Ecosystem pathways for connected construction

A part of the Deloitte Insights report titled
“Accelerating smart manufacturing: The value of an ecosystem approach”
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Most engineering and construction (E&C) firms have been slow in embracing digital technologies. While a number of firms are using digital as a tool to create new business opportunities and improve margins, many are missing out on innovative approaches to drive down costs and improve project execution.

To capture the full value of advanced digital technologies, firms should take a holistic approach toward integrating their internal and external value chains. Deloitte and MAPI’s 2020 Smart Manufacturing Ecosystem Study has identified a path forward that can accelerate progress.
Many E&C companies are investing in digital, but not making much progress

E&C companies surveyed are increasing their digital investments, allocating 39% of their overall operational budgets to digital initiatives, including an average of more than 10 smart construction use cases. However, few participants have these use cases operational at one or more location. How were certain E&C companies surveyed able to achieve faster progress and better returns on their investments?

In the study, while 73% of E&C companies 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 help to move the needle and dial up results.

A majority of E&C executives 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

<table>
<thead>
<tr>
<th>Use Case</th>
<th>Share of E&amp;C companies surveyed able to operationalize it</th>
<th>Share of E&amp;C surveyed who invested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procurement and inventory management</td>
<td>33%</td>
<td>93%</td>
</tr>
<tr>
<td>Customer collaboration for design and ideation</td>
<td>23%</td>
<td>90%</td>
</tr>
<tr>
<td>Quality sensing (remote inspection)</td>
<td>33%</td>
<td>87%</td>
</tr>
<tr>
<td>Dynamic scheduling</td>
<td>23%</td>
<td>80%</td>
</tr>
<tr>
<td>Digital twin and building information modeling</td>
<td>24%</td>
<td>77%</td>
</tr>
</tbody>
</table>

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

- Partnerships and alliances with external vendors: 73%
- In-house development efforts: 27%
The ecosystem approach: Amplifying collective network strength

The ecosystem approach for engineering and construction brings several independent stakeholders onto a common platform. This enables higher collaboration, reduced project risks, more efficient portfolio management, and improved outcomes for all stakeholders.

An ecosystem approach can not only enable true interoperability throughout the supply chain, but also respond to disruptions better. Four primary types of ecosystems support connected construction initiatives: job site, supply chain, customer, and talent.

**Foundations to becoming a viable, digital organization**

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

Source: Deloitte analysis
Construction ecosystems provide access to unique vendors and capabilities

Ecosystems are generally driven by a convener, who initially brings all participants together to develop capabilities and service offerings.

E&C firms, 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 and efficiently. For instance, health and safety insights can be at the fingertips of workers, who are likely to take quicker action in case of emergency.

An E&C company can gain faster access to new ecosystems and their participants by leveraging conveners.

**Alliance capabilities: Follow the conveners**

- **Unlock productivity-related use cases** like procurement and inventory management to reduce costs. The ecosystem also includes companies from the technology domain.
- **Unlock prefab and modular use cases** with new material applications developed by startups in collaboration with national R&D labs.

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A construction company with only 3 existing connections

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

<table>
<thead>
<tr>
<th>Industry consortia</th>
<th>Other E&amp;C firms</th>
<th>Start-up accelerators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operations vendors and contractors</td>
<td>Companies from other industry groups</td>
<td>National R&amp;D labs</td>
</tr>
<tr>
<td>IT software vendors</td>
<td>Services firms and contractors</td>
<td>Prefab and modular suppliers</td>
</tr>
<tr>
<td>Automation, robotics, or drones vendors</td>
<td>Connected technology providers</td>
<td>Material suppliers</td>
</tr>
</tbody>
</table>
Value drawn from the ecosystem can increase exponentially as connections grow

Digital technologies enable many siloed networks to converge and form a large single network or ecosystem. This converged ecosystem is designed to be more secure and agile and can deliver value at a larger scale.

Ecosystems can thrive when they foster the interconnections of people, processes and equipment, and their virtual counterparts. The study shows firms investing and participating in ecosystems are likely to see higher strategic benefits.

Companies actively seeking ecosystem participation reported having connections with a higher number of participants when compared with those not thinking about it.

Top partners contributing the most value to surveyed E&C company’s digital initiatives

#1 Industry 4.0 technology providers
#2 IT software vendors
#3 Operations vendors
#4 Physical automation and robotics vendors
#5 Services firms and contractors

- Same number of connections
- 2x connections
- 3x connections
The ecosystem approach can work, but it’s not easy. It requires a deliberate method and typically involves an executive commitment and the creation of a road map with important milestones.

Then, to support the road map, E&C companies often reach out to their ecosystem to build an enabling platform with an enterprise architecture. Firms need to identify the use cases and undertake a cost-benefit analysis. Companies can then accelerate their initiatives while determining which specific advanced capabilities to cultivate in-house.

**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. Form executive leadership team that represents operations and business with board-level remit.

**Build an enabling platform**
Consider what the base level of platform is needed across various projects and job sites.

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

**Strengthen the enterprise architecture**
Consider a framework that combines connected construction use cases, technology, and people together.

**Upgrade in-house capabilities**
Create internal center of excellence (CoE) to enable smart construction use cases and develop related talent.
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 opportunities are you most interested in solving for or enabling?

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?

How can you identify initiatives that positively affect margins and returns on investments (ROI)?

Identify key progress areas and critical use cases and technologies

Determine vision and goals

Prioritize and optimize the specific use cases, accommodate 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

Key questions that should be kept in mind while developing the road map:
An executive team can drive the digital strategy road map

- Set up an executive team to drive the ecosystem approach, which should include people from key business areas and operations.
- 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 geography or division level for different equipment—depending on the need.

The executive team should represent different business areas…

- **CFO or COO**
- **Risk, cybersecurity**
- **CIO or CTO**
- **Project manager**
- **CEO**
- **Director of engineering and design**
- **Environment, health, safety**
- **Procurement manager**

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

- **Leverage strategic sourcing** organization to facilitate identifying new partners
- **Establish digital innovation committee** that identifies potential new vendors or contractors
- **Listen to the internal team** for development, data analytics, and UX/UI design
- **Connect with existing technology and equipment vendors** to identify possible partners within ecosystems
- **Listen to the primary stakeholder** of the use case or initiative to identify potential partners

Connected construction  | Ecosystems defined  | Power of ecosystems  | Pathways  | Start your journey
2. DETERMINE USE CASES TO SOLVE THE BUSINESS ISSUES

- Reduce equipment breakdowns
- Manual document workflows
- Insights into real-time asset and project intelligence
- Enhance worker safety
- Minimize rework
- Reduce construction costs
- Improve design processes

3. BUILD CONNECTED CONSTRUCTION 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

E&C companies should consider applying the philosophy of strategic sourcing for their ecosystem approach, but frontload the approach with strong relationship development. Other aspects to consider:

- Collaborate and form relationships with partners that share your values and passion.
- 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.

Other sourcing considerations

**Surveyed E&C companies’ top preferences to measure value from partners:**
- Productivity or efficiency related metrics: 63%
- Direct revenue-related metrics: 57%
- Number of additional capabilities they bring: 50%

**Surveyed E&C companies’ top preferences to identify partners:**
- Regional players or entities with networks that enhance the strength of the regional ecosystem: 37%
- Player or entity with global presence and experience: 37%
- 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 engineering and construction firms to scale those benefits.

Determine which capabilities differentiate your business and support your long-term vision. Consider sensing and responding to them through the ecosystem. Identify who are the best vendors to provide the support.

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

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

- **Digital design and modeling**
  - Develop 3D modeling to enable multiple disciplines to integrate their designs within a single 3D model, enabling error detection, improved design accuracy, and estimates

- **Connected assets and equipment**
  - Better leverage technologies to track assets and equipment performance

Leveraged from vendors
Automation, drones, robotics
Blockchain capabilities

Leveraged from vendors
Start your connected construction 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
About the study
Deloitte and MAPI jointly launched the study in June 2020 to identify the ways in which smart manufacturing and connected construction ecosystems can potentially accelerate digital initiatives. The study included an online survey of more than 1,000 executives at manufacturing and E&C 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