
**Healthcare organization
management — Pandemic response
— Functional requirements for self-
symptom checker app**

*Management des organisations de soins de santé — Réponse en cas
de pandémie — Exigences fonctionnelles relatives aux applications
d'auto-contrôle des symptômes*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 304, *Healthcare organization management*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

In 2005, the International Health Regulations^[7] (IHR) declared that a global network of national health systems should be established to facilitate coordinated defence against public health threats and ensure the security of international public health. Four areas of work to achieve the envisioned network have been established:

- a) strengthening national prevention capacity;
- b) introduction of global alert and response mechanisms;
- c) containment of specific threats;
- d) travel and transports.

With the first case reported on 31 December 2019, the WHO declared COVID-19 as a pandemic in March 2020.^[6] The lack of effective vaccines and treatment created a crisis that has seen a significant number of confirmed cases and deaths worldwide. The pandemic has imposed enormous pressure on, and, in some countries, paralyzed public health systems, resulting in shortages of personal protective equipment (PPE), extracorporeal membrane oxygenation (ECMO) machines, hospital beds and medical personnel.

Each country has implemented various measures to block infection spread at entry points to the country, which has required tremendous resources. Asymptomatic cases and long incubation periods challenge infection prevention and control capacities of health care institutions and public health agencies.

A self-symptom checker app for a pandemic enables individuals to record and report pandemic-related symptoms, to provide information on screening test sites and to offer consultation channels that link them to health experts for disease spread containment.

The self-symptom checker app is designed to act as a frontline defence that enables isolation and quarantine of potentially infected individuals.

This document provides interested parties with guidance to support the development of applications for self-monitoring of symptoms to support screening. Self-monitoring applications can be used to support screening in businesses as well as border entry to contain the spread of infection and provide critical information to health care providers to provide appropriate care.

Annex A uses ISO/TS 82304-2^[1], Annex E to provide additional guidance when considering a self-symptom checker app.

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Healthcare organization management — Pandemic response — Functional requirements for self-symptom checker app

1 Scope

This document specifies functional requirements for a self-initiated disease symptom checker app to be used for early screening and control of pandemics such as COVID-19.

There are four functional components specified in this document:

- a) self-registration (see 7.2);
- b) symptom checking (see 7.3);
- c) guidance on screening stations (see 7.4);
- d) health consultation (see 7.5).

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1

confirmed case

person who has been confirmed to be infected with the infectious disease pathogen according to the diagnostic testing standard, regardless of clinical manifestations

[SOURCE: Korea Centers for Disease Control and Prevention^[2]]

3.2

isolation

separation of sick people with a contagious disease from people who are not sick

[SOURCE: Centers for Disease Control and Prevention^[3]]

3.3

pandemic

epidemic occurring worldwide, or over a very wide area, crossing international boundaries and usually affecting a large number of people

[SOURCE: A dictionary of epidemiology^[4]]

3.4 quarantine

separation and restriction of the movement of people who were exposed to a contagious disease to see if they become sick

Note 1 to entry: These people have possibly been exposed to a disease and do not know it, or they possibly have the disease but do not show symptoms.

[SOURCE: Centers for Disease Control and Prevention^[3]]

3.5 self-symptom checker app

tool that enables individuals to record and report pandemic-related symptoms, and that provides information on screening test sites, and offers consultation channels

Note 1 to entry: The consultation channels can provide a real time connection of the people with health experts for disease spread containment.

[SOURCE: Korea Centers for Disease Control and Prevention, Self-symptom checker^[5]]

4 General

To build or enhance the capacity to monitor and manage the spread of the disease at the points of entry and onward, the following actions, at a minimum, should be taken.

- To maintain timely communication with visitors/entrants: it is an onerous task to contact entrants, due to unanswered calls and/or phones being offline. This incurs delayed quarantine and extra personnel to manage connection with entrants.
- To monitor the entrants' health status: provision of information to entrants of public health control measures includes quarantine and monitoring.
- Information technology (IT) and infrastructure to support communication and screening applications: technology can enhance our response to pandemic management in a very significant way. For example, it is possible for disease-pertinent symptoms of an entrant to emerge after clearance from the point of entry due to a latent state of the virus. With the help of, for example, a smart phone-based application, it is made possible to track, monitor and manage the health of the entrant.

The purpose of this document is to provide guidelines towards the development of technology-based symptom screening applications to improve the efficiencies of infection containment practices.

5 The self-symptom checker app

Four core functional components of the self-symptom checker app are described in [Figure 1](#). Each functional component comprises a set of functions, each of which executes specific tasks.

The specific tasks of each functional component of the self-symptom checker app are as follows.

- Self-registration: after the self-symptom checker app has been installed on the smartphone, tablet or personal computer of the individual, he/she shall register himself/herself to use the self-symptom checker app.
- Symptom checking: the individual shall record and report through the self-symptom checker app any symptoms he/she has experienced.
- Guidance on screening stations: the individual can at any time search and contact nearby screening test sites, locations of which are determined by the GPS service, or other positioning service available, of the device owned by the individual.

- Health consultation: the individual can contact health experts through available communication channels, such as chatbot, mobile messaging application or email.

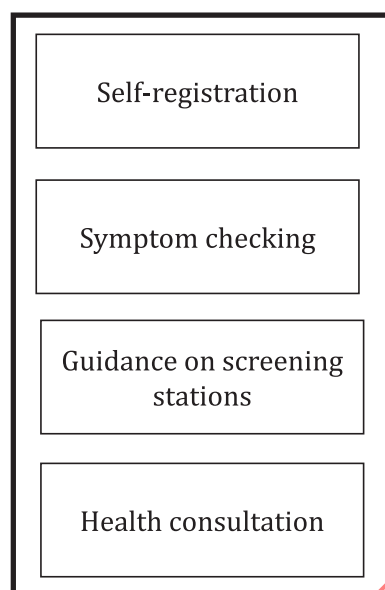


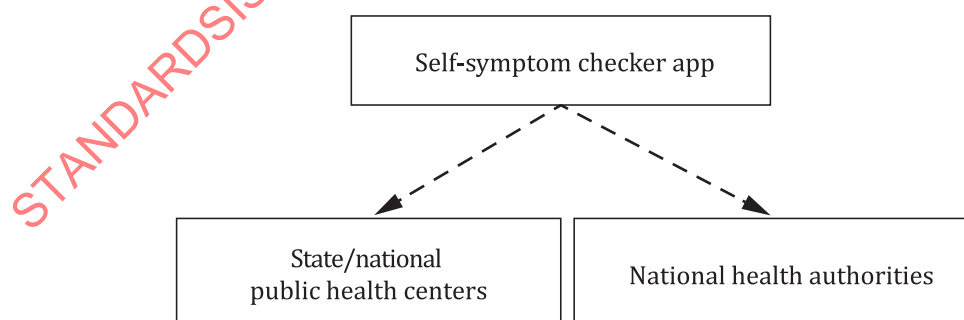
Figure 1 — Functional components of the self-symptom checker app

6 External services and applications of the self-symptom checker app

The self-symptom checker app is the central application upon which either optional or external services and applications, or both, can operate (see [Figure 2](#)).

For example, national health authorities, subject to user consensus, can gain access to demographic and symptomatic data about the individuals who have exhibited potential symptoms, and reach out pre-emptively to them for test and quarantine. State or national health centres can receive information about the individuals who have been exhibiting symptoms for two or more days consecutively and instruct them to visit a screening test site.

NOTE Local, regional or national guidelines on patient (or personal) information can apply.



Key

- - - ➤ optional data link to external services and/or applications

Figure 2 — Function of the external services and applications of the self-symptom checker app

7 Functional components of the self-symptom checker app

7.1 General

For the core functional components of the self-symptom checker app, see [Clause 5](#) and [Figure 1](#).

7.2 Self-registration

The Self-registration component is a required component. It enables a user to register. It principally initializes the self-symptom checker app by validating user credentials. The sub-components are shown in [Figure 3](#).

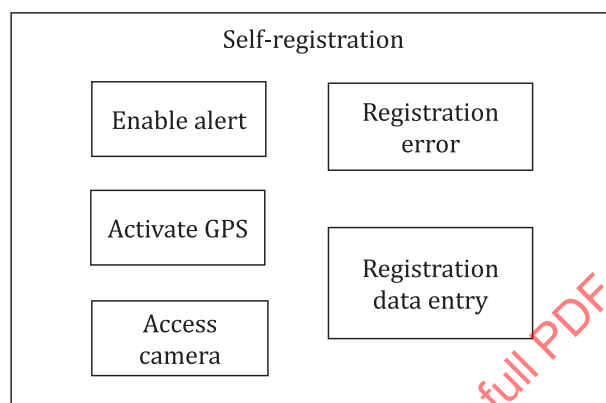


Figure 3 — Function of Self-registration component of the self-symptom checker app

7.2.1 Self-registration component

7.2.1.1 Enable alert

The Enable alert sub-component is a required component. It asks the individual to turn on the alerting function. Alerts including sounds and icons can be included in alert messages. The individual should be able to configure this feature as he/she sees fit. An example screenshot for the sub-component is shown in [Figure 4](#).



Figure 4 — Enable alert

7.2.1.2 Activate GPS

The Global Positioning System (GPS) is used in the optional Activate GPS sub-component. It turns on the GPS service on the individual's device. [Figure 5](#) shows an example of the Activate GPS component for iOS and Android¹⁾ mobile phones.

1) iOS and Android are the trade names of products supplied by Apple Inc., and Google LLC, respectively. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of the product named. Equivalent products may be used if they can be shown to lead to the same results.

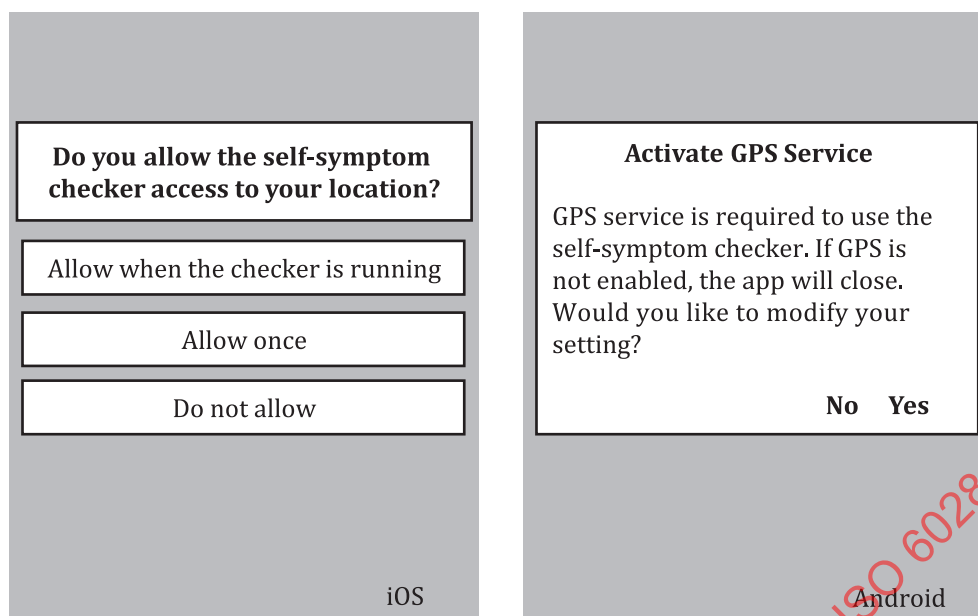


Figure 5 — Activate GPS

7.2.1.3 Access camera

The Access camera sub-component is a required component. It enables the individual to take a picture of his or her identification such as passport number, social insurance number (SIN) or social security number (SSN).

NOTE Local, regional or national guidelines on the use of personal information can apply. Entrants can opt not to use the app.

7.2.1.1 Registration error

The Registration error sub-component is a required component. It enforces the user data requirements pertinent to the streamlined use of the self-symptom checker app. Errors during registration can also occur when entered user data are not properly handled, as in a network connection error that occurs while GPS data are being transmitted to the server. When the required data elements, such as an identification number, are not entered by the individual, relevant registration error messages are issued to the individual.

7.2.1.5 Registration data entry

The Registration data entry sub-component has three sub-components (see [Figure 6](#)).

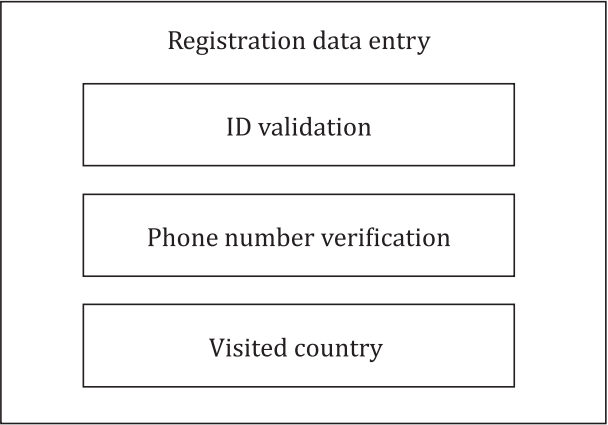


Figure 6 — Registration data entry component

7.2.1.5.1 ID validation

The ID validation sub-component is a required component. It validates user identification. Any unique identification can be employed, such as a SIN, a SSN or a passport number. If technology permits, one can choose to use a photocopy of the user ID card. Validating identification requires a level of integration with external databases such as a national identification database. Hence, it is not possible to validate the user identification number at the moment the individual enters it.

Figure 7 shows a typical flow of activities involved in validating identification. The server in the figure has access to the collection of identification numbers. The format and location of the collection is outside the scope of this document.

NOTE Local, regional or national guidelines on the use of personal information can apply.

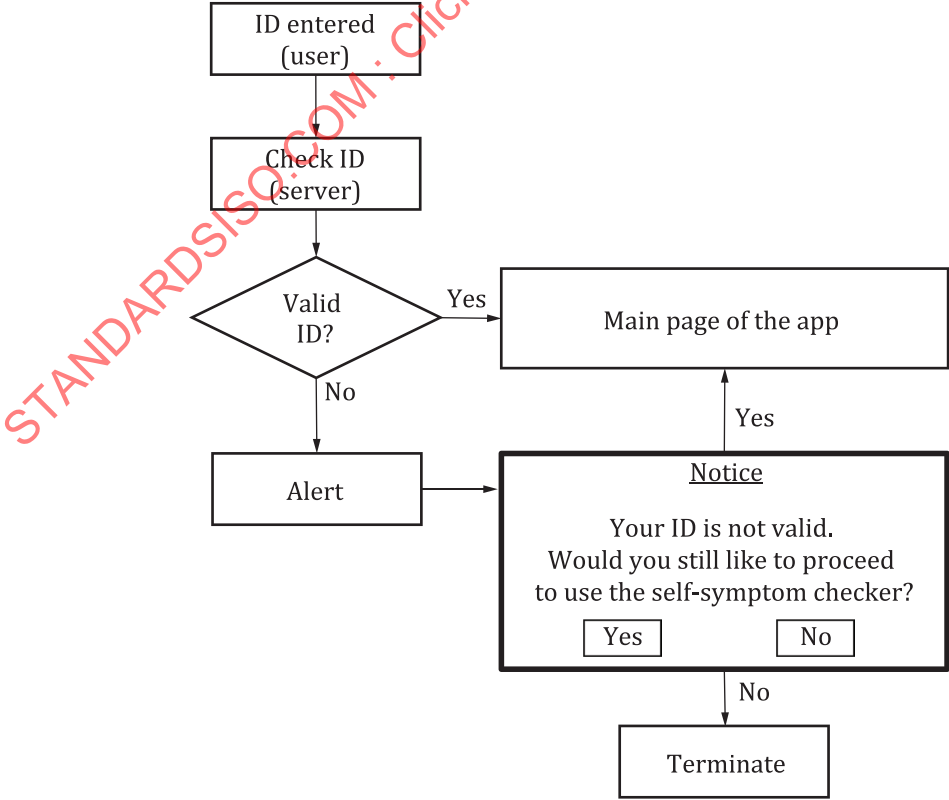


Figure 7 — ID validation

7.2.1.5.2 Phone number verification

The Phone number verification sub-component is a required component. It verifies the user-entered phone number by calling it using cellular network, if available.

7.2.1.5.3 Visited country

The Visited country sub-component is a requirement component. It enables the individual to choose from a list of countries the countries he/she has visited in the past 14 days prior to the entry. Multiple countries can be selected (see [Figure 8](#)).

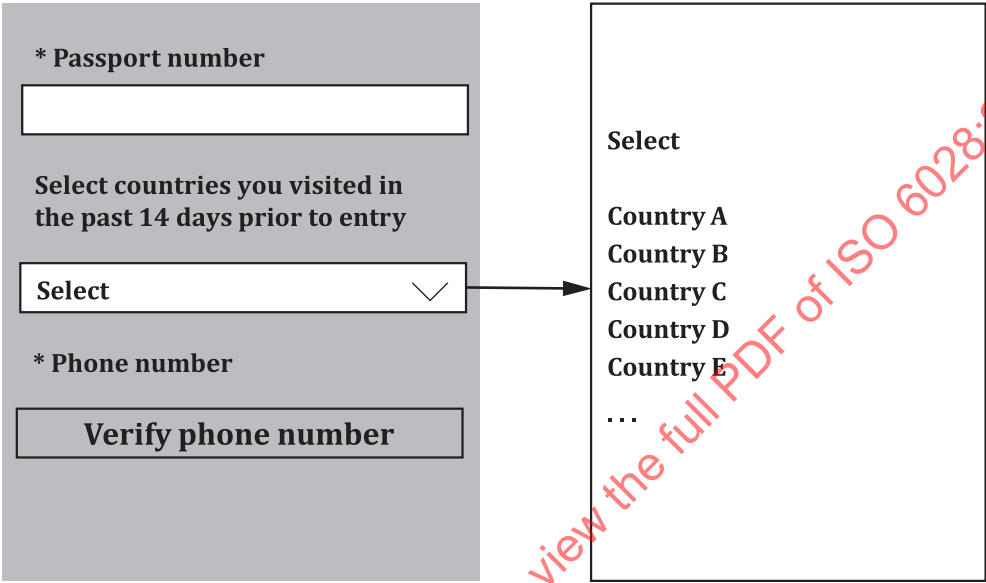


Figure 8 — Countries visited prior to entry

7.2.1.6 Data elements for Self-registration component

The minimum set of required and optional data elements for the Self-registration component are given in [Table 1](#).

NOTE Local, regional, or national guidelines on the use of personal information can apply.

Table 1 — Data elements for Self-registration

Element	Type	Status	Description
Identification number	String	Required	A unique identification number; for example, a passport number, a SIN, a SSN
Name	String	Required	Username
Phone number	Number	Required	Phone number
Address	String	Optional	Local address
Visited countries	String (list of countries)	Optional	Countries visited or lived in the past 00 days (e.g. 14 days) prior to registration

7.3 Symptom checking

The Symptom checking functional component (see [Figure 9](#)) is a requirement component. It provides capacity for the individual to record and report any symptoms related to the disease at hand. The symptoms used in this document are not exhaustive and thus can be extended or reduced as appropriate

for the disease. Four common symptoms are used in the document: fever, cough, sore throat and dyspnea (shortness of breath).

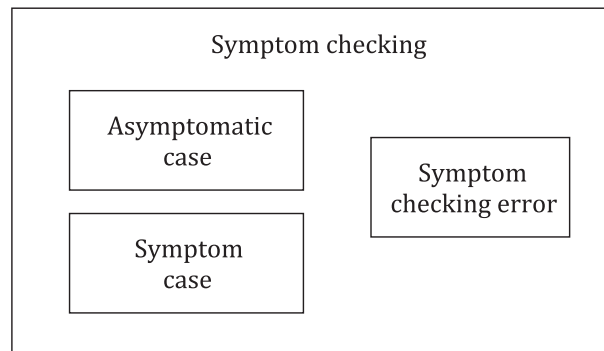


Figure 9 — Function of the Symptom checking component of the self-symptom checker app

7.3.1 Asymptomatic case

The Asymptomatic case sub-component is a required component. The individual can report that he/she has experienced no significant symptoms for the day, which is expressed by clicking the “No” buttons for each symptom (see [Figure 10](#)). Alternatively, the individual can opt to check the “No symptom” checkbox for the same effect. Symptoms evolve by gaining better understanding of the disease; hence, relevant symptoms to be used for should be in line with those published by international authorities, such as WHO or local government agencies.

Daily Symptom Check

Choose the symptoms, if any, you have experienced today

<No symptom>

Fever (XXX°C/XXX°F or higher)

YesNo

Cough

YesNo

Sore throat

YesNo

Shortness of breath

YesNo

Submit

Your symptom report for today has been submitted.

OK

Figure 10 — Asymptomatic case

7.3.2 Symptom case

The Symptom case sub-component is a required component. It is used to record and report any exhibiting symptoms the individual has experienced for the day (see [Figure 11](#)) when symptoms are experienced, the individual is advised to call a help line, if available, to consult with health experts. The call function in the individual's device is activated when the individual presses the 'ok' button to make the call. If the help line is not available, the individual should be advised to consult the nearest health expert immediately.

NOTE Because clinical standards for temperature for infectious diseases vary, the temperature for fever is set to non-specific degrees in [Figure 11](#).

Daily Symptom Check

Choose the symptoms, if any, you have experienced today

<No symptom> ☐

Fever (XXX°C/XXX°F or higher)

Yes

No

Cough

Yes

No

Sore throat

Yes

No

Shortness of breath

Yes

No

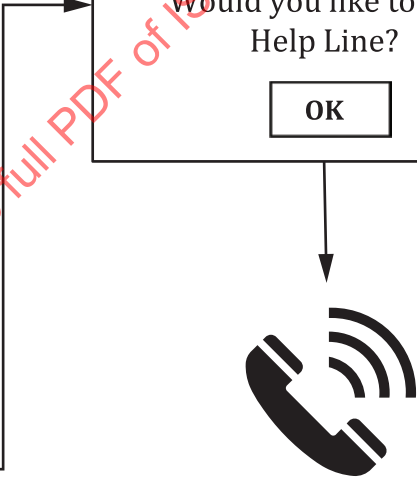
Submit

Notice

You have symptoms.
Would you like to call
Help Line?

OK





```
graph TD; A[Submit] --> B[Notice: You have symptoms. Would you like to call Help Line?]; B --> C[Phone Icon]
```

Figure 11 — Symptom case

7.3.3 Symptom checking error

The Symptom checking error sub-component is a required component. It checks the integrity and correctness of the data entered by the individual when the person uses the Symptom checking component. For example, it issues an alert message when the individual neither chooses a symptom nor checks off the “No symptom” checkbox.

7.3.4 Data elements for Symptom-checking component

The minimum set of required and optional data elements for the Symptom-checking component are given in [Table 2](#).

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Table 2 — Data elements for Symptom checking component

Example element	Type	Status	Description
fever	Boolean	Optional	A binary value of yes or no. When the temperature of the individual reaches over a specific temperature (e.g. 37,3 °C or higher), the value is set to yes; otherwise, no.
cough	Boolean	Optional	A binary of value of yes or no. When the individual experiences coughing, the value is set to yes; otherwise, no.
shortness_of_breath	Boolean	Optional	A binary value of yes or no. When the individual has trouble in breathing, the value is set to yes; otherwise, no.
sore_throat	Boolean	Optional	A binary value of yes or no. When the individual has a sore throat, the value is set to yes; otherwise, no.
no_symptom	Boolean	Optional	A binary value of yes or no. When the individual shows none of the symptoms (fever, cough, shortness of breath, and sore throat), the value is set to yes; otherwise, no. When the individual experiences any symptom, the default value of this element should be set to 'no'.

7.4 Guidance on screening stations

The Guidance on screening stations functional component is a recommended component. It uses the GPS (or any other positioning service available to the jurisdiction) service of the individual’s device to search and provides a list of nearby screening stations in operation (see [Figure 12](#)). The screening stations database holds available screening test sites in the country. The database is internally stored in the smartphone during installation of the self-symptom checker app and is to be updated whenever an update to the database is made. If information on the screening stations is not available, individuals should consult local health authorities for nearest screening stations.

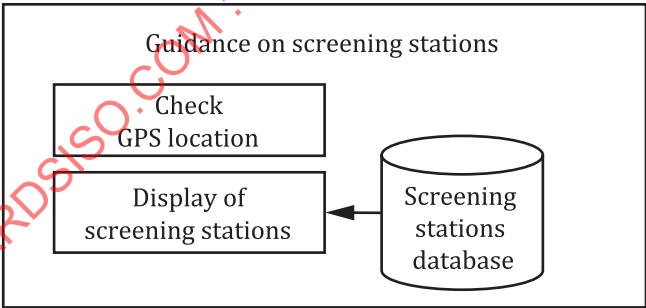


Figure 12 — Function of the Guidance on screening stations component of the self-symptom checker app

7.4.1 Check GPS location

The Check GPS location sub-component is an optional component. It activates the GPS service, or any other available positioning service, of the individual’s device and retrieves its current location.

7.4.2 Display of screening stations

The Display of screening stations sub-component is a required component. It retrieves a list of nearby screening stations. The individual can also search screening stations based on keyword(s) entered (see [Figure 13](#)).

Screening stations				
seoul Search List all				
#	City	District	Name	Tel
1	Seoul	Kangnam	Kangnam public health center	xx-xxxx-xxxx
2	Seoul	Kangnam	Samsung seoul hospital	xx-xxxx-xxxx
3	Seoul	Kangnam	Yeonsei severance hospital	xx-xxxx-xxxx

Figure 13 — Example of Display of screening stations

7.4.3 Data elements for Guidance on screening stations component

The minimum set of required and optional data elements for the Guidance on screening stations component are given in Table 3.

Table 3 — Data elements for Guidance on screening stations component

Element	Type	Status	Description
search_keyword	String	Optional	A search keyword to find screening stations.

7.5 Health consultation

7.5.1 General

The Health consultation functional component is a recommended one. It connects the individual to health experts online for consultation (see Figure 14). The communication methods vary depending on the technology available, ranging from messaging app, email or chatbot. The health experts should be trained professionals who are able to provide basic advice, pertinent to the management of the disease symptoms. If Health consultation service is not available, individuals should personally seek out help.



Figure 14 — Function of the Health consultation component of the self-symptom checker app

7.5.2 Application update

Application updates happen over the course of the lifetime of the self-symptom checker app. Installation of the latest version of the self-symptom checker app should incur no significant effect on the core

functionalities of the self-symptom checker app. There should be either a central or distributed server site where the self-symptom checker app is connected to the latest version of the application.

Figure 15 shows example activity flows in which smartphone-based self-symptom checker app is updated. The figure does not address any network errors that can occur during application updates, an issue that is not within the scope of this document.

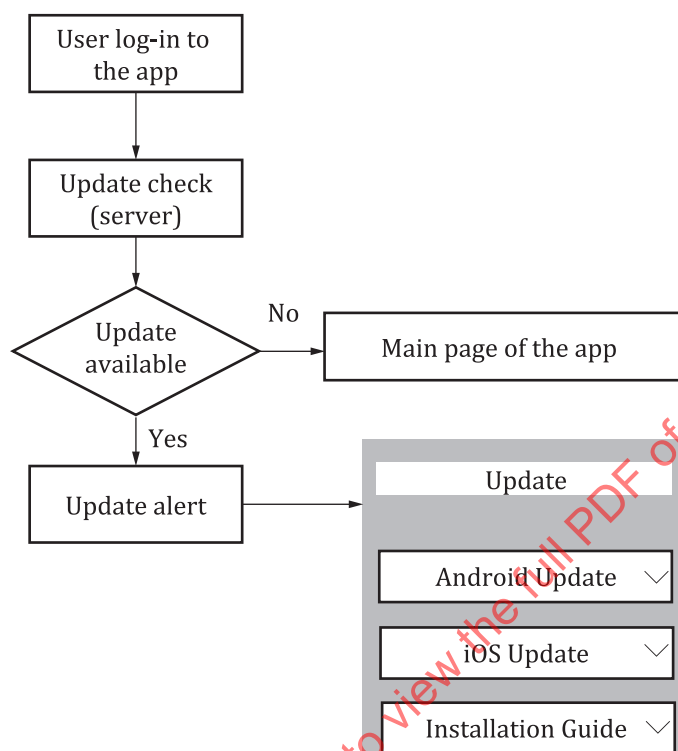


Figure 15 — Application update

7.6 Termination of the use of the self-symptom checker app

If the self-symptom checker app is used by an individual who is quarantined for a specific period due to local quarantine requirements (i.e. 14 days after entry into a country), the self-symptom checker app notifies the individual of the termination of the quarantine (see Figure 16).