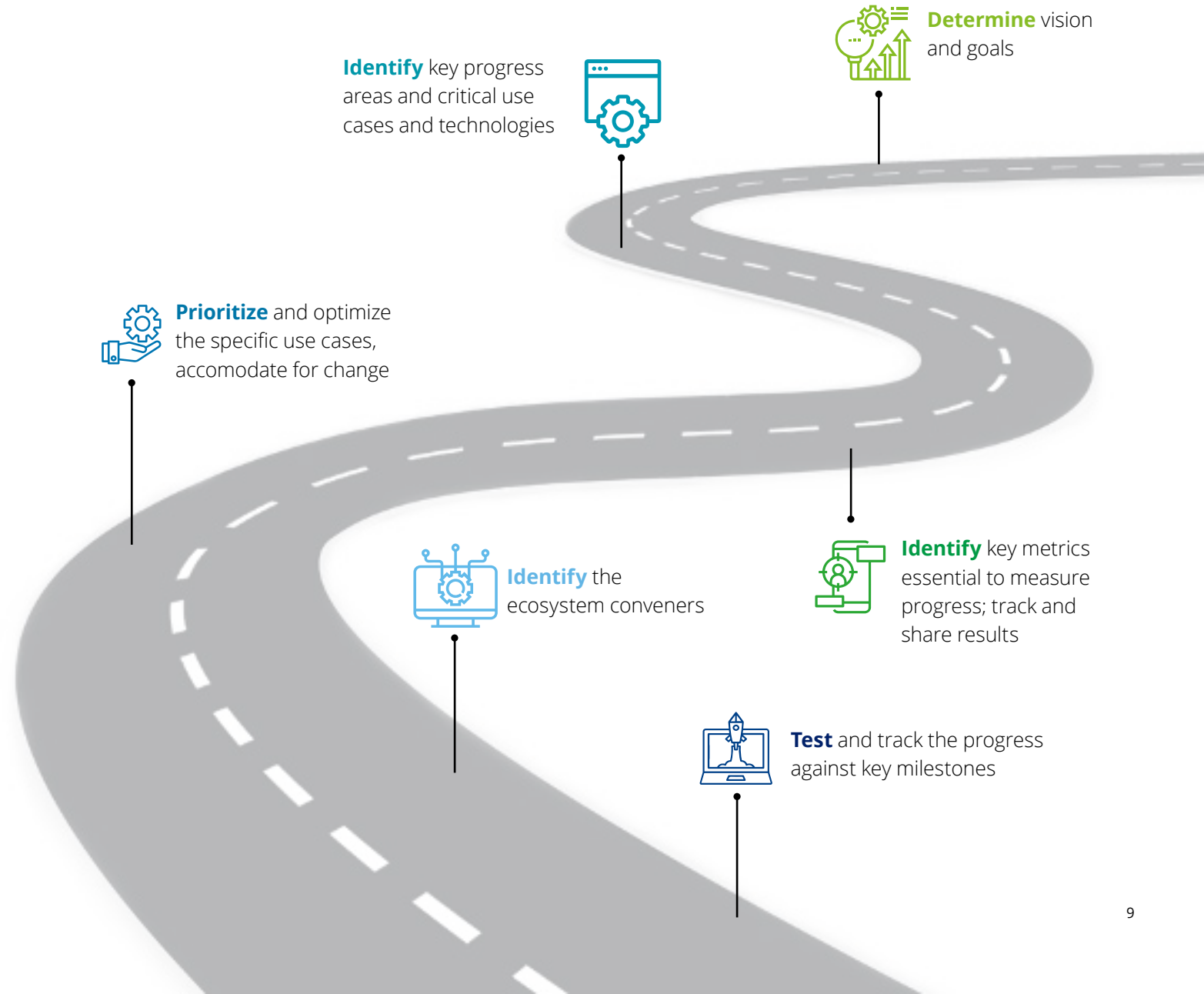Key questions that should be kept in mind while developing the road map:

- What is your vision for the next three years for digital?

- What use cases or business challenges are priorities to solve for?

- How can you accommodate for varying levels of maturity across your footprint?

- What do you need to do right now (capabilities) that will lead to bigger things in coming years?

Determine vision and goals

Identify key progress areas and critical use cases and technologies

Prioritize and optimize the specific use cases, accomodate for change

Identify key metrics essential to measure progress; track and share results

Identify the ecosystem conveners

Test and track the progress against key milestones
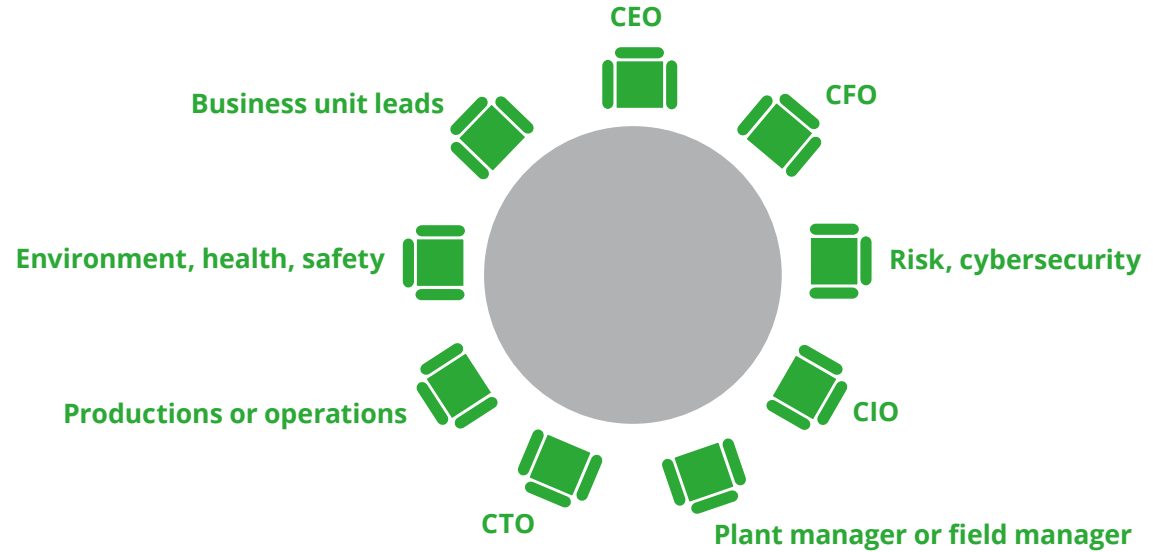
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A smart manufacturing executive team can drive the strategy road map

- Set up an executive team to drive the ecosystem approach, which should include people from key business areas and operations. It should be business-led and technology-enabled.

- Focus on unlocking the benefits of ecosystem—that is, easier and faster access to capabilities to help mitigate the inevitable disruption.

- Allow for flexibility to help cater to division- or location-specific nuances. For instance, the cloud provider or data platform can be decided at the corporate level, but the committee can allow for flexibility at the facility or division level for different vision systems or MES—depending on the need.

The executive team should represent different business areas...

CEO

CFO

Risk, cybersecurity

CIO

Plant manager or field manager

CTO

Productions or operations

Environment, health, safety

Business unit leads

...and allow multiple avenues to influence the road map

Listen to the primary stakeholder of the use case or initiative to identify potential partners

Leverage strategic sourcing organization to facilitate identifying new partners
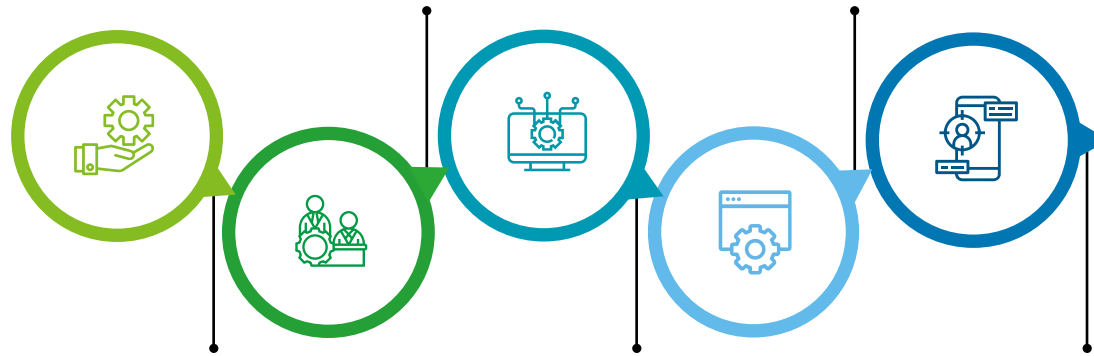
Listen to the internal team for development, data analytics, and UX/UI design

Establish digital innovation committee

Connect with existing technology and equipment vendors to identify possible partners within ecosystems

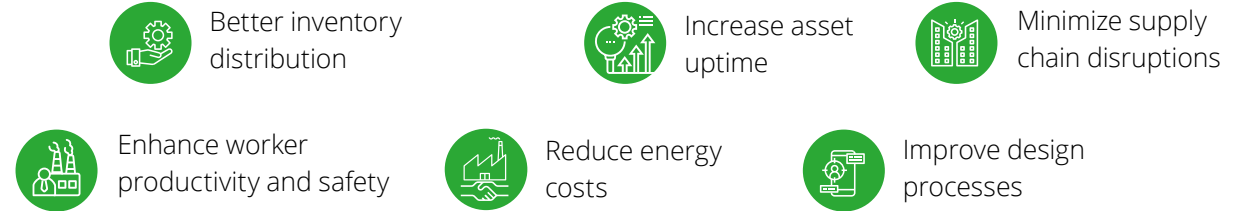# Build the platform and the enterprise architecture to support the road map

Building a digital platform in line with an enterprise architecture for smart manufacturing can be critical to support business priorities.

The strategies should include necessary core capabilities, but also reflect the use cases and the corresponding technologies that drive them.

The method here is driven by a layered approach to use cases, wherein the underlying technology platform remains consistent, thereby helping manufacturers expand beyond current or include new use cases in future.
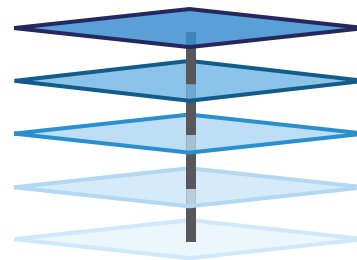
Smart manufacturing platform

1. IDENTIFY BUSINESS ISSUES

- Better inventory distribution
- Increase asset uptime
- Minimize supply chain disruptions
- Enhance worker productivity and safety
- Reduce energy costs
- Improve design processes

2. DETERMINE USE CASES TO SOLVE THE BUSINESS ISSUES

- Smart energy management
- Smart warehousing
- Augmented workforce
- Quality sensing
- Digital twin
- Smart conveyance
- Factory asset intelligence
- Dynamic scheduling

3. BUILD SMART MANUFACTURING TECHNOLOGY STACK

Level 4 Applications (e.g., ERP and PLM)

Level 3 Data science and analytics (e.g., WMS, RPA, and IA)

Level 2 IIoT data and ops pipeline (e.g., AR/VR and SCADA)

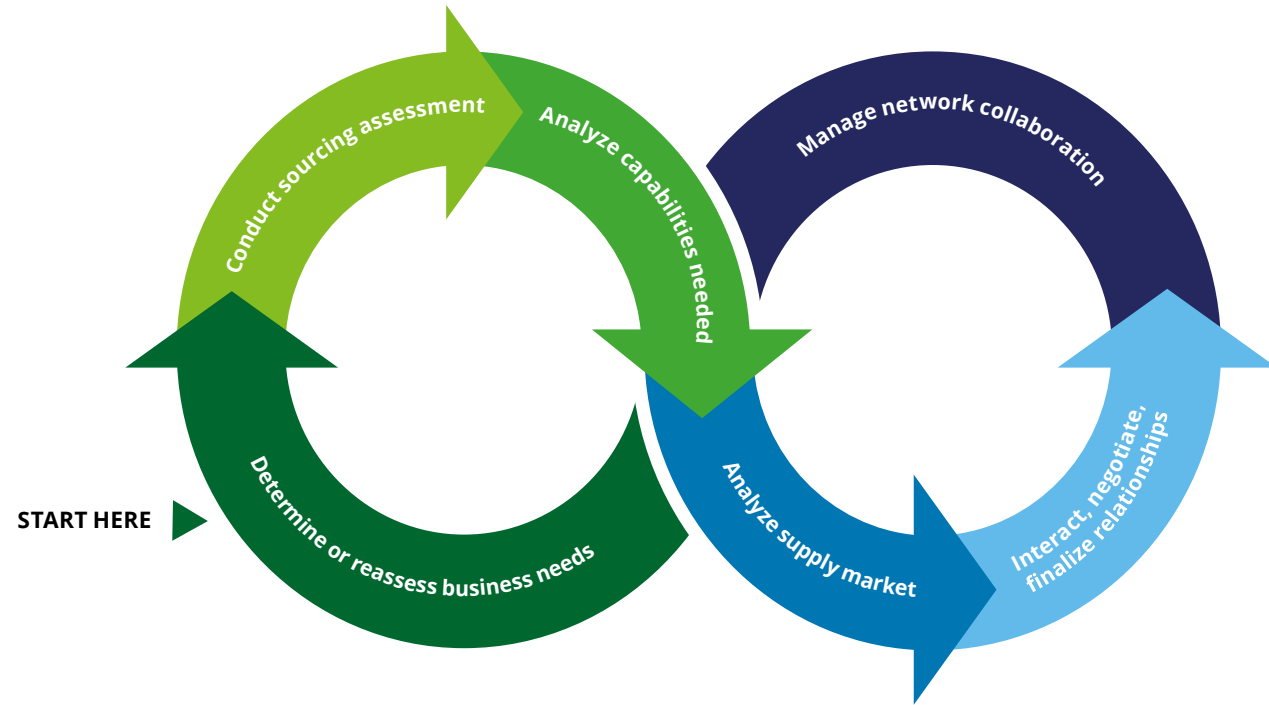**Level 1** IIoT edge and connectivity (e.g., PLC and edge gateways)

Level 0 Site and field (e.g., AGV and robotics)

Adopt and maximize a strategic approach for ecosystem participants

Manufacturers should consider applying the philosophy of strategic sourcing for their ecosystem approach, but front-load the approach with strong relationship development. Other aspects to consider are:

- Collaborate and form relationships with partners that share the same value and passion like yours

- Focus on forming bidirectional relationships where you are bringing your challenge or opportunity to them, but they also bring things to you—making sure there's a give-take dynamic

- Agree how value will be measured from these relationships

Ecosystems strategic sourcing methodology

Conduct sourcing assessment

Analyze capabilities needed

Manage network collaboration

START HERE

Determine or reassess business needs

Analyze supply market

Interact, negotiate, finalize relationships

Other sourcing considerations

Surveyed manufacturers' top preferences to measure value from partners:

- Productivity or efficiency related metrics: **64%**

- Direct revenue-related metrics: **47%**

- Number of additional capabilities they bring: **41%**

Surveyed manufacturers' top preferences to identify partners:

- Regional players or entities with networks that enhance the strength of the regional ecosystem: **36%**

- Player or entity with global presence and experience: **36%**

- Any player or entity with the required expertise of value, irrespective of their location: **23%**
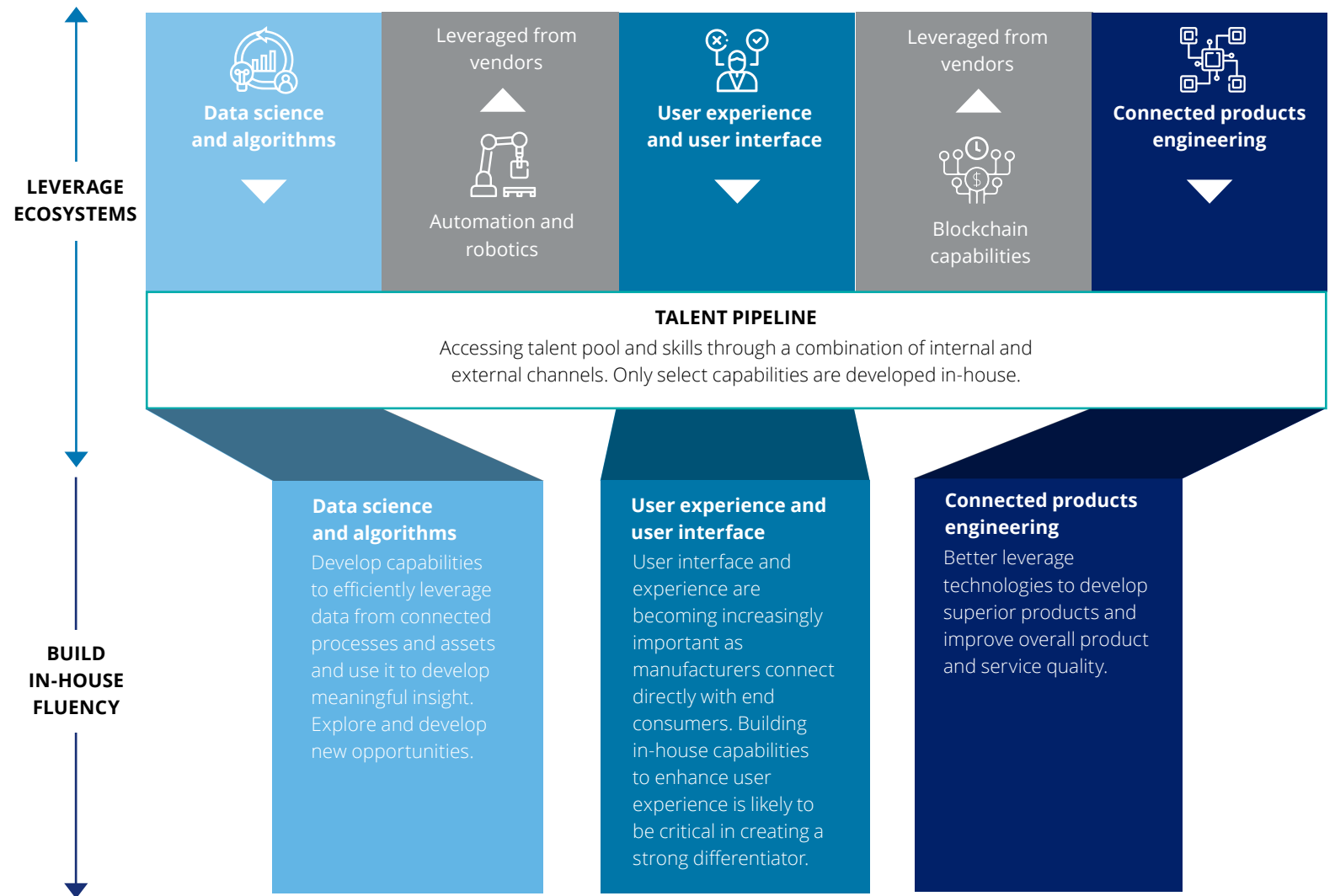
Start your journey

Determine what capabilities should be cultivated in-house

While external partners can provide faster access to smart use cases and technologies, upgrading select in-house talent and capabilities can likely help manufacturers to scale those benefits.

- Determine which capabilities differentiate your business and support your long-term vision

- Include a talent pipeline strategy to continually upskill the capability

- Consider whether developing CoEs or technology influencers within the firm is appropriate

- Be deliberate about which capabilities make more sense to continue to source through the ecosystem's partnerships

Leverage ecosystems and build in-house fluency

LEVERAGE ECOSYSTEMS

Data science and algorithms	Leveraged from vendors ▲ Automation and robotics	User experience and user interface	Leveraged from vendors ▲ Blockchain capabilities	Connected products engineering

TALENT PIPELINE
Accessing talent pool and skills through a combination of internal and external channels. Only select capabilities are developed in-house.

BUILD IN-HOUSE FLUENCY

Data science and algorithms
Develop capabilities to efficiently leverage data from connected processes and assets and use it to develop meaningful insight. Explore and develop new opportunities.

User experience and user interface
User interface and experience are becoming increasingly important as manufacturers connect directly with end consumers. Building in-house capabilities to enhance user experience is likely to be critical in creating a strong differentiator.

Connected products engineering
Better leverage technologies to develop superior products and improve overall product and service quality.

Start your manufacturing ecosystem

Define scope: Don't build capabilities you don't need. If you understand the nature of the business issue, the scope of the solution becomes easier to understand.

Act with speed: Speed is one of the key benefits of tapping into an ecosystem.

Scale fast: It's easy to do a proof of concept in an unscalable way. The ecosystem is ready to scale your test case. It brings scalable capabilities that are ready to respond.

Systemize the process: Create repeatable steps so that as you continue to activate new business use cases, you can tap into the ecosystem more readily.

The ecosystem-led digital innovation ecosystem

Define **scope**

Act with **speed**

Systemize the process

Scale fast
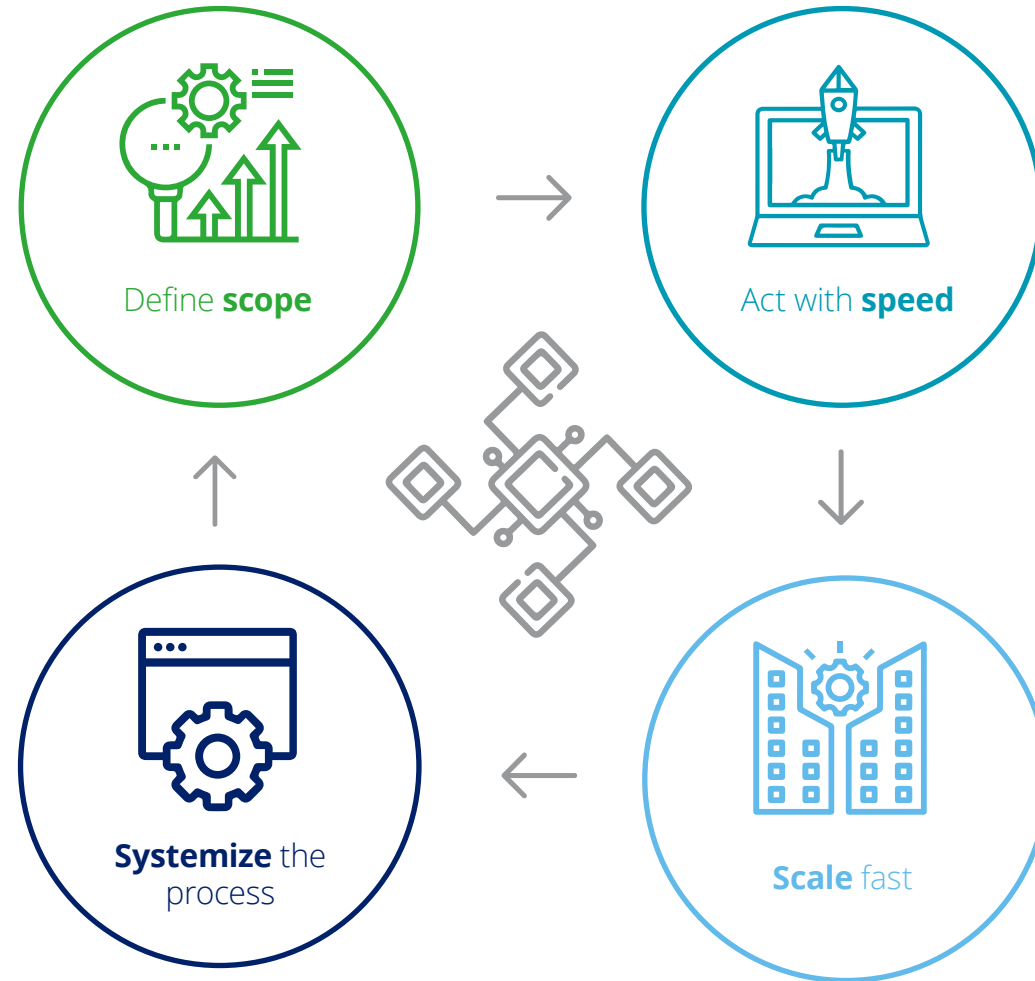
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Acknowledgements

About the study

Deloitte and MAPI jointly launched the study in June 2020 to identify the ways in which smart manufacturing ecosystems can potentially accelerate smart factory initiatives. The study included an online survey of more than 1,000 executives at manufacturing companies across three key regions globally: North America, Europe, and Asia. It also included executive interviews with more than 30 leaders from manufacturing companies and ecosystem participants.

See the full report for more insights from the survey and explore other reports on smart factory

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