

EventWatch® 2017 Annual Report

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POWERING THE RESILIENT SUPPLY CHAIN

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Executive Summary

2017 presented unique and interesting hurdles to supply chain professionals in the form of natural disasters, business developments, and site-level disruptions. EventWatch notified its customers of 1,931 supply chain events in 2017 of which 562 required an impact notification. On average, EventWatch published 5 bulletins per day last year, representing an additional bulletin daily when compared to 2016. Natural disasters and weather-related events proved to be considerable sources of disruption across the globe and especially in the United States. Hurricanes Harvey, Irma, and Maria contributed to a significant development in 2017, North America become the most disrupted region in terms of naturally occurring events. Factory Fire/Explosion was the most persistently disruptive event type observed by Resilinc's customers last year, representing 18% of all notified EventWatch bulletins. In 2017, EventWatch contacted more than 19,000 unique suppliers for potential impacts, which generated responses from 53% of those contacted supplier. This is an increase of about 10% from 2016. 32% of the companies listed on the S&P 500 Index were potentially affected. Additional statistics and graphs are presented in the report that follows.

About the EventWatch Annual Report

The EventWatch Annual Report aggregates, analyzes, and summarizes supply chain event information leveraging the extensive supplier network data and statistics collected by the EventWatch® 24x7 global event monitoring, alert, and analysis service. The report highlights global supply chain risk trends through a variety of lenses. It helps stakeholders to understand: Which disruption event types are most common or becoming more common? How does my industry compare to other industries in terms of the number of events experienced? Which regions are impacted the most? And, what months see the most disruptive incidents? The EventWatch Annual Report also highlights some general principles that are likely to remain consistent year after year. Through the comparative analysis that follows, it is clear that the more frequent, low-impact events that may go unnoticed by most are not only the majority of supply chain events, but should be as highly prioritized as the larger-scale and more severely disruptive events, like the Port of Tianjin explosion of 2015. What makes the EventWatch Annual Report different from "Top 10 Supply Chain Event" lists and other year-end reports and commentary is that it is driven by data and focuses on impacts to specific brands, suppliers, sites, and parts, based on value-at-risk calculations. To accomplish this it employs the Resilinc supplier repository which includes risk information associated with over 85,000 supplier sites – representing over 2 million parts.

The Supply Chain Events Year in Review

A number of geo-political, macro-economic, social/technological and environmental trends continue to impact global supply chain continuity. In 2017, the EventWatch 24×7 global event monitoring, alert, and analysis service published 1,931 supply chain event bulletins compared to 1,494 supply chain event bulletins in 2016, an increase of approximately 30%. This translates to 5 daily supply chain events observed by Resilinc customers on average in 2017, representing an additional daily event when compared to the year prior.

2017 saw its share of considerably disruptive events such as Hurricanes Harvey, Irma, and Maria and the financial troubles of major electronics manufacturer, Toshiba. While effectively mitigating against the aforementioned "black swan" events is crucial, research continues to reiterate the importance of preparing for smaller, more frequent disruptions that could have a larger impact on business revenue and day-to-day operations. As such, a dynamic supply chain risk management program in 2018 will focus its visibility on larger-scale events, such as storms and other natural disasters, as well as events that occur on a daily basis like site-level disruptions. 2016 observed marked increases in the number of Merger & Acquisition and Reorganization/Management Change events notified by EventWatch, dethroning Factory Fire/Explosion as the most commonly reported disruption. However in 2017, Factory Fire/Explosion reacquired the top spot as the most common disruption reported.

After reviewing the various disruptive occurrences that took place this past year, Resilinc has compiled a list of 5 ongoing events to carefully monitor in 2018. While this list is presented in no specific order, each of the events provided present their own unique hurdles to supply chain professionals in the new year and beyond.

> Geopolitical developments in North Korea: The supply chain community would be well-served in keeping a keen eye on geopolitical developments in North Korea in 2018. The situation appears to be volatile and potentially disruptive to the global supply chain network given the nation's proximity to China, South Korea, Japan, and the United States both geographically and politically.

> China's response to pollution and its impact to manufacturing: China's efforts to curtail pollution gave supply chain professionals much to contemplate in 2017. Locally, factories were shuttered to help reduce hazardous levels of smog throughout the country. As pollution is not an easily solved problem in the short-term, factory shutdowns and manufacturing limitations may be further utilized by the country in 2018.

> Cyber-attacks and cybersecurity: Cyber-attacks, particularly of the ransomware variety, and issues of cybersecurity made headlines throughout 2017. Cybersecurity, if not already, should be of the utmost concern of supply chain professionals in 2018.

> NAND flash chip supply shortages: In 2017, reports surfaced of temporarily halted production at Toshiba facilities in Japan leading to strained supplies of NAND flash chips globally. As global supplies of NAND flash chips are highly reactive to even slight changes in production, persistent monitoring will be necessary in 2018.

> Increased volatility of storms and natural disasters: With billions of dollars in damages incurred due to natural disasters in the United States alone in 2017, the spotlight has, for obvious reasons, turned again to climate change and its role in the increased volatility of storms. In 2018, stronger storms should be expected and should be mitigated against as well as possible. Pertinent climate change/weather data should be used in decision-making when available.

The chart below provides a top 5 summary of all bulletins by event type, industry, geography, disruption potential, and month for 2016 and 2017 for comparison purposes. Detailed analysis will be provided for each section of the chart throughout the remainder of this report.

Top 5 Supply Chain Events Breakdown by Category (2016 – 2017)										
Ranking	Event Type		Industry		Geography		Disruption Potential		Month	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
1	M&A	Factory Fire/Explosion	Life Sciences	Automotive	North America	North America	Low	Low	December	July
2	Factory Fire/Explosion	Merger & Acquisition	Automotive	Life Sciences	Asia	Asia	Medium	Medium	September	June
3	Reorganization / Management Change	Business Sale / Spin-off	High Tech	High Tech	Europe	Europe	High	High	November	August
4	Earthquake	Factory Shutdown/ Disruption	Others	Other	RoW	RoW	Severe	Severe	October	December
5	Business Sale / Spin-off	Hurricane/ Typhoon/ Cyclone	-	-	-	-	-	-	August	May

In comparing 2017 event data with previous year data for trend-identification purposes, it is important to note that the significant increase in the total number of events reported via EventWatch bulletins can be attributed to:

- More events occurring
- EventWatch continually refining thresholds and standards for notifying events
- Resilinc onboarding additional N-tier supplier and supplier sites in new regions, thus increasing the scope of potentially disruptive events

Moreover, Resilinc estimates that most of the increase in supply chain activity can be explained by the second and third factors. It should be noted that EventWatch alerts and notifications are not always confirmations of a specified disruption, but are confirmations of events that typically precipitate supply chain disruptions. Additionally, some events can result in multiple bulletins due to them causing more disruptions over the long-term (e.g. a hurricane can lead to later flooding and power outages). The EventWatch Annual Report considers each bulletin as a separate event. EventWatch sends two types of bulletins:

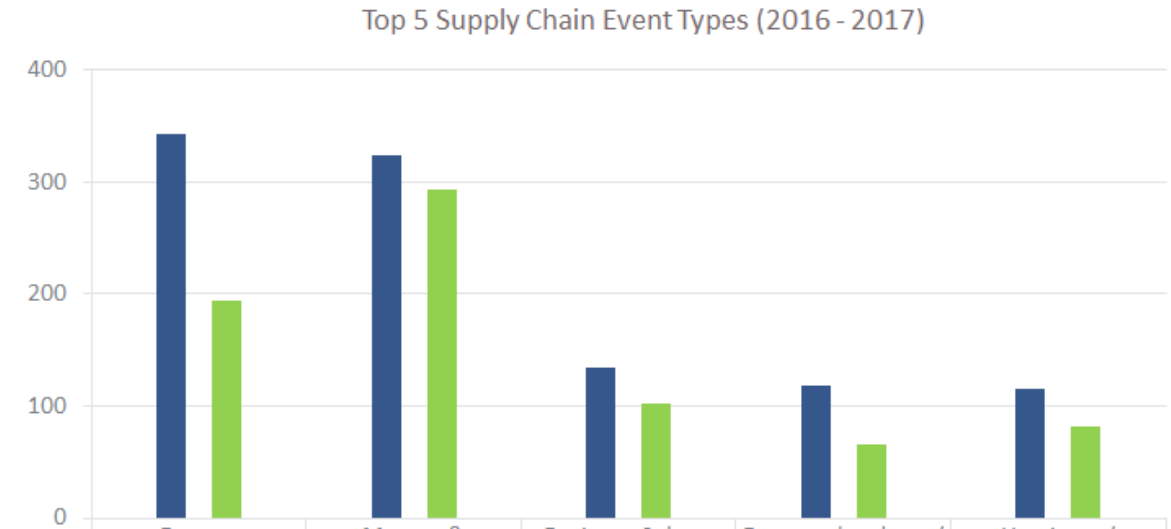
- EventWatch Notifications provide preliminary unverified information on potential supply chain disruptions that Resilinc is currently monitoring and investigating
- EventWatch Alerts inform customers of potential indirect and direct impact from events that may require customer action

EventWatch also sends the EventWatch Impact Notification when there are mapped sites in a potentially disrupted region or a site-level event has occurred to a mapped site. EventWatch Impact

Notifications provide Resilinc customers with impact intelligence regarding their suppliers, parts, suppliers sites, and products within the impacted region. In tandem, supplier partners also receive Supplier Impact Notifications. Supplier Impact Notifications create an "impact event" in the supplier Partner Portal and mobile app for them to confirm to their customers the extent of their disruption. In 2017, over 19,000 unique suppliers were contacted via Supplier Impact Notifications, 161 of which are companies listed in the S&P 500 Index. Out of these 19,000 suppliers, 10,114 responded - a response rate of 53% (a 10% increase compared to 2016). Of those 10,114 responses, 125 suppliers confirmed impact and provided their customers Time to Recovery (TTR), an invaluable metric in the mitigation process.

Number of Supply Chain Event Bulletins by Event Type

Below you will find the top 5 supply chain event types for 2016 and 2017. In 2016, Merger & Acquisition overtook Factory Fire/Explosion as the most common event type notified by EventWatch. In 2017, however, Factory Fire/Explosion regained its position as the most notified event type with 343 bulletins issued. Merger & Acquisition took second place with a slight increase of 324 bulletins issued compared to 293 the previous year. Business Sale or Spin-off increased by 33 bulletins for a total of 135 bulletins issued in 2017, which was enough to secure its third place ranking. Factory Shutdown/Disruption came in at fourth place with 118 bulletins issued, an increase of 52 bulletins from last year. And Hurricane/Typhoon/Cyclone took the fifth place position with 116 bulletins issued in 2017.



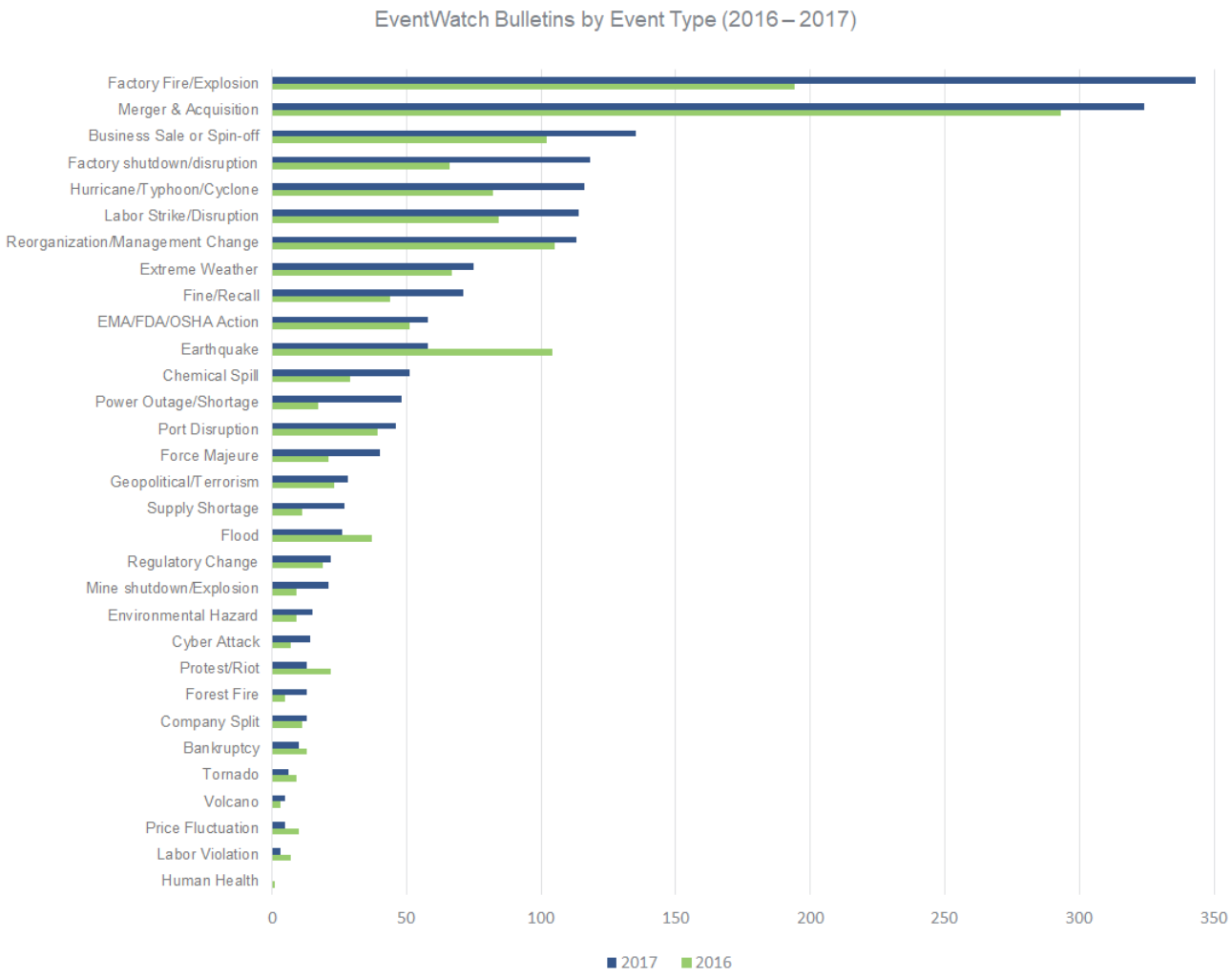
	Factory Fire/Explosion	Merger & Acquisition	Business Sale or Spin-off	Factory shutdown/ Disruption	Hurricane/ Typhoon/Cyclone
2017	343	324	135	118	116
2016	194	293	102	66	82

The following chart provides the top 5 supply chain event types for 2016 and 2017. Factory Fire/Explosion increased in 2017, representing 18% of all EventWatch bulletins issued up from 13% in 2016. Merger & Acquisition dropped slightly from 20% of bulletins issued in 2016 to 17% issued in 2017, though the number of bulletins issued for the event type actually rose last year. While Business Sale or Spin-off maintained its third position with 7% bulletins issued in 2017, the number of bulletins issued for the event

type rose by 33 bulletins. Factory Shutdown/Disruption and Hurricane/Typhoon/Cyclone both increased to 6% of bulletins issued in 2017, taking the fourth and fifth positions respectively. Combined, the top 5 supply chain event types represent 54% of all bulletins published by EventWatch in 2017.

Top 5 Supply Chain Event Types – Total per Year (2016 – 2017)		
Notifications	2016	2017
Factory Fire/Explosion	194 (13%)	343 (18%)
Merger & Acquisition	293 (20%)	324 (17%)
Business Sale or Spin-off	102 (7%)	135 (7%)
Factory shutdown/disruption	66 (4.4%)	118 (6%)
Hurricane/Typhoon/Cyclone	82 (5.5%)	116 (6%)
Total Events	1494	1931

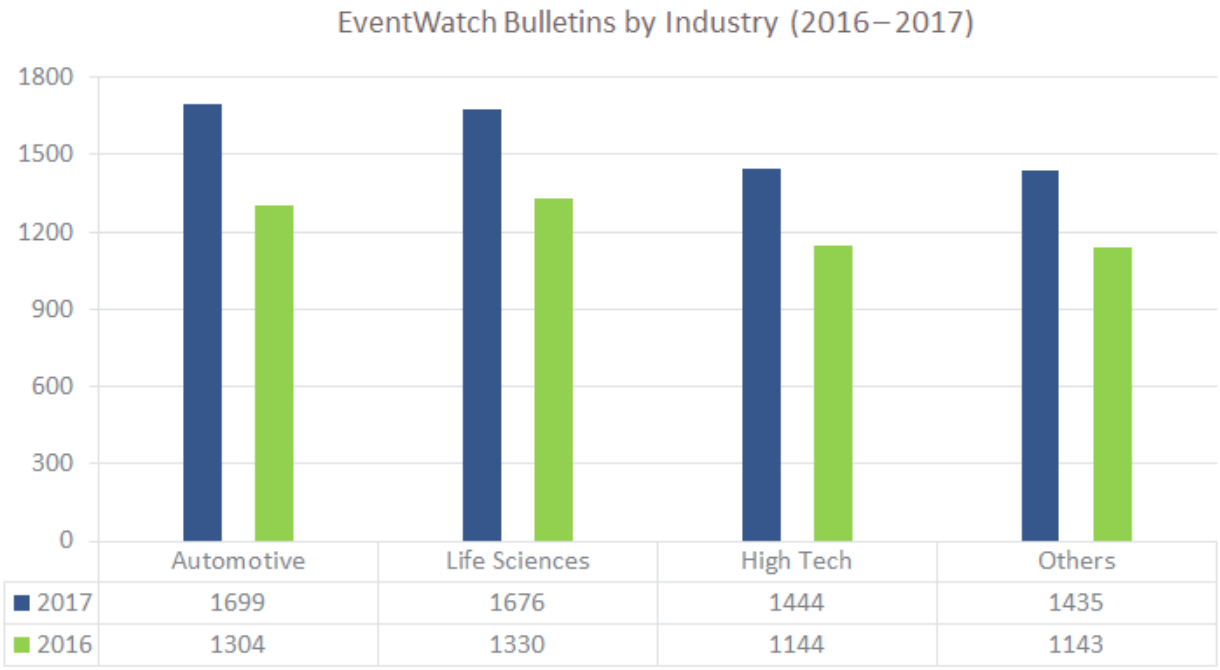
The following chart below provides an overview of EventWatch bulletins sent by event type for 2016 and 2017. We can see that Factory Fire/Explosion represents the most common disruption observed in 2017, up from the second position the year prior. Merger & Acquisition represents the second most common disruption observed, dropping from its first position in 2017. Despite the reversal of Factory Fire/ Explosion and Merger & Acquisition, both event types experienced fairly substantial increases in 2017. Note that the top 10 event types all registered increases in the number of bulletins issued in 2017. Business Sale or Spin-off, Factory Shutdown/Disruption, Hurricane/Typhoon/Cyclone, and Labor Strike/Disruption all saw significant increases from 2016, whereas the number of Earthquake bulletins issued fell. While this may appear to reflect drastic changes in the trends of disruptive events, as EventWatch continually refines its thresholds and incorporates customer feedback the number of bulletins issued for a specific event type may increase or decrease. Beginning in November 2017, EventWatch has expanded the Earthquake threshold so as to issue a bulletin anytime a 5.0 magnitude earthquake is reported in China, the Philippines, Japan, South Korea, and Taiwan, the original threshold would have us issue a bulletin only when a 5.5 magnitude earthquake was reported in the aforementioned regions. This illustrates the process by which an event type may experience a drastic change to its numbers from year to year.



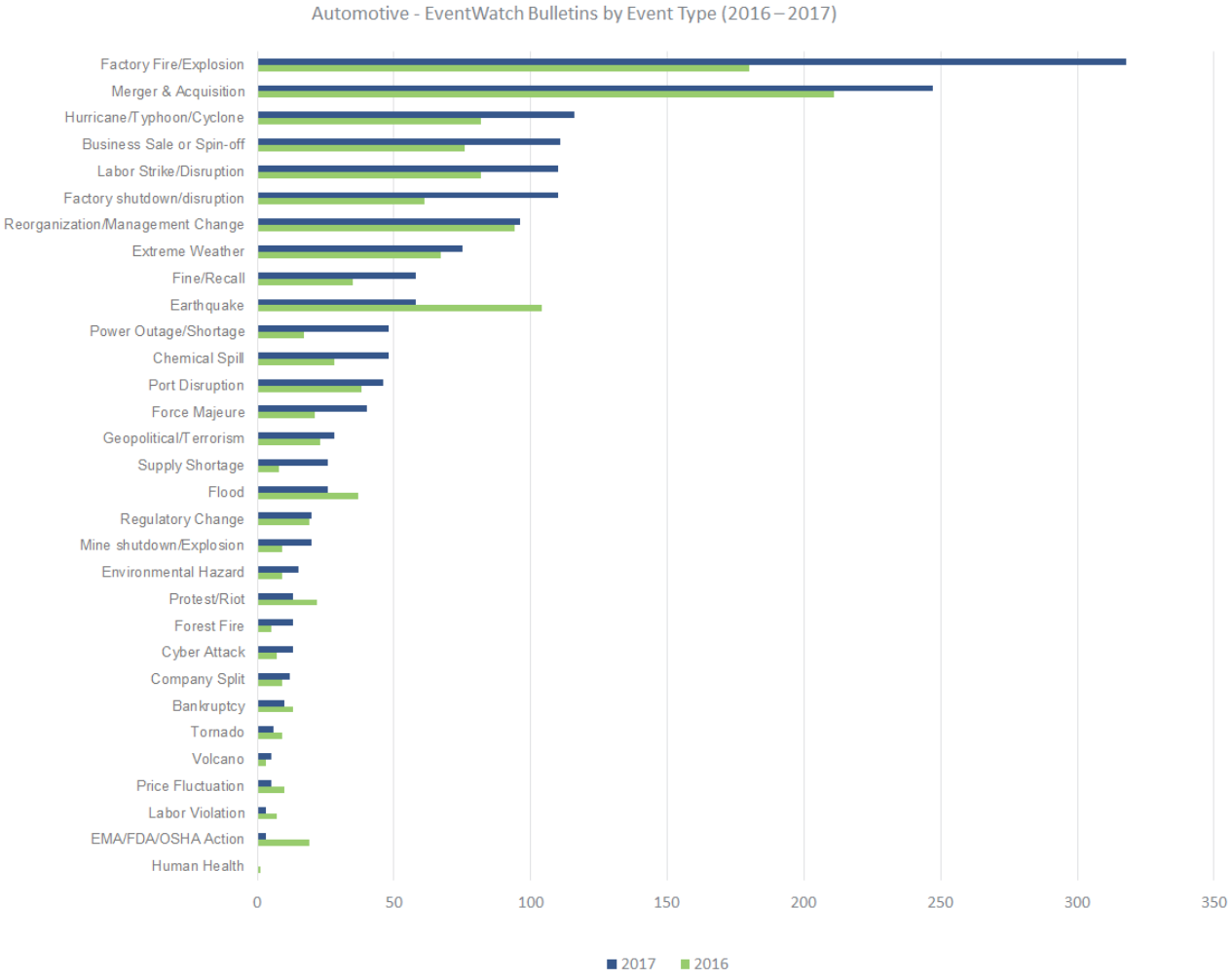
While most supply chain professionals are likely to have their eye on the more common disruptions represented in the top 10 of this chart, a number of less common disruptions all registered increases in 2017 from the year prior. These include EMA/FDA/OSHA Action, Geopolitical/Terrorism, Regulatory Change, Mine Shutdown/Explosion, Environmental Hazard, Cyber Attack, Forest Fire, Company Split and Volcano.

Number of Supply Chain Event Bulletins by Industry

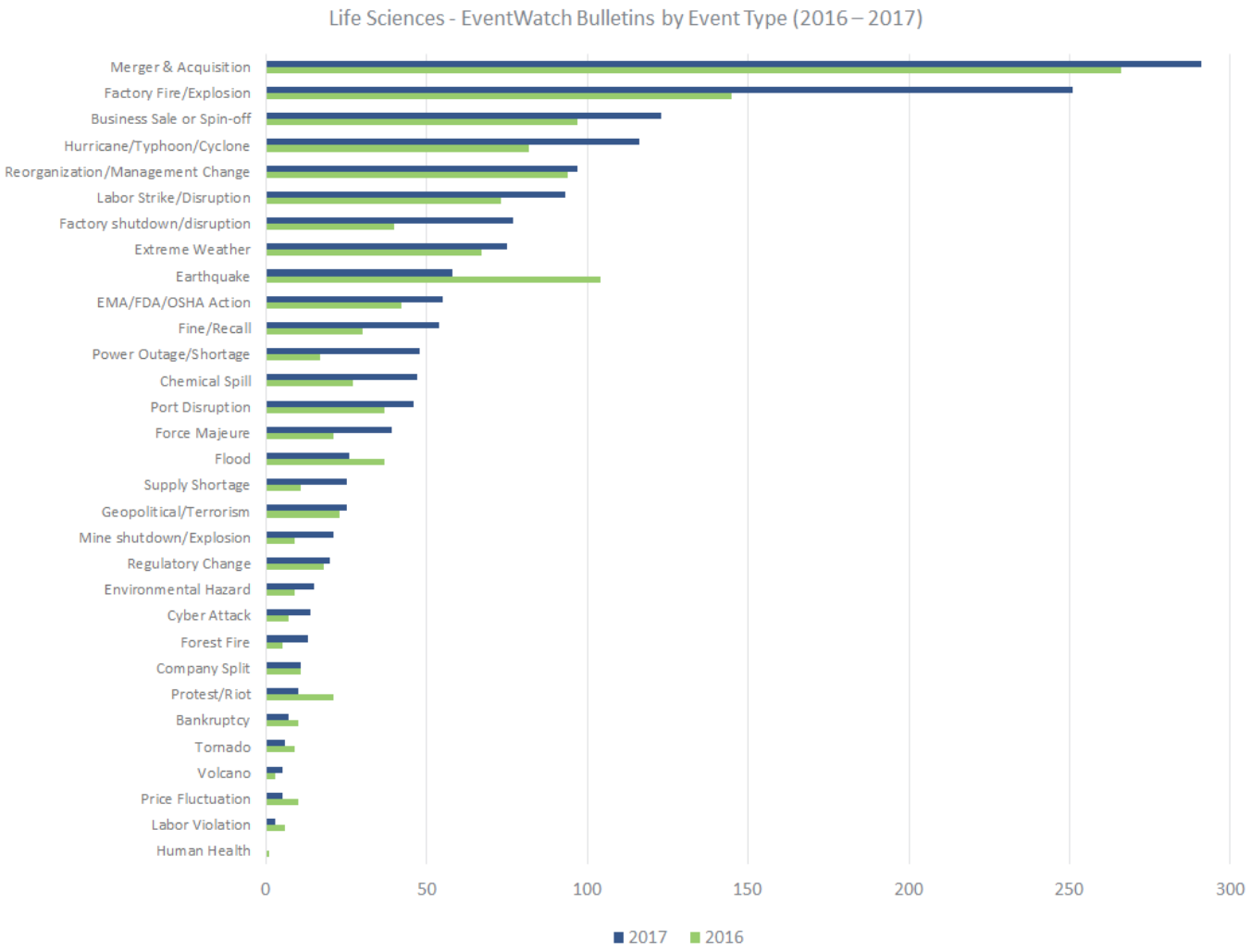
The chart below provides a comparison of the number of EventWatch bulletins by industry for 2016 and 2017. Bolstered by an increase to the number of Merger & Acquisition bulletins published due to customer feedback and refined standards, the life sciences industry was the most disrupted in 2016. In 2017, the automotive industry was the most disrupted industry as it saw an increase of 395 bulletins published. All industries observed increases of around 300 bulletins or greater in 2017.



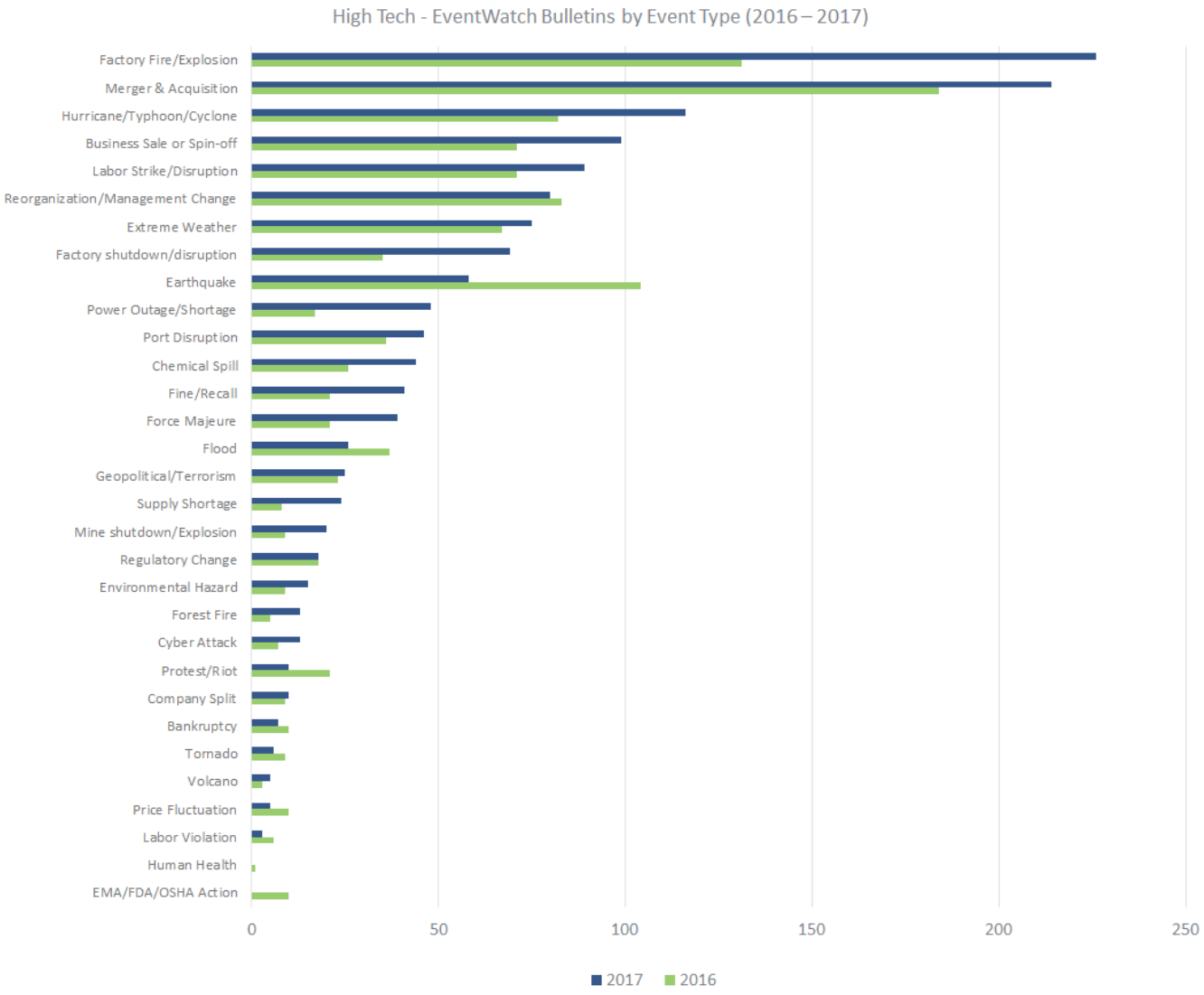
The chart below provides a more detailed breakdown of the types of disruptions observed by the Automotive Industry in 2016 and 2017.



The chart below provides a more detailed breakdown of the types of disruptions observed by the Life Sciences Industry in 2016 and 2017.

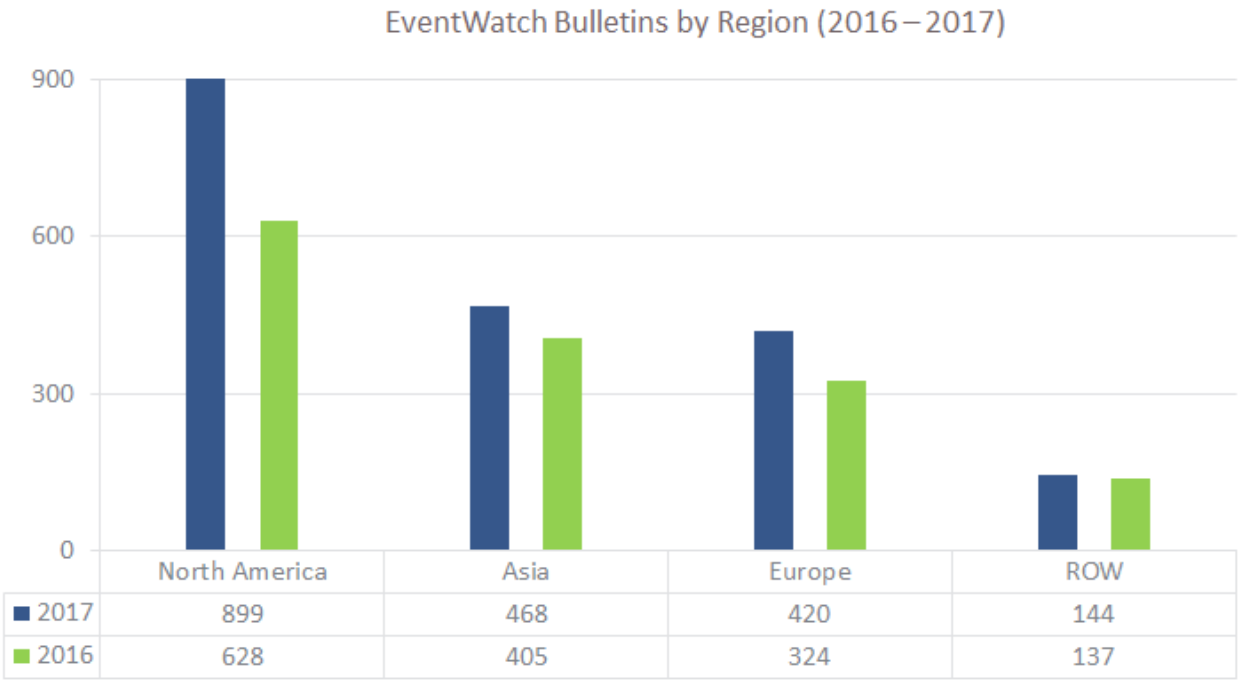


The following chart provides a more detailed breakdown of the types of disruptions observed by the High Tech Industry in 2016 and 2017.



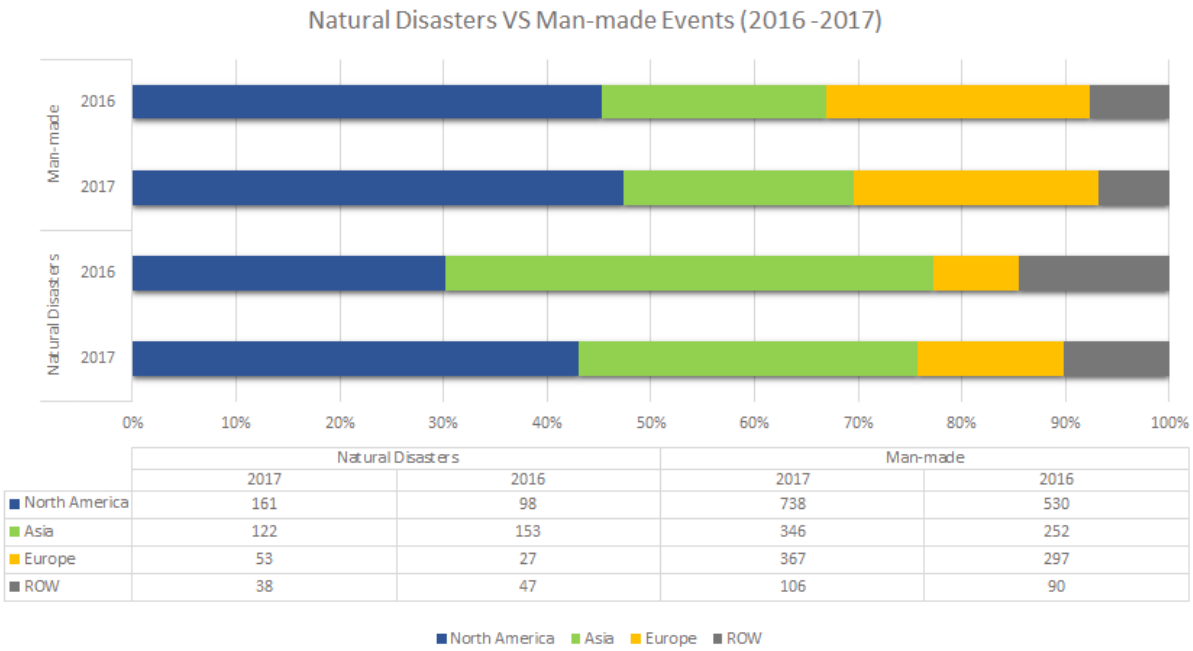
Number of Supply Chain Event Bulletins by Region

The chart below compares the number of EventWatch bulletins by region in 2016 and 2017. North America, Asia, Europe and Rest of the World (RoW) all observed an uptick in the number of bulletins published in 2017. They each maintained their first, second, third, and fourth positions respectively from 2016.



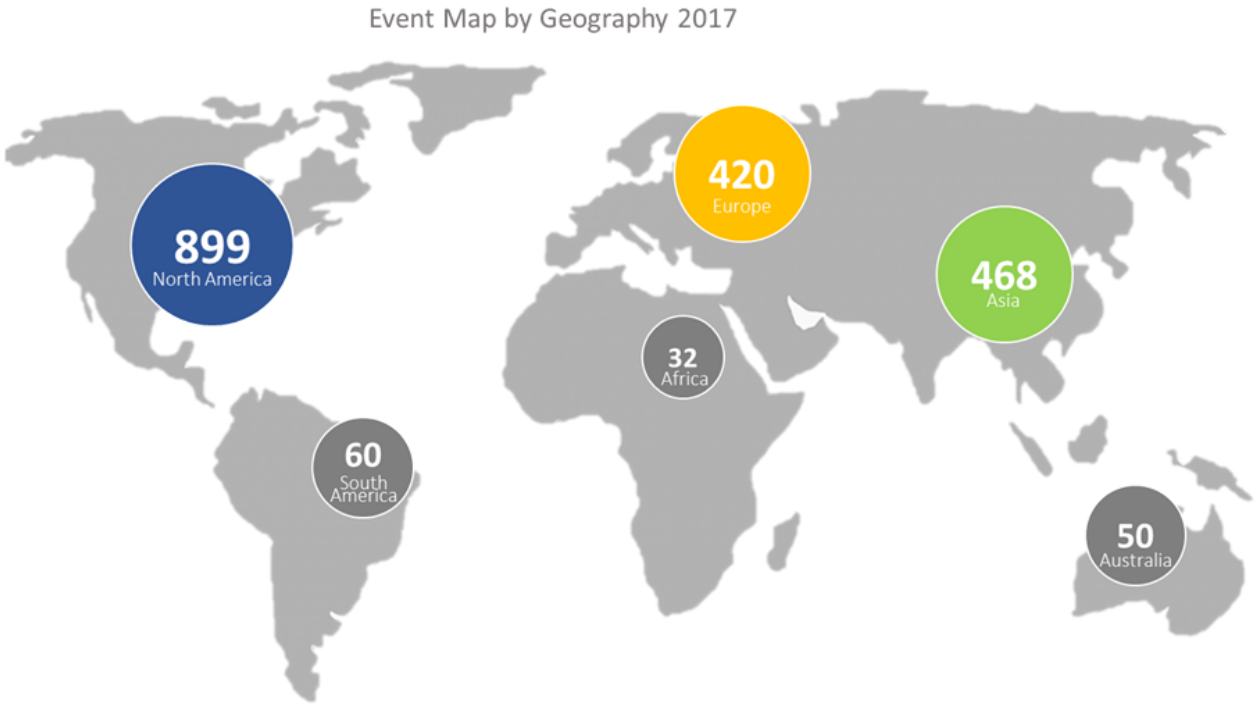
	North America	Asia	Europe	ROW
2017	899	468	420	144
2016	628	405	324	137

The below chart provides a comparison of natural disasters and man-made disruptions in 2016 and 2017 by region (North America, Asia, Europe, and RoW). For the purposes of this chart natural disasters include the Earthquake, Hurricane/Typhoon/Cyclone, Extreme Weather, Flood, Volcano, Tornado, Human Health, Environmental Hazard and Forest Fire event types. Man-made disruptions include all other event types. Please refer to page 8 for the complete list of event types. Most supply chain professionals would consider Asia to be the region most disrupted by natural disasters due to its inherent vulnerability to typhoons and earthquakes. This trend was corroborated in last year's EventWatch Annual Report as Asia was the most disrupted region by natural disasters. However in 2017, due to particularly disruptive storms and extensive forest fires, North America was significantly impacted by naturally occurring disruptions and for the first time, North America was the most disrupted region by natural disasters. Resilinc has identified this potential trend as a situation to monitor in 2018.



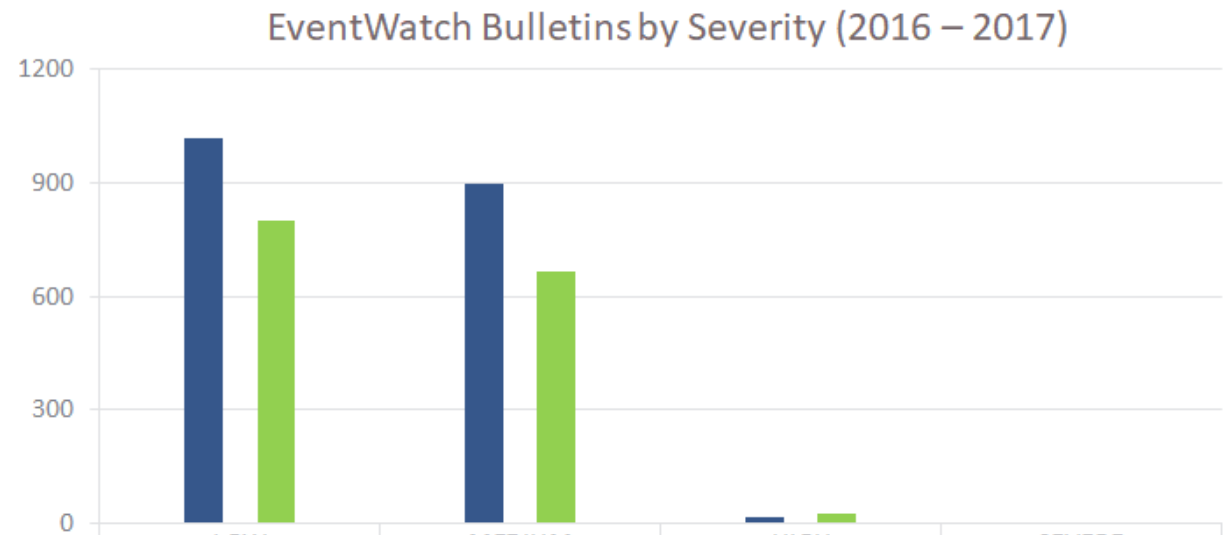
	Natural Disasters		Man-made	
	2017	2016	2017	2016
North America	161	98	738	530
Asia	122	153	346	252
Europe	53	27	367	297
ROW	38	47	106	90

The map below provides a visual representation of events notified by region in 2017.



Number of Event Bulletins by Severity

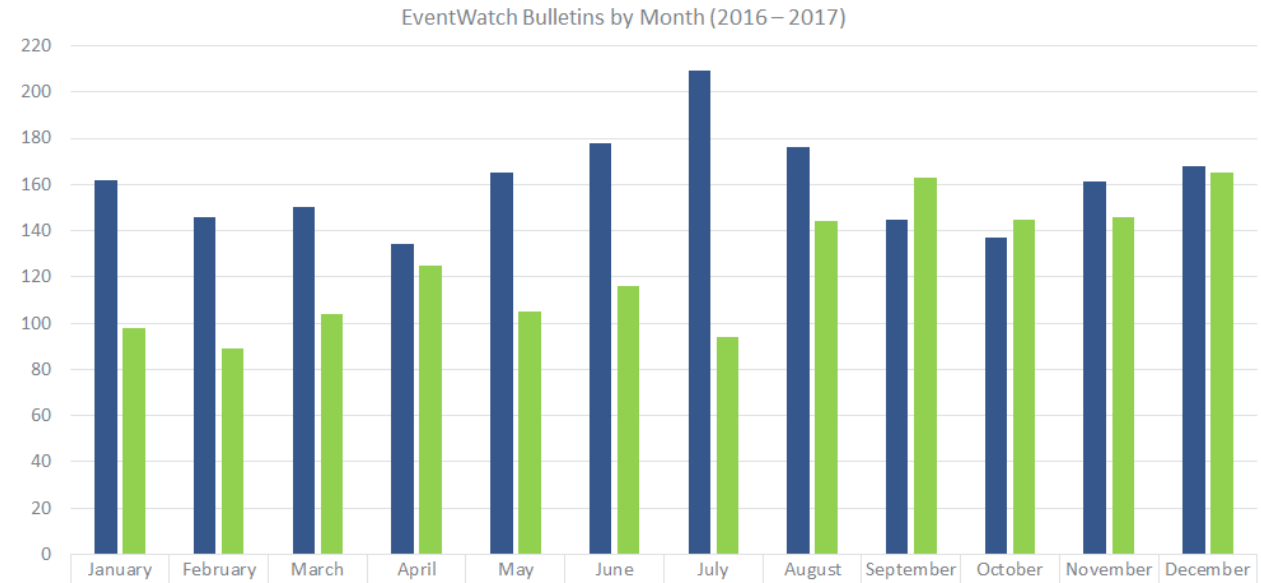
Low and medium events both increased in number from 2016's data. The number of highly disruptive events actually decreased in 2017 when compared to the year prior. Each event severity maintained its ranking from 2016. The graph below reiterates the trend that low and medium events present the greatest risk to supply chain operations across the globe and should be mitigated against as well as less frequent "black swan" events.



	LOW	MEDIUM	HIGH	SEVERE
2017	1019	897	15	0
2016	800	667	27	0

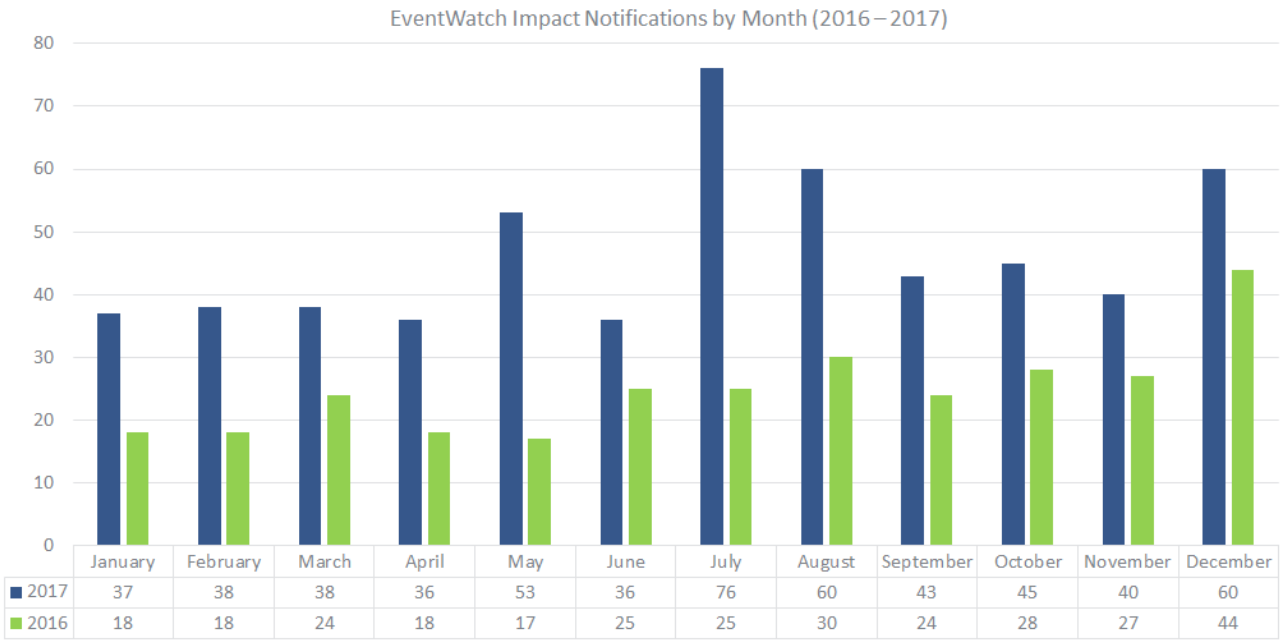
Number of Event Bulletins by Month

The chart below provides the number of EventWatch bulletins published by month in 2016 and 2017. Marking a departure from 2016's data; June, July and August were the most disrupted months in 2017. Q2 and Q3 saw a significant number of Merger & Acquisition events announced, contributing to the high number of bulletins for that part of the year. The second most common event type reported during this 3 month period was Factory Fire/Explosion. This data reiterates that the two most common disruptions observed in 2017 were Factory Fire/Explosion and Merger & Acquisition



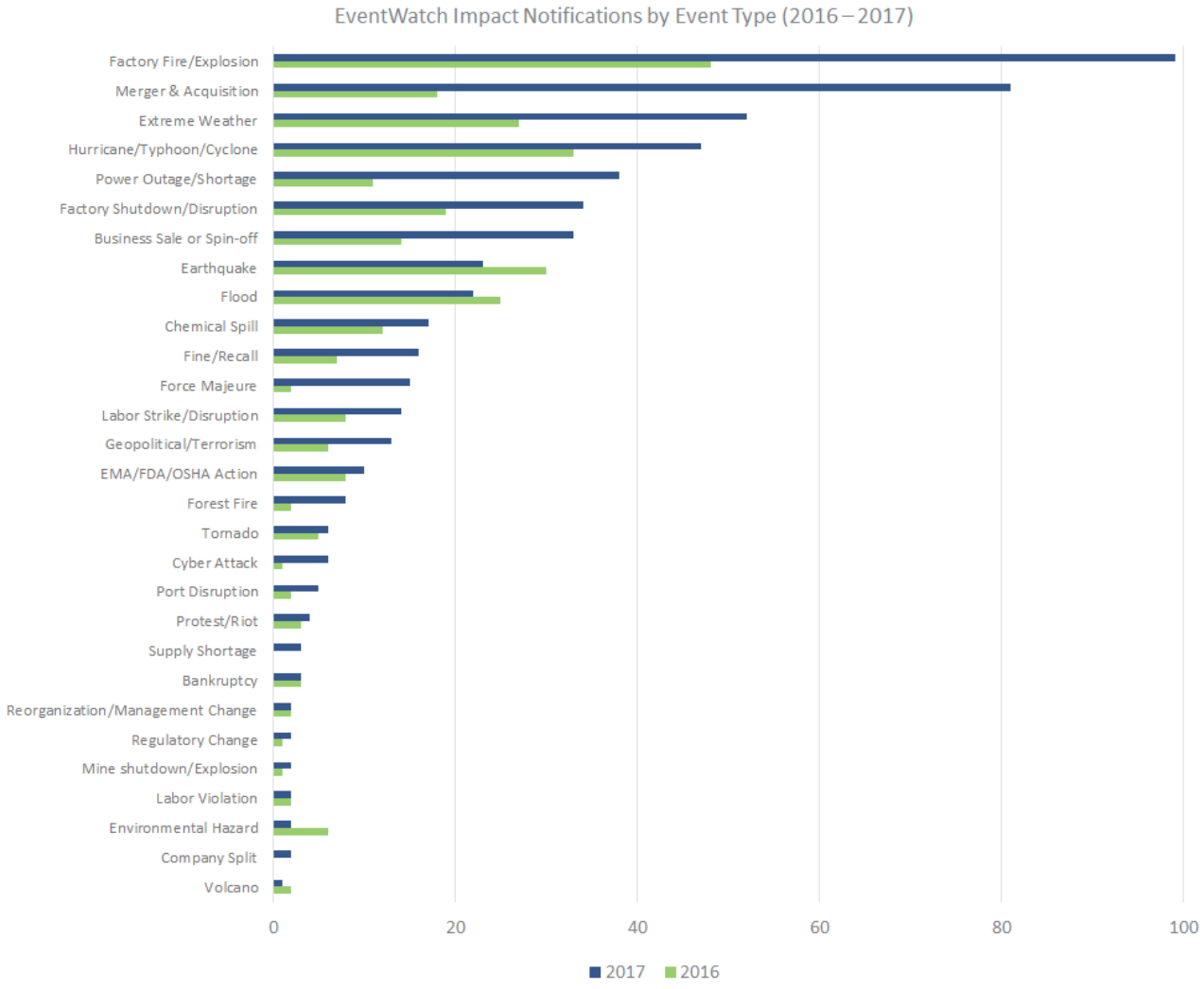
	January	February	March	April	May	June	July	August	September	October	November	December
2017	162	146	150	134	165	178	209	176	145	137	161	168
2016	98	89	104	125	105	116	94	144	163	145	146	165

When EventWatch identifies a supplier site has been potentially impacted by a disruptive event or is in the vicinity of such an event, an EventWatch Impact Notification is sent to the customer with that supplier in their network. The impact notification provides critical information such as number of sites potentially impacted, number of parts from the sites, number of products, potential revenue impact, as well as average time to recovery. Out of 1,931 bulletins notified in 2017, 562 required an impact notification. This represents a near doubling of impact notifications from 2016. The chart below provides a comparison of Impact Notifications issued by month for 2016 and 2017.

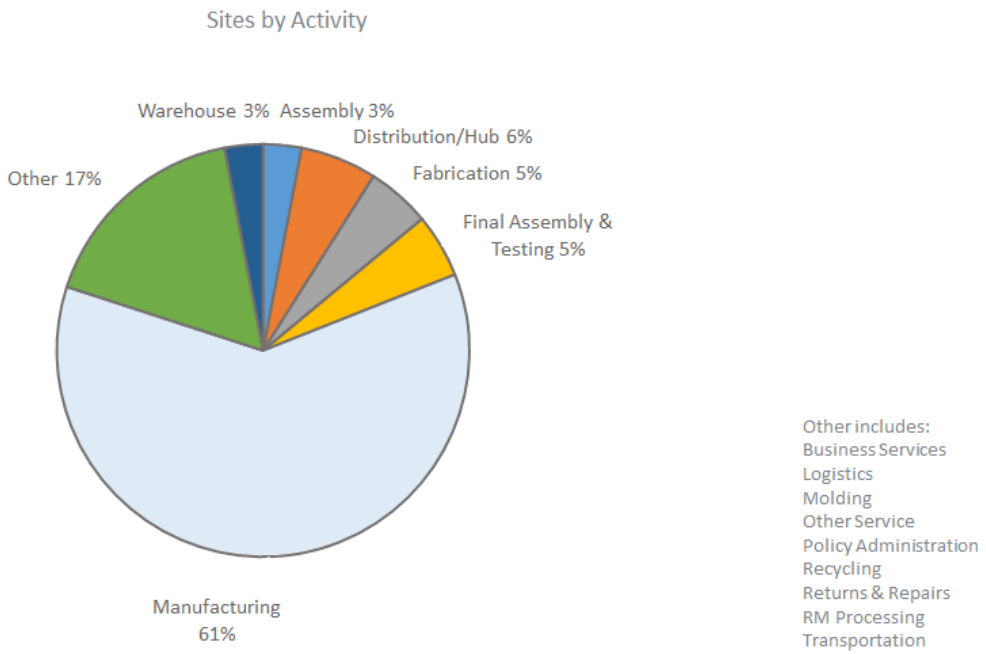


	January	February	March	April	May	June	July	August	September	October	November	December
2017	37	38	38	36	53	36	76	60	43	45	40	60
2016	18	18	24	18	17	25	25	30	24	28	27	44

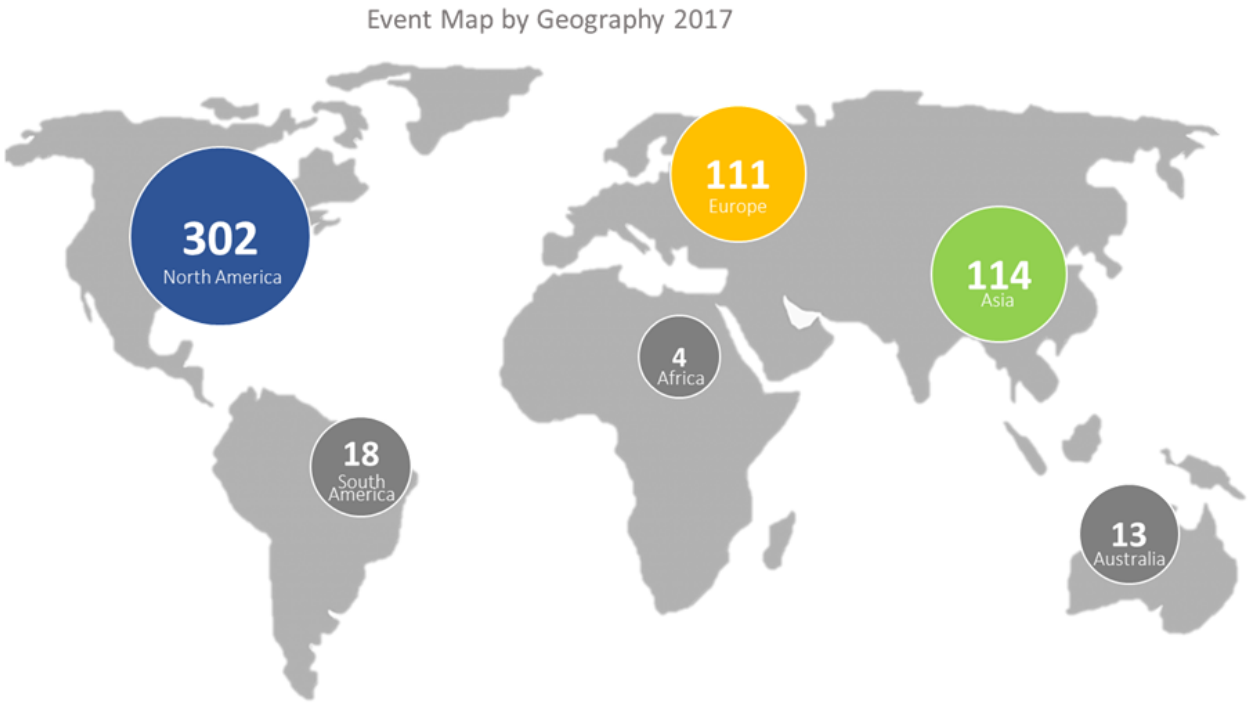
Factory Fire/Explosion was not only the most notified event type in terms of bulletins in 2017 but also in terms of impact notifications, this is due to the event being particularly disruptive to specific N-tier suppliers sites mapped in Resilinc's data repository. Merger & Acquisition took the second position last year, this is due to impact notifications being issued whenever an acquisition is closed involving a supplier in Resilinc's supplier network. Extreme Weather replaced Earthquake for the third position in 2017 with Earthquake assuming the eighth position. Hurricane/Typhoon/Cyclone moved to the fourth position in 2017 down from the second position the year prior, however, when combined with the number of Extreme Weather impact notifications, it is clear that weather-related events were highly disruptive to supply chain operations last year. Power Outage/Shortage took the fifth position up from eleventh in 2016, experiencing a significant increase in impact notifications issued in 2017. Any power outage observed by Resilinc, which extends longer than 6 hours will be notified when supplier sites are present in the impacted region.



The following chart provides a visual representation of the activities of the 143,642 N-tier sites belonging to 22,832 N-tier suppliers that EventWatch flagged for potential impact in 2017. As you can see, a significant amount of the potentially impacted site activity is manufacturing, the most critical of all supply chain activities. Other, which makes up the second largest piece of the pie chart, is comprised of business services, logistics, molding, other services, policy administration, recycling, returns & repairs, RM processing, and transportation.



This map provides a visual representation of events where EventWatch identified a supplier site potentially impacted by a disruptive event or is in the vicinity of such an event.



The table below provides the top 5 most significant events in 2017 in order of when they occurred and provides impact data including the number of supplier sites impacted, the number of parts impacted and average site time to recovery (TTR). All of the top 5 most significant supply chain events took place in North America in 2017 and were all considered naturally occurring events. For these events, Resilinc received 32 supplier impact confirmations.

Top 5 Most Significant Supply Chain Events (Ordered by when they occurred)						
	Event	Date	Location	# of Sites Affected	# of Parts Affected	Average Site TTR (Weeks)
1	Late Winter Storm/Northeast USA	March-17	United States	4,118	11,119	23
2	Laredo Border Closing	May-17	United States, Mexico	28,126	127,801	24
3	Hurricane Harvey	Aug-17	United States	2,062	3,068	17
4	Hurricane Irma	Sep-17	United States	2,242	2,544	33
5	Hurricane Maria	Sep-17	Puerto Rico	258	235	23

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About EventWatch®

Resilinc EventWatch® is a global supply chain event monitoring and analysis service providing email reports and cloud analytics personalized to your company with meaningful business impact insights from disruption events such as natural disasters, factory fires, and labor stoppages. For further information, visit www.resilinc.com/resilinc-eventwatch. Resilinc now offers simple, easy to use EventWatch products to make monitoring easy for you.

EventWatch Professional: ($99/month) Any professional can easily sign up and monitor up to 50 sites with Resilinc.

EventWatch Enterprise: ($4500/month) Cost effective, simple solution for complex enterprises (unlimited users, unlimited sites monitored), includes access to our Mobile App and Cloud solution.

Sign up for a 30-day free trial. Click here

About Resilinc

Resilinc is the leading provider of supply chain resiliency solutions and delivers scalable enterprise solutions that enable supply chain professionals to gain visibility across multiple tiers of their complex, global supply chains. With a comprehensive offering that encompasses multi-tier supply chain mapping, single points of failure analytics, global disruption event monitoring and management, mitigation workflow and part-level supply chain compliance programs for conflict minerals monitoring and business continuity planning, Resilinc has become the leader in comprehensive supply chain resiliency solutions. Resilinc helps customers achieve supply chain resiliency through innovative and patent-pending technology, an extensive resiliency-driven supply network, and a proven comprehensive enterprise scale solution that delivers strong value to both clients and supplier partners.

For more information, visit **http://www.resilinc.com**.

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