QualityEssentials Suite

Managing Quality During Supply Chain Disruption

Digital e-Book

Contents

Introduction

Supply chains all around us have been traumatically disrupted, placing extraordinary pressures on global production resources.

Quality departments, as contributors to those resources, are not often the first area of concern when supply chain disruption occurs. Don't mistake that lack of attention, however, as a belief that the Quality System is unimportant. In crises like these, companies *WILL* be relying upon the strength of their Quality Department to successfully meet production challenges and avoid mistakes.

Who Really Knows Disruption?

We know that not everyone working in Quality has experience with this kind of disruption. Nor does everyone have a common base of knowledge to help them plan or forecast problems and solutions for such a crisis.

In an effort to be of service, we have put together an eBook that we hope can aid Quality departments with executing effectively in this time of crisis. Our goal is to bring you content that will help you model the impacts of disruption and equip you to plan ahead.

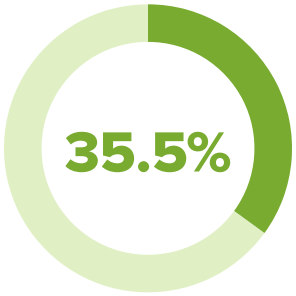
In this eBook your will learn how to:

- Define models of disruption to forecast likely impacts to your organization.
- Devise solutions to problems when your Quality Department has too much to do.
- Develop routines to help defuse the crisis atmosphere.
- Execute a graceful shut down to support a graceful startup.

Chapter 1: Defining Models of Disruption

We see four models of disruption in the current crisis.

By defining these models, our goal is to help you recognize factors that could affect your organization so you can use that information for planning your own responses. Developing a shared understanding of the model will help you and your team make consistent decisions that align with your circumstances.



35.5% of manufacturers are facing supply chain disruptions due to COVID-19.

Survey dates: Feb 28 - March 9, 2020
Source: www.nam.org

Model: Spiked Demand

In this model, you belong to one of those essential product supply chains that need to ramp up by multipliers previously unseen or unconsidered. Not only do you have all hands on-deck, but you may also have to expand the number of hands precipitously.

Your existing supply chain processes are unprepared and will have to be carefully husbanded to ensure the needed flow of materials.

ResMed of San Diego, who is ramping up global production of ventilators and **API Plastics** of Gainesville, who supply parts for **Sea Long Medical Systems,** are great examples of this model. Organizations like these will be relying on their Quality systems to ensure that they have properly qualified materials for inputs and outputs so that no production resource goes to waste.

Model: Stretched Erratic Supply Lines

The signature indication that you belong in this model is that disruption is not caused by spikes in demand but rather by delays in supply. Your planning team is constantly massaging the needs of your customers against the capacity of your suppliers and allocating or reallocating resources accordingly.

Your organization might not be part of a supply chain for critical materials; instead you build maintenance parts for emergency vehicles or other mechanical devices like store refrigeration units. You could be part of the pet food distribution network. You could produce over the counter medications and some significant part of your components come from China or elsewhere overseas. What you will notice is that internally planning horizons are not long and flexibility is paramount. You could be a large producer like **Apple** or a small business in a niche market.

Model: Repurposing

You could be an organization that has the ability to retool or repurpose manufacturing resources to help deliver products that are in critical need.

The products you are about to work with may not be in your normal wheelhouse or documented in your QMS. Not only might you have to build systems to accommodate unknown materials, but you may have to adapt to an outside organization's QMS to ensure outcomes are low risk.

We see examples of repurposing in distilleries like **Pernod Ricard,** who has switched to producing hand sanitizers. There are other examples, like **GM** and **Ford**, who are transforming facilities to produce ventilators through agreements with producers like **Ventec Life Systems**.

Model: Demand Downturn

Your products or organization don't fit the bill for essential needs, or your markets have closed due to stay-at-home orders. That doesn't mean that your products aren't valued - it simply means that, in the face of social distancing and other requirements, being fully operational is not required. Your tasks have to do with completing a graceful shut down and ensuring all products are correctly stored so that no materials are lost. In shutting down, you are focused on what needs to be maintained and in what state to enable a graceful start up.

Give it a thought:
Which of these models is your business facing?

Avoiding Surprises

No matter which of these models or combination of models applies to your organization, understanding them will not mean you will avoid all surprises. Our hope is that, by reviewing these suggested models, you are inspired to think about the challenges you may face so you can come up with solutions before some of the problems show up. In our next chapter, ***When Quality Has Too Much to Do,*** we will provide some specific recommendations on actions the Quality Department can take to begin addressing this crisis.

Further Reading

Due to the current challenges with COVID-19, many prominent associations and organizations have created web portals devoted to helping businesses adapt and navigate supply chain issues. While this information is timely, much contained here would be useful in any supply chain crisis. Here are some resources we think are worth exploring.

Food

foodsafetytech.com

foodsafetynews.com

Manufacturing

nam.org

sme.org

industryweek.com

Chemicals

www.aiche.org

acs.org

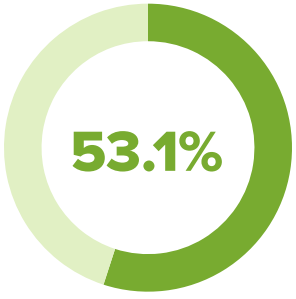
Chapter 2: Supply Chain Disruption - When Quality Has Too Much to Do

Now it is time to ignite your thinking on actions you can take that will address the crisis conditions affecting your Quality processes.

Our focus will be on policies and actions that can help you meet the most pressing demand of disruption – **having too much to do.**

Why Too Much?

The increase in tasking for your quality team will come from many different sources. In the simplest case, it will occur because more material is needed to support increases in volume. In the more complex case, it will occur because scarcity requires smaller and more frequent material deliveries. Regardless of cause, your need will be to **identify how you can possibly reduce the load and/or expand your capacity without putting the quality of your goods and services at risk.**



53.1% of manufacturers are anticipate a change in operations due to COVID-19.

Survey dates: Feb 28 - March 9, 2020
Source: www.nam.org

Update Procedures

As early as you can in the process, review and update any relevant procedural documents so that they will accommodate the range of expected activities and changes. Here are some procedure areas you may want to focus on right away:

1. SKIP LOTS

You might want to consider adjusting any **skip lot** metrics or introducing them if you haven't used them before. **Skip lot** techniques can significantly lighten the inspection load. If you already have existing well-managed, easy-to-access historical performance data about materials and vendors, it should be easy to justify this adaptation to meet your risk objectives.

2. RAPID VENDOR QUALIFICATION

If you do not have a specific accelerated **vendor qualification** or **materials qualification** process, now might be the time to develop one. The need to adapt to alternate materials or vendors in this manner frequently occurs when dealing with scarcity in the supply chain. It will also affect you if your organization has chosen to make the effort to retool or repurpose your facilities for alternative products.

3. EXPANDING CAPACITY

The two most common methods for expanding capacity are to add more labor and be more efficient.

4. ADDING LABOR EFFECTIVELY

When it comes to adding labor, you are going to find yourself in competition with other internal departments. It is a good idea to seek out staff from other departments that you feel confident have the needed skills to supplement your Quality Department staff. Caution is the name of the game here, though, as you do not want to recruit someone else's

pivotal resource and undermine inter-departmental relationships. Speak to their management first and make your case about why you need skilled staff to move into the Quality Department. It can be helpful to your case if you can position the change within a well-understood model of managing risk. It may be particularly useful to point out that in times of materials shortages and/or accelerated demand, formal risk management procedures suggest that materials that get used must be adequately cleared so that labor or other expended resources don't go to waste. Making sure materials and tasks are done right is critical to not wasting any scarce resource.

Do not forget: another way to make recruitment more accessible is to **break tasks down into levels of expertise.** Ask your team to identify the repetitive low-risk tasks they complete and then build junior level positions that can be trained in that level of execution without large investments in time. This will free your more senior team members to focus on tasks that have more complexity and require more skill or independent thinking.

5. DELEGATING INSPECTION TO IN-LINE WORKERS

Look for places where in-line inspection or data collection can be instituted; this idea is a little tricky and requires having confidence in operations staff, but may go a long way to relieve some of the burden placed on the Quality Department. Do not forget to update your Quality system with any such changes. Once again, a robust and adaptive Quality Management System is a big help here. The right QMS will make it possible to easily create instruction sets that can be adapted for use during in-line inspection activities.

6. CREATING CENTRALIZED COMMUNICATION

Speaking of other departments, remember the core Quality philosophy: **everyone is everyone's customer and vendor.** If you don't already have formal communications channels in place between departments, now would be an excellent time to establish them. Here are a few easy and useful ways to get started.

A. The Daily Anything

Tasks that are reliably repetitive can alleviate the **crisis** in crisis management. If teams know there is a once or twice a day coordination meeting or communication event, then they can be trained to use those events to help them evaluate **immediacy of action** or communication. Simply applying the question *"can this wait till?"* will provide a benchmark for understanding if something is an immediate priority or can be considered a lesser level of urgency. Limiting interruptions in this way can improve productivity, but more importantly, it can reduce stress on staff.

b. Put it on a List

Reducing the reliance on verbal communications and random emails will alleviate pressure on everyone. Requiring an **action or a request be placed on the appropriate list and then prioritized** will empower more efficient decision-making. Then you must be willing to empower staff to follow the priorities. Don't forget – when you roll this out, that there must be a way to update that list in real time. By the way, creating a list does not mean that there is no room for exceptions; instead it makes exceptions more meaningful.

c. Building Partnerships

In most cases these ideas are based on **building partnerships with other departments** by showing them how Quality will support them and help them do their jobs well.

Give it a thought:
What system issue or tool set has been the greatest hindrance to your productivity? What are you doing to overcome that problem? Which of the techniques above would yield the best result?

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Now, more than ever, companies need to take the time to find the right tools to enable digital transformation. They need to be able to build the most efficient processes possible. And for many of them they need solutions that are not cost-prohibitive and can be easily integrated.

READY TO SEE US IN ACTION?

Request a Free Demo today and in a short **20-minute** conversation you can learn more about how you can stop worrying about the issues in your Quality Management Systems and affordably gain greater control of necessary tasks.

Chapter 3: QA Department Routines to De-Escalate Your Supply Chain Crisis

In this chapter, we concentrate on routines that the Quality Department can use to reduce the stress levels associated with a crisis.

Why do we think that is important?

Frankly, no organization can sustain continuous crisis level activity. For our own success and the health of our teams, it is important that we build structures around the crisis that de-escalate it and allow us to evolve to a more normal set of activities. We know once the adrenaline rush of running in crisis mode has passed, we are going to want to stabilize processes for long-term reliability.

Here are some initiatives you can implement no matter how your QMS is supported:

1. ENABLE SOME SELF-SERVICE

You do not want members of your team who are trying to complete a task to be interrupted by the need to answer questions or run down a piece of data. Conversely, you don't want team members in other departments being held up or, worse yet, taking the wrong action because they can't easily access the content about Quality that they need for accurately determining next steps.

To move from interruptions caused by the need for questions and answers to self-directed decision-making, you have to develop communication hubs that individuals can reliably access to obtain the information that they need. You may get some push-back when you spend time entering data into shared spreadsheets or other tools, so you will need to remind staff that the time spent in data entry means less time spent answering questions others can answer for themselves. This trade-off is meaningful but sometimes has to be pointed out. Behaviorally, the very act of being able to access an inquiry form to answer a question or confirm a status will begin to minimize the sense that everything is in crisis.

Quality departments that are heavily paper-based or that do not have electronic systems with built-in tools may find this suggestion more challenging. Just remember - you don't have to start by sharing everything; ask your team for feedback on the actions and questions that most frequently interrupt their routines and focus on the top four or five. In your roll out be sure to consider how to train other departments on how to find the data and how to understand it. Finally, you will need to enforce the use of these tools, so be prepared to **be relentless** in expecting all staff to go there first.

2. LET GO AND LEVERAGE AUTOMATION IN YOUR TOOLS

Have you found that the time is never right to upgrade tools and generate automation? Do you often hear yourself or your team say **it is faster to do it myself than train someone?** These are the symptoms of behavior that keep us **mired in transaction overload.**

In spite of the perceived time waste and the stress of being in crisis, now is the time to find ways with the tools at hand to start automating repetitive functions and incorporate emails and other alerts so that you don't have to do constant manual monitoring. Let your systems tell you when your attention is needed and then enable them to provide with the data required to make those decisions. If your current tools can't support these productivity changes, then maybe a search for new tools is in order.

Skip Lots is a great example of blending data and behavior to reduce workload. This method enables you to quickly focus and dedicate resources to only the critical tasks. But, if you spend a lot of time researching through paper records to identify the skip lot sequence, then you have just eroded the benefits of deploying this methodology.

3. BREAKDOWN SILOS OF DATA AND ENCOURAGE COLLABORATION

This is never an overnight project and it is always a project that encounters deep resistance even from those who support improvement.

The existence of a crisis can often be the very lever that is needed to drive changes in data ownership and enable you to break down these monolithic silos. Supply chain disruption is rarely localized and it is rarely self-contained. This means that communication and sharing of data will cross department lines, company lines and geographical boundaries. This is particularly true when the disruption is driven by scarcity, because time is of the essence in these communications and wading through silos of data can waste too much of this very scarce resource.

The other thing your critical communications needs is accuracy and what is often called “one version of the truth”. Data stored in silos makes getting to a single version of the truth very difficult.

Let’s use the example of implementing **skip lots** procedures again.

If your data is siloed, it makes the extraction of needed information to substantiate such a policy more difficult, and it will delay your ability to arrive at a satisfactory outcome. There might even be a little fear that not all the information needed for an accurate evaluation of vendors is available. After all, how can you know what data is contained in a silo that you are not able to access?

4. FUTURE STATE OF YOUR QMS

For some companies, disruption will be short-lived and the need for crisis-level management or tasking will rapidly decrease as global transport and other constraints begin to lighten. Those companies will be able to fall back on old routines. For other companies the crisis will develop into higher levels of normal business because, as **Peter Navarro told us**, we will need to move to “on-shoring” of critical elements of production related to health, safety, defense and other needs. If these possibilities of volume increases turn into reality, then many of the ideas discussed this eBook are processes that you will want your QMS to robustly support.

Give it a thought:

Will this crisis have a long-term effect on your processes? Do you see it causing a permanent jump to higher levels of business operations? What concerns you the most and the least about that? Where do you think you need to be more prepared?

Chapter 4: Pushing the "Off" Switch: Your Quality Department's Role in a Graceful Shutdown and Successful Restart

We are going to focus on the role of the Quality Department in supporting the graceful shut down of operations.

Companies may need to temporarily shut down because of business demand downturn, or to address safety and health concerns. Obviously, shutting down is not as simple as flipping an “off switch.”

A *graceful shutdown* will allow the company to suspend operations while still maintaining the foundation for future activities.

CAUSES OF SHUTDOWN

There are many reasons manufacturers may take full or limited shutdown action during the current crisis, including:

- A direct response to **stay at home orders** issued by local government.
- A falloff in demand as restaurants, beauty salons, health clubs and other retail establishments cease their own operations.
- An overextended supply chain that means there is simply not enough material available to run production successfully.
- A pause to implement safety or staffing changes. Many organizations will encounter the need for temporary or intermittent shutdowns to enable deep-cleaning or to adjust their staffing levels.

Why the Quality Department Will Need to Change Focus

In each of these scenarios, there is an important contribution that the Quality Department makes in managing any shutdown or pause in operations. When most Quality plans are designed, they are built around a model of active on-going production. In fact, a key aspect of a Quality Management System is to establish practices that ensure manufacturing can keep operating at some consistent, predictable pace and be constantly served with suitable materials and other resources.

In the case of a shut down or temporary halt, the focus switches to establishing maintenance and completion conditions that will allow materials to survive the halt undamaged. The Quality Department will have to change their focus from supporting constant movement to implementing defined cut-offs. They will need to document new procedures and confirm that designated conditions are met and upheld.

How the Quality Department Supports a Shutdown

For the Quality Department, any shutdown (and restart) will have three phases of activity that need to be addressed. These are:

1. **Prepare**
2. **Monitor**
3. **Qualify the Restart**

PREPARE

To prepare for shutdown actions, the Quality Department will need to identify the controllable breaks in the process flow, as well as understand the volume of resources needed to complete tasking between breaks. The breaks can be as obvious as the timing of **when products switch department ownership** and are typically intuitive. Understanding the available capacity of labor or machine resources that can be applied to reach a stage of completion is generally more complex and is outside of the role of Quality.

In this circumstance, Quality will focus on defining the standards for condition of completion and condition of storage around breakpoints. From this information, Operations staff will understand how to prioritize the application of their resources to ensure that these standards are met. Investigating, defining, and documenting these process breaks are the main preparatory tasks of Quality when supporting shutdown planning.

MONITOR

Once the shutdown has occurred, the focus will switch to monitoring of materials and materials conditions, to ensure that they remain viable and available for restart. Understanding the conditions of storage and creating an appropriate monitoring plan will be part of the role of Quality. The monitoring plan should incorporate timing of reviews and parameters of acceptable conditions such as temperature or moisture. If spaces used for storage are normally used for such activities, then there will most likely be defined data specifications that can be incorporated.

A monitoring plan should also take into consideration the shelf life constraints for the materials and an evaluation of the impact on shelf life of storage methods. If the target date for restart is unknown, it will be critical to monitor for shelf life so that appropriate adjustments in material use can be made. It is helpful before a shutdown occurs to understand how changes or use of alternative storage methods will affect shelf life and incorporate that information into your plans.

Contamination risks from outside factors like deep cleaning should also be considered when developing monitoring plans. The goal is to keep products stable and suitable for use when operations restart.

QUALIFY THE RESTART

Documentation that captures the parameters and policies of restarting will also have to be developed and signed off. Most likely, you will begin developing the restart checklists based on the proceeding manufacturing operations. If you have existing “first article” procedures, they will also serve as inspiration for what should be on your checklists. Calibration activities should be on the list and you should have a plan for ramping up operations over some time frame so you can monitor and verify operability of equipment. If staff has been absent for a while or if there are new employees, be aware there will be some loss of familiarity with both tasking and equipment.

Safety should be a priority on your checklist. It is simply human nature to change our behaviors in a time of crisis and uncertainty. If there is a possibility that staff might interpret the urgency of restart as a reason for not complying immediately with safety measures, then taking a moment to reinforce safety behaviors will be important.

Finally, when developing your restart processes, give plenty of thought to cleaning and cleaning procedures. Depending on the length or purpose of shutdown, there may be agents in the environment that need to be removed from equipment.

MANAGING SHUTDOWN RISK

You will want to ensure your business can pass through this period with minimal loss of materials and revenue and come back when it ends, with a solid plan for restarting. Your Quality Department is the key to managing your shutdown risk. They will be engaged in ensuring the activities related to a shutdown are documented and implemented for future success.

PRODUCTIVITY IMPROVEMENT WORKSHEET

Gather your team and ***get real*** with some basic questions:

1. How frequently does the staff have gaps in their data that cloak their understanding of performance?

2. What features do we need in our current technologies to achieve productivity improvement?

3. Do we have the necessary tools and tools licensing to enable employees to complete self-directed work without competing for access?

4. What communications blind spots exist in our processes because we are unable to easily share data about critical events in real time?

5. How dependent is your staff on phone calls, and other notices, to handle specific conditions rather than being able to rely on the systems in place?

1 ..... 2 ..... 3 ..... 4 ..... 5 ..... 6 ..... 7 ..... 8 ..... 9 10

Conclusion: Supply Chain Disruption Will Drive Demand for Digital Solutions

Supply Chains, with their well-oiled, (and efficient), processes, have been undermined in 2020.

Scarcity, transportation delays, erratic demand, disjointed or broken communication, and, of course, government regulations have all presented significant problems and challenges.

Initially, in the face of these problems, most of us took the approach that our challenges would be short-lived, and we would move forward, confident that our processes were elastic enough to adapt and, ultimately, return to normal.

It is clear today's supply chain disruptions are going to have effects that will resonate within industry for years to come. Many organizations, if they can, will make changes, in particular with sourcing. So, the next big questions, for our customers are:

In a time of increasing costs and less robust revenues are your quality department processes and tools ready for the business challenge of operating profitability? Do you have the digital solutions that will allow you to adapt to changing supply chains?

SUPPLY CHAIN DISRUPTION, DEMAND FOR DIGITAL SOLUTIONS AND CASH FLOW

For most the crisis of adapting to supply chain disruption often fails to adequately anticipate the negative affect current solutions will have on cash flow management.

Cash flow is affected by two major factors. Revenue streams generally lighten when we ration shipments to customers, and inventory investments increase as we strive to reduce our exposure to scarcity and transportation delays. When we become aware of cash flow impacts, we also realize the criticality of cost control, while recognizing that staff are having to process more transactions and would like more resources to do the job well.

This combination of pressures:

- Stricter cost control
- Dealing with a higher volume of transactions
- The need for greater flexibility in processes creates the perfect environment for driving the identification of new efficiencies and innovation in processes.

COLLABORATION AND DATA SHARING DRIVE INNOVATION

But then, when we go looking for opportunities to achieve those needed efficiencies and drive innovation, what is it we tend to find?

We find that our current tools hamper our ability to rely on collaboration and data sharing, to drive the needed improvements.

The reality is, we are discovering that the analog tools, that we have resisted transitioning to digital platforms, are now impeding our ability to roll out new efficiencies. We are simply not equipped to deploy the key principles of collaboration and data sharing.

In contrast, organizations that are already on their path to digital transformation, have been identified as more likely to be able to restart and scale their operations - with ease. They are better equipped to weather the storm of supply chain disruption, and emerge as a leader, and not a casualty.

SHAREABLE DATA INCREASES VALUE

There is a key reason they are in this position. It is because their focus had already shifted to understanding how to best use their data. These companies have already recognized the core value of data. That it can more easily be put to work in multiple ways once it has been converted to a more shareable form through the right digital solution. This leveraging of the data, for multiple purposes, immediately increases the value of the information which helps create the needed ROI.

In a crisis, such as the current disruption of supply chain, there is a growing need for closer cooperation between both your internal teams, and your external partners. Including communication around quality expands your customer's sense of your responsiveness, enabling competitive advantage and growing loyalty. Your customers want to know that your company is equipped to be highly responsive to their concerns, and the changing landscape. They will appreciate you want to meet that goal without passing costs on to them.

COLLABORATIVE QUALITY MANAGEMENT IS MORE IMPORTANT THAN EVER

If you have already deployed digital tools enabling collaboration, it

should be relatively straight forward to achieve this accelerated ROI and responsiveness. However, if you are still managing with paper-based systems and the incremental use of software such as spreadsheets, or homegrown solutions based on Access, (or another tool), then you may need to recognize that these disjointed methods no longer support your customers' demand for real time information. When you have to take time to transfer content from one set of documents to other tools needed to generate additional reporting or analysis, you are decreasing the responsiveness needed to shift, (or maintain), operations during a crisis. Customer confidence can be lost.

FINDING YOUR SUPPLY CHAIN DIGITAL SOLUTION

Since the great depression, manufacturers have increasingly been called on to operate more and more productively and efficiently and have risen to that challenge. In fact, per the Bureau of Labor Statistics "output per hour for all workers in the manufacturing sector has increased by more than 2.19 times since 1987" and no doubt innovation driven improvements from the current crisis will further advance that performance.

It would seem now, more than ever, Quality Department leadership needs to take the time to find the right tools to enable digital transformation. As ever, they need to build the most efficient processes possible and they need to be sure the solutions they choose are not just cost appropriate but that they can be easily integrated to existing systems to maximize benefits. Your digital solution should have features that have widespread, repeatable use, and that can be relied upon across many, many transactions. Internal and external users must have their data needs met consistently, in a cost effective and prompt manner. Data collected at one event should be easily stored, shared and secured. These are the goals of a collaborative Quality Management System.

At Quality Essentials Suite, we have always had the goal of supplying “enterprise service at an affordable price”.

We are passionate about helping companies of any size get the tools they need for their success. With this content, and many of the other articles we have released in 2020, our goal has been to ignite your thinking about the role of quality during this crisis and the steps you can take to protect your business from disruption. We firmly believe going digital and enabling a collaborative QMS will play a crucial role in your manufacturing company’s ability to survive and thrive.

About Quality Essentials

Our mission is to provide user-friendly Quality Management solutions designed to be affordable, broadly applicable, and deployable independent of or integrated with a variety of source ERP solutions. We have specifically architected our solutions to be as efficient, repeatable, and reliable as possible.

Our promise is to enable manufacturers to efficiently generate and deliver unlimited variations of Certificates of Analysis reports by providing unrestricted user access to our data collection, analysis and reporting functionality. We provide software functionality that is as complete as possible for a cost that small and mid-size manufacturers can easily afford.

Our work expands all areas of ingredient manufacturing such as food, animal feed, supplements, chemicals, coatings and more. We do business with companies in the United States, Australia, South Africa, India, South America, Ireland, and Canada. Whether you are a CFO, an IT Manager, or a Quality Manager, you can rest assured that our depth of functionality and affordability makes QES the software of choice.

About Author Frances Donnelly

Director Product Development and Sales, Horizons International

Over the last 15 years in her role of Director of Product Development and Sales for Horizons International, Frances has become a respected thought-leader in the fields of Manufacturing and the Quality function.

She has made it her mission to bring to market the most useful software tools for products and services organizations, consistently researching, developing, and launching new products. These tools aim to improve profitability and Quality levels for customers and are based on many years of direct, hands on manufacturing and quality experiences.

She holds a degree in computer science, has written multiple articles for GP Optimizer and consulted with life sciences, chemicals, supplements, food, and other process industries in support of their ERP and Quality Management System implementations. She has served as a panelist at industry shows such as Amplify and maintains membership and certification with the American Society for Quality.

Frances is passionate about women in STEM, as well as the future of Quality and Industry 4.0.

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