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## Information Systems 01PDWOV

14 February 2023

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

### *Vehicle ticket*

Vehicles (cars, motorcycles) are subject to tickets for violations of traffic rules. The ticket is always issued by a public authority (traffic police, urban police, 'Carabinieri' and possibly others). The violation sometimes is captured by a device (ex speed limit check on a highway, entrance in a prohibited zone of a city, red light crossing, etc), sometimes in person by an officer. We analyze here tickets originating by a device.

### AS IS process

The device takes a picture of the vehicle and for each violation creates a file containing the picture and all relevant data (date and time, location, speed of the car in case of speed violation, etc). An officer of the public authority is charged of analyzing the document, deciding if the case is actually a violation, if yes find the identity of the driver. This is made by using a service (web service) offered by the ministry of transport (given a vehicle tag return identity of the owner). The officer creates a ticket. The ticket is created using an application of the public authority, application capable of supporting the whole lifecycle of the ticket. Having created the ticket the officer prints a paper copy, and sends it to the owner of the vehicle, using certified snail mail ('raccomandata AR'). Certified snail mail is a service of the Post Office, that delivers a paper letter to a person at a certain address, and collects the signature of the addressee as a guarantee that the letter has been received. The signature (and the date of delivery) is returned to the sender. By law official communications by the public administration (such as a traffic ticket) must be delivered within 90 days of the event (traffic violation in this case), and delivery must be certified (as with certified mail). In case delivery of the letter failed, another procedure starts (we don't analyze it here).

When the owner of the vehicle receives the letter, several options are possible.

- The owner accepts all charges and pays the ticket. Payment must be made within 45 days from the reception of the ticket using a specific external channel (PagoPa, a service for processing payments to the public administration using credit cards) as explained in the ticket. The authority checks the payment, if the payment is received in time the ticket is closed. Otherwise the amount to be paid is increased and another procedure (let's not analyze it here) to collect the payment starts. Further, at ticket closing, the administration may have to detract points from the driving license of the driver (ex detract 10 points for red light crossing, 5 for speed limit, etc – each driver has an amount of points, ex 20, and when he reaches 0 points the driving license is retired). This is made using another web service of the Ministry of Transport.
- The owner of the vehicle is not the driver in charge of the violation. The owner must send back to the authority, using certified snail mail, a paper form with the identity of the driver, signed by the actual driver, along with copy of an ID of the driver. This is made to avoid frauds, such as indicating as driver a not existent person, or a person who was not actually driving. Apart this, the next steps are the same as in the previous case (payment, possibly points reduction, etc)
- The owner appeals the ticket. Within 45 days she has to send back (using certified snail mail) any available proof she did not do the violation, or else (claim that the device was

wrong or broken, claim that some part of the legal procedure was not correct, etc). Upon reception of the appeal the authority has 90 days to analyze it, and answer, either accepting it (this is notified to the owner of the vehicle by certified mail and the ticket is closed) or rejecting it (again this is notified via certified mail). In case of rejection the driver has to pay the ticket, with an increase of the fine. Here the procedure is the same as in the previous cases.

#### TO BE process

The process does not change, but paper is never used. Let's assume that every citizen has a PEC and a SPID account. PEC is certified email (email is sent, and the sender receives confirmation that the email has been delivered). SPID is a two factor identification service, provided by a third party authority (not the public administration). A web site (ex web site of Urban police of Torino) redirects a user to SPID, SPID authenticates the user, the user continues to use the initial website, the latter having certainty about the identity of the user.

Communications from the authority to the citizen are notified via PEC. The citizen, using SPID to identify himself, accesses a web site of the authority and here performs all needed operations (payment, appeal, communication of driver data). Avoid responses via PEC from the citizen to the public authority.

In the following model the TO BE situation. Consider only ONE authority (ex Urban police of Torino).

#### 1 Organizational model: list roles or organizational units involved

Urban police

Officer

Citizen / owner of car

Citizen / driver of car (in case is not the owner)

Ministry of Transport

PagoPA provider

Besides,

SPID authority

PEC provider

are service providers that provide horizontal services (not specific to this business process), that may optionally be considered as OU involved.

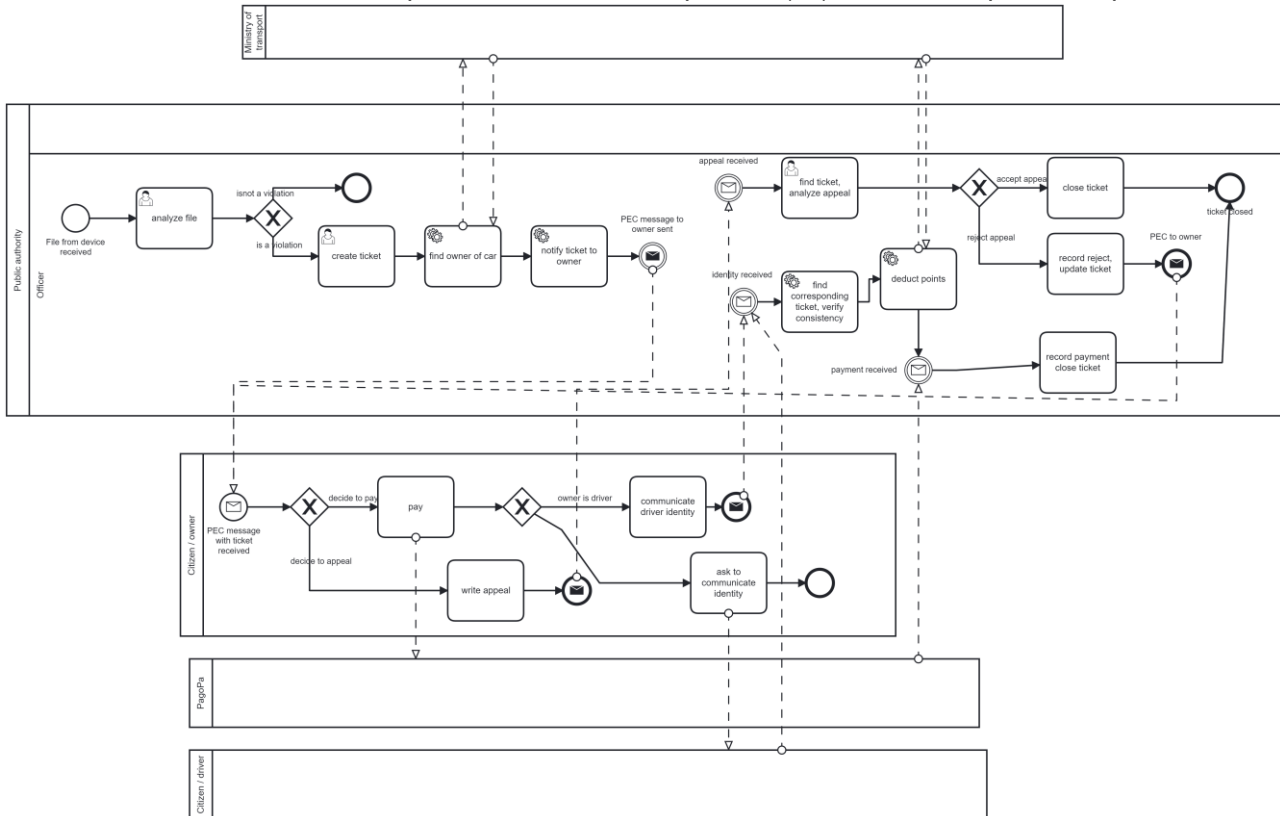
It is important to distinguish between owner and driver, since they not always correspond to the same citizen.

2aProcesses. List the key processes. For each process define name, input, output, description

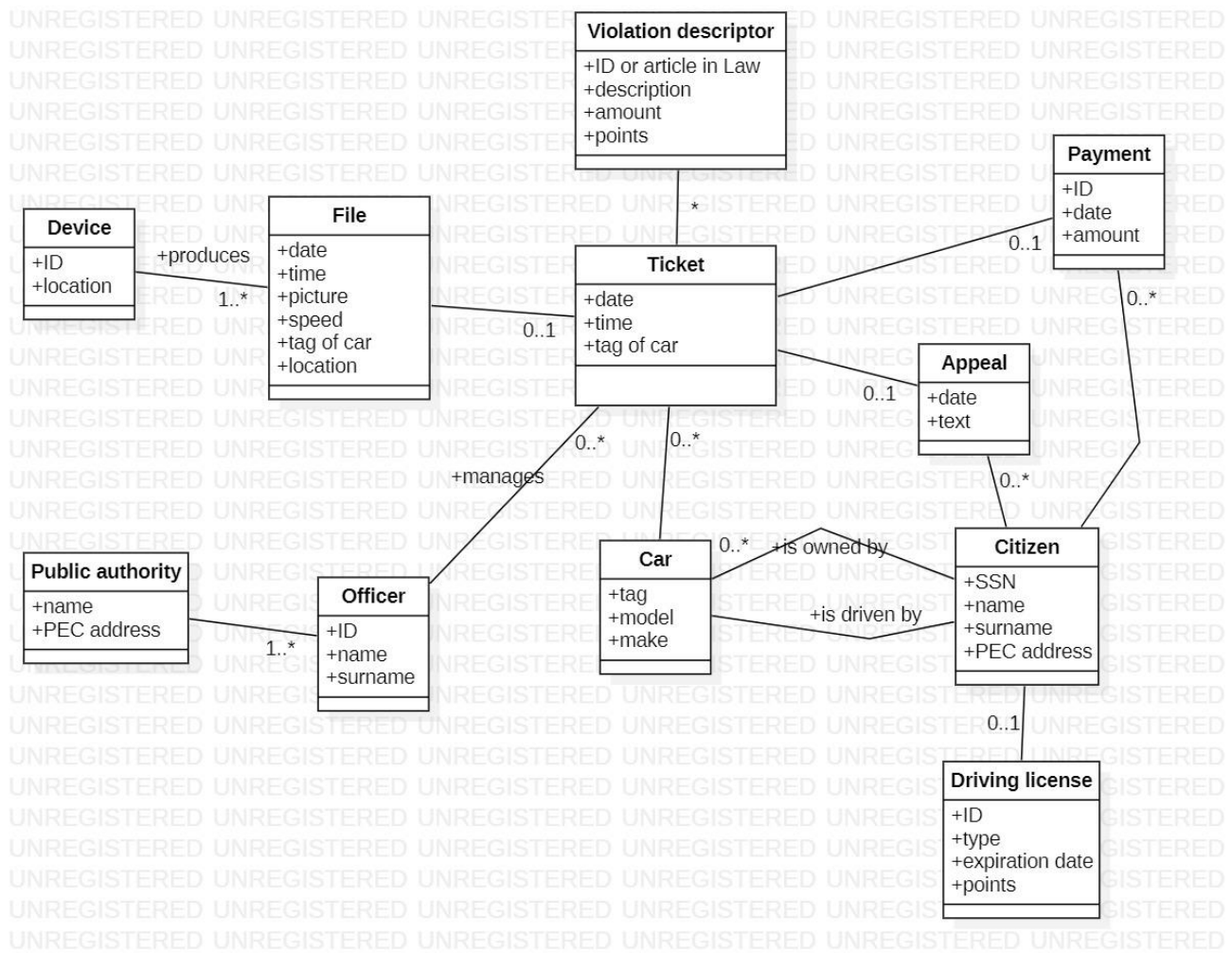
Process name	input	output	description	OU involved
Ticket issue	Traffic Violation event captured by device	Violation ticket sent to citizen/ owner of car	Device captures violation, officer receives and analyzes it, if actual violation ticket is officially created, officer finds owner of car and sends ticket to it via PEC	Urban police, Ministry of Transport (PEC provider)
Ticket payment or appeal	Violation ticket	Violation paid or rejected – ticket closed	Owner of car receives ticket, either pays (confirming she is the driver, or signaling who is the actual driver) or makes appeal. The officer, if ticket confirmed, detracts points from the driver and closes the ticket.	Urban police, Ministry of transport, citizen/owner, citizen/driver (SPID Authority, PagoPa)

There is **one** single process (Violation ticket management) that can be subdivided in two subprocesses. The two subprocesses happen in different points in time (due to the 45 days of time available to the citizen to pay or appeal) but are part of the same process (from violation event to ticket closed, either for payment or for successful appeal).

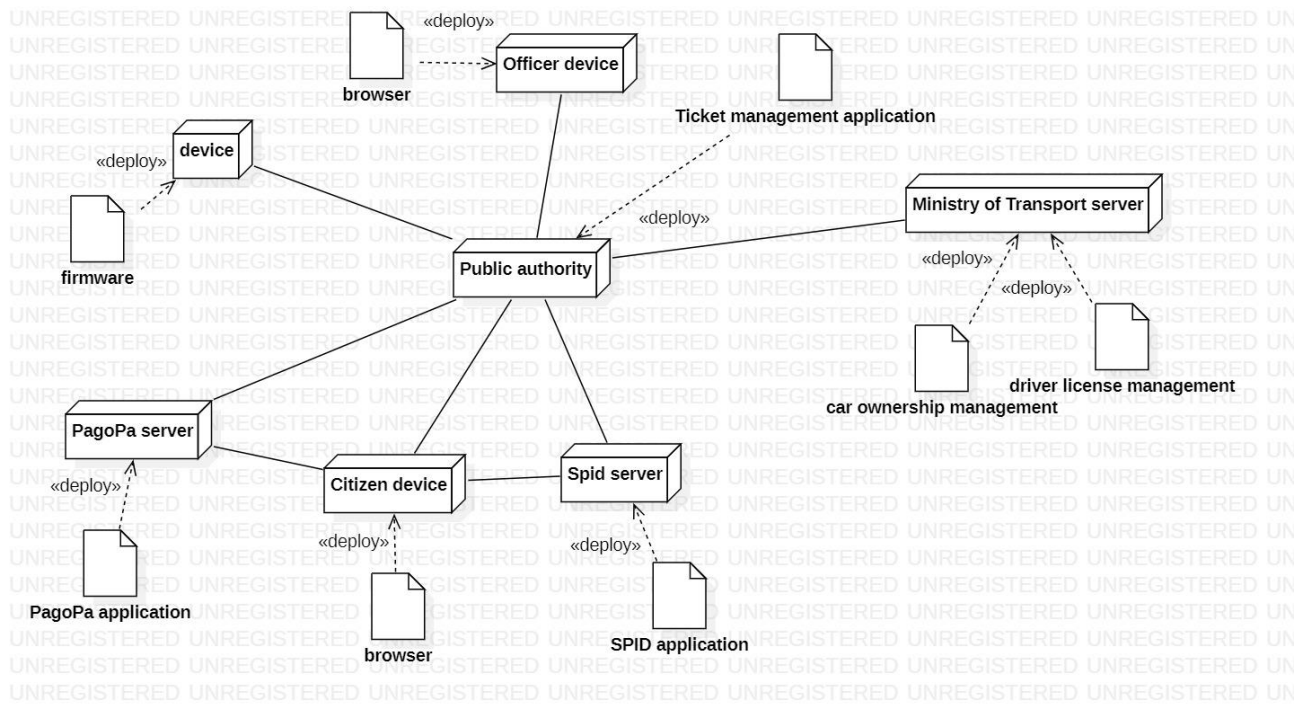
2b Processes. Define a BPMN process model for the process(es) listed in the previous question



2c Conceptual model. Describe key concepts and their relationships using UML class diagram



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

Citizen must Appeal within 45 days of reception of ticket

Citizen must pay ticket within 45 days of reception of ticket

Public authority must notify the violation within 90 days of the event

5 Define the KPIs, considering these high level business goals (or CSF), CSF1 maximum convenience for users (citizen, officers), CSF2 cost effectiveness for the public authority  
If needed, define also indicators that are not KPIs.

CSF name	KPI Category (General, cost ..)	KPI Name	KPI Description	Unit of measure
	General	NV	Number of violations detected by device per year	
		NT	Number of tickets issued per year NT < NV	
		NT_appeal	Out of NT, n tickets that generate an appeal	
		NE	Number of officers dedicated to the process	FTE
		R	Information resources to support the process (application to manage tickets and related hardware)	
CSF2	Service	LT	From violation detected (event 'file from device received') to ticket closed (event 'ticket closed')	Days
CSF2		LT_pre	From violation detected to PEC sent to owner of car (event 'file from device received' to event 'PEC message to owner sent')	Days
CSF2		LT_pay	From 'identity received' to 'ticket closed'	Days
CSF2		LT_appeal	From 'appeal received' to 'ticket closed'  Note: better to define two specific LTs for the second part of the process since the duration in case of appeal will be much longer	Days
CSF2	Efficiency	UC	Total cost / NT	Euro
		Total cost	Effort of officers * cost per hour + infrastructure cost (applications, hw) + communication cost (cost of snail mail, cost of PEC, cost of SPID )	Euro
CSF2, CSF1	Quality	Defectivity	#defects / NT Defects can be: time delay to send ticket not satisfied, wrong tag, wrong driver, wrong violation, wrong amount	
CSF1		Citizen satisfaction	Level of satisfaction of citizens about the process, to be collected via survey	

Since there is one overall process, one overall UC and LT is defined. Further, LTs are defined for the subprocesses (LT\_pay, LT\_pre, LT\_appeal) in order to control them specifically. In this case the difference between response time and lead time is generally huge, since long times (45 days, 90 days) are given by law to complete subprocesses.

Quality is considered from an internal point of view (defectivity) and an external one (citizen satisfaction)



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

KPI	AS IS	TO BE
NV		No change
NT		No change
NT_appeal		Possible decrease if defects decrease
NE		Possible decrease if defects and appeals decrease
LT		Should decrease, since all communications are digital, with delay zero (save 2-4 days for delivery of snail mail). However, much part of the overall process duration still depends on the citizen (45 days to pay)
LT_pre		No change
LT_appeal		No change
UC		Will change, depends on cost of new infrastructure
Defectivity		Should decrease, defects due to delays in ticket issuing and sending should decrease
Citizen satisfaction		Should increase, the procedure to pay and/or to communicate who is the driver is much more convenient

- 7 Considering the public authority and the infrastructure it has to build or acquire for the TO BE, define the software functions needed

Process /Activity	Software function(s) needed
<b>PUBLIC AUTHORITY side</b>	
Analyze file	Show file content (date, time, speed, location, associated picture, possibly tag recognized by computer vision)
Create ticket	Open ticket, insert data from file, insert violation, amount
Find owner of car	Interface with web service of MoT (given tag return owner description)
Notify ticket to owner	Notify owner (Interface with PEC service - create PEC message with ticket, insert email address, send)
Find ticket analyze appeal	Show appeal, find ticket given ticketId, find file attached to ticket, attach appeal to ticket, set decision about appeal
Record reject , update ticket	Write rejection report, attach to ticket, notify owner (interface with PEC service)
Close ticket	find ticket given ticketId, closeTicket
Find ticket verify consistency	find ticket given ticketId, attach driver description to ticket
Deduct points	Interface with web service of MoT (given citizen and driving license ID, deduce points from license)
Record payment	find ticket given ticketId, attach payment to ticket (Interface with PagoPa service), close ticket, notify owner (Interface with PEC service)
<b>CITIZEN side</b>	
Pay	Authenticate (Interface with SPID service) Find ticket, prepare payment for ticket, pay (Interface with PagoPa)
Write appeal	Authenticate (Interface with SPID service) Find ticket, write appeal for ticket, submit

- 8 Considering the comparison in point 6, summarize pros and cons for the actors in the TO BE situation (add actors if needed)

	PROS	CONS
PA	The digitalization of communications should reduce defectivity and LT	Investment in new IT infrastructure, training of officers
PA officer	Some routine actions are automated	Need to learn new technologies
Citizen	Satisfaction increases – all process can be done remotely, with more convenience	Digital divide, citizens who are not proficient with technology (SPID, PEC) are excluded SPID PEC have a yearly cost

9 What kind of change is the one described in the Vehicle Ticket case? (first, second, third order? – motivate your answer)

Second order, since the process does not change, only communications are digitalized. However people are impacted, both officers (who need some training on the new software functions) and citizens.

10 Mention a few types of value propositions, according to the BMC approach

See slides

11 Describe shortly the T Model of organizations

See slides

12 Describe pros and cons of having the IT area as a centralized staff function

See slides

13 Describe the difference between ‘time and material’ vs ‘fixed price’ models for market transactions

See slides