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EOSC COVID-19 DIGITAL ASSISTANT

This report covers the implementation, deliverables, and conclusions of the EOSC COVID-19 digital assistant project. AUTOMAISE acknowledges funding from the EOSC Secretariat in all materials related to this report (whether it is a text report, a presentation or website) using the following text: "EOSCsecretariat.eu has received funding from the European Union's Horizon Programme call H2020-INFRAEOSC-05-2018-2019, grant Agreement number 831644"

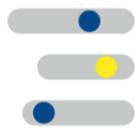
BRAGA, PORTUGAL, 4TH JANUARY 2021

AUTOMAISE S.A.

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1. Executive Summary

AUTOMAISE addressed EOSC Secretariat challenge “COVID-19 Fast Track Funding” by using its platform, this is to use AUTOMAISE’s advanced automation technology to setup a tailor made like solution for the challenge raised by COVID-19.

AUTOMAISE built an advanced AI conversational digital assistant in 5 languages (EN, ES, PT, FR and DE) and within 4 months [june-september 2020] with the goal to help alleviating the pressure/stress of not having enough COVID-19 tests and well to help keeping people well informed about this outbreak.

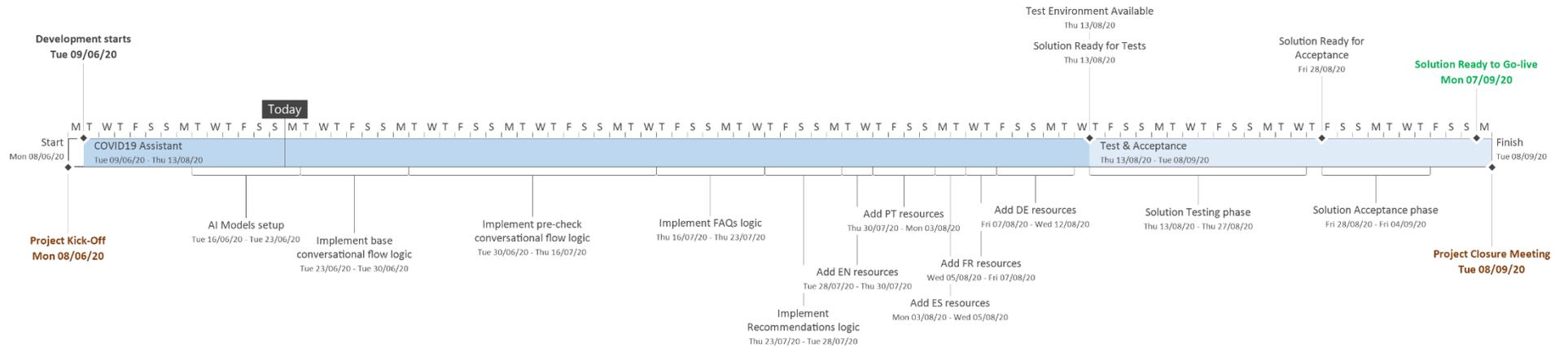
Despite its complexity and all the challenges raised by pandemic state, AUTOMAISE managed to deliver the COVID-19 Digital Assistant solution still as planned, on time and on budget.

At the moment, this solution is delivered fully managed by AUTOMAISE and free to the Portuguese public, as well for the entities who want to include it their portals/sites. This is, the goal is to spread the usage of this application across channels, e.g. WhatsApp, FB Messenger, WebChat widgets on sites, Twitter, Voice/Phone gateways, e-mail, etc. All of this available at no charges at all to the public.

AUTOMAISE believes that **deploying an EU official solution** within the European Union will increase both awareness and credibility. Public health response services are “overwhelmed” because of the growing impact of the COVID-19 outbreak and all tools that can give first responders a change to breathe and reorganize themselves are life savers!



2. Project Timeline



3. AUTOMAISE Platform

AUTOMAISE develops a low-code AI Platform for creating automations that solve bottlenecks in operations, internal processes, customer care and more. Modernize mission-critical systems and build advanced software on a single platform, that's visual, easy to use, and doesn't cut corners when it comes to security and complexity.

With a unique mix conversational AI, NLP, deep learning and bits of RPA we enable hyper-automation delivering automation rates above 80%.

The AUTOMAISE Platform is equipped with state-of-the-art AI and Machine Learning algorithms, from simple logistic regressions to the highly complex Deep Learning architectures, such as LSTM, Convolutional Neural Networks and Transformer based models. The range of tasks that is possible to tackle with our Platform ranges from classical classification tasks to regression modelling, also going through time series forecasting and recommendation systems. The key characteristics include:

- **Artificial Intelligence:** Machine learning and natural language processing at its core;
- **Cloud Service:** Fully managed global cloud technology;
- **Multi-language:** Our agents speak English, Spanish and Portuguese as of today;
- **Conversational AI:** Making use of AI and NLP AUTOMAISE's digital agents are capable to chat smoothly with customers using natural language;
- **Smarter Overtime:** Their accuracy will keep improving over time as they will learn from past interactions, i.e., Self-learn;
- **24x7 Availability:** Our Digital Assistants don't sleep. They are available around the clock;
- **Instantaneous:** promptly answer to any customer. Even simultaneously. The more the better;
- **No App Download:** Our Digital Assistants seamlessly integrate with existing and widely used chat platforms, like FB Messenger and Skype;
- **API integration** in compliance with platforms such as CRM, email, chat, SMS, etc.



4. COVID-19 Digital Assistant Project

4.1 COVID-19 Digital Assistant Description

Using its advanced AI automation technology AUTOMAISE decided to setup a tailor made like solution for the challenge raised by COVID-19.

AUTOMAISE proposed building an EU official advanced AI conversational digital assistant to alleviate the pressure/stress of not having enough COVID-19 tests and well to help keeping people well informed about this outbreak.

Hence, and regarding the project scope, our proposal was to use natural language understanding and AI to power the following features:

- **COVID-19 pre-check** <- this feature consisted of an AI driven flow of questions. The output was based on a hybrid approach between AI and predefined rules*. The assistant clearly informs patients how they should act according to the outcome;
- **Answer to frequently asked questions using natural language and AI** <- fully extensible via a self-service management portal.
- **Provide recommendations using natural language and AI.** <- fully extensible via a self-service management portal.
- **Self-service management portal** <- monitor the whole digital assistant performance, supervise AI and configure automation contents (FAQs, Recommendations, etc.).

* The goal was to implement WHO and EU health institute recommendations on triaging COVID-19 disease. Also, local characteristics/stage were considered when calculating the diagnostic. **This algorithm was validated by both Minho and Porto Universities' Health Schools.**

It was also our goal to have this digital assistant available in 5 languages (EN, ES, PT, FR and DE) so that the solution could be available to the European public as well as for entities who would want to include it their portals/sites and therefore reduce the pressure/stress of their HealthCare systems and to help keeping people well informed.

4.2 High Level Architecture

The COVID-19 Digital Assistant was built using Automaise Platform. Think of Automaise as a cloud SDK where developers can build projects on top (analogous to Java JDK or .Net Framework).



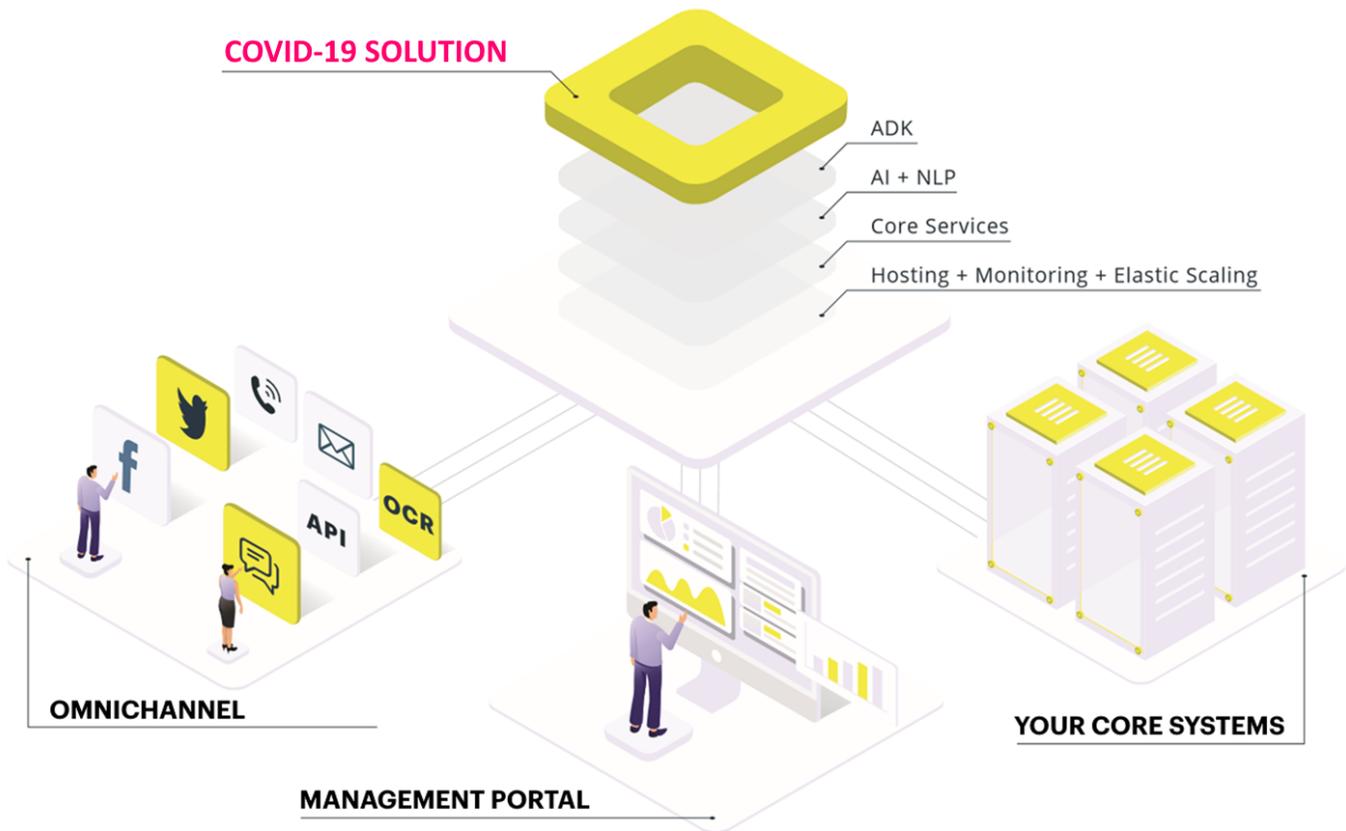
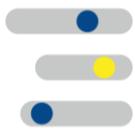


Figure 1: High-level Diagram

4.3 Artificial Intelligence (AI)

At the core of every automation (aka solution) built with Automaise platform lies our advanced AI and Natural Language Processing responsible for understanding your business and evolving with it. It is responsible for understanding niche businesses and, through continuous learning, to improve decision-making, action-taking and transaction-making while passing from being supervised to orchestrating automations with little to no supervision.

4.3.1 The 3 AI Models

Automaise have developed 3 AI models to power this COVID-19 Digital Assistant:

- **Screening:** responsible to understanding screening request and guide users though out the whole process.
- **Frequently Asked Questions:** capable to answer users using natural language to frequently asked questions.
- **Recommendations:** capable to provide recommendations to users using natural language processing.



4.4 User Interface (UI)

On top all the underlying technology (including Automaise's AI platform), Automaise developed two UI interfaces for the solution: Conversational chat web widget and the Backoffice portal.

a) Chat interface

Automaise used all of its AI conversational expertise to develop a state-of-the-art conversational assistant capable to virtually integrate on any chat channel. For this project Automaise have developed a simple and rapid to integrate web chat widget capable to be integrated on any website with a mere couple lines of source code, e.g.:

```
<!DOCTYPE html>
<html>

<head>
  <meta charset="UTF-8" name="viewport" content="width=device-width,
initial-scale=1">
  <link rel="stylesheet"
href="https://cdnjs.cloudflare.com/ajax/libs/font-awesome/4.7.0/css/font-
awesome.min.css">
  <link rel="stylesheet"
href="https://www.automaise.com/static/WebChat/covid19/covid19en.css" />
  <title>Digital Assistant COVID-19</title>
</head>
<body>
  <!-- Virtual assistant div -->
  <div id="automaise-virtual-assistant"></div>
  <!-- Bottom of body -->
  <script src="https://static.automaise.com/WebChat/automaise-
sockets.cdn.js"></script>
  <script>
    ConnectAutomaiseChat (<MERCHANT ID>, <ACCESS CODE>);
  </script>
</body>
```



</html>

This chat interface works both with natural language (i.e. written text) and/or via predefined actions (i.e. buttons). Some real screenshots after the break.

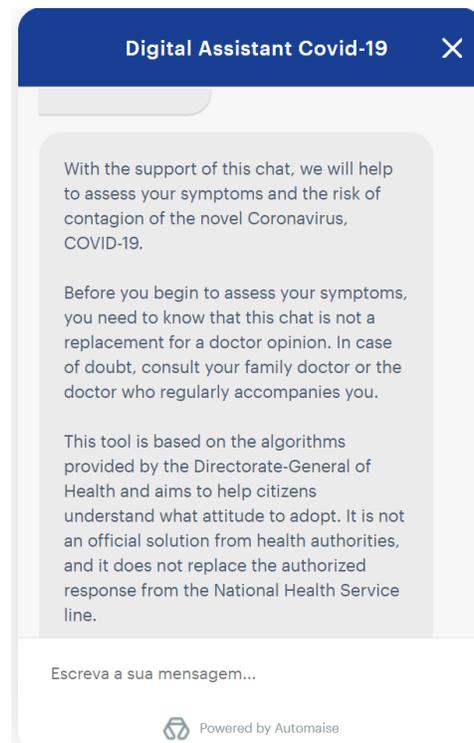


Figure 2: Chat welcome message EN (English version)

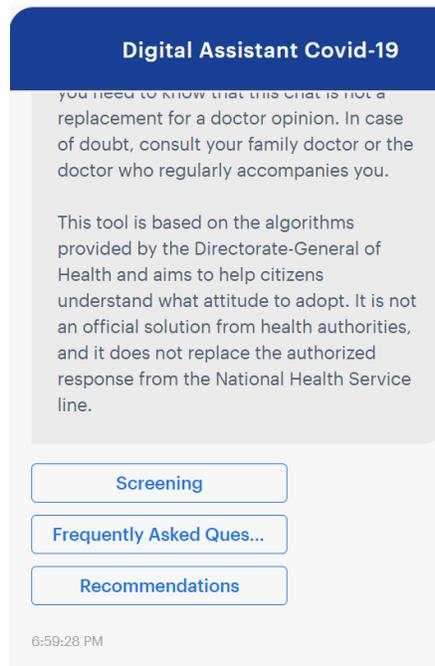
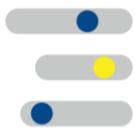


Figure 3: Chat options EN

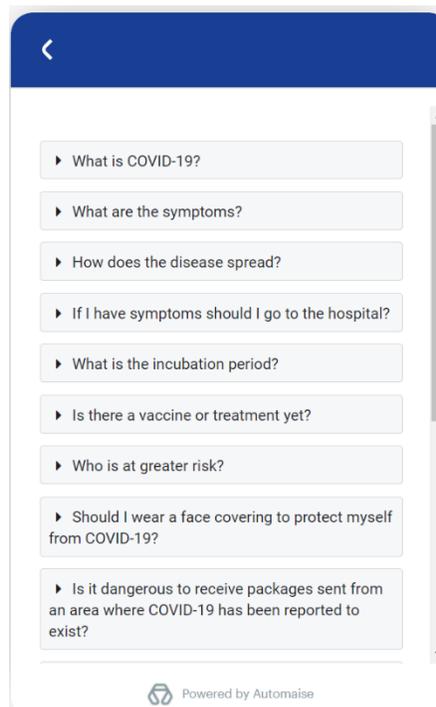


Figure 4: Frequently Asked Questions EN



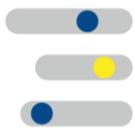


Figure 5: Recommendations EN

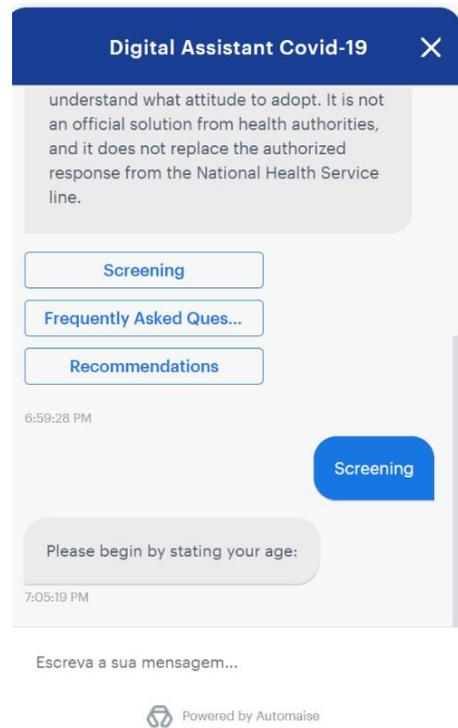


Figure 6: Screening process EN



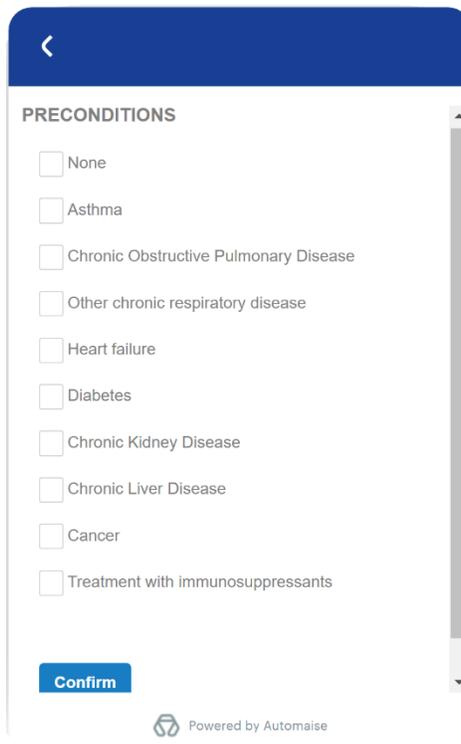
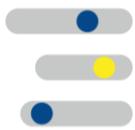


Figure 7: Preconditions list screen

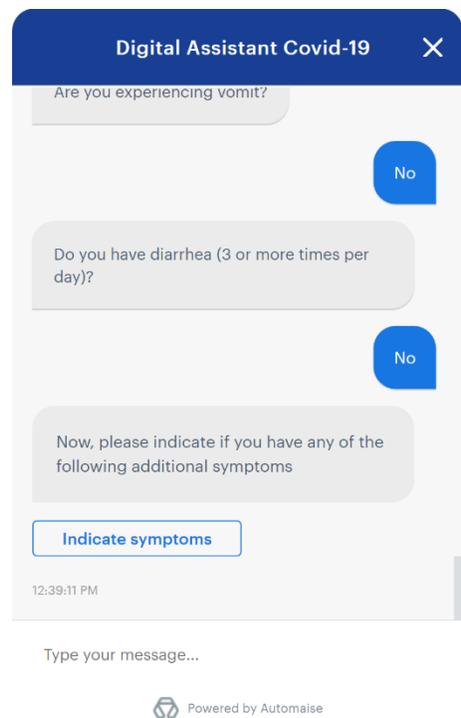
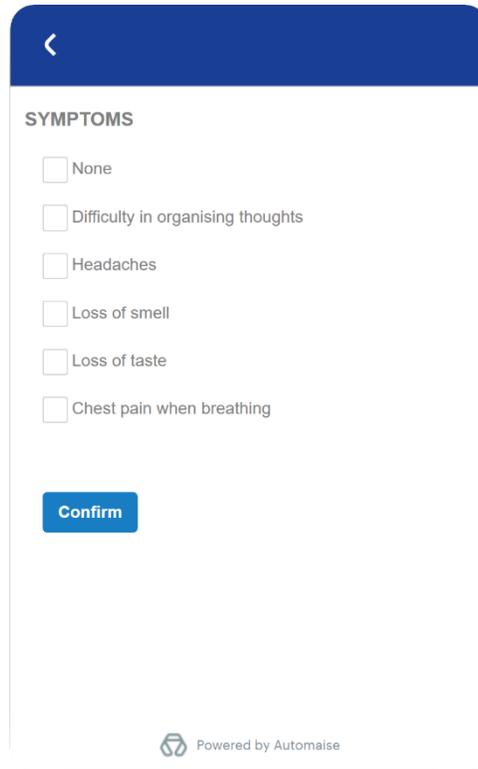


Figure 8: Screening flow





The screenshot shows a mobile application interface for reporting symptoms. At the top is a dark blue header with a white back arrow. Below the header, the word "SYMPTOMS" is displayed in bold. A list of six symptoms follows, each with an unchecked checkbox: "None", "Difficulty in organising thoughts", "Headaches", "Loss of smell", "Loss of taste", and "Chest pain when breathing". A blue "Confirm" button is positioned below the list. At the bottom of the screen, there is a small logo and the text "Powered by Automaise".

Figure 9: Symptoms list screen

b) Client's Portal [Backoffice]

Automaise developed a friendly Backoffice interface to enable designated personnel (e.g. supervisors) to control the solution. This web interface offers the following features:

- Welcome dashboard
- Real time chat monitoring and control
- Teach AI to monitor how the AI is behaving and teach it
- Solution insights to learn the work being done by the solution
- Settings area to define what the solution should answer for FAQs and Recommendations, as well other settings.

Please check below some real screenshots of the solution's web Backoffice portal.



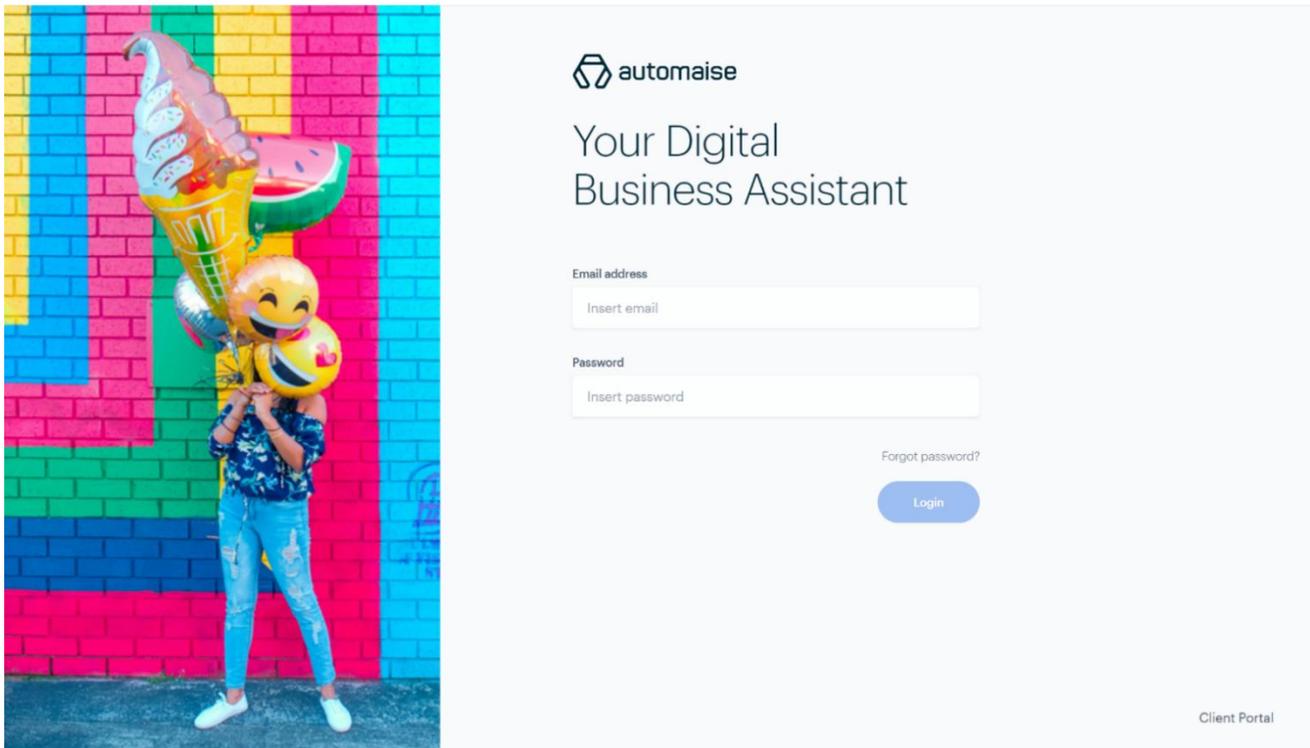
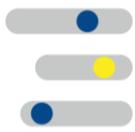


Figure 10: Client's Portal login

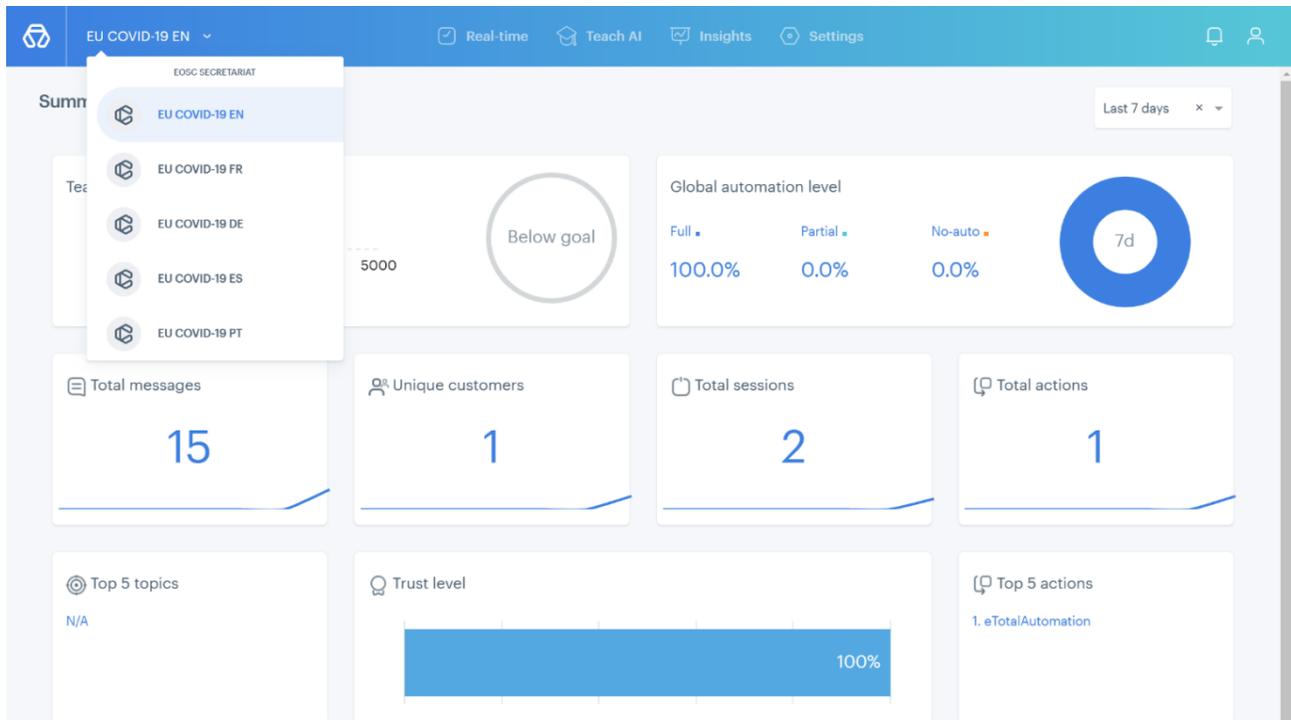


Figure 11: Client's Portal dashboard



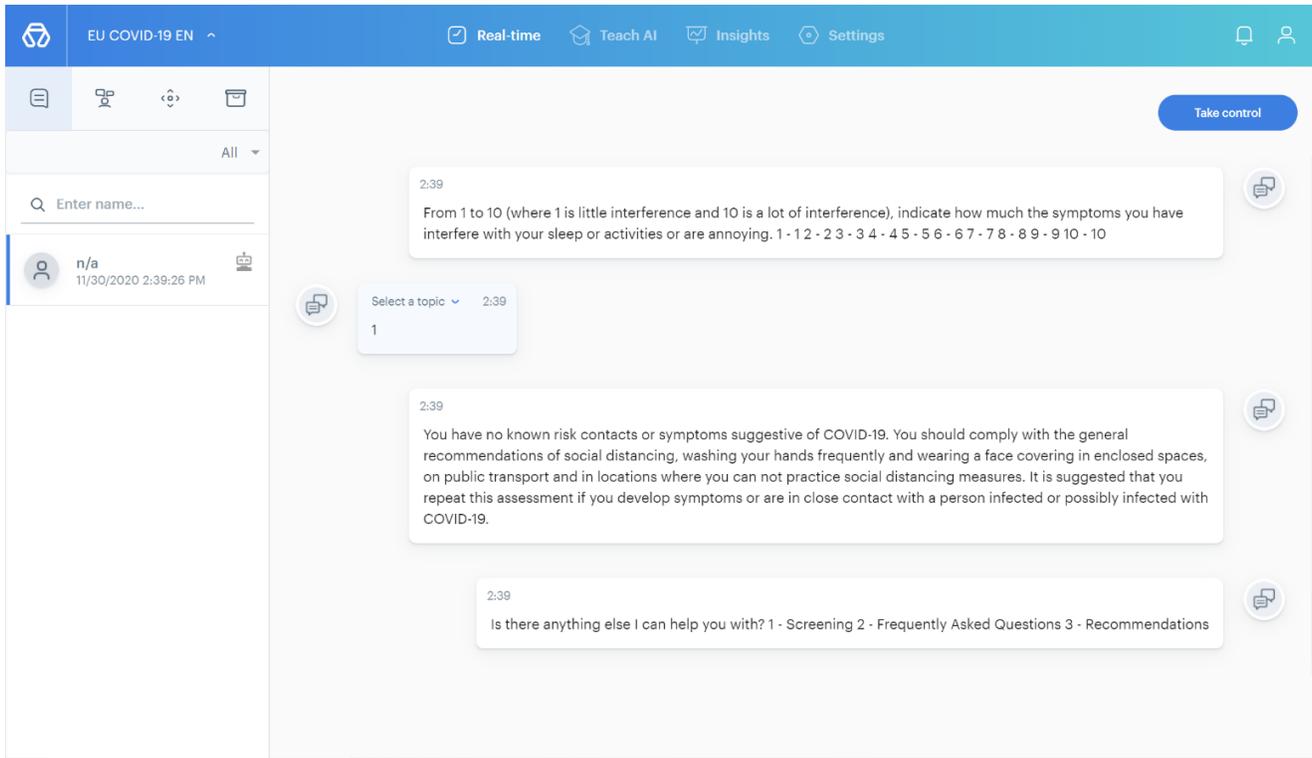


Figure 12: Real-time

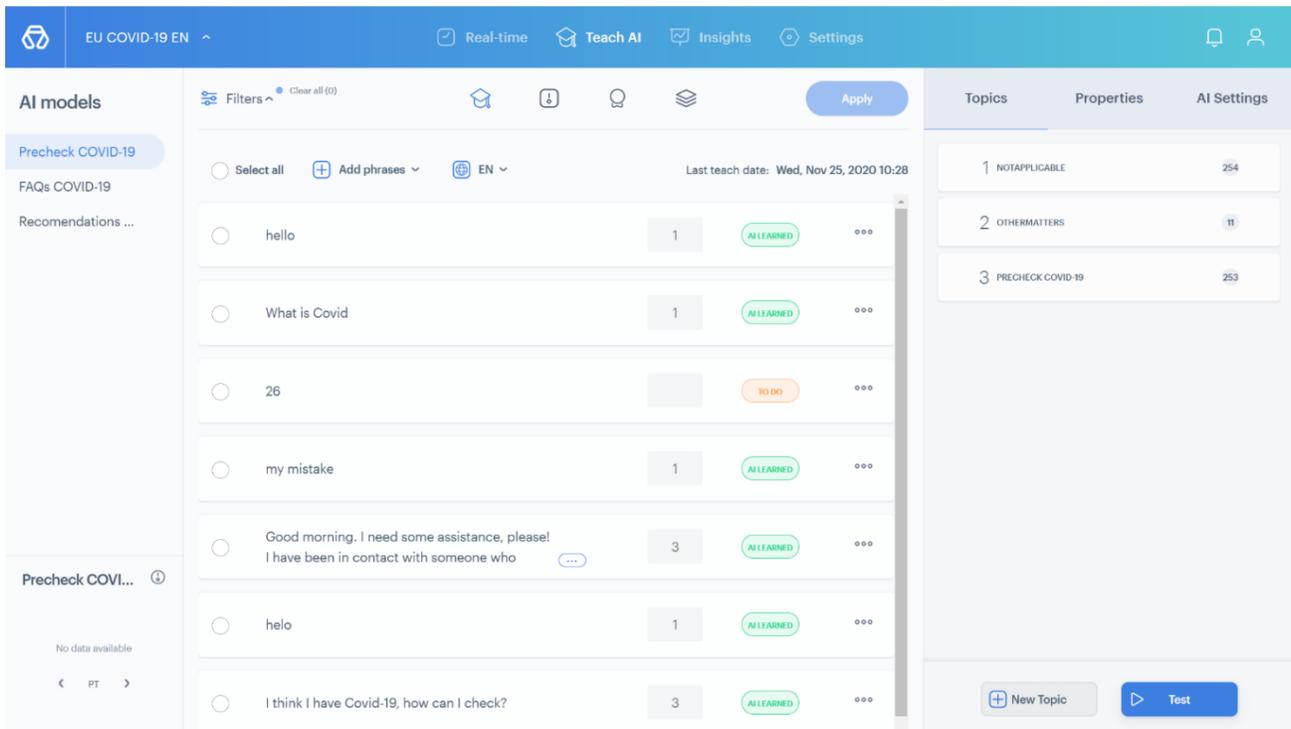


Figure 13: Teach AI



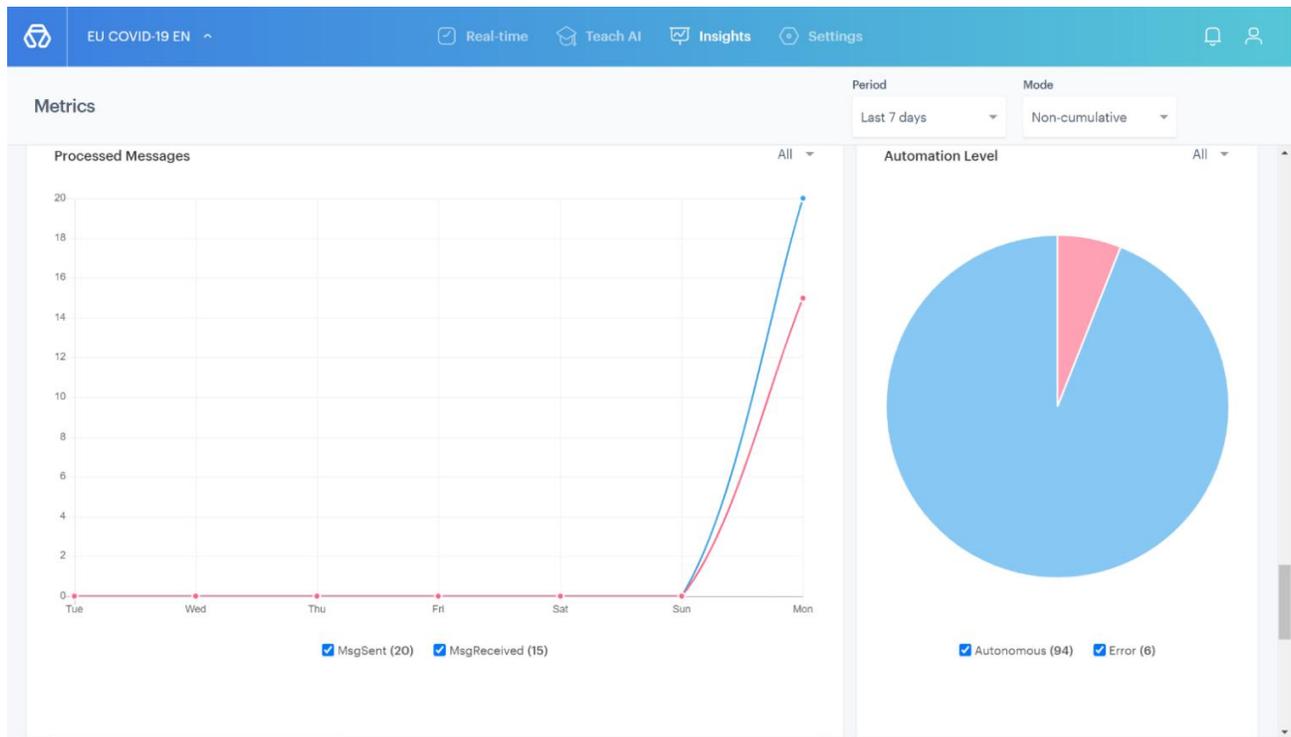
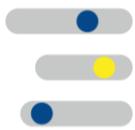


Figure 14: Insights

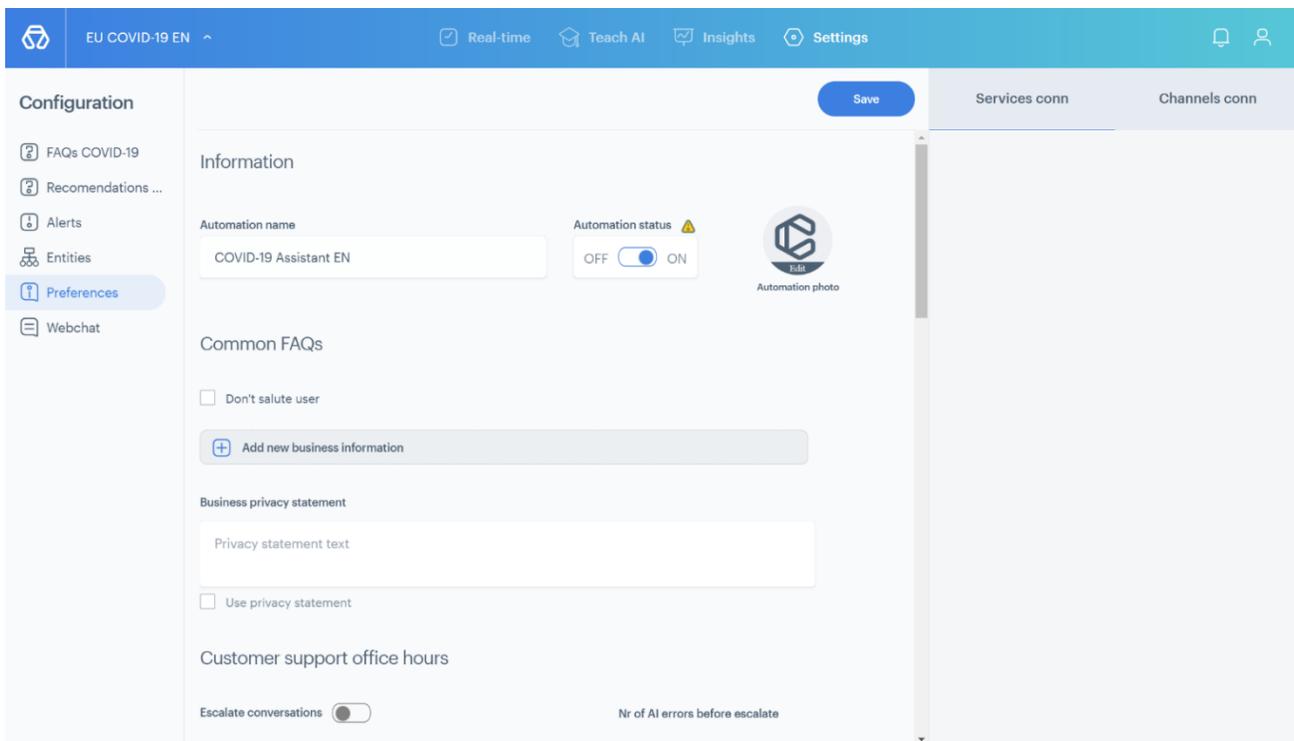


Figure 15: Settings

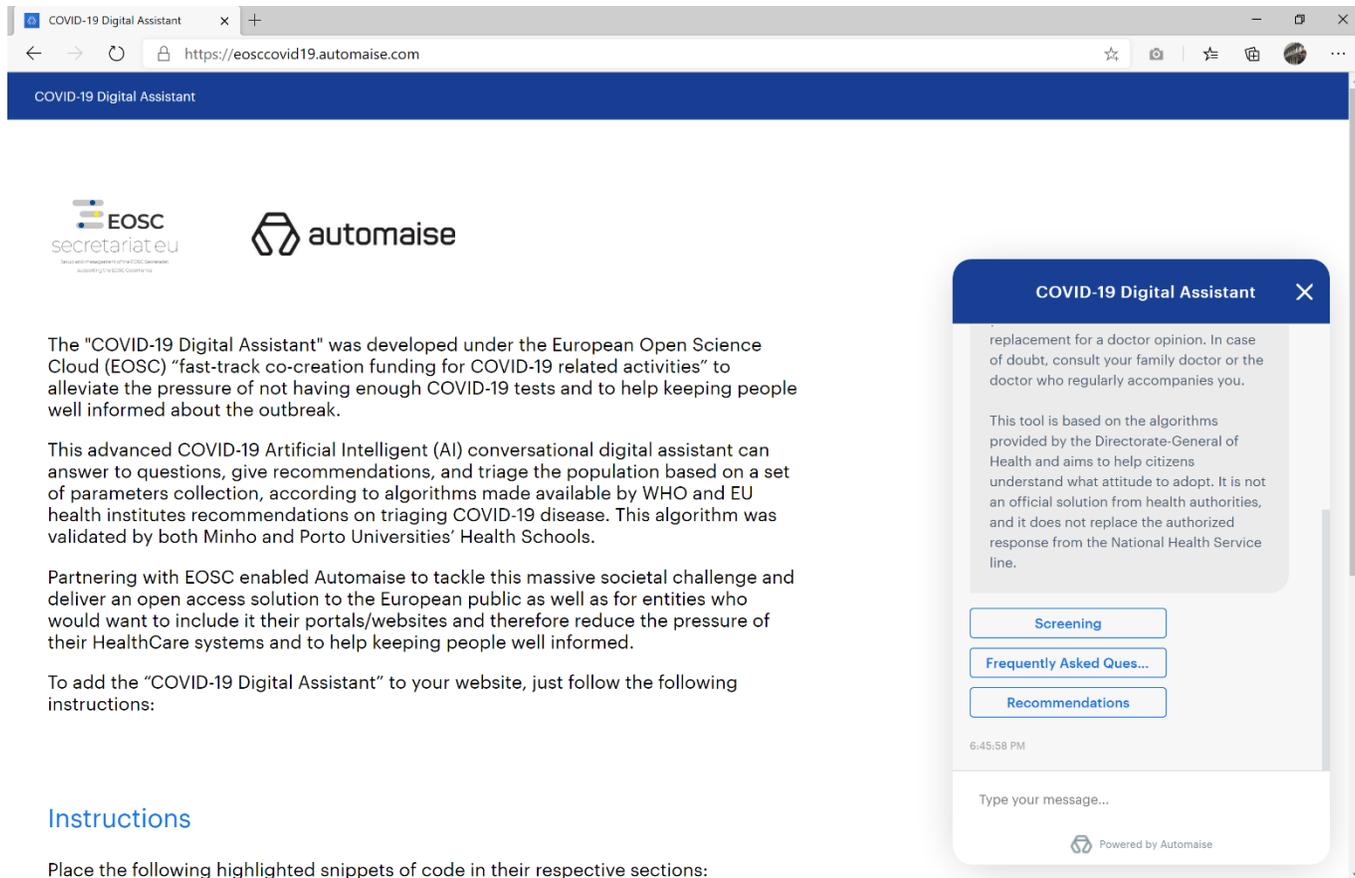


5. Project Deliverables

5.1 Readiness

The solution is complete and fully functional*. It can be found on the following demonstration link:

EOSC CODI-19 Digital Assistant URL: <https://eosccovid19.automaise.com/>



The screenshot shows a web browser displaying the COVID-19 Digital Assistant website. The page features the EOSC Secretariat and Automaise logos. The main content includes a disclaimer, a description of the AI assistant, and instructions for integration. A chat window is open on the right side of the page.

COVID-19 Digital Assistant

replacement for a doctor opinion. In case of doubt, consult your family doctor or the doctor who regularly accompanies you.

This tool is based on the algorithms provided by the Directorate-General of Health and aims to help citizens understand what attitude to adopt. It is not an official solution from health authorities, and it does not replace the authorized response from the National Health Service line.

Screening

Frequently Asked Ques...

Recommendations

6:45:58 PM

Type your message...

Powered by Automaise

The "COVID-19 Digital Assistant" was developed under the European Open Science Cloud (EOSC) "fast-track co-creation funding for COVID-19 related activities" to alleviate the pressure of not having enough COVID-19 tests and to help keeping people well informed about the outbreak.

This advanced COVID-19 Artificial Intelligent (AI) conversational digital assistant can answer to questions, give recommendations, and triage the population based on a set of parameters collection, according to algorithms made available by WHO and EU health institutes recommendations on triaging COVID-19 disease. This algorithm was validated by both Minho and Porto Universities' Health Schools.

Partnering with EOSC enabled Automaise to tackle this massive societal challenge and deliver an open access solution to the European public as well as for entities who would want to include it their portals/websites and therefore reduce the pressure of their HealthCare systems and to help keeping people well informed.

To add the "COVID-19 Digital Assistant" to your website, just follow the following instructions:

Instructions

Place the following highlighted snippets of code in their respective sections:

* **IMPORTANT NOTE:** although the solution is deployed and ready to be accessed, the cost of hosting the solution "open public", after the project completion, was not covered on this project cost, only the cost to develop the solution (as clearly stated before).

5.2 Backoffice Portal Access

It was sent an invite to join to Veronica Bertacchini veronica.bertacchini@technopolis-group.com. From this account you can create new accounts to other people.



5.3 Further links

Links for the "COVID-19 Digital Assistant" in PT (Portuguese), EN (English), FR (French), DE (German) and ES (Spanish):

- a. PT: <https://www.automaise.com/static/WebChat/covideuropept.html>
- b. ES: <https://www.automaise.com/static/WebChat/covideuropees.html>
- c. EN: <https://www.automaise.com/static/WebChat/covideuropeen.html>
- d. FR: <https://www.automaise.com/static/WebChat/covideuropefr.html>
- e. DE: <https://www.automaise.com/static/WebChat/covideuropede.html>

Note: if you are testing all the links on the same browser bear in mind that the conversation historic might get a mixed as you move across languages. This is a side effect of having all the language provisioned under the same domain (e.g. www.automaise.com).

Automaise Client's Portal: <https://client.automaise.com/#/login> **Note:** for all of those who will work within the platform we will need their email address to give them access to the Client's Portal.



6. Conclusion and Future Work

With this COVID-19 Digital Assistant solution, AUTOMAISE trusts that the following benefits will happen:

- Reduce health support phone lines pressure as people can run prechecks on them on using an official tool;
- Mitigate lack of COVID-19 tests available as the available tests should be retargeted to the serious suspects first;
- Alleviate stress and anxiety on peoples day-to-day as this feature will be available at their fingertips;
- Create AI models that will gain knowledge and accuracy as time goes by and will become an asset not only the anticipate the evolution of the COVID-19 outbreak but as well for potential future epidemics;
- Keep people informed correctly and stop misinformation and fake news;
- A bit indirectly, reduce costs handling with COVID-19 pandemic outbreak.

6.1 Future Work

Automaise strongly believes that a tool as such, with an EU official assistant “stamp” on it and made available to every EU citizen would be of great benefit. So, as future work Automaise would like to challenge EOSC to help us on:

- Help us getting budget to host and run this solution for 1 year (Estimated 100.000€ to cover a population of 200 million)
- Spread the word and help us install this digital assistant web chat widget on existing organizations/entities' web sites across EU (initially for the supported languages);
- Add support for other EU official languages (Estimated 5.000€ per language).



7. Openness

We are all living unprecedented times due to COVID-19 pandemic. Automaise believes the power of together is higher than the sum of the individuals. Sharing tools, assets and knowledge will be key to stop this pandemic sooner rather than later.

From Automaise side we commit to share/open everything that is related or was built specifically for this COVID-19 digital assistant project.

7.1 AI Models Structure

All meta information about the AI Models designed to power the solution it's open. The AI Models are:

- Screening AI
- FAQs AI
- Recommendations AI

Note: these structures/meta information is language agnostic, i.e., is the same regardless of the language.

Please check Zenodo zip file for further details.

7.2 AI Models Training Data

All the AI sample data used to train the AI models it's open and can be accessed/shared. The AI training sample data is per AI models and per language [PT, ES, FR, EN & DE] (i.e., there are 15 training datasets available as of today)

Note: Data to be accessible via periodic exports in JSON or CSV representation formats.

7.3 Pre-trained AI models

If the entity requesting access doesn't want or doesn't have the skills to train AI models, Automaise will also make available all the AI models pre-trained and ready to be used. Like for the training data, there are 15 AI models pre-trained available.

Note: these AI models are based on TensorFlow and PyTorch. The entity requesting access must have the setup of the required components to run the AI Models.

Please check Zenodo zip file for further details.

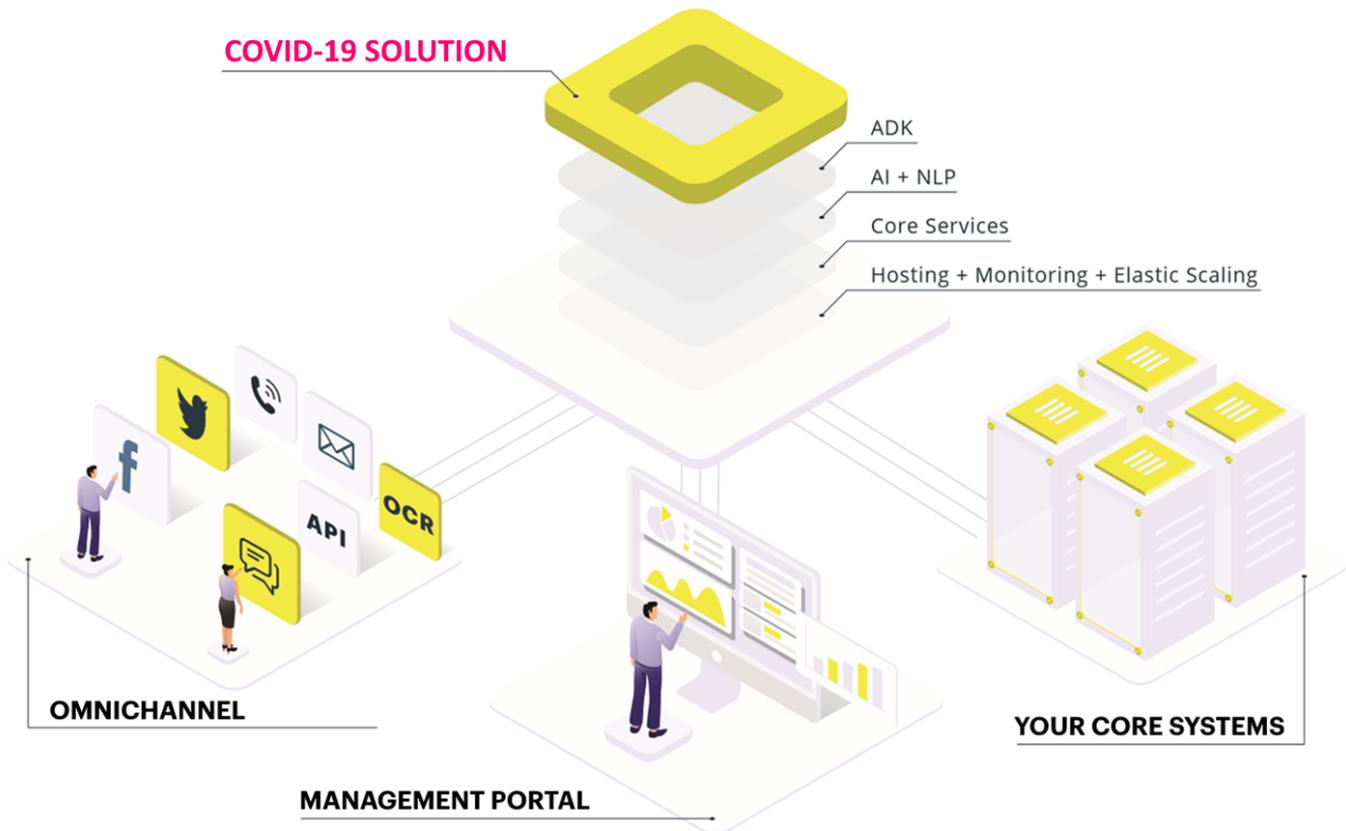


7.4 The Solution itself

The solution described on this document was built (as previously communicated) using Automaise AI automation platform. You can consider Automaise platform as an SDK on top of a set of building blocks that can be used, combined and/or extended to build smart automations.

7.4.1 Platform vs. Project

Considering the solution high-level blocks diagram below, we can split the blocks in 1) Automaise Platform (center grey components on the diagram) and 2) the solution built and described on this document (center yellow layer "COVID-19 SOLUTION").



Ownership & Access

- 1) The underlying platform is exclusive property of Automaise and its source code it's closed.
- 2) The solution specifically built components are open source and can be accessed/shared. Besides the source code relative to the yellow layer on the above diagram, all the components listed in 7.1, 7.2 and 7.3 are also open source and shareable.

7.5 Collected data (beware of the GDPR)

Once the solution goes live (see 6.1 Future Work chapter) all the data gathered by the solution will be made available to designated/authorized entities for research activities. The following data will be collected:

- Conversation messages
 - o Frequently asked questions
 - o Ask for Recommendations
- Screening data
 - o All answers provided by users during the screening process as well the prognosis of the system.

Note: Data to be accessible via periodic exports in JSON or CSV representation formats.

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