Soluzione 1

CASE STUDY

AN EAGLE'S EYE ON MORE THAN A THOUSAND MAJOR INFRASTRUCTURES

Managing data to maintain more than 1,000 major infrastructural works in a simple, effective and safe way

YEAR	2016
SECTOR	Infrastructure
TOOLS	Web app, Database, CAD

THE CHALLENGE

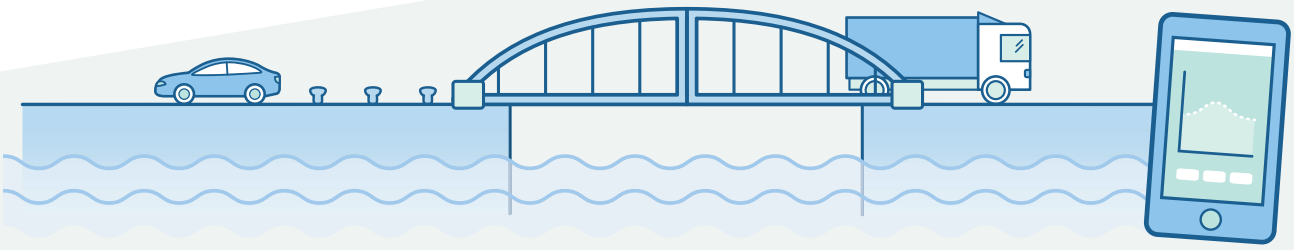
Major infrastructures are not only such because of what went into creating them but also because after their openings, it is necessary to **monitor** their status and **maintain** them over time.

"Making logging tasks easier and safer"

Our client, **an Italian company which is one of the leaders this sector**, monitors the status of infrastructure located along the main roads and highways while also performing data **analysis**, **laboratory tests** and the **study of adaptation plans**.

We are talking about an **impressive amount of data collected** through **inspections** and **tests** done on each infrastructure, which are done to assess its state of conservation and safety level as well as to foresee any possible deterioration related its use. Based on these evaluations, the company is able to recommend maintenance, restoration and adaptations.

So how can the data logging tasks be made **easier** and **safer**? And how can the data analysis be more **efficient** and **effective**? These are the questions that our client put to us!
The need was to create a new version of the application in use – an excellent client application that had been developed ad hoc. However, with the increase in managed data (our client manages over a thousand works) it started to show its limits.



The goals of the projects were:

- To identify and develop the best applications available to **support** and **facilitate the inspections**, from **data collection to analysis**, and to **manage** older data
- To **implement new methods and analysis regulations** identified by the managers of the projects as well as enable the **interaction** between seemingly unrelated data
- To **facilitate** the use of the application on the part of the end user
- To **maintain** the existing workflow and not interrupt the internal organization - inspection for detecting field data **>** data entry into the system (numerical data, photographs and CAD representations) **>** organization of information and calculation of indexes useful for analysis **>** analysis of all the information, reporting, evaluation and evolution of the management reports.

OUR ANSWER

The first step in defining the project was to think of a **web application** instead of a client application. There are many benefits to this:

- The **maintenance** and **upgrade** of the application are **simpler** – they are executed from a single point and **without disruptions** because, after the release, the updated application is **immediately accessible** to all users whereas client technology requires that the software is update on each device
- For the same reason, any correction or integration (whether at the database level or the application's functions) is much easier to be done
- **Accessibility** via the browser takes away much of the risk of any incompatibilities with outdated drivers.

We then looked at an architectural pattern called **MVP (Model, View Presenter)** that guarantees the separation of functionality into several software components.

As we already partially anticipated, this vision is critical for the **continual growth** of the project, leaving the client free to **improve the database without effecting the operation** of applications in production and while still being able to edit other applications (remote sensing, customer portal) .**The frameworks Node.js and Angular.js** were chosen for their **efficiency** both in regards to their **development** in reducing the lines of written code and their **web app performance** in which the **asynchronous programming optimizes the working time** of the processor when there are many active users.

The entire application was rewritten to make a more **simple** and **essential** interface. To test the interface, a **mock-up** was built: at the end of the project, it included more than 200 screens and various **A/B tests** dedicated to perfecting the experience.
The mock-up and later versions of the **prototype** were tested out by the client and other users while our account manager monitored and collected **feedbacks**.

A critical part of the solution was the **integration with CAD software**. In fact, the inspectors use CAD representations of parts of the infrastructures, to mark any defects that are found and track their evolution. Once more, also in this case we focused on the web app model. We are certain that in the future, this "heavy" software will be offered in the Software-as-a-Service version, however this state of the art option is not yet operating. We came across some difficulties at the "construction site" but, with a few well-aimed shots, we were able to find an optimal compromise.

Lastly, by treating the analysis and reporting sections of the data as an added module of the solution, we were able to introduce much more flexibility while keeping all of the preexisting features that were present in the original application.

THE RESULT

The first noted benefits are related to practical use – the loading times have been reduced and users can now **manage multiple processes at a time** whereas before, each process had to be completed or reset in order to start working on another one. Thanks to the revision of the interface, the features now have much **clearer dynamics** and the operations can be carried out much quicker. Some changes to the database and the increased possibility of communication between users has also **removed bottlenecks** that were happening due to the workflow requiring data approval.

The reporting has evolved, allowing new types of analysis to be given to clients and it is likely that from these, **new opportunities** or **services offered** will become available.
The strategy of replacing client technology with a **web app** has been rewarding and has increased **efficiency**. A simple example says it all: now users can access the system from different devices which is a very common need during transfers!

But along with those benefits, we are working with our client on future benefits as well, taking advantage of the **new ease the comes with the integration** of our application to include features dedicated to optimizing the processes. Take, for example, an automatic process for digital signatures, a time stamp and digitally stored copy for official documents. Another example would be the development of an area dedicated to inserting the data directly from the work site.

We hope to ride a long way together!