

IBM i COMMUNITY PREDICTIONS FOR 2022, PART 1

January 10, 2022 • IT Jungle • Alex Woodie

While the month and year ostensibly are just values in the date field, when the calendar flips over from December to January, things feel different. There's a greater sense of hope and optimism for what the new year will bring. Coming off another calamitous year filled with COVID-19, perhaps it's we need that even more so this year.

It has become an IT Jungle tradition to ask members of the IBM i community at the start of the year for their predictions. This year is no different, and so we'll kick off the first part of our (most likely) two-part series of IBM i predictions for 2022.

VS Code has been in the IBM i news lately, and that trend will continue this year, says Susan Ganter, an IBM i educator.

"I predict that recent activity related to VS Code plug-ins targeting RPGers will become a driving force behind a trend to push

RPG developers still using green-screen to update their toolset," Ganter tells IT Jungle. "I don't think that everyone moving away from green screen development will choose VS Code, but I do think the availability of additional options in the marketplace will open the eyes of more green-screener to investigate better options."

RDi has been the only major green-screen alternative for a long time. "It's my own personal tool of choice," Ganter writes, "but it's not the right tool for everyone. I believe that increasing buzz surrounding offerings such as Liam Allan's open-source VS Code plug-in, Code for IBM i will cause RPGers to reconsider sticking to the outdated green screen tools. They have not only RDi and Code for IBM i to look at. Remain Software has recently made enhancements to MiWorkplace, bringing it up to date as another option to add to the list. Perhaps more options will emerge as well.

"Regardless of which tool they choose, I support the move away from SEU/PDM tools," she continues. "Other tools will support modern RPG language enhancements and can dramatically increase productivity."

Stuart Milligan, a solutions architect with Midrange Dynamics, a provider of DevOps and change management systems (CMS) for IBM i, sees more REST integration happening in the midrange. Keeping a handle on all those moving parts will be tough for the roll-your-own crowd, he says.

"Companies with an investment in their IBM i applications are using REST APIs to expose existing logic to open-source technology UIs or for partner integration. Real-time integration using REST APIs has proven globally to be a rapid, and cost-effective strategy for organizations to leverage existing applications and data, while still growing functionality that keeps them competitive. This trend will



continue in 2022.”

“Software development requirements are being driven more granularly, and directly, by business stakeholders than ever before,” Milligan continues. “Combined with distributed architecture, there is real pressure from the business to synchronize, continuously integrate, and deploy changes by different teams without errors, while providing real-time project and task updates to stakeholders. Some brave souls have attempted to solve this complex problem using a DIY DevOps approach. However, the constantly evolving landscape of DevOps and developing business applications, forces most IBM i shops to follow the growing trend to replace legacy CMS, and home-grown disconnected parts with modern, purpose-built IBM i DevOps solutions.”

Chris Wey, president of the Power Systems Business at Rocket Software, sees the cloud looming large for IBM i shops in the new year.

“In 2022, hybrid cloud becomes an integral part of the modernization strategy for companies large and small,” Wey writes. “As IBM i owners learn more about their application

workflows and usage patterns, they better understand which applications and workloads are better suited for the cloud, thus expanding their modernization projects to embrace those operational efficiencies.”

The cloud is also on the mind of Tom Huntington, the executive vice president of technical solutions at HelpSystems, particularly as IBM prepares to deliver another souped-up server to the IBM i installed base.

“Organizations on IBM i will start to rethink their move to the cloud as they realize their company is now dependent on technology they have no control over,” Huntington writes. “This realization energizes the roll-out of Power10 as it becomes the fastest adopted new server by the IBM i marketplace.”

IBM i shops will recognize that a mix of cloud and on-prem is more acceptable, he continues. “Organizations want to get current for security reasons and on-premise for IBM i is the right choice for reliability and control,” Huntington says. “So I believe we will see a surge in upgrading the IBM i operating systems and Power hardware in 2022 as a result. Leading organizations will also focus on integrating their

IBM i applications with the cloud for modernization (APIs) as the adopted model.”

Open source has been a major factor in the IBM i equation, and undoubtedly will continue to be one, according to Jon Paris, an IBM i educator. But where does that leave traditional languages like RPG and COBOL?

“Personally, I’m hoping to see IBM make it a lot simpler to integrate open source apps with conventional RPG and COBOL,” Paris writes. “Many people have provided tooling to try and simplify the process but in some ways that just makes it harder for integration novices to choose. Since IBM have been placing so much emphasis on integration via SQL perhaps that is a vehicle that they could explore. Or perhaps RPG will provide the much-needed OS bridgework?”

“Regardless, RPG will continue to grow,” Paris tells IT Jungle. “I am constantly impressed by the work the Toronto team have done in recent years to keep the language relevant and am sure trend that will continue but while I have no knowledge of what is to come, I do know that RFEs have a major impact on the direction that the RPG team takes. How do I know?”



Because a couple of my own RFEs have been accepted and implemented in the past couple of years! If you haven't kept up to date with recent changes in RPG you should really check out IBM's RPG Cafe where you will also find information on how to submit your own RFEs."

Christopher Burns, a senior consultant with Tri-Delta Resources Corp, sees an old talking point reemerging from the shadows – only this time, with more muscle.

"Mom and Pop IBM i shops found even entry level Power7 servers to be far more horsepower than they ever needed," Burns tells IT Jungle. "Imagine when Power10s hit the store shelves. And while cloud hosting has become readily available, it doesn't always make sense for smaller, budget conscious customers, or those whose local Internet service may be unpredictable. Plus, they may have Windows server based applications in house that exchange data with their IBM i based applications through a simple ODBC connection or IFS share. Splitting these two siblings up could get complicated . . . and expensive. Hence, I predict that chatter will once again call for an abstraction layer, perhaps open source, that would allow Windows

Server to run reliably on Power hardware in a guest partition. Such a move would make Power the most flexible server line on the planet, simplify IT for small businesses everywhere and consolidate workloads like never before. Might just be chatter, but it'll be loud chatter."

Power10 is waiting in the wings – and so is the next release of IBM i, says Pete Massiello, president of iTech Solutions Group, the Connecticut-based IBM i reseller, consultancy, and cloud services provider.

"2022 will be an exciting year for the IBM i community," Massiello writes. "We know that iNext will be released, and IBM executives have publicly called this release 7.5. In addition, we know the low-end Power10 servers will be coming, so with those two items alone it will be a great year. IBM i 7.5 is filled with lots of great new enhancements."

"In other areas, I see people continuing their move from spinning and SSD drives to NVMe," the Champion for Power continues. "Much faster, and at about the same cost as spinning disks, this is a no-brainer. We have also seen many more people moving to external storage from

internal storage, and with the added functionality that external storage brings, I see that trend continuing. I have yet to see any traction with Db2 Mirror for i, and perhaps now with 7.5 out this year, we will see people finally start to implement this great technology."

In 2022, modernization and transformation of IBM i systems shifts from a "nice to have" to a "mandatory requirement," according to Michael Killian, the vice president of sales for Profound Logic, which develops Web and mobile modernization tools for IBM i.

"Depletion of RPG resources is no longer on the horizon; it is happening and has happened," Killian writes. "Certainly, organizations with plans to grow and thrive in the upcoming decade must capitalize on legacy assets to move them forward and position themselves for success now, especially because genuine transformations take multiple years, and our community has a ticking time-bomb as we get closer to 2030 (the year in which most RPG programmers will have already retired).

"The key to garnering transformation success is to partner with experts that



offer a flexible combination of transformation automation, integration (systems, application, and data), and proven yet state-of-the-art new development solutions,” he continues. Profound is ready to help, he adds.

The pending demise of RPG has been greatly exaggerated, according to Roger Pence, the longtime product evangelist for IBM i development tool provider ASNA. But that doesn't mean we (or i) is out of the woods. Far from it, in fact.

“For decades, midrange pundits have been predicting the impending death of RPG,” Pence pens. “History has shown them wrong. Like COBOL, RPG isn't going to die. But they were close. It's not the language that's going to fade away, it's the RPG programmers.

“By 2030, most RPG programmers will be, or rapidly approaching, 80 years old,” he continues. “Without

their cadre of RPG programmers to maintain their system of record RPG applications, the business in is peril. The business can't persist without those RPG applications.”

But wait! The bad news gets even worse, Pence says. “Not only is this generation of RPG programmers on the cusp of retirement, young programmers haven't, and won't, enter the RPG pipeline,” he continues. “Programming/IT college graduates today are highly unlikely to have encountered either the IBM i or RPG in any of their academic studies. The IBM i and its RPG programming language simply aren't on any young programmer's radar today. The reality is that most IBM i shops with an RPG dependence have a crisis coming very soon and need to plan today to avoid that crisis.”

The Db2 for i database has been a focus of attention by IBM for the past few years. That trend will continue in the new year, predicts

Paul Tuohy, the host of the popular iTalk with Tuohy podcast.

“I think database and SQL enhancements will continue, as expected,” Tuohy writes. “This will probably include tweaks to the JSON and web services functionality. But I think there will be an extra push in the area of SQL IBM i Services: they are at the heart of new IBM i Navigator web interface and also provide a means of sharing system, performance and operations information with more generic ops/admin applications.

“Open source will continue to be one of the major areas of enhancement,” he continues. “It is way outside my area of expertise but it will be fun to see what new open source functionality is introduced to IBM i in 2022.”

Stay tuned for our next batch of IBM i predictions for 2022.



ERP TRENDS & PREDICTIONS 2022: MORE DISCUSSION FROM EXPERTS

January 10, 2022 • Technology Evaluation Centers • Predrag Jakovljevic

Our recent blog post on the Top 10 2022 trends and predictions in the enterprise resource planning (ERP) software market has generated a plethora of comments from market experts and players and prompted some of them to share their own opinions. A few wanted to opine on one or more of our Top10 trends, while others pointed out other ERP trends worth mentioning. (Of course, we realized all along that there are more than ten trends.)

In this follow-up blog post, we share the most noteworthy comments and thoughts by some notable players in the ERP software market, starting with comments on cloud ERP issues.

Cloud ERP's Security and Performance

Joe Scioscia, VP of Sales at VAI, a provider of the S2K ERP Enterprise software suite, sees the cloud ERP market in 2022 evolving along these particular lines:

- *Ransomware and security*

- *High availability*
- *Data vaulting (a way to secure data by sending copies of it off-site where it can be protected from theft, hardware failures, and other threats)*
- *Ramifications of working remotely*

“One of the biggest challenges that cloud software providers face in 2022 is the rapid transformation of the digital sector. Everyone wants to be in on the action, but the methods by which organizations can transition to cloud aren't one size fits all. The cloud market is going to need to become even more flexible in the years ahead,” Scioscia strongly believes. “This includes taking holistic approaches to security and data storage, offering real-time security monitoring, analytics, and more to help businesses get the most from the cloud. This becomes even more important when considering that remote work isn't just a pandemic coping

mechanism—it's here to stay and it isn't going anywhere.”

Winston Hait, Director of Product Marketing, Platform at FinancialForce, believes that, given the shift to remote and hybrid models for work, companies will need to think thoroughly and decide who can access which data, when, for how long, and from where? ERP vendors will need to accommodate these emerging needs of their customers.

Epicor recently launched Epicor Security Suite to both its cloud and on-premises ERP customers with several managed services. Look for many other ERP vendors to follow suit.

Mobile ERP—Work from Anywhere

Scioscia believes that the adoption of mobile ERP and use of mobile apps as business tools will continue to grow in 2022, especially in these aspects:

- *Customer self-service apps*



for ordering and account management

- *Proof of delivery apps*
- *SMS notifications for businesses*

“As a result of the fluctuations in demand we’ve seen in 2021 as well as a desire from business leaders for real-time updates, more managers will leverage mobile apps in 2022 as business tools to gain better insights into the supply chain. In the coming year, I expect a majority of organizations to switch to mobile-friendly operating systems in order to better track products and manage inventory, using a solution like ERP to support mobile applications.

In addition, as companies continue to move between in-person and remote work, contactless mobile operations are becoming increasingly important for those who can’t physically be in the warehouse. Mobile apps can now offer customer self-service tools, SMS notifications for proof of delivery, predictive insights, and other functional capabilities leading to more organizations leaning on the technology for success in 2022.”

For his part, Hait adds that it is not only about mobile, but also about the work from home (WFH),

or work from anywhere (WFA) paradigms. The term “Mobile ERP” implies mobile devices, but it is really about anytime/anywhere access to data, processes, and systems throughout the ERP lifecycle as well as about how it flows into the customer management lifecycle (i.e., sales, delivery/installation and related services, support, etc.

Real-Time Awareness via IoT

Hait believes that ERP’s real-time awareness can be applied via the Internet of Things (IoT) devices and edge computing. Will your ERP system be aware of, listen to, and be able to process info from IoT devices to help drive business decisions?

For his part, Scioscia adds the following:

“IoT and edge technologies are becoming an increasingly important priority for the supply chain, helping manufacturers improve production costs through increased visibility and insights. As the supply chain continues to weather a storm of challenges that will seemingly last through the first half of 2022, more manufacturers are adding IoT technology to their existing supply chain management strategies.

Companies within the distribution, logistics, and manufacturing sector have high levels of outsourced processes, and the implementation of IoT technologies in these areas are helping companies devote more time, energy, and resources to the actual development of high-quality products. The added pressure of inventory shortages is making IoT even more critical for manufacturers to implement as the technology advances to vastly improve production costs and offer insights into the supply chain in 2022 and beyond.”

Smarter ERP

As our recent blog post indicates, combining business intelligence (BI) and artificial intelligence (AI) amounts to augmented analytics, the use of AI within ERP solutions will continue to evolve and grow. To that end, Scioscia says the following:

“Supported by the growing sophistication of machine learning (ML), predictive analytics tools will be able to yield more impressive insights to help executives make decisions in 2022. For example, with ML digesting more and more data, analytics tools powered by ML will be better able to predict and track trends, yielding outcomes that can help companies determine future inventory levels,



weather patterns, changes in demand and more.

Analytics tools are also helpful for sales and customer-facing teams who need greater intelligence into their customer base and the ability to track customer feedback, sentiment, engagement, and more. By pulling insights from customers in real-time and storing them in a central dashboard powered by ERP, business leaders can make smarter decisions using analytics to meet new goals in 2022.”

While our article on ERP 2022 Trends opined that the “BI and AI for Masses” is not yet mainstream, Hait argues that with the FinancialForce Workspaces, Tableau CRM, and Einstein Next Best Action capabilities, the vendor is currently bringing that functionality to the masses in a way that they can benefit without the end users having to know much, if anything, about it.

For its part, NetSuite’s recently unveiled Analytics Warehouse is another example of prebuilt analytics helping users spot patterns and quickly surface insights from NetSuite and third-party data to enhance decision making. An important concept here is datasets that suggest table joins based on the standard

records. This feature lets users create their own joins to otherwise unrelated records. So, now users can create and reuse a dataset for multiple analytics workbooks.

With datasets, operations teams, analysts, and other data leaders can curate collections of data (pre-select fields, run calculations, etc.) that downstream users can use to build reports. Datasets save the operations people time and give them more control, and enable easy, fast, and consistent reports for business users.

ERP as the SCM backbone

Scioscia concurs with our prediction that ERP will relinquish the driver’s seat to supply chain management (SCM) software. Will we see an increased adoption of supply chain planning (SCP) tools to optimize inventory and minimize dead (obsolete) stock? What else might we expect? Scioscia stipulates the following:

- *Long vendor lead times*
- *Effective inventory planning based on demand*

“If the last two years have taught us anything, it’s that flexibility is key when it comes to the supply chain. Recent disruptions and fluctuations in supply and demand are causing major headaches for many of today’s companies.

But how can we solve this? It’s simple—we need to unlock better insights and improve inventory management, and this can start with ERP.

By utilizing an ERP solution to mitigate and predict demand spikes, distributors can identify surges and patterns to ensure shelves and inventory levels stay consistent throughout the year. Even with the ports being clogged up, an ERP provider can help give customers honest and longer lead times to ensure that people are able to meet deadlines and deliveries come when needed.”

Scioscia also believes that robotics automation will continue to transform the warehouse, creating faster and more streamlined processes. We will be seeing even more automation in terms of conveyors and carousels, as well as more use of mobile apps in the warehouse to streamline picking and increase productivity.

“It’s no question that robotic automation is one of the solutions to current labor shortages. Jobs that have long been considered menial, like sorting and distributing, can now be quickly replaced by applications that can do the work at a faster pace with zero error. Mobile solutions also



now exist to give supply chain managers near complete visibility of the warehouse at all times and can quickly patch fixes if something goes wrong.

Most critically, rapid and automated picking ensures that deliveries get out the door on time. While the implementation of robotics and automation in the warehouse must be supplemented with increased skills and new talent, the reality is that companies who invest in this type of fulfillment technology now will see greater gains in the long run.”

Blockchain for Traceability?

While we did not see blockchain as a major trend when it comes to ERP, Scioscia wants to talk about how blockchain is evolving, and how it will eventually affect the ERP software industry. He predicts a slow adoption for smaller businesses, but that the ever-increasing use of foreign suppliers will lead to the growing blockchain requirements.

“While blockchain has been an exciting buzzword for a few years now, the pandemic really brought out the possibilities of blockchain for creating a more transparent supply chain in 2022. By connecting suppliers, manufacturers, distributors, and

consumers together through traceable technology, blockchain can help supply chains transfer and store real-time data quicker while creating a connected, more accurate system for stakeholders to view the status of products.

Blockchain is also evolving to include more foreign suppliers who can transition to the blockchain to better align with their global counterparts. While a slower adoption is occurring for smaller businesses, blockchain is becoming more accessible for all organizations to implement. In 2022, we will continue to see more companies leveraging blockchain to improve equal access to communication and data in an effort to reduce errors and supply chain hiccups.”

ERP in 2022: Enabling “Doing More with What You Have”

At the end of the day, automation, timely insights, and agility is what businesses need from their ERP and related enterprise software solutions. Supply disruptions are making it critical to be able to maximize profit and revenue and available to promise (ATP) from their current means. In fact, wouldn't it be nice if ERP software could tell you to which profitable customer or supplier to allocate some orders given the shortages,

and thus pick the right battles?

This way, companies can have their allocation strategy set up for, say, on time delivery. But then one can view revenue and profit and automatically re-allocate (or allocate that way initially if you like). And there are multiple ways to determine the cost that is used for the gross profit calculation. ERP software should be able to help you optimize the use of what you have and make sure that the resources you have are working on the most profitable orders or the ones that are most important however you determine that.

This “do more with what you have” approach can also be applied to, say, construction projects where one can look at the available resources and materials and decide on their ability to be able to commit to a date to finish a project etc. Vendors like Deltek, FinancialForce, Acumatica, Sage Intacct, Unit4, and others emphasize that there is an amplified focus on project management tools and the project management discipline itself. The process begins with competent project managers, which leads to successful projects and ends with the goal of satisfied customers. This model enhances project management capabilities and



offers project managers more insight into their projects, a distinct focus of ERP solutions that are purpose-built for project-focused businesses.

Reimagined ERP

In conclusion, modern technology, superior user experience (UX), and industry features for reimagined processes will form the marching orders for all the ERP software providers. The ERP solutions of

the future will need to enable a significantly better return on investment (ROI) than current ERP offerings do. Ease of use for an average end user and the overall practicality of ERP software will be the “must have” features for software development.

Additionally, costing and pricing flexibility will be required from the vendors, who will come up with innovative programs. Perhaps

pricing for the actual software usage, given that the profit-sharing pricing initiatives from the past have often turned to be tricky?

How can vendors help customers be more successful with their implementations? What about the cost of failed implementations? And will ERP vendors come up with some compelling value props in that regard?



SUPPLY CHAIN PREDICTIONS FOR 2022

The CIO at VAI says “the past year equipped us with the knowledge and experiences to maintain operational efficiency and continue business growth”

January 5, 2022 • Tissue Online • Kevin Beasley

Another holiday season with an overloaded supply chain was bad news for retailers and business leaders. “If nothing else, it means we have spent the entire year battling supply chain disruptions”, said Kevin Beasley, CIO at VAI enterprise. From the increase in cyberattacks in the first quarter to port congestion and labor shortages, business and supply chain leaders faced several major challenges in 2021.

With the start of this new year, it is important to take stock and look ahead to the challenges and opportunities in store for the supply chain in 2022.

Many of the supply chain issues that arose in 2021 will continue to complicate operations, and business and supply chain leaders must prepare now for 2022. While it is difficult to make predictions in this volatile supply chain market,

Beasley shared with Forbes four likely scenarios that can be expected to become reality:

CONTINUED SUPPLY CHAIN ISSUES

The current supply chain landscape is not going to fix itself with the beginning of 2022.

The global paper and plastic shortage are spilling over into the new year, driving down the stock of items like straws and food packaging. Industries like manufacturing, transportation and warehousing are struggling to find workers, which directly impacts supply chain operations. This means continued order delays, supply shortages and potentially unhappy distributors, retailers and consumers.

AUTOMATION TO FILL THE LABOR GAP

In 2021, warehouse managers and leaders continued investing in

automation technology to perform tasks such as inventory counts and product restocking. Additionally, the market has seen automation paired with artificial intelligence (AI) to complete more complex tasks, such as self-driving trucking and analyzing workflows.

Since businesses are implementing automation for more strategic and complex initiatives, the technologies can also be used to aid the understaffed workforce. Automation will not replace the need for human workers, but rather complement human activity in warehousing, trucking and other industries along the supply chain.

AN EVEN GREATER EMPHASIS ON SECURITY

In 2021, businesses saw a 10% increase in the average cost of a data breach and a record-high number of data compromises. Cybercrime is evolving, and it does



not appear to be abating anytime soon.

Historically, only larger enterprises were targets of these crimes, but smaller businesses have been under siege just as frequently this year — and will likely continue to be targeted in the new year. The past year taught that many ways of protecting data are no longer enough to maintain secure operations, especially in remote or hybrid workplace environments. Security cannot be an afterthought but will continue to come first in every business strategy and initiative.

INCREASED SPENDING ON SUPPLY CHAIN TECHNOLOGY

Nearly half of supply chain leaders increased spending on technologies such as predictive analytics and AI during the pandemic. Spending will likely continue to climb in 2022 considering the operational efficiency it provides and its other time-tested benefits.

Over the past several years, many organizations turned to cloud-based enterprise resource planning (ERP) software for a more secure and reliable way to map out and oversee supply chain operations. Mobile support for ERP solutions is becoming ubiquitous, especially as organizations continue to operate in a remote or hybrid environment. 2021

underscored the ability to access critical information in real time, from anywhere.

Lastly, anticipate the cloud to increasingly become a common tool for smaller businesses as it is for larger organizations.

“Moving further into 2022, many of the supply chain woes we faced in 2021 will continue to hinder operations. However, the past year equipped us with the knowledge and experiences to maintain operational efficiency and continue business growth. With this knowledge, we can navigate 2022 with confidence, a skilled workforce and a technology-driven strategy”, declares Kevin Beasley.



10 BIG DATA CHALLENGES AND HOW TO ADDRESS THEM

Bringing a big data initiative to fruition requires an array of data skills and best practices. Here are 10 big data challenges enterprises must be ready for.

January 5, 2022 • TechTarget • George Lawton

A well-executed big data strategy can streamline operational costs, reduce time to market and enable new products. But enterprises face a variety of big data challenges in moving initiatives from boardroom discussions to practices that work.

IT and data professionals need to build out the physical infrastructure for moving data from different sources and between multiple applications. They also need to meet requirements for performance, scalability, timeliness, security and data governance. In addition, implementation costs must be considered upfront, as they can quickly spiral out of control.

Perhaps most importantly, enterprises need to figure out how and why big data matters to their business in the first place.

“One of the greatest challenges around big data projects comes

down to successfully applying the insights captured,” said Bill Szybillo, business intelligence manager at ERP software provider VAI.

Many applications and systems capture data, he explained, but organizations often struggle to understand what is valuable and, from there, to apply those insights in an impactful way.

Taking a broader look, here are 10 big data challenges that enterprises should be aware of and some pointers on how to address them.

1. Managing large volumes of data

Big data by its very definition typically involves large volumes of data housed in disparate systems and platforms. Szybillo said the first challenge for enterprises is consolidating the extremely large data sets they’re extracting from

CRM and ERP systems and other data sources into a unified and manageable big data architecture.

Once you have a sense of the data that’s being collected, it becomes easier to narrow in on insights by making small adjustments, he said. To enable that, plan for an infrastructure that allows for incremental changes. Attempting big changes may just end up creating new problems.

2. Finding and fixing data quality issues

The analytics algorithms and artificial intelligence applications built on big data can generate bad results when data quality issues creep into big data systems. These problems can become more significant and harder to audit as data management and analytics teams attempt to pull in more and different types of data. Bundler, an online marketplace for finding web shopping assistants who



help people buy products and arrange shipments, experienced these problems firsthand as it scaled to 500,000 customers. A key growth driver for the company was the use of big data to provide a highly personalized experience, reveal upselling opportunities and monitor new trends. Effective data quality management was a key concern.

“You need to monitor and fix any data quality issues constantly,” Bunddler CEO Pavel Kovalenko said. Duplicate entries and typos are common, he said, especially when data comes from different sources. To ensure the quality of the data they collect, Kovalenko’s team created an intelligent data identifier that matches duplicates with minor data variances and reports any possible typos. That has improved the accuracy of the business insights generated by analyzing the data.

3. Dealing with data integration and preparation complexities

Big data platforms solve the problem of collecting and storing large amounts of data of different types – and the quick retrieval of data that’s needed for analytics uses. But the data collection process can still be very challenging, said Rosaria Silipo, a Ph.D. and principal data scientist at open source analytics platform

vendor Knime.

The integrity of an enterprise’s collected data stores is dependent on them being constantly updated. This requires maintaining access to a variety of data sources and having dedicated big data integration strategies.

Some enterprises use a data lake as a catch-all repository for sets of big data collected from diverse sources, without thinking through how the disparate data will be integrated. Various business domains, for example, produce data that is important for joint analysis, but this data often comes with different underlying semantics that must be disambiguated. Silipo cautions against ad hoc integration for projects, which can involve a lot of rework. For the optimal ROI on big data projects, it’s generally better to develop a strategic approach to data integration.

4. Scaling big data systems efficiently and cost effectively

Enterprises can waste a lot of money storing big data if they don’t have a strategy for how they want to use it. Organizations need to understand that big data analytics starts at the data ingestion stage, said George Kobakhidze, head of enterprise solutions at technology and services provider ZL Tech. Curating enterprise

data repositories also requires consistent retention policies to cycle out old information, especially now because data that predates the COVID-19 pandemic is often no longer accurate in today’s market.

Thus, data management teams should plan out the types, schemas and uses of data before deploying big data systems. But that’s easier said than done, said Travis Rehl, vice president of product at cloud management platform vendor CloudCheckr.

“Oftentimes, you start from one data model and expand out but quickly realize the model doesn’t fit your new data points and you suddenly have technical debt you need to resolve,” he said.

A generic data lake with the appropriate data structure can make it easier to reuse data efficiently and cost effectively. For example, Parquet files often provide a better performance-to-cost ratio than CSV dumps within a data lake.

5. Evaluating and selecting big data technologies

Data management teams have a wide range of big data technologies to choose from, and the various tools often overlap in terms of their capabilities.



Lenley Hensarling, chief strategy officer at NoSQL database company Aerospike, recommends teams start by considering current and future needs for data from streaming and batch sources, such as mainframes, cloud applications and third-party data services. For example, enterprise-grade streaming platforms to consider include Apache Kafka, Apache Pulsar, AWS Kinesis and Google Pub/Sub – all of which provide seamless movement of data between cloud, on-premises and hybrid cloud systems, he said.

Next, teams should start evaluating the complex data preparation capabilities required to feed AI, machine learning and other advanced analytics systems. It's also important to plan for where the data might be processed. For circumstances where latency is an issue, teams need to consider how to run analytics and AI models on edge servers, and how to make it easy to update the models. These capabilities need to be balanced against the cost of deploying and managing the equipment and applications run on premises, in the cloud or on the edge.

6. Generating business insights

It's tempting for data teams to focus on the technology of big data, rather than outcomes. In

many cases, Silipo has found that much less attention is placed on what to do with the data.

Generating valuable business insights from big data applications in organizations requires considering scenarios like creating KPI-based reports, identifying useful predictions or making different types of recommendations.

These efforts will require input from a mix of business analytics professionals, statisticians and data scientists with machine learning expertise. She said pairing that group with the big data engineering team can make a difference in increasing the ROI of setting up a big data environment.

7. Hiring and retaining workers with big data skills

"One of the biggest challenges regarding big data software development is finding and retaining the workers with big data skills," said Mike O'Malley, senior vice president of strategy at SenecaGlobal, a software development and IT outsourcing firm.

This particular big data trend isn't likely to go away soon. A report from S&P Global found that cloud architects and data scientists are among the most in-demand

positions in 2021. One strategy for filling them is to partner with software development services companies that have already built out talent pools.

Another strategy is to work with HR to identify and address any gaps in existing big data talent, said Pablo Listingart, founder and owner of ComIT, a charity that provides free IT training.

"Many big data initiatives fail because of incorrect expectations and faulty estimations that are carried forward from the beginning of the project to the end," he said. The right team will be able to estimate risks, evaluate severity and resolve a variety of big data challenges.

It's also important to establish a culture for attracting and retaining the right talent. Vojtech Kurka, CTO at customer data platform vendor Meiro, said he started off imagining that he could solve every data problem with a few SQL and Python scripts in the right place. Over time, he realized he could get a lot further by hiring the right people and promoting a safe company culture that keeps people happy and motivated.

8. Keeping costs from getting out of control

Another common big data



challenge is what David Mariani, founder and CTO of data integration company AtScale, refers to as the “cloud bill heart attack.” Many enterprises use existing data consumption metrics to estimate the costs of their new big data infrastructure – but that’s a mistake.

One issue is that companies underestimate the sheer demand for computing resources that expanded access to richer data sets creates. The cloud in particular makes it easier for big data platforms to surface richer, more granular data, a capability that can drive up costs because cloud systems will elastically scale to meet user demand.

Using an on-demand pricing model can also increase costs. One good practice is to opt for fixed resource pricing, but that won’t completely solve the problem. Although the meter stops at a fixed amount, poorly written applications may still end up eating resources that impact other users and workloads. So, another good practice lies in implementing fine-grained controls over queries. “I’ve seen several customers where users have written \$10,000 queries due to poorly designed SQL,” Mariani said.

CloudCheckr’s Rehl also recommends that data management teams raise the cost issue upfront in their discussions with business and data engineering teams about big data deployments. It’s the responsibility of the business to define what it is asking for; software developers should be responsible for delivering the data in an efficient format, and DevOps is responsible for ensuring the right archival policies and growth rates are monitored and managed.

9. Governing big data environments

Data governance issues become harder to address as big data applications grow across more systems. This problem is compounded as new cloud architectures enable enterprises to capture and store all the data they collect in its unaggregated form. Protected information fields can accidentally creep into a variety of applications.

“Without a data governance strategy and controls, much of the benefit of broader, deeper data access can be lost, in my experience,” Mariani said.

A good practice is to treat data as a product, with built-in governance rules instituted from the beginning.

Investing more time upfront in identifying and managing big data governance issues will make it easier to provide self-service access that doesn’t require oversight of each new use case.

10. Ensuring data context and use cases are understood

Enterprises also tend to overemphasize the technology without understanding the context of the data and its uses for the business.

“There is often a ton of effort put into thinking about big data storage architectures, security frameworks and ingestion, but very little thought put into onboarding users and use cases,” said Adam Wilson, CEO of data wrangling tools provider Trifacta.

Teams need to think about who will refine the data and how. Those closest to the business problems need to collaborate with those closest to the technology to manage risk and ensure proper alignment. This involves thinking about how to democratize the data engineering. It’s also helpful to build out a few simple end-to-end use cases to get early wins, understand the limitations and engage users.



FOUR SUPPLY CHAIN PREDICTIONS FOR 2022

Kevin Beasley, CIO at VAI, oversees the corporation's overall technology strategy.

December 29, 2021 • Forbes • Kevin Beasley

Another holiday season with an overloaded supply chain is bad news for retailers and business leaders — if nothing else, it means we have spent the entire year battling supply chain disruptions. From the 42% increase in cyberattacks in the first quarter to port congestion and labor shortages, business and supply chain leaders faced more than their share of challenges in 2021.

But the year also presented opportunities for organizations to learn and adapt to unexpected circumstances. This includes some CIOs and their IT teams who were tasked with managing the shift in security infrastructure requirements for remote work. Meanwhile, food industry suppliers had to keep pace with fluctuating demand while organizations across industries deployed supply chain technologies to help keep their businesses afloat.

As the year draws to a close,

it's past time to take stock and look ahead to the challenges and opportunities in store for the supply chain in 2022.

What's in store for the supply chain in 2022?

Many of the supply chain issues that arose in 2021 will continue to complicate operations, and business and supply chain leaders must prepare now for 2022. While it's difficult to make predictions in this volatile supply chain market, here are four likely scenarios you can expect to become realities.

1. Continued Supply Chain Issues

The current supply chain landscape is not going to fix itself on January 1. The global paper and plastic shortage is spilling over into the new year, driving down the stock of items like straws and food packaging. Industries like manufacturing, transportation and warehousing are struggling to find

workers, which directly impacts supply chain operations. This means continued order delays, supply shortages and potentially unhappy distributors, retailers and consumers.

2. Automation To Fill The Labor Gap

In 2021, warehouse managers and leaders continued investing in automation technology to perform tasks such as inventory counts and product restocking. Additionally, we have seen automation paired with artificial intelligence (AI) to complete more complex tasks, such as self-driving trucking and analyzing workflows.

Since businesses are implementing automation for more strategic and complex initiatives, the technologies can also be used to aid the understaffed workforce. Automation will not replace the need for human workers, but rather complement human activity

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in warehousing, trucking and other industries along the supply chain. It is no surprise that warehouse automation software and systems are anticipated to become a \$47.4 billion market by 2023.

3. An Even Greater Emphasis On Security

In 2021, businesses saw a 10% increase in the average cost of a data breach and a record-high number of data compromises. As many organizations continue to operate in a hybrid environment, security remains top of mind.

Cybercrime is evolving, and it does not appear to be abating anytime soon. Historically, only larger enterprises were targets of these crimes, but smaller businesses have been under siege just as frequently this year — and will likely continue to be targeted in the new year. The past year taught us that many legacy ways of protecting data are no longer enough to maintain secure operations, especially in remote or hybrid workplace environments. Security cannot be an afterthought, but will continue to come first in every business strategy and initiative.

4. Increased Spending On Supply Chain Technology

Nearly half of supply chain leaders increased spending on technologies such as predictive

analytics and AI during the pandemic. Spending will likely continue to climb in 2022 considering the operational efficiency it provides and its other time-tested benefits.

Over the past several years, many organizations turned to cloud-based enterprise resource planning (ERP) software for a more secure and reliable way to map out and oversee supply chain operations. Mobile support for ERP solutions is becoming ubiquitous, especially as organizations continue to operate in a remote or hybrid environment. 2021 underscored the ability to access critical information in real time, from anywhere.

Lastly, anticipate the cloud to increasingly become a common tool for smaller businesses as it is for larger organizations.

Prepare for 2022 with a technology-focused approach.

As we look ahead to 2022, there is a lot to consider: how to anticipate supply shortages, how to maintain customer loyalty — the list goes on and on. While it's not feasible to prepare for every possible supply chain disruption, you can shore up cybersecurity and equip your workforce with the right technology. Consider

these initiatives as the new year approaches.

- *Prioritize security in everything your business does, from the technology you adopt to the remote work protocols you implement.*
- *Research and invest in the right supply chain technologies or solutions for your organization.*
- *Invest in upskilling and reskilling your current workforce to promote internal mobility and combat labor shortages.*
- *Implement cloud-based solutions to improve operational efficiency and monitor supply chain performance.*
- *Manage customer expectations realistically — account for delays and shortages using innovative technologies like predictive analytics.*

Moving further into 2022, many of the supply chain woes we faced in 2021 will continue to hinder operations. However, the past year equipped us with the knowledge and experiences to maintain operational efficiency and continue business growth. With this knowledge, we can navigate 2022 with confidence, a skilled workforce and a technology-driven strategy.

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CLOUD TRENDS AND CHALLENGES FOR 2022

Businesses and enterprises are meeting challenges and finding ways to use the cloud most effectively.

January 18, 2022 • DevPro Journal • Bernadette Wilson

By 2025, the volume of data stored in the cloud will reach 100 zettabytes – and half will reside in the cloud. Jake Lindquist, Product Marketing Manager at Ensono, comments, “After two volatile years and an uncertain future, enterprises will limit capital investments in traditional three-tier data centers. The shift to hybrid cloud environments has been occurring for many years, but flexibility and adaptability are required for survival and not just innovation.”

He adds that private cloud has also become an essential part of business’ cloud strategies. “The options to build independently or outsource to service providers make it more attainable and appealing. Enterprises will continue to see value in utilizing private cloud for at least the next decade.”

As companies continue their

migration away from on-premises data centers, the following industry experts have identified cloud trends – and challenges – stacking up for 2022.

Look for These Cloud Trends and Challenges This Year

Joe Scioscia, VP of Sales at VAI:

“One of the biggest challenges cloud providers face in 2022 is the rapid transformation of the digital sector. Everyone wants to be in on the action, but the methods for which organizations can transition to cloud aren’t one size fits all. The cloud market will need to become even more flexible in the years ahead. This includes taking holistic approaches to security and data storage, offering real-time security monitoring, analytics and more to help businesses get the most from the cloud. This becomes even more important when considering that remote work isn’t just a

pandemic coping mechanism – it’s here to stay, and it isn’t going anywhere.”

Dan Lawyer, Chief Product Officer at Lucid:

“In the first six months of 2021, cloud app adoption increased 22 percent, with the average company using 805 distinct apps and cloud services – 97 percent of which were unmanaged. As cloud adoption increases and the cloud becomes more complex in 2022, tools to help developers understand and organize their cloud environment will become necessary and take over the market. Visual solutions that help them see their cloud infrastructures, detect and troubleshoot outages, and make changes in real-time will emerge as a better way to tame the cloud chaos – and make cloud management via spreadsheets obsolete.”



Marco Palladino, CTO and Co-Founder, Kong Inc.:

“Large, tech-savvy organizations are becoming much more judicious in how they use the cloud and will increasingly repatriate from their ‘all in cloud’ stance. We’ll start to see this shift happening in 2022. In much the same way that enterprises have embraced open source software and have opted to do it themselves, tech-savvy companies are beginning to realize they can run their own private cloud better and just use the public cloud for specific use cases such as usage bursts. Bank of America is one significant example of how a company can use private cloud to lower its IT costs, and I expect more large organizations will explore similar private cloud uses.”

Duan van der Westhuizen, SVP Public Cloud at Ensono:

“Enterprises will continue to embrace cloud-native architectures to accelerate digital initiatives. Serverless technologies like AWS Lambda and Azure Functions allow for rapid development in a pay-as-you-go model without the need to deploy separate cloud infrastructure. Incorporating these technologies into agile methodologies in 2022 will accelerate speed to market and improve developer effectiveness while removing complex and

lengthy IT infrastructure decisions from app development cycles.”

Dustin Milberg, Field CTO Cloud Services, InterVision:

“For organizations to be successful in the cloud journey, they need to shift from an IT mindset to an engineering mindset. This does not mean swapping out people. Rather, it’s necessary to invest in existing resources by teaching the skills that are critical to leverage the cloud while balancing cost, quality, and security.”

“Over the last 18 months, employees have been forced to become more self-reliant to address their own end-user computing needs. Most employees are now digital natives and fairly self-sufficient, which reduces the burden for corporate IT staffing. The current trends point to organizations beginning to phase out corporate IT and leverage strategic solution providers for tactical tasks like service-desk, unified communications, infrastructure, cloud services, etc. In turn, they will use the cost and resource savings to re-tool and become engineering organizations, strategically aligned to the measurable business outcomes.”

Sean McDermott, founder and CEO of Windward Consulting Group:

“Cloud access brokers have been around for a while, but there will be a big rise in this area as SaaS platforms are more prevalent in large enterprises but present significant security challenges. This technology provides a level of connection between systems and the cloud and creates necessary access controls to protect critical data.”

The Bottom Line: Cloud is the Competitive Path

Overall, industry leaders see enterprises gaining an advantage with the cloud. Rajiv Kanaujia, VP Operations at CloudCheckr, summarizes, “When Tesla started to use Giga Press for building large casing (car bodies), it was breaking away from the traditional car-building approach. Now the same strategy is being adopted by half a dozen car companies.”

“On the same line, I believe that the battle between traditional IT and cloud-native or cloud-centric IT approaches will continue and will get more heated,” Kanaujia says. “The winners will be companies that moved to cloud-native or cloud-centric IT approaches before others, gaining competitive financial leverage. The leverage gained will be used to develop new products and offerings and grow the company.”



NO END IN SIGHT FOR SUPPLY CHAIN HEADACHES

Like a dark shadow, supply chain challenges are following us into 2022.

February 8, 2022 • Industrial Distribution • Anna Wells

It was late December when Transportation Secretary Pete Buttigieg announced he'd be awarding more than \$241 million in grants to bolster U.S ports, with the amount of money for similar projects set to double in 2022.

It was a decision welcomed by many industry stakeholders, though the overall prospects were clear: the complexity of the supply chain problems facing American businesses will require more than just an influx in cash. The World Bank recently downgraded its outlook for the global economy, blaming ongoing bottlenecks in global supply chains as a key factor being compounded by increasing COVID-19 outbreaks heading into 2022. Add to it the worker shortage that's added to transit bottlenecks and scarcity of labor supporting manufacturing production and there's a snarled mess that poses a continued

headache for distributors. But in a recent article for Forbes, Kevin Beasley, CIO at VAI, a cloud-based ERP provider, says the challenges inherent in the global supply chain crisis are also presenting another side: opportunities. Beasley stresses that, while the past year has been difficult, it has simultaneously "equipped us with the knowledge and experiences to maintain operational efficiency and continue business growth." So what can distributors do to maintain some momentum amidst this ongoing issue?

Ongoing Flexibility

Nobody has a better view of the front lines of this battle than an independent distributor and, according to Lockport, NY-based buying group NetPlus Alliance, the impacts are becoming more and more apparent.

In NetPlus Alliance's latest Industry Outlook survey of its members (conducted in 4Q21), nearly 74% of its distributors reported worsening supply-chain problems compared with the first half of 2021, including longer lead times due to material shortages, high freight and shipping costs, limited production and unpredictable delivery.

Dan Judge, Chairman of NetPlus Alliance said that "many members are reporting higher inventory dollar amounts, including holding more inventory to meet the needs of customers and the rising costs of products. Supply-chain uncertainty leads some distributors to increase stock to serve as a buffer against price increases, long lead times, and lack of availability."

And pivots are happening on the customer side as well. Judge also noted that one of the



members said that customers are generally willing to pay more to keep production running, so they have become good sourcers of products and have offered alternatives.

We've Been Here Before... Kind Of

For Sleek Technologies CEO Mike Nervick, disruption and evolution have always held a place in the supply chain, whether or not we acknowledge it in comparison to today.

“Although many logistics companies have become seasoned pros at managing unforeseen challenges,” says Nervick, “you’d be hard-pressed to find a shipper, carrier or third-party that isn’t happy to see 2021 in the rearview mirror.”

But with the rearview looking similar to the road ahead, what’s a distributor to do to mitigate another nightmare scenario?

“2022 is shaping up to be just as strenuous,” admits Nervick. “Logistics industries have been working as hard as possible to find ways to alleviate many of the headaches they experienced this year – which is why technology will likely be one of the key talking points in the year ahead.”

Sleek Technologies, a leader in freight procurement automation, takes a new approach to an old process, dynamically sourcing compliant, asset-based capacity when needed most. Shippers set 80+ configurable attributes that dynamically open qualified capacity.

According to Nervick, the logistics industry has been stuck in “tried and true” ways of doing business for far too long. And while there’s something to be said about sticking with what works, as the world speeds up, logistics companies have fallen farther behind: “The unpredictability that’s taken hold of the market place over the last 18 to 24 months has highlighted just how antiquated the processes that logistics companies have relied on have become,” he says.

The good news, adds Nervick, is that many companies are starting to realize the need for them to overhaul their operations and processes – particularly when it comes to digital. “Companies industry-wide have begun to embrace sophisticated computing as a way to facilitate smarter decision-making and increase their agility – which is why the AI in logistics market is set to experience a 15.8 percent CAGR

from 2020-2025. As the supply chain crisis rumbles on into 2022, expect more and more shippers, carriers and third parties to lean heavily on technology as they look to bolster OTD performance, unlock capacity and manage costs, among other priorities.”

Automation to “Complement Human Activity”

Beasley of VAI also tells Forbes that technology investments can bridge the gap in many cases. This includes using automation as a way to plug labor shortages. Says Beasley, “Automation will not replace the need for human workers, but rather complement human activity in warehousing, trucking and other industries along the supply chain. It is no surprise that warehouse automation software and systems are anticipated to become a \$47.4 billion market by 2023.”

He adds that cybersecurity, a long-standing need that is so often pushed to the backburner, is even more critical now as attacks on businesses increase and remote work increases vulnerability. And as companies lean into these improvements, where applicable, they should encourage supply chain partners to do so as well. After all, a supply chain is only as strong as its weakest link.



THE ONLY THING WORSE THAN A RANSOMWARE ATTACK? MISHANDLING ONE

Kevin Beasley, CIO at VAI, oversees the corporation's overall technology strategy.

March 10, 2022 • Forbes • Kevin Beasley

Imagine starting your workday and your screen suddenly goes dark. It turns out a hacker has encrypted the files on your device and the only way to stop them from leaking the information is to pay up — fast.

While you hope to never see your business fall victim to a ransomware attack, organizations experienced 17% more incidents in 2021 than they did in the previous year. Using a form of malicious malware, a hacker encrypts the files on an organization's device and threatens to leak the information unless the victim pays a ransom. And no one is safe from these attacks: Organizations of all sizes and industries are at risk.

In addition to the ransom itself, ransomware attacks pose an added risk of disruption, downtime, lost revenue and customer distrust. Now, more than ever, you need to prioritize security. But you also

need to know what to do in the event of an attack.

The Aftermath Of A Ransomware Attack

The world's largest meat supplier, JBS Foods, fell victim to a ransomware attack in May 2021. The company recovered with the help of consultants and government officials, but not before the attack wreaked havoc on the entire organization's operations.

The incident unleashed a domino effect, causing plant shutdowns, increased wholesale prices and, ultimately, an \$11 million loss in ransom. This type of attack also has a negative impact on customer trust. On average, more than two-thirds of consumers lose trust in an organization after a data breach.

This is just one example of the millions of ransomware attacks

that occur every year. In 2021, ransomware attacks climbed 158% in North America alone. And more than just the frequency is increasing — ransom demands are also growing.

What does this mean for your organization? Simply put, cybersecurity cannot be an afterthought. You need to proactively shore up cybersecurity measures, prioritize security in all business initiatives and ensure your cybersecurity coverage is in place. To get started, consider these tips:

- **Ensure** an enterprisewide understanding of security measures through training.
- **Require** multifactor authentication (MFA) and complex passwords for login.
- **Implement** network

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segmentation.

- **Update** software and scan for vulnerabilities regularly.
- **Administer** endpoint and detection response tools.
- **Ensure** that your cyber insurance policy is in place.

Operating under cybersecurity best practices can significantly reduce the likelihood of falling victim to an attack, but there are no guarantees. Considering the rise in frequency and severity of these attacks, you also need to have a thorough response plan in place.

Your Data Has Been Compromised. Now What?

In the event of a data breach, an agile and informed response can go a long way. Fast action not only helps mitigate the consequences of the breach — it can also help you regain affected customers' trust more quickly. Contact authorities such as CISA and contact your insurance company.

The Federal Trade Commission (FTC) provides regulatory guidelines explaining the steps businesses should take in the event of a breach. Your actions may vary slightly depending on the severity of the incident, but in most

cases, you should follow these steps:

- **Take equipment offline.** To avoid further data loss, pull all affected equipment offline immediately — but do not turn any devices off until a forensic expert is present. If viable, replace affected equipment, update credentials, and carefully monitor entry and exit points.
- **Secure systems.** The next thing you need to do after discovering a ransomware attack is to fix vulnerabilities that could have led to the breach. Change computer passwords and secure physical areas, including switching access codes if needed.
- **Call in a team of experts.** In all instances, but especially when dealing with a severe data breach, you need to work with a team of experts to create a comprehensive response plan. This may include forensics, IT, information security, human resources or legal teams. Also, consider hiring a third-party investigator to identify the source of the breach. Refer to your legal counsel to ensure compliance with regulations that may be connected to a breach.
- **Remove posted information from the web.** Bad actors often

post stolen data on the victim's website or other sites. Search your company's name and the exposed data to ensure the information is not located anywhere else. You may have to contact the administrator of another website if the information needs to be removed.

- **Interview and investigate.** Speak with the person who discovered the breach and anyone else who may have knowledge about the incident. If your organization has a customer service center, communicate with staff so they know where to relay important information regarding the breach. Most importantly, do not destroy evidence during the investigation.
- **Address vulnerabilities.** Consider the service providers you work with. What personal information do they have access to? Ensure your providers have appropriate access privileges, and if they were involved in the breach, make sure they are taking the required steps to prevent a future breach. Verify that they fix their own vulnerabilities before continuing the partnership. Additionally, evaluate whether your network segmentation was successful in containing the breach and make changes

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accordingly.

- **Communicate clearly.** All states have regulatory guidelines in place regarding who you should notify in the event of a breach (e.g., other businesses, stakeholders or customers). Check federal, state and local laws for additional requirements. Prepare a thorough communication plan, because after discovering a

ransomware attack, people will have questions and concerns. Explicitly state how the breach happened, what information was stolen, what actions you are taking to address the breach and what actions you will take to protect victims of the attack (e.g., offering free credit monitoring services).

With the number of ransomware attacks on the rise, it is essential

to practice safe computer habits and understand the steps to take in the event of a breach. Ensure all members of your organization are aware of cybersecurity best practices and policies and consistently remind people to remain vigilant. Preparation is key, so start today to minimize the chance of falling victim to a ransomware attack.

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HOW ERP TECHNOLOGY HELPS REDUCE COLD CHAINS' GROWING CARBON FOOTPRINT

For enterprises that touch the cold chain, reducing their carbon footprints begins with creating more efficient and sustainable supply chains.

March 16, 2022 • Food Logistics • Pete Zimmerman

Discussions about supply chain sustainability have taken center stage in recent years, forcing organizations to rethink the practices responsible for their carbon footprints. Indirect emissions, which are created by supply chain activities like transportation and distribution, comprise up to 90% of an organization's greenhouse gas (GHG) emissions each year, and the amount of GHGs will continue to rise unless action is taken.

Supply chain disruption is closely linked to GHG emissions, but only when supply chain operations are inefficient. Disruptions frequently delay a project, requiring additional energy and resources. If an organization is not able to prepare for or mitigate a delay, such a disruption can harm their bottom line. Unfortunately, disruption can always be around the corner, from shifts in demand and severe

weather to pandemic-driven interruptions such as materials shortages.

The issue is even more complex for professionals in the cold food and beverage supply chain, which is complicated by the logistics of distributing, storing and transporting temperature-controlled products. For enterprises that touch the cold chain, reducing their carbon footprints begins with creating more efficient and sustainable supply chains.

The disruption-prone cold chain is unsustainable

Food systems across the globe account for one-third of human-produced GHG emissions each year, primarily stemming from activities along the supply chain. In each product lifecycle, operations related to fuel and energy consumption, the processing of goods and transportation are

continuously emitting gasses into the atmosphere. Cargo transportation alone accounts for 10% of annual global GHG emissions.

The carbon footprint of these activities grows when the supply chain is interrupted. Disruption frequently results in delayed or extended project timelines, which inevitably means organizations must pour additional energy and resources into the project.

For example, when an unforeseen winter storm slammed Texas in February 2021, it created a domino effect of supply chain turmoil and unsustainable operations. During this time, warehouses had to store excess inventory, manufacturing operations stopped and poor road conditions created long lead times, meaning trucks used more fuel than normal. Additionally,



cross-border shipments that ordinarily take a day required at least 2-3 days. Although these issues can occur in any supply chain, cold chains require different energy-intensive processes and face additional challenges in maintaining food freshness and quality.

Cold chain professionals face a double challenge: They need temperature-controlled storage and distribution for food and beverage products, which are costly and can create a significant carbon footprint. But the cold chain is also fragile. From the moment a food product is harvested or manufactured, there's a risk it can reach unsafe temperature during transit or distribution. When disruptions occur — if operations are inefficient or workers are unprepared — food and beverage products spoil and must be thrown away.

The food waste that stemmed from the Texas winter storm disruptions in 2021 was valued in the millions of dollars, including items thrown away due to transportation issues. Food waste also presents a significant environmental concern because when you waste food, you also waste the water and energy it takes to grow, package, and transport it.

The bottom line? To reduce GHG emissions from the supply chain, enterprises need to embrace more sustainable practices.

4 ways an ERP system can boost efficiency and sustainability

Sustainability and profitability in the supply chain are linked, but only with information technology such as enterprise resource planning (ERP). ERP enables organizations to operate more efficiently by using real-time information for insights into operations.

Here are several ways ERP can help organizations create more efficient operations and reduce their carbon footprints.

1. Make more accurate predictions.

Predictive analytics use machine learning, artificial intelligence (AI) and statistical algorithms to analyze internal and external data. The resulting insights can be stored in a cloud-based ERP system to forecast future trends more accurately, such as a time of year when a certain food product is not in high demand. As a food supplier, this helps you scale back accordingly to avoid food waste.

2. Coordinate more accurate

shipping routes.

Predictive analytics can be deployed to optimize trucking and cargo shipping routes. When unexpected disruption occurs, such as traffic or severe weather, real-time data is the key to optimized routes. AI paired with route optimization software enables real-time rerouting while collecting data to inform future decisions. By determining the most efficient shipping routes, organizations can reduce fuel usage and prevent perishable items from spoiling by delivering orders in a timely manner.

3. Increase visibility with operational insights.

A lack of real-time visibility is a key contributor to operational inefficiency. But sensor technology such as Internet of Things (IoT) devices can be connected to an ERP system for real-time information about each point in the supply chain. Picture this, a loading dock is backed up and cannot handle its next scheduled shipment. However, the transportation team in charge of the shipment is not aware of this, so they arrive at the dock with a cargo ship full of perishable goods. This further congests the port while the perishable goods spoil due to warm temperature exposure. If each party along a



supply chain has access to real-time updates, this type of situation can be avoided.

4. Measure sustainability KPIs

Enterprises along the supply chain have started to build sustainability KPIs into their ERP systems to calculate and record the environmental impact of business initiatives (e.g., greenhouse gas emissions per unit of revenue). Documenting these types of

KPIs not only helps identify areas of improvement in terms of sustainability, but also helps you sell products. Clearly labeling products with consumer-friendly sustainability KPIs is an effective selling point considering 73% of U.S. consumers factor a product's sustainability into their purchasing decisions.

Conversations around supply chain sustainability are not going away

anytime soon. Enterprises need to take a step back and rethink how their activities are impacting their carbon footprints, especially organizations that operate along the cold chain. Ultimately, creating more sustainable supply chain operations not only reduces your carbon footprint — it also positions your business for long-term efficiency and success.



LONG PANDEMIC AND LOCAL COMMERCE: EXPERT ROUNDUP

March 24, 2022 • Street Fight • Joseph Zappa

Street Fight's core focus is localized commerce and marketing: how brick-and-mortar businesses use technology to connect with customers. This month, we're covering the continued impact of the pandemic on that space. To that end, three martech and retail tech leaders from VDX.tv, CatapultX, and VAI expound on the pandemic and local commerce in this expert roundup.

Justin Worster, Vertical Lead, Restaurants, and Senior Performance Strategy Manager, VDX.tv

The restaurant industry in 2022 continues to be impacted by shifts in dining preferences and behavior, but some pandemic consumer habits are here to stay. For example, online ordering has remained strong as a majority of consumers have maintained their takeout habits. Compared to 2019, online order volumes are up 70%.

Our data shows that the

demographic with the highest lift for online ordering during lunch hours are under 40, bring in median household incomes, and work in a service industry. The consumers that fall within this demographic fully embrace e-commerce and are adapters of all things digital. The online ordering audience is a sizable group that restaurant advertisers cannot afford to ignore, and digital advertising is one of the best ways to reach them.

Numerous restaurants have recognized the value of the repeat customer and are seizing the opportunity to invest in customer loyalty by developing loyalty programs and/or mobile apps that keep consumers faithfully placing takeout orders. According to the Paytronix Annual Loyalty Report 2021, there has been a 6% increase in spend per check among loyalty vs. non-loyalty guests, and loyalty programs have been shown to consistently boost visits by 18-30% per enrolled

member. Yum! Brands reports a similar trend, with Taco Bell's Rewards Program leading to an increase in overall spend of 35% for active customers vs. their pre-loyalty purchase behavior.

Zack Rosenberg, CEO, CatapultX

When people think of mom-and-pop shops, they usually think of simplicity. Maybe of small towns and being served with a smile? But, the mom-and-pop shops of today have adapted and changed with the times, whether it's through social media or a new way of looking at things. They have to in order to stay afloat.

What people often forget is how impactful SMB advertising can be. Did you know that 60-65% of all of the revenue generated by Facebook and Google comes from small businesses? That's hundreds of billions of dollars a year!

What local business consumers may not be thinking about is how

STREET FIGHT



artificial intelligence is already helping local businesses serve their audience. And it's not just the tech-savvy businesses but regular small businesses, too. Here are some examples of how AI is affecting local commerce.

Social Media Management

More and more, people are using social media to find out about local businesses. This means that, if you own a local business, creating content that AI algorithms will pick up is paramount.

Customer Service

Some local businesses are using chatbots powered by AI to provide customer service. This can free up employees' time so that they can focus on other tasks.

Video Advertising

AI is helping small business advertisers to better target local consumers. Advertisers can now use AI to identify the best time to show ads as well as to personalize ad content.

Over 80% of internet traffic is

against video content, but only 25% of advertisers can afford to create video assets. This means the disparity between the haves and have-nots grows as new video formats such as CTV grow in popularity. AI can help anyone with a logo, some copy, and a link to become a video advertiser.

Joe O'Hea, Sales and Account Manager, VAI

The pandemic sparked a realization in many businesses, big or small, that the only way to keep up with the demand of today's e-commerce and supply chain landscape is by implementing modern technology. Fast delivery, curbside pickup, and mobile shopping have transformed consumers' expectations, forcing businesses to adopt tools with e-commerce functions like ERP and IoT to streamline supply chain operations.

Now, as the pandemic begins to wane, the need for these technologies and transformation continues to hold true. More manufacturers are making the

switch to cloud-based, integrated ERP, with predictive analytics and AI, to gain clear visibility into warehouse production and distribution lines. As a result, products are shipped to distributors faster and are received by consumers in a more timely and efficient fashion, ultimately resulting in stronger customer loyalty and higher profits.

In addition, large retailers are coming up with innovative technologies and techniques to speed along the commerce process like Amazon's "Just Walk Out" technology. The pandemic accelerated consumers' online shopping habits and as a result, more retailers are turning to technologies to streamline quicker, more efficient shopping experiences. Moving forward, we can expect to see more advancements to the technologies that really took off during the pandemic, including improvements to contactless payments and curbside pickup to better the overall customer experience.

STREET FIGHT



7 WAYS TO IMPROVE DATA FOR SUPPLY CHAIN DIGITAL TWINS

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Enterprises are beginning to create digital twins of different aspects of their supply chains for simulation purposes. Various approaches to supply chain twins show tremendous value in sorting out supply chain bottlenecks, improving efficiency and meeting sustainability goals.

“Digital twins can be used to create digital copies of product lines, manufacturing systems, warehouse inventory and other processes that are then analyzed – allowing supply chain managers to extract data, predict supply and demand and streamline operations,” said Kevin Beasley, CIO at Vormittag Associates Inc., a company that offers integrated enterprise resource planning (ERP) solutions for databases.

Digital copies can mirror supply chain touchpoints, helping to streamline business operations by pinpointing the exact processes taking place. By implementing digital twin technology to align with

ongoing supply chain touchpoints and operations, companies can gain better insights into how to pivot and manage hiccups.

But enterprises face numerous challenges in transforming raw supply chain data into living, breathing digital twins.

“As supply chains continue to build up more data than ever before, the adoption of IoT technology and predictive analytics tools to capture and process this data and drive business insights has become increasingly important to the success of digital twins,” Beasley said.

Things are starting to improve. In the past, the use of digital twins was more challenging to implement as supply chain segments were more separated and data was siloed. Now, with the rise of cloud-based systems and automated supply chain management tools, digital twins are becoming increasingly

useful to predict trends, manage warehouse inventory, minimize quality faults and integrate one seamless flow of data.

Moving forward, Beasley expects to see the use of digital twins evolve alongside artificial intelligence (AI)-enabled modeling and IoT technology. For example, while IoT devices and sensors located throughout the supply chain have expedited the use of data to drive predictions on supply chain trends, the use of AI would make this system even more powerful.

As AI-enabled models advance, manufacturers will be able to utilize data insights and create digital twin technology that can transform their ability to streamline operations, predict inventory and cut down on waste.

Here are seven ways to transform raw data into actionable supply chain twins:

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800.824.7776 | sales@vai.net | www.vai.net

Start with digital threads

Jason Kasper, director of product marketing at product development software provider, Aras Corporation, explains that it is essential to include the digital thread when planning out a digital twin. These must work in concert for practical analysis and decision-making within the supply chain.

In the context of a supply chain, he sees a digital twin as a representation of the configuration of all assets, including warehouses, manufacturing and supplier facilities, trucks, ships and planes. It also links to digital thread data such as inventory, location status and condition of assets.

By developing the backbone for a digital thread, organizations can weave together meaningful relationships, connections, decisions and who made them.

“Creating this complete view enables a full understanding of a specific supply chain’s status and the actions to keep it operationally efficient,” Kasper said.

Move from tables to graphs

Most enterprise applications capture data and put it into tables and the relationships or links between objects represented

by the data are only revealed when you execute a query and join the data — and joins are computationally expensive, according to Richard Henderson, director of presales EMEA at TigerGraph.

As a query grows in scope and complexity, this overhead makes queries across any reasonably sized digital twin too slow to be useful in the operational context, taking hours or even days. Businesses such as luxury vehicle manufacturer, Jaguar Land Rover, have found they can get around this problem by building their digital twin using a graph database.

When Jaguar Land Rover attempted to build a model of its manufacturing supply chain using SQL, testing revealed that it would take three weeks to run one query to view their supply chain for one model of a car over six months. When they built the model in TigerGraph, the same query took 45 minutes and with further refinements, this is being brought down to seconds.

A graph database approach allowed them to visualize relationships between business areas that previously existed in silos to identify critical paths, trace

components and processes in greater detail than ever before and explore business scenarios in a safe, sandbox environment.

Keep pace with data drift

Another big challenge for digital twins is data drift, said Greg Price, CEO and cofounder at Shipwell, a cloud based TMS solution provider. Teams need to ensure the data collected for the digital twin accurately and consistently represents the true conditions of the physical twin. Additionally, having the best quality data is key to deriving full value from a digital twin. This is slowly getting better as teams move towards streaming analytics, but the practice is not yet prevalent within the industry.

It is also not just the ability to have the data but the ability to understand it. Without good behavioral understanding, the interpretations run the risk of being off base, which can lead to poor decision-making. Companies need to build competency to understand how data drift can occur across the supply chain and then develop countermeasures to minimize its impact across each aspect of the supply chain, such as pricing and route management.

Bridge data silos

Because data is not standardized



and the digital systems used to manage the supply chain, such as ERP systems or warehouse management systems (WMS), were not created to be connected or share information.

Sam Lurye, CEO and founder of Kargo, a supply chain logistics and data solutions platform, explained that, “The biggest challenge in exchanging data is that it is extremely siloed across the supply chain.”

New companies are emerging to solve for this problem and they do so in one of two ways: aggregating existing data or generating a new data source.

Project44 is an example of a company that aggregates data from antiquated systems and makes it operational. Companies like Samsara and Kargo build their own unique data sources that create a source of truth with real-time, accurate data. The more real-time data you have, the better the digital twin.

Improving 3D capture

Even when supply chain twins are focused on modeling the relationships between suppliers and distributors, they can benefit from better 3D models representing products, processes

and facilities.

“When new items are introduced in a supply chain, as they often are in such a dynamic environment, there’s the challenge of ensuring that all components are continuously updated, as the representation must work hand-in-hand with the data to maintain the correctness of this solution,” said Ravi Kiran, CEO and founder of SmartCow, an AI engineering company.

Efforts in photogrammetry are attempting to tackle the issue through automation, but the technology has to evolve before it can be used in complex supply chain applications.

Include subject-matter experts

It takes a concerted effort to integrate with appropriate systems to ensure a robust digital twin is configured.

“The challenge to making this work well is having the required subject-matter experts step back from the daily management of the supply chain and its processes to support the configuration of the digital twin,” said Owen Keates, industry executive for Hitachi Vantara’s manufacturing practice.

These experts understand how

real-world processes integrate into the flow between ERP, supplier and third-party logistics systems, through to point-of-sale systems.

“Such investment in time from supply chain specialists will ensure that not only is the digital twin a true representation of the real world, but it also gets the team deeply invested in the digital twin and expedites the adoption of the digital twin process,” he added.

Leverage the cloud

Cloud providers are starting to provide a staging ground for consolidating supply chain data across business apps and even across partners. For example, Google Supply Chain Twin brings together data from disparate sources while requiring less partner integration time than traditional API-based integration.

“Since Google Cloud launched Supply Chain Twin, customers have seen a 95% reduction in analytics processing time, with some companies dropping from two and a half hours down to eight minutes,” said Hans Thalbauer, Google Cloud’s managing director of global supply chain, logistics and transportation.

Until recently, large companies only exchanged data based on



legacy technologies like EDI. A cloud-based approach can not only improve data sharing across partners, but it can also lower the bar for weaving in contextual data about weather, risk and customer sentiment to gain deeper insight into their operations.

“Our vision for the supply chain is to change the world by leveraging intelligence to create a transparent and sustainable supply chain for everyone. Building an ecosystem with partners on data, applications and implementation services is a top priority to enable this vision,” Thalbauer said.

Supply chain leaders are also starting to take advantage of

Microsoft’s digital twin integrations.

“Microsoft Azure could be a game-changer for many industries that rely on internal and extraneous data sources for their planning and scheduling,” said Yogesh Amraotkar, managing director of NTT Data’s supply chain transformation.

Azure also provides tools that make it easier to combine real-time sensory data using IoT Hub with the visualization of the supply chain elements with IoT Central.

Blue Yonder’s software-as-a-service solutions for the supply chain are built on the Microsoft Azure Cloud, which is growing

rapidly across the globe.

“Supply chain planning in the cloud, in the form of SaaS solutions, has already become the norm in the supply chain software industry,” said Puneet Saxena, corporate vice president of global manufacturing high-tech at Blue Yonder, a supply chain management provider.

Linking an ecosystem of data providers still requires time and implementation effort, but once established, these automated linkages can keep operating successfully without excessive human effort and trends in this vein of technology are likely to continue.



CAN CLOUD-BASED TECHNOLOGIES HELP BRIDGE THE LABOR GAP?

Kevin Beasley, CIO at VAI, oversees the corporation's overall technology strategy.

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A labor shortage of 4.6 million workers—the greatest since the World War II era—is plaguing industries from IT services to manufacturing. To compensate for the lack of labor, employees are forced to wear multiple hats and are so preoccupied with day-to-day operations that they might lack time to innovate. High employee migration also increases the pace at which new talent enters the organization, widening skills gaps and potentially creating operational inefficiencies due to miscommunication and learning curve challenges.

While engagement initiatives should be top of mind for employers in 2022, even the most effective retention strategies may no longer be enough to maintain steady business growth. Bridging the labor gap is about helping a limited workforce through cloud-based applications and

services, including enterprise resource planning (ERP) and IT management. By taking advantage of the resources and services that can perform tasks and automated business functions with cloud technologies, organizations can alleviate the impact of labor shortages and focus on what they do best—run their business.

Why Labor Shortages Are Hindering Innovation

The impact of the current labor shortage on innovation can be significant because the inability to innovate may significantly harm your organization's bottom line due to spending all of your time just keeping up with your current tasks. By not exploring new ways to operate, you can lose your competitive edge. In fact, without more technical workers, U.S. companies could miss out on more than \$160 billion in annual revenue.

This is especially true for the IT security industry, in which nearly 465,000 U.S.-based jobs remain unfilled. Security and IT teams are spread thin as they balance the management of their on-premise tech stacks and security. By taking on too many responsibilities, these workers become less productive and leave the organization vulnerable to cyberattacks.

Another issue facing workers is the skills gap, in which cybersecurity professionals cite heavier workloads, unfilled positions and burnout as factors behind the widening gap. Further contributing to the skills gap is a wave of early retirements and the proliferation of new technologies, making it difficult for organizations to maintain current operations—let alone innovate. They simply do not have the bandwidth to grow business when they can barely stay above water.

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The bottom line is that labor issues are not going away anytime soon, and without adequate labor, innovation may remain on the back burner. Instead of waiting for a new wave of talent, consider investing in technologies such as cloud, mobile, AI, IoT and analytics that can streamline and automate operations to improve efficiency and optimize your limited workforce.

Considerations When Moving To Cloud-Based Technologies To Fill The Labor Gap

According to Gartner, Inc., the cloud market is expected to double the size of the non-cloud market by 2025 as organizations increasingly outsource ERP, IT services and more business functions to the cloud. By using various cloud applications and providers, you can potentially unburden your understaffed workforce so they can focus on core business functions and innovation.

In addition to the traditional HR methods, there are other technologies that can help solve the labor shortage—including investments in cloud computing, which can benefit both your business and your workforce. If you plan to use cloud capabilities, it's imperative to have a roadmap and process in place so that you

and your team understand the steps to properly deploy to the cloud or add cloud applications or services to your existing infrastructure. You may need to evaluate your infrastructure and devise a detailed plan to move to a cloud environment. For example, you might want to consider the following:

1. Evaluate whether your application can be deployed to the cloud or whether there is a suitable cloud replacement.
2. Determine whether your infrastructure is ready for the cloud.
3. Look at new methods rather than trying to replicate your on-premise deployment. There are various cloud services from many vendors that can simplify cloud deployment.
4. There should be internal teams representing all departments so that the cloud can fulfill all of their needs.
5. Since the purpose of this is to augment the workforce, employees need to be well trained and tested in their capabilities to use the cloud so that all can benefit.

Moving to the cloud can provide a

few benefits:

- Integrate new technologies seamlessly. When IT teams are swamped, the last thing on their minds is implementing new technology and tools, both of which are critical to innovation. However, cloud-based services can enable you to quickly implement technologies that your organization may not have the skills or time for. A cloud provider can manage the logistics of implementing, maintaining and securing the technology, allowing your IT and security teams to improve existing processes and train employees on the new technology.
- Automate tasks for operational efficiency. Automation is integral to bridging the labor gap because it can help understaffed workforces manage both tedious and complex tasks. Cloud-based automation is becoming increasingly common in use cases like invoice processing and workflow analytics, but you can also automate cloud management functions like storage, backups and security. Automation can increase accuracy and efficiency while

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reducing labor requirements, enabling you to reallocate time and energy to more strategic tasks.

- Streamline processes and communications. Disparate operations, processes and communications can live in a single repository with cloud-based software such as ERP by using APIs that

integrate internal and external applications securely. The technology can provide easy access to real-time updates that eliminates wasted time such as searching for transactions and documents. When each member of an organization has access to the same, accurate source of data, you can improve transparency and communication between

teams.

While you should continue to prioritize employee engagement and retention, the reality is that labor issues may be here to stay longer than we would like. Digitizing operations can help you fill labor gaps that are hindering innovation and growth, and you can improve efficiency and your bottom line.

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