**SAP IoT Prototype Challenge**

### 1 The Story

Nowadays Police is involved in many tasks from parking fine to fight against terror attacks threat. Most of these tasks are time consuming and based on the police officer experience. For the road safety the recurrent tasks are speed control, insurance control, driving licence control and in my country: yearly safety visit for the car. For the speed control many equipment exists:

All this equipment are able to read the plate number of the car. In order to help the Police focusing on confirmed issues instead of controlling car randomly, the IoT application will consist of the following solution:

1. Plate number is scan
2. Plate number database is controlled. If plate does not exists alert is sended. No more control are done
3. Stole Car database is controlled, if car is recorded as stolen alert is sended
4. Last safety visit date is controlled, if too old alert is sended
5. Insurance central database is controlled, if the car has no known insurance alert is sended
6. Unpaid fine database is controlled if car has unpaid fine for a too long time alert is sended
7. Alert that are handle by a police car are no longer available to other car. Each police car has an alert pool corresponding to his neighbourhood and his area of action.

### 2 The point of view

As an experienced police officer, I know that on the streets of **my city** there is many problems with cars like unpaid fines, no insurance drivers, ect... but there is no special mark on these car to recognize them. I know I’ve got works to do but I can’t find it....

“As an experienced police officer, I need a way to identify offending cars in order to improve safety in the streets and my efficiency.”
3 The Persona

Name: Rosco P Coltrane

Background: 5 years of experience in city police. Now patrol along and try to improve road safety.

Job Title / Role: Urban Patroler

"For me, I would like to..."

Be more efficient in the random control I made on driver and car.

MAIN GOALS
- Ensure best-practices are followed
- Correct performance less ABAP Code before first functional test
- Get QA checks before transports
- Improve efficiency of developers

PAIN POINTS
- Most of the time control are OK (not needed)
- Control takes too much times
- Finding a stolen car is a like a miracle

JOBS RESPONSIBILITIES

Main tasks and frequency:
- Speed control
- Car and driver document check
- Fine generation for driving and parking
- Help citizen find their way
- Overall safety and security in the streets

NEEDS
- A way to know which car I should control
- A way to prioritize my actions
- Simplicity

STAKEHOLDERS

Main persons in contact during work:
Drivers, Police station

4 The user Experience

<table>
<thead>
<tr>
<th>Actions</th>
<th>Go for Patrol</th>
<th>Find suitable place</th>
<th>Control car</th>
<th>Control an other car</th>
<th>Again And again</th>
<th>Find an Issue</th>
<th>Extend control</th>
<th>Check Stolen car database</th>
<th>End control</th>
<th>(sometimes) Arrest thief</th>
</tr>
</thead>
</table>

Mindset
- "Will it be a good or bad day ?"
- "Do not stay at the same places !"
- "Is there an issue?"
- "Let’s try again"
- "Did my job is usefull ?"
- "I did lost my work day !"
- "May be we find other issues"
- "Always have to wait to get info from this database"
- "This takes too much times"
- "He’s unlucky we find him"

Feeling

Touch P.

Patrol Car

Roads of the City

Car & Driver

Car & Driver

Car & Driver

Car & Driver

Fine Ticket

Driving licence

Insurance stamp

Radio or Computer

Driver Fine ticket(s)

Driver

5 Prototype

The prototype has been made using “build.me” and is available here:
https://standard.build.me/api/projects/e67fc276b9b8b0300cd35364/prototype/snapshot/latest/index.html#/14774764579046075_50
The UX is based on the master-detail template. The master view list all the surrounding car to chase. And the detail view contains the car’s offence (Insurance, stolen vehicle, ...)

Notes:
- Car icon should be replaced by truck icon (do not exists in build.me icon list)
- Number below the car icon should represented as “rating” like in the detail page.
- Offense level is “calculated” based on number of tab to show and fine amount
- Here all possible tabs are shown, but in most case only 1 or 2 or the following tabs are shown (“Stolen”, “Insurance”, “Safety”, “Fines”).

If the car has been stolen this tabs appears:

If the car has insurance issue this tabs appears:

Note: Number next to the “Insurance” icon is the number of month without insurance
If the car has a safety visit issue this tabs appears:

Note: Number next to the “safety” icon is the overdue number of month.

If car has unpaid fines this tabs appears:

Note: “Date” Column is a ID for the UI5 Control and is not displayed as a date. This should be the Date of the fine. Can’t be able to fix this.
If car has unpaid fines this tabs appears:

Note: the map should be interactive and use all possible room. Can’t fix this with the image I use.

User should use “Ignore” button to inform that he can’t handle this task. The car stay at “free” status. User will use “Chase” button when accepting the task and engaging the pursuit of the car. The car move to status “Hunted”.

Note: I was unable to drive status color from data. Because when I succeed the color is ok but the list control always display dots (as he was waiting for OData answer). But the Free status color should be green when alert is not too old, and yellow when quite old. Red color is reserved for status “hunted”. On hunted car the “Chase” button becomes “Join” to indicating the user that you are helping a colleague for the pursuite.

6 Evolutions

This solution could be improve with the following features:

1. “Doublette” detection
2. Vehicle log

I did not include in my version because they require more ressources (“doublette” detection) and change in most country law (Vehicle log)

6.1 “Doublette” detection

The “doublette” is a term used (in my country) where the plate number a car is used for another identical (model & color) car. This is often used to make some bank attack or other bad things. While checking the plate number you can’t
detect from outside or either during control (except if you’re checking the car chassis number). But you can detect this if you receive to message from the same plate number from 2 different site far from each other. In a other way you’ll keep for each vehicle the last spot and time it has been located. And when receiving a new one (location and time) you’ll calculate the average speed. If the speed is too high this is a “doublette”. So the message will be send to 2 different areas (and both vehicle must be engaged).

### 6.2 Vehicle log

Last terror attack in France involve vehicle (like in Nice). If vehicle check message send from the edge to the core to be checked is store in a hadoop store they could be queried (let’s say using HANA VORA) in order to know where vehicle has been spotted, days, weeks or months before it has been implicated in a terror attack. Currently such data storage is not authorized, but if it change in the future the solution could be adapted to store and retrieve this valuable information.

### 7 Core and Edge

Here is some calculation about the Core and Edge chalenge for this apps. This figure is for France (It could be the same for most of other european country but can’t be applied to the US).

The message is composed with :

1. Short ID of the Equipment (that will provide Geo localisation)
2. Timestamp
3. Plate number (around 10 chars)

So message size is some how 100 Chars long.

There is 39M vehicle in Vehicle database.

There is 3 to 5M vehicle per day on the road that might cross 3 to 5K equipments.

So ther should be around 30 to 50M of check perform per day, concentrated during time frame 8-10 and 17-19.

So expected 4M check per hour.

The risk/problem is that ther is a quite important number of vehicle so they can’t be deployed to the very edge (on equipement I mean).

The number of control is huge so it can’t be send to the core without have network trouble.

So their must have some computer at the frontier of the core and the edge that have a copy of all database used in order to handle 5% of the over all workload. Database replication must be provided in order to quickly update all database next to the edge from the one in the Core.

### 8 Thanks

Thanks for you time and your review. Please appologize for the english terms used here I guess they are not fully suitable, but I do not find better ones as English is not my mother language.