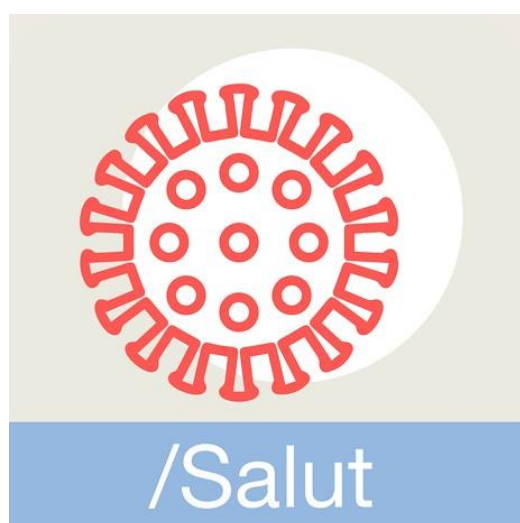


COVID19 CAT



/Salut



Generalitat
de Catalunya

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1. Introduction

The Department of Health of the Government of Catalonia has made a **Monitoring and tracing test for Coronavirus SARS CoV-2 symptoms** available to its citizens, in order to effectively monitor those with COVID-19 symptoms or those that have been in contact with someone diagnosed with the virus.

The test is available through two digital tools:

- A mobile phone app called STOP COVID19 APP (available for both Android and IOS), accessible through the different app markets.
- A web-based Chatbot called COVID19Xat, accessible through the official website of the Catalan Health Service (CatSalut). This Chatbot is different to customary Chatbot mechanisms as it is able to register the results of the interaction with users. The reason for making the Chatbot available is to reach those users without a smartphone (as well as those with an old generation smartphone) or those whom do not wish to download the app but still want access to the test.

From the data collected through both tools, the health system is able to monitor those cases with symptoms and, if necessary, alerts the emergency services of the most severe cases and informs primary care centres of those with mild symptoms for their monitoring.

The information is also used to determine the evolution of the disease at the individual level and aggregate, in order to design and implement measures and strategies to better the quality of the health services and conduct studies in relation to coronavirus.

2. The Goal

The need for a test capable of conducting a first classification of the cases of patients with this pathology was first revealed at the beginning of March.

To this purpose, the objectives of the digital tools developed are the following:

1. Relieve the pressure of the number of calls on the telephone numbers set up for Covid-19 emergencies (061 CatSalut Respon).
2. Provide reliable information and medical advice to citizens.
3. Be able to monitor and evaluate the symptomatology of those citizens who answer the test to validate the classification and, in case of severe symptoms, activate the emergency services.

3. Functional Requirements

3.1 Functional definition

The objective of the APP STOP COVID19 CAT and the COVID19Xat is to offer the user a self-assessment test on the symptoms of COVID-19. In this way, the user provides information about the symptomatology and receives advice depending on the result. In case of a possible COVID-19 case, the digital tools store the citizen's data in order for the health services to be able to monitor his/her progress. The health services will assess the need to re-classify, monitor, or alert the emergency services in case they're needed.

3.1.2 Data

The STOPCOVID19 and COVID19Xat tools are voluntary tools.

As it is described later on, both tools require the Personal Identification Code (CIP), which is a code that can be found on any Individual Health Card. Alternatively, the user can provide their ID or Passport.

List of recorded data:

1. Identification data: CIP, ID or Passport.
2. Contact details: telephone number and/or address and alternative telephone number.
3. Health data: the user's answers about the symptomatology.
4. Location data: the longitude and latitude coordinates of the location from where the user is answering the test, data obtained automatically with the user's prior consent (through the same APP or the browser in case of Chatbot)

3.1.4 Geolocalisation

With the objective of facilitating healthcare in relation to the evolution of COVID-19, the use of localisation and identification tools are necessary within the app and Chatbot. The geolocalisation tools used are the following:

- App: the app geolocates the location of the user through the handset (once the user has accepted to activate the localisation services).
- Chatbot: The chatbot geolocates the location of the user through the acceptance of the geolocalisation option in the browser.

The information provided by these systems is relevant in case emergency services need to be alerted and is also important for eventual test deliveries or other necessary health materials to citizens' homes. Geolocalisation also allows for the creation of a heat map that identifies the areas with a greater density of cases, so the resources available can be assigned according to the necessities of each area or area-specific containment measures can be adopted.

3.1.5 Data workflow



3.2 Case of usage

The Coronavirus SARS CoV-2 symptoms monitoring and tracing Test works as follows:

It outlines four initial questions that allow the identification of users' symptoms that indicate the need to complete the self-assessment test. The questions are:

- a. Do you have a fever?
- b. Do you suffer from shortness of breath?
- c. Do you have a persistent cough?
- d. Do you have a sense of general unrest?

If the user answers NO to ALL of the questions above, it will not be necessary to continue with the test. The person is considered to be asymptomatic and they will be referred to the protection measures and health advice that can be found in the official information sources.

If the user answers YES to one of the questions above, it will be necessary to continue with the self-assessment test to identify more details:

- a. Age and gender
- b. Illnesses or basic details that allow to identify the potential risk of the user
- c. Specific symptoms:
 - i. Exact temperature
 - ii. Level of discomfort (in a scale of 1 to 4)
 - iii. Level of shortness of breath (in a scale of 1 to 4)

- d. Current condition, specifying whether or not the user is experiencing difficulties to carry out ordinary activities (taking a shower, getting up, eating, etc.)

With the combination of the symptoms, the risks, the current condition and the age of the user, the algorithm bounded to the test establishes a classification of the cases according to the following criteria:

- Level 1: Severe symptoms and associated risk: The emergency services are alerted. The emergency services contact the user for monitoring purposes and activate the resources if needed.
- Level 2: Severe symptoms but no associated risk: The user is urged to stay home and to self-assess the symptoms experienced twice a day during 14 days. The case is reported to the primary care services, which will aid with the monitoring.
- Level 3: Mild symptoms and associated risk: The user is urged to stay home and to self-assess the symptoms experienced twice a day during 14 days. The case is reported to the primary care services, which will aid with the monitoring.
- Level 4: Severe symptoms and no associated risk: The user is urged to stay home and to self-assess the symptoms experienced twice a day during 14 days. The case is reported to the primary care services, which will aid with the monitoring.

4. App STOP COVID-19 CAT

The process of usage of the APP STOP COVID-19 CAT is as follows:

- [Google Play](#)
- [App Store](#)

The app is available for Android and iOS. The links to their official markets are:

- [Google Play](#)
- [App Store](#)

4.1 Functional description

We will now proceed to describe the actions required in every screen.

4.1.1 Home page

The first screen that will appear when the application is installed on the device allows the user to select the language in which the self-assessment test will be conducted. The application is available in 5 languages (Catalan, Spanish, English, French and Mandarin).

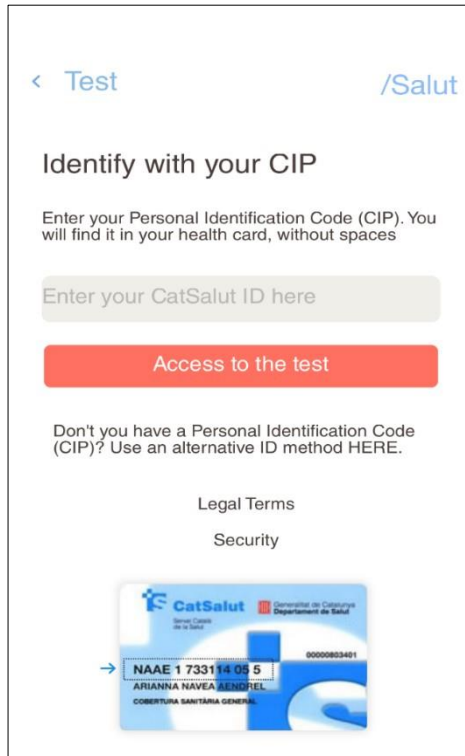


4.1.1 Identification - Login

Once triggered, the app will show the identification screen, where the user will have to provide their identification number. The preferred option will be the CIP code (health service number), but, alternatively, identification with ID or Passport is also allowed.

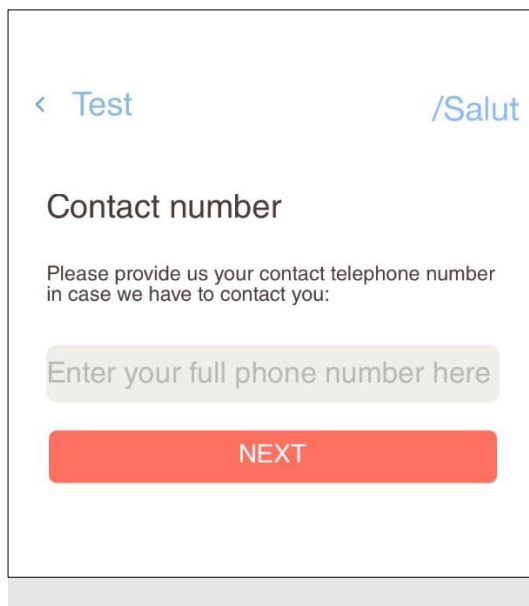
This screen also shows the legal considerations to take into account, such as the security requirements.

As shown on the screenshot, an image of the health card is shown, providing the user with information about where to find the CIP number so that they can insert it correctly in the application.



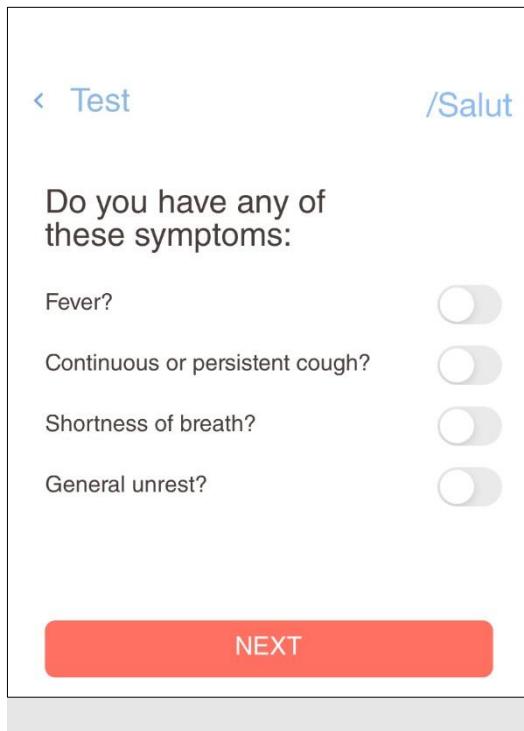
4.1.2 Contact telephone number

The user's telephone number is requested, to be able to contact the patient and keep their data updated.



4.1.3 Symptomatology

Then the test begins. A first assessment of the symptoms of the patient is conducted. The information asked is:



< Test /Salut

Do you have any of these symptoms:

Fever?

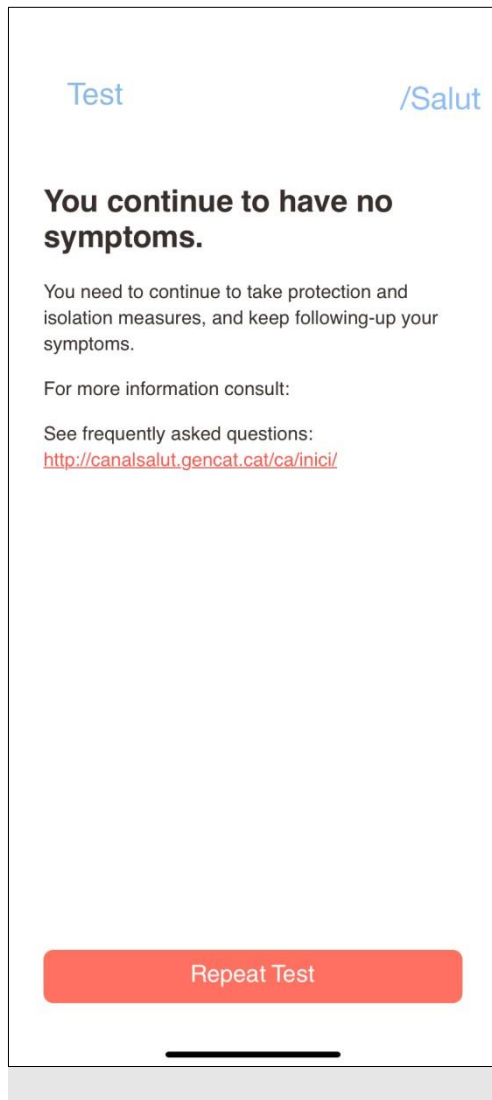
Continuous or persistent cough?

Shortness of breath?

General unrest?

NEXT

In case of a nega4ve answer to all ques4ons, the applica4on will consider it not necessary to conduct any further survey and it will urge the user to observe the precau4on measures.



4.1.4 User data and history

Anerwards, the app requests some personal data about the user (age and gender) and about their medical history.

The image displays two screenshots of a mobile application interface for a COVID-19 risk assessment test. The left screenshot is titled 'Test' and shows the 'Personal data' section. It includes a field for 'Age' with a grey input box, and a 'Gender' section with two options: 'Man' (represented by a male icon) and 'Woman' (represented by a female icon). Below this, there is a section 'Have any of these symptoms:' with three items: 'Dyspnoea (shortness of breath)', 'Hemoptysis (expectorate blood)', and 'Flank pain', each with a toggle switch. The right screenshot also shows the 'Test' screen, focusing on the 'Suffer from any of these diseases:' section, which lists various conditions like Diabetes, Cardiovascular disease, and Cancer, each with a toggle switch. Below that is the 'Have any of these situations:' section, listing 'In treatment with drugs that produce immunosuppression', 'Pregnancy', 'Postpartum (<6 weeks)', and 'Breastfeeding mother', each with a toggle switch.

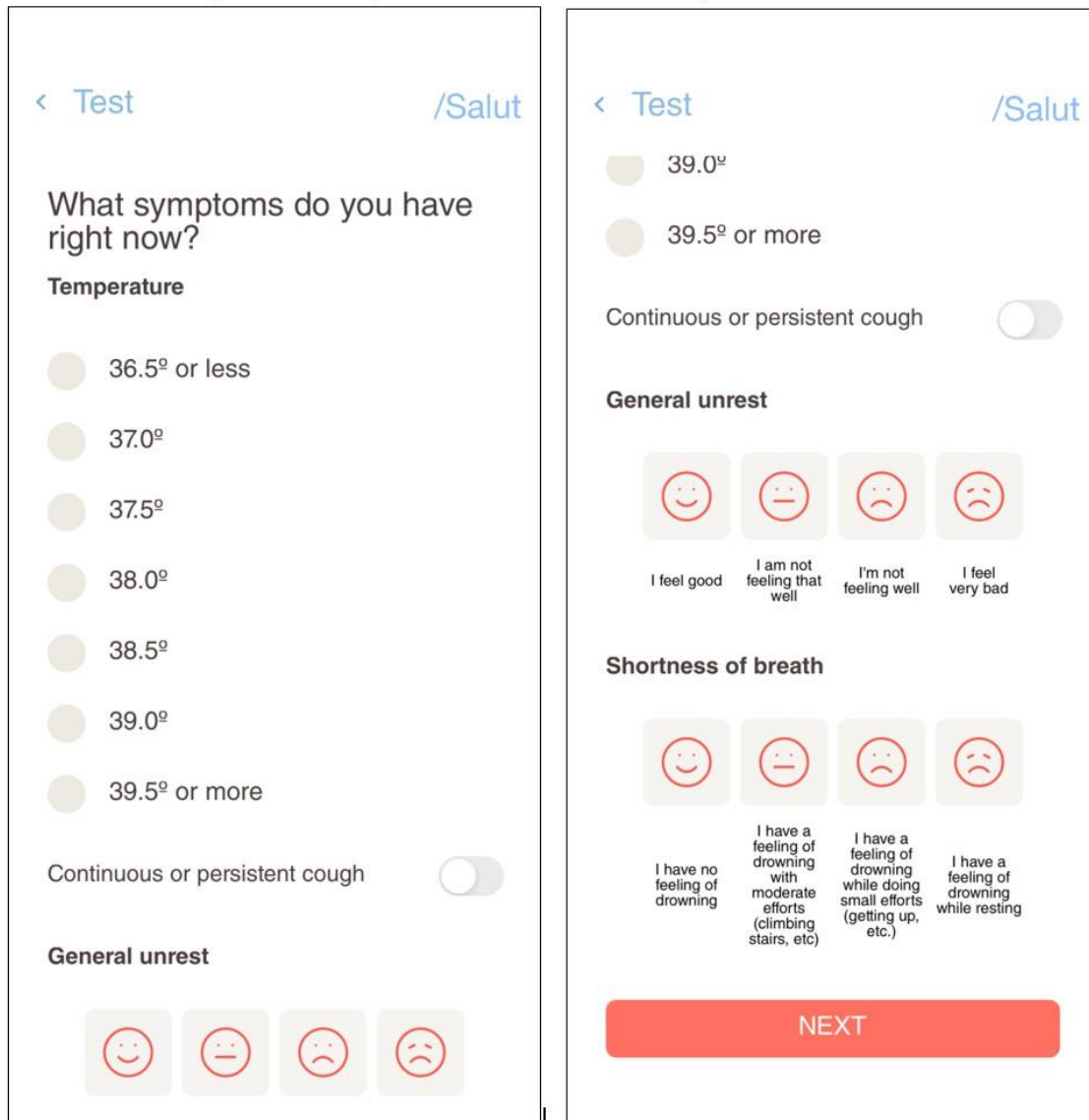
The data provided at this stage allows the algorithm used to conduct a risk analysis of the user.

4.1.5 Current health condition

The final part of the test gathers detailed information to identify the user's current health condition:

- Temperature, measured in degrees and suggesting the following concrete values: 36.5° or less, 37°, 35.7°, 38°, 38.5°, 39°, 39.5° or more.
- Physical condition assessment: on a scale of four possible situations:
 - I feel good
 - I am not feeling that well
 - I'm not feeling well
 - I feel very poorly
- Shortness of breath assessment: on a scale of four possible situations:

- I have no feeling of drowning
- I have a feeling of drowning when performing moderate efforts (climbing stairs, etc.)
- I have a feeling of drowning whilst performing small efforts (getting up, etc.)
- I have a feeling of drowning whilst resting



Test /Salut

What symptoms do you have right now?

Temperature

- 36.5° or less
- 37.0°
- 37.5°
- 38.0°
- 38.5°
- 39.0°
- 39.5° or more

Continuous or persistent cough

General unrest

I feel good | I am not feeling that well | I'm not feeling well | I feel very bad

Shortness of breath

I have no feeling of drowning | I have a feeling of drowning with moderate efforts (climbing stairs, etc.) | I have a feeling of drowning while doing small efforts (getting up, etc.) | I have a feeling of drowning while resting

NEXT

4.1.6 Result

Once the app gathers the data from the user and his/her answers to the test, the user's case is assessed in accordance with a classification of severity (see section 3.2), and the user will be given instructions as per the classification of his/her symptoms.

Test /Salut

Stay home and control the symptoms.

Follow the protection and contention measures.

Monitor possible changes in your symptoms through the test, twice a day (morning and evening) for, minimum, 14 days.

Tips:

- Drink a lot of liquids (water, juices, broth...)
- Resting
- Take antipyretic and/or pain relievers (paracetamol preferably)

And always, if you have doubts, call the service "061 SalutRespon" who will evaluate your situation and will indicate you how to act.

For more information consult canalsalut.gencat.cat/coronavirus

Repeat Test

4.2 Non-functional requirements

The non-functional requirements are those related to the characteristics that in one way or another can limit the system. They describe a restriction on the system that limits our choice in finding a solution.

The non-functional requirements of the applications are the following:

- **Application compatible with mobile devices:** a compatibility with iOS and Android is required, also taking into account former versions of both operative systems.

- **Mul.language:** it needs to allow the configura4on of the different screens in several languages, allowing changing language when needed.
- **Hos.ng:** in suppliers of the corporate plaporm of the Health Department.
- **Increasing ability:** the increasing ability both with regards to the number of users as well as data processing should be taken into account.
- **Extensibility:** a solu4on to add new func4ons should be considered.

4.3 APP architecture

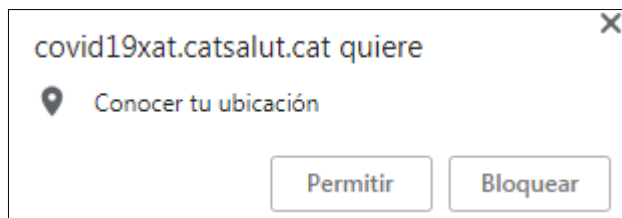
Pending developers information

5.Chatbot – COVID19Xat

We will now proceed to describe the usage process for the chatbot.

5.1 Functional description


Access to the chatbot is done through the official website of the Catalan Health Service (CatSalut) or by following the link covid19xat.catsalut.cat. Once the user accesses the link, an automated message will pop up to require access to the user's loca4on.



We will now proceed to describe the ac4ons required in every screen.

5.1.1 Home page

The home page offers descrip4on informa4on about the chatbot and requires acceptance of the privacy and security terms and condi4ons. Once these are accepted, the iden4fica4on screen will open up. The user will have to fill in his/her CIP code (health service number), or, alterna4vely, iden4fica4on with ID or Passport is also allowed. The user will also need to introduce his/her mobile phone number.

/Salut SARS-CoV-2 coronavirus symptom surveillance and monitoring test 

Hello user! If you have symptoms of coronavirus SARS CoV-2 or have been in contact with an affected person, you should monitor your symptoms daily.

This application will allow you to track the evolution of the symptoms and will give you directions and tips to follow in each case.

Use of this service constitutes acceptance of the terms and privacy policy described in 'See the conditions and policies'

[See conditions and policies](#)

I agree

Insert your Personal Identification Code (CIP) that you will find on your health card, without spaces.

Please provide your phone number in case we have to contact you.

[Next](#)

5.1.2 Symptomatology

In case of a nega4ve answer to ques4ons of main symptoms, the chatbot will consider it not necessary to conduct any further survey as the user is not displaying any symptoms and it will provide the user with monitoring advice.

Do you have any of these symptoms?

Do you have fever?

No

Do you have a continuous or persistent cough?

No

Do you have shortness of breath?

No

Do you have general discomfort?

No

You have no symptoms, but don't trust it!

Follow the protection and isolation measures and monitor your symptoms at least 14 days.

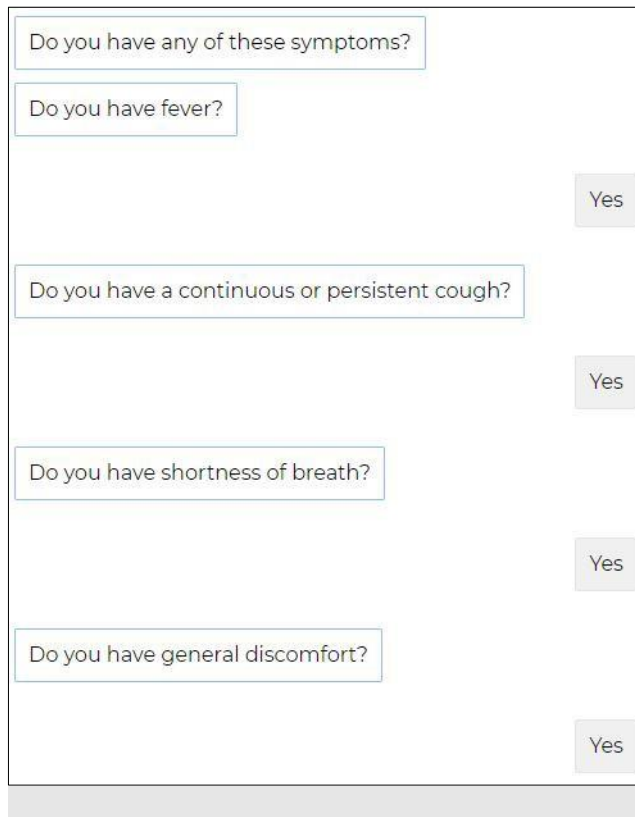
It's very important that you follow the confinement measures and stay home!

Containing coronavirus is everyone's responsibility.

If you have any doubt, consult canalsalut.gencat.cat/coronavirus

Send results

In case of an affirmative response to any of the questions asked, the test will initiate in order to monitor the user's data and his/her past health records (see next section).



Do you have any of these symptoms?

Do you have fever?

Yes

Do you have a continuous or persistent cough?

Yes

Do you have shortness of breath?

Yes

Do you have general discomfort?

Yes

5.1.3 Patient symptoms and past health records

Anerwards, the chatbot will ask the user to introduce his/her age and gender, previous illnesses, symptoms and current situa4on.

Enter your personal data:

Gender

Man

Woman

Next

Have any of these symptoms:

Dyspnoea (shortness of breath)

Hemoptysis (expectorate blood)

Flank pain

Next

Suffer from any of these diseases?

Diabetes

Cardiovascular disease (including hypertension)

Chronic liver disease

Chronic pulmonary disease

Chronic renal disease

Chronic neurological or neuromuscular disease

Congenital or acquired immunodeficiency (including HIV)

Cancer

Next

Have any of these situations?

In treatment with drugs that produce immunosuppression

Pregnancy

Postpartum (<6 weeks)

Breastfeeding mother

Next

5.1.4 Current health condition

Once the user has filled out the aforementioned information, the questionnaire will ask the user to describe his/her current health condition in order to be able to assess the degree of severity of his/her case.



What symptoms do you have right now?

Do you have a continuous or persistent cough?

Yes

Temperature

38.5°

General unrest

1	2	3	4
I feel good	I am not feeling well	I'm not feeling well	I feel very bad

4· I feel very bad

Shortness of breath

1	2	3	4
I have no feeling of drowning	I have a feeling of suffocation with moderate efforts (climbing stairs, etc)	I have a feeling of drowning with small efforts (getting up, crouching, etc.)	I have a feeling of suffocation at rest

4· I have a feeling of suffocation at rest

Do you have difficulty to do basic activities of daily living, such as getting out of bed, showering, eating, reading, talking... ?

Yes

5.1.5 Result

In case of a suspected COVID-19 case, the chatbot will ask the user an alternative contact.

Provide us an alternative phone number

Please, provide us the phone number of a family member or friend in case we cannot contact you directly

Address

Lastly, the result will show and an indication of how to proceed in accordance with the level of severity of each case (as explained in section 3.2).

5.2 Non-functional requirements

The non-functional requirements are those related to the characteristics that in one way or another can limit the system. They describe a restriction on the system that limits our choice in finding a solution.

The non-functional requirements of the applications are the following:

- **Application compatible with mobile devices:** the compatibility with Chrome, Internet Edge and Firefox.
- **Multilingual:** it needs to allow the configuration of the different screens in several languages, allowing changing language when needed.
- **Hosting:** in suppliers of the corporate platform of the Health Department.
- **Increasing ability:** the increasing ability both with regards to the number of users as well as data processing should be taken into account.
- **Extensibility:** a solution to add new functions should be considered.

6. Performance review

In order to measure the impact of the digital tools described, the following indicators have been established:

- Number of downloads of the app in Android
- Number of downloads of the app in IOS
- Number of individual users
- Number of self-assessments carried out
- Percentage of first-time self-assessment test versus consecutive tests
- Number of potential asymptomatic cases identified
- Number of potential level 1 cases identified



- Number of potential level 2 cases identified
- Number of potential level 3 cases identified
- Number of potential level 4 cases identified
- Number of re-classified cases
- Other indicators by province through geolocation