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UNIVERSITY OF PIRAEUS

Optimization of a specific Greek Police Business Process, using Systemic Methodologies

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15th HSSS National & International conference

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Presentation Structure

- **Present Picture of the Problem**
  We trace the increase of Crime Rate, Justice Elasticity & Illegal Immigration
- **Systems Thinking**
  We present Greek Police as a "**System**" and we also trace the "**Problem**"
- **DCSYM Methodology - Business Process Management – VSM Model**
  We determine the process that must be optimized and we use specific tools to succeed it.
- **System Dynamics – Vensim PLe**
  We present a System Dynamics model, through which we will predict the behavior of Crime Rate, increasing the patrols by 20%.
- **Conclusions**
  The necessity of creating a new Department of studies and analyses, inside the Unified Coordination Center for Business & Crisis Management (ESKEDIK), for similar researches.

Present Picture of the Problem

- The amount of Thefts and Burglaries in Greece in 2016 was **74.181** and in 2017, **80.305**. That means that we had an **8% increase** in **Crime Rate** (Ministry of Citizen Protection,2017).

Γ.Α.Δ. ΑΤΤΙΚΗΣ	2016 ΕΓΚΛΗΜΑΤΑ			2017 ΕΓΚΛΗΜΑΤΑ		
	τελ/να	απόπειρες	εξιχνιάσεις	τελ/να	απόπειρες	εξιχνιάσεις
ΚΛΟΠΕΣ - ΔΙΑΡΡΗΞΕΙΣ	**43.270**	3.328	5.246	**43.715**	2.875	5.116
Από ΙΧΕ Αυτοκίνητα	11.303	1.171	719	12.431	1.083	762
Ιερών ναών	63	8	8	72	8	19
καταστημάτων	5.018	440	1.312	4.543	314	1.065
Κλοπές - Διαρρήξεις λοιπές	4.691	161	539	4.594	154	536
Κλοπές - Διαρρήξεις οικιών	12.793	1.497	2.129	12.809	1.258	1.327
Σε Συγκοινωνιακά Μέσα	2.677	4	136	2.761	9	912
Κλοπές με αρπαγές τσαντών	1.144	13	56	764	11	33
Σε δημόσιο χώρο-μικροκλοπές	5.581	34	347	5.741	38	462
ΚΛΟΠΕΣ ΤΡΟΧΟΦΟΡΩΝ	**16.319**	478	3.988	**19.714**	428	3.391
Κλοπές Τροχοφόρων ΙΧΕ Αυτοκινήτων	8.110	364	2.141	8.913	339	1.800
Κλοπές Τροχοφόρων ΙΧΦ	1.246	49	399	898	22	219
Κλοπές Τροχοφόρων Λοιπών οχημάτων	450	4	34	281	4	18
Κλοπές Τροχοφόρων Μοτοποδηλάτων	805	7	179	1.257	6	151
Κλοπές Τροχοφόρων Μοτοσυκλετών	5.708	54	1.235	8.365	57	1.203

Γ.Α.Δ. ΘΕΣΣΑΛΟΝΙΚΗΣ	2016 ΕΓΚΛΗΜΑΤΑ			2017 ΕΓΚΛΗΜΑΤΑ		
	τελ/να	απόπειρες	εξιχνιάσεις	τελ/να	απόπειρες	εξιχνιάσεις
ΚΛΟΠΕΣ - ΔΙΑΡΡΗΞΕΙΣ	**11.822**	874	1.508	**13.506**	923	1.702
Από ΙΧΕ Αυτοκίνητα	2.491	195	272	2.885	287	327
Ιερών ναών	40	13	19	37	8	31
καταστημάτων	1.724	226	478	1.463	191	425
Κλοπές - Διαρρήξεις λοιπές	1.334	103	206	1.260	117	194
Κλοπές - Διαρρήξεις οικιών	2.885	312	299	2.728	272	333
Σε Συγκοινωνιακά Μέσα	1.190	6	50	2.030	9	70
Κλοπές με αρπαγές τσαντών	169	4	17	90	2	12
Σε δημόσιο χώρο-μικροκλοπές	1.989	15	167	3.013	37	310
ΚΛΟΠΕΣ ΤΡΟΧΟΦΟΡΩΝ	**2.773**	55	1.709	**3.370**	58	1.309
Κλοπές Τροχοφόρων ΙΧΕ Αυτοκινήτων	1.229	36	785	1.265	33	591
Κλοπές Τροχοφόρων ΙΧΦ	523	13	293	438	6	203
Κλοπές Τροχοφόρων Λοιπών οχημάτων	29		9	37		4
Κλοπές Τροχοφόρων Μοτοποδηλάτων	199	1	174	337	6	150
Κλοπές Τροχοφόρων Μοτοσυκλετών	793	5	448	1.293	13	361

In 2016, there were:
74.181 Thefts & Burglaries

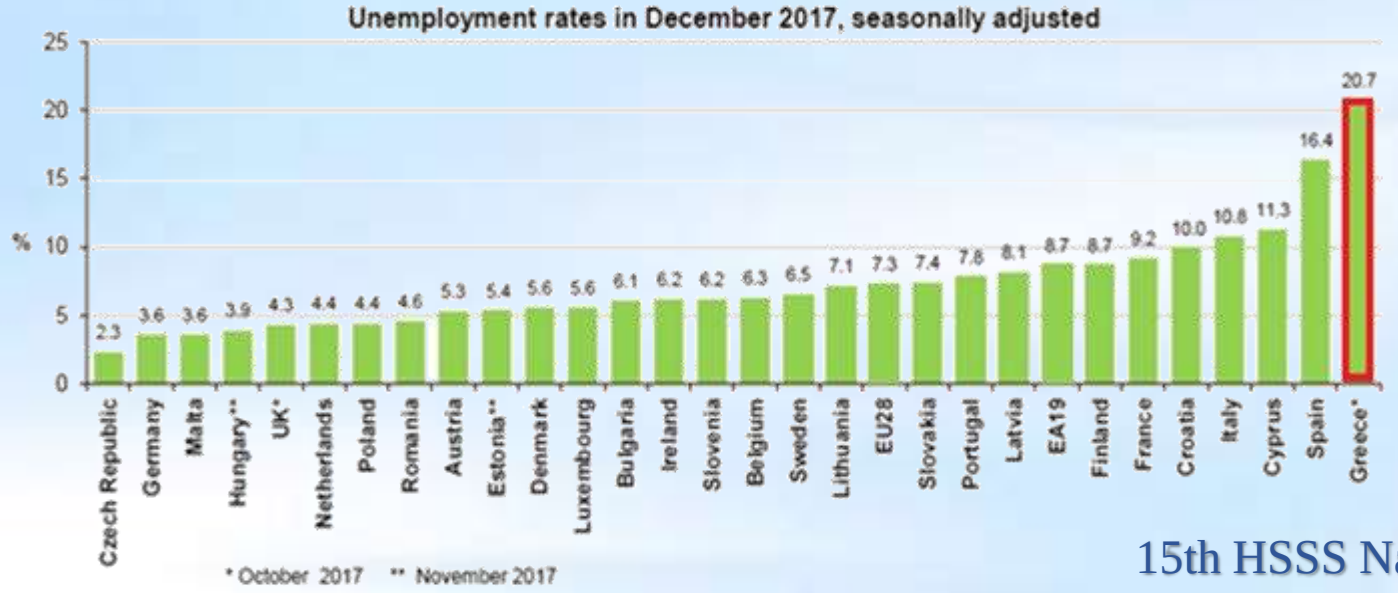
In 2017, there were:
80.305 Thefts & Burglaries

That means that we had:

$$1-\frac{80.305}{74.181} = 8\%\ \textbf{Increase}$$

Present Picture of the Problem

- Due to the **Law. 4354/2015** there was a decrease between **15% and 30%,** on the gross monthly salary, of a policeman. A fact which affects the **policemen efficiency and morality**.
- Also there was a **reduction in Government spending**, for the Ministry of Interior. The amount of 5.213.249.000 €, was splintered **on the Ministry of Citizen Protection** and for the Local Government Agencies (Municipalities etc).
- The **Unemployment** in Greece, climbed at **20.7%,** a fact which led a lot of people to the boundaries of poverty and misery. At the same time there has been an **increase** on the *human proposal of committing Thefts and/or Burglaries*.

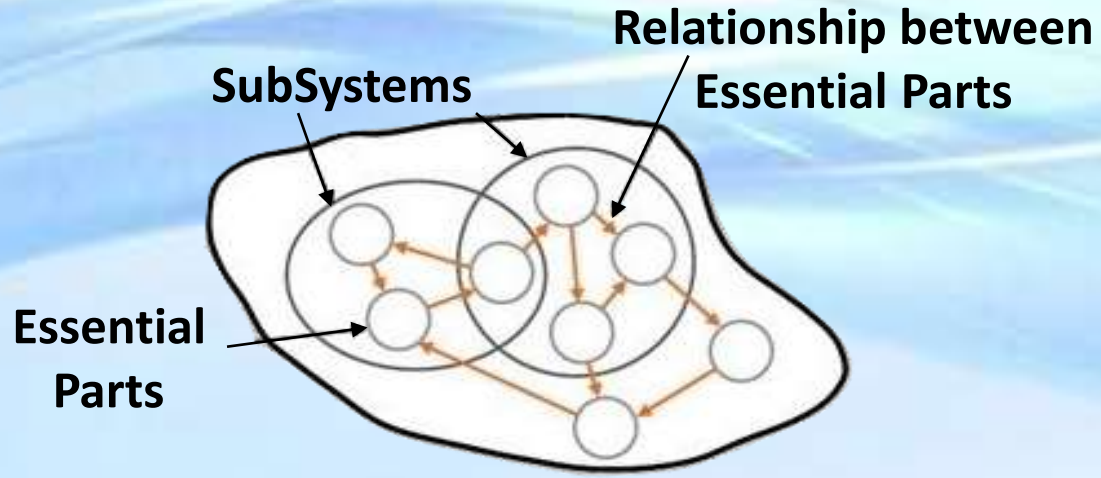


Present Picture of the Problem

- The total Greek prisons' capacity is at about **9.886** prisoners, and in 2017 there was a decrease from **121.4** prisoners to **97** prisoners **per 100 seats**. This reduction can be translated as "**Justice Elasticity**" (**75% increase**) especially in misdemeanours where the penalty is from 6 months to 2 years (Ministry of Citizen Protection,2017).
- The **Immigration** in Greece is at about **8%,** where the **6%** is for citizens from Non-Member Countries (Eurostat,2016).

Systems Thinking

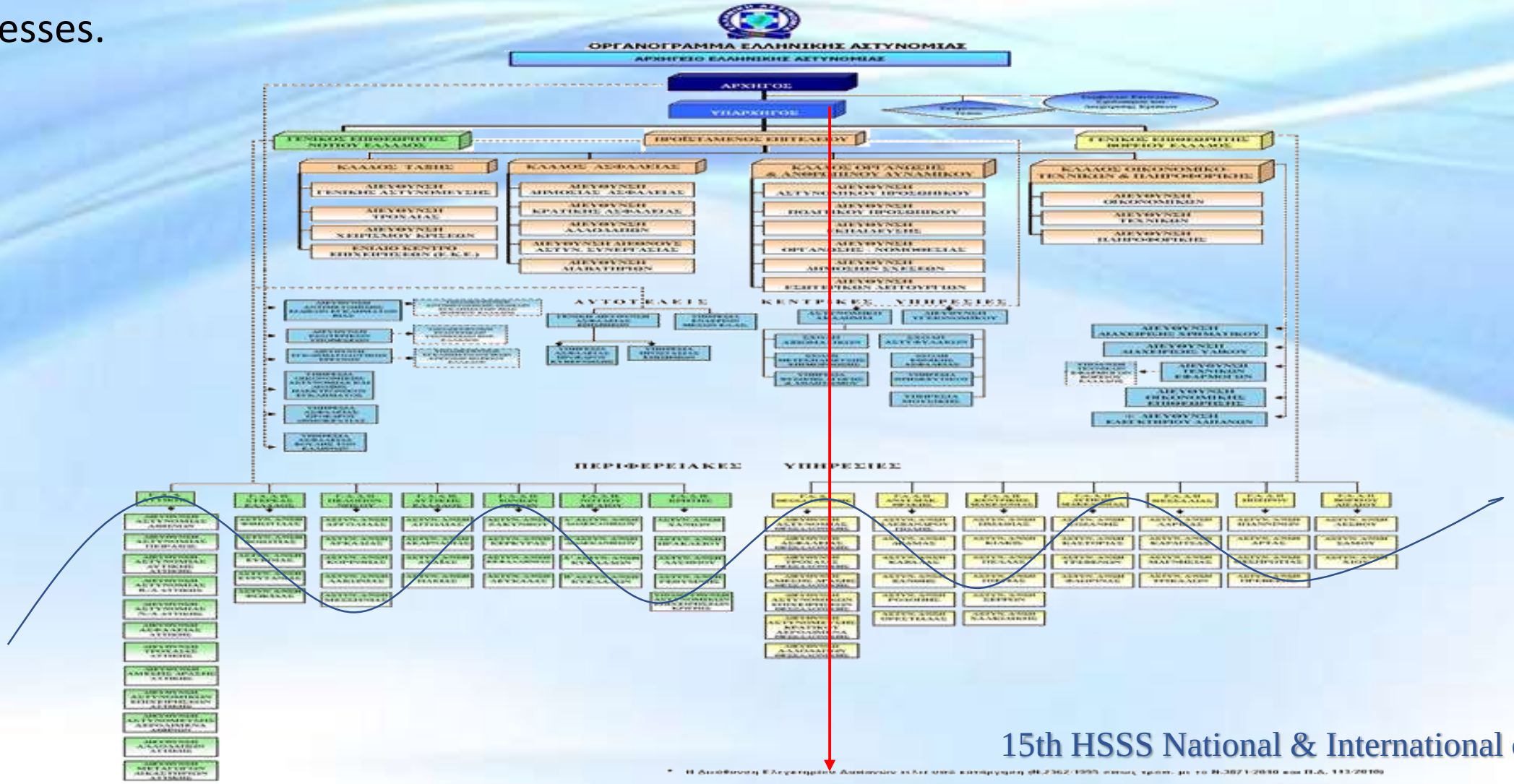
- **System** is a single set, which has one or more **defining functions** and consists of two or more **essential parts,** fulfilling three basic rules (Russell Ackoff,1981).



- The under study **System** is the **Greek Police,** where a **Problem** has been traced (The increase of Crime Rate)
- We call it "**Problem**" because the **Greek Police** doesn't fulfil its **Purpose of Existence** (Law 2800/2000): (1) to ensure Public Peace and Order (achieved by general police & traffic police), (2) the prevention and the repression of Crime, (3) the protection of the State & the Democratic constitution (achieved by the conduct of public and state security police).

Systems Thinking

- Although it has a **vertical structure**, there are a lot of **horizontal communications** between it's essential parts(departments), fact that causes daily conflicts & delays to the implementation of processes.



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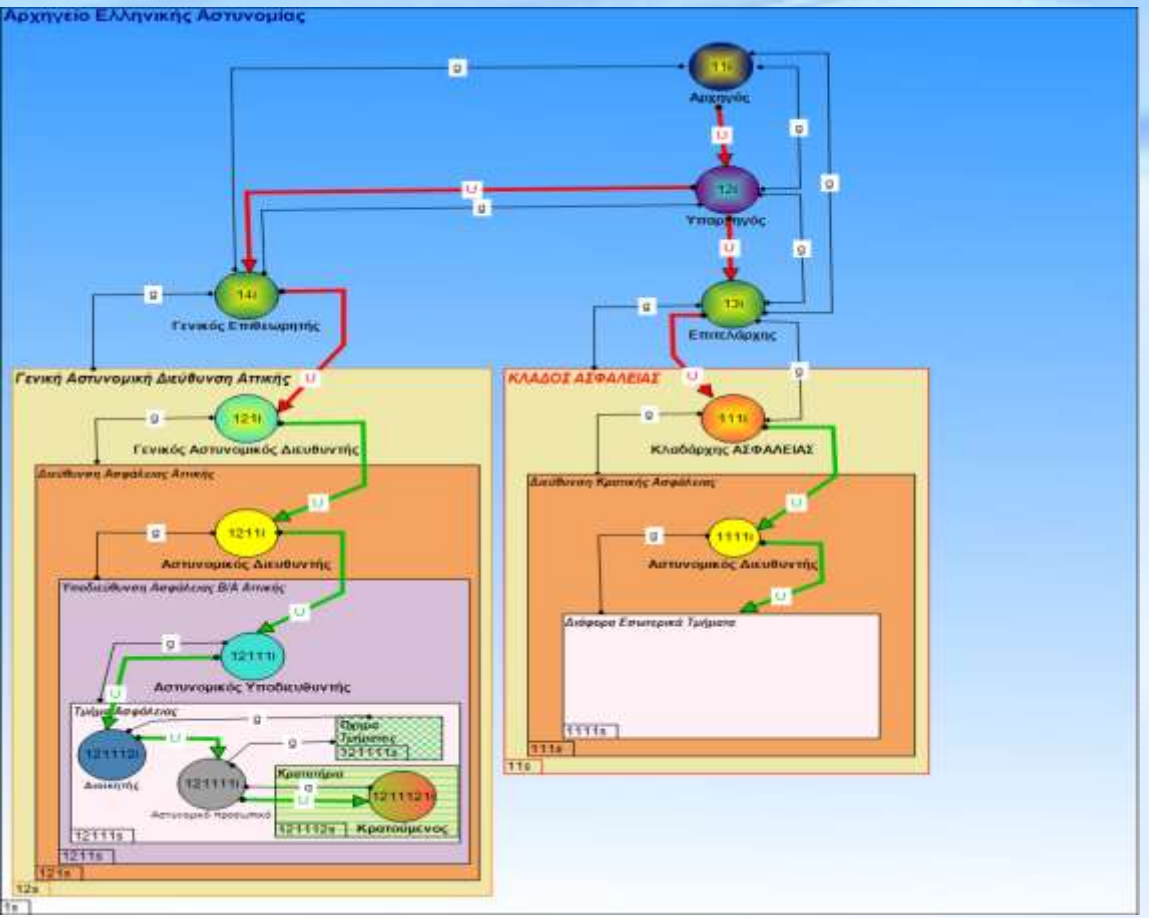
Systems Thinking

- We have focused our study on a single process: «**The arrest of a perpetrator who has committed a theft or a burglary and his referral to Justice** (Misdemeanors that are being punished with a penalty from 6 months up to 2 years according to new Law. 4619/2019)»
- We are going to present the today's form of this process and the reasons why it must be optimized as soon as possible.
- We will also calculate:(a) the amount of money that Greek Police could save, (b) the reduction of the total number of policemen who are responsible for those referrals and (c) the way that crime rate can be decreased from the increase of patrols (that are going to be created).
- Due to our focus, we will use the term «**Proposal committing Thefts & Burglaries»** instead of «Crime Rate».

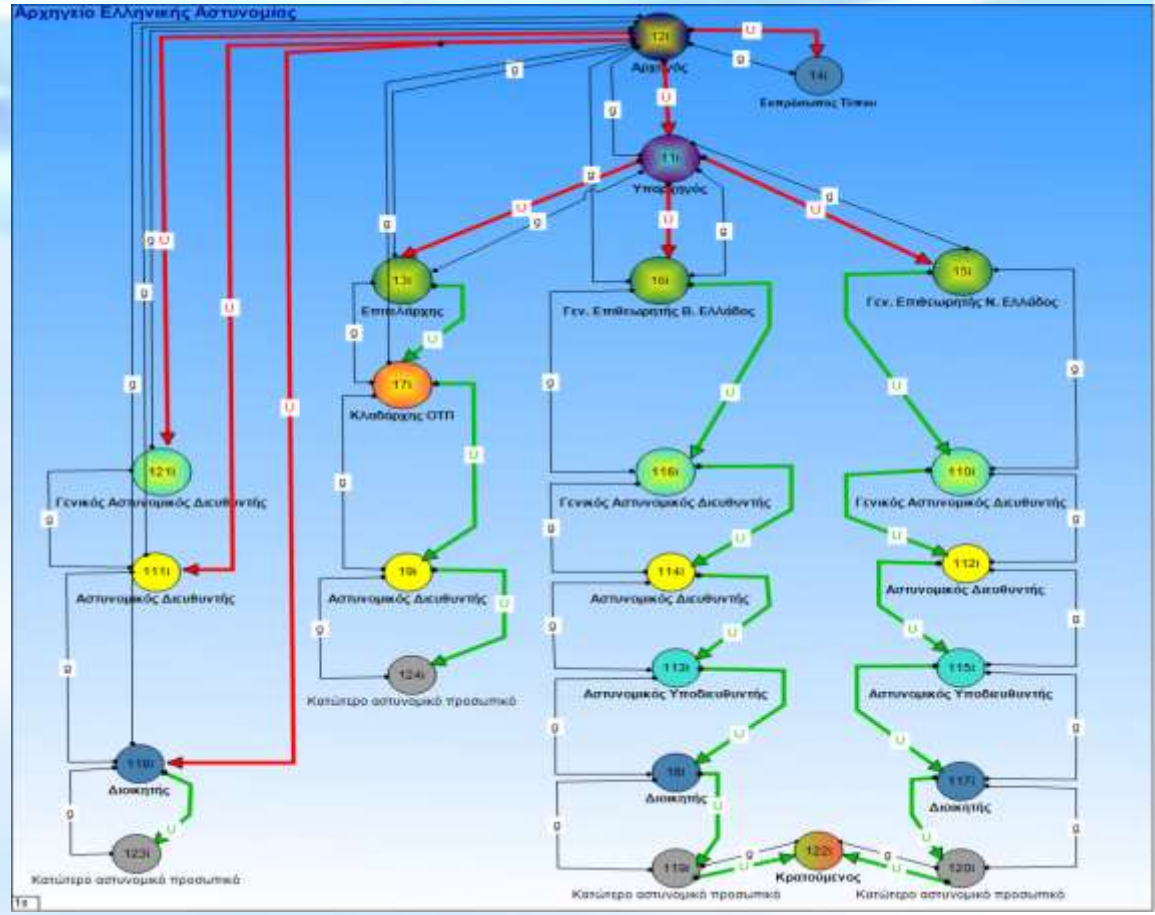
DCSYM Methodology – VSM Model
Business Process Management (BPM)

- We have used DCSYM Methodology to present the **structure** of the Greek Police, the possible **communications** and **controls** between different departments or/and individuals.

Structure

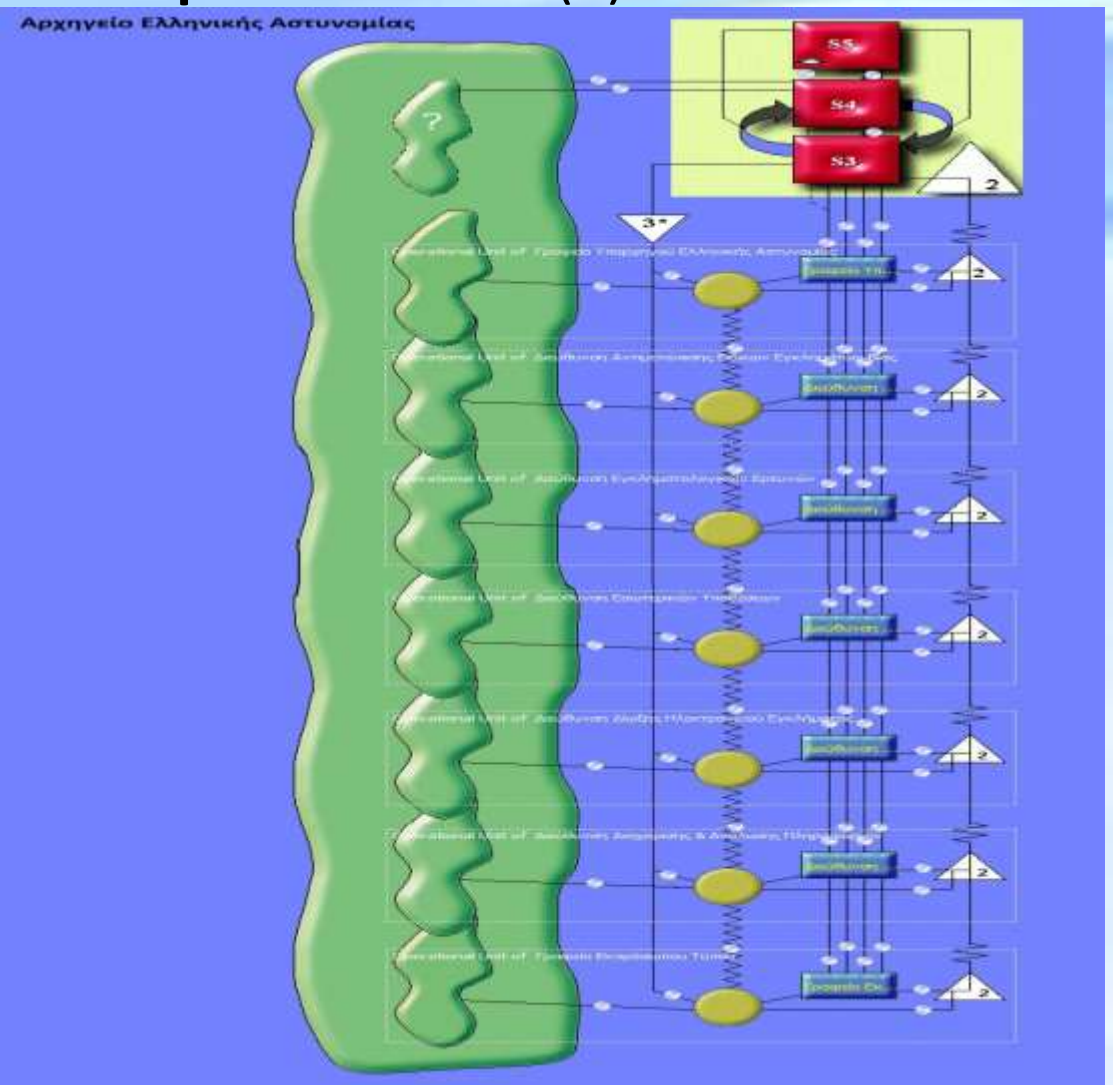


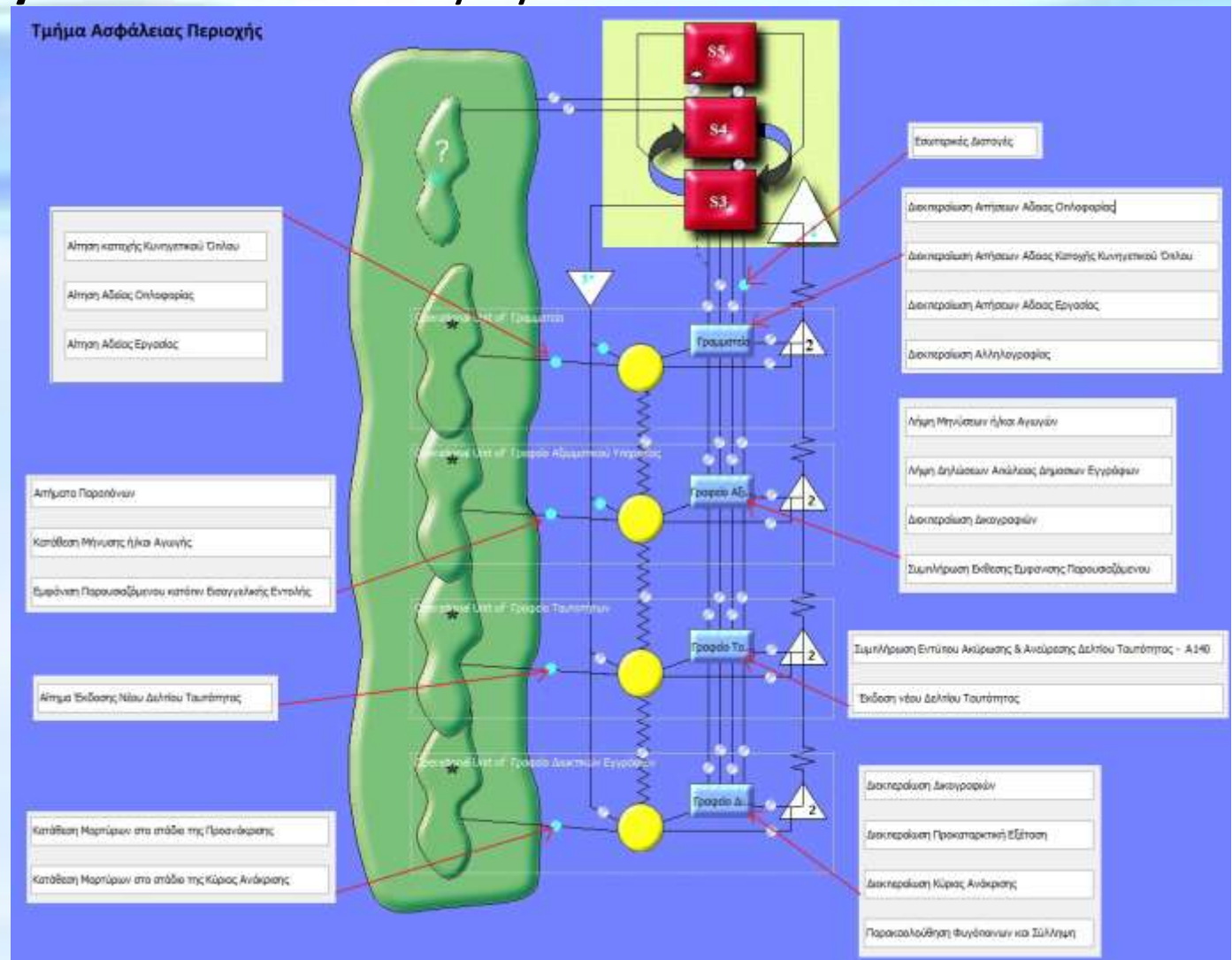
Communications & Controls



DCSYM Methodology – VSM Model
Business Process Management (BPM)

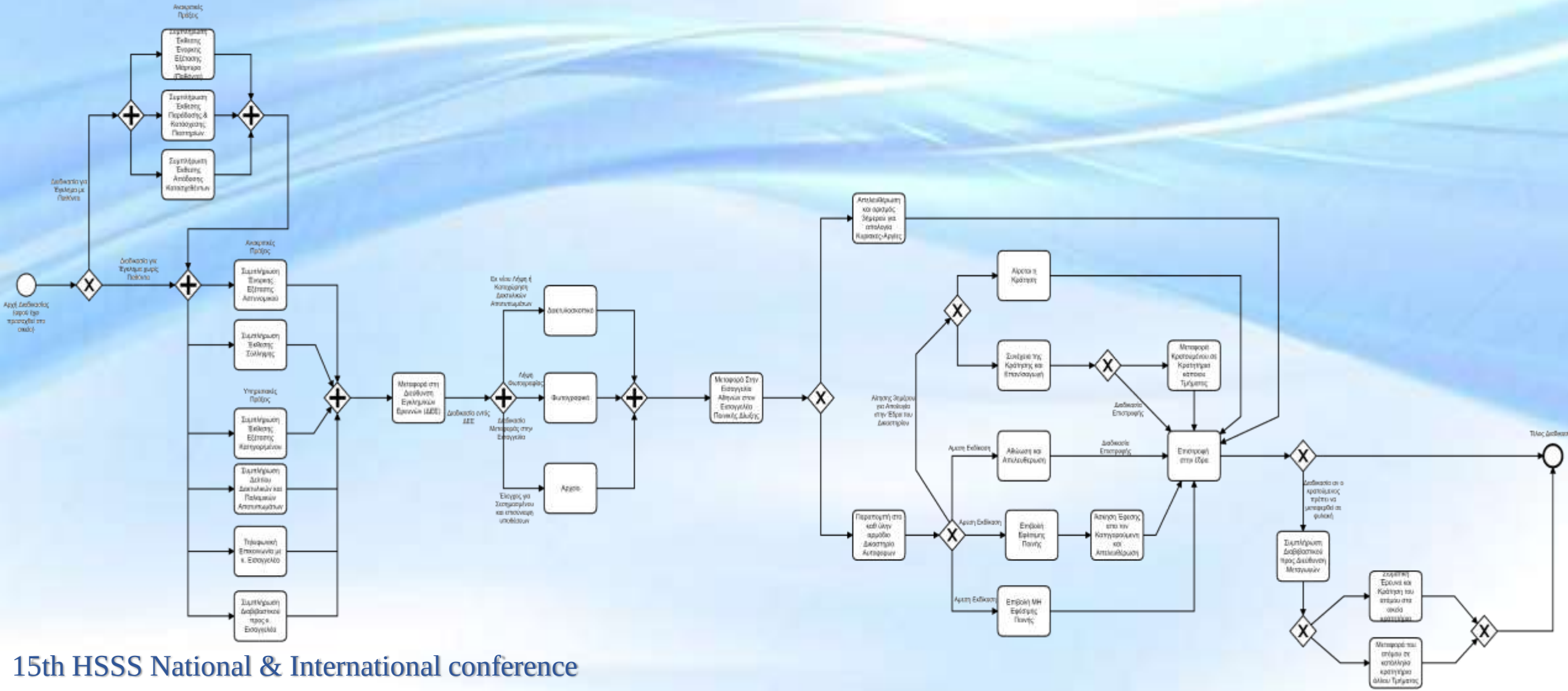
- We have also used VSM Model to present: (1)the **structure**, (2) **the processes of each department** and (3) to **detect the viability** of the under study System.



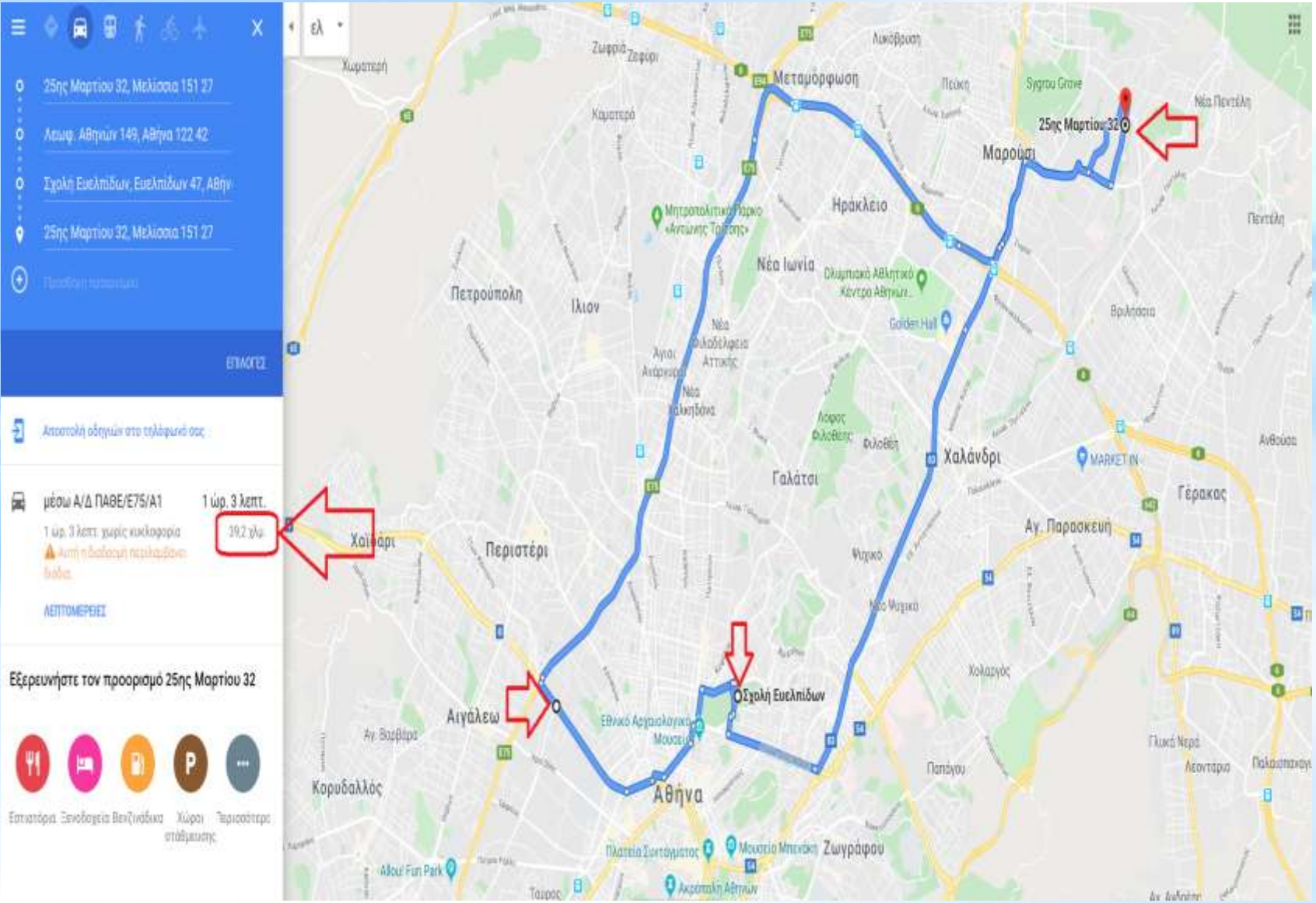


DCSYM Methodology – VSM Model
Business Process Management (BPM)

- Suppose that T.A Pentelis has arrested a **perpetrator** of a **wallet theft**.



DCSYM Methodology – VSM Model
Business Process Management (BPM)



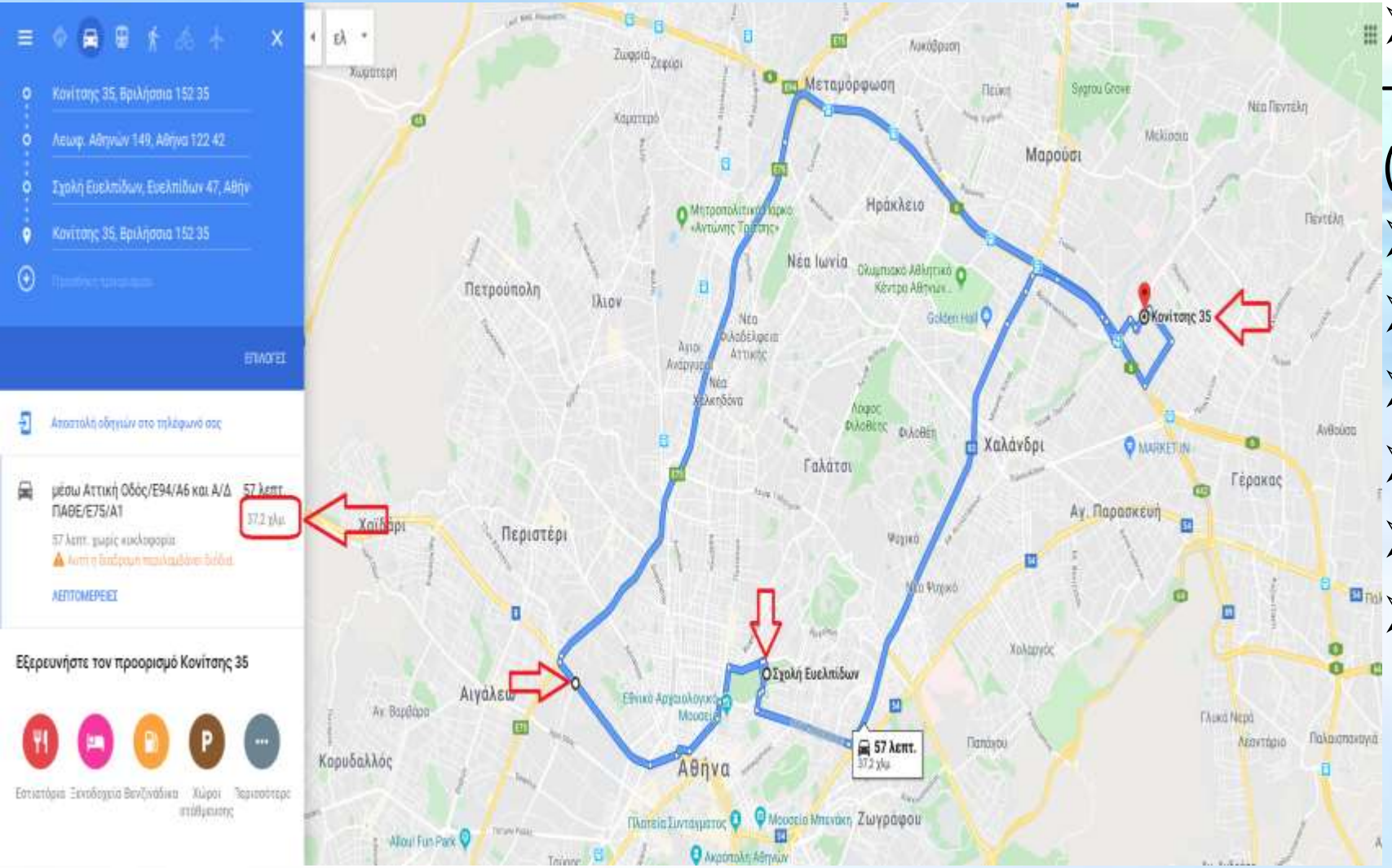
- **Route**

T.A Pentelis → DEE → Courts (Sx. Evelpidwn) → T.A Pentelis

- **Vehicles:**1
- **Policemen:** 2
- **Distance:** ~39 km
- **Cost :** ~ 7,50 € (fuel - Tolls)
- **Service:** ~ 4,86 €
- **Total:** 12,36 €

DCSYM Methodology – VSM Model
Business Process Management (BPM)

- T.A Vrilissiwn has also arrested a **perpetrator** of a burglary.



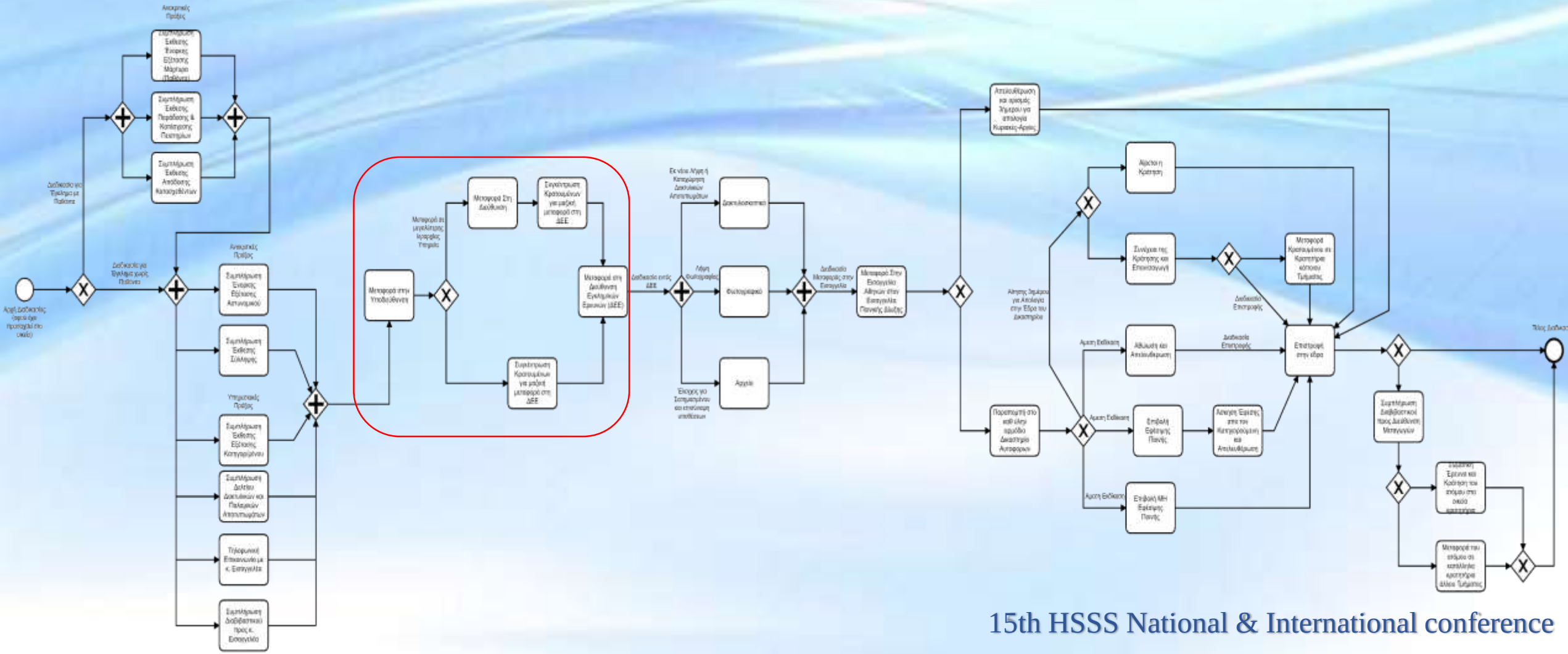
- **Route**

T.A Vrilissiwn → DEE → Courts (Sx. Evelpidwn) → T.A Vrilissiwn

- **Vehicles:**1
- **Policemen:** 2
- **Distance:** ~37 km
- **Cost :** ~ 6,77 € (fuel - Tolls)
- **Service:** ~ 4,66 €
- **Total:** 11,43 €

DCSYM Methodology – VSM Model
Business Process Management (BPM)

- **Informing** the Subdivision and **Merging** those 2 transports into 1, according to P.D. 141/1991 article 144 paragraph 9 section a΄



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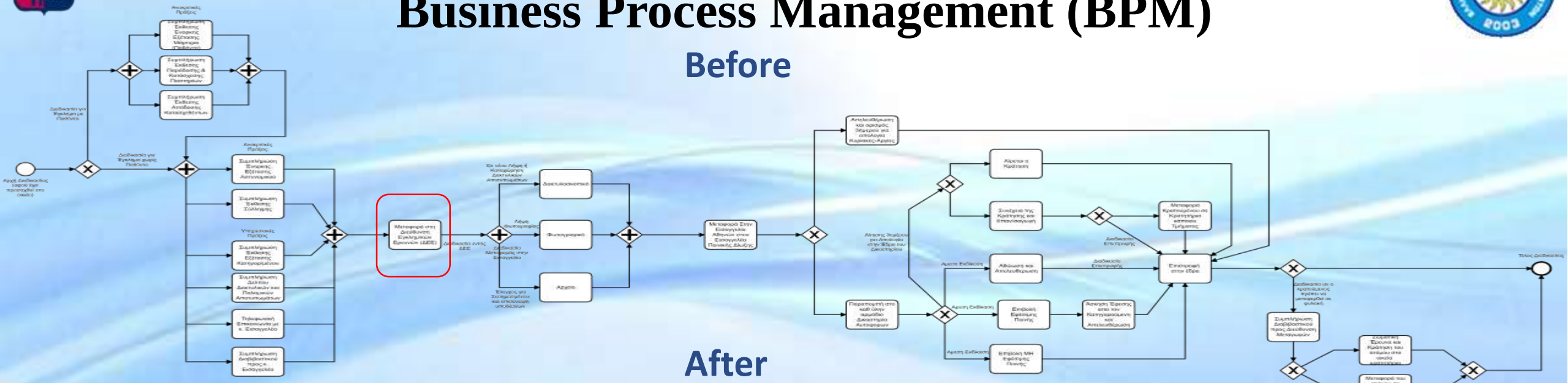
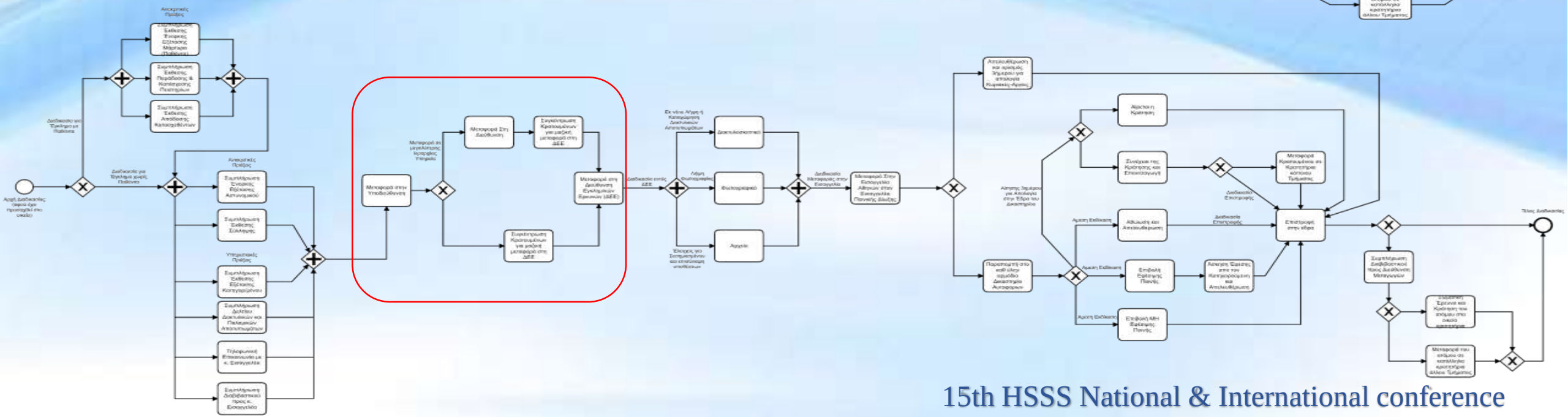
DCSYM Methodology – VSM Model Business Process Management (BPM)

Before



After



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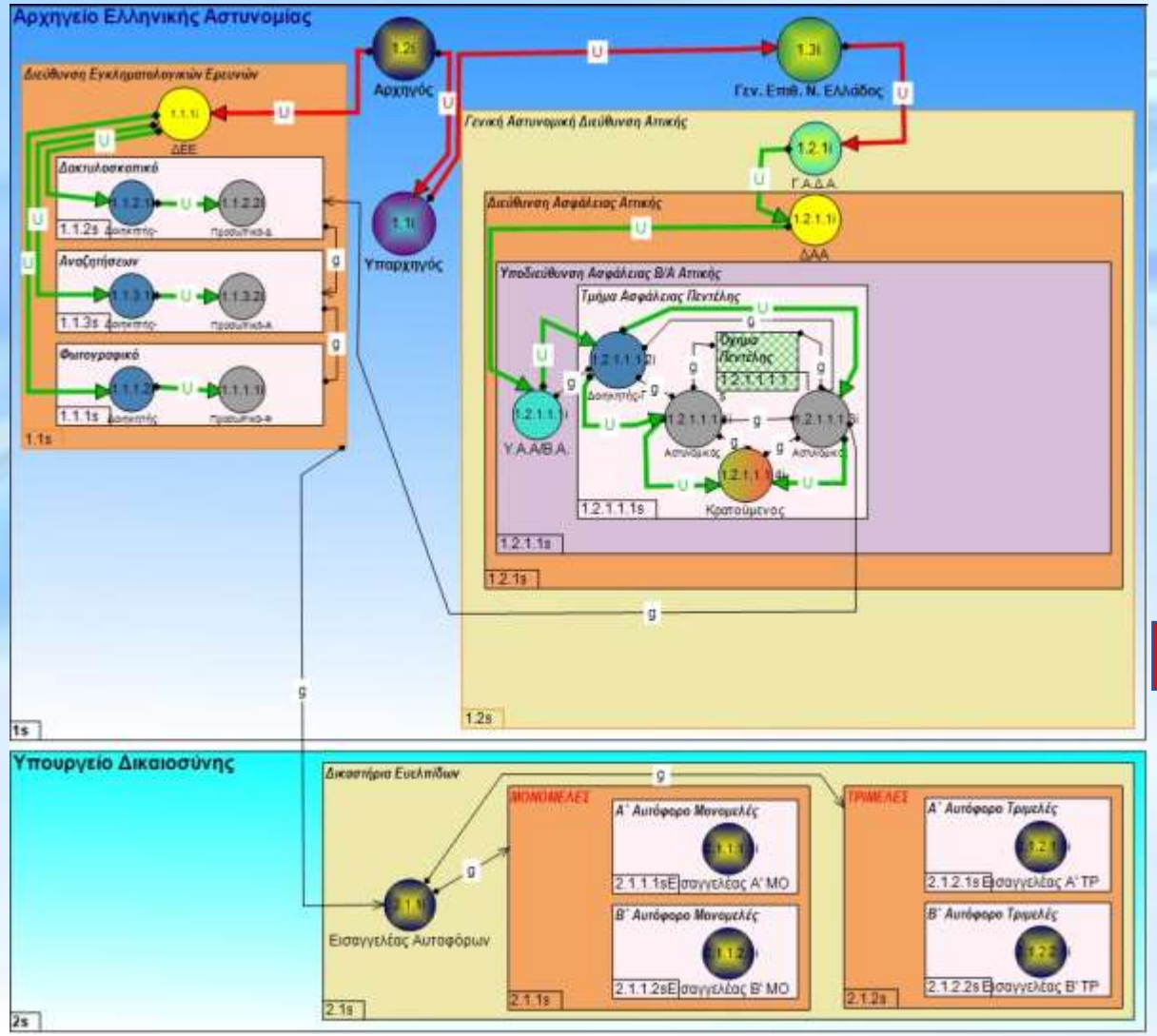
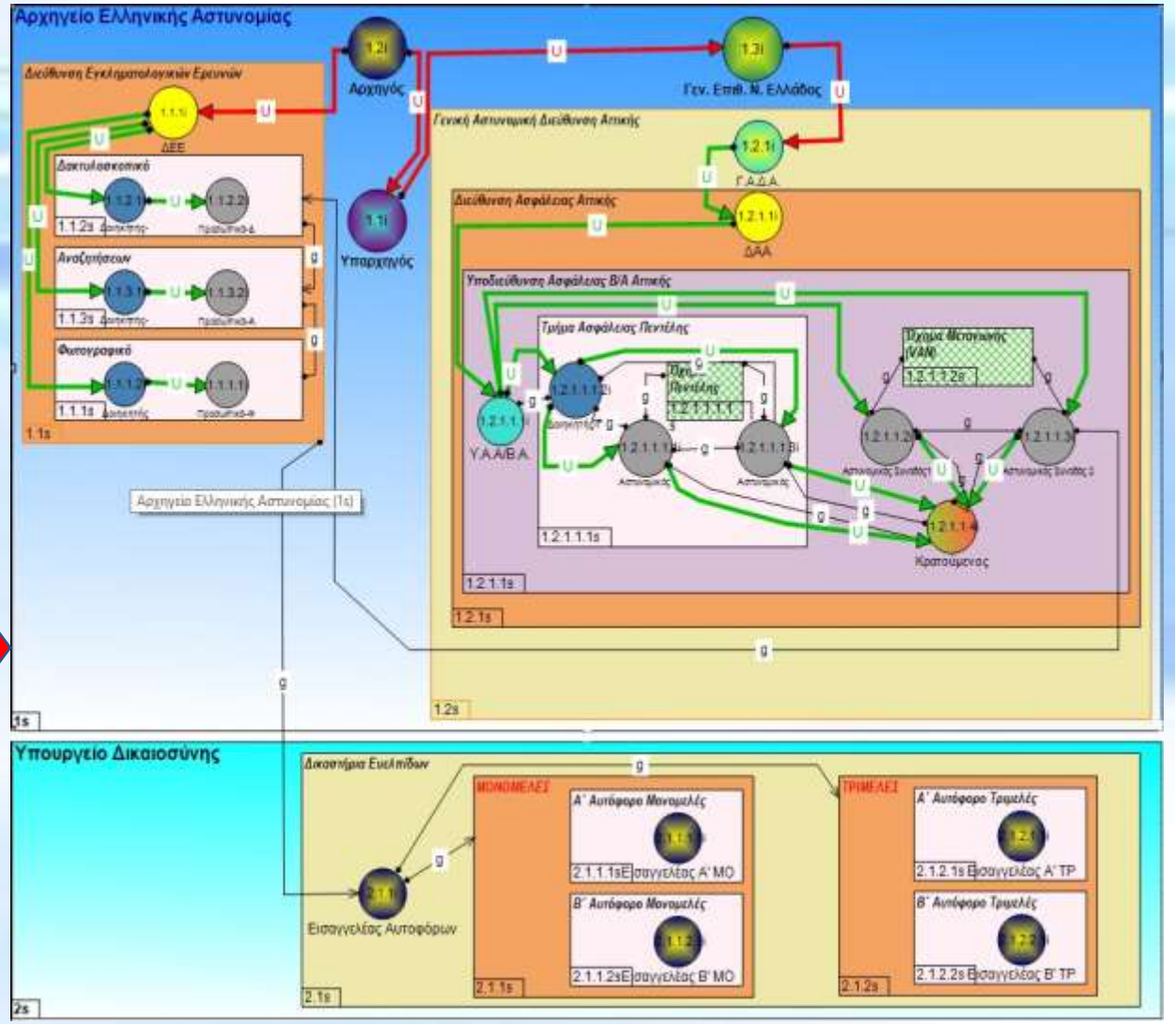
DCSYM Methodology – VSM Model
Business Process Management (BPM)

Before



After



DCSYM Methodology – VSM Model
Business Process Management (BPM)

- **Merging** those 2 transports into 1, we have achieved to:
  1) Reduce the cost for each transport by ~**5,57 €**
  2) Saving of **2** policemen
  3) **1** vehicle less used

- **If** the Subdivision was responsible for those transportations, then:
  We would have **4** policemen with 2 vehicles available for patrols.

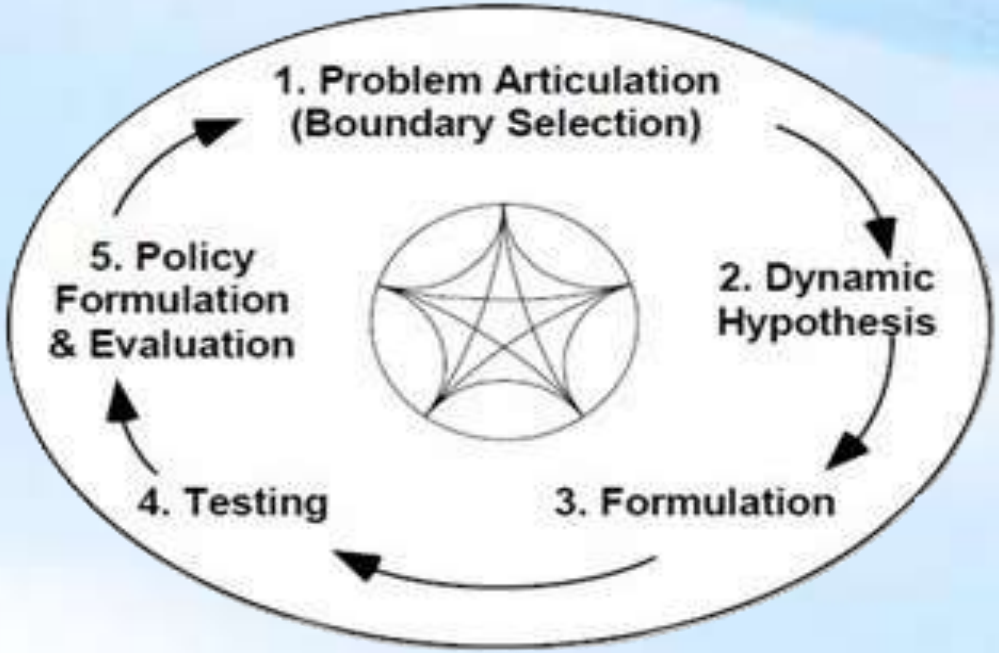
- Studying the 2017 statistics sheets of Greek Police, there were almost **74** transports **daily** in **Athens & Piraeus**:
- 1) Reduce the daily cost by **(n*5,57€) – (new cost) = 412 € - (new cost)**
- 2) Saving of **108** policemen: (2p*74tr) – (5v*8p)= (148 - 40) = **108**
- 3) Only **5** busses (25 p) are going to be used (1 for each Subdivision), instead of 74 vehicles

www.astynomia.gr/images/stories/2017/statistics17/2017_1.xls

www.astynomia.gr/images/stories/2017/statistics17/2017_2.xls

System Dynamics

- Due to the abstractive nature of our **Soft System** (Complex Situations can be traced and the process of finding the source of a problem is very difficult), we have used the **Systemic Dynamics Modeling (SD)** method, so as to predict the changes on Crime Rate after the optimization of the business process that we have focused in.
- The **Dynamic Hypothesis** is being developed from the Systemic Analyst in order to explain the possible causes of the Problem that we have focused in.



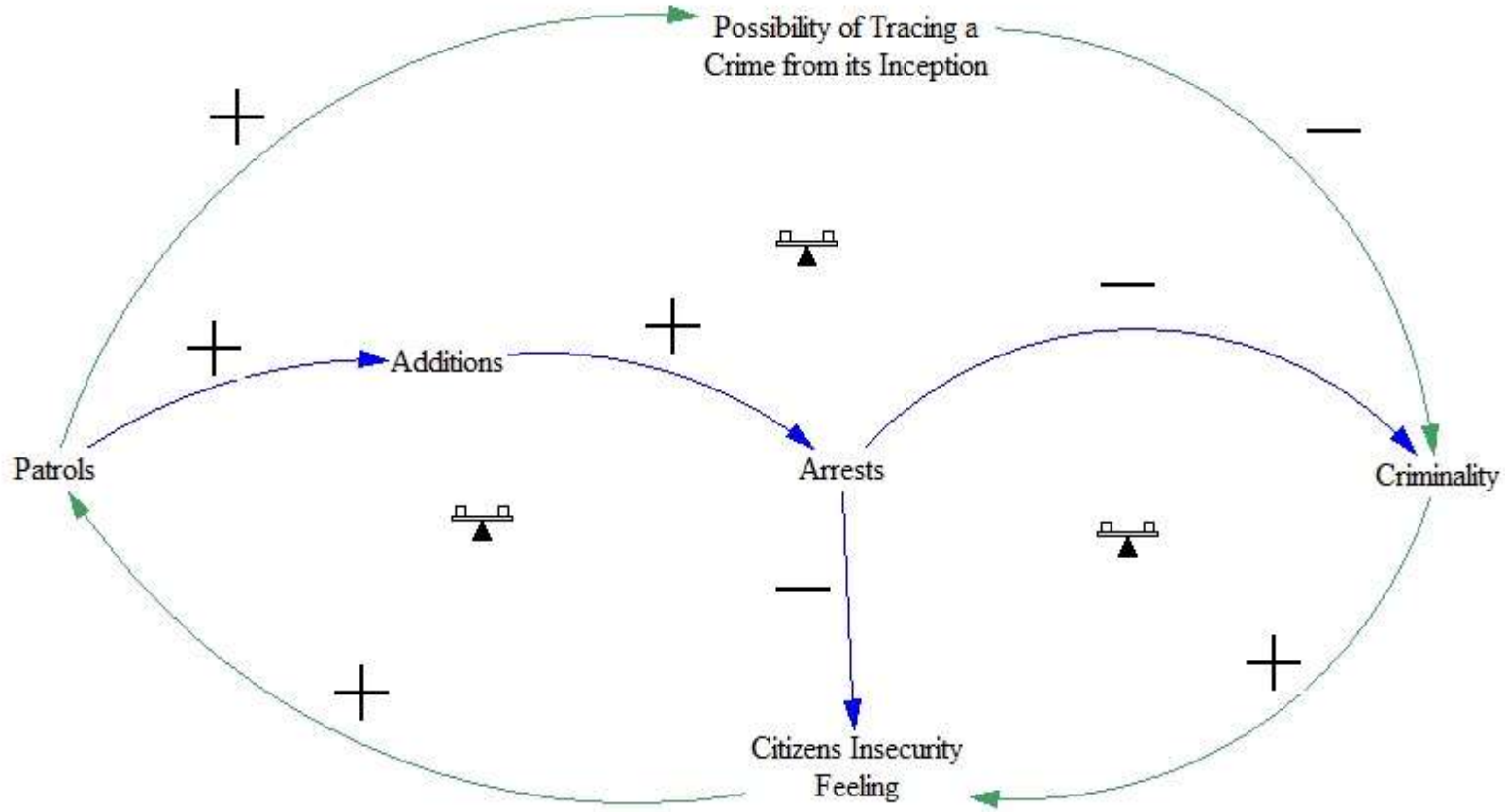
System Dynamics

- Our Dynamic Hypothesis is that the increase of Crime Rate is the result of patrol absence, and if we **increase by 20% the amount of those patrols** (using the people that we have saved from the process optimization) there will be a **decrease of 2% on the "Proposal of committing Thefts & Burglaries"**
- The **Purpose of Formulating** is to check the Dynamic Hypothesis and predict the future behavior of the under study System.
- In order to create a Mental Model as closer to reality as possible, we have attached some variables which we are going to call them as «**Social Variables**» (Ashby's Law of Requisite Variety).

https://aes.ues-eus.eu/aes2018/enteteAES2018.html (p. 147-166)

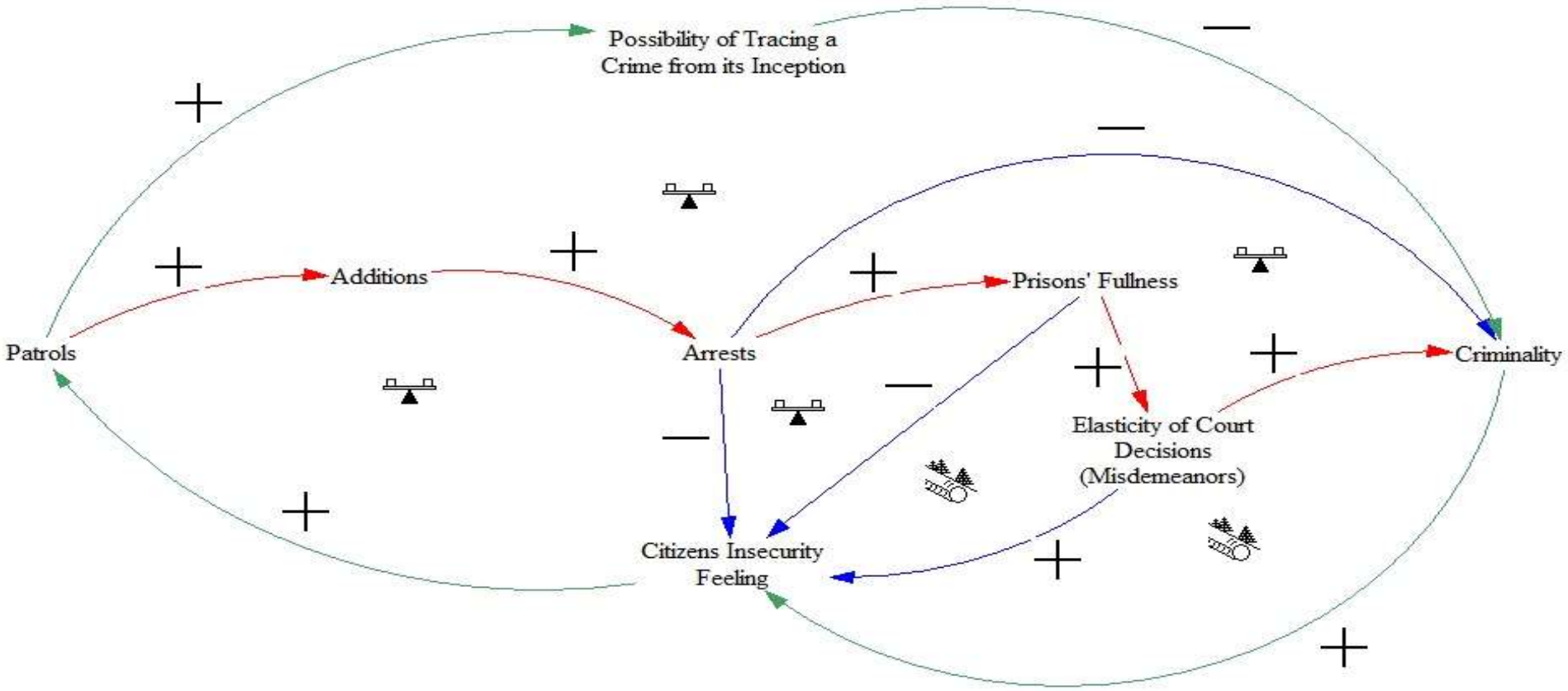
System Dynamics

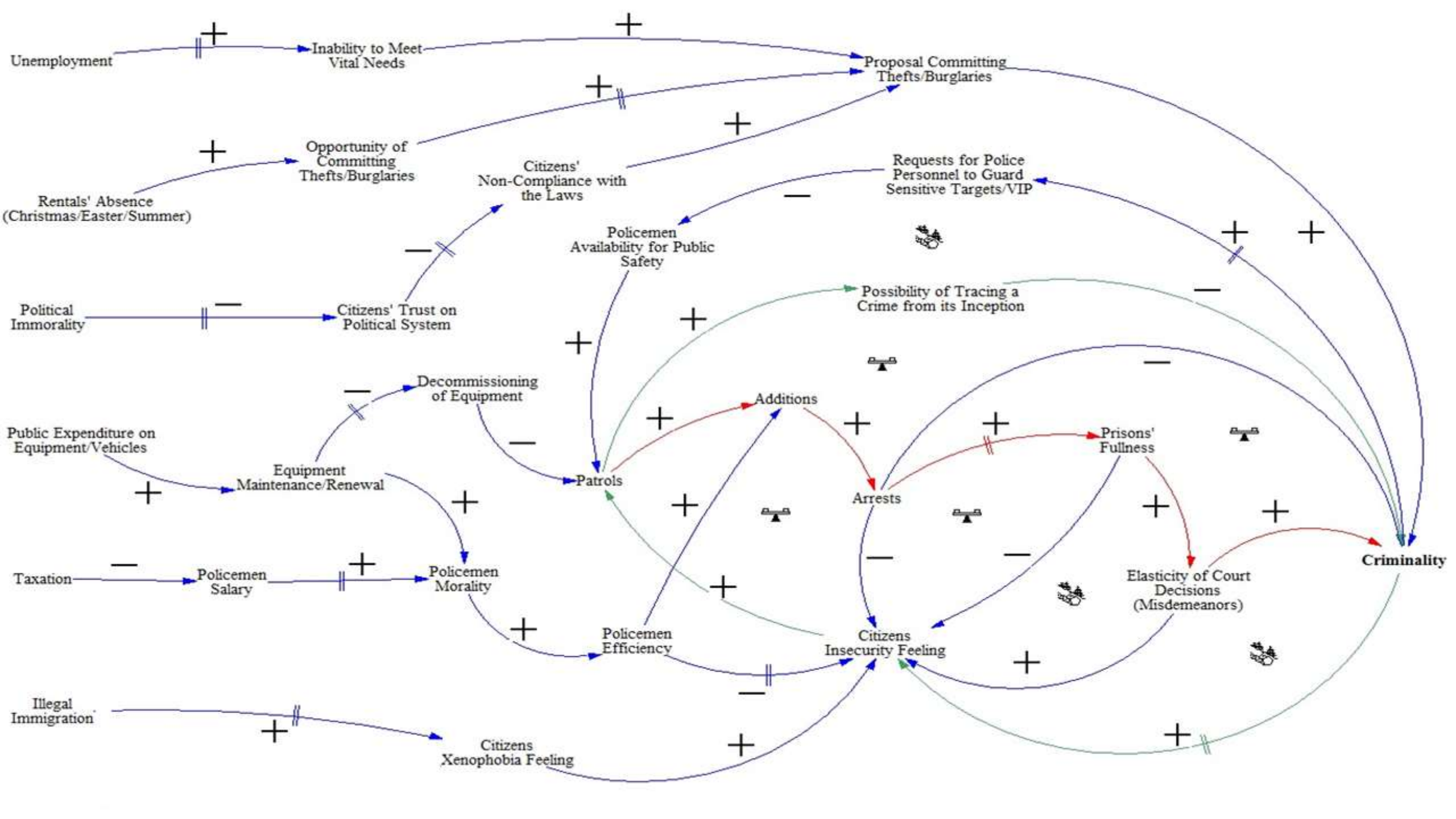
Causal Loop Diagrams



System Dynamics

Causal Loop Diagrams

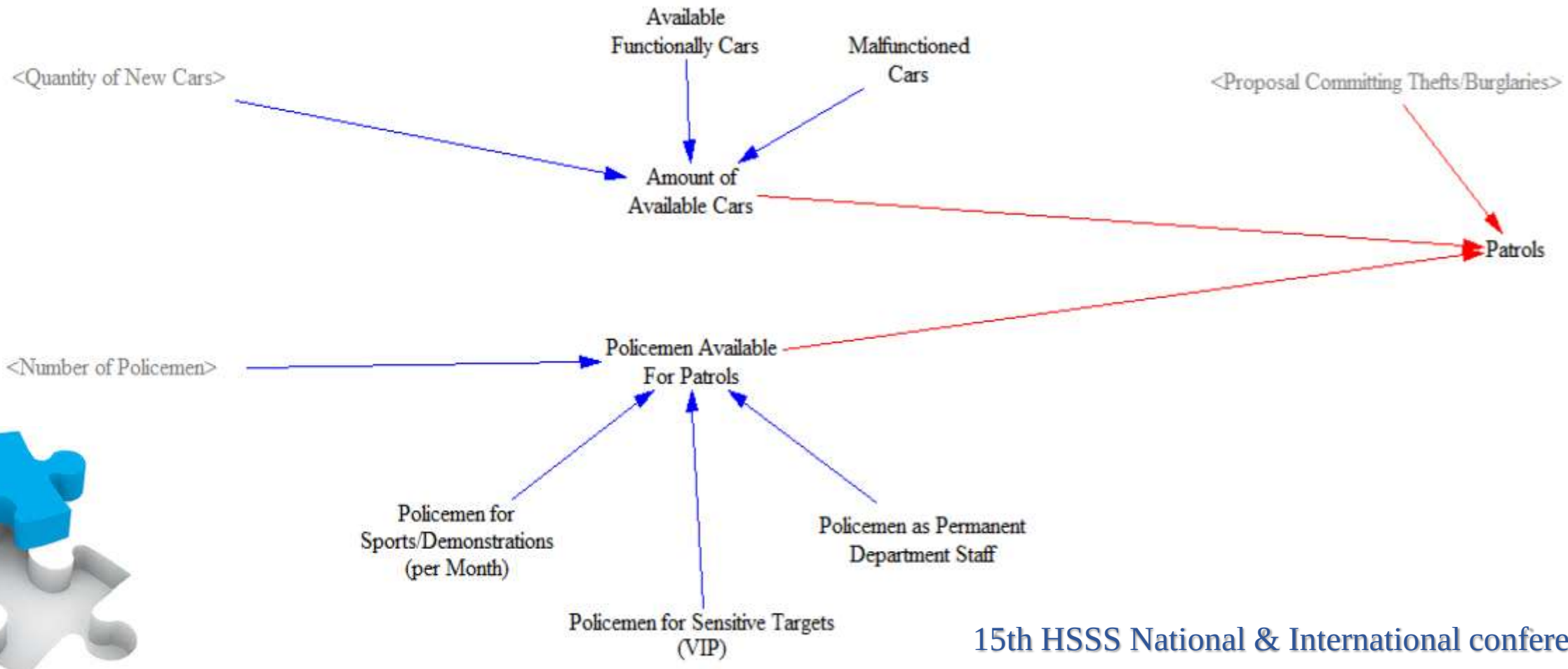



Unemployment
Inability to Meet Vital Needs
Proposal Committing Thefts/Burglaries
Opportunity of Committing Thefts/Burglaries
Rentals' Absence (Christmas/Easter/Summer)
Citizens' Non-Compliance with the Laws
Requests for Police Personnel to Guard Sensitive Targets/VIP
Policemen Availability for Public Safety
Political Immorality
Citizens' Trust on Political System
Possibility of Tracing a Crime from its Inception
Decommissioning of Equipment
Additions
Public Expenditure on Equipment/Vehicles
Equipment Maintenance/Renewal
Patrols
Arrests
Prisons' Fullness
Criminality
Taxation
Policemen Salary
Policemen Morality
Elasticity of Court Decisions (Misdemeanors)
Policemen Efficiency
Citizens Insecurity Feeling
Illegal Immigration
Citizens Xenophobia Feeling

System Dynamics

- Our **Mental Model,** consisting of five (5) **Views** and the variables, MUST be initialized in specific order.

View "Calculate Number of Patrols"



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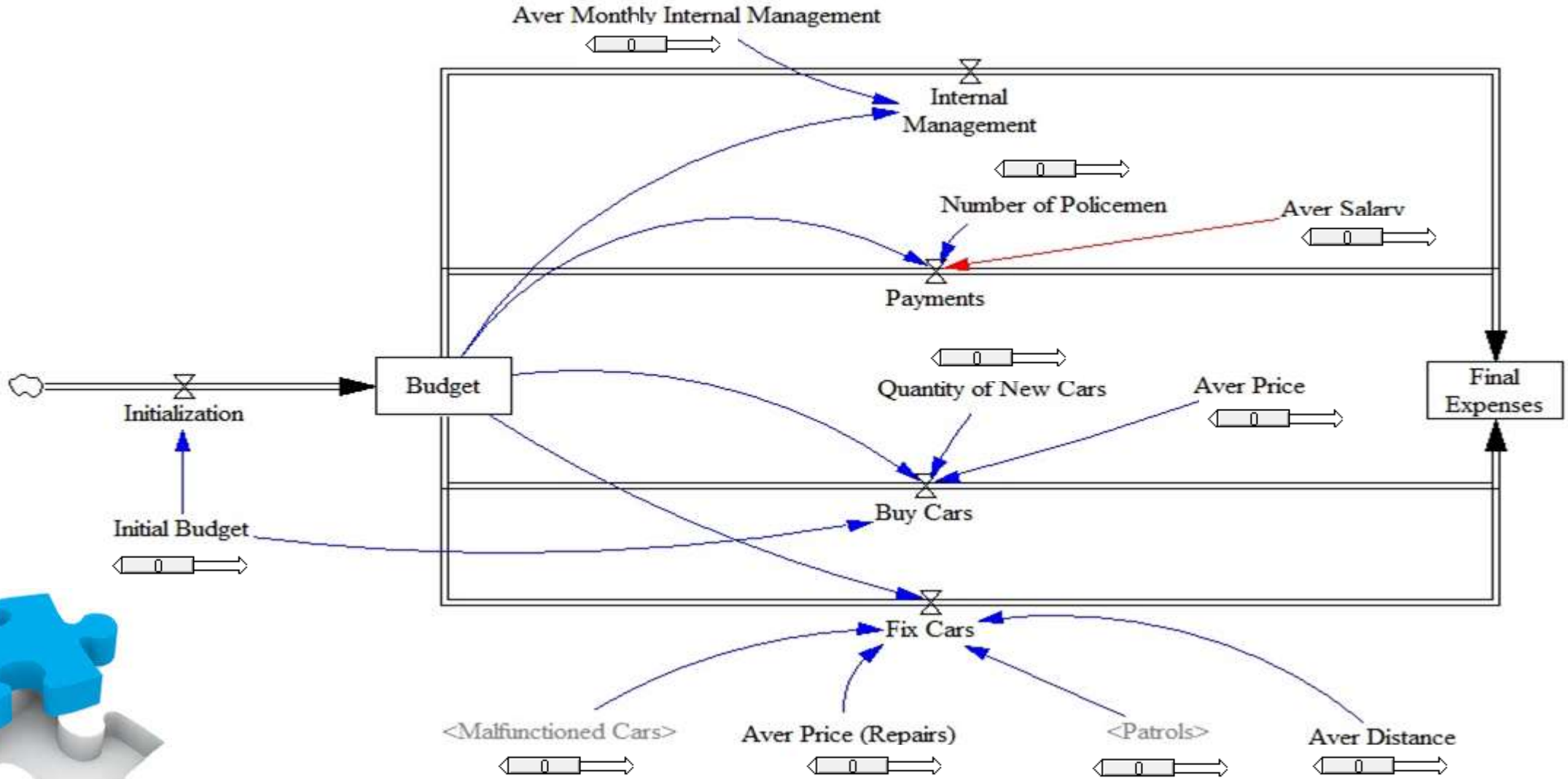
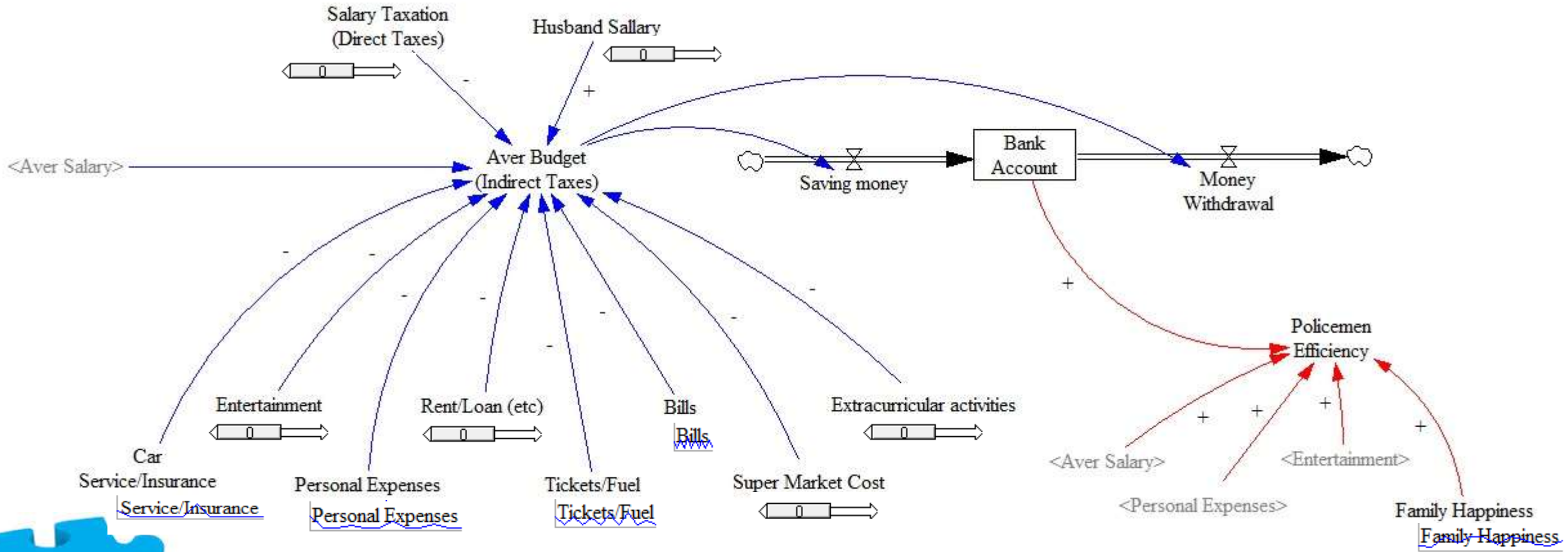
System Dynamics

View "Financial Annual Budget"



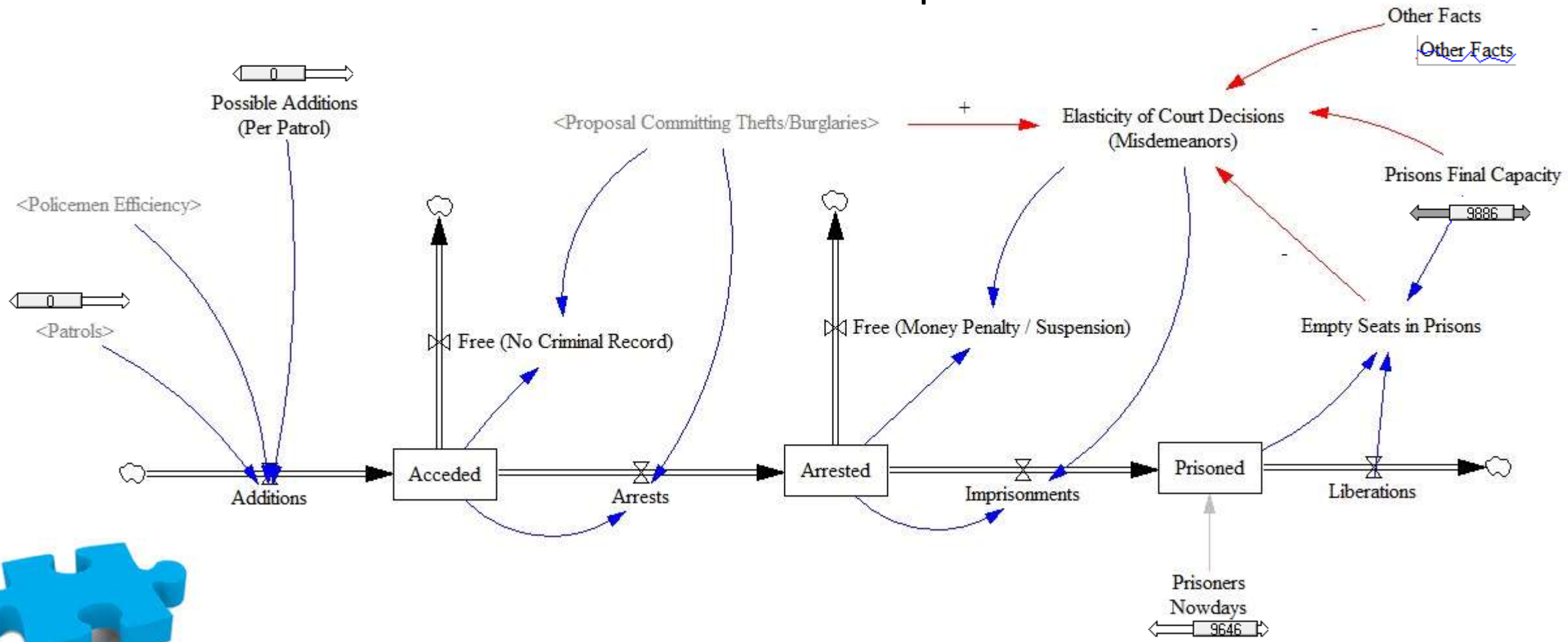
System Dynamics

View "Calculate Policemen Efficiency"



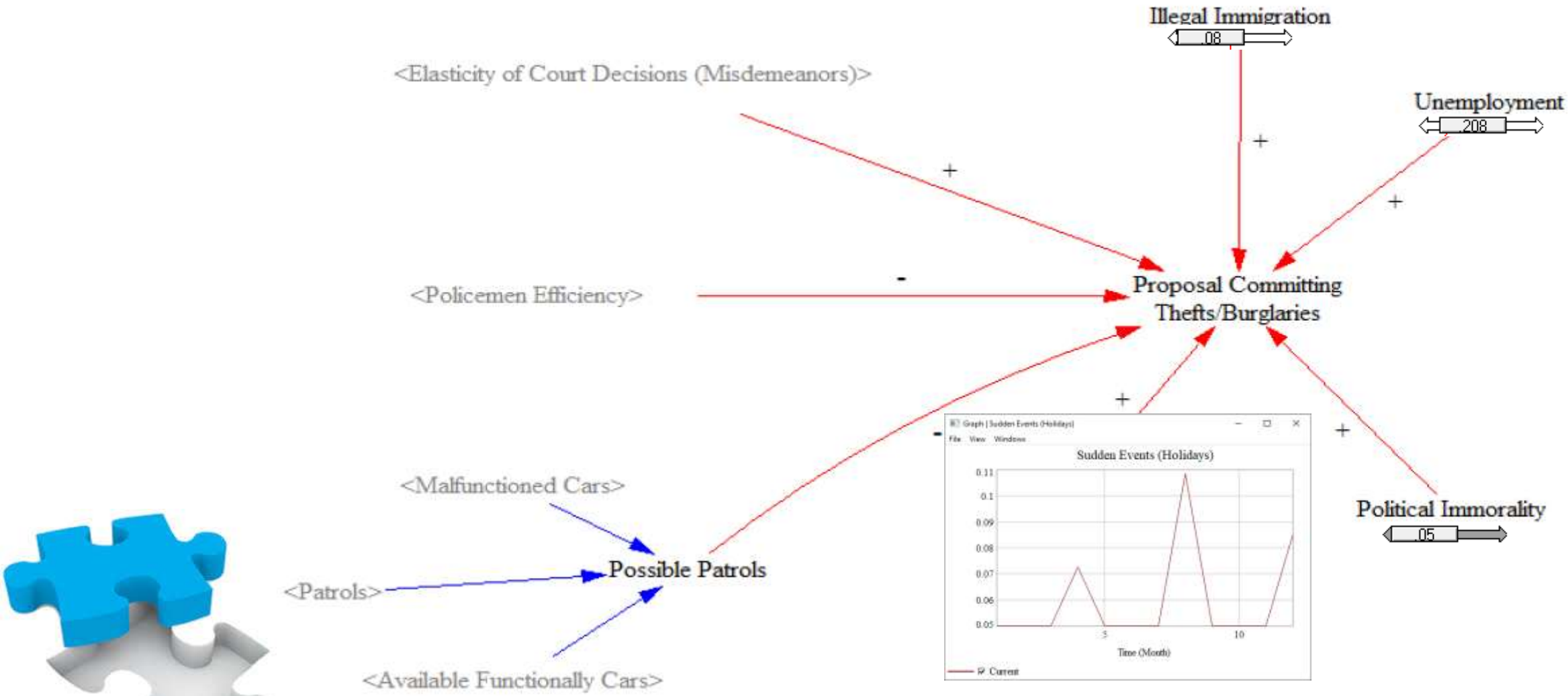
System Dynamics

View "Calculate Arrests & Imprisonments"



System Dynamics

View "Calculate Proposal of Committing Thefts/Burglaries"



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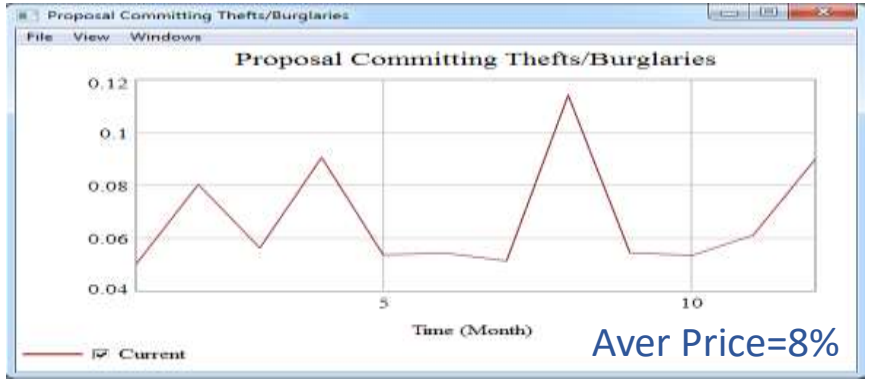
System Dynamics

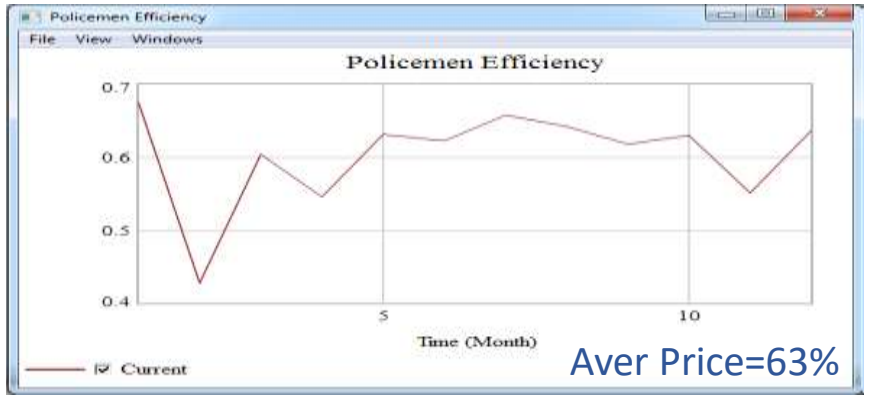
1st Simulation – Mental Model Testing

No	Views	Variables	Initial Values
1	Financial Annual Budget	Aver Salary	**1.830**
2	Calculate Policemen Efficiency	Salary Taxation (Direct Taxes)	**0.3**
3	Calculate Policemen Efficiency	Husband Salary	**750**
4	Calculate Policemen Efficiency	Entertainment	**240**
5	Calculate Policemen Efficiency	Rent/Loan (etc)	**550**
6	Calculate Policemen Efficiency	Super Market Cost	**450**
7	Calculate Policemen Efficiency	Extracurricular Activities	**130**
8	Calculate Arrests & Imprisonments	Possible Additions (Per Patrol)	**5**
9	Calculate Arrests & Imprisonments	Prisons Final Capacity	**9886**
10	Calculate Arrests & Imprisonments	Prisoners Nowdays	**9646**
11	Calculate Proposal Committing Thefts/Burglaries	Illegal Immigration	**0.08**
12	Calculate Proposal Committing Thefts/Burglaries	Unemployment	**0.2028**
13	Calculate Proposal Committing Thefts/Burglaries	Political Immorality	**0.05**



Aver Price=8%

Aver Price=75%



Aver Price=63%

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System Dynamics

2nd Simulation

- We increase the existing **Salary Taxation** (Direct Taxes) by 30% (**30%** ➡ **39%**).
- A rise of **0.5%** on the value of the variable "Proposal Committing Thefts and Burglaries" is noticeable.

3nd Simulation

- We have increased the existing recorded rate of **Unemployment** from (**20.28%** ➡ **30%)**
- An increase of **4.25%** on the value of the variable "Proposal Committing Thefts and Burglaries" is clearly depicted.

4th Simulation

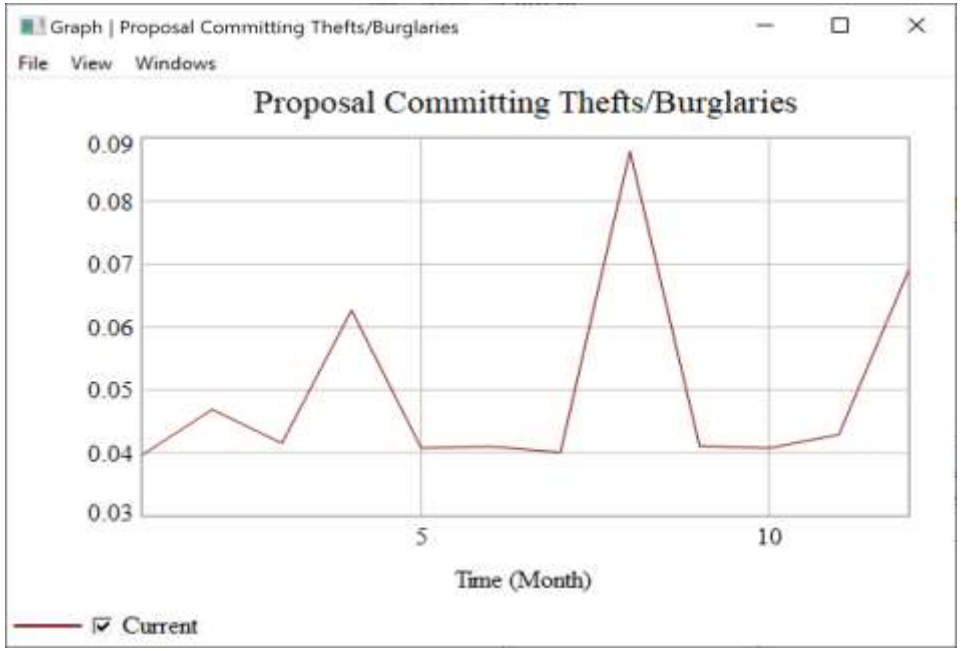
- We increase the existing recorded rate of **Illegal Immigration** by 40 % (8% ➡ **11.5%**)
- There is a distinct rise of **3%** on the value of the variable "Proposal Committing Thefts and Burglaries".

System Dynamics

5th Simulation

- If we use the human resources, which we have obtained from the process optimization, we will achieve a **20% increase of the existing patrols** (in Athens & Piraeus).

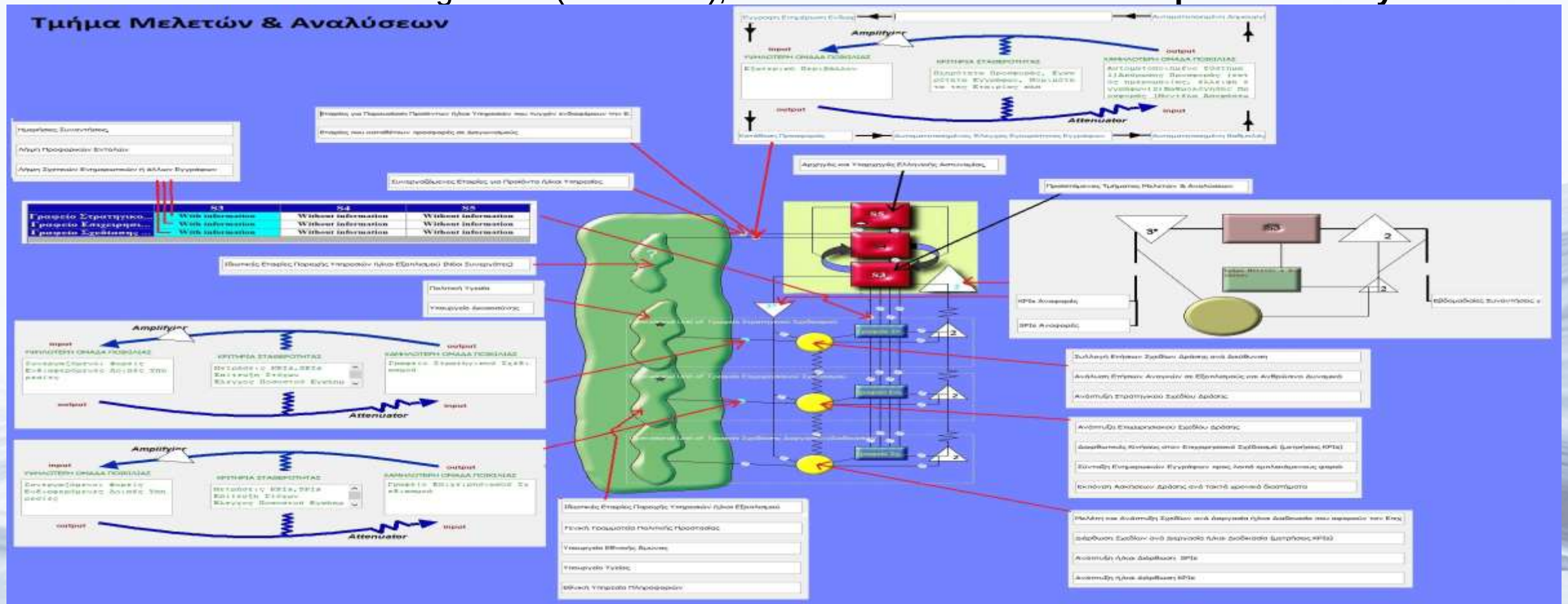
- Then, there will be a **reduction** from 8% to 6% on the value of the variable "Proposal Committing Thefts and Burglaries", that means a benefit of **2%**



Conclusions 1/2

Specifically:

- The **Crime Rate and the Security Sensation** of Greek civilians, both **are depended reversely on the amount of Patrols**.
- There is an **immediate necessity of creating a new department**, within the Unified Coordination Center for Business & Crisis Management (ESKEDIK), **for similar researches & deeper data analysis**.



Conclusions 1/2

Specifically:

- Some of the responsibilities of the new department, will be:

1. To cooperate with the Strategy and Development Division for Coordinating Funding Resources (S.O.S.A.X.P.) on the Project "Reformatting the Public Sector"

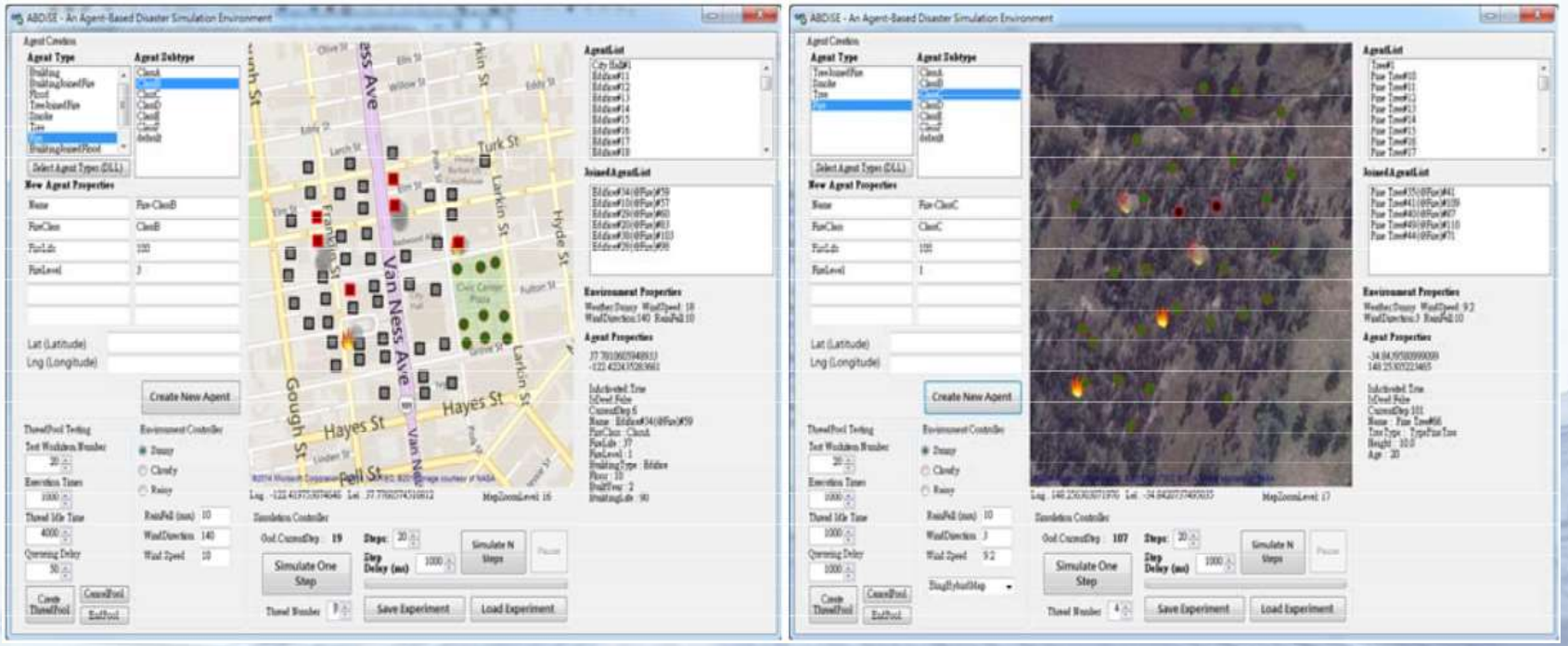
2. SWAOT Analysis for achieving **Strategic Goals**

S.W.O.T.	Helpful	Harmful
Internal	**Strenths** **1.** Σαφήνεια στον καθορισμό της Αποστολής του Οργανισμού **2.** Σαφής καθορισμός Διεργασιών και Διαδικασιών **3.** Κατάλληλα εκπαιδευμένο προσωπικό	**Weaknesses** **1.** Στάσιμα Χρηματοοικονομικά Δεδομένα **2.** Γήρανση του Ανθρώπινου Δυναμικού **3.** Στιβαρότητα Οργανωτικής της Δομής και Τρόπου Λειτουργίας της
External	**Opportunities** **1.** Τεχνολογική Εξέλιξη **2.** Συνεργασία Υπηρεσιών μέσω Ηλεκτρονικού Δικτύου	**Threats** **1.** Αυξανόμενες ανάγκες – Απαιτήσεις της Ελληνικής Κοινωνίας **2.** Νομικό Πλαίσιο και οι τελευταίες του τροποποιήσεις

Conclusions 1/2

Specifically:

3. Data Analysis and use of System Dynamics, for developing:
   a. Agent – Based Simulations (using **Anylogic Software**) capable **for Crisis Management** and
   b. Proper Action Plans, for evacuations
   For example: Fire on an urban area.



https://pdfs.semanticscholar.org/94bf/b84c9b80846a975051100e2c93c40783d4a7.pdf

Conclusions 1/2

Specifically:

4. **Optimization of other processes,** for **further benefits** in human and financial resources.

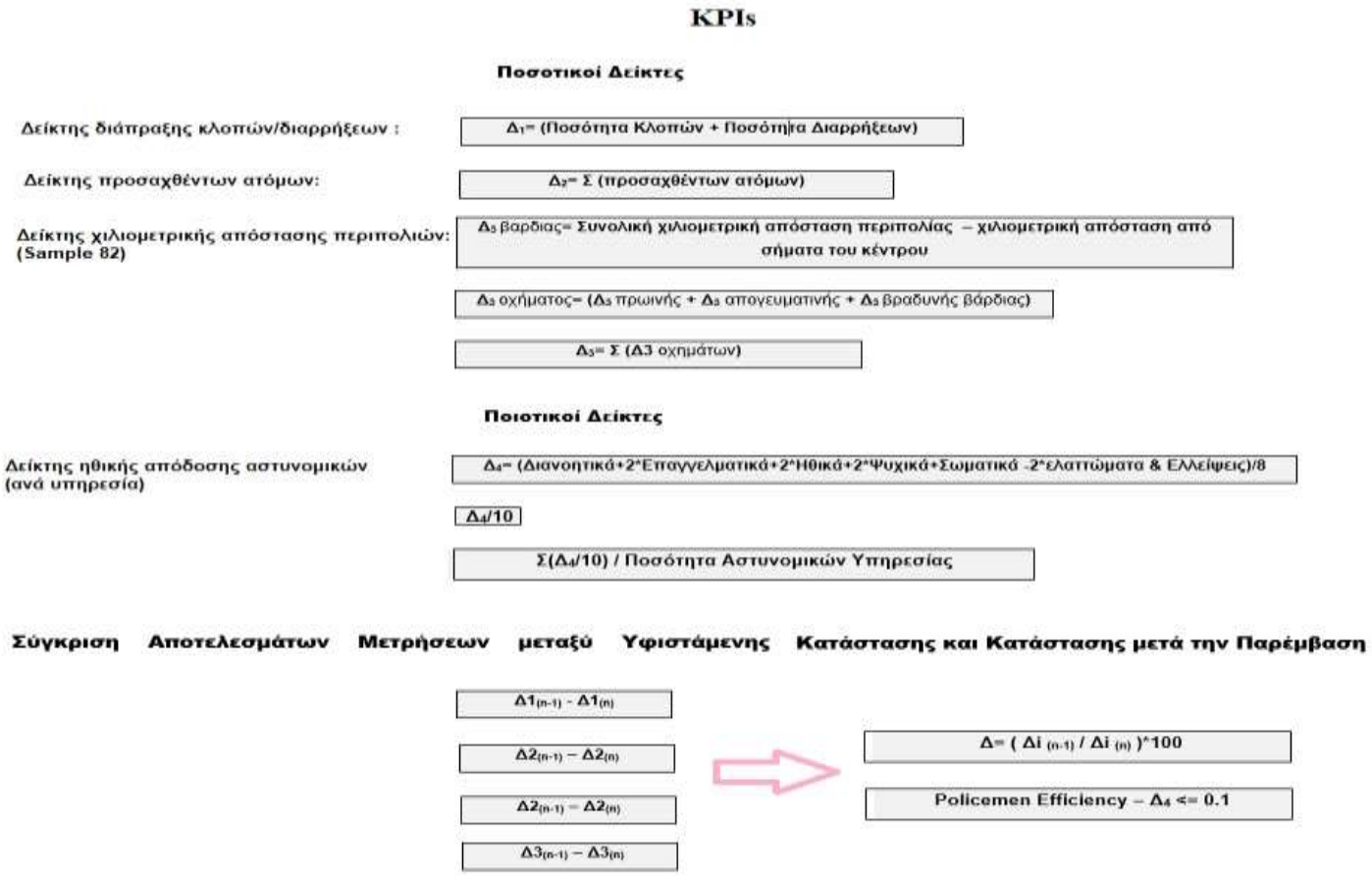
   Examples:

   a. Handling of Internal Mail (similar optimization)
   b. Delivery of Invitations (use of **Law. 4623/2019**)
   c. Data Back up (no need for paper buck up)
   d. Process of fingerprint and Signing of lawsuits etc. - using digital scanners
   e. Process of calculating needs on human resources for a basketball / football game or even on a protest march.
   f. Recycling Process
      1. UPS Batteries and Car Batteries
      2. Metal components of Computers and Printers
      3. Cars & Car Parts
   g. Process of personnel relocation (permanent or temporary)
   h. Process of staff capacity report (sample P-121 & P-118)

Conclusions 1/2

Specifically:

5. Data Analysis Department will also be responsible for the **Stakeholders Management**, **Project Management,** development of **Time Charts** and **proper KPIs** for calculating the **efficiency** and the effectiveness (an ENDLESS process):



Conclusions 2/2

Generally:

- The **usage of Systemic Processes, Techniques, Tools and Software** can predict whether a possible strategic move will bring the desirable results, or not.

- This study and the Mental Model that we have constructed could help: (a) the Chief of Greek Police to develop a more efficient Strategy for dealing with violence and crime and (b) the Undersecretary of State for Citizen Protection (who is responsible for Criminal Policy) to create a more flexible policy against Illegal Immigration.

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