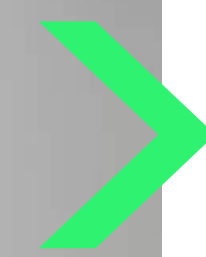


Our experiences:



Covid-19 Survey

epm[®]

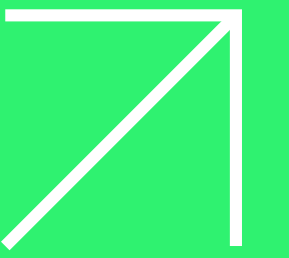
➤ The 2020s, brought the challenge of dealing with the global COVID-19 pandemic.

Due to the criticality of the event and its rapid spread, it became essential and necessary to contribute to the mitigation of the risk of contagion through the early identification of symptoms that would allow the establishment of action plans.

The EPM group has numerous collaborators and contractors who, by the nature of their services, had to continue operating. This further increased the risk of exposure, so, in order to establish containment measures, the alternative of applying a daily survey was proposed to know at first hand the physical health status of employees and contractors, as well as the risk factors of these and their families.

02





The challenge for Ceiba was to build, in a very short time, an application with high availability that would allow users to report their symptoms at any time, **24 hours a day, 7 days a week**. It also needed to be able to support **more than 20,000 users** per day, also considering the different connectivity conditions of the personnel in the field, allowing completion in **off-line mode** for subsequent processing.

03



➤ Learn about the technology behind the "COVID-19 Survey" for EPM.

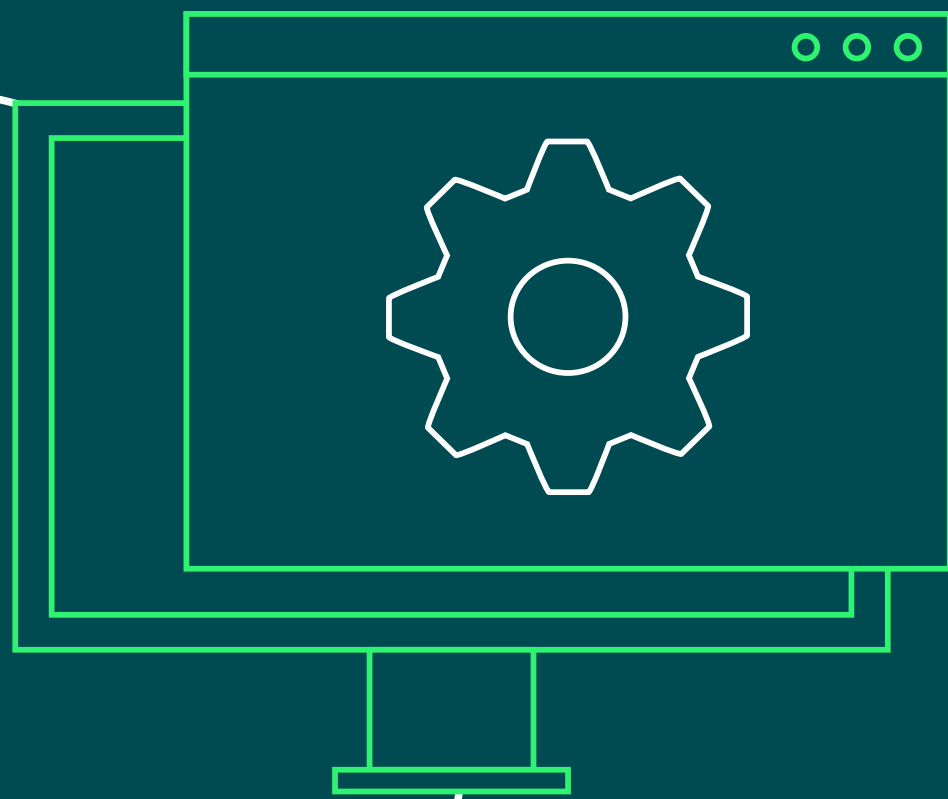
This way a web application was developed in Angular 9, a solution that was also migrated to Ionic in its version 5, to generate a mobile application, both for Android and IOS.



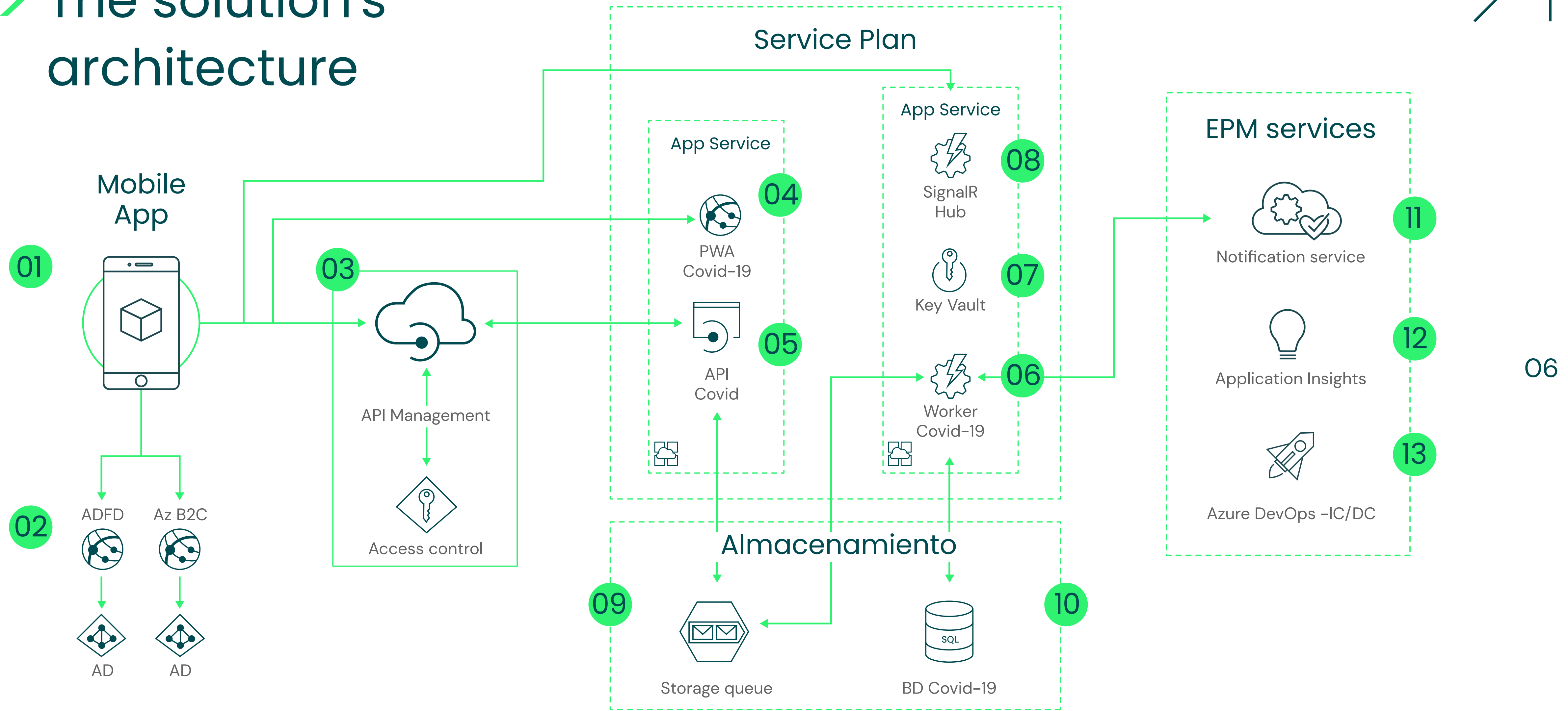
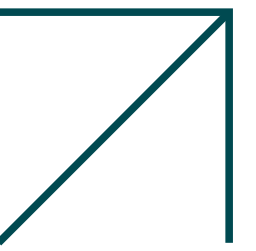
➤ The application backend is built in .Net Core.

➤ The application allows user authentication, capture of georeferencing coordinates and completion of a series of questions associated with the Covid symptomatology.

➤ Based on the responses collected, workflows and integrations with the Group's core systems are activated to process the new issues reported.



> The solution's architecture



06



> The solution's architecture

01 Mobile:

The person's mobile device that is filling out the survey, in this setting, is where the EPM-Covid-19 PWA runs.

02 Authentication:

The application has identity sources: ADFS for EPM group employees and B2C for group contractors.

03 API Management:

Azure service that enables secure exposure of APIs and services used by applications as a backend.

04 PWA COVID-19:

Application frontend for EPM-Covid-19. Built with PWA features to be able to run in offline mode (without internet connection) and subsequently be able to send the survey information recorded by the employee or group contractor.

05 API COVID-19:

Entry point for Frontend requests (Backend for frontend), it is responsible for data validations and forwarding this information to the messaging broker queues to be processed by the backend.

06 Worker COVID-19:

It is the workload that performs all the backend operations of the application. It is activated by a request in one of the broker queues.

07



> The solution's architecture

07 Azure Key-Vault:

This service is responsible for storing sensitive information in a secure and safe condition.

08 SignalR – Hub

This component is responsible for sending user notifications to the frontend to notify them of the result of a process in the backend.

09 Storage Queue:

Azure service that works as a messaging broker to contain workloads when the demand of requests is reaching its limit. Without this middleware, the application would simply not scale properly and would become unavailable, breaking the two main quality attributes of the application.

10 SQL Server:

Azure service containing the EPM-Covid-19 application database.

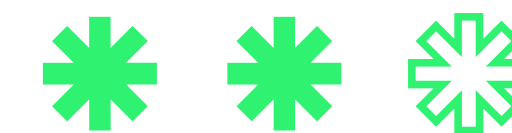
11 EPM Notifications:

EPM's internal service to which we integrate to generate the notifications of the process.

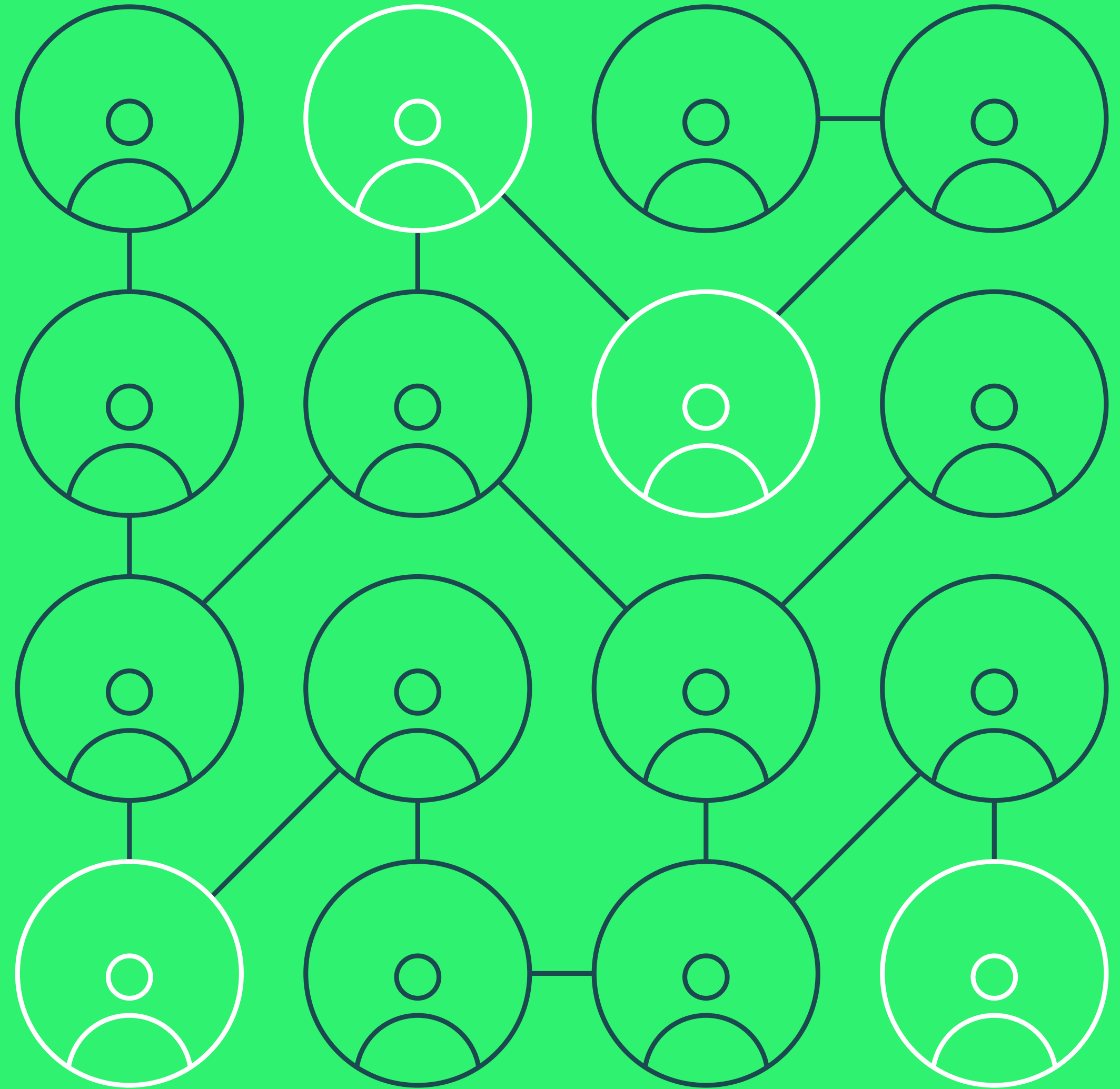
12 Application Insights:

Azure service for recording Log, Audit and monitoring information of the EPM-Covid-19 application.

08



The data collected through the application has allowed EPM's medical staff to establish epidemiologic fences when an employee or contractor reports symptoms or confirmation of the virus.



➤ The timing and quality of the development allowed EPM Group to comply with the requirements of the National Government in terms of prevention.

This has helped contain the virus and has contributed to significantly reduce the reported cases and the reported incapacities that had been occurring in critical projects such as HidroItuango.



