

EFFECTIVE DECISION-MAKING IN A WORLD OF CHANGE AND DISRUPTION

CHOOSE ACTIONABLE ANALYTICS OVER SPREADSHEET HELL

Data Source

In this report Mint Jutras references data from its 2016 and 2018 Enterprise Solution Studies, investigating goals, challenges and status and performance of software used to run a business.

This year's study focused on business growth and the role new (digital) technologies play, along with enterprise applications, in enabling (or inhibiting) growth and performance.

These studies collected responses from 525 and 460 participants respectively, from companies of all sizes from very small to very large, representing a wide range of industries. For this report we selected responses from the 273 participating manufacturers.

Sound decisions have always been key to success in navigating the complexities of manufacturing. What products should you manufacture and when should you produce them? How do you source and make them? How do you reduce lead times without building excess inventory or sacrificing quality? Finding a clear path to growth and profits has never been easy. But as the pace of change accelerates in today's global, digital economy, navigating through the potential land mines of disruption makes it even harder. Customers are more demanding and every decision you make can be critical and time-sensitive.

An integrated, comprehensive enterprise solution with embedded analytic capabilities provides a single source of the truth and fosters effective decision-making at all levels of the organization. Integrating analytics with your Enterprise Resource Planning (ERP) and Manufacturing Execution System (MES) provides access to actionable intelligence that empowers employees, motivates them and makes them feel like an integral part of the decision-making process. Combining analytics with the latest digital technologies speeds the process. And yet, the sad reality is that most manufacturers are far from this desired state. They have incomplete solutions and still rely heavily on spreadsheets, which are not only prone to errors but can only provide a snapshot of the data, frozen in time.

Where is your enterprise? Are you still, like most manufacturers, stuck in spreadsheet hell? Here we explore steps you can take to digitally transform your decision-making. We highlight one company, Plex Systems, and how its Plex Manufacturing Cloud can help you make good, data-driven decisions in real time, from a single source of truth.

WHY IS THIS SO IMPORTANT? WHAT'S CHANGED?

Manufacturers have struggled with decision-making challenges for decades. Even if you manufacture a simple product, the complexities behind the scenes tend to be overwhelming. For decades, everyone was in the same boat, so customers understood long lead times and occasional missed shipments. And wide-scale change in industries happened slowly, sometimes taking years or even decades to evolve.

None of that is true today. The pace of change has been accelerating to the point of hockey stick inflection; disruption can happen virtually overnight, and customers have become more demanding.

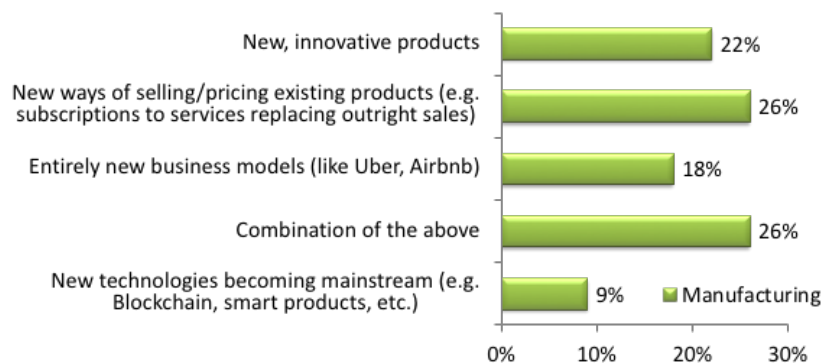
AN ERA OF DISRUPTION

The digital age is upon us. If your business is still running in analogue mode, it is time to develop a sense of urgency. The pace of change and the pace of technology innovation has accelerated beyond anyone's expectations and it doesn't show any signs of slowing down. We live in disruptive times.

We asked our 2018 Mint Jutras Enterprise Solution Study participants to assess the level of risk their industries face in terms of the potential for disruption. While just over half of those surveyed (54%) view the potential for disruption as low (or no) risk, 46% view it as medium or high risk. Perhaps they recognize what the other 54% don't - that disruption in the digital age comes fast and with massive impact. How do you think the taxi industry would have answered this question on the eve of the launch of Uber? Do you think the hotel industry anticipated Airbnb? Did Blockbuster foresee the shattering impact Netflix would have on its business? Nobody saw these coming and few were prepared, sometimes with devastating results.

Technology made all of these disruptions possible and none were decades in the making. Compared to slow, evolutionary changes of the past, they literally happened almost overnight. Most disruption in the past came from new, innovative products. But today that disruption could just as easily come from new ways of selling/pricing existing products (think subscriptions for services or outcomes replacing outright sale of products) or entirely new business models (Figure 1). These disruptions require a different level of decision-making, blending together the strategic and the tactical, while also increasing the need for speed. And therefore, it is important for manufacturers to get the foundation right with agile, scalable, unified systems, so they can respond to disruptions with greater confidence.

Figure 1: Where is this disruption most likely to come from?



Source: 2018 Mint Jutras Enterprise Solution Study

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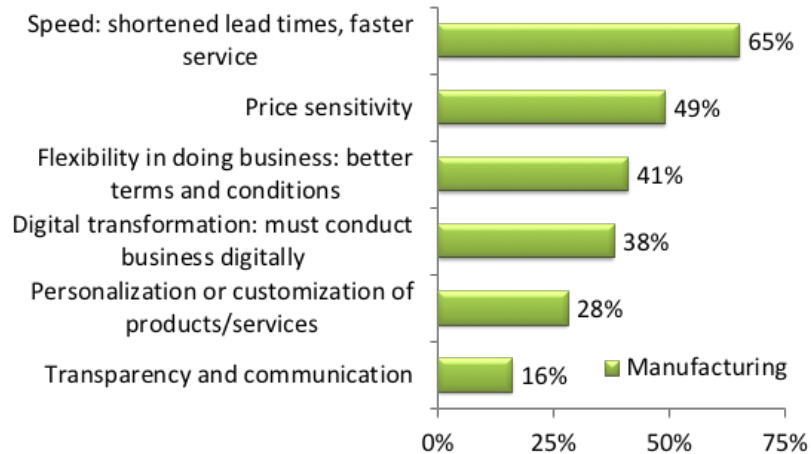
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CUSTOMERS ARE MORE DEMANDING

This need for speed is also reflected in customer demands. The vast majority (87%) of manufacturers surveyed indicated customers had become more demanding over the past few years. When asked, “How so?” speed is clearly top of mind.

Figure 3: In what way are customers more demanding? (Select all that apply)

Speed is clearly top of mind in responding to customers that have grown more demanding. But customers are still price-conscious and require flexibility.



Source: 2018 Mint Jutras Enterprise Solution Study

Yet customers still tend to be sensitive to price and seek flexibility in business relationships. This means the traditional trade-offs between short lead times and building inventory buffers are still present and are made even more difficult as (28% of) customers demand more personalization or customization of products and/or services. This requires an added level of visibility and access to data. Historically, when business applications like ERP didn’t provide that level of visibility, decision-makers turned to spreadsheets.

WHAT’S WRONG WITH SPREADSHEETS?

Spreadsheets are perhaps the most universal of all business tools today. But we often have a love/hate relationship with them. We love them because they keep us in our comfort zone. Everyone knows how to work a spreadsheet, at least to some extent. But there are two fundamental reasons why we should hate them.

First of all, the data in a spreadsheet isn’t “real,” as in real-time. Most often today the spreadsheet is originally populated with data from enterprise applications. This in of itself is not cause for worry, because at the time of the export the data is real and valid. But it only represents a snapshot in time. In the very fluid world of manufacturing, it almost instantly becomes out of date.

There is one indisputable fact about spreadsheets that should put fear in the heart of any responsible business person. The vast majority contain errors, and the more complex the calculations, the higher the likelihood of error. Mistakes are just so incredibly easy to make.

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As it gets passed around and (quite often) modified, data in that spreadsheet starts to take on a life of its own, and that indeed is cause for alarm. Now you are bypassing the built-in security and audit trail of the application. The more the data is shared and modified, the less likely you will be able to “wind it back” to the original source, making data integrity suspect.

But it is the second cause for concern that should really put fear in the hearts of decision-makers. There is one indisputable fact about spreadsheets. The vast majority contain errors, and the more complex the calculations, the higher the likelihood of error. Mistakes are just so incredibly easy to make. They may result from something as simple as a misplaced parenthesis or a formula pointing to the wrong cell. And as easy as mistakes are to make, they are equally as hard or harder to find.

The result of combining these two inherent problems: the data might not only be out-of-date, it might be just plain **wrong** and lead you to make faulty decisions.

The preferred approach is to give the application itself the look and feel of a spreadsheet in order to keep the user in the application. Or better yet, make the application so intuitive and easy to use that the user actually prefers it over a spreadsheet. Next generation ERP solutions should provide this type of user experience along with a footprint that is broad and deep enough to keep users out of spreadsheets. That is a good start, but good analytical capabilities are also a must.

The key to success is a complete, seamlessly integrated end-to-end solution with tools built in for reporting and analysis. While reporting and even spreadsheets might be useful in answering questions about your business, analytics are more iterative in nature. They help you ask the right questions in order to strategically guide your business to desired growth levels. Look for embedded analytics for real-time visibility. If your ERP doesn't do this today, or if it leaves substantial gaps in serving all the functions in the organization, perhaps it is not supporting you as well as you might like to think.

ARE WE THERE YET?

The short answer is no. In 2016 Mint Jutras started placing some questions in our annual Enterprise Solution Studies to determine the digital preparedness of all types of companies.

Manufacturers were no more or less prepared than other industries. While many self-assessed themselves as quite well prepared, we followed up with a list of basic activities likely to occur in manufacturing businesses and asked how well they were supported (digitally). We found on average 80% or more of these activities still involved spreadsheets, or worse – paper and manual processes.

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But keeping the data all in one integrated solution is only part of the answer. Making that data accessible and useful in decision-making is also important.

So, have things changed dramatically in the past two years? We find some progress, but not enough. In so many ways, “digital transformation” is simply delivering on the original promise of ERP. Mint Jutras defines ERP as an integrated suite of modules that provides the operational and transactional system of record of your business. Even the earliest versions of ERP did indeed provide this system of record. But did they live up to the promise of an end-to-end, integrated solution that could streamline and automate all your business processes? Did they make your life easier? No. The technology necessary to deliver on that promise simply didn’t exist back then. But it does today even though the majority of manufacturers fail to utilize it.

Table 1: How well are functions supported by ERP today?

	Well satisfied with (single solution) ERP	Partially satisfied with ERP, supplemented with spreadsheets, etc.	Not satisfied
Marketing	19%	55%	26%
Sales	27%	61%	12%
Service (including any field)	27%	62%	11%
Finance/Accounting	42%	49%	9%
Human Capital and Talent Management	26%	56%	18%
Procurement	39%	51%	11%
Production/Manufacturing	43%	47%	9%
Warehouse Management	39%	52%	10%
Quality management	35%	52%	13%
Operations (e.g. scheduling, project management)	28%	58%	14%

Source: 2018 Mint Jutras Enterprise Solution Study

Our 2018 Mint Jutras Enterprise Solution Study assessed how well the typical functions within a manufacturing organization were supported by a single, integrated solution (Table 1). Note that in every category, less than half of respondents indicate that the function is "well satisfied" with a single solution. Those indicating functions are "partially satisfied" are still supplementing those solutions with manual tools like spreadsheets or some other application which may or may not be integrated with ERP.

IN SEARCH OF A SINGLE SOURCE OF THE TRUTH

The level of integration between different solutions can vary tremendously, ranging from none to arm’s length (passing data periodically) to seamless integration. The risk to decision-making in using separate solutions, even when they are tightly integrated, arises from having multiple data sets. Product, item and inventory data is the perfect example, something every manufacturer must deal with. As soon as you have two copies of the same data you run the risk of one of them being out of date (i.e. wrong at certain points in time).

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Even if the two data sets are synchronized, is this done continuously, in real time? Even with the best intentions and the best technology, Murphy's Law is ever-lurking: "If something can go wrong, it will." And it only takes one time for trust in the data to be lost. That's when decision-makers stop using the application and turn to alternatives (like spreadsheets).

On the other hand, having a single source of data for decision-making encourages trust. Access to actionable information empowers employees, motivates them, and makes them feel like an integral part of the decision-making organization. And if they trust the data, they trust their decisions. Trusting the application to help make informed decisions keeps decision-makers engaged and may even help in the hiring and retention of millennials, which represent the future of manufacturing.

BEYOND REPORTING... REAL ANALYSIS

But keeping the data all in one integrated solution is only part of the answer. Making that data accessible and useful in decision-making is also important. For this you need the right tools. ERP and other software that creates a system of record of your business has long been famous (or perhaps infamous?) for being easier to get data into than to get information and answers out of. Reporting has often been perceived as a weakness. In all fairness to the solution providers, it is quite difficult to anticipate all the inquiry and reporting needs of the business users, particularly since the needs change over time and also can vary so significantly from one business to another.

In recent years, however, a lot has changed. Reporting capabilities have become much more "self-service," allowing the non-technical business user to gain much better insight from the data collected. Long gone are the days of hefty paper-based reports delivered daily, weekly or monthly. Today, reporting from any ERP solution is easy enough to use. Business users can run their own reports and inquiries, selecting from pre-defined (multiple) sort and selection criteria.

Yet even with these self-service capabilities, reporting is only part of the solution. Reports are useful in answering questions you already have. Analytics can help you go one step further. Analytics help you ask the right questions. Analytics implies analysis and any real analysis of data is iterative. You need to start poking at data, changing your view, looking at it in different ways, in order to recognize patterns and causal relationships. You need to transition from reporting of facts to real analysis and intelligence.

GIVE ANALYTICS A BOOST

While many today invest in business intelligence and analytical tools, too often they remain in the domain of the Information Technology (IT) specialist. If the IT backlog becomes too great, and business users have to wait too long, often the questions they are asking change before the IT department can provide

Cloud versus SaaS

Cloud refers to access to computing, software, storage of data over a network (generally the Internet.) You may purchase a license for the software and install it on your own computers or those owned and managed by another company, but your access is through the Internet and therefore through the “cloud,” whether private or public.

SaaS is exactly what is implied by what the acronym stands for: Software as a Service. Software is delivered only as a **service**. It is not delivered on a CD or other media to be loaded on your own (or another’s) computer. It is accessed over the Internet and is generally paid for on a subscription basis.

Using these definitions, we can confidently say **all SaaS is cloud computing, but not all cloud computing is SaaS.**

Multi-tenant SaaS: Multiple companies use a single instance of hosted software; configuration settings, company and role-based access personalize business processes and protect data security.

them with answers. If that happens frequently, those same business users stop asking and turn instead to their own tools, which usually means (again) spreadsheets.

So, first of all, any analytical tools need to be easy enough for the average (non-technical) business user to use. And you can’t expect the business user to be savvy enough to be able to extract data from multiple sources. The best answer to this is to have a single source for the data and to directly embed the analytics. But there are also some additional advanced technologies that can significantly extend the value of analytics. In our 2018 study we refer to them collectively as embedded digital technologies and capture current investments and plans. Those that have the most direct impact on decision-making are shown in Table 3. With the exception of the move to the cloud and software as a service (SaaS) we find manufacturers have gained little traction in exploiting these technologies.

Table 3: Plans and Investments for Embedded Digital Technologies

	Invested	Actively considering	Expect vendors to deliver at N/C	Planning to invest in 1 year	Planning to invest long term	No plans/ no activity
Move to cloud/SaaS	40%	16%	12%	5%	10%	17%
IoT technologies that facilitate autonomous exchange of data	12%	17%	14%	4%	14%	39%
Natural Language Processing (voice-based) user interface	5%	14%	7%	4%	9%	61%
Location-based tracking (GPS)	8%	10%	9%	4%	10%	58%
Machine Learning	5%	16%	13%	5%	14%	48%
Artificial Intelligence	4%	16%	11%	4%	10%	55%

Source: 2018 Mint Jutras Enterprise Solution Study

CLOUD/SAAS

Cloud enablement and Software as a Service (SaaS) is the only “technology” in Table 3 that is even close to being mainstream. Indeed, whether you run a solution on your own premises or in a private or public cloud, the ability to access anytime, from anywhere is a significant advantage and cloud-enablement opens the door for the kind of connectivity you need as a full and active participant in the digital economy. While there are a lot of benefits in moving to the cloud, SaaS has the potential of delivering much more, particularly multi-tenant SaaS solutions (see side bar).

Multi-tenant SaaS solutions deliver some competitive advantages to manufacturing businesses that simple hosted or hybrid cloud solutions can’t. With multi-tenant SaaS deployments, the entire user community is on the same version of software and therefore all can share best practices without the burden of managing upgrades, patches and different versions. And since the software vendors manage a single line of code, instead of multiple release levels, potentially across different operating systems and databases, they can devote their entire development budget to innovation.

Embedded digital technologies help us leverage data collected from sensors on the shop floor by connecting it directly to the ERP and MES applications that manage the process of manufacturing, providing a level of context you simply can't get from a stand-alone analytics solution.

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THE INTERNET OF THINGS

Internet of Things (IoT) technologies facilitate the autonomous exchange of data. Many companies, manufacturers in particular, have been collecting data from sensors (think machines on a shop floor) for decades. But without the connectivity of the Internet that data was largely under-utilized. These foundational technologies help us leverage that data by connecting it directly to the ERP and MES applications that manage the process of manufacturing, providing a level of context you simply can't get from a stand-alone analytics solution.

For example: Getting an IoT signal from a machine indicating a filter needs to be replaced is a valuable alert to schedule maintenance. But maintenance requires downtime. A stand-alone solution doesn't tell you what work orders are scheduled to be run through that machine, when the products being produced are due, or if the downtime will result in a late shipment to a customer. It doesn't tell you whether or not there is another machine that priority orders could be routed through. You need to connect it to MES for that. And it can't tell you who the customer is, or the consequences of missing a due date. You need to connect it to ERP for that. Integrated ERP and MES delivers the context that standalone solutions can't.

Technologies like natural language processing (NLP), machine learning (ML) and other forms of artificial intelligence (AI) may seem to be just the latest alphabet soup to some manufacturers. And yet, they have the potential of extending the value of the growing volume of data, particularly as you integrate IoT with ERP and MES. It won't be long before these types of technologies will be generally available for the enterprise, but you won't be able to take advantage of them if you are still stuck on old legacy solutions. And vendors that wait for their customers to ask them for these technologies before starting to research and develop them, will be too late to the party.

PLEX SYSTEMS AND THE PLEX MANUFACTURING CLOUD

One vendor that is definitely not waiting around is Plex Systems. Its Plex Manufacturing Cloud is a multi-tenant SaaS ERP solution designed specifically and exclusively for manufacturing. Plex was an early cloud pioneer, offering its ERP solution exclusively as multi-tenant SaaS since 2001, long before cloud and SaaS were well understood and accepted. Plex originally chose to deliver exclusively as SaaS because it had also perfected rapid application development. A multi-tenant SaaS solution allowed the company to deliver innovation as fast as it was developed, rather than the more traditional approach of packaging up releases every 12 to 18 months. Therefore, cloud, SaaS and continuous innovation is built into its DNA.

The vast majority of the Plex Manufacturing Cloud has been developed organically by Plex as a fully integrated suite. In addition to fulfilling the

MES Adoption

- ✓ *80% of all manufacturers indicating MES was relevant to their business had adopted an MES solution; 54% of them had a solution fully embedded within ERP.*
- ✓ *83% of Plex customers indicating MES was relevant to their business had adopted an MES solution; 71% of them had a solution fully embedded within ERP.*

operational (MES) needs of a manufacturer, Plex also provides a full complement of accounting and human resource modules, as well as front office modules that manage customer orders (ERP). Also included are integrated engineering modules and quality management functionality.

In addition, Plex also offers Intelliplex, its own suite of embedded analytics capabilities for manufacturing business intelligence (BI). Unlike most stand-alone BI tools that require specialized technical skills, Intelliplex is designed as a tool for the business user. In addition to more traditional report-writing capabilities, Intelliplex comes with self-service templates designed to allow the typical business user to tap into the data collected in the Plex Manufacturing Cloud for real analysis. A non-technical business analyst can easily drag and drop selected metrics to create visually appealing charts. Executive dashboards might start at a high-level overview, allowing decision-makers to drill down into successive levels of detail and perform analysis.

Intelliplex is a useful tool in performing analysis on the data within ERP, but that can be a tiny fraction of the data needed for effective operational decisions. Plex's goal has always been to connect the shop floor to the top floor. To this end, this year Plex enhanced its capabilities in extended ERP and MES through the acquisition of IoT/industrial automation/data analytics vendor DATTUS.

While sensors, machines and equipment on the shop floor have been collecting vast volumes of operational data for decades now, that data has not always been "connected" or accessible for decision making. Indeed the very fact that this data collection has been happening for decades contributes to the problem. Many of the machines and software put in place decades ago pre-date the Internet and therefore have no ability to connect to a network. Retrofitting equipment, or replacing it, is expensive and most of these machines were designed to last a lifetime. Expensive custom integration projects are beyond the expertise and budgets of all but the largest manufacturers. So what's the alternative?

Providing an alternative is what DATTUS is all about. DATTUS solutions connect manufacturing equipment and sensors to the cloud. Think of it as the bridge between you and your machines. The platform is a hardware/software combination, which collects data from [PLCs](#), [VFDs](#), industry protocols like [MTConnect](#), and popular enterprise applications including Salesforce, SAP and (of course) Plex. The goal: making this data available for analysis and decision-making.

The net result of all these efforts by Plex is a very engaged customer base. We mentioned earlier the importance of providing access to actionable information to empower employees, motivate them, and make them feel like an integral part of the decision-making organization. For this to be successful, they need to engage actively with the solution. What better measure of engagement than the percentage of employees that actually utilize the system

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CONCLUSION

Manufacturers today cannot afford to continue to make decisions as they have in the past. The pace of change in business and technology, combined with the growing volume of data available for decision-making forces us to re-think how we go about making both strategic and tactical decisions. Whether you are running a production facility on a day-to-day basis or plotting your growth strategy, you need to get out of spreadsheets and start to take advantage of new technologies available today. You need to make decisions from a single source of data, and that data needs to be available to you live and in real time.

If your ERP doesn't provide you a complete, end-to-end solution, if it doesn't provide embedded analytics, if those analytics aren't enhanced with advanced technologies... perhaps it is time to trade it in. Perhaps it is time to take a look at the Plex Manufacturing Cloud.

About the author: *Cindy Jutras is a widely recognized expert in analyzing the impact of enterprise applications on business performance. Utilizing over 40 years of corporate experience and specific expertise in manufacturing, supply chain, customer service and business performance management, Cindy has spent the past 12+ years benchmarking the performance of software solutions in the context of the business benefits of technology. In 2011 Cindy founded Mint Jutras (www.mintjutras.com), specializing in analyzing and communicating the business value enterprise applications bring to the enterprise.*