



Navigating Change in Crisis Using Data

EVERYWHERE INFUSE ANALYTICS

Executive Summary

COVID-19 came upon us quickly and rapidly reshaped our lives, organizations, and businesses. As governments shut down cities and countries, the public and businesses turned to data for answers. This sparked a widespread need for trusted sources of insights to lead the way.

It isn't the first time society has experienced a scenario of this kind, but it is the first time there has been a worldwide pandemic in a very long time. Pandemics affect politics, lifestyle, and families and, of course, create uncertainty around the economy. There are lessons to be learned from those events through a close evaluation of the data and the impact of the actual event and the years that followed. Data, up to this point, was used primarily in hindsight. Today, it is used in real time to understand current situations.

As we step into the post [COVID-19 pandemic](#) future, data can guide and help us navigate our decisions.

Companies will use data to shift resources, enhance outcomes, support customers, and find new efficiencies. Data and analytics will help navigate the growing uncertainty and give clear opportunities to collect, analyze, and act on data—in all three scenarios of pre-pandemic, present pandemic and past pandemic.

This whitepaper looks at how data helps us manage the impact of the COVID-19 virus on our lives; how data has always been used to address public health emergencies; how it has evolved to deal more rapidly with the current crisis; and how the newest data analytics technology can not only mitigate the impact of the crisis but can also guide us to find a way through it and provide future benefits for data-driven organizations.

Change is already among us. Accelerating data analytics to navigate this change is what this whitepaper is all about.

Changing Times

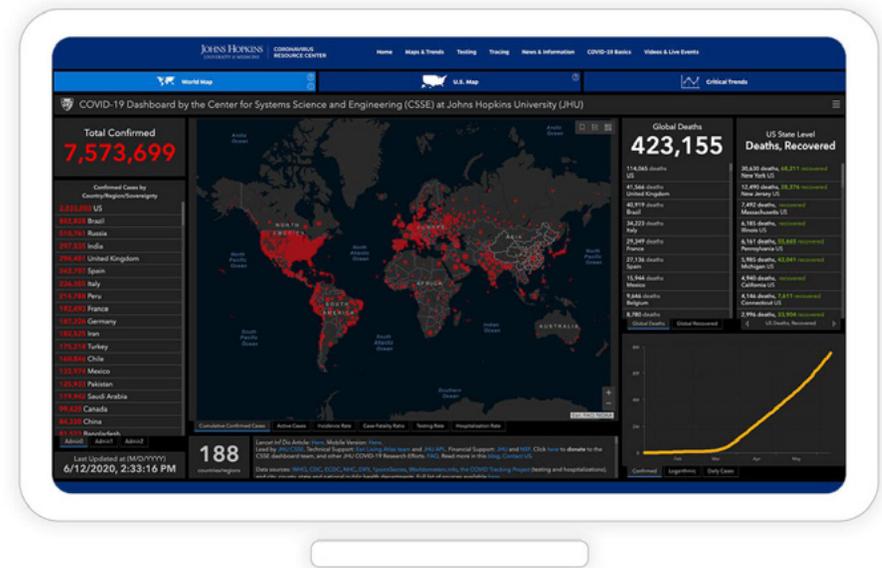
Data surrounds us

The COVID-19 pandemic started in late 2019 and spread to over 177 countries by mid-April 2020. Each country experienced different levels of the outbreak and implemented shutdowns depending on the severity and speed of the outbreak and the public health response in different locations. Within a few months, the new coronavirus had changed the way we live, work, and go about our daily routines.

On January 22, 2020, a [dashboard](#) was shared with the world.

Professor Lauren Gardner, a civil and systems engineering professor at Johns Hopkins University, and her graduate student, Ensheng Dong, provided researchers, public health authorities, and the general public with a user-friendly tool to track the outbreak as it unfolded.

For the first time in history, the public and the world at large turned to data to help them understand what might happen next in their lives.

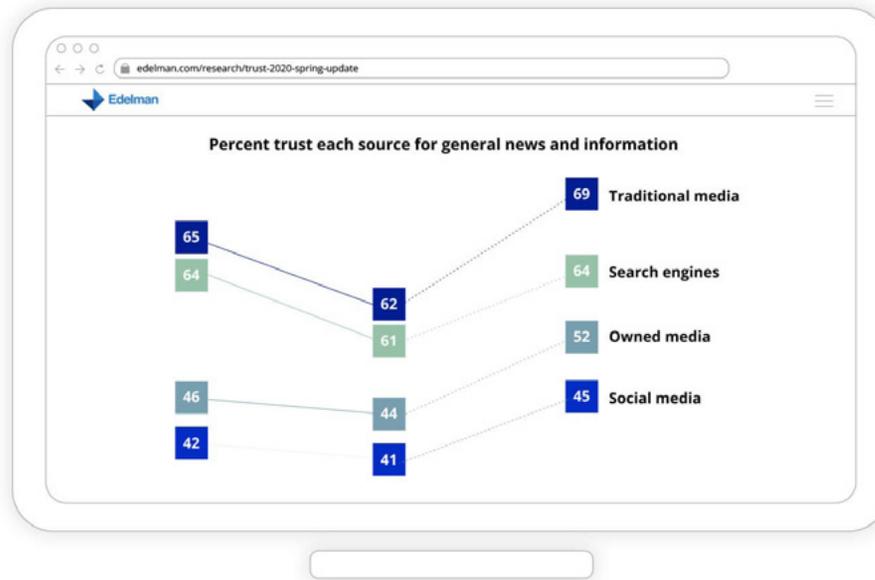


Source: [Johns Hopkins University & Medicine Coronavirus Resource Center](#)

Learning to live with COVID-19

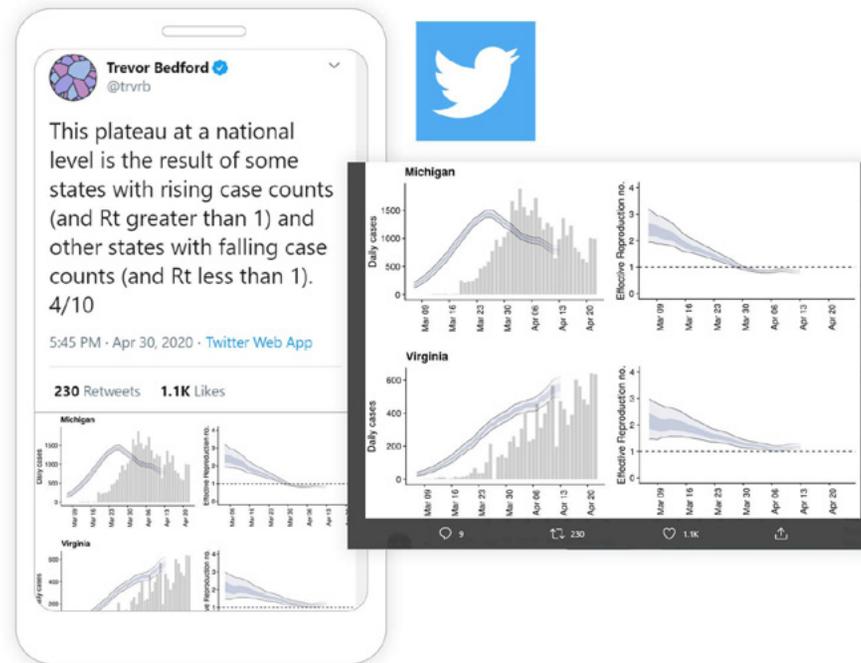
Governments across the world began to use data more than ever before to make important policy and economic decisions. They locked down cities, closed public areas, and urged people to stay at home. Businesses and organizations began crisis management to assess how they'd sustain operations without a clear end in sight. New terms became commonplace, like numbers of confirmed cases, daily cases, and flattening the curve.

Strong public demand for expert voices arose, as people wanted to hear from the most trusted sources of information on the pandemic: doctors (80%), scientists (79%), and national health officials (71%).



Source: [2020 Edelman Trust Barometer Spring Update: Trust and the Coronavirus](#)

As such, trusted sources began delivering clear, factual visualizations that provided good insight into the pandemic, while there were many sources of incorrect information meant to incite fear and alienate certain parts of the population. Many people turned to these reliable sources for information on the spread of the disease and how to behave. Infectious disease epidemiologist Trevor Bedford started adding clear, intelligible visualizations to his tweets that supported findings and conveyed the state of the pandemic to followers worldwide.



Source: [Trevor Bedford on Twitter](#)

A new way to work

The impact on the general public carried over to businesses, organizations across the world started testing their crisis management planning, and the effects of the pandemic were seen across many industries; some negative, some positive:

According to a [Moody's report](#), shipping, lodging, restaurants, gaming, and retail were hardest hit by coronavirus-related market chaos in the short term.

[Now, the global economy faces the worst decline since the Great Depression of the 1930s](#), according to the International Monetary Fund.



Source: [Business Insider](#)

For [passenger airlines](#), the number of daily flights decreased by 80% in early 2020 and in some regions, nearly all passenger traffic was suspended. Consequently, the industry is in survival mode. Airlines, airports, and ground-handling firms are conserving their cash reserves as their normal revenue streams have dried up.

On April 21, 2020, the price of US oil [turned negative for the first time in history](#).

Unemployment claims reached 36 million in the US alone ([in May 2020](#))—that equals the net number of jobs created since the last recession (nine and a half years ago) and ended with the pandemic's arrival.

On the positive side: Grocery stores, packaging, and telecommunications will survived relatively unscathed, according to the Moody's report.

Consumers around the world rushed to their local grocery stores. From cleaning supplies and canned goods to the inflated demand for toilet paper, grocery stores are responded never-before-seen trends in consumer behavior.

While consumers bought out stocks of goods, [supermarkets and FMCGs used data](#) to respond to supply and demand and to keep a clear picture of how their business was performing and how aligned they were with their crisis management planning.

"In the midst of the COVID-19 pandemic, maintaining momentum is vital and the art of decision-making imperative," said Evan Castle, head of market intelligence and strategy at Sisense.

From new regulations to fluctuations in demand and remote work, business

leaders must face this new economic reality by addressing three distinct challenges with clarity: tracking rapidly changing circumstances, responding to volatility in both supply and demand, and maintaining a clear picture of corporate business performance.

Beyond all of this is the need to understand how these circumstances affect our biggest asset of all: people. For example, in April 2020, The New York Times reported that [20 million jobs](#) had been lost in the US in just four weeks. This number has continued to escalate. So, from furloughing staff to closing businesses, from childcare to education, and from a rise in anxiety about health to mental well-being issues triggered by enforced isolation, decisions around people have remained at the forefront of the importance of data collection.



“We have an opportunity to look at the data and to decide the world we want to live and work in, and rebuild it together for the better.”

- **GUY LEVY-YURISTA**

Chief Strategy Officer of Sisense

Historically Speaking

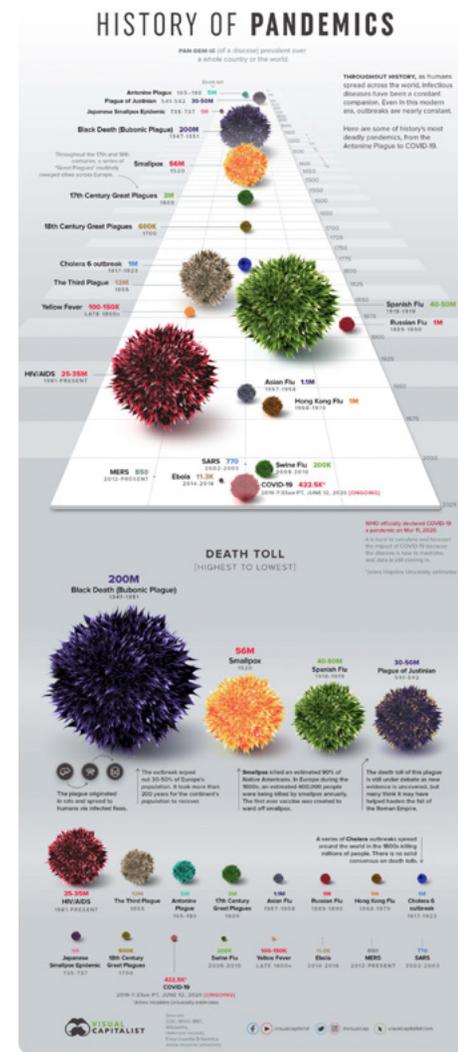
Data from the past can chart our future

Disease has plagued humanity since the earliest days. However, it was not until the disease reached the agricultural and farming communities that the scale and spread increased dramatically.

Data was gathered in order to record the extent of each disease and, where possible, examine the conditions that enabled the diseases to spread, but this was a slow and painstaking process. As a result, the data that was gathered was used to help with a cure rather than to prevent the spread as it happened.

Widespread trade created new opportunities for human and animal interactions and sped up many epidemics. Malaria, tuberculosis, leprosy, influenza, smallpox, and others first appeared during these early years.

The more civilized humans became, the more pandemics occurred.



Source: Visual Capitalist: Visualizing the History of Pandemics

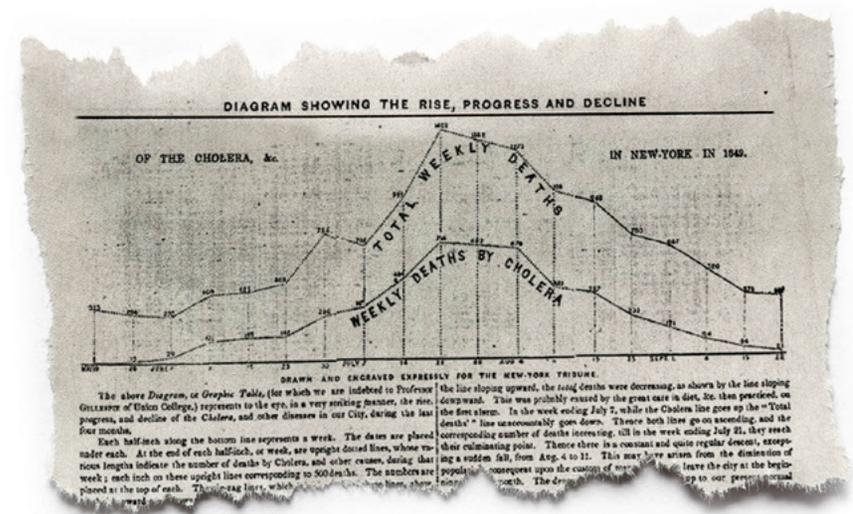
Hindsight is history

One of the first signs of using data to combat a crisis was in the mid-1800s with the spread of cholera. Cholera had killed hundreds of thousands of people across Europe, Africa, and Asia.

Daily newspaper circulations rose dramatically using high-speed printing press technology. This technology allowed journalists to explore new reporting techniques, including charting data.

At the time, the chart was so new that it required four paragraphs to explain how to read it. People of that era were simply not used to seeing data in a visual format. However, the chart was extremely effective at communicating that cholera had ravaged New York City over the summer of 1849.

Data at this level was used in hindsight. Although considered a technological advancement, the chart was built on historical numbers (cases of infection that had already occurred) and only after cholera had done its damage to New York City. The chart could then be used among professionals to try to understand the disease and perhaps make changes to mitigate future breakouts when and if they occurred. What it couldn't do is anticipate future rates of infection under certain conditions and predict outbreak patterns under the influence of other variables.



Source: [Visual Capitalist: Data Visualization and Cholera: An Unexpected Connection](#)

Looking back

In [March 2006](#), epidemiologist Larry Brilliant gave a TED Talk about what a global pandemic would look like and how it would spread quickly around the world. In his presentation, he explained the need for early detection and early response. He showed how a virus could quickly spread from one country to another. As such, the entire world could be infected within three weeks.

Early detection, early response. That is the key to preventing a pandemic.

This was not the case with smallpox. Smallpox, the only virus totally eradicated from the world, had been around since the third century BC. The virus spread from country to country over the centuries with the growth of civilizations. The basis for vaccination began in 1796 when British surgeon Edward Jenner invented the [smallpox](#) vaccine, the world's first vaccine against any disease. So why did it take another 179 years to eradicate this disease if there was a viable vaccination available?

Finding and isolating the cases of smallpox was the problem. Data was [inconsistent](#) or not available.

Between 1920 and 1978, the reported number of smallpox cases was around 11.6 million. It was well known by authorities that this number was certainly smaller than the actual number of cases, although no one knew by how much. The World Health Assembly was aware of the underreporting and attempted to correct it. However, in developing countries where the disease was the highest, the public health monitoring system was dysfunctional, and that led to many infections and deaths not being recorded.

As such, there was a need to move away from the general vaccination campaigns to focusing on actively [seeking out cases](#) and containing outbreaks with quarantine and vaccination of local people. Using a surveillance and containment strategy, teams were equipped with Jeeps and motorbikes to search villages, markets, and even houses for cases.



A “smallpox detective” interviews a child while following the trail of infection and outbreak, Ethiopia, 1972.

Source: [World Health Organization: The Smallpox Eradication Programme – SEP \(1966-1980\)](#)

A rather military approach was adopted as teams of vehicles would swarm in and isolate an area as soon as an active case was discovered. The motorized team would quickly arrive, and vaccinate everyone in the area, whether they had been vaccinated before or not.

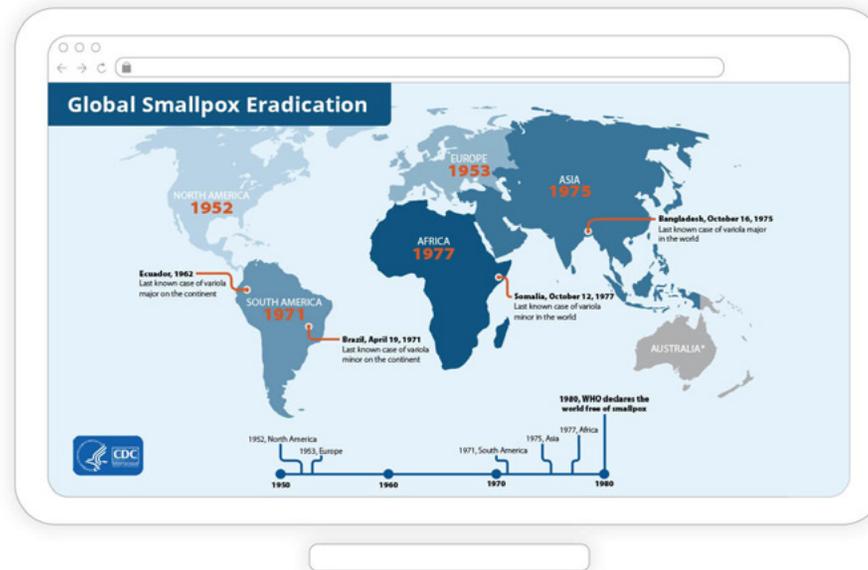


A woman shows her vaccination scar to an army medical unit, former Yugoslavia, 1972.

Source: [World Health Organization: The Smallpox Eradication Programme – SEP \(1966-1980\)](#)

This door-to-door approach was followed in South America, Asia, and Africa, the last remaining countries to finally eradicate the disease.

In late 1975, according to the [CDC](#), the last person in Asia to have active smallpox was isolated. Guards were posted at her home 24 hours a day until she was no longer infectious. A house-to-house vaccination campaign within a 1.5-mile radius of her home began immediately. Members of the Smallpox Eradication Program team visited every house, public meeting area, school, and healer within 5 miles to ensure the illness did not spread.



Source: [Centers for Disease Control and Prevention: Global Smallpox Eradication Map](#)

Essential work must continue

Over the centuries, no matter what the disease, there was still an essential need for work to continue.

Power utilities, the food service industry, and health care organizations cannot stop their work or allow their workers to work from home. In general, these teams have devised a system under which essential personnel remain working because these jobs are critical to society. However, the people doing these jobs could also get infected by or infect their coworkers, which could be disastrous and force companies to shut down completely.

These organizations have emergency protocols that are practiced and put into place to address these situations. Businesses must mitigate the effects of the pandemic while simultaneously allowing the operations which support essential functions to continue.

When dealing with a virus that grows exponentially, a two-week or two-month head start makes a difference in the spread of cases. And even when a

pandemic situation is announced, there will still be a need for each and every city/country to continue certain operations. So, essential workers must continue to work, even when they face high health risks.

For instance, in 2015, the WHO released a [report](#) that found that, depending on their role, health workers were up to 32 times more likely to be infected with Ebola than adults in the general population.

The question remains: How can organizations mitigate the circumstances of spreading disease when employees have social networks outside of work environments such as family, friends, clubs, schools, and the like?

Later on, we discuss how data can help mitigate the spread while remaining open for business.

Actioning Data

Using data to make decisions

Reliable [data helps](#) promote responsible decision-making in workplaces and communities around the world. It influences legislative action around international travel, the provision of emergency medical resources, the bolstering of financial markets, support for small business owners and proprietors, and medicine and treatment for those who are infected.

Here are a couple of significant examples that show how data and analytics, AI, and machine learning are helping.

The [Global Public Health Intelligence Network \(GPHIN\)](#) uses a secure, Internet-based, multilingual early-warning tool that continuously searches global media sources such as news wires and websites to identify information about disease outbreaks. The goal is to use leading-edge communications technology and automated processes on a real-

time, 24/7 basis, complemented by human analysis to monitor media sources worldwide.

According to the [WHO](#), GPHIN is one of the most important sources of informal information related to outbreaks. More than 60% of the initial outbreak reports come from unofficial informal sources, including sources other than the electronic media, which require verification.

In the throes of the 2008 economic recession, British Airways cut costs across the organization. One area they refused to cut, however, was their business intelligence program.

British Airways claimed that [continued investment in analytics](#) during the crisis was a critical factor in streamlining marketing activities and thwarting fraudulent bookings when their business was especially fragile. They understood the need to maintain momentum in their analytics program in the face of an overwhelming crisis.

Using AI to chart a new path

In 2018, [HealthITAnalytics](#) released an article based on studies that show how data analytics can provide valuable insight into reducing hospital-acquired conditions.

Health care providers can react quicker and identify possible deterioration even before symptoms are detected by the naked eye by using data analytics to help flag changes in a patient's vitals.

Machine learning strategies are predicting clinical events in the hospital, such as the [development of an acute kidney injury](#) or sepsis.

[At the University of Pennsylvania](#), a study using predictive analytics and Electronic Health Care data identified patients headed for severe sepsis or shock 12 hours before the onset of the illness.

A separate study at Huntsville Hospital in Alabama [found](#) that combining predictive analytics and clinical decision support tools could identify instances of sepsis and help reduce sepsis mortality. This analytics-driven strategy showed clear improvements over the previous electronic surveillance systems.

Big Data analytics techniques are also being used to track and control the novel coronavirus. Researchers have been using data to expose the nature of the virus—who is more affected, what measures can help reduce the spread, and where the disease will likely go next.

James Hendler, the Tetherless World Professor of Computer, Web, and Cognitive Science at Rensselaer Polytechnic Institute (RPI) and director of the Rensselaer Institute for Data Exploration and Applications (IDEA), told [HealthITAnalytics](#):

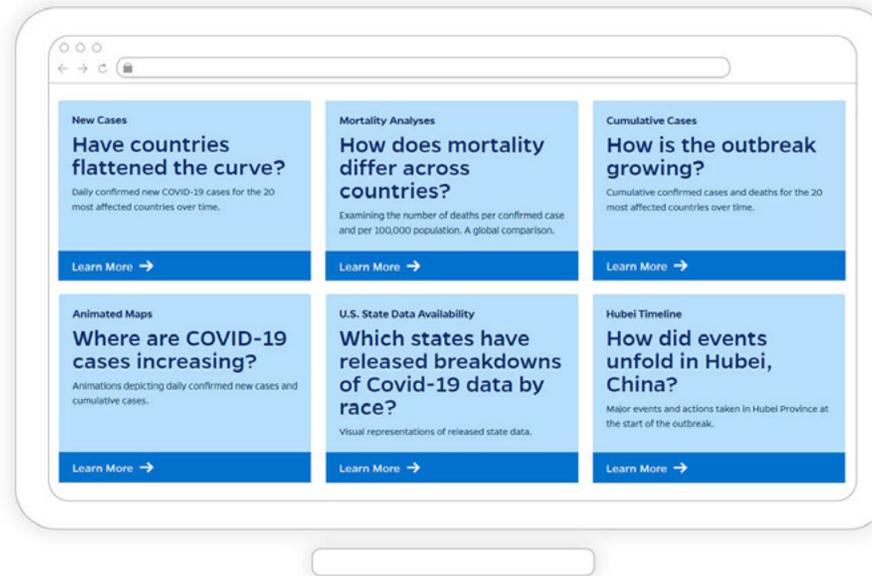


“Between recognizing signs and symptoms, tracking the virus, and monitoring the availability of hospital resources, researchers are dealing with enormous amounts of information – too much for humans to comprehend and analyze on their own. It’s a situation that is seemingly tailor-made for advanced analytics technologies.”

Living through it with data at your side

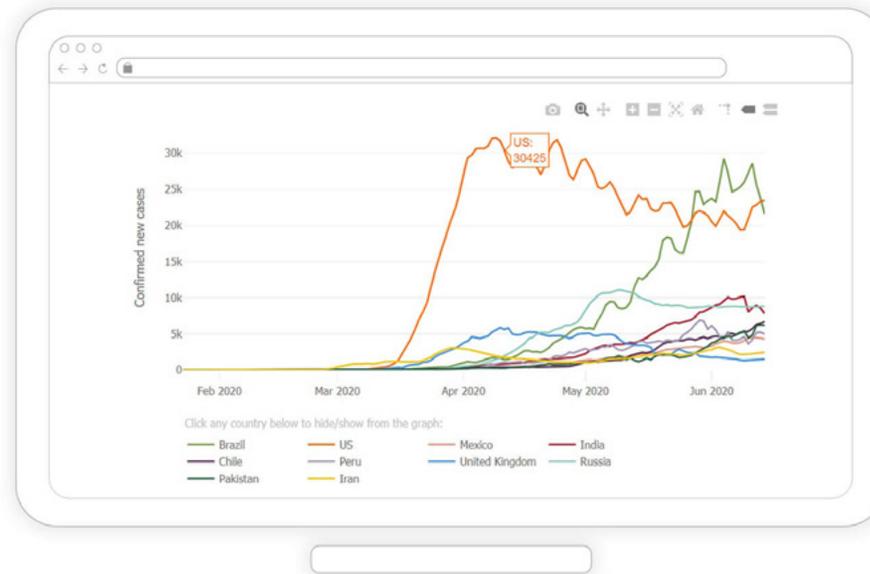
Households and families are also using this data to prepare for the nuances of everyday life that will change as a result of this virus, whether it be securing a paycheck, buying groceries and essentials, playing with their kids, inviting the neighbors over for a barbecue, or walking the dog.

Johns Hopkins University's Coronavirus Resource Center was created to track critical data for decision-making. Critical trends are displayed in up-to-date visuals that give context to the data collected on Johns Hopkins University's COVID-19 map.



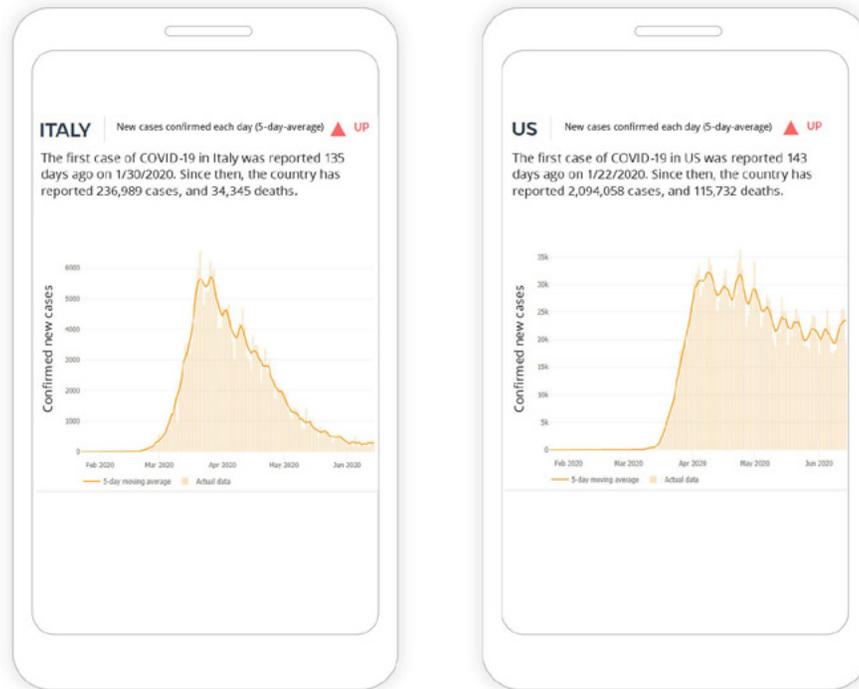
Source: [Johns Hopkins University & Medicine Coronavirus Resource Center: Maps & Trends](#)

The general public is accessing these data-based visuals as their go-to for up-to-date, trusted information on the pandemic. Animated maps, line graphs with detailed rollovers, and individual widgets allow anyone to see a broader picture, compare, get more information, and come away with valuable insights that will help them make decisions that affect counties, cities, and countries.



Source: [Johns Hopkins University & Medicine Coronavirus Resource Center: New Cases](#)

We all know how to read a chart and determine for ourselves what the next action should be. Now is the time to apply the full force of business intelligence used by data analytics teams to help navigate the growing uncertainty.



Source: [Johns Hopkins University & Medicine Coronavirus Resource Center: New Cases](https://coronavirus.jhu.edu/data/new-cases)

Modern Examples of How Data is Helping

Businesses that use data are winning

Nearly every pandemic is first approached with denial and doubt. Data visualizations from reliable sources of data can bring a single source of truth to the public, wiping away doubt and minimizing the response time that is so critical in lessening the impact of a crisis.

As part of its efforts to address the challenge of the coronavirus, the UK government announced that its National Health Service (NHS) struck [the first deal of its kind](#) with the private hospital sector to increase the capacity of health care across England with 8,000 new hospital beds, 1,200 almost-new ventilators, and over 10,000 additional nurses (including more than 700 doctors and over 8,000 other clinical staff).

This huge project will involve real-time data flowing through dashboards to better understand the data that could help solve the crisis and lead toward better crisis management.

In the midst of the COVID-19 crisis, maintaining momentum is vital and the art of decision-making imperative. Now is the time to apply the full force of business intelligence used by analytics teams to help navigate growing uncertainty. Four clear opportunities are ripe to collect, analyze, and act on data:

- 1. Maximize revenues:** Identify drivers to increase sales by evaluating existing customers and processes.
- 2. Drive efficiencies:** Identify underperforming departments and programs and determine where to reduce expenses. Use analytics to correlate and compare your operations, performance management, and financial analysis.
- 3. Collaborate with others:** Identify departments and programs that are under strain and divert skills and resources from better resourced and less stretched areas to collaborate with other departments under pressure.

4. Predict outcomes: Lastly, look to forecast trends in supply and demand and track fast-moving changes in leading indicators.

The health care sector is facing a global challenge as it attempts to identify a cure for the COVID-19 virus and optimize resources for those already infected. It requires an unprecedented collaborative effort, and importantly, data is at the heart of the solution.

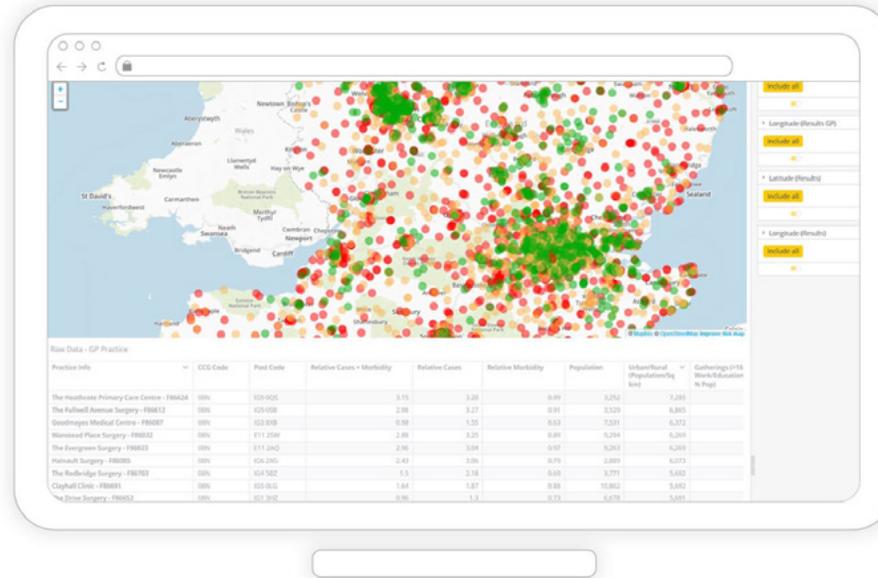
UK health care provider [Res Consortium](#) used Sisense technology to map the spread of the virus across the country on a [dashboard](#).

It provides service capacity planners at both local and regional NHS clinical commissioning groups with the information they need to target resources to areas where the outbreak becomes more severe or where there is a higher density of at-risk patients.

The Res Consortium team has analyzed local cases and the population characteristics of those areas to model the relative expected number of cases at local levels. It has applied the data on the age and health of these populations to adjust for the disease impact at these levels. It shows the areas that could use more support as the number of cases increases.

“The beauty of the dashboard is that it builds all elements together, and we can dynamically adjust for the change in factors,” said Director of Resconsortium Michael Stedman. “The speed at which we can work through the process of data management to publication enables us to adjust to local conditions and needs exactly as they change, which is a critical consideration in this fast-moving environment.”

As we’ve seen, the ability to collaborate and to use dashboards as a way to do this is a skill that is quickly evolving within the pandemic.



Source: [Res Consortium Dashboard COVID-19](#)

Rapid response and rapid detection through AI

[Social Network Analysis](#) is a modern way to fight the spread of COVID-19 using data. By using this type of analysis, businesses can maintain their presence at work while being ready to mitigate circumstances when an infectious case is detected.

These social networks stem from the mathematicians and not from the online social media networks. They can be used to curb the spread of coronavirus while working through the crisis.

These graphs are a representation of entities (each is assigned to a node) and their relationships (each relationship is represented by a line between two nodes).

There are a lot of theoretical studies about these graphs and they can be applied to solve many problems (classic examples are transportation problems), but here, our focus is on a very specific type of graph: those which connect people, and they are often associated with the study of social matters. So for our purposes, social networks are graphs whose nodes represent people and lines represent relationships between people.

The graphs will contain as much information as possible and allow the company to make informed decisions.

Automate, track, and predict positive outcomes

[Premium Retail](#) uses analytics to enable leading brands to measure sales performance, observe trends, and track execution. With a solid data strategy, the team is able to tie together retail data and sales performance, analyzing billions of rows of data from nearly a dozen different retail data sources.

Best of all, [data preparation](#) is 70% automated. Access to a unified performance picture enables their retail customers to make near-real-time decisions on product placements, ensure compliance, and benchmark performance against stores and competitors.

[RetailZoom](#) is a consultancy that helps supermarkets and FMCG companies in Cyprus unlock their data to reveal patterns and forecast future performance. Its team of data scientists supplies its customers with predictive models

that incorporate transactional and demographic data to determine the size and scope of promotional activities.

Constantinos Mavrommatis is the chief data scientist at [RetailZoom](#). As the crisis unfolds, he and his team are watching the retail industry's response closely. And in a fast-moving environment, keeping an eye on changing circumstances is vital to managing your business through the evolution of the pandemic.

"We're watching in real time as our clients' use of dashboards is shifting," says Constantinos. [RetailZoom's](#) clients are equipped with dashboards that spot atypical behavior on a daily and weekly basis, but until February, usage of these dashboards was low. That's the beauty of building analytics into your business continuity plan. When things start swinging outside of the ordinary, a well-modeled anomaly dashboard is a key to ensuring a timely response.



Source: [Sisense: The Data Behind: Retail Analytics in Times of Crisis](#)

Summary

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Countries and communities around the world are coming together as one to fight this global pandemic. The ammunition we have to fight this war is data. Data is available to us to analyze and predict and quickly react to the forces around us.

Data-driven decision-making is more important than ever

The decisions we make today will profoundly impact tomorrow for us, our children, and grandchildren.

Our goal is to provide ideas around what a better future could look like. Data will be at the core of each of these stories because that is what is needed, and it is what we do best. The right data is free from political bias or gut feel; it's something that is indisputable.

We hope you lean into the future with us because we plan to push the limits of what we know about the ebbs and flows of the COVID-19 virus and beyond that, lay a pathway to what's next. The future will be about a new purpose and

a complete pivot that will be driven by analytics that empower the builders of tomorrow. We will each get to define our future.

The virus knows no boundaries. All of us must work together as a global community to conquer this pandemic.

Data will help us identify the targets, react much faster than before, and rebuild the world into a safe place for work and life.

Now, more than ever, data will be the driver of change that ensures the decisions we make today will create benefits in the future.



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