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Information Systems 01PDWOV

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Books, notes are not allowed. Write only on these sheets.

Covid swabs on return from abroad

Travel within the Schengen area (that includes most EU countries plus some others) is free, as if this was a single nation. However, due to the Covid pandemic some restrictions have been applied by individual countries. For instance Italy requires citizens returning from some Schengen countries (ex Spain, Croatia, and others) to perform a Covid swab within 48 hours from entering Italy.
The swab can be made (free of charge) at the local ASL (Azienda Sanitaria Locale). In Italy health services are a responsibility of the regional government (20 regional governments, one per region). Each region divides its territory in areas, each is managed by one ASL. An ASL covers an area with 0,1 - 0,5 million people. Each citizen is enrolled in one (and only one) ASL and is taken care of by one base doctor.

AS IS process
The citizen fills in a paper form. The form contains data about the person (name, SSN, address, email, cell phone), the trip (origin of trip, date), and a signed commitment to do the Covid swab within 48 hours, and to remain quarantined until the result of the swab.

At arrival (airport, train station), the citizen delivers the paper form to an authority (the exact authority is not defined, could be border police, or a security agent).
In practice the paper form is not collected by anyone in many cases.

The citizen must contact her ASL and arrange an appointment for the swab. Normally each ASL publishes an email and a telephone number as contact point for this Covid swab service. By definition personal contacts (and therefore physical offices) must be avoided. Since the paper form has not been sent to the ASL, all data already written in the paper form is collected again.

At the defined time and date the citizen performs the swab. When the result is available the ASL emails the result to the citizen and to her base doctor. If the result of the swab is negative the process ends. If the result is positive the citizen is taken in charge by the base doctor, as the starting point of another process.

TO BE process
The process is as much as possible digital.
Constraints to be considered: each ASL has its own information system. The Ministry of Health has another information system that is connected to each ASL.

In the following model the TO BE situation.

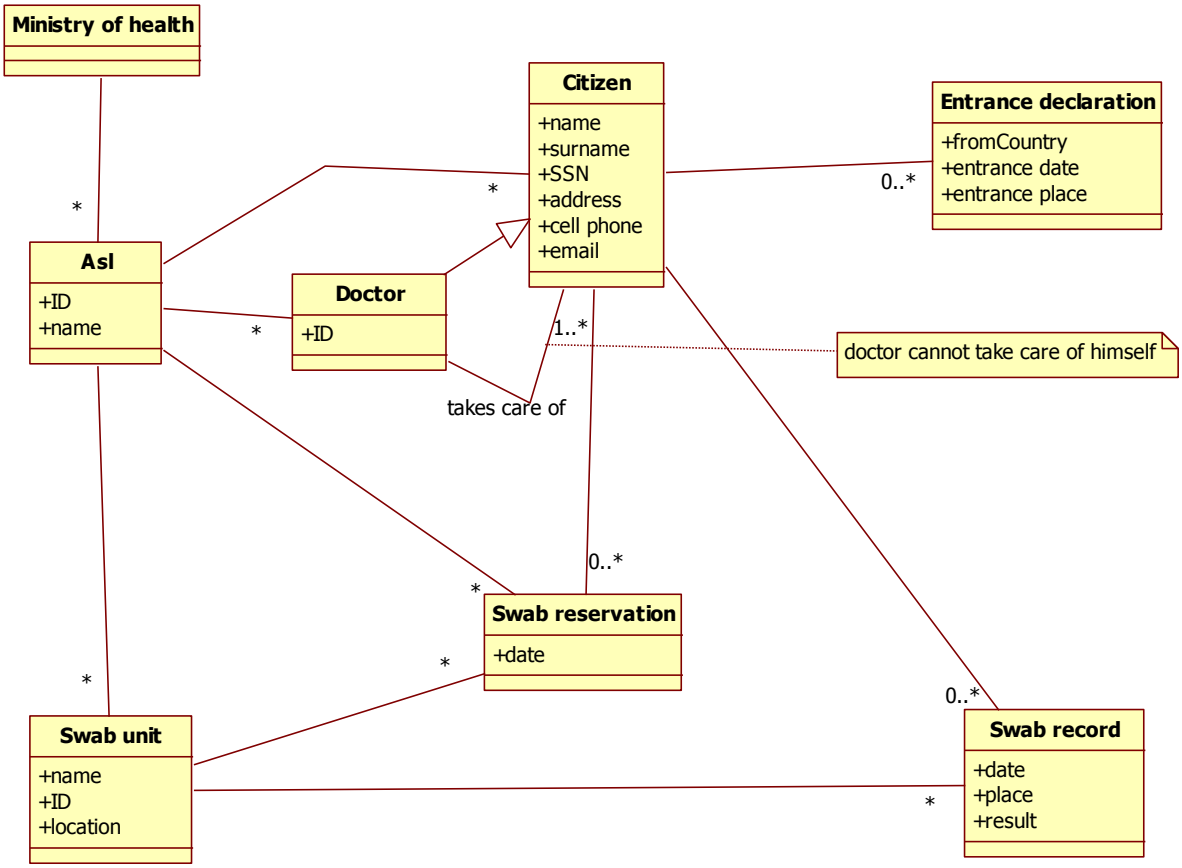
Citizen accesses web site of Ministry of health, and here fills the (digital) form. At the border the border authority can check, on the same web site, if the citizen has filled the form. The ministry sends citizen data to the relevant asl for the citizen. The asl contacts the citizen, sets up the appointment for the swab, performs the swab, sends results.
There is only one web site the citizen can access (no one per asl, or one per region). The ministry keeps access to all data (citizens entered, from which country, how many are positive, etc)

1 Organizational model: list roles or organizational units involved

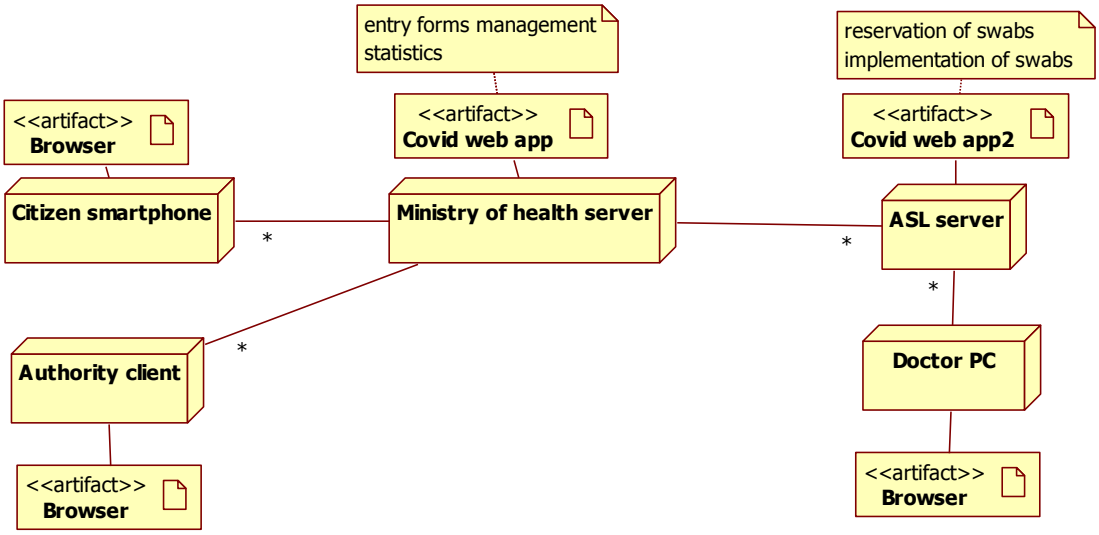
Ministry of health
ASL
    Base doctor
    Swab unit
Citizen
Border Authority

2 Functional model: Design and model (using BPMN + UML class diagram) the TO BE process

Process name	input	output	description
Entrance declaration		Entrance declaration (name, SSN, entry date, origin of trip, final destination, address)	Citizen declares his/her entrance in Italy from a Covid-risk country. Ministry of health receives the declaration, records it, and dispatches it to the relevant ASL
Declaration check	Citizen (name, ssn)	Check result	Border authority can check, when the citizen enters, if she has submitted the entrance declaration
Swab reservation	Entrance declaration	Swab reservation (date, hour, place)	The relevant ASL defines when and where the swab will be performed. The reservation is sent to the citizen and to the unit in charge of doing the swab
Swab execution	Citizen (name, SSN)	Swab (physical) Swab record (date, time)	An ASL unit performs the swab on the citizen
Swab analysis and result	Swab (physical) Swab record	Swab result	A lab analyzes the swab, and sends the result to the citizen, his/her base doctor, the ASL itself
Monitor			Ministry can check number of entrances, per country, and % of positive swabs per country of entrance / per ASL / per point of entrance, or else


Ministry of health
Citizen
+name
+surname
+SSN
+address
+cell phone
+email
Entrance declaration
+fromCountry
+entrance date
+entrance place
Asl
+ID
+name
Doctor
+ID
doctor cannot take care of himself
takes care of
Swab reservation
+date
Swab unit
+name
+ID
+location
Swab record
+date
+place
+result
*
0..*
1..*

3-a IT Model / Technological model: describe the hardware architecture of the system (use **UML deployment diagram**)



3-b Business rule: define (in English, or formally) at least one business rule for the process

Doctor cannot take care of himself

Citizen must perform swab within 48 hours from entrance

5 Define the KPIs, considering these high level business goals (or CSF), CSF1 limit spread of the virus, CSF2 reduce the overall cost of the process, CSF3 protect privacy of citizens
If needed, define also indicators that are not KPIs.

There are two high level processes, entrance from abroad, swab execution.

CSF name	KPI Category (General, cost ..)	KPI Name	KPI Description	Unit of measure
	General	N_entrance forms		
	service	LT_form	Lead time to complete entry form (citizen)	t
CSF2	Cost	C_form	Cost to handle a form (write + manage)	
CSF1	Quality	No_form	# entrances not declared /total entrances	%
	General	N_swabs (related to entries from covid risk country)		
CSF1	service	LT appointment	Lead time to obtain an appointment (citizen)	
CSF2	Cost	C_swab	Cost to manage a swab (ASL): define appointment, write result, communicate result	
CSF2	Cost	C_swab2	Cost to implement a swab ASL): effort of personnel to get sample, effort to elaborate sample, cost of chemical material, cost of machines and labs	
CSF1	Overall quality	N_swabs/ N_entrance forms	Should be 1, less than 1 means not all citizens entered do the swab	%

6 Compare the previous and the current situation, using the KPIs defined above

KPI	AS IS	TO BE
N_entrance forms	Not really controlled nor counted	Should increase
LT_form	manual	Computer based – could decrease
C_form	Zero (but nothing is controlled)	increases
N_swabs		Should increase
LT_appointment		May decrease (mostly depend on availability of personnel to do swabs, that is not impacted by the IS)
C_swab		May decrease
C_swab2		No change (does not depend on IS)
N_swabs/ N_entrance forms	Unknown, therefore uncontrollable	Known

7 Considering the ministry of health + ASLs and the infrastructure they have to build or acquire for the TO BE, define the software functions needed

Process /Activity	**Software function(s) needed**
	Create entrance form, check form
	Dispatch data to relevant ASL

8 Considering the comparison in point 6, summarize pros and cons for the actors in the TO BE situation

	PROS	CONS
Citizen	Faster form compilation, asl interaction	
Authority	Accurate control on entries	Cost of IS
ASL	Avoid entering citizen data (received by Ministry)	Cost of IS
Ministry of health	Accurate control on entries and swabs performed (N_swabs/ N_entrance forms is known)	Cost of IS

9 Consider the case of exercise 1. Analyze it applying the concepts of Agency theory.

Principal = Ministry of health, agent = citizen
Writing entry form is a bonding activity, controlling the forms at the border is a monitoring activity
Each asl transmits to ministry the swabs performed = bonding
Ministry controls data = monitoring

10 Describe the ‘Conway’s Law’ and its application to Information systems

11 Describe the differences between ‘time and material’ and ‘fixed price’ market transactions

12 Describe the high level software functions offered by an ERP

13 Describe the multi sided business model, and provide an example of it