



## *Navigating Future Global Crises: The Role of R&D*

*Recent crises have had a crippling impact on many sectors at the national and international level. These events include health, economic, and natural disasters such as the COVID-19 Pandemic, Ever Given blockage of the Suez Canal, Fukushima earthquake in Japan, and the sudden cold freeze in Texas. As a result, investors and corporate leaders are urgently looking for ways reduce risk and improve response in future.*

*The goal of this study is to help R&D teams and leaders anticipate and respond more effectively in future crises. We are building on the discussion from the IRI 2021 Annual Conference. The Study Team included twelve IRI member companies who compiled and shared lessons learned from these recent disruptions in order to improve our preparedness and response at scale in a future crisis at both the executive and operational levels.*

# Executive Summary

How can recent experience with COVID help to improve our future performance for business? In addition to COVID, our nations face future crises with food supply, emerging pandemics threats, and climate change. Can the R&D teams help us navigate future global crises better?

Innovative R&D response can help economies to deal with these existential future crises. Global food supply is under stress from the Russia-Ukraine war, as these two countries cultivate 12% of global calorie supply. Climate change, as noted at COP26, poses a threat due to greenhouse gas emissions and rising temperatures. Not only that, a Nature article in April 2022 notes climate change increases the likelihood of new pandemics from zoonotic transmission of viruses to humans at spillover hotspots. In these and other cases, R&D can inform and sharpen our response.

Twelve companies affiliated with IRI agreed that the past teaches our teams to manage future crises. Using business case studies from CPG, automotive, energy, and infrastructure sectors, this Study Team illustrated how companies can create superior value and improved outcomes for companies, sectors, and economies in the areas of Leadership, Back to Office, and Supply Chain.

## Overview

Several case studies were reviewed across different companies and sectors to identify common themes of what has helped organizations achieve success during recent tumultuous times.

There are three sections to this report: Section 1 on Leadership Lessons, Section 2 on Back to Office, and Section 3 on Supply Chain Resilience. Below is a quick summary for each section.

**Section 1: Leadership.** The team studied case studies across different companies and sectors. What was critical to understand? What did management focus on in times of the recent COVID-driven crisis? What common themes emerged that were cross-functional and also relevant for multiple sectors?

The key **Leadership** takeaways were on four main themes of greater communications, team flexibility, cash preservation, and prioritizing goals. Communication at all levels has to be frequent, open, honest, and reassuring. Leaders have to be flexible and be prepared to guide their teams in pivoting between different ways of working and be responsive to new processes. Cash preservation is important and increasing working cash by preserving cash from non-critical areas, and how to manage it, has been critical in this difficult time. Overall, leaders have to quickly

prioritize between processes, goals, and key products is crucial for business model adaptation during a time of crisis.

**Section 2: Return to Office.** the team discussed case studies from member companies and sectors. Key challenges were in communications, staff support and training, and overall coordination and planning. The team explains that organizations are now institutionalizing procedures created during the COVID-19 pandemic to facilitate returning to in-person work, and enable the R&D workplace to better accommodate future crises with minimum impact on productivity and work quality. In-person collaboration fuels innovation; and successful R&D requires access to laboratory resources on key projects. Hybrid in-person/virtual meetings are fast becoming the new normal, and companies are trying to maintain flexibility as they try to increase productivity while ensuring safety. Variability in regional conditions had to be accounted for in all decisions.

In terms of managing the back to work process following the pandemic, effective communication skills were of paramount importance. Messaging must convey that management directives and workplace conditions may change, but certain core principles are maintained, including commitment to employee safety; commitment to customer service; and compliance with local and federal directives. It was important to establish robust infrastructure for online/hybrid collaboration, as this enabled virtual interaction when in-person collaboration is not possible. The role of a virtual meeting facilitator was emphasized. The need was also there to clearly define conditions and procedures for shutdowns, including measures to safely return workers onsite and resuming “normal” business travel.

**Section 3: Supply Chain.** The team examined the broader global challenges and then delved into specific instances such as the Evergreen blockage in the Suez, flooding in Louisiana, electricity outages in Texas. It is clear that the lean ‘just-in-time’ approach to supply chain is now replaced by an emphasis on reducing risk and improving resilience,

The key takeaways for **Supply Chain** are increased resilience and reliability, reducing risk, and ensuring reliable delivery from source to customer. Organizations are taking a new look at building resiliency into their supply chain system – away from lean, just-in-time delivery - and "designing in" redundancy to enable material substitution and multiple supply partner options. First, management wants greater clarity. Second, they want to look around the corner. Third, they want to win every market.

# 1. Leadership Lessons

## Summary

Several case studies were reviewed across different companies and sectors to identify common themes of what has helped organizations achieve success during recent tumultuous times.

## KEY TAKEAWAYS

Key takeaways and lessons learned include:

- **Communication:** Communication at all levels has to be frequent, open, honest, and reassuring.
- **Flexibility:** Leaders need to be prepared to guide their teams in pivoting between different ways of working and be responsive to new processes.
- **Cash preservation:** Increasing working cash flow by preserving cash from non-critical areas, and how to manage it, has been critical in this difficult time.
- **Prioritization:** Leaders' ability to prioritize processes, goals, and key products is crucial for business model adaptation during a time of crisis.

## RECOMMENDATIONS

Four main themes were discussed by the Study Team: guidelines for good communication, providing flexibility, need for cash preservation, and the need to prioritize critical activities.

- Communication at all levels has to be frequent, open, honest, and it is important to remain positive and reassuring.
- Leaders need to be prepared to guide their teams in pivoting between different ways of working and be responsive to new processes.
- Teams need to be prepared for potential delays in non-critical spending with cuts in, for example, travel, CapEx, and non-essential improvements.
- The ability of leaders to guide the prioritization of processes, goals, and key products is crucial for business model adaptation during a time of crisis.

## Executive Perspective: Leadership

Three areas with opportunities for Leadership emphasis were:

- Some combination of onsite and remote work is necessary to recruit & retain quality workers
- Adapt company practices (i.e., meetings) to accommodate mixture of onsite and remote work
- Maintain timely and honest communication with all workers, onsite and remote

The period beginning in early 2020 brought many new and unprecedented challenges to tackle, ranging from employee well-being to maintaining customer confidence. Day-to-day business issues became exacerbated as global supply chain issues caused disruption to production lines and quality. Furthermore, innovation and R&D management were impacted as the pandemic continued and uncertainty reined. Maintaining company culture, while still driving growth, became even more challenging – and important- during this period.

Leaders were faced with trying to help individual employees navigate challenging personal situations while trying to keep their companies moving forward. For many organizations, their strategy for people management during this period was to “lean in” to people in the hope of driving an increasingly cooperative and team-oriented culture. This supported robust onboarding of new hires while working to provide a supportive environment. Companies worked to manage risks by understanding different concerns in regions across the globe. They learned to deal with these differences using specialized and regional specific communication styles, taking into account different government rules regarding the pandemic.

The framework for employees’ working lives changed, so leadership had to evolve its approach in order to achieve necessary growth. This included a clear focus on prioritization and flexibility – identifying what needed to be prioritized and initiated (working from home), what projects should continue (innovation), and where the organization should pivot and perhaps reassign resources (halt travel).

Organizations and teams have become more aware of the risk that can occur during various crises scenarios. With strong leadership and comprehensive planning, crises can be mitigated by prioritizing the most impactful actions as well as a consistent retroactive assessment of lessons learned.

## COMMUNICATION

During tumultuous and ambiguous times, leadership must adapt in terms of communication strategies - meaning how to communicate effectively and regularly. Communication must be broad, tailored to the personal needs of employees, direct, honest, regular, and reassuring.

Specifically, management needs to be trained upfront on how to handle and communicate during difficult situations while keeping workflows running. The covid-19 pandemic forced managers to learn how to manage employees remotely, account for health and safety, and provide access to resources, while serving as a support network to help employees manage personal challenges

and stress. This type of preparation should also include how to successfully on-board new hires while continuously weighing the costs and benefits of in-person vs. virtual work. These concepts apply to both big companies and small businesses.

The lack of spontaneous face-to-face interactions as staff begin working remotely was a new challenge. Virtual environments require a more scheduled communication structure thereby eliminating the spontaneity of communication and idea-generation. Substitutes for informal communication that proved effective included communication inclusivity such as constant interaction with leadership, effective technology use, and the use of virtual reality platforms and additional trainings.

Crucially, during difficult times it is critical to be positive, giving hope for a better future, and seeing the “glass half full”.

## FLEXIBILITY

During the covid-19 pandemic, flexibility in employee working situations became paramount. This applied equally to employees who needed to be on site and those who were working remotely – all had different circumstances that impacted their ability to work. Also, different geographies had very different guidelines and both employees and employers alike had to adjust to the local specifications.

Going forward, leaders would do well to recognize and balance the benefits of both in person and remote work. Leaders found the benefits of in-person work included interaction, spontaneous conversations, and coaching. Concurrently, the benefits of working remotely included increased productivity, flexibility, and no commute time. The benefits should be merged in order to develop the ideal workplace solution for employees, that integrates flexibility, productivity, and strong communication.

As the pandemic evolved, many companies began adopting a flex schedule, which allowed employees to work both remotely and in the office during the week. Many companies adopted hybrid options such as 40/60 split remote/in-person as a working model.

As a key takeaway, leadership must develop strategies to ensure that employees continue to achieve their career goals, grow in their position, and work at their full potential. The concept of “out of site out of mind” should be most certainly avoided.

## CASH PRESERVATION

"Cash is king" is an age-old saying and as many times before, cash preservation became critical for companies during the various crises beginning in 2020. With an uncertain future, yearly/monthly plans started to look hazier and there was no clear picture about future sales/recovery and how the pandemic and other crises would evolve. Companies began to follow the age-old wisdom, preserving cash for emergencies. There were some great examples seen from different industries and companies. Some companies not only preserved cash for themselves but also provided support to their customers. Their pandemic responses included supporting customers with cash, profitability, and foot falls. Increasing working cash flow and providing cash incentives were critical for many smaller dealers/customers to stay in business.

Some manufacturing companies preserved cash from non-critical areas so that critical operations could continue to run smoothly. Manufacturing was not stalled as these product delays would have incurred more costs. Keeping all processes running with enough cash at hand proved to be a more effective strategy. Companies were able to keep product lines moving and ensure that all business units were fully operational as the crisis improved.

Many companies completely stopped or delayed non-emergency spending: for example non-critical travel, CapEx, process improvements, etc. New projects that were not essential to the near future were put on hold until the situation became clearer. In some cases, bonuses were put on hold and some companies had to implement temporary salary cuts. New hiring was stalled in favor of critical cash preservation. Further changes, such as working shorter hours/weeks in return for salary cuts were implemented. Some of these decisions were not popular and quite painful but had to be undertaken from an operational and leadership perspective. Leadership had to make sure that these temporary decisions were reversed as things became stable.

The role of upper management in preserving cash and making day-to-day decisions while communicating these decisions to employees became critical. In many cases, the approval of upper management in spending cash was required. For example, at some companies, approval was required for large expenditures over cash preservation from upper management. Different methods of cash preservation were explored outside of various cuts geared towards personnel. To improve preparedness for future crises, companies should examine what worked for them to increase cash flow and be prepared to implement a rigorous system for approval of non-critical cash spend.

## DRIVE PRIORITIZATION

Driving prioritization in times of crisis becomes even more critical, and leadership's ability to make the best choices for each situation is essential for success. Examples of choices that many companies, businesses, and leaders had to make during the covid-19 pandemic include: how projects were prioritized and de-prioritized, resource allocations, and with that, specific activities to be put on-hold due to available resources or shift in resources to other priorities. Keeping the balance between innovation and business maintenance, and global versus local initiatives were also of importance.

One specific example of the importance of balanced prioritization was the ability of many industry sectors, including fast-moving consumer goods companies, to prioritize qualification of new sources of raw materials in order to mitigate spikes in the cost of commodities. In this case, research and development, procurement, and supply chain leaders, among others, had to make tough decisions in terms of shifting resources from new product development/innovation projects to identification and validation of alternative sources of raw materials for products already in market in order to mitigate impact on margin. On the innovation front, emerging consumer needs due to the pandemic changed the innovation grids for many companies, so more prioritization was needed in this front as well.

Additional prioritization for leaders of global companies was necessary for the on-going shifting of workloads from one geographic location to another, based on the given status of the pandemic in each region of the globe. As any manufacturing plant, laboratory, or other type of facility requiring physical presence of employees to get work done was closed, or had restricted presence due to covid-19 mandates, plans had to be made by leadership to address the situation and keep work going. Contingency plans were key - in essence the ability to shift the workload to another site, outsource etc. For smaller businesses the choices were different: what resources to keep and what to let go of, and how to keep things afloat in one specific location.

These are just a few examples of many, in which leaders had to prioritize to drive success and empower their teams. Through all of this, the learning for any leader, leading in a time of tumult and ambiguity, is that flexibility will drive success, prioritization is needed, and first and foremost communication throughout any organization needs to be clear, fact-based, and thoughtful. The purpose behind the prioritization, directive to embrace flexibility, as well as the benefit of the choices made for the overall good of the organization need to be transparent to the workforce.



## SUMMARY: CHALLENGES FOR COMPANY LEADERS

The table below summarizes the four challenges of communication, flexibility, cash preservation, and prioritization, stating the main problem and identified solutions. Whenever a crisis emerges, the leadership team needs a playbook to turn to. These are the tasks facing leadership teams for the line of business that should be part of standard operating procedures. The Study Team observed that while R&D and S&OP often function separately, the closer they can operate as a cohesive unit, the greater the benefit for the company in both normal times as well as times of crisis.

Challenge	Problem	Solution
<b>Communication</b>	<ul style="list-style-type: none"> <li>• Lack of communication can be detrimental</li> <li>• Sense of insecurity and loss of confidence</li> </ul>	<ul style="list-style-type: none"> <li>• Frequent and open communication at all levels</li> <li>• Reassurance of control and ability to succeed</li> <li>• Clarity, fact-based, and thoughtfulness</li> </ul>
<b>Flexibility and Planning</b>	<ul style="list-style-type: none"> <li>• How to balance virtual vs. in-person interactions</li> <li>• What is important to remote employees and for different geographies</li> </ul>	<ul style="list-style-type: none"> <li>• Hybrid working models (e.g. 40/60)</li> <li>• Ensure strategies are in place to foster professional growth and keep people motivated and working at full potential</li> </ul>
<b>Cash Preservation</b>	<ul style="list-style-type: none"> <li>• How to increase cash flow and preserve for emergencies</li> </ul>	<ul style="list-style-type: none"> <li>• Implementation of rigorous system for approval of non-critical cash spend</li> <li>• Cuts in non-essential travel, CapEx, process improvements</li> </ul>
<b>Prioritization</b>	<ul style="list-style-type: none"> <li>• Decisions on what programs and activities to put on-hold and what to prioritize</li> <li>• How to prioritize resources</li> </ul>	<ul style="list-style-type: none"> <li>• Balance focus innovation and emerging critical operational needs</li> <li>• Contingency plan to shift work between geographies and/or work with reduced workforce</li> </ul>

## 2. Return to Work

### SUMMARY

The R&D workplace has to accommodate future crises with minimum impact on productivity and work quality. Throughout the pandemic, corporate research locations remained open to some extent based on the assumption that person-to-person collaboration fuels innovation and critical R&D personnel require access to laboratory resources on key projects. Hybrid in-person/virtual meetings are becoming the new normal as companies build in flexibility without sacrificing safety.

### KEY TAKEAWAYS AND LESSONS LEARNED

Key takeaways and lessons learned include:

- **Communication:** Communication at all levels has to be frequent, open, honest, and reassuring.
- **Flexibility:** Leaders need to be prepared to guide their teams in pivoting between different ways of working and be responsive to new processes.
- **Cash preservation:** Increasing working cash flow by preserving cash from non-critical areas, and how to manage it, has been critical in this difficult time.
- **Prioritization:** Leaders' ability to prioritize processes, goals, and key products is crucial for business model adaptation during a time of crisis.

### RECOMMENDATIONS

1. Effective communication is paramount. Messaging must convey that management directives and workplace conditions may change, but keep core principles intact, including employee safety, customer service, and legal compliance.
2. Establish robust infrastructure for online/hybrid collaboration spaces and meetings.
3. Create flexible workspaces and labs. Know which teams need to be onsite and when.
4. Clearly define conditions and procedures for shutdowns and safe return to work.

## Executive Perspective: Return to Work

### Three areas with opportunities for R&D to improve the future of work:

- Some combination of onsite and remote work is necessary to recruit & retain quality workers
- Adapt company practices (i.e., meetings) to accommodate mixture of onsite and remote work
- Maintain timely and honest communication with all workers, onsite and remote

Organizations are now institutionalizing procedures created during the COVID-19 pandemic to facilitate returning to in-person work, with the intent to better enable the R&D workplace to accommodate future crises with minimum impact on productivity and work quality. Throughout the pandemic, corporate research locations remained open to some extent based on the assumption that person-to-person collaboration fuels innovation and critical R&D personnel require access to laboratory resources on key projects. Laboratory and office spaces were reconfigured to accommodate social distancing, and schedules were adjusted to mitigate crowding in common spaces. Additionally, steps were taken to ensure surface cleanliness and interior air quality. Hybrid in-person/virtual meetings are becoming the new normal, and companies are trying to maintain flexibility as they issue measured mandates with an eye to maintaining productivity without sacrificing safety of personnel.

## DETAILS ON RECOMMENDATIONS

The Study Team noted these details on the four recommendation areas:

1. Effective communications should include:
  - Commitment to employee safety;
  - Commitment to customer service; and
  - Compliance with local and federal directives.
2. Robust infrastructure should be developed as a regular course of business to support online/hybrid collaboration spaces and meetings. Almost as a habit, these will make it easy to switch to regular virtual interaction when in-person collaboration is not possible. We are seeing this already in many business settings, and R&D is also adapting to this.
  - **VIRTUAL MEETING FACILITATOR** is a new critical need – this could be a new, valued job description as the talent to emcee remotely influences success of virtual meetings.
3. Create flexible workspaces (including labs) that can facilitate social distancing, if needed. Have plans in place for which teams need to be onsite and when.
4. Clearly define conditions and procedures for shutdowns, including measures to safely return workers onsite and resuming “normal” business travel.
  - Prioritize return to R&D facilities for workers on short-term, mission critical projects.
  - Define required onsite tasks and those that can be performed remotely. Show flexibility in allowing employees to work in their preferred environment as much as possible. Continue to review onsite/virtual guidelines with employees to facilitate engagement.

- For travel, focus on mission critical projects and willing travelers. Research conditions and restrictions at the destination – define a process for green-lighting travel and for briefing travelers.

## CHALLENGES

The Study Team described four core challenges, relating to communications, infrastructure, staff support, and appropriate planning.

1. Communication
  - Communicating critical requirements (i.e., masking, cleaning, closings) in a rapidly changing landscape.
  - Shifting guidance and directives lead to “*compliance lag*” across company S&OP.
2. Infrastructure
  - Configuring lab and office spaces to enable distancing.
  - Building and maintaining the infrastructure for virtual and hybrid work.
3. Staff support and training
  - Getting all staff up to speed on new tools and IT infrastructure without a disruption in productivity.
  - Supporting managers as they contend with unprecedented challenges with their team members.
4. Planning
  - Coordinating efficient and effective shutdowns of facilities when necessary.
  - Anticipating new variants and other curveballs.
  - Accounting for variability in regional conditions and restrictions in all decisions.

## CASE STUDY

A global manufacturer of automotive products offers a case study in maximizing cash flow and profitability and maintaining momentum in ongoing digital, IT and engineering efforts, while maintaining worker safety and offering support and flexibility to employees in uncertain times.

From an employee standpoint, the company was able to develop a plan and system to offer a series of support activities to employees. Vaccination camps were organized in office locations, and dedicated vaccination slots were provided to others who were working remotely from their home locations. All vaccination support was offered to employees and their dependents.

Telemedicine support and advice for suspected COVID cases were also provided to employees and dependents. During the peak in 2021, when hospital bed availability hit 0% in many cities, a volunteer group was set up to monitor and update information on the latest bed and medication availability. Additionally, a series of financial and medical leave supports were also offered.

From a business standpoint, in order to facilitate ongoing business initiatives in the new pandemic environment, customers were given extra support in terms of increased cashflow, sustained profitability, and generating more footfalls during the tough lockdown period. The company supported the customer community through earlier release of incentives, allowing for lower levels of inventory than stipulated, and early introduction of sanitization services, which ensured a basic level of revenue for the customers.

From a digital transformation standpoint, there was a balanced impact from the pandemic. While some wish list and research initiatives got deprioritized, it was clear that virtual interactions would require strengthening the digital infrastructure and prioritizing initiatives that could take advantage of the digital mandate. Given the lack of travel opportunities, data became a key asset to drive business decisions and interactions with various stakeholders. There was a push to culturally accept remote working, which ensured faster decision making despite the inability to meet face to face.

Over the course of the pandemic, the company was able to leverage its considerable resources and position to offer employees and their families the required support to continue to be healthy and productive. That support and flexibility allowed the company to advance in an environment where most were struggling to merely maintain business.

# 3. Supply Chain Resilience

## Summary

The term supply chain, once limited to business discussion, has become a household topic as companies across the globe struggle to distribute goods to consumers, keep store shelves stocked, and car lots full. Organizations that have invested in supply chain design that is capable, but lean, have found vulnerability and must take a new look at building resiliency into their supply chain system. This may include investment into reversing some of the lean design principles leveraged over the past decades, or at the very least, advancing efforts to "design in" redundancy into the new product launch process to enable material substitution or multiple supply partner options.

## KEY TAKEAWAYS AND LESSONS LEARNED

Here are issues to consider:

- Would investing in a more robust inventory model offset future potential lost sales and profit given the more frequent and intense supply chain disruptions experienced?
- Should the NPL process design include a more robust supply model with more supply partner or material substitutions available to leverage?
- Is it time to invest in developing second and third tier supply chain risk management plans with supply chain partners?
- When will technology be capable of anticipating future supply chain disruptions such that the ROI justifies the investment?

## RECOMMENDATIONS

- Better understand the second and third tier levels of the supply chain.
- Designing in material substitution options in the NPL phase is a must.
- Decades of lean supply chain design and the resulting TCO analysis may need a fresh look at investment.

## Executive Perspective: Supply Chain

### Three areas with opportunities for Supply Chain are:

- Reduce risk and increase resilience
- Anticipate change and 'look around the corner'
- Optimize value of transactions with inventory, insurance, and near-shore alternates

Within the R&D space, managers must ensure that capital investments are adequate while also factoring in shareholder needs. Make sure to evaluate Wall Street trends when answering questions about market expectations for both public and private companies. Furthermore, it is important to evaluate action plans regarding activist investors that put pressure on the company.


**CHALLENGES FOR SUPPLY CHAIN**

The table below summarizes the four challenges of communication, flexibility, cash preservation, and prioritization, stating the main problem and identified solutions. Whenever a crisis emerges, the leadership team needs a playbook to turn to. These are the tasks facing leadership teams for the line of business that should be part of standard operating procedures. The Study Team observed that while R&D and S&OP often function separately, the more cohesive they are, the greater the benefit for the company in both normal times as well as times of crisis.

**Preventing Out of Stock:** Shifts in consumer behavior and orders can lead to product out-of-stocks. Such lost sales can greatly impact customer confidence and lead to loss of loyalty. To reduce out of stock, one needs more accurate demand forecasts localized by trade zone, consumer segments, and frequent shopper profiles. This can recapture lost sales and improve customer retention.

**Increasing Competitive Advantage:** For quick, agile response, one should coordinate and inform the entire team particularly on changes – from sourcing, manufacturing, merchandising, and marketing to end customers. This will bridge the silos and speed up response to customer and competitor challenges.

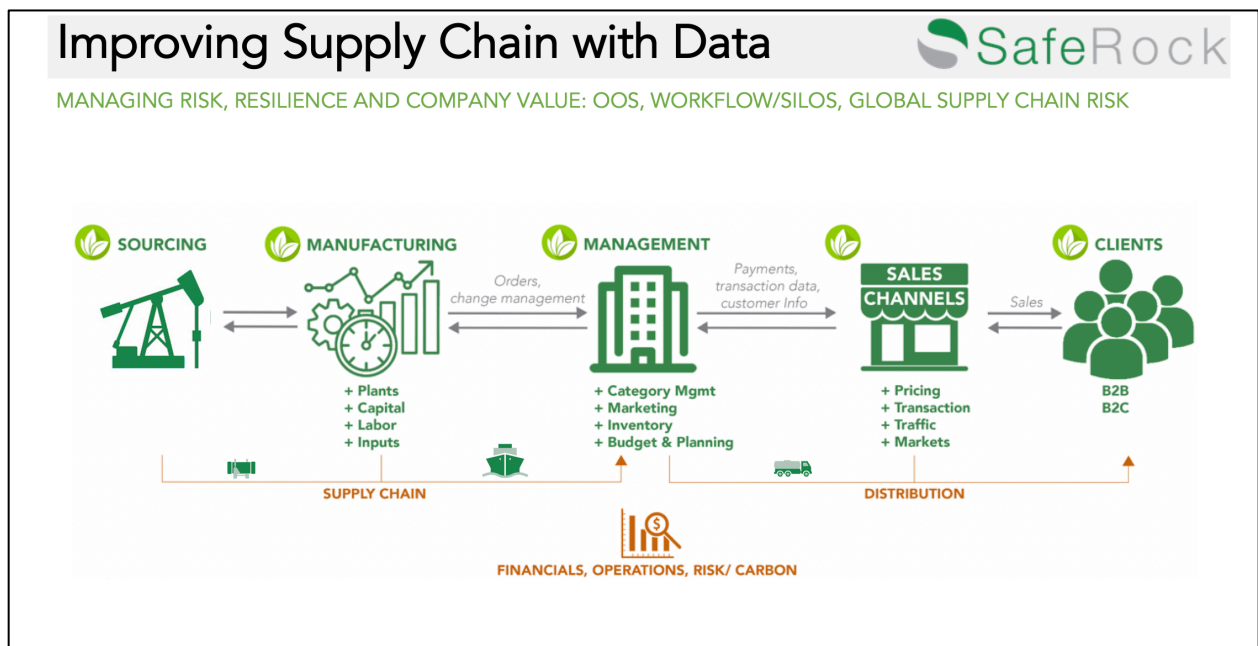
**Reducing Global Risk:** Lean supply chain can be inflexible and lead to unanticipated costs and breakages in product availability. R&D can lead technology, manufacturing, and logistics to work in alignment, thereby increase supply chain resilience and reduce risk.

The Challenge – Supply Chain 		
Challenge	Problem	Solution
<b>Prevent out of Stock and Capture Lost Sales</b>	<ul style="list-style-type: none"> <li>Unanticipated changes in demand or supply can lead to OOS</li> <li>Lost sales and loss of customer confidence</li> </ul>	<ul style="list-style-type: none"> <li>Eliminate OOS with Artificial Intelligence and Machine Learning</li> <li>Recapture lost sales with highly accurate demand forecasts for every market</li> </ul>
<b>Increase Competitive Advantage</b>	<ul style="list-style-type: none"> <li>Working in silos</li> <li>Slow reaction, loss of market share</li> </ul>	<ul style="list-style-type: none"> <li>Bridge the silos and get everyone on the same page</li> <li>Align all teams in the ecosystem and speed up communications and action</li> </ul>
<b>Reduce Global Supply Chain Risk</b>	<ul style="list-style-type: none"> <li>R&amp;D can't get new products out</li> <li>Lean supply chain won't work as is; this leaves risks unaccounted for, and leads to unanticipated costs</li> </ul>	<ul style="list-style-type: none"> <li>R&amp;D must lead tech, mfg, and supply chain to work in alignment</li> <li>Increase supply chain resilience with new financial model</li> </ul>

## IMPROVING SUPPLY CHAIN RESILIENCE – A DATA -DRIVEN APPROACH

It is entirely possible to improve supply chain resilience using a data-driven approach. The complete supply chain links source material to the customer. The five main areas within this are sourcing, manufacturing, corporate issues of inventory/capital/planning, sales channels, and clients. These are described in the accompanying graphic.

One example of data-driven analysis is to obtain detailed market-by-market projections of supply and demand using advance artificial intelligence and machine learning methods. This can be used to accurately forecast optimal inventory and safety stock levels for each and every local market – sometimes ranging into thousands of markets. This helps with risk management. Supply plans and inventories need to have sufficient buffer stock to meet unanticipated market demand in times of volatility. However, the company soon learned that it did not have enough resiliency. They needed to pressure test their demand and supply assumptions further in future.



## CASE STUDY: WINTER STORM URI, FUKUSHIMA EARTHQUAKE, AND SUEZ CANAL

On February 13<sup>th</sup> 2021, Winter Storm Uri moved into the southern gulf region of the U.S. and resulted in an unplanned power outage for the numerous petrochemical plants in the region. This caused severe damage to many resin producing plants, as well as their feedstock sources, requiring weeks of repair to bring the plants back online. Two other events occurred within days of the winter storm: an earthquake struck Fukushima Japan, which disrupted polymer production equipment, and the container ship, Ever Given, became disabled in the Suez Canal, essentially



shutting a major shipping lane. While there were countless events and challenges that occurred throughout 2021, these events had a common thread that proved the risk management plan for one global packaging producer failed to anticipate global supply chain dependencies that existed with their key suppliers.

Material	Where Consumed?	Base Risk Mgt Plan	Base Risk Mgt Flaw
Resin	N. America, Europe, Asia, LATAM	Multiple Sources qualified, regional sourcing and qualified options	<ul style="list-style-type: none"> <li>All sources were basic to ethylene, propylene, acetic acid, other feedstocks</li> <li>Multi-continent supply didn't mean alternative feedstock source</li> </ul>
Adhesives and Primary Adhesive Materials	N. America, Europe, Asia, LATAM	Multiple Sources qualified, regional sourcing and qualified options	<ul style="list-style-type: none"> <li>All sources basic to ethylene, acetic acid, VAM</li> <li>Regional constraints = global supply instability</li> <li>Decades of supply without formal contract = no supply</li> </ul>

From a resin perspective, the corporate team had prepared a supply risk plan that involved a multi-plant, multi-region approach, with a secondary plant located in another region of the world qualified to supply in any event of disruptions in the U.S. When Uri shut down all production in the Gulf of Mexico, their team quickly began discussions with their supply partner to begin plans to source from the alternative region plant.

**Fukushima earthquake:** While this plan was being put into motion, they learned that the plant relied upon base raw materials from Japan that had only days earlier experienced a significant earthquake, temporarily shuttering numerous manufacturing plants in the region, including a key supplier to their secondary production facility. The lack of basic raw material created a serious problem.

**Suez Canal and Ever Given:** Then, as this Japanese supply source began to start up production again, yet another challenge entered the story: the Ever Given. The Ever Given was a container ship that's journey originated in Asia and was making its way West through the Suez Canal. On its journey through the canal, it ran aground essentially stopping all traffic through this vital shipping lane for days. This brought the supply chain for the company to a halt while the ship was dug out.

According to Wikipedia, "at 07:40 Eastern European Time on 23 March 2021, as it was passing

through the Suez Canal on its way to Rotterdam from Tanjung Pelepas, *Ever Given* became stuck and blocked the canal. According to a statement by the Suez Canal Authority (SCA), the ship ran aground diagonally after losing the ability to steer amid high winds and a dust storm. In a separate statement, Evergreen Marine said that it had been told the ship "was suspected of being hit by a sudden strong wind, causing the hull to deviate from [the] waterway and accidentally hit the bottom". The ship ended up with its bow wedged in one bank of the canal and stern nearly touching the other.



*Tugboats trying to free the jammed ship, as viewed from the [International Space Station](#), 27 March 2021*

The ship, which had no tugboat, was the fifth in a northbound convoy, behind two prior container ships that were each paired with a tugboat. There were fifteen vessels behind it when it ran aground. Traffic in both directions was blocked for just over six days, leading to a traffic jam of over two hundred vessels.”

When reflecting on this and a host of other challenges presented throughout 2021, it is clear that a lack of supply chain resiliency can impact all functions of a manufacturing organization, from finance to operations to R&D. When asked how the pandemic impacted R&D leaders, the company team’s primary response was that they were forced to prioritize supporting supply chain solution projects and to shelve new product design projects, which has set back new product launch schedules.

## SUMMARY: OBJECTIVE FOR SUPPLY CHAIN

In summary, company leadership can improve supply chain in several ways, and they need to guide with a new focus. One important adjustment is away from lean, just-in-time delivery to a resilient supply chain with alternate material, manufacturing processes, suppliers, supply lanes, and flexibility in final deliverables. In times of shortages, this helps to meet the needs of clients.

### Industry Players can improve supply chain in new ways





**Objectives**

- Fulfilling the lean Just-in-Time mandate is no longer enough
- A resilient supply chain has to incorporate the cost of external disturbances as part of its financial performance metrics
- Supply chain partners should increase flexibility even at added cost

President Biden - October 13, 2021  
"Never again should our country and our economy be unable to make critical products we need because we don't have access to materials to make that product. Never again should we have to rely too heavily on one company or one country or one person in the world, particularly when countries don't share our values when it comes to labor and environmental standards."

*Following discussions with the White House, FedEx, UPS, and Walmart are now working 24/7 to alleviate supply chain problems in the United States.*

The table above summarizes the four challenges of communication, flexibility, cash preservation, and prioritization, stating the main problem and identified solutions. Whenever a crisis emerges, the leadership team needs a playbook to turn to. These are the tasks facing leadership teams for the line of business that should be part of standard operating procedures. The Study Team observed that while R&D and S&OP often function separately, the closer they can operate as a cohesive unit, the greater the benefit for the company in both normal times as well as times of crisis.

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