Politecnico di Torino

COLLEGIO DI INFORMATICA

Corso di Laurea Magistrale in Ingegneria Informatica

Traffic Penalties

Tickets

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Contents

Introduction

An italian city admnistration is an autonomous entity with specific tasks. It is involved in population businesses, local laws and environment management in order to guarantee a high level life and keeping citizens in safety.

In particular, we are going to talk about Udine's administration, a mid-size town located in the north-east of Italy.

In this report we will analyze many aspects of the organization, such as processes, roles and functional aspects. We will analyze in details two keys processes of this company: issuing of penalties and limited access zones management. Taking into account financial and human costs we will try to formulate an evolution of the system through the TO BE model. Finally we will propose a possible improvement of the TO BE infrastructure.

Chapter 1

Municipality of Udine
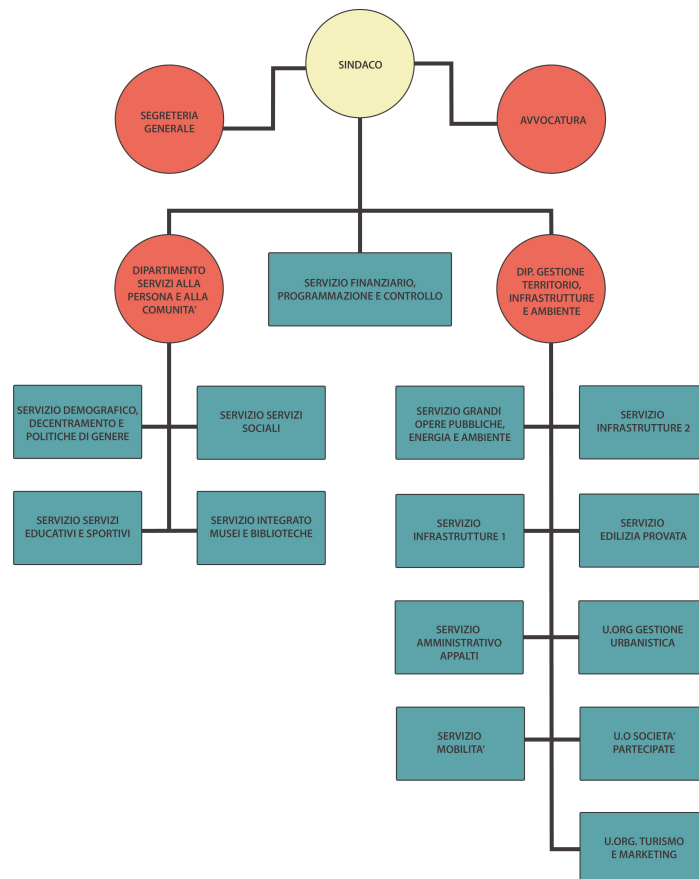
1.1 Municipality: the organization

Figure 1.1: Municipality: organizational structure

Any italian city follows the same organizational model, because it is defined according to the constitution chart. There is a council that, keeping reunions, takes decisions for each aspect of the social life. If this were an actual firm, the role of CEO would belong to the mayor, i.e. the head of the council and the one that puts the final sign in any decision. The council is composed by different assessors and each one has a specific role. For instance, there is the assessor involved in the public transportation management, another one involved in the education (schools, university, etc.) and so on. Figure 1.1 shows the organizational chart of Udine's municipality.

Website

1.2 Goal, Mission and Principles

As this is a public administration company, it's difficult to set it to a business domain. So, the management process is almost absent in this company.

1.2.1 Goals

Main goals of this company are:

- Culture: sport, education, turism, museums, cinemas

- Handle viability within the perimeter

- Ensure compliance with municipal ordinances

- Guarantee public order

- Improve services

An example of services could be traffic lights and road accidents management, roads maintenance and traffic penalties, that we are going to analyze in the next chapters.

1.2.2 Missions

- Parkings administration

- Traffic penalties management

- Roads maintenance

- Quick intervention in case of negative events

1.2.3 Principles

1.3 Size

1.3.1 Penalties issued

1.3.2 Employees

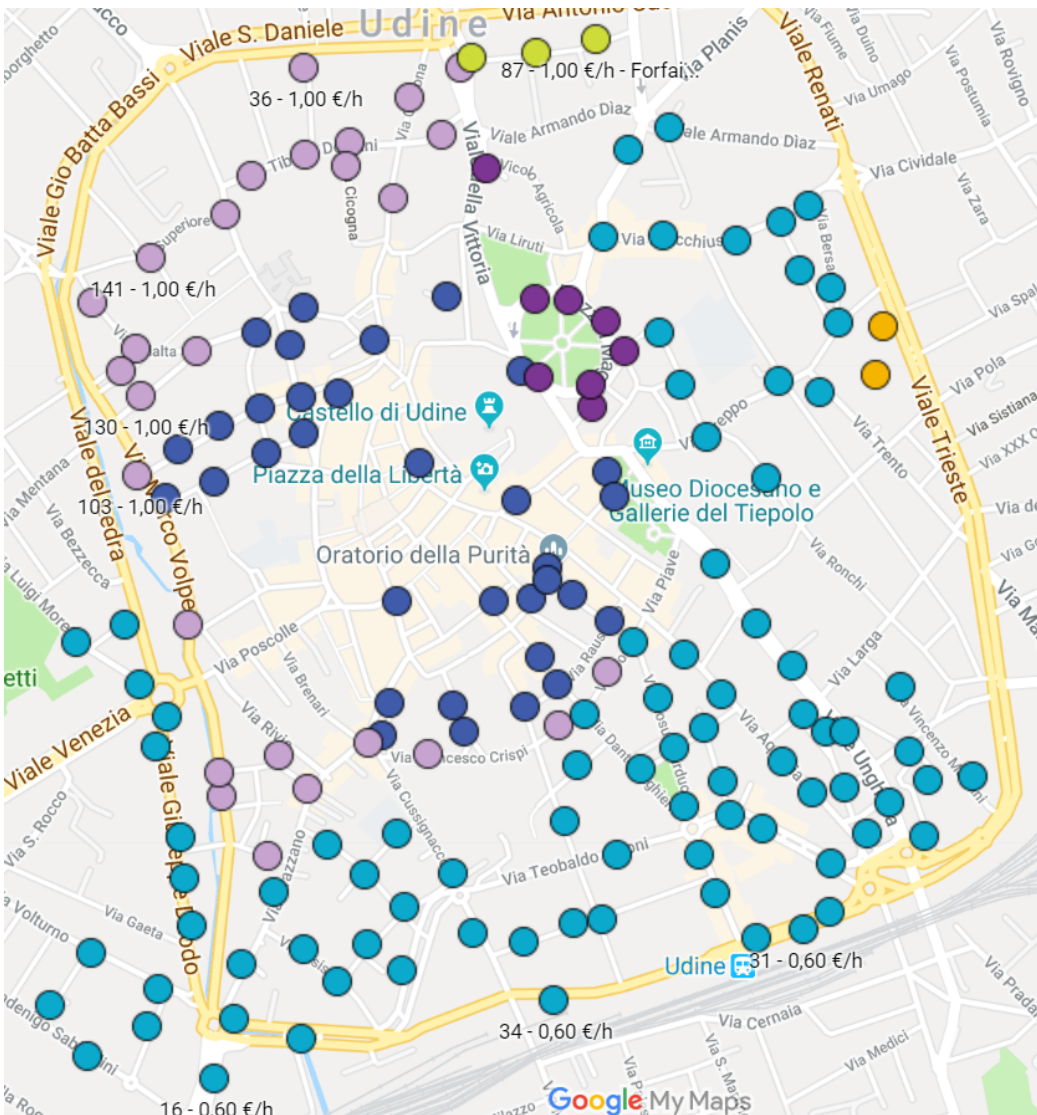### 1.3.3 Parking Area

Figure 1.2: Parking areas

1.3.4   Turnover

1.4   Culture and Politics

- Respect and protection of environment

- Social responsability

- Transparency

- Community centered

- Providing sense of safety to community

Chapter 2

Traffic Penalties management

Penalties are an important source of income for the municipality. They are issued by the police departement, that works for the municipality itself. During the 2015 police has issued 40,000 million of penalties, gaining around 3 million Euros, for both parking and access violations in some streets of the city.

2.1   Organization Type

Since this is a public administration, it is not so easy to assign a specific structure to it: we're analysing the police departement of Udine, not the general police departement, which is the same in the whole Italy. However this can be seen as a hybrid structure, because each departement is exactly replicated in any city and each one has the same tasks. Moreover offices are divided according to similar functions and skills.
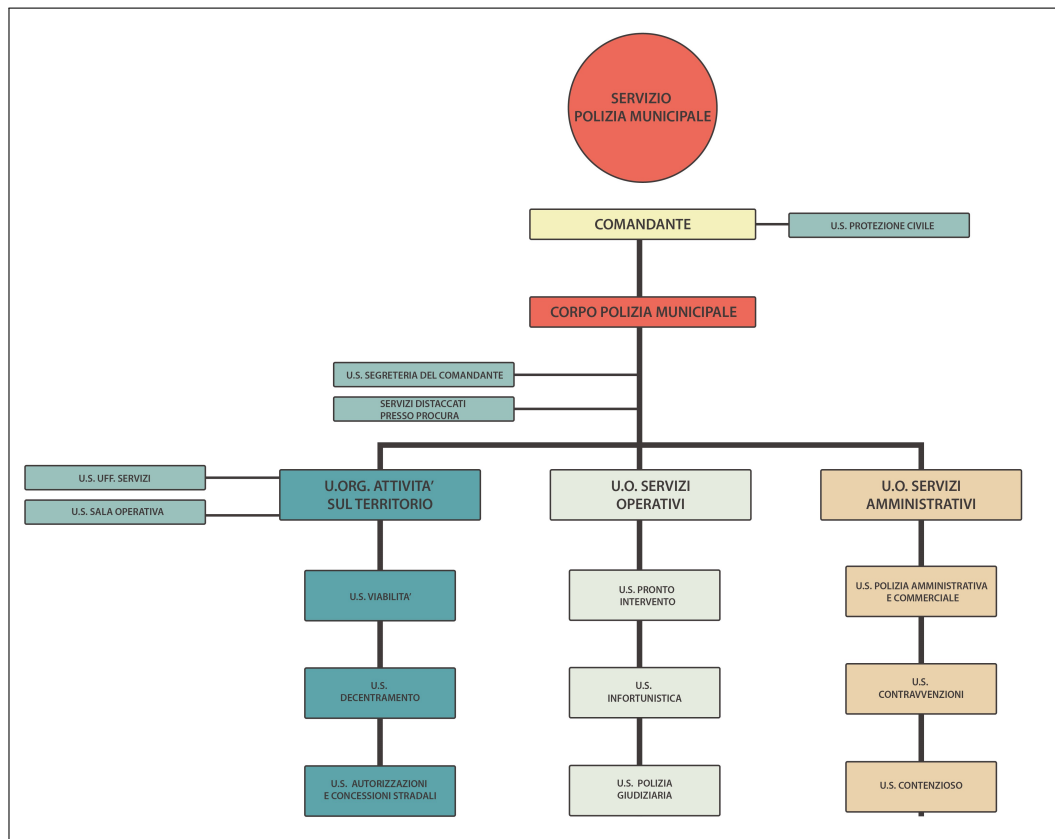Figure 2.1 shows the organization chart of the police departement, highlighting roles and tasks.

Figure 2.1: Police: organizational structure

2.2 Processes modeling

In this chapter we will describe the AS IS and TO BE model of the penalties processes.

2.2.1 AS IS

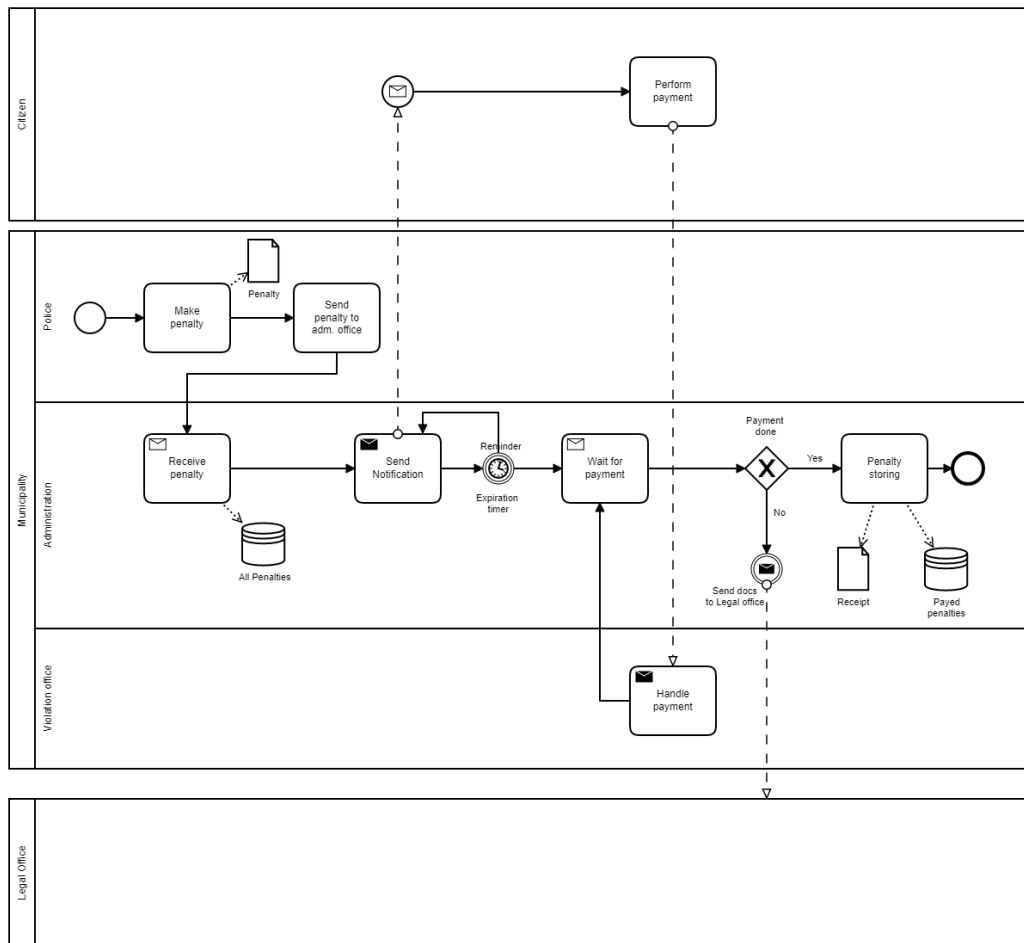Figure 2.2: bpmn AS IS

In the current situation the policeman makes a penalty by filling a paper report. Then, he delivers the paper to the administration office where the penalty is handled. This office sends a notification through postal service to the car owner and it has up to 60 days to pay the penalty at standard price. Over that time the price doubles. Payment has to be done at payment office.

Finally the administration office receives the payment, closes the penalty procedure and registers all files related to the penalty.
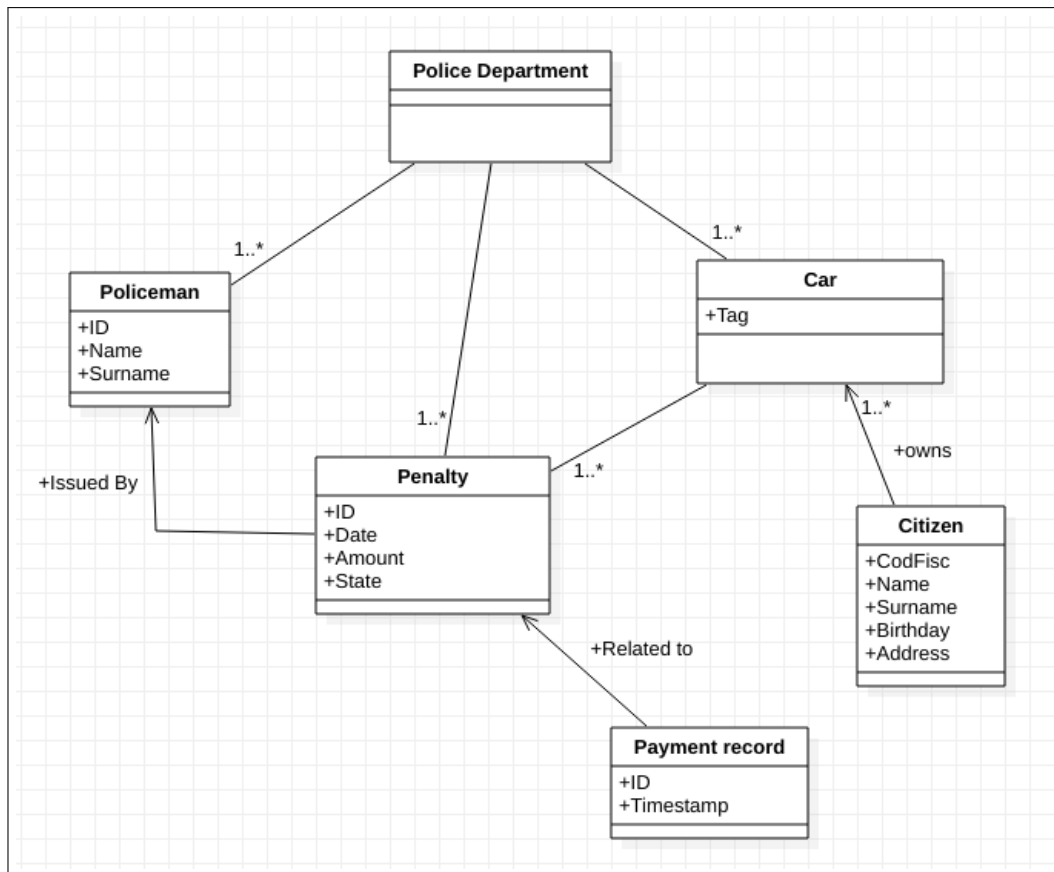

Figure 2.3: UML AS IS

2.2.2 TO BE
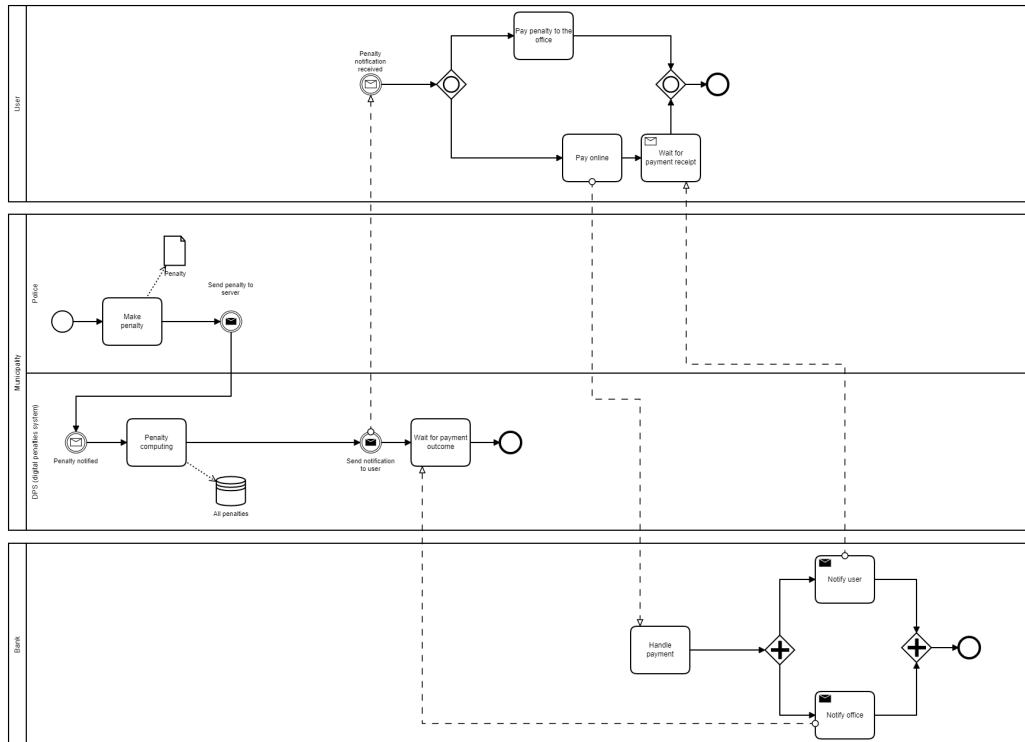
Figure 2.4: bpmn TO BE

The news system allows to make a penalty by taking a picture of the car tag
and filling the form to complete the report. Then, it is sent to the server of
municipality and automatically handled. The server also sends a notification
to the car owner who, in case he has downloaded the municipality's app
and created an account, receives a message on his own device. As before,
the payment time is limited to 60 days (standard price), otherwise the price
doubles. The payment is handled automically by payment system which
sends a digital receive to municipality system and the penalty files are stored
in the DB.

Figure 2.5: UML TO BE

Chapter 3

Comparison TO BE vs AS IS

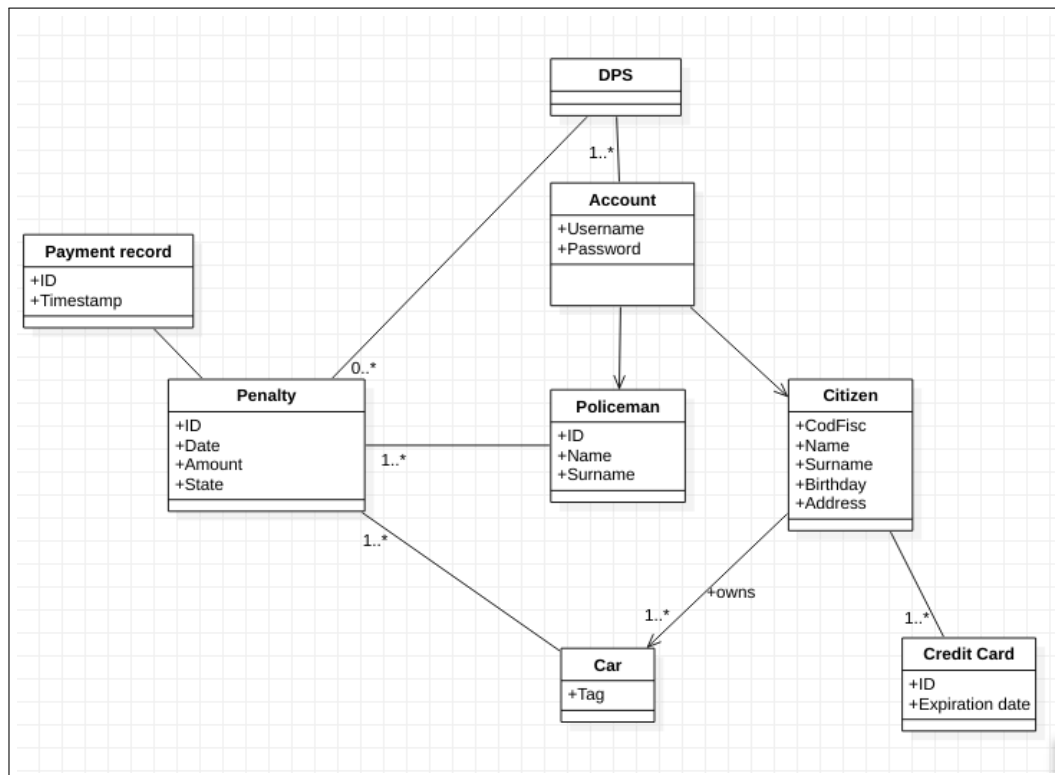In this chapter we will discuss about the differences between the old system and the new one, using tools such as KPI (definition of process key points), TCO (Total Cost of Ownership) and ROI (Returns On Investements). Finally we will decide if the new system is suitable for this company or not and propose some improvements.

3.1   KPI

KPI			
CATEGORY	**NAME**	**DESCRIPTION**	**UNIT OF MEASURE**
General	NP	# penalties per year	
	NPP	# penalties paid in time	
	NE	# employees (administration and policemen)	
	NPC	# penalties statute-barred (if it's not notified in 90 days)	
Efficiency	UC	Unit cost per employee per year (salary, maintenance, ..) / NE	€
Service	LT1	Lead time to make a penalty	t
	LT2	Lead time to perform payment	t
Quality	N_ERR1	# errors in filling penalty report / NP	%
	N_ERR2	# amministration errors (lost penalties, ...) / NP	%

Figure 3.1: KPI

KPIs evaluate the success of an organization or of a particular activity (such as projects, programs, products and other initiatives) in which it engages. They are useful a lot for comparing the AS IS and TO BE situations, because we can see the effect of the TO BE model on the indicators and take a decision.

3.2 Analysis AS IS vs TO BE

Analysis AS IS vs TO BE		
KPI	**AS IS**	**TO BE**
NP		same (it doesn't depend on the developed system)
NPP		may increase (easier user experience: online payment, notification, ...)
NE		may decrease (automatic penalties management system: some people could be fired, some people could be shifted)
NPC		may decrease (istantaneous notification of the penalty)
UC		may decrease (lower costs of utilities, such as toner, paper, ...)
LT1		decrease (policeman enters the penalty directly into the system)
LT2		should decrease (new aesier ways to pay: app, website, ...)
N_ERR1		may decrease (no signal, wrong gps signal, ...)
N_ERR2		decrease (automated system: it shouldn't make mistakes)

Figure 3.2: Analysis AS IS vs TO BE

Looking at the figure above, it is clear that the new system could improve a lot the management of the processes. However, before concluding that the system has a good impact we have to analyze economical aspects of the new model. We will see them in the next sections.

3.3 TCO

TCO	
PHASE	**COST**
Construction C	Cost of infrastructure, app development
Deployment D	Training of personnel, cost of deployment
Operations and Maintenance O + M	Infrastructure updates,infrastructure maintenances, payment of royalties
Dismissal DS	Uninstall of application, backups and data migration

Figure 3.3: TCO

3.4   ROI

ROI					
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Cost	C + D	-	-	-	-
Cost	-	O + M	O + M	O + M	O + M
Saving	-	$UC_{AsIs} - UC_{ToBe}$	$UC_{AsIs} - UC_{ToBe}$	$UC_{AsIs} - UC_{ToBe}$	$UC_{AsIs} - UC_{ToBe}$

Figure 3.4: ROI

The AS IS situation remains the same during the first year, because this time is used for development and deployment; so it's impossible to replace the old system until the new one is not ready.

Then, second year is used for personnel training and for testing if the system works properly. So, savings of two first years are negative due to the above reasons.

Finally, last 3 years should be charaterized by a positive saving value because during that time the new system will have fully replaced the old one. Speaking about the whole time period of 5 years, we can assume that the saving is positive, because all expenses related to administration costs (for instance the employees' salaries and offices maintenance) and material costs (paper, ink and so on) are avoided. New costs should be lower by using the new system.

$$TotalSavings = 4 * (UC_{ASIS} - UC_{TOBE}) - (C + D)$$

3.5   Conclusion and improvements

3.5.1   Final decision on new system

Since most of properties have improved we can conclude that the investement makes sense. In fact, even if the first operative years are characterized by costs greater than revenues, savings become important later and they justify the initial costs. Moreover, the TO BE model has a great impact also on human resources, because a lot of repetitive and risky works are substituted by an automatic system that guarantess efficiency, precision and a lower risk of failure.

3.5.2 Possible improvements

If the system works properly, it could be a good idea to improve some aspects of the infrastructure. Some of them could be:

- buying custom devices with custom firmware for each policeman. Doing so, company could adapt new features according to new needs;

- integrating other services of public administration, such as checking the validity of public transportation service, a more quick communication between policemen and so on;