

# 2022 ADVANCED MANUFACTURING OUTLOOK REPORT

How has the  
pandemic affected  
Industry 4.0 adoption?

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## TRENDS *in* MANUFACTURING

86% of Canadian manufacturers say new service offerings are a critical or high priority.



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## MESSAGE FROM SALESFORCE CANADA



More than 10 years ago, an executive coach named Marshall Goldsmith published a best-selling book called *What Got You Here Won't Get You There*. While it was aimed at a broad audience of business professionals, that title is a good way of summing up the overarching

takeaway from this year's Advanced Manufacturing Report.

What got Canadian manufacturers "here" — in the sense of becoming the successful businesses they are today — was a laser focus on operating as productively, efficiently and as lean as possible. Those are all still hugely important attributes as manufacturing continues to evolve.

COVID-19 showed us, however, that manufacturers will need to tackle additional priorities to get "there." Though you might have varying definitions of "there" based on your particular organization, let's say it stands for being prepared to face whatever the future holds.

The first priority is to increase organizational agility. Think about how the pandemic, with little advance warning, forced businesses of every kind to enable the workforce of the future by adopting work-from-anywhere modalities and digital-first experiences for customers. You'll know your business is agile if you're able to not only make critical decisions with speed, but to act just as quickly with minimal disruption to customers and employees.

A lot of manufacturers already realize this means addressing weaknesses along the entire value chain. That's why the second priority is to adopt data-driven business processes to modernize commercial operations. Only by translating data into insights can the industry optimize everything from demand forecasting to opportunity and order management. Digitization of key processes and data analytics will also drive greater supplier and channel partner visibility, boosting their engagement and performance as well.

Fortunately, the cloud-based tools to do all this are already widely available. In fact, Salesforce's own research shows that future-ready manufacturers are 2.2 times more likely to have moved their sales and operations systems to the cloud. They are also 2.5 times more likely to have fully migrated specific business-critical systems, such as financial planning or demand planning systems.

Finally, Canadian manufacturers should reassess key milestones on the customer journey and where they can add value.

This not only includes sales and marketing, but aftermarket services like spare parts, diagnostics, and support. If you agree that being future-ready is ultimately about becoming more resilient, you need to adopt a mindset in which service is a revenue centre, and transform accordingly.

As you'll see in this year's report, more manufacturers than ever before are balancing cybersecurity risks with the opportunities presented by technologies like the Industrial Internet of Things (IIoT). They're beginning to see the investments they need to make, and the skills gaps they need to close.

Salesforce is proud to sponsor this research because it aligns with our commitment to helping Canadian manufacturers move forward with confidence. I encourage you to use the data here as a catalyst for a larger discussion about how you can become future-ready — and get to a place where you have the technology, processes and partnerships in place that make you ready for anything.

**Rory Macleod,**

Area Vice President

**Manufacturing, Automotive and Energy at Salesforce**

[rory.macleod@salesforce.com](mailto:rory.macleod@salesforce.com)

## MESSAGE FROM SYSPRO



Over the past few years, the industry was left vulnerable due to the reliance on manual, legacy and disparate business systems. This year's Advanced Manufacturing Outlook report echoes this as it states that 66% of Canadian manufacturers still use spreadsheets like Excel as their number

one way to collect data. The pandemic also exhibited the importance of an integrated supply chain so that suppliers and customers can engage in real-time. To remain connected to the supply chain, manufacturers and distributors have recognized that digital transformation will be instrumental in engineering a bounce-back.

I have no doubt that the disruption caused by the pandemic is actually an opportunity for manufacturers to transform the way they do business. We've seen many forward-thinking organizations come to us after they realize that business-as-usual is not good enough. They are now exploring the viability of Industry 4.0 to improve their processes and future-proof their businesses.

The concept of Industry 4.0 is nothing new and, while there is a renewed interest in this shift, the pace of adoption could definitely be better. 86% of the survey's respondents felt that Industry 4.0 is a great concept but challenging to implement. Despite this hesitation, manufacturers that fully embrace digital transformation will prevail over their competition.

We've seen that some businesses have begun the process by implementing emerging technologies and techniques such as robotics and 3D printing to create an Advanced Manufacturing eco-system. Here the aim is to improve the manufacturing of products. To take your supply chain to the next level, data collection and analysis is key. Assimilating this data and gathering meaningful insights to make critical business decisions can really help manufacturers run an efficient business and therefore, become more profitable. Here is where the Smart Factory comes into play.

A Smart Factory involves an interconnected network of machines, communication mechanisms, computing power and systems that uses advanced technologies such as artificial intelligence (AI) and machine learning (ML) to analyze data, drive automated processes and learn as it goes. With access to real-time data for real-time decision making, manufacturers and distributors can experience significant operational benefits

through the digital transformation process, which include visibility into performance across the supply chain, flexible production and of course end-to-end integration with suppliers and customers. For example, Arjo, a SYSPRO customer, saved over 95% of work hours by automating their inventory management process.

Enterprise Resource Planning (ERP) is at the heart of the Smart Factory. In the past, the system was simply about data entry and output. These systems were more rigid. With the introduction of connected services and APIs, systems are now far more integrated, using the cloud as the vehicle for this inter-connectedness and orchestration. As a result, businesses can analyze data in real-time to improve workflow, decrease response time, and save money.

The good news is that Digital Transformation doesn't have to be an all or nothing investment. To start, businesses should decide on what processes are most critical and take a phased approach to fully transform operations. As a trusted advisor, SYSPRO can assist you in making those decisions.

Specializing in the manufacturing and distribution sectors, SYSPRO Enterprise Resource Planning software provides the solutions, processes, and tools to assist manufacturers and distributors to manage data and gain key business insights. SYSPRO's strength lies in our focus on making things possible through our specialist, industry-built approach to technology that can be deployed on-premise, in the cloud, and accessed from a mobile device.

While the journey towards Industry 4.0 may be inevitable, the good news is that there are solutions available that focus on achieving your key business objectives and turning your big ideas into reality.

As a global organization, SYSPRO keeps pace with changing industry needs across multiple vertical sectors including industrial machinery & equipment, fabricated metals, electronics, food & beverages, plastics & rubber, packaging, automotive parts & accessories and medical devices. Talk to us about how we can guide you along your digital transformation journey. Learn more about SYSPRO's solutions for manufacturers at [syspro.com](https://syspro.com).

**Brian Rainboth,**  
CEO  
**SYSPRO Canada**

# EXECUTIVE SUMMARY

The COVID-19 pandemic has changed Canadian manufacturing forever, and as manufacturers continue to recover in the face of a virus that has ravaged the economy, they are exploring new ways to innovate, bounce back and succeed.

Supply chain crunches, market uncertainty, new regulations and security concerns are forcing manufacturers to alter their businesses in an effort to survive and grow through the ongoing pandemic.

Our 2022 Advanced Manufacturing Outlook survey found that manufacturers are still investing in and adopting advanced technologies to optimize processes, improve operations, and create new products for the marketplace. The survey measured Advanced Manufacturing (also known as IIoT and Industry 4.0) engagement among 208 manufacturing business owners, leaders and senior executives.

For a third consecutive year, the research was headed by R.K. Insights in Toronto and conducted throughout the months of June and July for Canadian Manufacturing and PLANT magazines, in partnership with our sponsors: Salesforce, SYSPRO, Alberta Innovates and Alps Welding Ltd. The margin of error +/- 6%, 19 times out of 20.

As part of our survey, Advanced Manufacturing is defined as manufacturers focusing on automation, interconnectivity, machine learning and the analysis of real time data that involved the Industrial Internet of Things (IIoT), the cloud, advanced computing and artificial intelligence.

This year's survey examined how integrated these technologies are, and how widespread they've become in terms of adoption. The trends continue to be positive and growing, especially in certain areas. The growth and challenges were clearly affected by the ongoing COVID-19 pandemic, but more companies are applying IIoT technologies or evaluating their utility in their organizations. Technology investments have been affected by the ongoing pandemic, in some cases hastening adoption of Advanced Manufacturing-enabled solutions, and in some cases slowing them down as organizations hold onto capital due to market uncertainty, with 32% of respondents saying there's been no change in the amount of intended spend, compared to 50% last year. The key challenges remain a lack of skills and talent and a supply chain ravaged by the global pandemic, affecting manufacturing across all its key sectors. Other hurdles include an increased concern for cybersecurity in the face of increased ransomware attacks and difficulties integrating advanced technology into legacy systems.

Only 17% cited costs as the main reason for not investing in technology, compared to 23% last year, when it was the top reason for not investing. 89% of respondents see IIoT as a growth opportunity, with the C-suite supporting Industry 4.0 increasing to 85% from last

year's 75%.

However, there are a few troubling trends in the face of the pandemic. Manufacturers believe that the increase in digitalization brings risks, with 78% believing that investing in new technologies will raise the company's cybersecurity risk. That said, 62% of companies now know where to find government programs to help with technology investments, up from 42% last year.

9% of respondents now report that their operations are "primarily machine driven", while only 6% now say "there are no automation systems in place", the rest identifying with varying levels of automation.

Many more companies have been affected by the pandemic and have an adjusted planned spend on IIoT investments, with 39% saying their planned spend has decreased and 29% saying there's been an increase. In the next three to five years, manufacturers plan to spend on robotics/automation (60%), data capturing at machine/shopfloor (50%), IIoT/M2M (44%), cloud computing (41%) and additive manufacturing/3D printing (39%). The intended amount to spend on these technologies over the next three years hasn't changed from last year, with the average remaining \$1.4 million.

The most significant benefits seen by manufacturers has changed somewhat. The top cited benefits manufacturers have seen are increased throughput (37%), increased quality of product (33%), reduced staff requirements (28%), and reducing downtime (27%) (last year, this was the top cited benefit).

The number of manufacturers not convinced of the economic benefits of a technology investment has continued to drop (14%) compared to last year (19%), with funding challenges (45%) being cited as the top reason for not implementing new technologies. Last year, the top cited reason for not implementing new technologies was organizational resistance to change (41%), which has now fallen to fourth on the list of reasons for not implementing.

Regarding security, manufacturers have an increased level of concern with relation to their company, with 79% rating themselves as highly concerned, versus 21% not concerned. Significantly, most manufacturers have experienced a cyber-attack at their company (83%), which is a large increase compared to last year (68%). Despite this, 93% of manufacturers believe they've done enough to protect their business from cyber-attacks.

Manufacturers cited falling behind their competition (69%), pricing pressures as a result of automation (50%), and customer losses (33%), as their biggest concerns if they do not invest in Industry 4.0 tools.

**Sadi Muktadir,**

Editor,

**Canadian Manufacturing** magazine







# INTERESTING TIMES CALL FOR INTERESTING SOLUTIONS

2021's story of innovation

By Sadi Muktadir Editor,  
**Canadian Manufacturing** magazine

The Canadian manufacturing industry continues to battle through another tough year. The pandemic's pressures continue to regulate the global economy and influence recovery efforts. The lockdowns, uncertainty and regulations did not spare the manufacturing industry and have instead inspired innovative solutions and resiliency.

Manufacturers are now operating smoothly around the regulations of COVID-19. Many businesses have opted for vaccine mandates, work-from-home flexibility, socially distanced workspaces and rapid testing infrastructure in an effort to successfully create the new manufacturing standard. Plant managers continue to come up with creative ways to continue business uninterrupted and lead the charge into a post-pandemic climate.

However, the future remains unclear, as the virus evolves and governments react. The pressure continues to pile on businesses across all sectors to maintain day-to-day operations unhindered. Supply chain constraints, market uncertainty and trade difficulties still affect manufacturers in novel ways.

These novel ways are increasingly resulting in innovative responses from manufacturers, who are turning to advanced manufacturing technologies to provide solutions. These technologies include tools such as the industrial internet of things (IIoT), automation, AI, robotics and data visualization and storage software to help business owners navigate the pandemic's challenges.

IMAGE © BY WRIGHTSTUDIO / ADOBE STOCK

“There’s a lot suggesting that manufacturers are seeing adopting digital technologies as important to their business and what’s more important is having those manufacturers ask the right questions around how they’re going to achieve their goals around what they invested in.”



– Jayson Myers, NGen

The 2022 Advanced Manufacturing Outlook survey dove into how the application of these tools in the industry, including how they were being applied and to what effect. It will come as a surprise to few manufacturing leaders that when forced to find a way to run a plant with limited staff or completely remotely, they found a way, often through investments in new technologies.

We at **Canadian Manufacturing** and **PLANT** magazines deployed our survey over the summer of 2021, and it was our third instance examining how integrated advanced technologies were in the industry. The results found a number of emerging trends, some very surprising and some others that many leaders saw coming. Most telling however, was that the industry still has some way to go before the transition to the smart factory is fully complete.

We polled 208 manufacturing business owners and senior executives to measure their engagement with automation, digitalization and other aspects of Industry 4.0. We asked what technologies they were investing in, how those technologies are being used, how they are capturing and utilizing data and how their business and investment in technology was affected by the pandemic. We also asked them about challenges regarding adoption, and the growing concern around security.

RK Insights conducted the survey, in partnership with our premier sponsors Salesforce and SYSPRO and supporting sponsors Alberta Innovates and Alps Welding Ltd.

## WHO TOOK OUR SURVEY?

Our survey participants were made up of manufacturers from all across Canada, but overwhelmingly based in Ontario (49%), while Western Canada comprised of (18%). Atlantic Canada polled (12%), Quebec (8%), and the Prairies (7%). Most of the companies surveyed

were small, with 39% employing less than 50 people. Of the remaining 61% that employ over 50 people, 31% employ 50 to 249 employees, 15% have 250 to 499 employees, 7% have 500 to 999 employees, and 5% have 1,000 to 4,999 employees. 3% of those polled had 5,000 or more employees at their organization. Most of the manufacturers polled (64%) had over \$10 million in domestic revenue, but of the 36% making less than \$10 million, 20% are making less than \$5 million.

Survey participants had an overwhelmingly positive view of advanced technologies and IIoT in manufacturing, with 89% seeing IIoT as a business growth opportunity, 86% believing that emerging technologies allow small companies to compete globally and 83% believing that technology enables them to keep up with evolving customer expectations. Significantly, 85% mentioned that upper management at their company support Industry 4.0, up 10% from the year prior, illustrating an increased level of buy-in from decision makers. Increasingly, 82% are at least somewhat concerned for the future of businesses that do not invest in Industry 4.0. This is a large jump from last year’s survey when 63% of respondents expressed some level of concern for businesses not exploring new technologies.

That said, 86% of respondents still believe that while Industry 4.0 is a great concept, it is challenging to implement. 78% believe that investing in new technology actually raises the company’s cybersecurity risk. 68% feel that machinery replacement is a massive investment that will cause unaffordable downtime, and only 62% reported having a plan or roadmap to implement Industry 4.0 technologies.

Amidst these challenges, manufacturers are moving forward with new technologies, with 29% planning to increase their spending since the pandemic, up from last year’s pandemic-hesitant 15%. 32% indicated no change in their intended spend, a drop from last year’s 50%, suggesting some movement in a COVID-19 climate, while 39% have elected for a decrease in spending, choosing to focus their capital investments in other areas of the business. 69% of manufacturers reported that the pandemic has accelerated their digital transformation plans, with 46% reporting that it’s been accelerated by 1-4 years. One interesting finding is that when asked how prepared their company was for the pandemic, those already applying IIoT solutions made up 83% of the respondents who stated their organization was prepared and only 17% of this same group reported that they were not really prepared for the pandemic. Overall, those planning to invest over the next three years will spend an average of \$1.4 million, unchanged from last year’s amount.

23% of respondents identified with currently applying IIoT capabilities, defined in our survey as interconnected sensors, instruments and other devices networked together with computers’ industrial applications, including, but not limited to manufacturing and energy management. An increased 20% plan to invest in these technologies over the next 12 months, up a significant amount from two years prior, when 8% reported having a plan.



# DEMOGRAPHICS

## RESPONDENT PROFILE

Those who participated in the survey were overwhelmingly male (89%), senior manufacturing executives and managers (average age 52.9 years) who for the most part have a management only role in their companies (46%). Owners comprise 21% of the sample, 7% have a minority ownership stake and 14% are in an equal partnership. Most companies (63%) have revenues greater than \$10 million. Thirty nine per cent have fewer than 50 employees, but the average number of employees overall is 514.

## NUMBER OF EMPLOYEES

169 replies

Less than 50	<b>39%</b>
50 – 249	<b>31%</b>
250 – 499	<b>15%</b>
500 – 999	<b>7%</b>
1,000 – 4,999	<b>5%</b>
5,000 or more	<b>3%</b>

## INDUSTRY SECTORS – 174 replies

Industry	%
Metal, Fabricated Metal Products and Primary metal	<b>25%</b>
Miscellaneous manufacturing	<b>20%</b>
Computer and electronic product	<b>15%</b>
Food manufacturing, beverage and tobacco product	<b>14%</b>
Machinery	<b>13%</b>
Electrical equipment, appliance and component	<b>13%</b>
Motor vehicle, motor vehicle parts	<b>12%</b>
Plastics and rubber products	<b>7%</b>
Aerospace product and parts	<b>7%</b>
Chemical	<b>6%</b>
Clothing manufacturing	<b>5%</b>
Paper manufacturing	<b>4%</b>
Durable goods industries	<b>4%</b>
Life Sciences	<b>3%</b>
Environmental	<b>3%</b>
Printing and related support activities	<b>3%</b>
Ship and boat building	<b>2%</b>

## LOCATION

172 replies



Yukon / NWT / Nunavut  
**<1%**



British Columbia  
**10%**



Alberta  
**8%**



Saskatchewan  
**5%**



Manitoba  
**2%**



Ontario  
**49%**



Quebec  
**8%**



New Brunswick  
**3%**



Nova Scotia  
**3%**



Newfoundland & Labrador  
**1%**

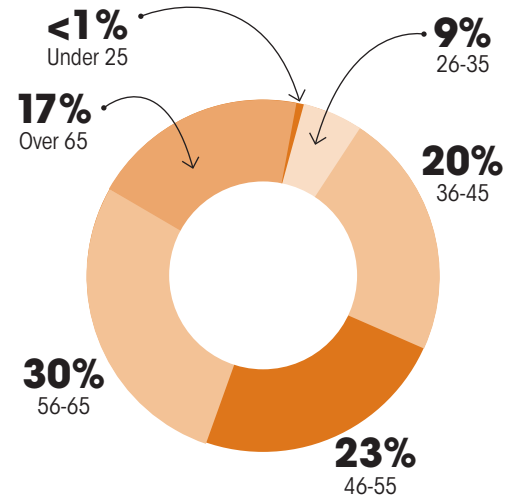


PEI  
**5%**

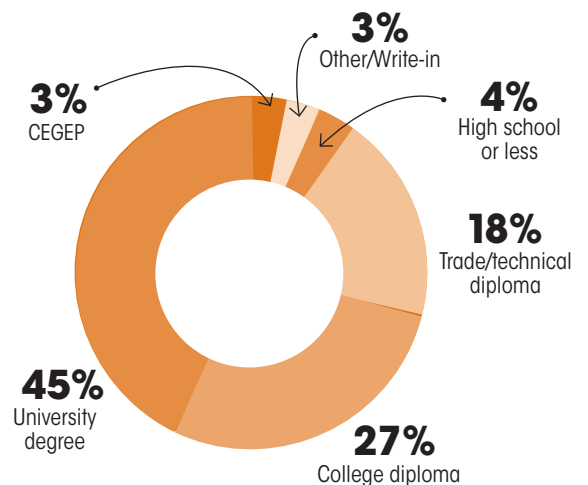
## COMPANY REVENUE – 162 replies

\$1M to <\$5M	<b>20%</b>
\$5M to <\$10M	<b>16%</b>
\$10M to <\$30M	<b>28%</b>
\$30M to <\$50M	<b>12%</b>
\$50M to <\$100M	<b>5%</b>
\$100M to <\$250M	<b>4%</b>
\$250M to <\$500M	<b>4%</b>
\$500M to <\$1B	<b>6%</b>
\$1B plus	<b>5%</b>

## AGE – 183 replies



## EDUCATION – 184 replies





“

*"I look at any implementation and the primary driver is to improve the throughput and in doing so, you'll see those secondary benefits like reduced staff and creating new revenue streams. I look at throughput as the primary reason for driving ROI in a technological investment."*

*– Steve Loftus, Innovative Automation*



## SMART FACTORY, SMART BUSINESS

To help us dive into the results of our Advanced Manufacturing Outlook survey, we gathered 13 industry experts and senior leaders at a virtual roundtable held on August 11. They discussed the implementation of Industry 4.0 and where Canadian manufacturers are in its journey, including the key difficulties and findings, as well as what the future bodes for the industry.

Peter Coffee, VP for Strategic Research at Salesforce kicked things off by addressing why he felt 23% of respondents that were currently applying IIoT capabilities, was lower than last year's 30% of survey respondents applying IIoT.

"The graver the situation, the more likely it is for you to say, 'Well we better stick to what we know'. And because of the uncertainty caused by the pandemic, it may have reduced people's appetite for innovation."

With that in mind, people unfamiliar with the concept of IIoT as it relates to manufacturing has gone down, showing a positive trend that Peter Coffee was clear to point out as well.

"The hype level around this has gone up and the people who feel they're familiar with IIoT because of business publications or news has made them understand it on some level."



# DEMOGRAPHICS (continued)

## TITLE – 171 replies

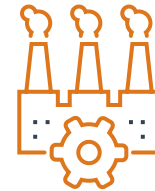
Administrative Management	<b>23%</b>
Owner / Partner	<b>21%</b>
CEO / President	<b>15%</b>
Maintenance Manager	<b>13%</b>
Director	<b>12%</b>
Vice-president	<b>11%</b>
Plant Engineering	<b>9%</b>
Technician / Technologist	<b>9%</b>
Design Engineering	<b>6%</b>

Plant Manager	<b>6%</b>
Production / Operations Manager	<b>6%</b>
Quality Assurance Manager	<b>6%</b>
Materials Manager	<b>6%</b>
Purchasing / Supply Manager	<b>5%</b>
IT / Systems Manager	<b>3%</b>
Safety Manager	<b>1%</b>
Logistics Manager	<b>1%</b>

# ORGANIZATION

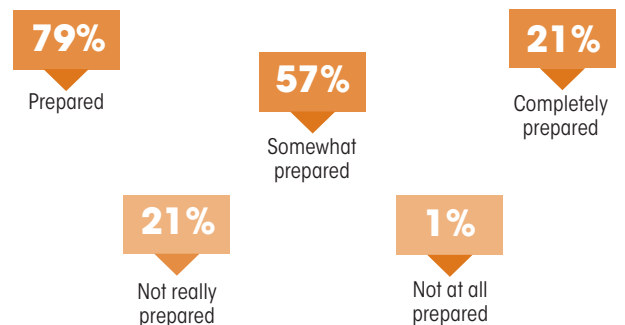
## CHALLENGES IMPLEMENTING TECHNOLOGY – 103 replies

- 45%** ▶ Funding challenges
- 45%** ▶ Lack of skilled talent
- 39%** ▶ Integrating with legacy technology
- 33%** ▶ Pressure to deliver short-term results
- 33%** ▶ Resistance to change
- 32%** ▶ Too many technology choices and unsure where to start
- 26%** ▶ Difficulty keeping pace with the rapid pace of change
- 19%** ▶ Not sure how to access available resources
- 17%** ▶ Lack of leadership vision
- 14%** ▶ Fear of failure



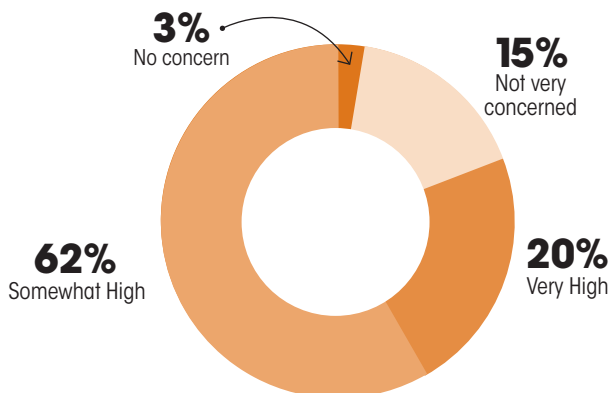
## HOW PREPARED WAS YOUR ORGANIZATION TO DEAL WITH THE PANDEMIC IN TERMS OF YOUR TECH CAPACITIES?

Total Those familiar with IIoT n=117



## CONCERN ABOUT BUSINESSES NOT INVESTING IN INDUSTRY 4.0

100 replies



Steve Loftus, President of Innovative Automation, a Barrie, Ont.-based automation solutions provider, also mentioned that the 23% of manufacturers applying IIoT may indicate a trend or Industry 4.0 happening in waves, as opposed to a steady crescendo.

"I looked at this as people implementing IIoT projects and then maybe reassessing other projects because an IIoT investment is not the only chore, right? They're taking a step back, re-evaluating the process and then at a later date following it up. Their projects will probably move them into these different categories because I would hazard to say this is more of a wave application as opposed to a constant application of Industry 4.0."

Rory Macleod, Area VP of Sales at Salesforce, added on to this, suggesting that upgrades are happening in manufacturing businesses outside of just IIoT investments.

"When I'm talking to customers, especially as it relates to the pandemic, they're re-evaluating where they're investing. I think there's been a shift from implementing internal IIoT upgrades and towards keeping customers connected, asking 'How do we change our services to support our customer base?'"

JP Giroux, President of EMC (Excellence in Manufacturing Consortium), an organization that contributes knowledge, expertise

**“All the companies that used to have an ironclad rule of ‘thou shalt not do personal business on your company machine’, have now switched to an environment where that’s the only way capable of doing business.”**



**– Peter Coffee, Salesforce**

## INVESTMENT

AVERAGE  
SPEND  
OVER 3  
YEARS

**\$1.4 MILLION**  
(\$1.4 million in 2021)

TECHNOLOGY PRIORITIES OVER NEXT 3-5 YEARS	2022	2021
Robotics, automation	60%	49%
Data capturing	50%	46%
IIoT	44%	41%
Cloud	41%	42%
3D printing, additive manufacturing	39%	38%
Advanced analytics	36%	41%
ERP	34%	-
Artificial intelligence	32%	34%
Virtual reality	24%	28%

107 replies

### HOW IS YOUR COMPANY APPLYING IIOT

208 replies

- 35%** ➤ Improving efficiency/productivity
- 24%** ➤ Tracking materials, shop floor assets
- 22%** ➤ Providing more visibility into production
- 22%** ➤ Tying in business data from top to bottom
- 21%** ➤ Improving maintenance functions
- 20%** ➤ Developing smart products
- 17%** ➤ Analytics functionality
- 16%** ➤ Developing new services
- 13%** ➤ Consolidating control rooms





and resources to over 13,000-member manufacturers across Canada, reminded panelists of 2020's effect on manufacturing.

"We have to remember last year at this time of year, it was total chaos and we were monitoring the pulse of manufacturing in terms of priorities and they were focused on survival. Especially the small and medium-sized businesses."

Steve Bassaw, Product Manager at SYSPRO, an ERP company involved in digital transformation, responded with an optimistic outlook based on his work with manufacturers throughout the pandemic.

"I suspect that next year that 23% will jump up quite high, because a lot of companies that were in survival mode kind of settled down and got used to post-pandemic operations. They've acquired an agility that will help them grow even beyond IIoT."

## Tactics vs. Strategy

Stewart Cramer is the Chief Manufacturing Officer at Next Generation Manufacturing Canada (NGen) in Hamilton, Ont., the not-for-profit corporation managing Canada's Advanced Manufacturing Supercluster. As the organization's Chief Manufacturing Officer, he is a part of researching and finding organizations to give over \$500

million of federal money over the next two years that will help fund collaborative, industry-led advanced manufacturing projects.

Cramer brought up an interesting point about the distinction between Tactical Internet of Things and Strategic Internet of Things, and how it relates to the Canadian manufacturing industry during the pandemic.

"Last year was a very tactical response due to an urgency to survive and IIoT implementations may reflect that. Now, we may see companies come through to look ahead and make plans for more strategic IIoT investments. From looking at the survey findings one of things that came through to me is a deeper understanding of what IIoT is, so we may see some movement as manufacturers get into strategic planning."

Dennis Dussin, President of Alps Welding Ltd. a Woodbridge, Ont.-based metal fabricator and pressure vessel manufacturer, added onto this sentiment about Strategic Internet of Things.

"What is really striking in the survey numbers is that there's a stark change in the number of companies that have a plan and intend to invest over the next 12 months. Over the last couple of years, it's gone from 8% to 20%. Most SMEs are using IIoT tactically because of the pandemic. But certainly, now over the last year and a half

*Continued on page 17*

### GREATEST THREAT IF NOT INVESTING

101 replies

Falling behind the competition	<b>69%</b>
Pricing pressure as a result of commoditization or automation	<b>50%</b>
Low margins	<b>33%</b>
Customer losses	<b>33%</b>
Disruption by industry outsiders	<b>33%</b>
Other	<b>6%</b>

INVESTING PRIORITY OVER THE PAST 12 MONTHS	%	AVERAGE
Cloud	86%	\$71,500
Data capturing/shopfloor	83%	\$68,800
Robotics, automation	81%	\$89,900
ERP	81%	\$87,400
IIoT/M2M	80%	\$63,400
Advanced analytics	79%	\$58,100
3D printing, additive manufacturing	70%	\$55,600
Artificial intelligence	65%	\$48,000
Virtual reality	60%	\$50,800

101 replies

### HOW PREPARED WAS YOUR COMPANY TO DEAL WITH THE PANDEMIC?

117 replies

### PANDEMIC IMPACT – 105 replies

CHANGE IN INVESTMENT LEVEL		TIMEFRAME	
Decrease	39%	Longer	44%
No change	32%	No change	42%
Increase	29%	Brought forward	14%

		CURRENTLY APPLYING IIOT	EVALUATING IIOT
Prepared	<b>79%</b>	<b>83%</b>	<b>65%</b>
Not really prepared	<b>21%</b>	<b>17%</b>	<b>35%</b>
Not at all prepared	<b>1%</b>	<b>0%</b>	<b>0%</b>



## RECRUITING

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# Manufacturers beware: **THE AGE OF CYBERCRIME** is upon us

The pandemic brought an increased level of digitalization across all industries and sectors, with many businesses opting for a transformation so they could transition to a work-from-home, touchless environment and pivot to providing new products and services. This meant, of course, new technologies, often in the form

of IIoT-enabled solutions, connecting production facilities and operations without causing downtime.

As a result of this transformation, the 2022 Manufacturing Outlook Survey found that 83% of manufacturers have experienced some type of cyberbreach or attack. This is a significant jump from



2021's survey, which found 68% had experienced and reported an attack.

Peter Coffee, Vice President for Strategic Research at Salesforce suggests that the number might actually be much higher.

"There are companies who have experienced a breach, and companies that don't know they've experienced a breach," he said.

During the roundtable's discussion on cybersecurity in light of Industry 4.0 adoption amidst the pandemic, manufacturers are cognizant of the breaches that are plaguing all industries.

"What we've learned first-hand from manufacturers is that this is becoming more of an issue at the C-level from an exposure liability point of view. As cyber incursions are getting more and more comprehensive it's harder to protect yourself and companies are having to pay more attention," said Scott McNeil-Smith, VP of Manufacturing Sector Performance at EMC.

An interesting finding from the survey was that 78% of executives believe that an investment into technology opens up their cybersecurity risk, as opposed to protecting them from it.

"I find it interesting that there's a perception that investing in newer technologies basically increases cyber-security risk, as opposed to reducing it, which is the reality," said Rory Macleod, Area VP of Sales at Salesforce.

Regardless of the level of investment, the executives understood that their businesses were open to a breach.

53% of manufacturers undertook a cybersecurity review during the pandemic, recognizing that with the shift to work-from-home environments and new software, the chances of a phishing scam happening were high. The roundtable participants still felt that this number may not have been high enough.

"These numbers paint a picture of a little bit of complacency for me and some serious vulnerability. Especially with 20% of respondents saying they're not concerned about cyber-attacks. I think 100% of respondents should be somewhat concerned about cyber-attacks," said Dennis Dussin, President of Alps Welding Ltd.

The survey data seems to support this view; that attacks are on the rise, and also demonstrates a growing variety of attacks. 55% of attacks were phishing attacks. 28% were targeted external cyber-attacks, up 14% from the year prior. 23% were faulty data encryption or compromised financial information, up 9% from the year prior, and 19% were breaches from a third-party vendor.

Despite the findings revealing that attacks are on the rise, 93% of respondents to the survey felt that they have done enough to protect their businesses from cyber-attacks.

"There's always more precautions you can take. But cyber-attacks are increasing and I know a lot of SMEs are unprepared for them and don't have the security infrastructure in place. I think the number of breached manufacturers is going to grow as they're exposed and attacked," said Dussin.

The sentiment seemed to be that manufacturers were underestimating the risk of ransomware and phishing attacks.

Only 35% of those who had taken some measures to protect from cyber-attacks had a prepared cyber breach response plan, indicating

that most of their measures were intended to prevent attacks prior to when they occurred, as opposed to after the fact.

"It's a little scary right? What happens if there's a breach, do they have a recover or resilience plan? What does their business continuity plan around that look like?" asked Macleod.

Participants also mentioned that gone are the days of when an SME could get by because they weren't the likely target of any attacks, with most breaches trying to compromise the data of larger companies.

"A few years ago, when I used to talk to my colleagues running small businesses, they would say 'Who's going to attack me, I'm a small business without anything valuable.' People have realized that these attacks are indiscriminate and often not even targeted, but instead automated and malicious software that's looking for any vulnerable system. And when you read it that way, small businesses are more vulnerable than large businesses," said Dennis Dussin.

The new work-from-home environment has introduced some risk, especially when working with infrastructure and legacy applications that are more susceptible to malware due to a lack of updates.

"All the companies that used to have an ironclad rule 'thou shalt not do personal business on your company machine', have now switched to an environment where that's the only way capable of doing business," said Peter Coffee.

The roundtable participants made sure to emphasize the understanding of just how much a security system would cost already cash-strapped manufacturers amidst the pandemic.

"CEOs and business owners have spent so much time dealing with IoT-connectivity for employees that they've become complacent on the security spend. The spend isn't there until there's an actual attack because we're dealing with people on a budget and with constraints," said Steve Loftus, President of Innovative Automation.

The consensus seemed to be that it's a tricky scenario to manage the responsibilities of implementing a strong cybersecurity strategy versus the actual risk of an attack.

"More can always be done to protect your business, but it does







IMAGE © BY KNOWHOWFOOTAGE/ADDBESTOCK

have to be balanced with what the cost of the impact is, versus putting your dollars into customer-facing systems or production systems,” concluded Rory Macleod.

Manufacturers are juggling the pressures of the pandemic, fighting through strained supply chains and an increase in ransomware

attacks while applying advanced technologies, and beginning to realize that their security budgets may need a little more financial support.

The pandemic’s juggling act continues, with manufacturers ascertaining which ball dropping will hurt them the least.

# ONE STEP AHEAD OF THE NEXT BIG THING

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they're and seeing how far they can go if they pivot their business with IIoT or use it strategically to revamp their business model."

The roundtable discussion seemed to point towards a more strategic and intentional approach to applying Industry 4.0 tools outside of a tactical need for it in order for the business to survive.

## Under every nook and cranny

The discussion moved towards how the companies were applying IIoT at their businesses and how much the applications had changed and stayed the same over the last survey fielding.

The top uses of IIoT were in improving efficiency/productivity (35%), tracking materials/shop floor assets (24%), providing more visibility into production processes (22%), tying in business data from shop floor to top floor (22%), improving maintenance functions (21%), developing smart products (20%), analytics functionality (17%), and developing new revenue streams (16%).

"The number that surprised me and I thought was most intriguing was analytics functionality, because I believe that's probably an unintended benefit. You don't see it being targeted by anyone who hasn't implemented IIoT upgrades and companies that were having the most success and are maybe starting to understand the power of running their business based on analytics," said Stewart Cramer, in reference to the 45% of respondents currently applying IIoT using analytics functionalities to improve their business.

Peng-Sang Cau, VP of ATS Automation, a Cambridge, Ont.-based automation system manufacturer, illustrated an important point about why there were a variety of uses by manufacturers.

"When you're buying a piece of equipment or a new technology, you want to ensure that it has all of the analytic capabilities to use information and data to make real-time decisions so these numbers don't really surprise me," she said.

For her, it seems clear that manufacturers would try and use their IIoT upgrades in as many ways as possible in order to improve their efficiency, provide visibility and improve maintenance functions.

Meanwhile, Scott McNeil-Smith provided an interesting theory as to why efficiency and productivity remain at the top and the breakdown of IIoT uses remains similar to years prior, linking the ability to apply analytics functionalities, developing smart products and new revenue streams to a talent shortage.

"The SMEs in our group that have implemented some analytical capabilities are metering and measuring data from their equipment, but they don't have the human resources necessary to analyze what data is important, so they haven't gone that extra step in highlighting what's important to them in their business plan. They just don't have the resources to go through and review all of the data points," he said.

He provided a distinct example from his work with a company within their consortium.

"We know a company that's talking about pulling 2000-3000 points of data per day and their employees maybe have an

**“I think a lot of times we look at investments in technology as kind of independent, examining what the ROI is in purchasing some software. But we really have to look at them as an integrated plan to improve an operation and it's about taking a look at the processes and the people we have in place.”**



**– Dennis Dussin, Alps Welding**

opportunity to review 100 of them. They're looking at the next step instead because of that, and using AI and automation to kind of streamline some of the analysis."

Dennis Dussin added onto this.

"I think a lot of times we look at investments in technology as kind of independent, examining what the ROI is in purchasing some software. But we really have to look at them as an integrated plan to improve an operation and it's about taking a look at the processes and the people we have in place. A lot of it has to do with not having laid the groundwork, or not having the right advisors to see other kinds of benefits."

Jayson Myers, CEO of NGEN, also posited salient points regarding the goals of manufacturers in applying IIoT upgrades.

"The survey question doesn't talk about if manufacturers have been successful in achieving their objectives, so there seems to me to be a huge gap between intention and results. And I think this goes to some of the previous comments about integrating technology into a process that will achieve your business results at the end of the day. Maybe this is part of why companies are experiencing challenges implementing technologies. It probably doesn't have to do with the technology, but more with the management process in place to drive an intentional business objective."

The discussion moved towards other key benefits of IIoT upgrades and how it was beginning to open up new revenue streams and products and Steve Bassaw mentioned a key statistic he found relevant.

"I thought it was really interesting that among those who were applying IIoT, developing new services and revenue streams was the reported the least with 16% of companies doing so, but of those who have a plan to apply IIoT in the future, it is the highest reason why they're reportedly applying IIoT."



66

*"Addressing staffing is a big requirement for any sort of investment, particularly with IIoT. Whatever technology you're investing in, you're hoping it gives your staff the ability to do more with less."*

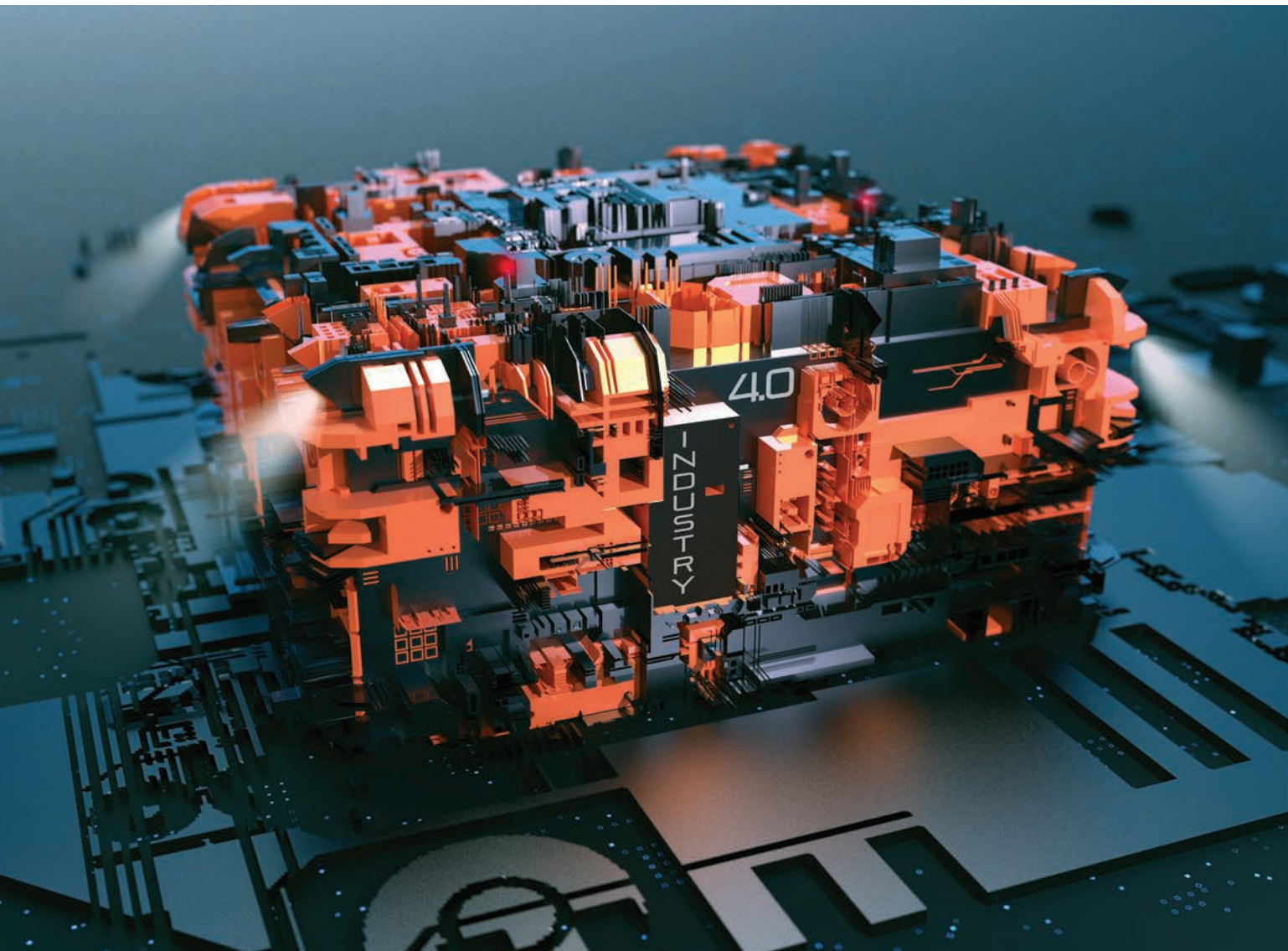


*– Peng-Sang Cau, ATS Automation*

This number and Steve's comment suggests that as a result of the pandemic, more manufacturers are turning to IIoT to help them enable and develop new services and revenue streams and are specifically evaluating Industry 4.0 tools that can help them do so.

The pandemic has forced many manufacturers to consider new business models, products and services to survive and grow, evaluating how their production lines can be used to create much-needed value in the marketplace. Steve went on to explain one such example in his work with clients.

"We have a client who manufactures lights for street lamps. They're now starting to manufacture smart street lamps and not just selling the lamps to the cities and transit authorities, but also selling the data that these lights collect; whether it's traffic data, weather data, pedestrian data and so on. I see more and more of that happening and it's certainly slow, but I'm excited to see that number go up as more manufacturers explore ways to disrupt business models."

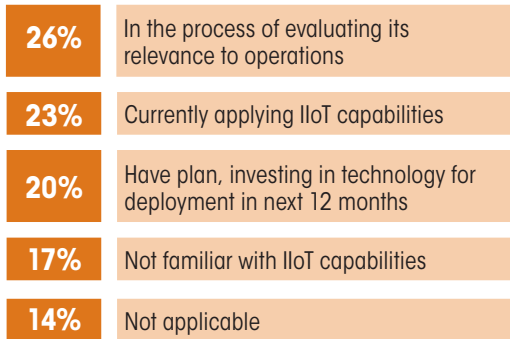


# TECHNOLOGY

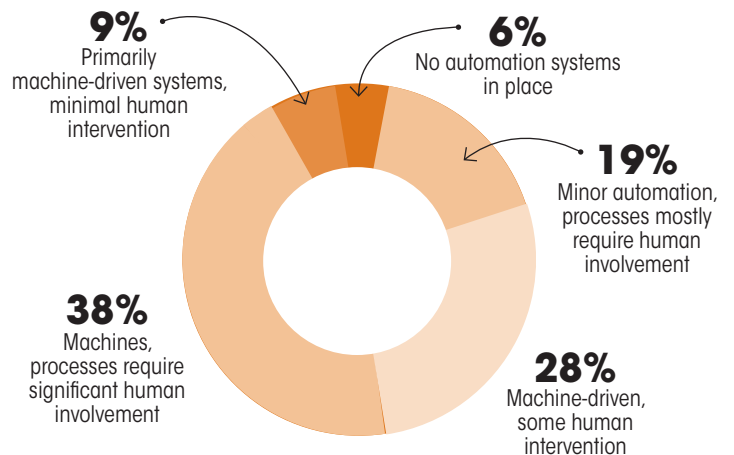
## APPLYING IIoT – 208 replies

	Total	Currently applying	Have a plan	Evaluating	Not familiar
Improving efficiency/productivity	35%	77%	41%	35%	3%
Tracking materials, shop floor assets	24%	36%	46%	20%	6%
Tying in business data shop floor to top floor	22%	38%	44%	17%	3%
Improving maintenance functions	21%	28%	34%	28%	3%
Developing smart products	20%	36%	41%	13%	0%
Analytics functionality	17%	45%	17%	15%	0%
Developing new services/revenue streams	16%	21%	46%	7%	0%
Consolidating control rooms	13%	34%	22%	6%	0%
Not currently applying IIoT	40%	0%	2%	37%	92%

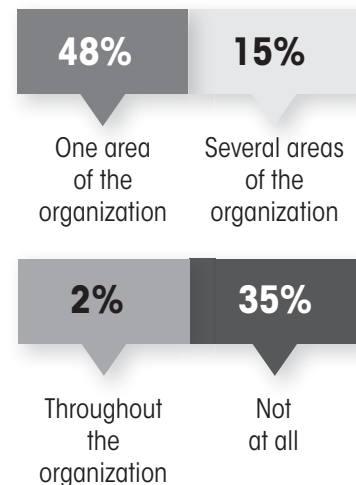
## IIoT ENGAGEMENT – 208 replies



## LEVEL OF AUTOMATION – 104 replies



## USING MACHINE LEARNING – 104 replies



## BENEFITS FROM TECHNOLOGY UPGRADES

208 replies

	TOTAL
Experienced a benefit	80%
Increased throughput	37%
Increased quality of product	33%
Reduced staff requirements	28%
Reducing downtime	27%
Reducing time to market	23%
New revenue streams	20%
Product innovation	19%
Other	6%
None of these	20%

## Big benefits

The conversation moved away from the how manufacturers were applying IIoT to where manufacturers were seeing its benefit. Peter Coffee quipped that, "You won't get benefits from things you've never even tried and if you weren't attempting to improve product quality, it wasn't likely for you to report it as a benefit."

Peng-Sang Cau pointed out how much reduced staff requirements had gone up, increasing to 28% from 23% the year prior and how it was an important benefit being listed by manufacturers.

"Addressing staffing is a big requirement for any sort of investment, particularly with IIoT. Whatever technology you're investing in, you're

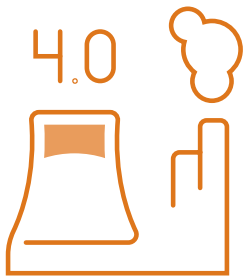
hoping it gives your staff the ability to do more with less."

JP Giroux also expanded on how the labour shortage was exacerbated by the pandemic, forcing manufacturers to look at IIoT upgrades to address reduced headcounts.

"The labour shortage was a factor before COVID-19 and it's still the case now where there's a challenge for manufacturers to just on-board and keep employees so I could see this number going up as well."

Dennis Dussin and Stewart Cramer agreed with the sentiment as well, recognizing that a talent shortage continues to plague the industry amidst COVID-19 recovery efforts.

## TECHNOLOGY (continued)



### RATE THE FOLLOWING – 118 replies

89%	I see IIoT as a business growth opportunity
86%	Emerging technologies allow small companies to compete globally
86%	Industry 4.0 is a great concept, but challenging to implement
85%	Upper management at our company supports Industry 4.0
83%	Technology enables me to keep up with ever evolving customer expectations
80%	Systems are designed with input from those who use them
78%	The pandemic has accelerated digital transformation
78%	Investing in new technology raises the company's cybersecurity risk
75%	CRM technology has allowed my business to be resilient
68%	Machinery replacement is a massive investment and will cause downtime we can't afford
62%	Our company has a plan/roadmap for I4.0
62%	I know where to find government programs to help with new technology investments

### REASONS FOR NOT INVESTING IN INDUSTRY 4.0 – 203 replies

32%	Difficulties integrating advanced technologies in existing systems
26%	Lack of skills to support investment
22%	Lack of financing and support
20%	Lack of adequate information about advanced technologies
20%	Investment not necessary for continuing operations
20%	Concerned about exposure to cyber security threats
19%	Uncertainty, risk and disruption
18%	Not sure where to start
17%	Too costly
17%	Lack of support or services from government
14%	Not convinced of economic benefit
12%	Weak customer demand

Total  
Those familiar  
with IIoT n=

105



“During COVID-19, every business has had to operate with fewer people, while still trying to get more done with fewer people. And the pandemic has made it worse, so advanced technologies have played a huge part in helping,” said Dennis Dussin.

Rory Macleod expanded on this in his work with Salesforce’s clients.

“Our clients have been citing challenges around the open positions they have and not being able to hire fast enough and how they’re actually now leveraging technology because Millennials and Gen Z are not that attracted to manufacturing because of their old-school view of it. Companies that are using technology are able to attract and now retain some of that talent.”

Rory’s comments suggest that while IIoT upgrades have helped manufacturers operate with reduced staff requirements, they will also help to attract and retain key talent in an effort to shore up key labour gaps in the industry.

The other key benefits found through IIoT upgrades include: increased throughput (37%), increased quality of product (33%), reducing downtime (27%) and reducing time to market (23%).

For Steve Loftus, these numbers made sense.

“I look at any implementation, the primary driver is to improve the throughput and in doing so, you’ll see those secondary

benefits like reduced staff and creating new revenue streams. I look at throughput as the primary reason for driving ROI in a technological investment.”

Peter Coffee agreed with the importance of increased throughput in applying an IIoT upgrade.

“I think Steve’s made a really great point here in that some of the things that are described as benefits are ‘nice-to-haves’ but if you’re not getting the higher throughput or higher quality product then you’re just rearranging deck chairs on the Titanic.”

While some of the reported benefits included addressing the labour shortage, there was another key benefit related to reducing time to market, according to Stewart Cramer.

“The reducing time to market is interesting because it has to do with agility and one of the key factors that have become clear during the pandemic is our need for agility in the supply chain to reduce this time to market,” he said, referring to the 23% of manufacturers reporting a reduced time to market benefit. “46% of those that have a plan to apply IIoT upgrades, are looking to specifically reduce their time to market, whether that’s through a new vertical or product innovation, but I’d be really interested to see where those companies go a year from now, because it’s absolutely an agility play. They’re looking for agility in their supply chains.”



IMAGE © BYROMASET / ADOBE STOCK

“Last year was a very tactical response due to an urgency to survive, and IIoT implementations may reflect that. Now, we may see companies come through to look ahead and make plans for more strategic IIoT investments.”



– Stewart Cramer, NGen

## Roadblocks and barriers

When the conversation moved towards the topic of roadblocks to implementing new technologies during the pandemic, the panelists were forthcoming about some of the challenges they’d seen and experienced over the last year, and this was supported by the survey data.

Among reasons for not investing in new technology upgrades; 32%

cited difficulties integrating advanced technologies in existing systems, 26% mentioned lack of skills to support investment, 22% cited a lack of financing and support, 20% were concerned about exposure to cybersecurity threats, 20% said that the investment wasn’t necessary for continuing operations, a further 20% said there was a lack of adequate information about advanced technologies and only 17% said an upgrade would be too costly. This is in stark contrast to the year prior, when an IIoT investment was considered to be too costly by 23% of respondents and was the fourth leading reason for not investing.

JP Giroux highlighted another salient point related to the lack of skills to support an investment in technology and how it may be linked to the labour shortage in manufacturing.

“When I looked at this question, I thought many of the reasons for not investing were related to people and talent,” he said. “Even the reason about difficulties integrating new technologies into existing processes could be related to having the right people. A lack of skills to support investment can be related to a lack of talent with those skills. Even lack of adequate information about advanced technologies is related to the skills shortage and our ability as a sector to attract the new generation.”

JP suggested that the talent with the skills and knowledge around IIoT and new technologies could address some of the reasons for manufacturers not investing, a point also emphasized by his colleague Scott McNeil-Smith.

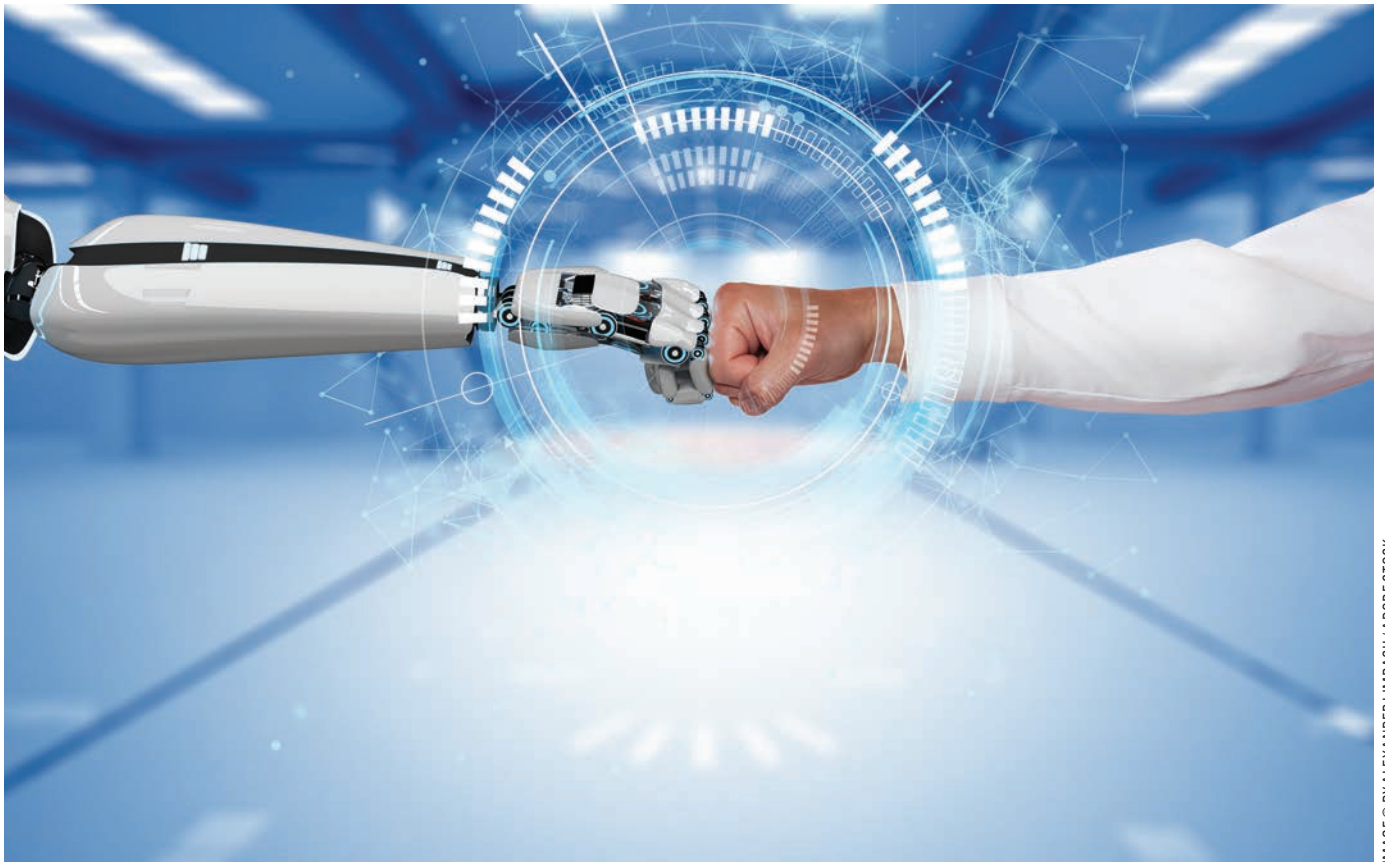


IMAGE © BY ALEXANDER LIMBACH / ADOBE STOCK

“One of the challenges manufacturers have, particularly the smaller ones, in integrating new technologies, is the lack of internal capability in deciding what to invest in exactly. They don’t have the external subject matter experts and are relying on outside consultants. So, we see the number one opportunity area for improving technology adoption is through addressing the people side of things.”

Dennis Dussin observed, “Most SMEs don’t have the internal resources to be able to implement or integrate these kinds of IIoT projects and if I’m honest, they’re getting most of their information from technology vendors, which may not be the most objective source of information. A lot of us read all this information about possible benefits and we say ‘Hey that looks great, but is this real?’”

Dennis also added a key point about a need for neutral consultants and resources to provide information on the benefits of different IIoT upgrades and technologies.

“I think it’s an important thing to address whether it’s through organizations like EMC or NGen or the government, to provide neutral advisors to help SMEs get there,” he said.

Rory Macleod added on to this idea as well, saying, “I was talking to a CEO who was in the middle of a three-year ERP implementation, trying to convince them move forward with some initiatives and he was concerned about his ability to take on more projects and felt it was going to be another three-year endeavour. He was really surprised about some of the things we were walking him through so I think there’s a role for industry groups to support manufacturers and help them understand how to make these decisions and what’s involved in adopting technologies because I don’t think they’ve got the experience or are buying these kinds of tools every day.”

The conversation around reasons why manufacturers had not invested in new technologies moved towards how manufacturers could look at their business in order to apply small IIoT upgrades to see improvements. Stewart Cramer and Jayson Myers challenged some ideas manufacturers may have about IIoT upgrades being difficult or expansive in size, including some of the roadblocks survey respondents listed for not investing in new technologies.

“Investing in IIoT is not a matter of buying a hammer and then going to look for nails. Instead, you start with a problem you need to solve. When I was running an SME, we started with a specific process problem and we did exactly what we had to do to get good data to drive increased throughput. It wasn’t necessarily a lot of money and I couldn’t say that whole plant was digitized, but we could say is that we solved that problem,” said Stewart Cramer.

Myers added, “There are so many companies that have invested in an ERP system three years ago and say ‘We’re still trying to work through it.’ It’s disrupted all their processes and you kind of wonder if that was the smartest investment to have made in the first place and if there was some kind of analysis there’s probably some other way of actually solving some of the problems they wanted to solve.”

## THE POWER OF DATA

To capture and manage the crucial data required for advanced manufacturing operations, 66% of respondents are using spreadsheets, enterprise resource planning (ERP) makes up 46%, accounting packages are used by 44% and MRP’s are 35%. Sensors to collect big data are now used by 34% of manufacturers and manual paperwork has dropped to 30%.

“The big shift I’m seeing is that less use of spreadsheets and less use of accounting packages might be related to more capture of data through sensors and other means,” said Peter Coffee. “That would imply to me, less manual collection and manual entry of data and perhaps this is an indicator of better networks in place to collect data with greater accuracy and less delay.”

Rory Macleod added, “In the last year as well I think we’ve seen that the shift to remote work has accelerated how these tools and technologies were being used. It’s a little harder to push paperwork when people are remote, but we’ve also seen manufacturers take on more responsibility as distributors to go direct to customers.”

Steve Loftus observed, “The biggest gain we’re after is instantaneous data. It’s the speed that we’re receiving the data at versus what we get when we’re using spreadsheets. That data from spreadsheets is a month or six weeks old and that’s too long nowadays. That’s the primary driver and with that comes efficiency. We have less people processing spreadsheets, we have an ERP instead that has customized tools that allow us to view that data at regular intervals.”

Stewart Cramer added, “Companies that are using their ERP and MRP systems might be using them better now because of the shift to remote work. Maybe the pandemic forced companies to make more use of those technological investments.”

## New Opportunities

Overall, 92% of companies familiar with IIoT are monetizing their data in some way, up from 77% last year. 57% are improving operational efficiencies, 42% are adding new services to existing offerings, 33% are developing analytics capabilities for external sale, 33% are leveraging supply chains, 32% are developing new business models, and 21% are partnering with similar companies in their sector.

Regarding the increasing number of companies partnering together in the sector, Peter Coffee said, “There’s a surprisingly high appetite sometimes for companies to share certain data as a way of benchmarking themselves. Especially because of the pandemic, we’ve seen where there’s a manufacturer and an ecosystem of value-added partners, including distributors and retailers, there turns out to be a lot of things they can collaborate on.”

Steve Bassaw noticed an interesting finding regarding the increased number of manufacturers leveraging their supply chains.

“I think there’s an increased opportunity to leverage supply chains and monetize that data for manufacturers. We’ve seen companies create a competitive advantage by marrying up their supply chains



with suppliers and customers. You may end up with more efficiencies and lower prices from your suppliers through that so that's an interesting statistic to monitor moving forward."

## Sharing Data

Nearly universally (99%), manufacturers cited an area that would benefit from sharing data within their organization. 56% cited production benefits, 55% cited sales benefits, 50% cited supply chain benefits, 50% named customer support and 41% named enterprise planning as able to benefit from data sharing.

"I was pleasantly surprised to see sales benefits up there, because a lot of times, especially SME's in manufacturing are sort of disconnected from sales and in their own silo. It was nice to see data sharing benefitting production and sales as leaders in that," said Steve Bassaw.

Peng-Sang Cau added, "The data sharing benefits are interesting because it looks like the key issue companies want to address immediately are in the front-end of their business. It matches the fact that technology adoption is growing at the same time organizations

are looking at increasing production and sales. As work among colleagues is shared, we may see technology adoption move towards the back-end of businesses where warehousing and distribution benefits can be reported."

## THE SPECTRE OF CYBER-ATTACKS

The level of concern regarding cybersecurity has gone up since last year's survey, with 79% of manufacturers reporting concern, while 21% reported being not concerned. 83% of manufacturers reported having experienced a cyber-attack, up drastically from 68%. However, it should be noted that the survey did not ask respondents if the cyber-attack occurred in the last year. 55% of manufacturers reported a phishing attack, 28% reported a targeted external cyber-attack, 23% reported compromised data encryption or financial information, 22% reported a data breach and 19% reported a breach through a third-party vendor. All of these numbers were an increase from the previous year, in some cases a doubling.

Scott McNeil-Smith said, "I think there's a direct correlation

# Industry 4.0 FEEDBACK

Manufacturing executives responding to the 2022 Advanced Manufacturing Outlook survey had an opportunity to write in comments about their experiences with Industry 4.0. Here are some of their insights (edited).

## TECHNOLOGY

- We have built enhanced technology into some of our products, so that they can be controlled via smartphone for example.
- We utilize technology to improve equipment reliability and speed up our business decisions
- We use IIoT-enabled technology on almost all our custom equipment

## PERFORMANCE

- Our focus was to try and have our plant well maintained before the pandemic. We were running poorly before the pandemic and it hasn't gotten any better.
- Complete elimination of our paper-flow processes/approvals. Pandemic made us expedite these previously planned transitions from 3-6 months to 2-3 weeks.
- Office jobs may be able to convert to home but warehousing, shipping & receiving and manufacturing cannot be done outside the plants. We couldn't change anything.

between the number of incidents and the rate of exposure to the level of interest in increasing cybersecurity. This is becoming an issue at the C-level and board level, when you ask the question 'What was your budget for cybersecurity before you were attacked versus after?' and we're seeing the increased concern happen from an increase in incident rates."

Dennis Dussin also added, "What I took away from these numbers is that it paints a picture of a little bit of complacency when I see that 20% of respondents are not concerned about cyber-attacks. I think 100% of respondents should be somewhat concerned about cyber-attacks."

Rory Macleod noted an interesting point about manufacturers hesitant to upgrade their legacy applications to IIoT-enabled ones due to security concerns.

"The amount of legacy applications are all risk points when it comes to cybersecurity. If they're not smart about how they deploy IIoT, they'll introduce vulnerabilities and risk points because as we all know, malware hasn't gone away. I think they're underestimating the risk a little bit."

*"If anyone is going to solve this labour shortage it's not going to be anyone here on this call. It will be the next generation and solving that shortage depends on our ability to get those young people with digital skills into the industry."*



*– JP Giroux, EMC*

## IoT/IIoT

- The company now uploads data to a cloud service that makes it easier to work from home

## ENGAGEMENT

- Better communication as a result of an IIoT investment

## COST

- Capital projects are hard to plan during a pandemic and this situation will continue until a point in time when general travel becomes safe again.

## INVESTMENT

- Investment levels will be affected by the return to normal business, which in our case is mostly overseas.
- Customers in our target industry are usually not aware of the potential benefits of IIoT investments
- Unsure of benefit vs. reward and afraid of downtime to repair technology in our environment
- Weak management group, no internal support

## TRAINING

- With the down turn in the work (Aerospace) there has been significant reductions in work force. The highly skilled folks took the opportunity to leave. This will have a significant impact on the eventual recovery of the industry.

Survey respondents were asked about the measures they'd taken to protect from cyber-attacks and 56% had applied data privacy controls, 53% had undergone a cybersecurity risk assessment, 51% had created a security infrastructure, 50% had a cybersecurity strategy, 42% had crisis management procedures and 35% had a cyber breach response plan.

Macleod added with reference to these numbers, "The fact that very few of them (35%) had a breach response plan is a little scary. What happens if there's a breach? What's your business continuity plan?"

Steve Loftus added a sobering idea, saying, "CEOs have spent so much time implementing IIoT that they've become hesitant about

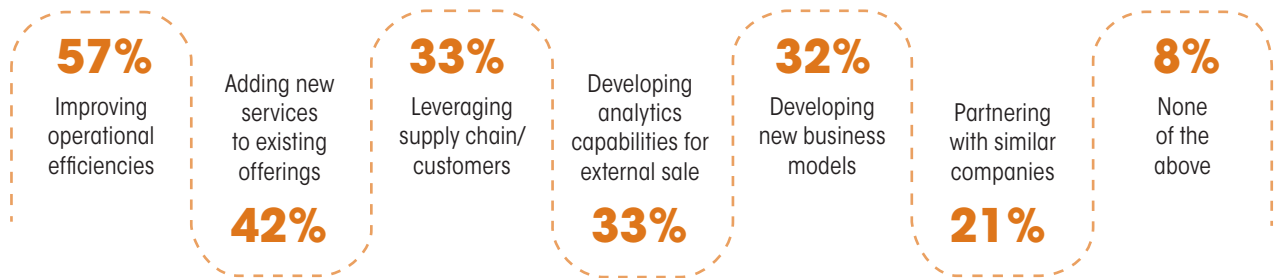
spending on cybersecurity until there's an actual attack. We're dealing with businesses with a budget and constraints. Remote work has created a lot more exposure and weakened their security systems that needs more attention."

Rory Macleod responded with sympathy to the plight of SMEs with budgets.

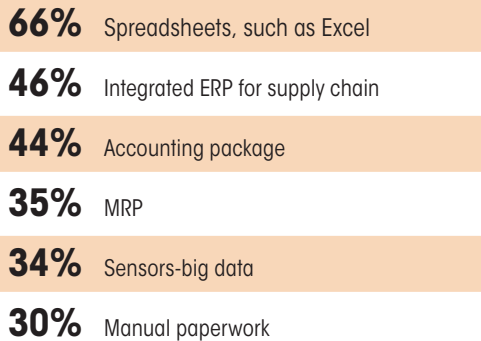
"You touch on a good point. Cybersecurity is one of those things you can spend an enormous amount of money on but you've got to balance it with the cost of the risk as well. There are brand issues or other things, so more can always be done but it does have to be balanced with the cost of the impact versus putting those dollars into customer-facing systems or production systems."

## DATA

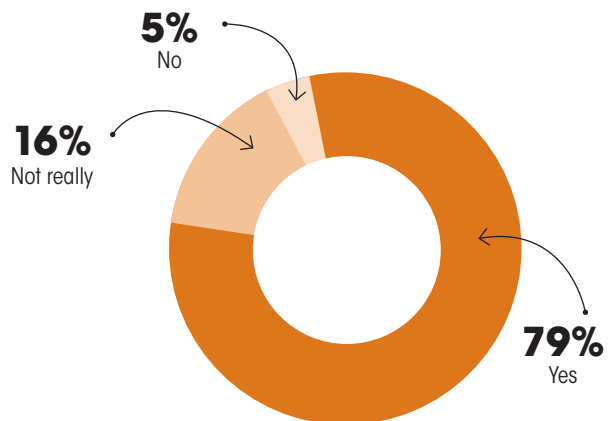
### HOW DATA IS MONETIZED – 104 replies



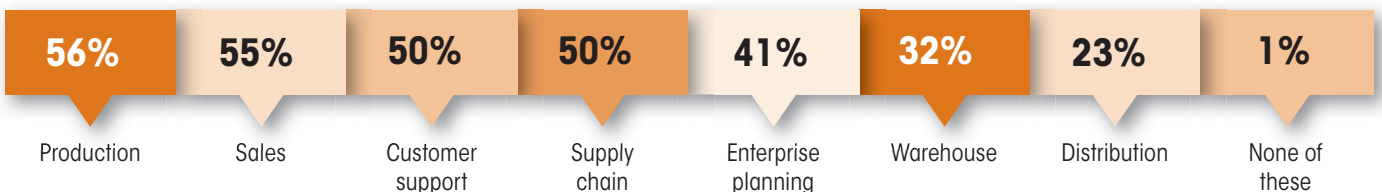
### COLLECTING AND USING DATA – 105 replies



### USING CLOUD SYSTEMS – 99 replies



### AREAS TO IMPROVE DATA – 105 replies





## Staying safe

When survey respondents were asked if they'd done enough to protect from cyber-attacks, 93% of respondents reported that they had done everything possible, up from 68% last year, while 7% reported that they hadn't.

Dennis Dussin said, "There's substantial percentage said that they had done everything they could do to protect against cyber-attacks which is very surprising to me, because there's always more precautions that you can take, especially with cyber-attacks increasing. It wasn't like 80% had security infrastructure in place, it's only 51%. So it paints a picture of a work-in-progress."

Peter Coffee added to this perspective.

"I think one of the questions that would be fascinating to ask is, 'Do your customers ask you what you are doing to protect their data?' and 'Do you feel you're at risk of losing employees or customers due to incidents?' I'm curious if they have reputational concerns as well."

The sentiment from panelists seemed to be that organizations could do more to protect their data and that it would be a good idea to continually assess what measures have been taken and could be improved upon to protect their data in the face of increased Industry 4.0 adoption.

## Worries about the future

When survey respondents were asked what they thought were the biggest threats about not investing in new technologies, 69% cited falling behind the competition as their biggest worry. 50% said pricing pressure as a result of commoditization, 33% said customer losses, a further 33% said disruption by industry outsiders, and another 33% said lower profit margins.

Jay Myers emphasized the need to understand investments in technology, saying, "The part of this question I'm concerned about is companies that have invested in Industry 4.0 but don't meet their business objectives end up making stranded investments."

Stewart added to this by stating "Investments have to be made in the context of driving a business outcome and not a new technology."

According to Steve Loftus, not investing in new technologies would lead to a difficulty in recovering from the pandemic.

"As soon as you fall behind in these categories, like pricing

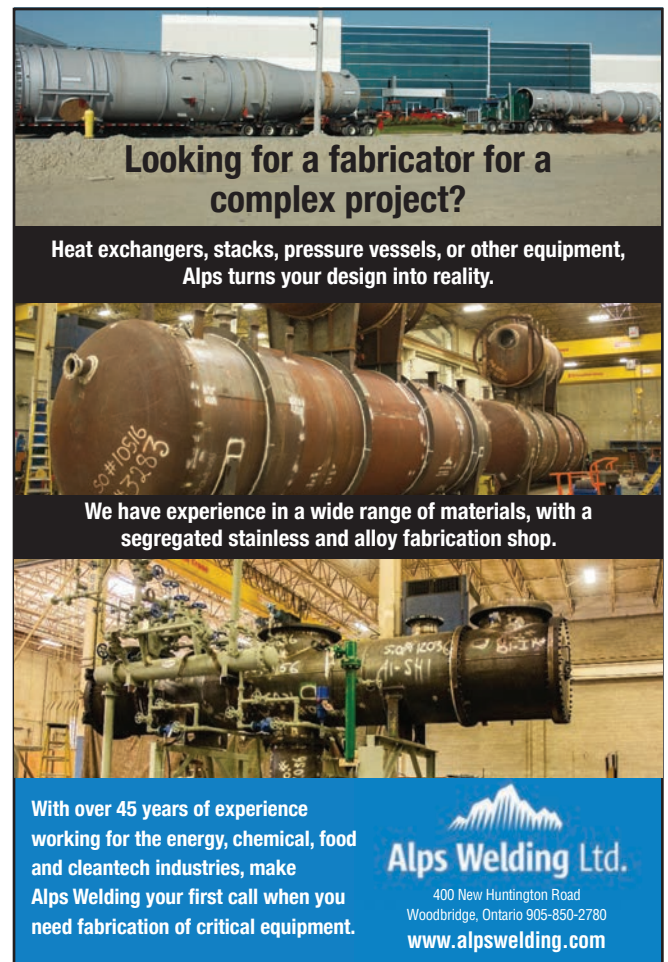


IMAGE © PUGUN & PHOTO STUDIO / ADOBE STOCK

**“We’ve seen companies create a competitive advantage by marrying up their supply chains with suppliers and customers. You may end up with more efficiencies and lower prices from your suppliers through that, so it will be interesting to monitor moving forward.”**



**– Steve Bassaw, SYSPRO**



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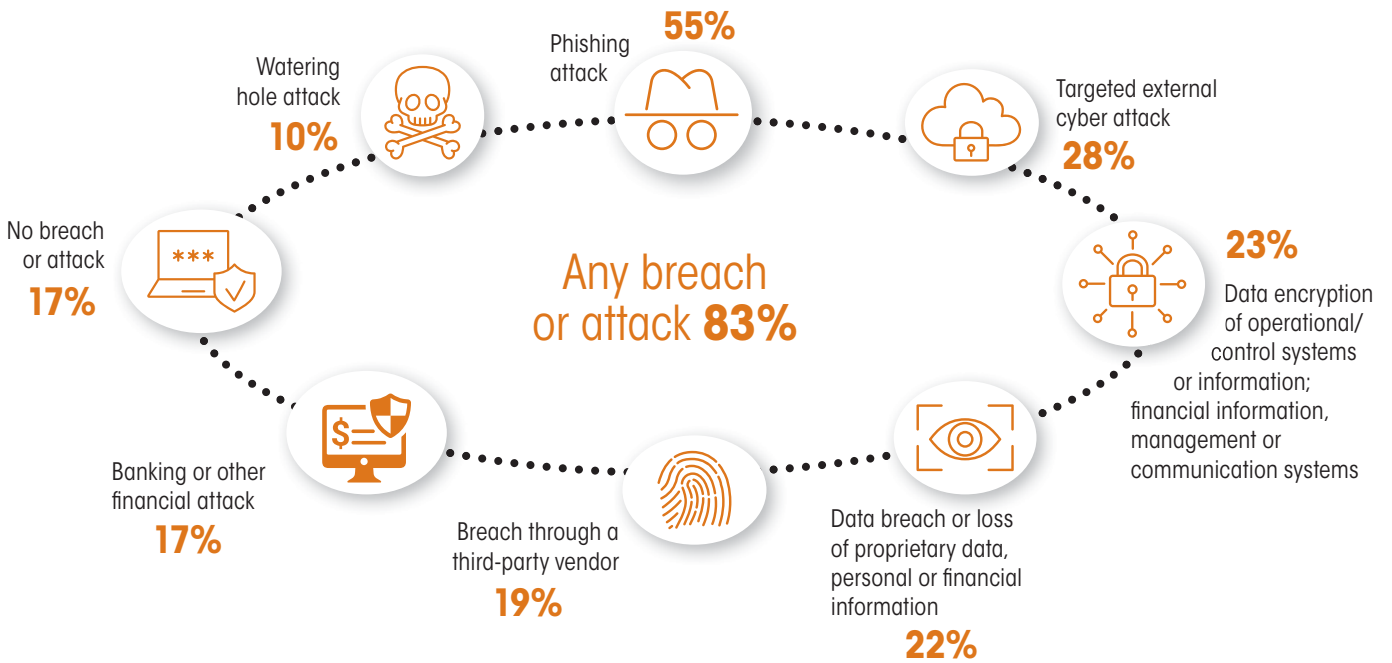
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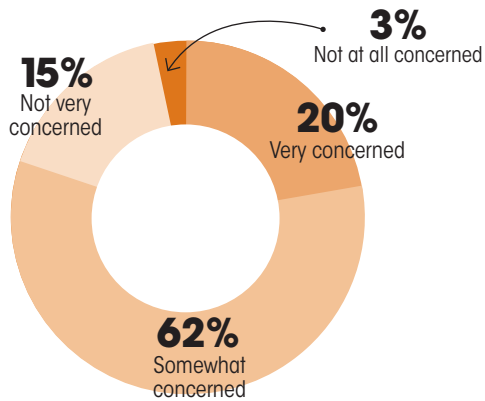
# CYBERSECURITY

## ATTACKS OR BREACHES – 102 replies

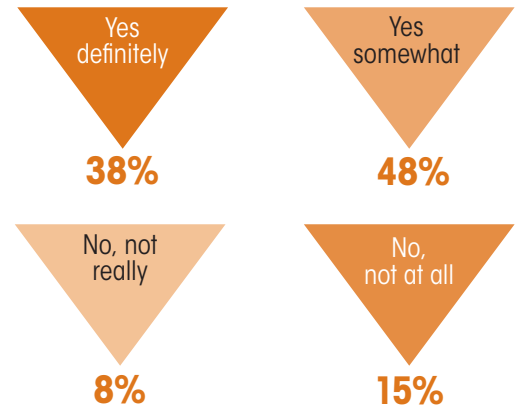


## CONCERN ABOUT CYBER RISKS

100 replies

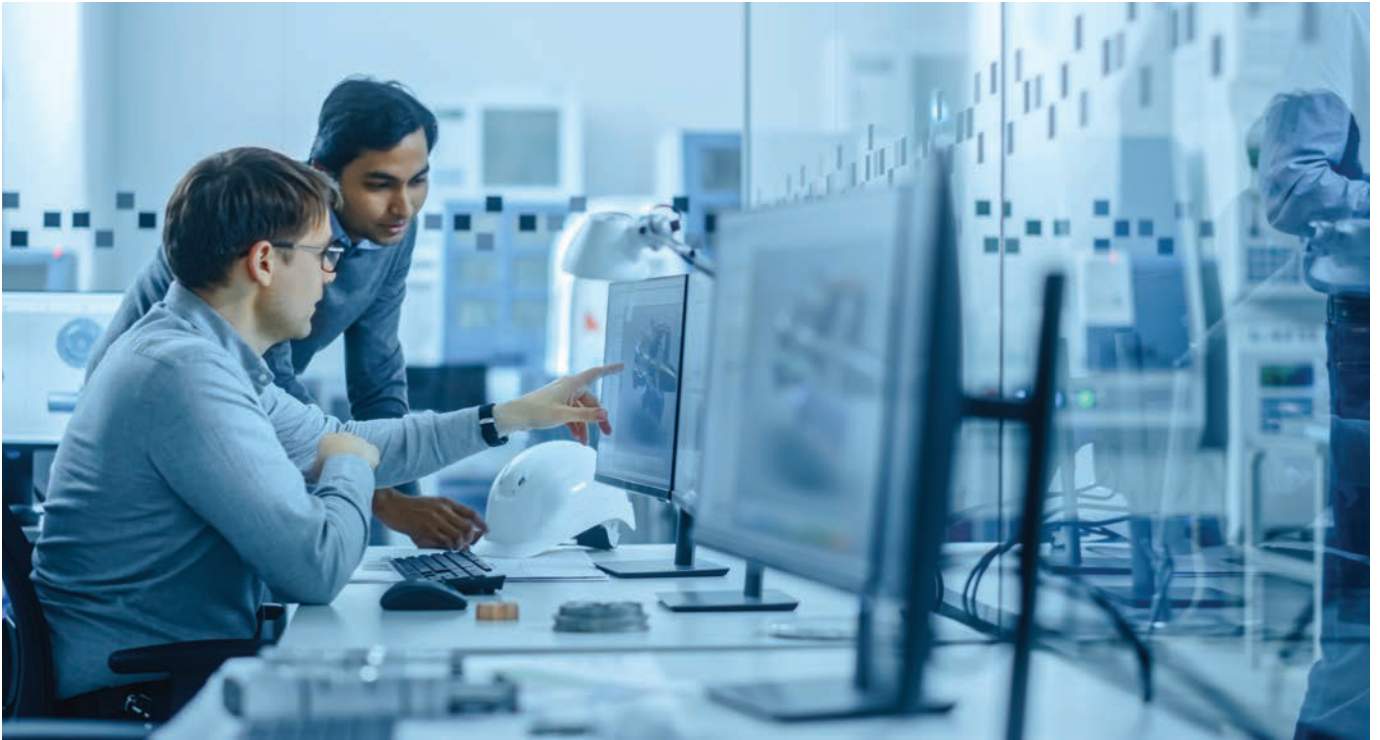


## GOVERNANCE POLICY IN PLACE – 99 replies



## SECURITY MEASURES TAKEN – 101 replies





pressures from commoditization or customer losses, you wouldn't have the profits to actually invest in new technologies like automation. Your chance of recovery decreases if you don't invest in new technologies to keep up with the competition."

Peter Coffee provided another sombre outlook about not investing in Industry 4.0 infrastructure.

"It's death by inches, because initially, you lose brand reputation and then there's a loss of profitability. Then there's a loss of your ability to be a partner to people who are keeping up with new tools and expect you to be integrated and eventually, you wind up with the lowest profit margin where your supply chain is just covering your overhead."

## FINAL THOUGHTS

To end our roundtable conference, panelists provided their closing thoughts on the survey data and the future of Industry 4.0 amidst a pandemic recovery.

Steve Loftus highlighted the importance of cybersecurity in his comments.

"One of the big concerns for me from the data is cybersecurity and the story of complacency. It's shocking that manufacturers are playing Russian Roulette here with their information but that was my big takeaway," he said.

JP Giroux said, "I think exploring what works and what doesn't work are the next steps for Industry 4.0. There's a lot of awareness now to hear about Industry 4.0 so I think we can begin moving towards talking about some of the success stories."

Peng-Sang Cau added the need for further education, both with

regards to cybersecurity measures and the concept of IIoT on a smaller scale.

"I think it's something that other organizations can take on, to education SMEs a little more because cyber-attacks do have a major impact on bottom lines. The other idea I wanted to mention was that there's so much more to this whole IIoT concept and I think you have to break it down to little building blocks to not scare the SME right away," she said.

**"We've done a good job covering plans and processes, but I think people represent both the vulnerability with regards to cybersecurity and also as drivers when it comes to adopting technology. The greatest opportunity to affect improvement within your workforce and move your business along is that investment in people."**



– Scott McNeil Smith, EMC



Peter Coffee added, "For me, what's wrong with the label 'Internet of Things' is the word 'internet' and the word 'thing'. You're not putting everything on the internet and if you are it's very dangerous and it won't be secure. And if you're thinking about it as the connection of things instead of the enablement of processes then again, you can be doing something very wrong."

Steve Bassaw noted two key observations during the discussion.

"One, SMEs know now that technology can help them. Two, there are challenges they're still dealing with like skill shortages and having to rely on outside consultants and things like that. There's homework for organizations like NGen and EMC, and even the government, to help manufacturers get there," he said.

Dennis Dussin expanded on this idea in his closing remarks.

"The conversation has matured a lot of over the last year or two that I've been involved in these. We used to talk about how cool technology was and why there weren't more companies adopting it. And now we're getting into what they should adopt and how they should adopt it and if they're using it for the right purposes. SMEs are aware of this, but they know they're going on an unguided journey with a lot of threats and potentials for wrong turns. So SMEs really need an objective, trustworthy set of guides that can help them make decisions about what to, how much to spend and how to deal with risks," he said.

Rory Macleod highlighted the ongoing investments in new technologies in his closing statement.

"It's good to see manufacturers are continuing to invest in improving their commercial operations. The data shows there was a disruption that occurred in the push to remote working and supply chains, sales, marketing were all impacted, so it will be interested to see what the data looks like next year. There may be a new way of doing business now, and new priorities around investment."

Scott McNeil-Smith offered some perspective on what the future of manufacturing looks like and what the focus should be on, saying "We've mentioned our idea of People, Plan and Process, and we've done a good job covering plans and processes, but I think people



IMAGE © PSCANRAIL / ADOBE STOCK

**“The amount of legacy applications are all risk points when it comes to cybersecurity. I find it interesting that there’s a perception that investing in newer technologies basically increases cyber-security risk, as opposed to reducing it, which is the reality.”**

**– Rory Macleod, Salesforce**



represent both the vulnerability with regards to cybersecurity, and also as drivers when it comes to adopting technology. The greatest opportunity to affect improvement within your workforce and move your business along is that investment in people.”

Scott mentioned a need to invest in incumbent workers and raising their capabilities from the workforce to the C-level.

Jayson Myers capped off the event, observing the need for manufacturers to ask questions around the problems they were having when it came time to make IIoT investments.

“What shines through for me is that this is a country of small companies and small manufacturers and to some degree it’s been reflected in the conversation we’re having. The other thing is that I’m not so sure that Canadian companies are at a big disadvantage, I know there are similar discussions going on around the world because of the pandemic. There’s a lot here suggesting that companies are seeing adopting digital technologies as important to their business and what’s more important is having those companies ask the right questions around how they’re going to achieve their goals around what they invested in,” he said.

As manufacturers plow ahead into 2022, they’re using the experience of the pandemic to respond in innovative ways, pivoting and applying big-brain lessons around agility, resilience, collaboration and knowledge to thrive in an evolving environment. It’s a valuable time to reflect on the changes the pandemic has brought, beyond the shift to remote work and supply chain troubles. Manufacturers have learned to operate with reduced head counts, pivoted to new products and are applying technologies in novel ways to improve production and throughput. The Canadian manufacturing industry is accomplishing more with less and responding to the economy’s curve balls with gusto and intelligence at every turn. Industry 4.0 is here, and how it will solve the manufacturing industry’s remaining problems will be a sight worth seeing.

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