Filling Digital Transformation Gaps with Applications

JIM BROWN

President, Tech-Clarity

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Digital Transformation

Digital Transformation Puts Pressure on Development

Digital transformation is crucial to the success and profitability of today's industrial companies. But transitioning to a digital business exposes shortfalls and creates gaps in most companies' software ecosystems.

Manufacturers must fill the gaps in their company's processes, organizational approaches, and systems. Developing solutions to meet digital demands puts significant pressure on application development to do more – and do it faster! How can manufacturers improve the way they develop software applications to fill their digital transformation gaps and achieve their business strategies? We surveyed over 300 manufacturers to find out.
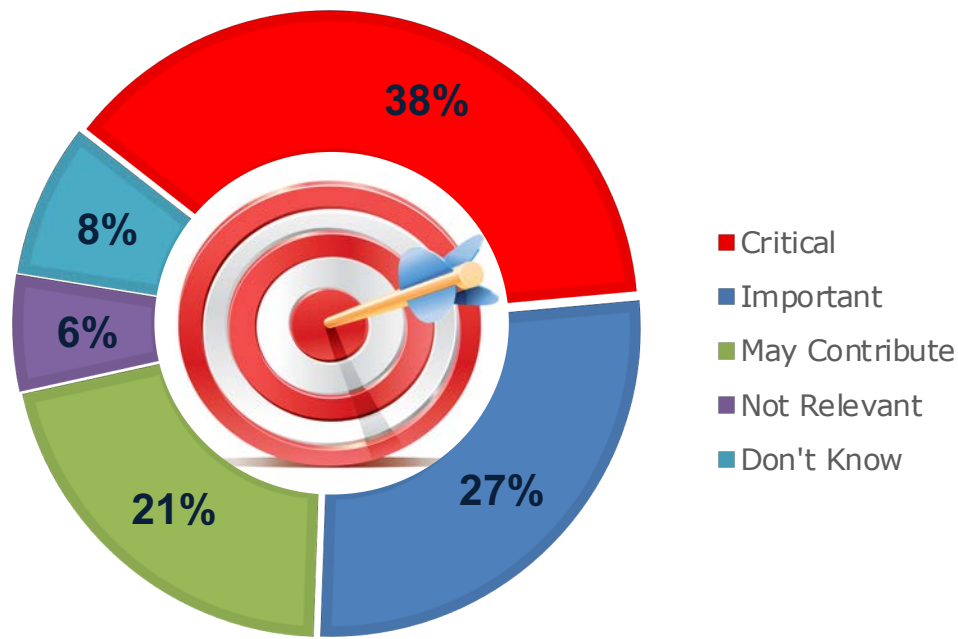
Digitalization Importance to Business Strategy[1]

- ■ Critical — 38%
- ■ Important — 27%
- ■ May Contribute — 21%
- ■ Not Relevant — 6%
- ■ Don't Know — 8%

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Digital Transformation Demands Development Agility

Business Risk

Survey respondents share that the digital transformation trend in manufacturing impacts companies in many ways. Digitalization creates business complexity and risk that challenge company viability. Our research[2] shows that about three-quarters of companies shared that business risk and disruption increased for their market over the last five years, and a full one-half of companies with over 10,000 employees said that it had grown "significantly." These risks demand rapid responses.
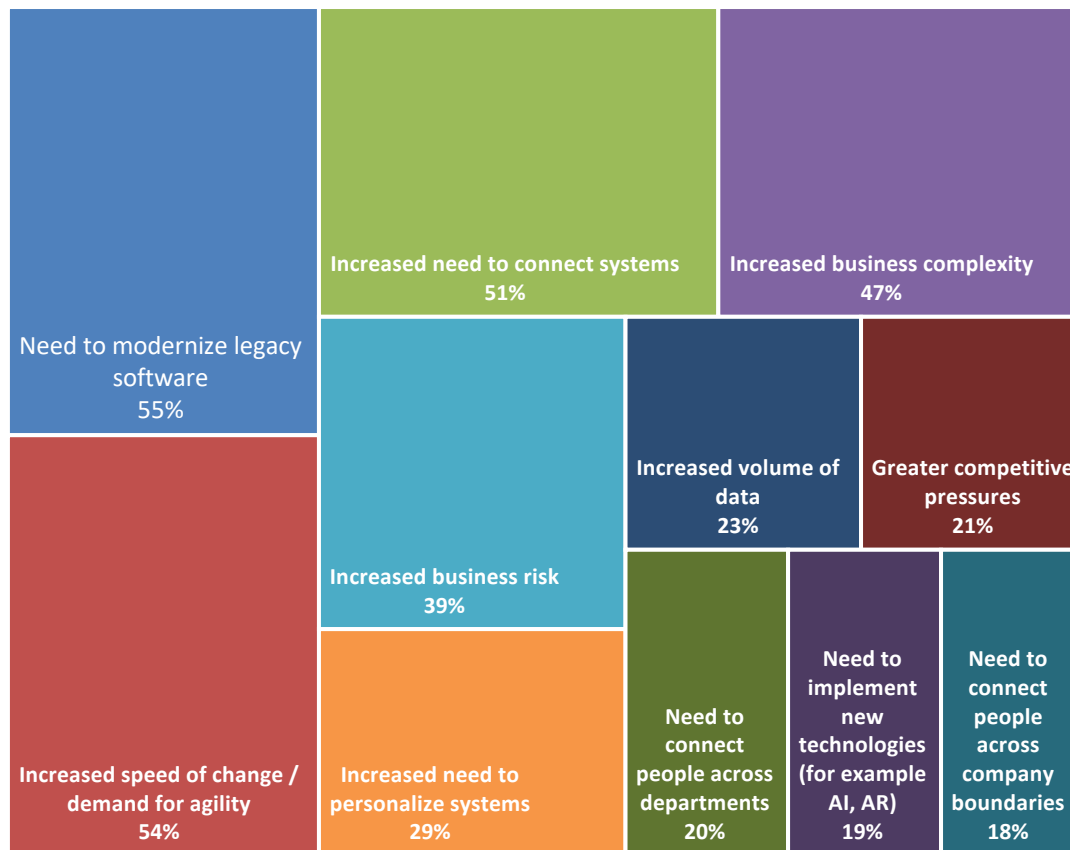
Demand for Agility

The most commonly reported business benefit is the flexibility to work anytime / anywhere, reported by two-thirds of participants. This is followed by ease of collaboration. This capability, along with the ability to have more integrated workflows as reported by about one-half of companies, allows OEMs and the supply chain to work together more efficiently and effectively. This is particularly important for Automotive companies given the global nature of their business, the need to be agile, and the integrated nature of the automotive value chain.

Impact on Software Development

Digital transformation's impact on software needs is dramatic. It creates the need to update legacy solutions built for different times and increases the demand to integrate systems and people. It generates the need for new kinds of solutions, including personalized solutions that provide simpler, more focused "apps" that help users accomplish a task and the need to implement new technologies such as Artificial Intelligence (AI) and Augmented Reality (AR). Companies can't expect to meet these demands if they continue developing solutions in the same way they have been.

Digitalization Impacts on the Manufacturing Industries

Need to modernize legacy software
55%

Increased need to connect systems
51%

Increased business complexity
47%

Increased business risk
39%

Increased volume of data
23%

Greater competitive pressures
21%

Increased speed of change / demand for agility
54%

Increased need to personalize systems
29%

Need to connect people across departments
20%

Need to implement new technologies (for example AI, AR)
19%

Need to connect people across company boundaries
18%

96% of industrial companies say the speed they need to create and implement new software has increased.

About **two-thirds** indicate the demand for speed has increased significantly. The level of need for new software has increased a similar amount.

Examining Digital Transformation Gaps

Digital Transformation is Multi-faceted

Industrial companies are pursuing a large number of initiatives as part of their digital transformation efforts. These include digital threads, digital twins, smart / connected products, Industry 4.0 / smart manufacturing, service transformation, digital design continuity, and a variety of others.
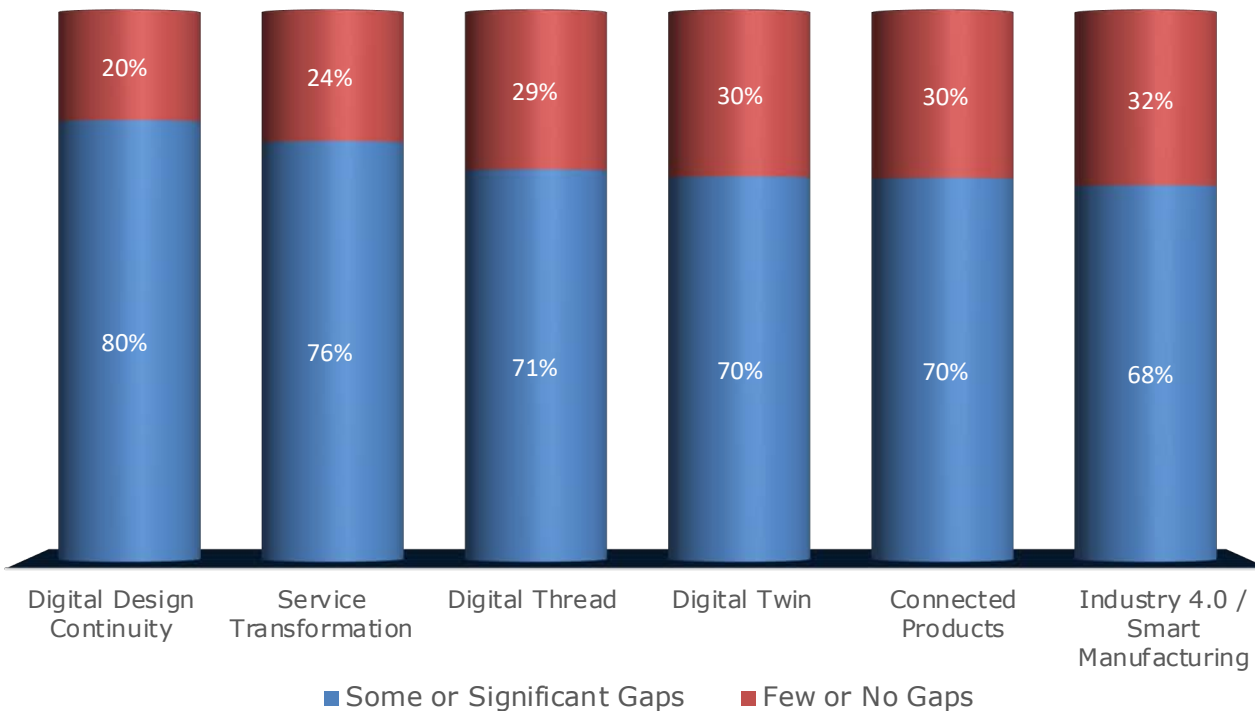
Quantifying the Gaps

These initiatives all require new business processes and operating models that lead to process, organizational, and technology gaps.

Surveyed companies face at least some, if not significant, gaps in their systems to support each of these digital transformation initiatives. The gaps from their various initiatives create a compounding effect because companies are commonly pursuing several initiatives concurrently. Manufacturers must develop a large volume of applications to fill these gaps.

Level of Gaps in Digital Transformation Initiatives

	Digital Design Continuity	Service Transformation	Digital Thread	Digital Twin	Connected Products	Industry 4.0 / Smart Manufacturing
Few or No Gaps	20%	24%	29%	30%	30%	32%
Some or Significant Gaps	80%	76%	71%	70%	70%	68%

■ Some or Significant Gaps   ■ Few or No Gaps

At least **two-thirds** of companies surveyed report gaps on each digital transformation initiative investigated.

Challenges

Legacy Software

Respondents report that their companies face multiple challenges when filling digital transformation gaps. The most commonly reported challenge, indicated by over one-half of participants, is difficulty changing legacy systems. These systems were typically built in times where processes were more predictable and static. The fact that companies find it hard to change their existing solutions is a vital problem given that the need to modernize legacy software is the most commonly reported impact of digital transformation.

Dynamic Needs

The second most commonly reported challenge is rapidly changing needs. The pace of change in digitalization is intense and has accelerated due to COVID-19 disruption[3]. Software changes must be made rapidly or by the time the software is ready it no longer meets the needs of the day.

Technical Challenges

Companies also report significant technical challenges to meet their digital transformation objectives. Integration / accessing data from multiple systems is a challenge for over one-half of survey respondents.

> The top challenges manufacturers face in filling digital transformation gaps directly hinder the agility they need to modernize systems and adapt to an increased rate of change.

That's a critical challenge given that 51% of companies report that digital transformation leads to an increased need to connect systems. Supporting a variety of devices and operating systems is also a challenge, as companies need to deploy applications to multiple platforms, often including a variety of mobile devices to support digital operations. These challenges make filling gaps more difficult.

Challenges Filling Digital Transformation Gaps

Hard to change legacy systems, 55%

Supporting a variety of devices and operating systems, 54%

Integrating / accessing data from multiple systems, 53%

Rapidly changing needs, 54%

Developing good requirements, 38%

Deploying solutions that can be used by 3rd parties (customers, suppliers, regulators, etc.), 34%

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Filling Digital Transformation Gaps

The COTS Strategy

There are a lot of gaps to fill and a lot of challenges to overcome. Over the years, companies have tried to pursue commercial, off-the-shelf (COTS) software strategies. The driving force behind this strategy has been trading off a tight fit with business needs in pursuit of faster implementation and lower support costs. This strategy has proven successful in supporting stable, standard, predictable business processes but has also led to expensive and hard to maintain customization.

Revisiting the Build versus Buy Decision

While some companies prefer to purchase COTS software to fill their digital transformation gaps, others prefer to build custom solutions. The data shows that most companies don't have a single, preferred approach. There is a clear overlap in their preferred approach, indicating that companies don't see their choice as "one size fits all."

Companies are Open to "Build" versus only "Buy"

Companies are open to building solutions, or at least building to support areas that COTS software doesn't. In particular, companies with revenue greater than $1 billion are more likely to prefer building (86%) than COTS (51%). We have seen that companies can't get everything they need from commercial software, particularly as needs change so quickly.
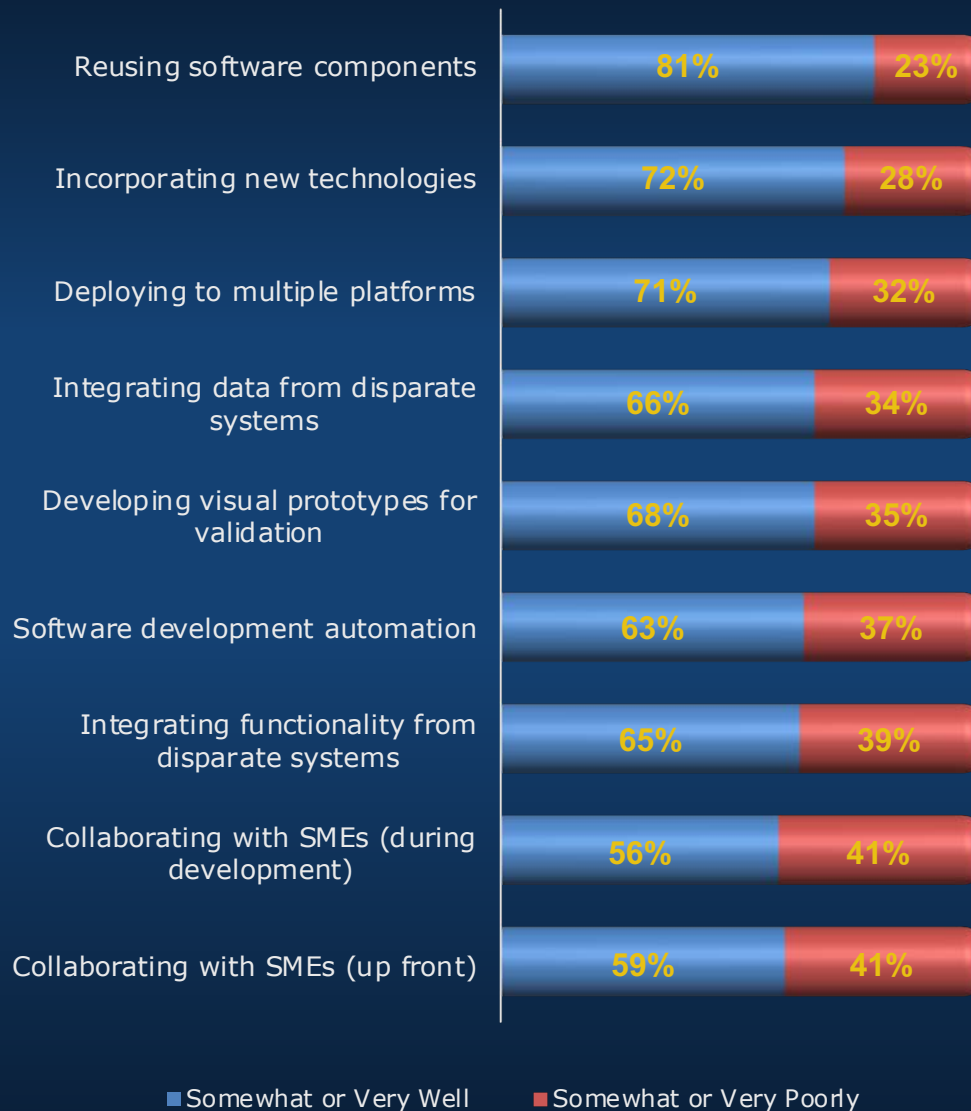
Preferred Way to Fill Digital Transformation Gaps

Purchasing COTS 66%

Building Custom 61%

Manufacturers have likely increased their willingness to build custom solutions due to the trends towards building smaller, more role- and task-specific apps to complement large, monolithic enterprise systems.

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IT Capabilities

Application Development Capabilities

Capability	Somewhat or Very Well	Somewhat or Very Poorly
Reusing software components	81%	23%
Incorporating new technologies	72%	28%
Deploying to multiple platforms	71%	32%
Integrating data from disparate systems	66%	34%
Developing visual prototypes for validation	68%	35%
Software development automation	63%	37%
Integrating functionality from disparate systems	65%	39%
Collaborating with SMEs (during development)	56%	41%
Collaborating with SMEs (up front)	59%	41%

■ Somewhat or Very Well   ■ Somewhat or Very Poorly

IT recognizes their strongest capabilities lie in technical performance, while their weakest is collaborating with subject matter experts.

IT Recognizes Collaboration Struggle

Perhaps one of the most critical gaps to fill, particularly as companies build applications in addition to buying COTS, is the one between IT and business resources. The survey asked IT participants how well their company does in a number of application development capabilities. The chart is telling. It is sorted by the capabilities that IT participants felt they are strongest in. Note that at the bottom of the list is collaborating with users, both up front and in development. IT respondents recognize their companies' strongest capabilities lie in technical performance, and they are keenly aware of IT-Business collaboration difficulties.

Business User Collaboration is Crucial

Collaboration is critical to filling digital transformation gaps correctly and doing it with agility. Traditional approaches that rely on emails and discussions about requirements historically miss the mark due to interpretation errors and rapidly changing needs. Integrating functionality across systems also relies on domain expertise and is relatively low on the list of IT capabilities. The people aspects of development create challenges for IT in filling digital transformation gaps.

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Exploring Low-Code Development

Low-Code, a Better Way to Build?

Low-Code development was designed to bridge, or even eliminate, the gap between functional subject matter experts and IT resources. The low-code approach allows for closer interaction or cocreation between functional and technical resources. It provides visual prototypes, collaboration, and modeling that engage users and business resources early and throughout development.

Low-code abstracts and automates steps across the application lifecycle to streamline development, allowing companies to create agility, modernize legacy systems, and reduce IT backlogs.

Has the Time Come for Low-Code?

Low-code development is not new, but it's gaining ground. The concepts have been used for years, although some may think of it in terms of "rapid application development" or "model-based software development." Now, the solutions are more mature and digitalization's application development demands are renewing interest. Low-code has the potential to fill digital transformation gaps faster with better quality, greater speed, and higher levels of collaboration.

But how many manufacturers know about it? The survey shows that only 15% are currently developing solutions using low-code development. Another one-quarter of responding companies are considering using low-code. Others may be familiar or aware of it, but a full one-quarter are not even aware of it. Based on our research, we believe it's time for more industrial companies to explore the potential of low-code development.
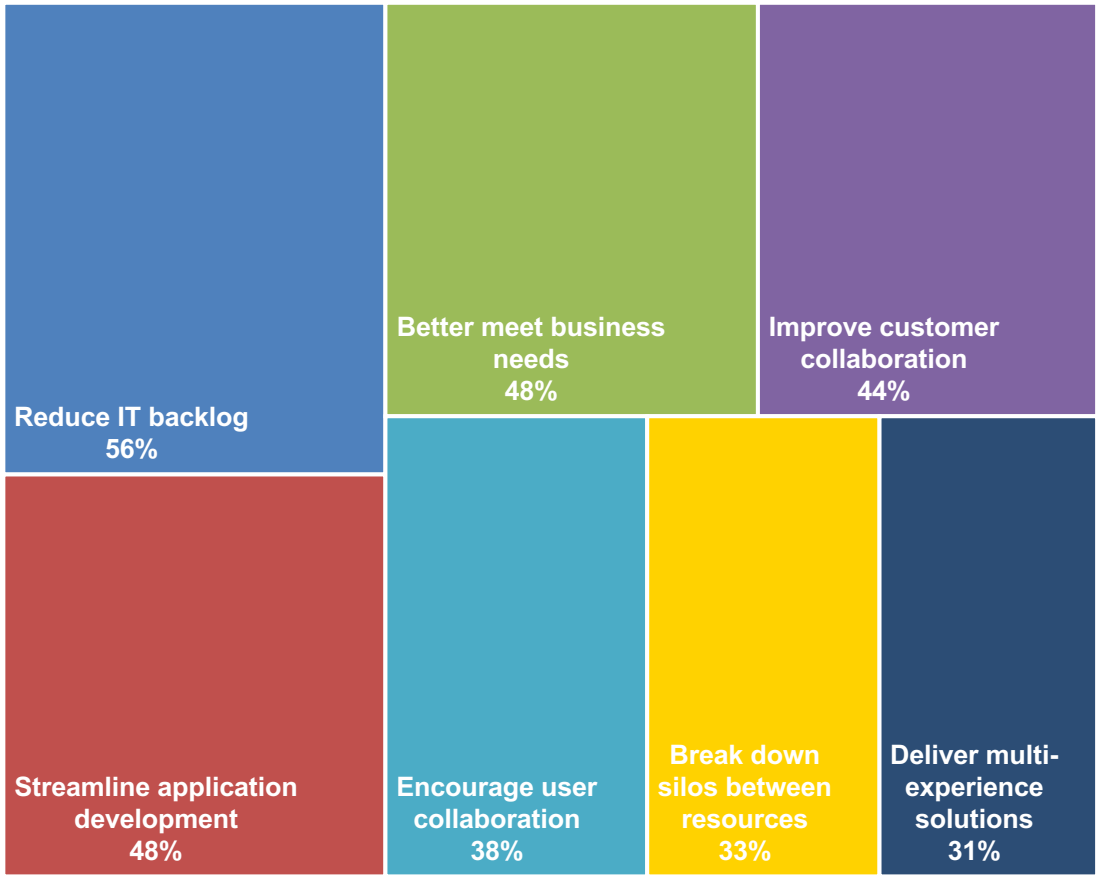
Experience with Low-Code Solutions

- Currently Using 15%
- Considering 24%
- Familiar With 15%
- Aware Of 21%
- Not Aware Of 25%
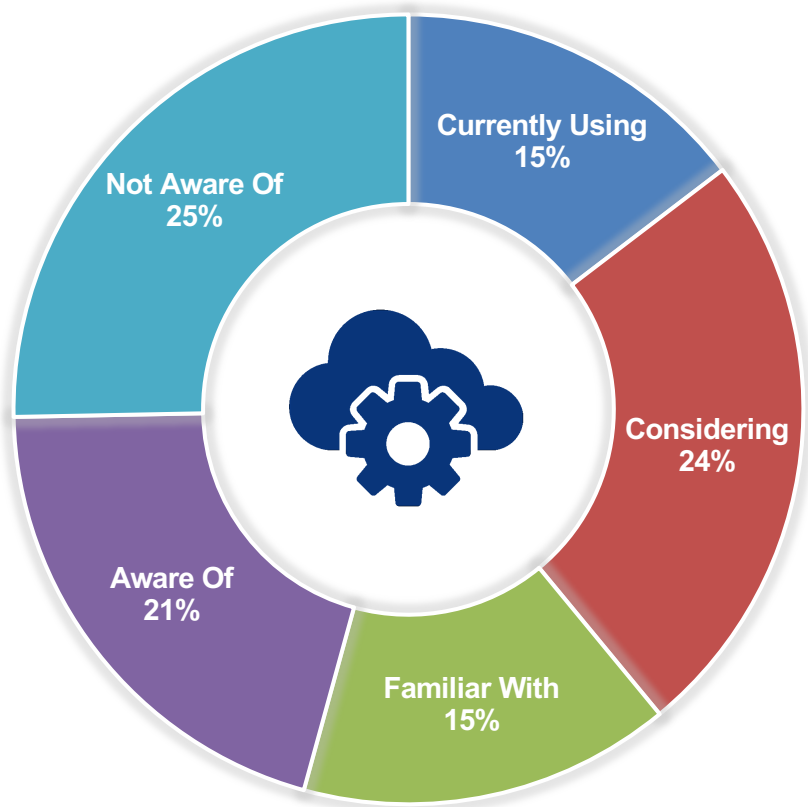
Low-code development holds significant promise to help manufacturers and other industrial companies fill digital transformation gaps with applications, but relatively few are aware of it or its capabilities.

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Benefits

Low-Code Development Benefits

Reduce IT backlog **56%**	**Better meet business needs** **48%**	**Improve customer collaboration** **44%**
Streamline application development **48%**	**Encourage user collaboration** **38%**	**Break down silos between resources** **33%** / **Deliver multi-experience solutions** **31%**

Companies currently developing solutions using low-code development are over three times as likely to be able to fill digital transformation gaps "very well" than those not yet using it.

Agility

Low-code is often touted for its ability to help improve software development productivity. Companies that use low-code most commonly report benefits related to driving down IT backlog and streamlining application development. Those are key to the speed at which companies can fill their digital transformation gaps.

Meeting Business Needs

Looking beyond productivity, about one-half of manufacturers say that low-code development helps better meet business needs. Companies must now support dynamic, evolving needs as they reinvent business models and processes. These needs go beyond automating proven practices that may go back decades, like a three-way match in accounting. Rapid development ensures the needs are met before they change.

Collaboration

The next three most commonly reported benefits all relate to collaboration. They include encouraging user collaboration, breaking down silos, and improving customer collaboration.

Low-code drives higher levels of collaboration to better meet business needs despite rapidly changing requirements. The combination of agility and collaboration ensures companies fill digital transformation gaps in a way that meets current, evolving digital transformation needs.

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Conclusions

Digital Transformation Gaps

Manufacturers are keenly aware that digital transformation increases business complexity and risk. Digitalization increases the speed of change, demands more agility, and creates the need for more (and faster) software development.

The vast majority of companies have gaps across the digital transformation initiatives they are pursuing. Few companies can fill these gaps very well. This disadvantage is partly due to technical challenges and partly due to their poor ability to collaborate with critical subject matter experts.

Filling Gaps with Low-Code

Companies must fill their gaps and they are doing so by both building and buying solutions. Low-code development provides them with the ability to build their custom solutions faster. It also enables companies to integrate and extend their COTS solutions more rapidly. Although still in early adoption, low-code development addresses companies' technical challenges, creates development agility, and supports collaboration so manufacturers can efficiently modernize legacy systems and deploy new applications.

The result is that manufacturers using low-code development are better able to fill their digital transformation gaps. We believe that low-code development is a critical capability to explore to drive overall digital transformation efforts.

Few manufacturers can fill their digital transformation gaps very well, but those that use low-code development are over three times as likely to be able to operate at that level – likely due to better agility and collaboration between IT and the business.

About the Research

Data Gathering

Tech-Clarity analyzed 335 responses to a web-based survey on filling digital transformation gaps. Survey responses were gathered by direct e-mail, social media, and online postings along with third-party data collection.

Industries*

The respondents represent industrial companies that manufacture products or provide engineering services. 24% were from Industrial Equipment / Machinery, 22% Automotive / Transportation, 16% Aerospace / Defense, 14% Consumer Products (Retail and Hard Goods), 10% Life Sciences / Medical Devices, 9% Energy / Utilities, and others including Marine, Electronics / High Tech, Architecture / Engineering / Construction, Consumer Packaged Goods, and Building Products and Fabrication.

Company Size

The respondents represent a mix of company sizes, including 7% from companies greater than $5 billion in annual revenue, 19% between $1.1 billion and $5 billion, 56% from companies $251 million to $1 billion, 7% from $100 million to $250 million, as well as 11% from less than $100 million. Company sizes were reported in US dollar equivalent.

Geographies*

Responding companies report doing business in North America (74%), Western Europe (61%), Asia (43%), Latin America (25%), Eastern Europe (24%), and others including Africa, Australia, and the Middle East.

Role

The respondents were comprised of 45% Directors, 25% Vice Presidents, 16% Managers, 10% Individual Contributors, 5% others including Executives / C-Level.

Organizational Function

Of the respondents, 34% were in Manufacturing roles, 28% in Design / Engineering, 9% in Product Management, 7% in Industrial / Manufacturing Engineering, 6% in Information Technology (IT), and the remainder were from a variety of organizations including Supply Chain / Logistics, Operational Technology (OT), Quality, Project / Program Management, and others.

The respondents represented a mix industries, company sizes, and geographies.
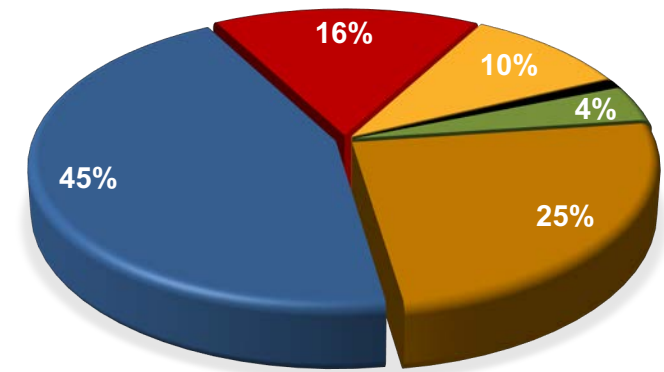
- Executive, "C-level" (CEO, CFO, COO, etc.)
- Vice President
- Director
- Manager
- Non-manager, staff, individual contributor, engineer
- Other

* Note that the values may total greater than 100% because companies reported doing business in multiple industries and geographies.

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Acknowledgments

About the Author

Jim Brown founded Tech-Clarity in 2002 and has over 30 years of experience in the manufacturing and software industries. Jim is an experienced researcher, author, and speaker and enjoys engaging with people with a passion to improve business performance through digital enterprise strategies and supporting software technology.

Jim is actively researching the impact of digital transformation and technology convergence in the manufacturing industries.

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Jim Brown
President
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