

## BACKGROUND

The spread of COVID-19 pandemic has largely impacted the world's economic activities, and we are seeing countries across the globe implementing severe containment measures with the hope to flatten the curve.

However, the key to successful COVID-19 containment relies on proper testing, tracing and then isolating any positive cases and identifying people they may have been in contact with, followed by instructing those contacts to quarantine or isolate.

With the increase of positive cases, the information collected by public health coordinators and contact tracers after each case interview becomes critical intelligence.

The fact is that today regardless how contact tracing data is collected, contact tracers usually have to manually build relationships and make inferences with little to no context simply because traditional analytic solutions do not help with visualizing the association, connection and relationship of positive cases and contacts, making it time consuming to take actions.

## CUSTOMER SUMMARY

Taiwan has been well known for its efficiency and effectiveness to combat coronavirus since the outbreak occurred in Wuhan. A lot of that has to do with how Taiwan's government responded to the epidemic and leveraged big data and various technologies to facilitate tracking down the infections and eventually lead to successful containment to slow down the spread of the infections, or in other words to flatten the curve. Here is some news coverage for references:

1. [Taiwan sets example for world on how to fight coronavirus \(ABC News\)](#)
2. [What Taiwan can teach the world on fighting the coronavirus \(NBC News\)](#)
3. [Taiwan Has Been Shut Out of Global Health Discussions. Its Participation Could Have Saved Lives \(TIME\)](#)
4. [How Taiwan is containing coronavirus - despite diplomatic isolation by China \(The Guardian\)](#)
5. [Taiwan has only 77 coronavirus cases. Its response to the crisis shows that swift action and widespread healthcare can prevent an outbreak. \(Business Insider\)](#)

After the 2003 SARS outbreak, Taiwan has established the National Health Command Center (NHCC) based on its Centers for Disease Controls (CDC). This disaster-management center focuses on large outbreak response and acts as the operational command point for direct communications among the central, regional and local authorities. In essence, the NHCC addresses public health emergencies and provides disaster information for decision-makers. It is a unified central command system that includes the Central Epidemic Command Center, the Biological Pathogen Disaster Command Center, the Counter-Bioterrorism Command Center and the Central Medical Emergency Operations Center. This joint framework serves as a comprehensive platform for preventing major epidemics.



### Summary of why the CDC is interested in Gemini Explore

As part of the CDC, the **Epidemic Intelligence Center (EIC)** is responsible for **collecting, analyzing** and **reporting** communicable disease information. Such information is shared with the public and updated daily.

Throughout the **COVID-19** outbreak, hospitals around Taiwan are required to report confirmed cases to the **EIC** as soon as any patient is tested positive for the disease. This reporting is usually done by the physician via an online form. Once a case report has been received, the EIC will send disease investigation agents to visit the hospital and interview the patient for his/her history of the following to facilitate timely diagnosis and further case-reporting.

1. **Travel** (where have you traveled to?)
2. **Occupation** (where do you work?)
3. **Contact** (who are the people you have contacts with during travel and/or work)
4. **Cluster** (Besides travel and work history, have you been in close contact with other people?))

Again, this information is collected and reported back to the **EIC** for further analysis to determine the level of epidemic prevention measures and scale of quarantine.

### Business challenge: (why they would buy our solution)

There is a team of data analysts at EIC responsible for the analysis of the collected data stored in a relational database. With the rise of patients testing positive, the amount of disease investigation data is also increasing.

The EIC team is basically working against the clock to achieve very complex analysis in order to report and share actionable insights to the local public health authorities. This will enable them to implement measures for epidemic prevention usually leading to further quarantine or testing of those in contact with the patient who has the disease.

EIC currently uses a relational database to collect and store data. The analysts usually need to export the data for analysis using various spreadsheets or BI tools, in order to make sense of it.

Importantly, this analysis is provided to the Director General of CDC and the Minister of Health and Welfare who is also the Chief Commander of the NHCC for press media communication. The EIC is seeking ways to shorten analysis time as well as provide better reporting and visual intelligence to NHCC.

### Technical Challenge:

1. People skill and experience
  - Not everyone in the EIC team is familiar with all the analysis tools. Senior analysts usually perform faster and are more effective. This is still a time-consuming process.
2. To effectively correlate the data with each positive case's TOCC report using spreadsheets and plain text.
  - Traditional analytic solutions do not help with visualizing the association, connection and relationship of positive cases and contacts, making it time consuming to take actions.
  - Public health authorities still rely heavily on statistical analysis solution such as Microsoft Excel and some other BI tools, eg. Tableau, Qlik or MS PowerBI. These types of statistical analysis solutions do not help with pointing out the specific TOCC information.
  - The analysis and investigation today is still very much based on manual drawing process which is not intuitive and doesn't scale
  - The result is: lots of trial-and-error and misses/blind spots.



### 3. Lack of context for communication

- The reports used today lack the visual intelligence of the TOCC across people, place, time and event. They are unable to show how some of the positive cases and contacts are related/associated with each other. Such analysis and communication helps determine:
  - 1) the source of infection;
  - 2) the spread of the epidemic;
  - 3) the scale of containment measures needed.

### The Solution

Gemini Data offers an innovative solution to help public health authorities, coordinators, contact tracers to analyze and interact with contact tracing data. We provide a highly intuitive graph visualization tool enabling public health authorities, coordinators and contact tracers to effectively trace relationships across people, places and events, and help them identify hot spots as big as a geographic territory such as a city, or down to something as small as a particular restaurant or a place.

With Gemini Explore, public health authorities can now slow the spread by immediately reaching out to people who have potentially been exposed and setting them up for ongoing monitoring and check-ins.

## HOW DOES GEMINI EXPLORE WORK?

The following steps describes the process:

1. Public health authorities conduct contact tracing interviews with positive cases
2. Such information is collected and typically stored either in a CRM-like system or a relational database
3. Prepare the datasets in .CSV format as exported from CRM or relational database
4. Configure the required data-models based on the contact tracing data formats
5. Upload the datasets to Gemini Explore
6. Start interacting with the data by navigating and exploring positive cases and trace relationships across people, places and events using Gemini Explore's intuitive graph exploration interface
7. Save the result of an investigation about certain cases and contacts as a "Story" for further analysis or sharing

### Use Case Description (details):

After deploying Gemini Explore, the analyst at EIC could easily respond to reported cases by leveraging our intuitive graph exploration capabilities:

**Case Triage** - Quickly identify the connection, association, and relationship of those that are infected with the disease so as to avoid blind spots or gaps when correlating the TOCC of any positive cases.

**Epidemic Analysis** - Perform rapid contextual analysis of the TOCC report for each positive case across people, time, place and events without the requirement of complex query language or code. Point and click is the way to go!!



## USE CASE EXAMPLE 1

### Local transmission or group infection

Quickly correlate the relationship and association across multiple symptomatic patients. A Taiwanese taxi driver (case 19) was infected by a businessman returning from China, he then went on to infect multiple family members.

## USE CASE EXAMPLE 2

### Group infection

A family returned to Taiwan from a vacation in Italy via Hong Kong. All were identified as having the same source of infection.

## The Value

With **Gemini Explorer**, public health authorities like the EIC of TWCDC will be able to communicate the latest development of the epidemic with its supervisors and working groups as well as press media, with contextual results and visual intelligence.

This same information can be shared with the local authorities such as police and social workers and neighborhood so that they can take timely response for necessary quarantine and/or isolation of the target contacts.

As a result, this translates to higher satisfaction from the public about the government's performance of dealing with the epidemic at scale.

