



Iowa Manufacturing Needs Assessment 2023-2024



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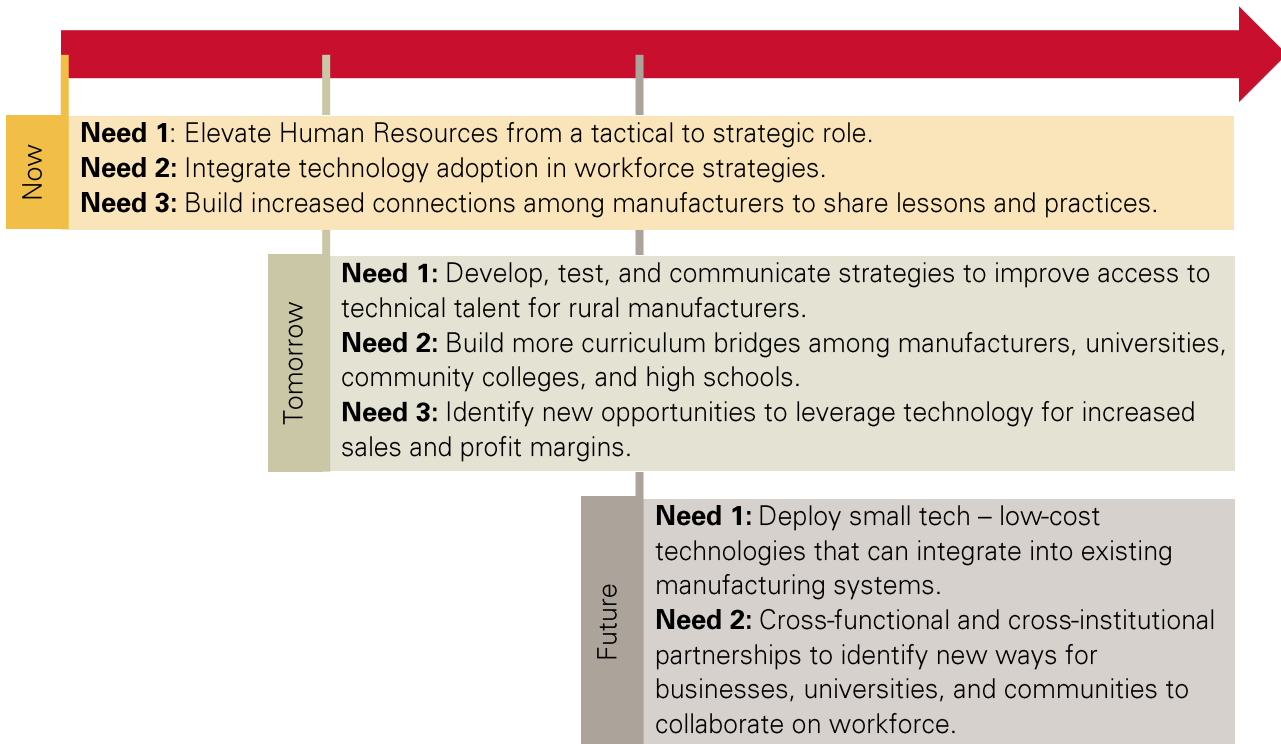
Executive Summary

CIRAS conducts a biennial assessment to better understand the needs of manufacturers in Iowa. This report highlights the results of a survey of leaders at 220 manufacturers across Iowa and follow-on discussions with manufacturing leaders and others supporting the manufacturing ecosystem.

Key findings include the following:

- Profitability compression is evident, with more than half reporting ROS under 10%.
- Top growth inhibitors have improved dramatically in the past two years. Hourly workforce availability is the top constraint for the first time in this survey.
- Availability of salaried technical workforce, particularly in rural areas, is becoming a major issue.
- Reducing production costs has rapidly increased as a growth strategy in response to inflation and reduced margins.
- Technology deployment is accelerating and creating real benefits. Survey respondents reported results above expectations for eight of nine technologies.
- Indicators suggest continued acceleration of technology implementation, with significant numbers of manufacturers stating they are starting implementation of various technologies.
- 95% of survey respondents report implementing at least one Industry 4.0 technology or enabling technology, which demonstrates readiness for continued technology change.
- New production employee scheduling strategies are gaining momentum and creating value for manufacturers.
- Productivity improvement systems, such as lean, are re-emerging in response to workforce shortages and continuous rapid changes across industry.

As a result of the analysis, CIRAS identified the below as core needs for Iowa manufacturing:



The State of Iowa Manufacturing

Manufacturing is a core driver of Iowa’s economy. More than 3,400 manufacturers contribute more than \$39 billion to Iowa’s economy, making it the Iowa’s largest sector. With 215,000 people making an average wage of \$62,914, manufacturing is unmatched in its ability to provide high quality jobs for such a large portion of Iowa’s population.¹

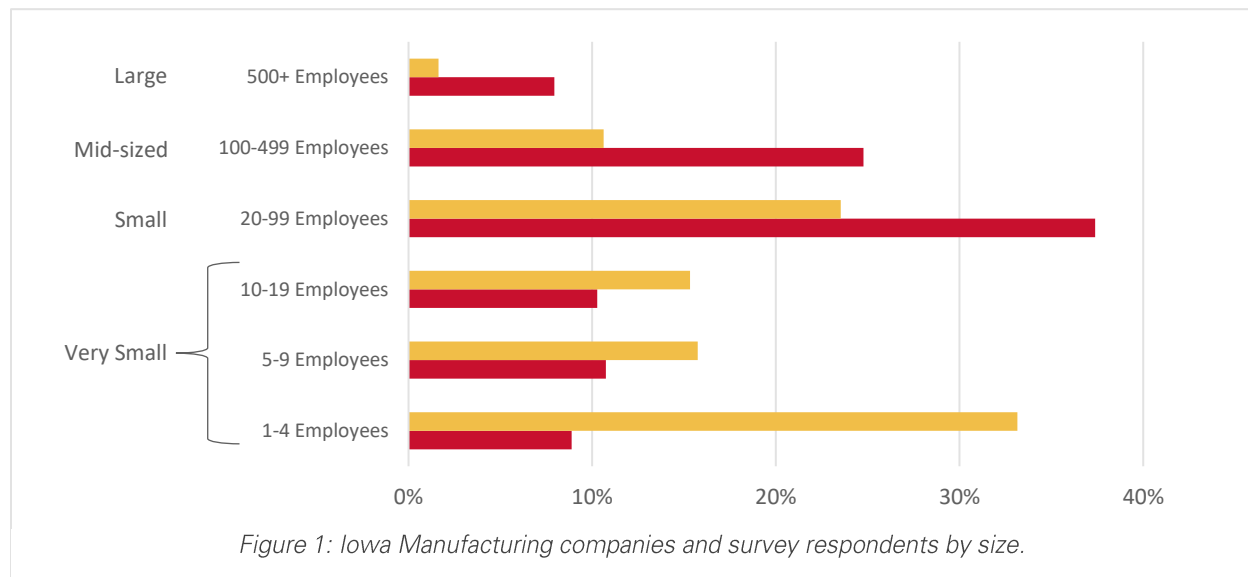
To better understand the underlying issues, risks, and opportunities that will define the future of manufacturing, CIRAS conducts a biennial needs assessment of Iowa manufacturers. In 2023, 220 manufacturers of all varying sizes and types responded to an in-depth survey regarding their companies, limitations to growth, actions, and results.

Respondents to this survey represent 3% of very small manufacturers, 10% of small manufacturers, 15% of mid-sized manufacturers and 30% of large manufacturers (Figure 1). Since 94% of manufacturing employment is in manufacturers with more than 20 employees,

we consider it a suitable representation of Iowa manufacturing.

CIRAS conducted needs forums with the CIRAS Advisory Board and at the Iowa Association of Business and Industry *Iowa Manufacturing Conference*. Additional forums were conducted with manufacturing-related researchers at Iowa State University to better identify links between research and emerging needs in manufacturing.

This report provides survey data regarding business fundamentals (profitability, strategies, and product development), followed by growth impediments, and initiative implementation and outcomes. When appropriate, survey information is supplemented by feedback from the forums. Throughout this document are sidebars that provide additional context and insights beyond the needs assessment process. The final section provides a summary of key needs that are critical to the success of Iowa manufacturing now, in the near term, and over the next decade.



¹ Source: U.S. Census Bureau County Business Patterns, U.S. Bureau of Economic Analysis

Profitability

Less than half (47%) of respondents to the survey report a return on sales (ROS) of more than 10% (Figure 2). The data shows a trend of margin compression over the past four years. During forum discussions, manufacturers confirmed persistent margin pressures. Participants stated that while material and labor costs have partially subsided from the pandemic, they remain higher than historical trends. Current data from the Bureau of Labor Statistics confirms this sentiment: average hourly earnings of production employees in Iowa manufacturing rose 16.5% from December 2019 through October 2022, with wages remaining generally flat since then (Figure 3).

Forum participants noted that sustained cost increases remain higher than price tolerance in

both the consumer and B2B markets. These increased labor and material costs with little pricing power have continued to squeeze profits, leading many manufacturers to revisit process improvement and automation tools, as discussed further in this report.

Pricing pressures tend to impact smaller and larger companies differently (Figure 4). On average, larger companies follow closer to a normal distribution: most have the tools to maintain moderate profits but lack the market niche to command high profits. Smaller companies are more of a bimodal distribution, where they are more likely to have less than 5% ROS and more than twice as likely as their larger counterparts to have a ROS more than 20%.

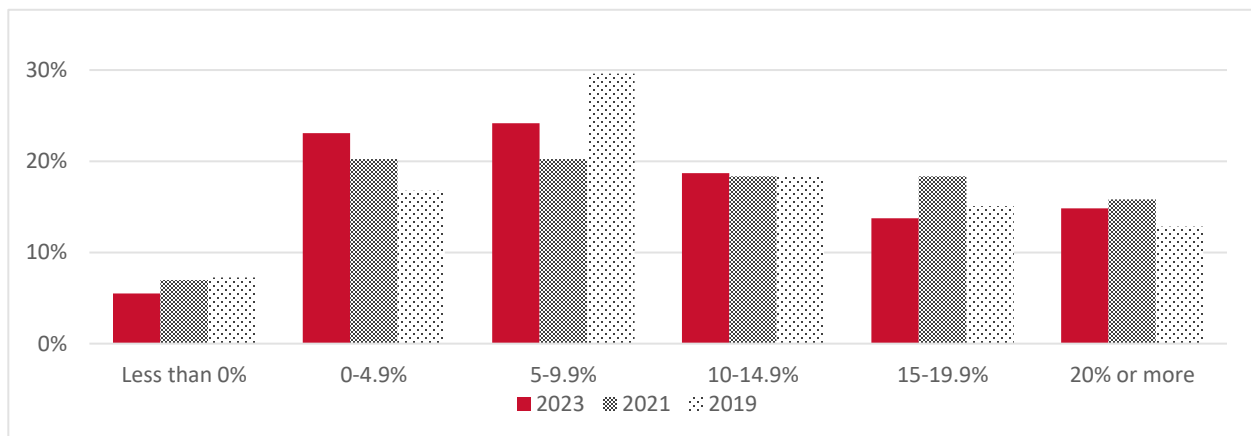


Figure 2: Reported Return on Sales (ROS) over the past three surveys.



Figure 3: Hourly product employee wages, Iowa Manufacturing (Source: BLS series SMU19000003000000008)

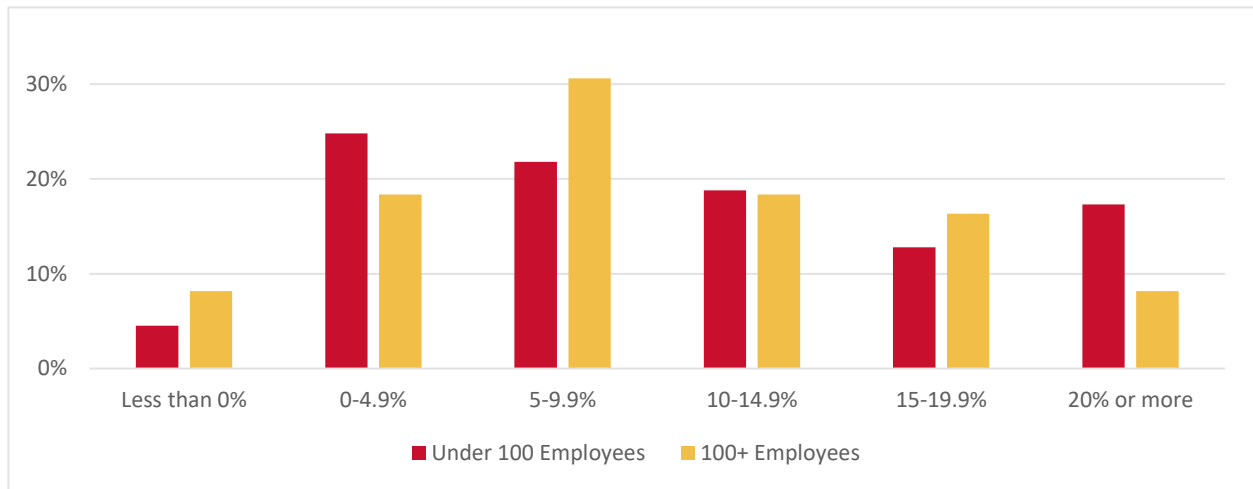


Figure 4: ROS breakdown by company size.

Business Strategy

The ability to deliver products with higher quality than the competition is the most common strategy among Iowa manufacturers, followed by superior customer service (Figure 5). There have been no significant changes in the strategy mix among respondents since the previous survey.

In addition, we do not see any significant trends over time in the effectiveness of particular strategies over others, or in the effectiveness of a particular strategy to generate returns.

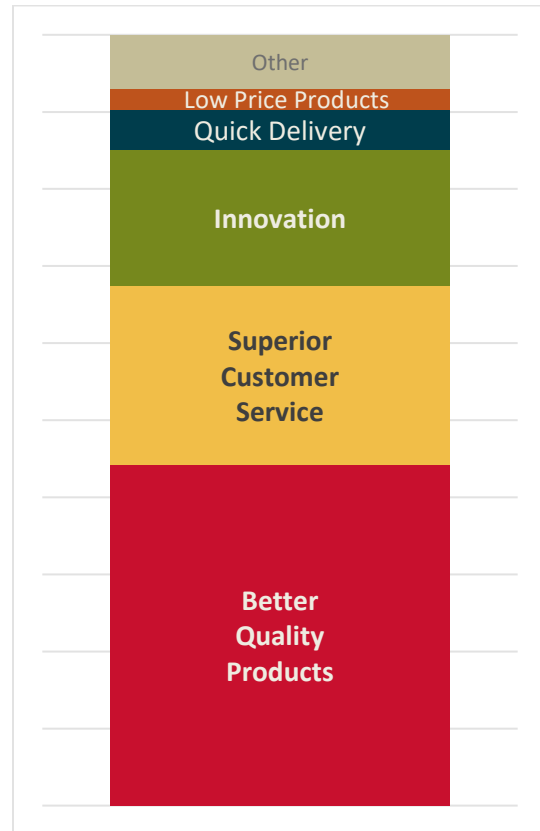


Figure 5: Primary business strategy of respondents.

Growth Strategies

Respondents identified the top three planned actions to grow profits (Figures 6-8). The most frequently identified planned source of sales growth is to increase sales through increasing market penetration in current markets. Reducing production costs was the second most frequently stated goal and accessing new domestic markets was third. These rankings remain consistent from the previous year.

The number of companies with a focus on market penetration has decreased while reducing production costs has increased. This

aligns with the compression of profits: companies are more interested in regaining profit margins than increasing low-margin profits. They also see opportunities to capture market share by being different in a world of price increases.

Plastics and Rubber Products Manufacturers have significantly increased their focus on broader marketability and quality, while Food manufacturers have significantly decreased their focus on increased sales through new products.

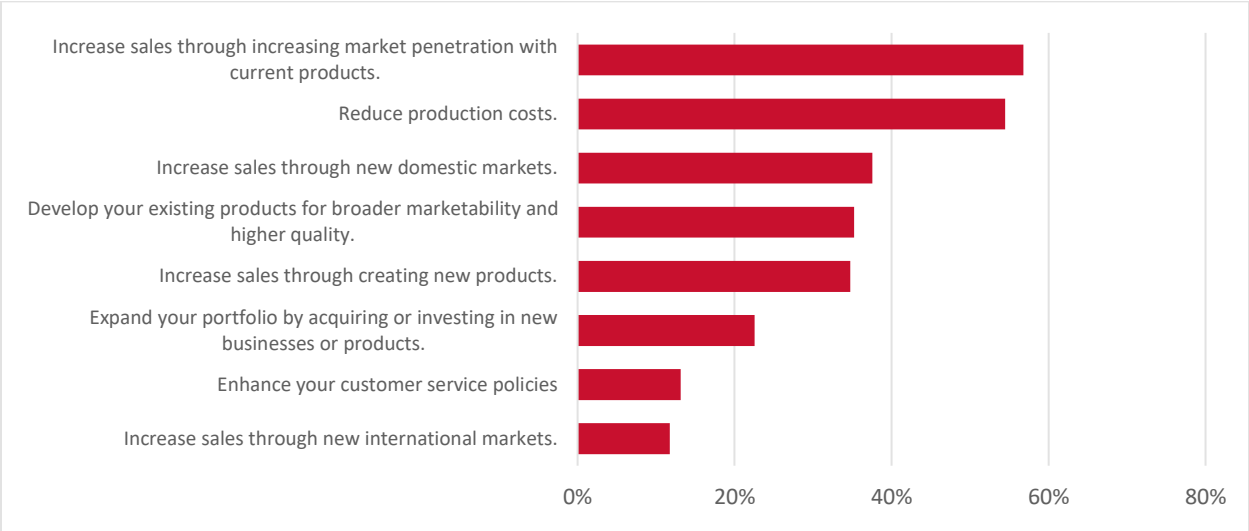


Figure 6: Percent of respondents identifying a given strategy among their top three approaches to growth.

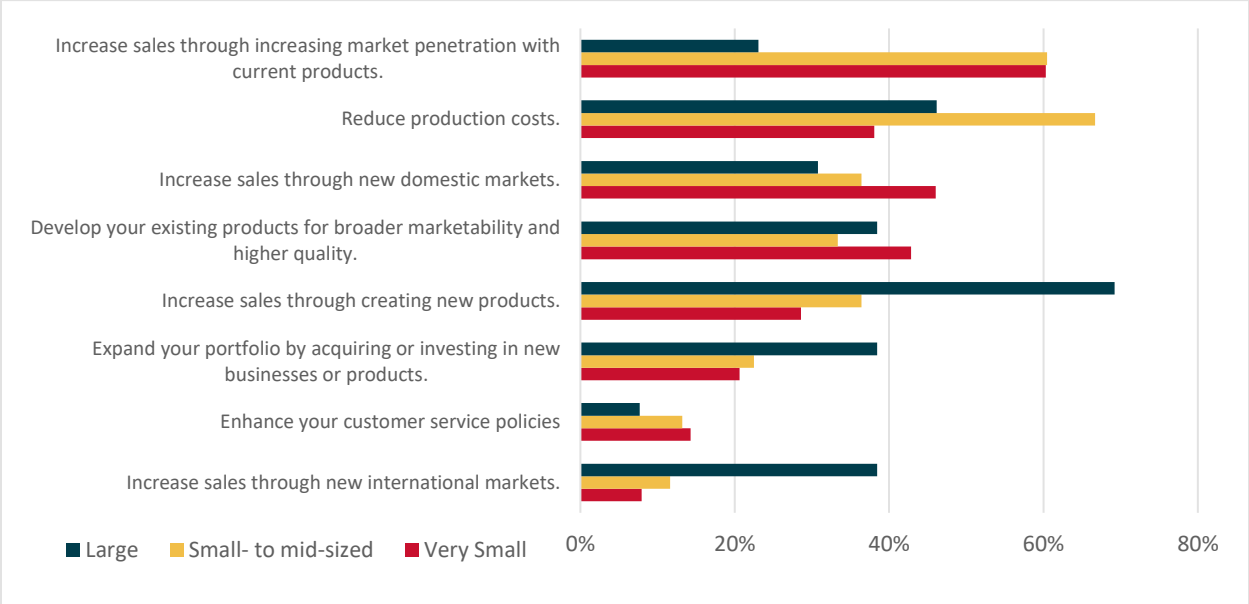


Figure 7: Growth strategies by company size.

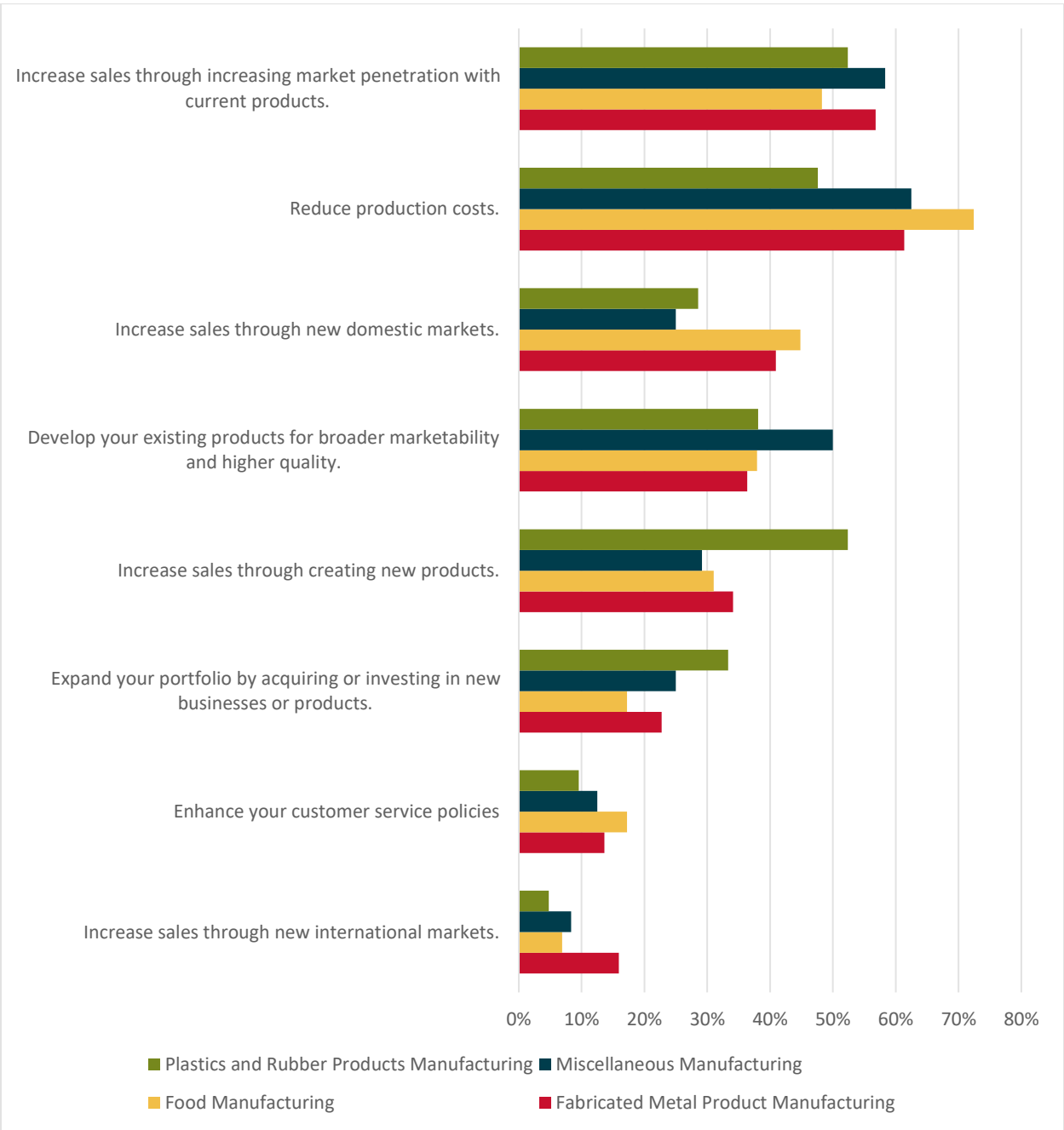


Figure 8: Growth strategies by industry.

Developing New Products

One key factor in the long-term success of a manufacturing business is the ability to develop new products and services on a regular basis. This survey (Figure 9) continues to demonstrate that the portion of Iowa manufacturers releasing products new to the market is relatively small. There has been no significant change in this metric from the previous survey.

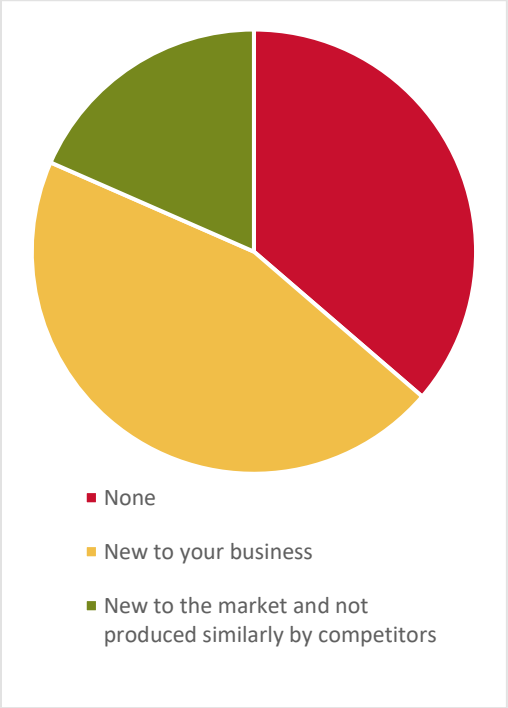


Figure 9: Portion of companies releasing new products and services in the past year.

Inhibitors of Growth

The key issues that business leaders identify as limiting growth over the next five years provide insights into what will drive investment in time and funds. Figures 10 and 11 provide summaries of responses to the question “I believe ___ will limit my ability to grow over the next five years.”

In a change from previous surveys, there is only one item that falls into the “Strongly Agree” category: Inadequate availability of hourly workforce. Top inhibitors from the previous survey (labor costs, raw material costs, and healthcare costs) have shown considerable improvement. Infrastructure (power, water/wastewater, internet etc.) was rated the lowest among respondents.

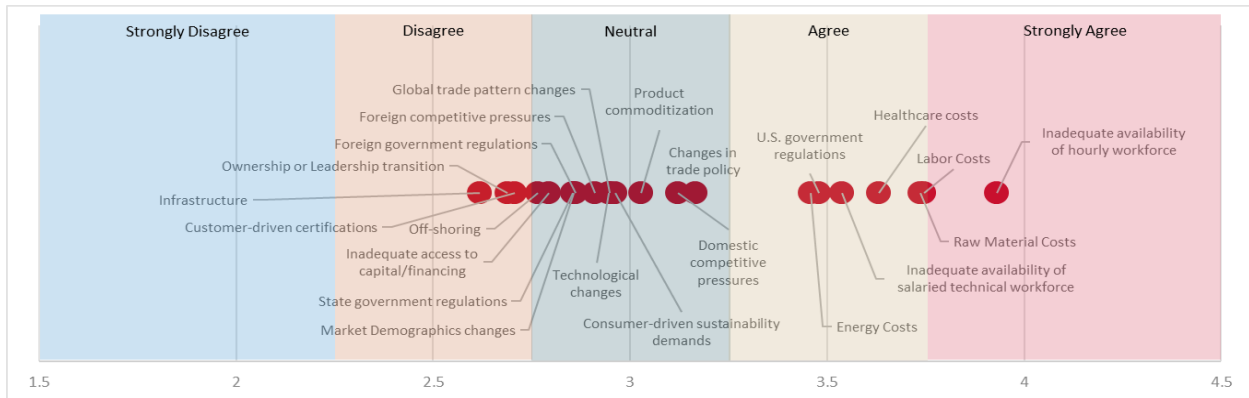


Figure 10: Average rating for company-reported inhibitors of growth.

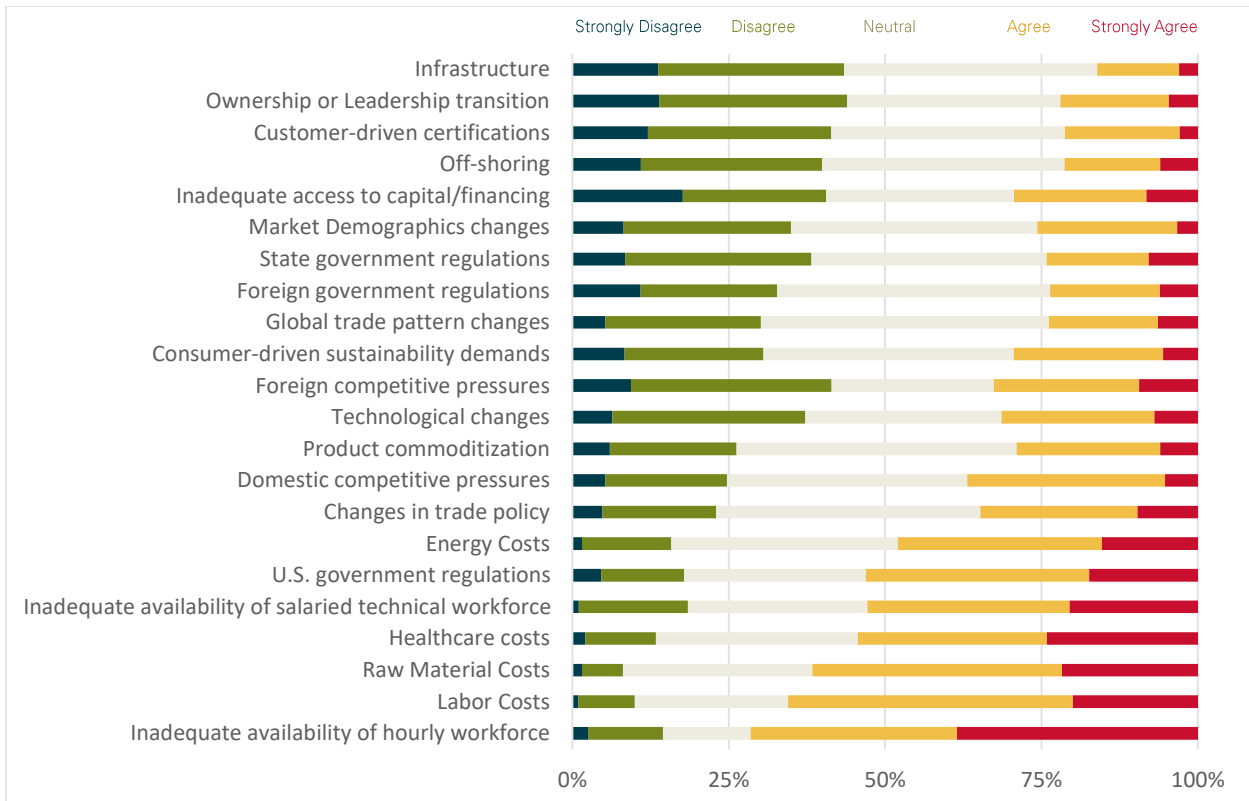


Figure 11: Detailed breakdown of company-reported inhibitors of growth.

A review of top impediments over time (Figure 12) aligns with comments heard throughout the in-person forums: Most aspects of a manufacturing business are in a better place today than they were two years ago. The availability and costs of people and materials have returned to manageable levels, and leaders have continued to find new ways to respond to challenges. While healthcare costs continue to rise, increases are more predictable and equitable across industry, lowering their impact on competitiveness.

Despite the notable improvements, there are two emerging issues: U.S. Government Regulations and availability of salaried technical workforce.

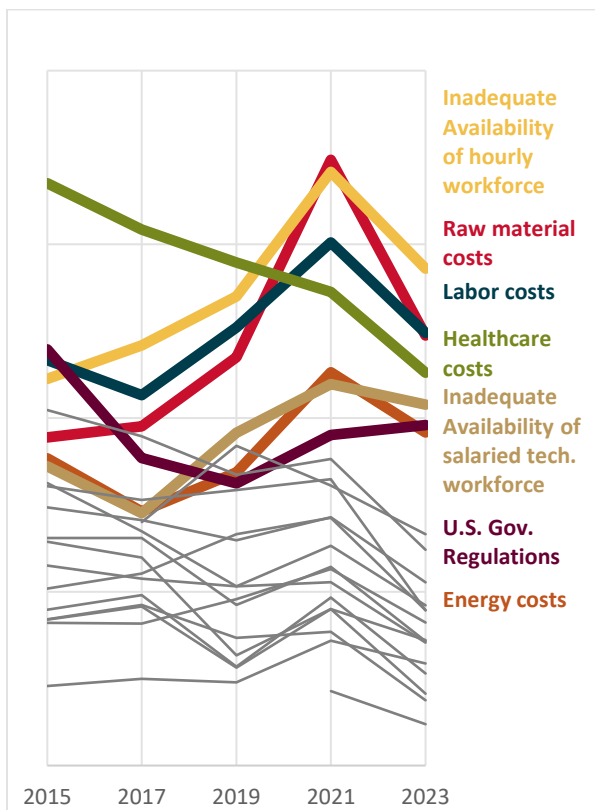


Figure 12: Key changes in growth inhibitors over the past four surveys.

U.S. Government Regulations

While a needs assessment is not the forum to conduct a detailed assessment of the regulatory environment, there was a clear message from forum participants: their responses were not related to a single regulation or agency, but rather the unpredictability and inconsistency of regulations. Businesses thrive on clear and consistent rules, and the lack of clarity and consistency over a long period prevents their ability to understand and innovate ways to comply while meeting the financial and operational needs of their business.

Skilled Technical Labor

The availability of skilled labor is becoming increasingly challenging, especially in rural areas. While urban manufacturers rate it as high-but-manageable, rural manufacturers rate availability of salaried technical workforce at the same level as raw material costs and healthcare costs. Multiple forum participants noted that availability of technical talent in rural areas was reaching a crisis point. The technical talent gap in rural areas currently has wide-ranging impacts on manufacturers including:

- Inability to attract and retain engineers for product development and to deploy Industry 4.0 technologies.
- Lack of middle-skill technical talent to design, maintain, and operate emerging technologies.
- Instructor availability for middle-skill development, especially in emerging technologies.

Many of the root causes of this technical talent gap are outside of the immediate control of the business. This includes the rapid aging of current technical talent into retirement, the inability to provide the community amenities that early career talent expects, and the continued lack of individuals interested in middle-skill technical careers in manufacturing. As will be discussed later, many manufacturing leaders are engaged in various approaches to improve these items, with varying degrees of success.

Inhibitors by Industry, Strategy, and Size

As we have seen in the past, the specific growth inhibitors varied across manufacturing

subsectors. Figure 13 breaks down top issues by a variety of factors.

Industry	Fabricated Metal Product Manufacturing	Inadequate availability of hourly workforce U.S. Government Regulations Inadequate availability of salaried technical workforce
	Food Manufacturing	Raw Material Costs Labor costs Inadequate availability of hourly workforce
	Miscellaneous Manufacturing	Raw Material Costs Labor costs Inadequate availability of hourly workforce
	Plastics and Rubber Products Manufacturing	Rising labor costs Inadequate availability of hourly workforce U.S. Government Regulations
Strategy	Better Quality Products	Inadequate availability of hourly workforce Rising labor costs Raw material costs
	Innovation	Raw material costs Rising health care costs Rising labor costs
	Superior Customer Service	Inadequate availability of hourly workforce Rising labor costs Raw material costs
# of Employees	1-4	Rising health care costs Rising labor costs Inadequate availability of hourly workforce
	5-9	Inadequate availability of hourly workforce Rising health care costs Inadequate availability of salaried technical workforce
	10-19	Inadequate availability of hourly workforce Rising labor costs Rising health care costs
	20-99	Inadequate availability of hourly workforce Raw material costs U.S. Government Regulations
	100-499	Inadequate availability of hourly workforce Raw material costs Labor costs
	500+	

Figure 13: Top three inhibitors of growth by industry, strategy, and company size. Items in **bold** indicate new items from the 2019-2020 list.

Actions and Results

Our survey asks two questions regarding strategic initiative actions and results. First, for a list of 23 initiatives, the survey asked the extent to which the company has implemented each item (5 = Implemented and being sustained, 4 = Implementation in Progress, 3 = Plan complete and starting implementation, 2 = Implementation planning started, 1 = Have not implemented).

For the same list of initiatives, the survey asked the perceived benefits for the initiatives companies have implemented (5 = Significantly Above Expectations, 4 = Above Expectations, 3 = Met Expectations, 2 = Did Not Meet Expectations, 1 = Significantly Below Expectations).

Pairing these two questions provides insight into implementation levels among lowa manufacturers and potential benefits compared to expectations.

Figures 14-19 show the results from both questions for technology, human capital, and management systems initiatives. Each initiative is plotted with the current survey result (●), attached to a line tracing historical results. This approach allows us to visualize the trends in implementation and value (direction of the line) along with speed (length of each line segment). Note that some initiatives, such as Internet of Things are recent additions with less history.

Technology Tools

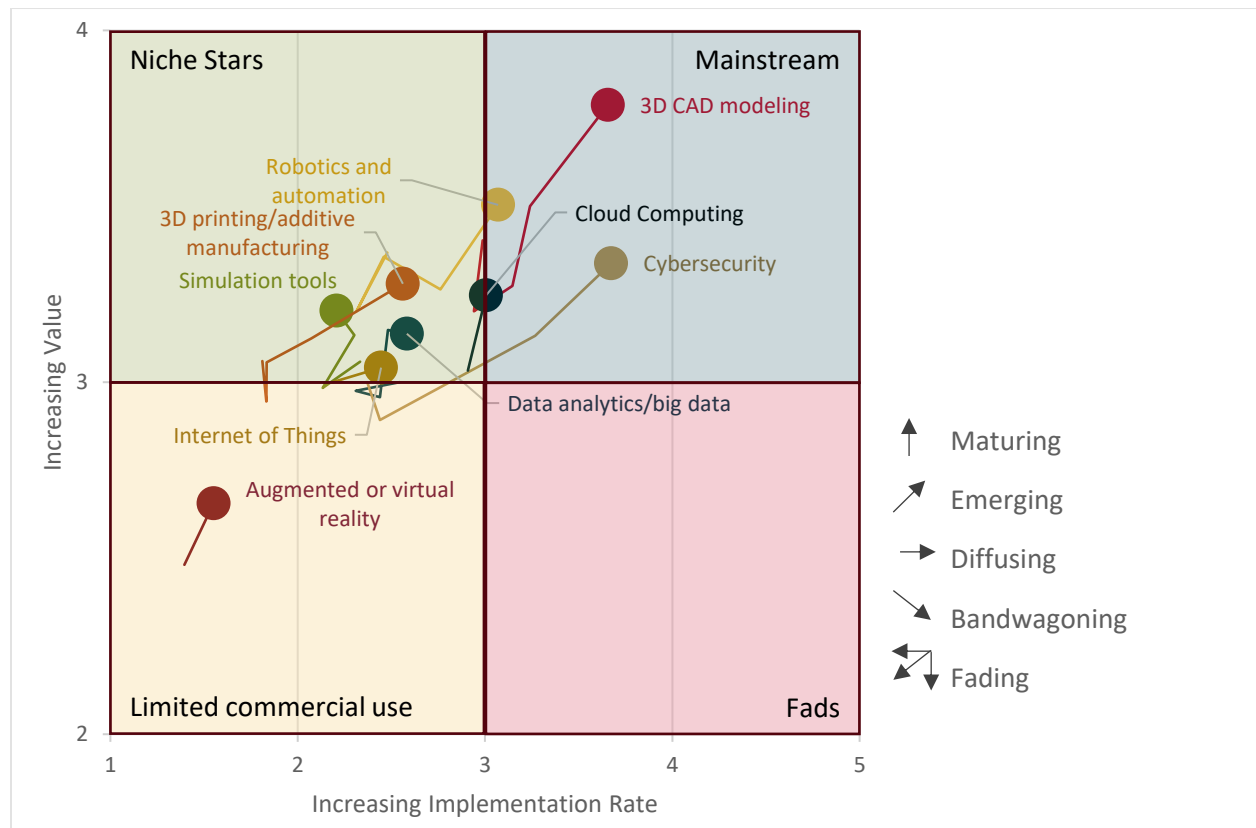


Figure 14: Implementation rates and benefits of technology tools.

We continue to see significant leaps in technology adoption creating business value. There are four technology groups that now we consider to be mainstream: **3D CAD Modeling**, **Cybersecurity**, **Robotics and Automation**, and **Cloud Computing**. These four technologies have become the foundation of the fourth industrial revolution². Just six years ago, none of these technologies – including 3D CAD modeling – were considered mainstream in Iowa. The rapid adoption of these technologies represents a major shift in how we make products in Iowa.

Forum participants are optimistic about technology adoption. Several stated that their overall businesses are learning how to see, test, and implement new technologies. Many also commented on the capabilities of the emerging generation. Younger employees expect technology to be integrated into their jobs and are willing and able to help. Many enter the working world with real experience using robotic and technology from STEM experiences in high school and college, creating a foundation for them to immediately contribute at all levels of employment – from the shop floor to the office.

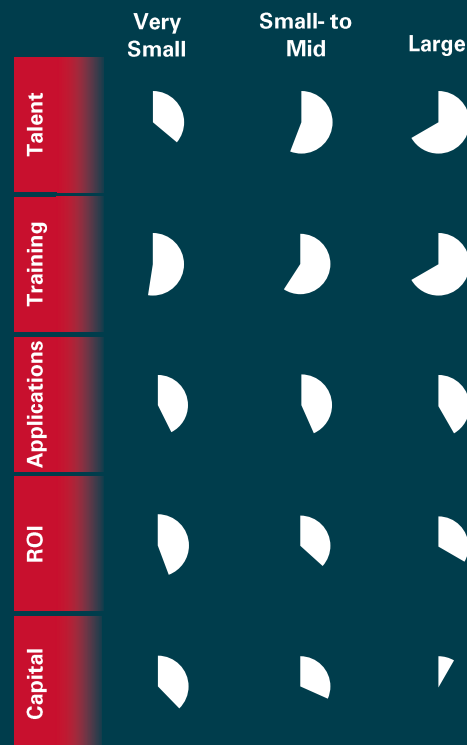
Artificial Intelligence is not explicitly included in this survey. From a technical standpoint, we consider artificial intelligence to be part of the data analytics/big data category. However, the speed and prevalence of generative AI applications may require a rethinking of that approach in future surveys. Initial discussions with manufacturers reveal a major gap in the application of AI – ranging from advanced, custom predictive tools to a belief that it is not applicable to manufacturing at this time. A similar survey from the Wisconsin Center for Manufacturing & Productivity³ revealed that 51% of Wisconsin manufacturers stated that “A.I. is not going to have much of a real impact on businesses like mine”.

² For a detailed analysis on the impacts, status, and strategy for Iowa’s transition, see *Seizing the Manufacturing 4.0 Opportunity: A Strategic Plan for Iowa’s Manufacturing Industry*.

Impediments to Technology Adoption

Iowa manufacturers continue to make exceptional progress in implementing the technologies needed to remain globally competitive: 95% of all respondents reported at least some implementation of a technology associated with Industry 4.0.

However, many still face real barriers to fully taking advantage of technologies that solve critical issues. Below are the percentage of survey respondents that identified these topics as barriers. Of note is the amount of variation in barriers we see by company size.



³ <https://www.wicmp.org/report-conclusions/2023-wi-manufacturing-report-conclusions/>

Cybersecurity implementation continues to rise rapidly. Manufacturing leaders report continued implementation of cybersecurity practices, and continued value. Follow-on discussion revealed two general groups of implementers. The first group focused primarily on outsourcing cybersecurity measures to their information technology providers. This approach has maintained low costs, but anecdotal evidence is that the risk reduction for these companies is limited. The second group has partnered with experts to create a blended strategy. These manufacturers typically partner with an insurance company, a dedicated cybersecurity company, or both, to ensure they have the internal and external practices needed to

mitigate risks. While business leaders in this space still struggle to point to a specific ROI, many commented that the depth of implementation reduced risks sufficiently to justify the costs.

Figure 15 provides more detail in implementation progress. Of particular note are the number of companies planning or starting implementation of many of these technologies. In our earlier survey, 17% of respondents were in the planning or starting implementation phase for any technology. In this survey, that figure becomes 29%, demonstrating significant continued movement in Industry 4.0 technologies.

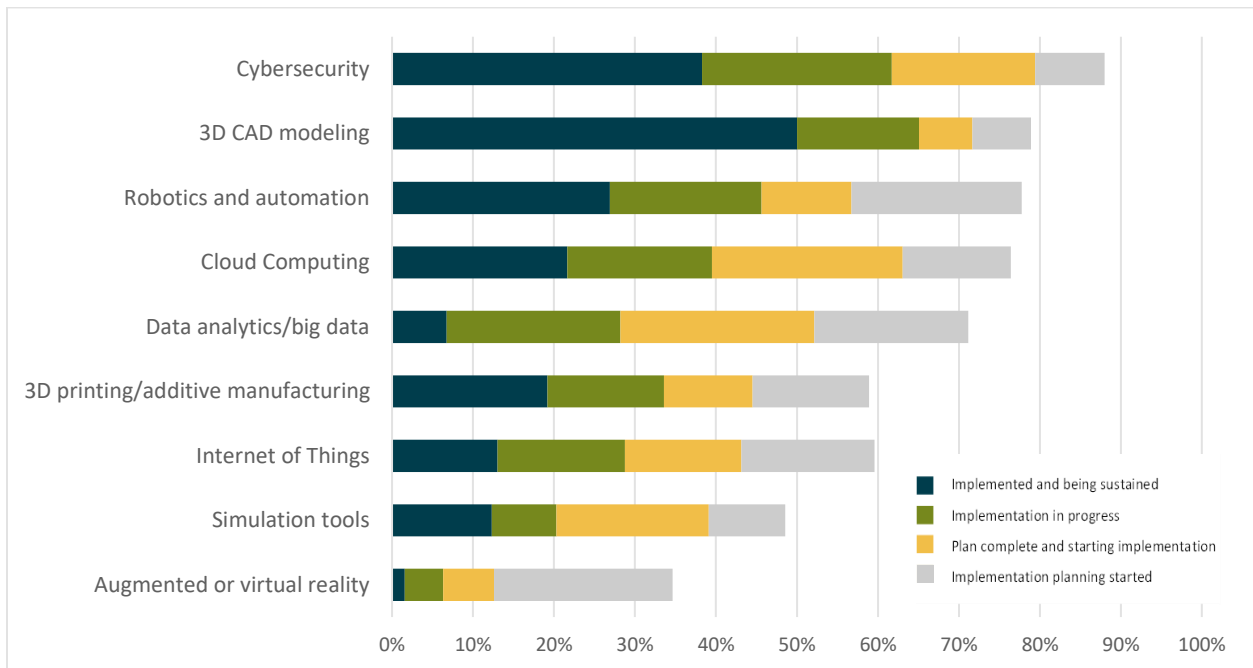


Figure 15: Industry 4.0 implementation among survey respondents.

Human Capital Programs

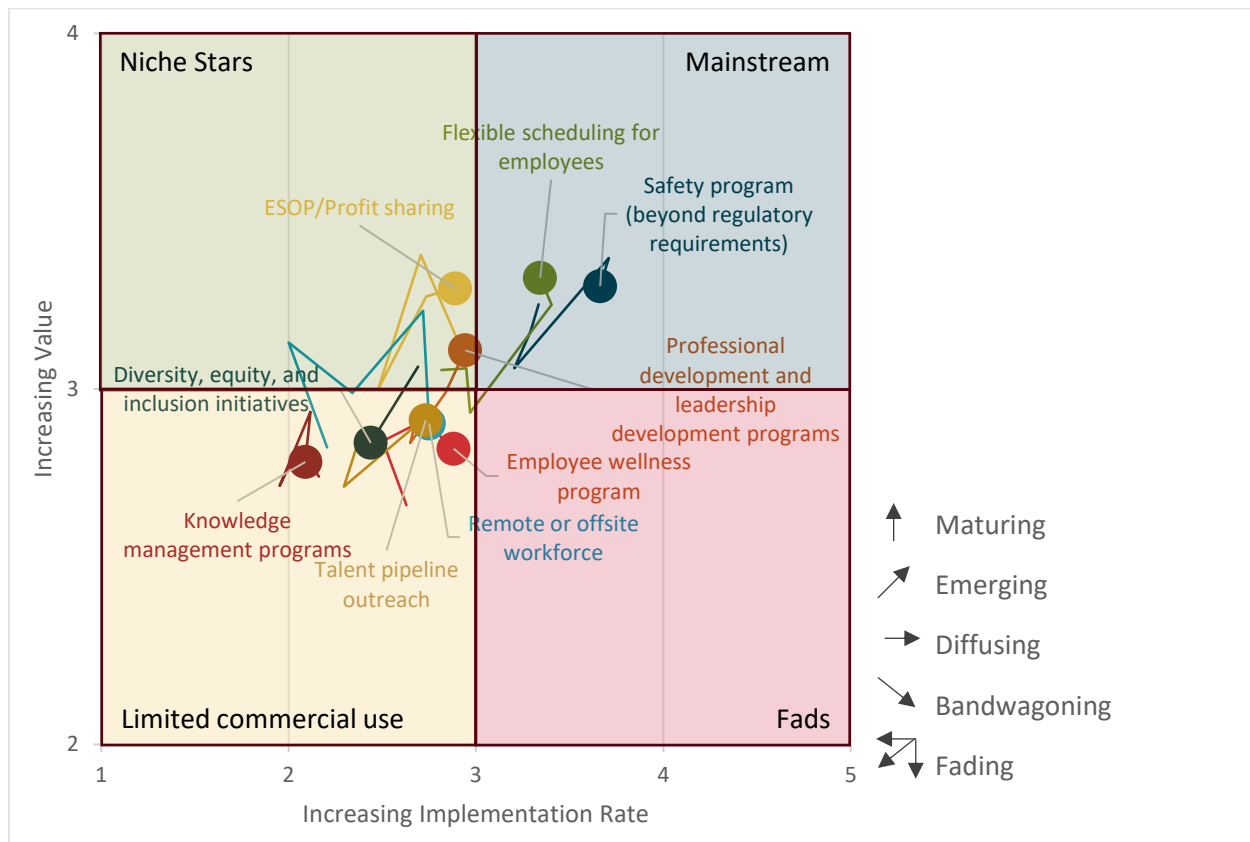


Figure 16: Implementation rates and benefits of human capital programs.

In contrast to technology implementation, human capital programs generally struggle to find firm footing and growth in value. There are two standout exceptions: Flexible Scheduling and Safety programs.

Flexible scheduling in a traditional sense, where individuals can choose working hours among a wide range of options, is generally not feasible in most manufacturing plants. While forum participants have noted they have dramatically increased flexibility for office-based employees, they have taken different approaches on the shop floor. Leaders have rethought shift schedules, part-time employment, and more by working with employees to design work schedules that work for the person and the business.

The most popular change we heard is the 4x10 plus 3x12 shift design. This typically has 10-hour shifts Monday through Thursday, followed by a

TechThrive: Rethinking Rural Innovation

A 2024 analysis by the [Washington Post](#) ranked Iowa 42nd among the 50 states and D.C. in “brain drain”. There is a perception that post-collegiate success requires moving elsewhere.

But what if universities, communities, and businesses partnered to change that perception? Iowa’s manufacturers employ more than 55,000 people in occupations not readily associated with manufacturing, including office support, management, engineering, and science jobs. These jobs regularly require a college degree and are based in communities across the state.

TechThrive seeks to rethink how stakeholders can come together to help better connect students with a vision for a career in their home community. For more, visit <https://techthrive.iastate.edu/>.



Successful Approaches for Workforce Retention and Attraction

Leaders are shifting from traditional tactics to strategic workforce activities to create results. Three trends are worth monitoring: comprehensive workforce planning, job quality assessments, and employer of choice frameworks.

Workforce Planning is a cross-functional approach to connect strategic and operational business activities with the people needed to execute those plans. This thorough view can only be obtained through collaboration and relies on Human Resources expert input. Thoughtful workforce planning improves the ability to meet current and future staffing needs and helps focus on effective recruitment, development, and retention approaches.

A job quality assessment helps businesses better understand macro and job-specific recruitment and retention issues. It is vital for understanding how a company meets its employees' needs, encompassing competitive pay, benefits, a safe work environment, and opportunities for growth and input into decision-making. The National Institute for Standards and Technology (NIST), provides a Job Quality Toolkit at no cost.

Becoming an employer of choice means being a company where people want to work, thanks to excellent leadership, competitive pay, and an engaged, valued workforce. This creates a positive environment where feedback is welcomed and acted upon. While easy to achieve employer recognitions exist, it is critical that the leadership team views this as a strategic journey incorporating employee input and business needs.

There is no single solution to attracting and retaining the best people. Developing a long-term strategic advantage in human capital requires coordinated, cross-functional efforts across the whole business.

separate shift of 12-hour days Friday through Sunday, while paying these employees for 40 hours of work. Some businesses add a third 10-hour shift overnight Monday through Thursday. Implementation of this shift design has been near-unanimous in positive responses from business leaders and individual employees. Businesses commented that it has had immediate impacts on employee attraction and retention and demonstrated improved productivity.

While **safety programs** have long stood out as well-implemented and valuable, several forum participants went out of their way to offer more support on the value of safety programs. Many firmly believe that effective safety programs, including a strong culture at all levels of leadership plant, is a critical component to attracting and retaining talent while also making good business sense.

Next-generation technologies are also affecting safety. Automated systems are supporting higher risk jobs, wearables (including sensors like Iowa's own MakuSafe) and exoskeletons are reducing risks, and emerging research focuses on more ways to train employees in safe practices.

While many human capital programs seem to stagnate in terms of value, forum participants pointed out that a driver of this may be the lack of companies implementing specific toolsets that meet their needs. For example, many stated that generic employee wellness programs did not provide benefits. However, several noted specific changes they have made with extremely positive results. These include on-site occupational health support, stretching programs, on-site mental health programs, and more.

One specific issue which many forum participants have yet to improve is the 90-day retention rate for new hires. Despite various efforts in talent pipeline outreach, orientation programs, changes to recruiting processes, few have found effective solutions.

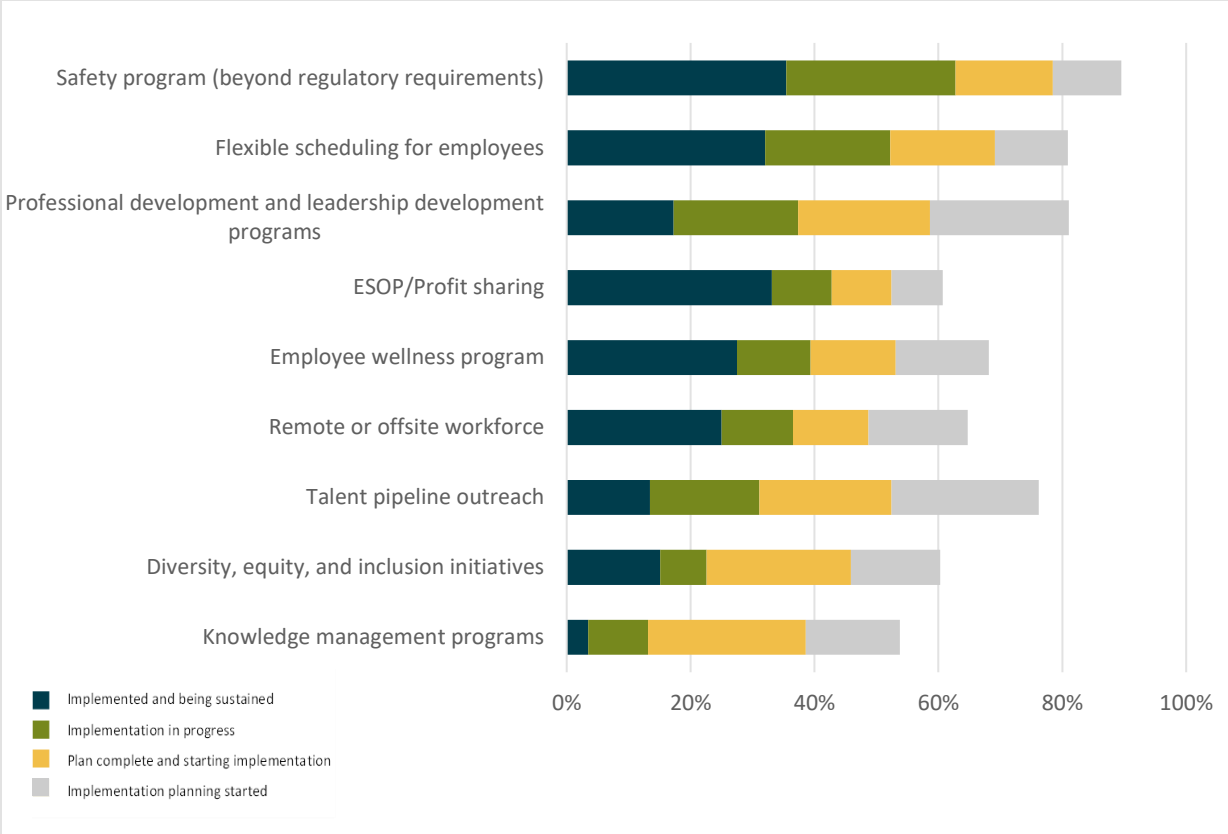


Figure 17: Human Capital implementation among survey respondents.

Management Systems

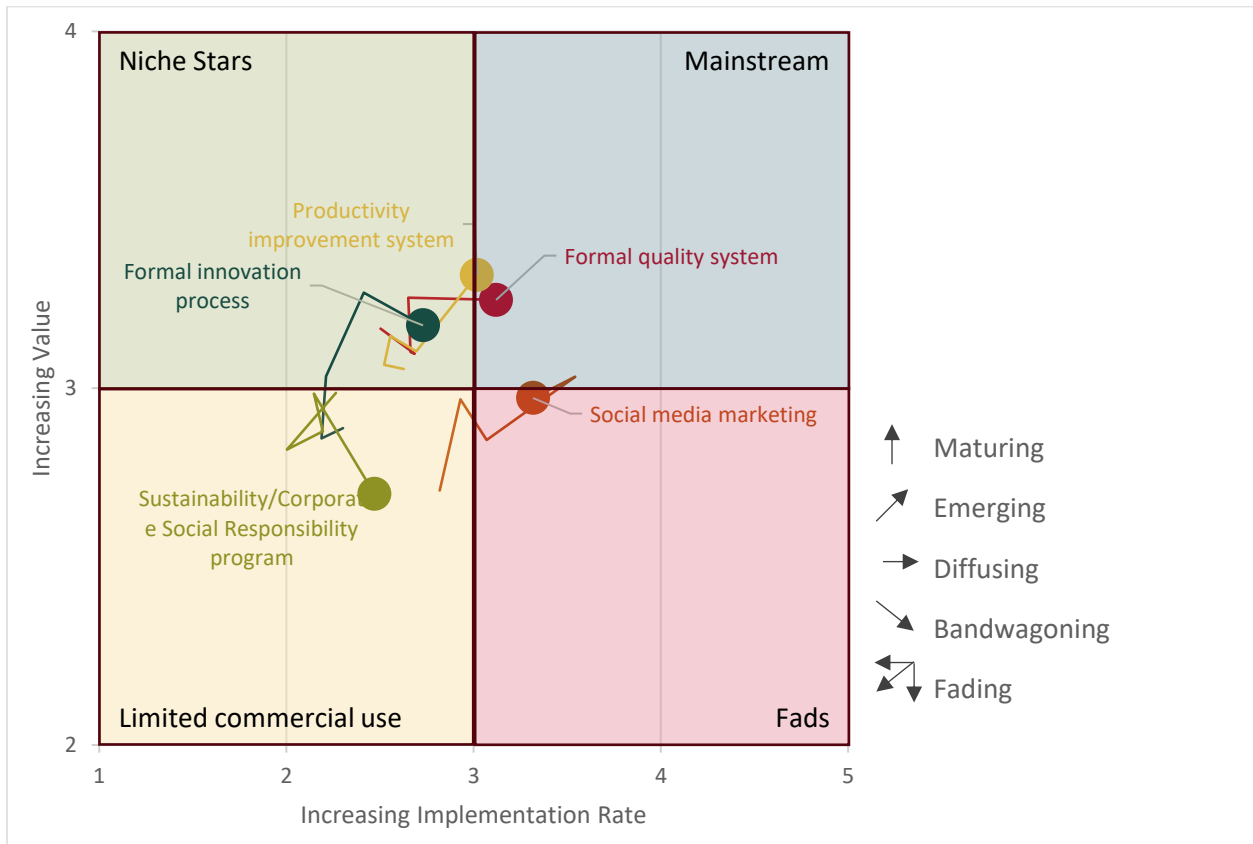


Figure 18: Implementation rates and benefits of human capital programs.

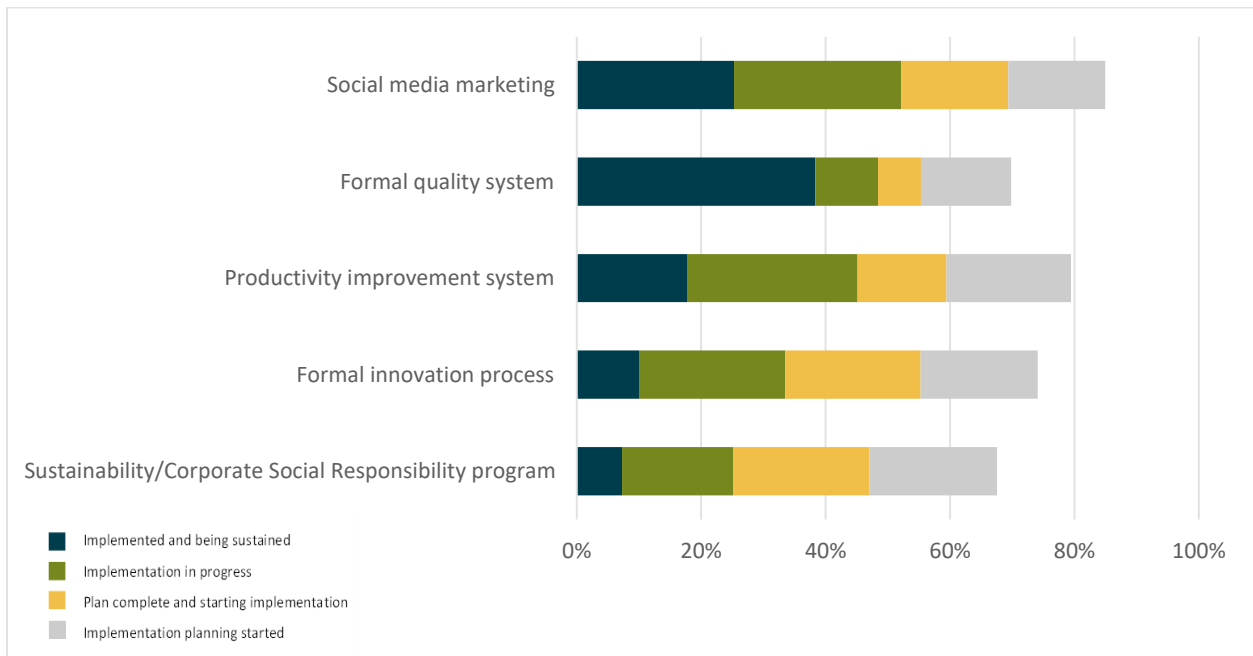


Figure 19: Management systems tools implementation among survey respondents.

Since the past survey, we saw moderate increases in implementation of productivity improvements, quality systems, innovation processes, and sustainability/corporate social responsibility programs.

Productivity improvement systems seem to be re-emerging and grew year over year in value. Forum participants stated that the workforce gaps forced them to rethink productivity programs such as Lean, and that they have produced stronger than expected benefits (see sidebar). Innovation processes and formal quality systems continue to grow and provide value beyond expectations.

Social Media Marketing is still the most-implemented management tool in this survey, and generally meets value expectations. Through forums and other informal discussions, we are seeing a significant increase in digital-centric business. That includes procurements that are started via online inquiry, POs placed through connected systems, and customer service conducted via online systems. Traditional business development activities, such as trade shows, remain relevant, but an increasing amount of business is conducted without an in-person relationship.

Respondents indicate that sustainability and corporate social responsibility programs continue to not meet expectations. While approximately 20% of respondents reported above-expected results, nearly 45% reported outcomes below expectations. Our experience is that sustainability programs are similar to employee wellness programs. When smaller manufacturers attempt a large, business-wide program to meet all potential stakeholder needs, they struggle to create value. However, when businesses listen to customers and their communities about key issues, and how they can adjust to help meet those needs, sustainability programs create value. We believe that the value gap is not a functional deficiency, rather a scoping problem.

Lean: a flexible framework for today's challenges

For too long, Lean has been unfairly confined to a niche or scapegoated for shortcomings, with a prevailing belief that its effectiveness is not universal. The refrain "We've tried that, and it didn't work" is not uncommon. Such experiences with Lean often stem from a misguided emphasis on the tools rather than on people.

Lean is a mindset and management system that requires a commitment to developing and empowering people to solve problems—a principle more relevant now than ever as companies work to regain stability in an ever-changing world. Rather than viewing Lean as a rigid set of practices, it should be seen as a flexible framework adaptable to any setting, and it must begin with a focus on your people and with a commitment to continuous improvement.

Integrating Lean thinking and principles in every aspect of the organization's operations is critical to fostering a culture of continuous improvement and innovation. By embracing the fundamentals of Lean—people development, standard work, making work visible, and problem-solving, companies can unleash their workforce's potential to navigate challenges and drive sustainable growth. Rethinking Lean isn't just about adopting a methodology; it's about cultivating a mindset that prioritizes employee engagement, and collective structured problem-solving.



What Do Companies Really Need?

Based on our 2023-2024 process, CIRAS has identified a handful of core issues that will drive Iowa manufacturing into the future.

NOW Actions to help manufacturers face their most pressing problems.

Need 1: Elevate Human Resources from a tactical to strategic role.

HR professionals, particularly in SMMs, have extremely demanding roles. They often have significant administrative responsibilities including payroll, compliance etc. and are frequently not at the table during strategic discussions on workforce. This will require additional investment in HR talent at businesses, increased professional development opportunities, and refreshed organization structures to elevate workforce success as a strategic imperative.

Need 2: Integrate technology adoption in workforce strategies.

As emerging technologies mature and create value among Iowa manufacturers, we need to transition from viewing technology deployment as a pure financial decision to one integrated with workforce strategies. An integrated view of technology not only ensures return on investment hurdles are met, but that it is deployed to improve the lives and jobs of those working in all areas of a manufacturing business.

Need 3: Build increased connections among manufacturers to share lessons and practices.

Manufacturing practices and technologies are changing rapidly in a time when digital communication is experiencing a “signal to noise ratio” problem where it is difficult for companies to quickly determine the good from the flashy. Increasing direct, personal connections among practitioners and leaders across Iowa to share real-time lessons and implement practical solutions is a key opportunity.

TOMORROW Emerging needs that must be addressed to mitigate risks.

Need 1: Develop, test, and communicate strategies to improve access to technical talent for rural manufacturers.

The success of rural manufacturing will largely be driven by the ability to attract and retain technical talent at all levels of the organization. Too often, manufacturers are relying on remote technical talent to serve their needs. New approaches to attracting and retaining technical talent at or near rural manufacturing communities are needed.

Need 2: Build more curriculum bridges among manufacturers, universities, community colleges, and high schools.

As we continue down the path of Industry 4.0, the core challenge of manufacturing will be to maintain traditional manufacturing knowledge while growing the ability to implement and maintain technology. We need to ensure that instructors at all levels have access to current technologies, techniques, and skills needed to develop the next generation of technical talent across Iowa.

Need 3: Identify new opportunities to leverage technology for increased sales and profit margins.

While emerging technologies serve the immediate purpose of leveraging limited workforce, the capability and flexibility of these technologies create new market opportunities. Recovering profit margins will require a component of innovative product, process, and business model changes. Companies that devise ways to meet more custom needs quickly at moderate costs will create pricing advantages to recover lost margins.

FUTURE Investments to drive competitiveness over the next 3-10 years.

Need 1: Deploy *small tech* – low-cost technologies that can integrate into existing manufacturing systems.

Iowa manufacturers have the foundation in place to take technology leaps. While other states tend to be dominated by mega-factories and very small suppliers, Iowa has a competitive advantage with an outsized number of mid-sized manufacturers. These businesses have the volume to be competitive yet are small enough to remain nimble. Increased hardware and software tools that can be deployed within larger systems (and connect to those systems) can create new competitive advantages for Iowa.

Need 2: Cross-functional and cross-institutional partnerships to identify new ways for businesses, universities, and communities to collaborate on workforce.

The complexity of the long-term workforce challenge, including generational change, population growth in urban areas and population loss in rural areas, and technology change require new ways of developing and maintaining manufacturing skills. Subject matter experts and institutions will need to continue to rethink traditional approaches and create new ways to serve workforce needs through partnerships.