

Measure title: PUBLIC TRANSPORT SECURITY PROGRAM IN CRAIOVA

City: Craiova

Project: MODERN

Measure number: 05.05

Executive summary

The measure consisted in the implementation of a surveillance system for the public transport system in Craiova, that included surveillance cameras installed in 10 passengers stations (1 camera in each station), 15 buses (3 cameras and one DVR with internal hard disk in each bus), and communication equipment's that transmit images and information from the monitored sites to the a central management centre (called "dispatcher").

This system represents a part of a larger integrated system which was implemented on the Craiova public transport system through the MODERN project. This system includes a vehicle monitoring system and an associated info mobility system and e-ticketing system. All these three different components of the overall system were integrated from the technical point of view, sharing parts of the overall IT architecture.

The purpose of the measure is to supervise the passengers transport and increase the security for public transport in order to be more attractive for citizens. The system allows a rapid intervention of Police to isolate travellers with criminal behaviour in buses or in the area of passengers' stations.

The measure was implemented in the following stages:

- Definition of the integration of the surveillance cameras in the video surveillance system of the Municipality
- Studying of the most important stations with large passenger flow and high risk of vandalism.
- Definition of the technical requirements for the system
- Installation of the surveillance cameras under a schedule agreed by RAT and the equipment provider.
- Installation and running of the overall system

In order to highlight the impact of the measure on the transport, society and security, a set of indicators have been measured: quality of service, awareness, acceptance, perception of security and frauds level.

The key results of evaluation activity are as follows:

- Taking into consideration the surveys carried out on the PT users, the perception of security increased by 6 % and the people feel more protected from pick-pockets or bags thieves;
- The frauds level decreased by 50% because the thieves or agitators are discouraged by surveillance cameras that can record the antisocial events.

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The two major lessons learnt regards:

1. The necessity for a good definition of the places where to install the video surveillance; this because a good start of the experimentation could influence the feeling of passengers and avoid the possibility to be forced to change them.
2. To overcome the initial perception of the people that use public transport every day that the Municipality spies them with the video-surveillance cameras. This feeling was only at the beginning of the operating period after a while realizing that those cameras are helping them to get a much nicer travel and a safer environment.

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A Introduction

A1 Objectives

The measure objectives are:

A. High level/longer term:

- To encourage more people to use PT

B. Strategic level:

- To reduce the antisocial issues and increase PT safety

C. Measure level:

- To install video surveillance system in 10 public transport stations and 15 buses in order to decrease fraudulent and anti social issues by 10% in PT.
- To reduce the anti social issues in order to increase the passengers` perception of security by 3%.

A2 Description

Public transport is a complex and multi-layered system. Critical elements of this system are the fraudulent and antisocial behaviour of some passengers. In Craiova, the public transport does not offer enough safety to passengers, as it should have.

The most critical points in the security status of public transport in Craiova were:

- Peak hours when buses are crowded
- In the less populated stations
- During the weekend when the number of passengers is lower than in the work days
- At the edge of the city

The measure implementation was therefore important in order to reduce these negative aspects of the public transport in Craiova City.

The system applied consists in the installation of

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- 10 in 10 passenger's stations (1 camera for each station),
- 45 video surveillance cameras in 15 buses (3 cameras for each bus) and one DVR with internal hard disk in each bus
- Communications equipment to transmit images and information to the dispatcher (management centre).

The percentages of stations equipped with cameras are 5% of all the passengers' stations and the percentage of buses equipped with cameras is 8 % of the total fleet.

The centre of the system (dispatcher) is located at RAT headquarter. The surveillance system is viewed by RAT headquarter and from there, if a problem exists, it will be communicated to the Local Police to take action and to resolve if possible the problem.

The system allows the rapid intervention of police and isolation of travellers that creates a climate of uncertain journey in the buses or in the public transport stations.

Regarding the video-surveillance cameras placed in the buses, they can store the recorded images on the internal hard disk for a period of 7 days and can be downloaded from DVR with a special device in case of need.

The aim of this measure, by monitoring stations and bus is to encourage more people to leave the private cars for the public transport use.

B Measure implementation

B1 Innovative aspects

The innovative aspect of the measure is the following:

New physical infrastructure solutions – Installation of cameras in public transport stations and buses represents a new infrastructure solution in order to decrease the anti social issues that are escalating with the increase of transport capacity.

B2 Research and Technology Development

The RTD activity that was dedicated to planning and design of the measure is described below:

- Analysis of existing surveillance systems on the market and their utility in public transport system.
- Identification of the stations and buses that could be equipped with surveillance systems.
- Preparation of specification for the surveillance system for vehicles and stations.

The system assures the video surveillance of the passengers flows from the monitored stations with the help of 10 video cameras; it is a closed - local surveillance circuit. Each camera is IP connected to the dispatch where the monitoring and the storage is being made and the video coding respects the MPEG-4 standard.

- The system is composed of the following elements:
- IP surveillance cameras
- Software common GUI interface
- Server
- Connection between server and the surveillance cameras

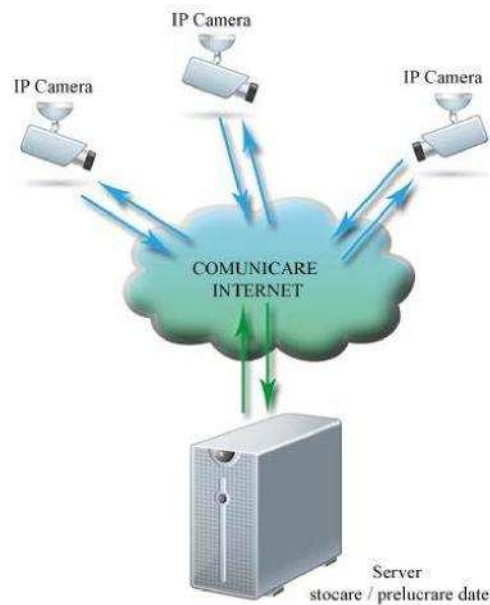
The functional scheme of the system is presented in the following figure.

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For what concerns the bus stations, the system is composed by a set of 10 cameras IP cameras which communicate in a secure way with the dispatcher through the internet.

The cameras were installed in the following bus stations:

- BRD station,
- station platform,
- Romanescu Park,
- Banie complex,
- Oltet,
- 3F Pharmacy,
- 15 Cv. Noua station,
- Electroputere,
- Siloz,
- Regia de Tutun.

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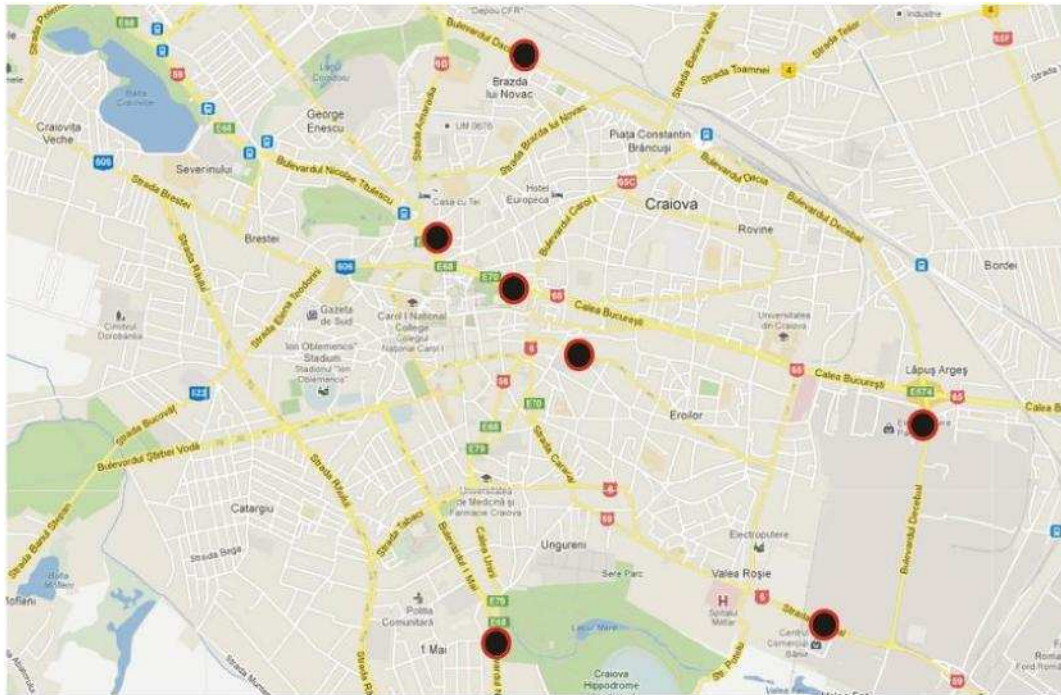


Figure 1 PT stations in which the cameras were installed

The access to the server and to the IP cameras from the closed surveillance circuit is secured with username and password.

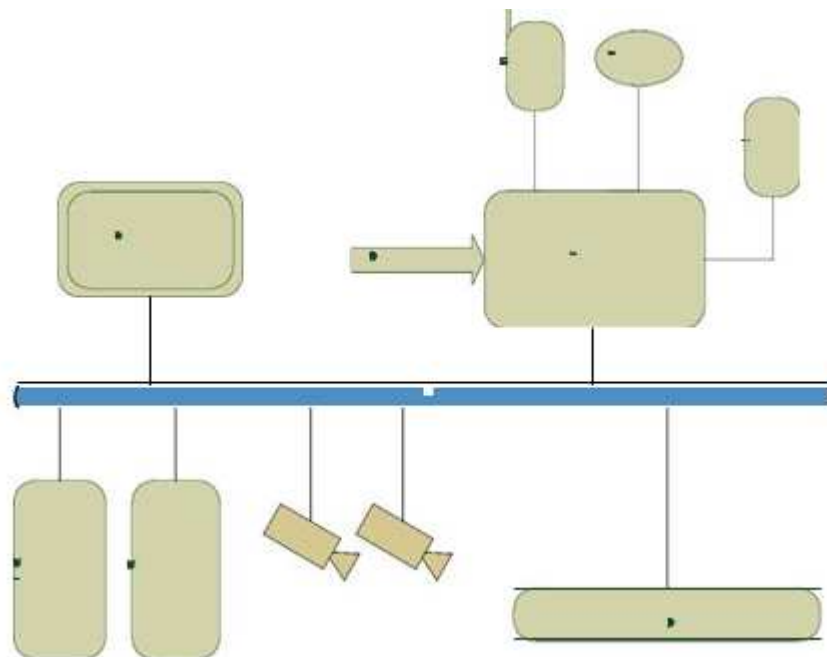


Figure 2 The rack in which the server is installed at the central dispatch



Figure 3 The dispatch centre – live real time video data from a single IP camera

For what concerns the video surveillance system installed on the buses, it is a closed circuit surveillance system, based on cutting edge digital equipment that assures surveillance, recording and high operation flexibility. There is a total number of 45 surveillance cameras installed on 15 buses (3 for each bus – placed strategically in order to assure a complete covering of the interior space).



The 3 surveillance cameras installed into any single bus are connected to an on-board DVR recording system that stores local information for a period of 72 hours; this allows the recovery of the images if some particular event occurs. This information can be afterwards

transferred to a computer or a data server (using storage equipment like memory stick or by a direct connection between a laptop and the DVR).



Fig.5 - Surveillance camera in one of the buses

The cameras installed have the following characteristics:

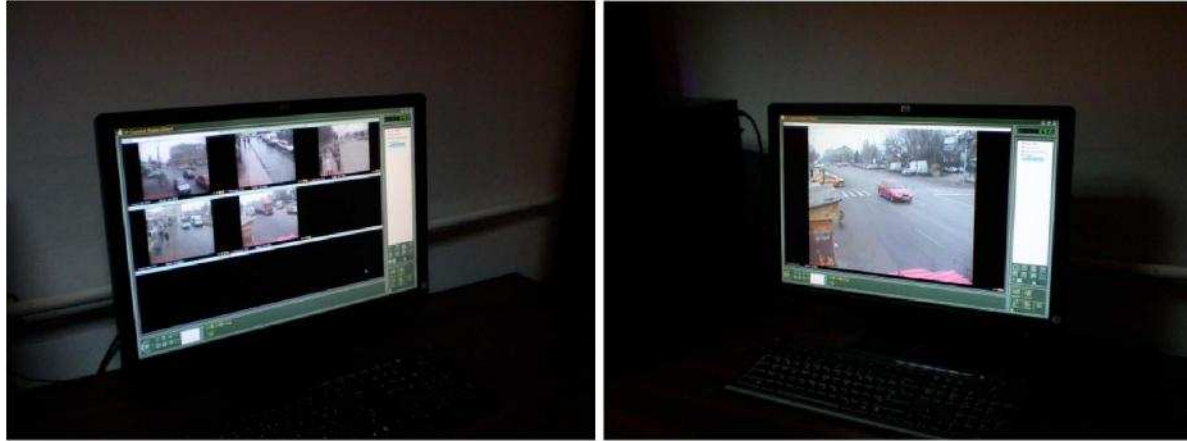
- Minimum resolution of 640x480 pixels;
- Recording rate: a minimum of 5 frames / second;
- The possibility of recording at a diffuse light
- The recordings are encrypted, and accessing them is done only by following a clear authentication procedure

The DVR installed on the bus is a DVR supporting at most 4 video channels, supplied at 24V and with surge protection is also installed in each bus where 3 video surveillance cameras can be found,. The DVR also has a USB port for the storage of backup copies or for the storage of other video information, if necessary. The information is stored for a period of 72 hours and after that they are circularly rewritten (the oldest information is deleted to offer space for the most recent ones).

The system has a central server, hosted in the central dispatch center of PTC Craiova, this being responsible for the coordination of the system, for the expansion of the configurations including other equipment's and for the arbitration of access rights and of permissions into the system. The server has the following configuration:

- Intel core I5 760 @ 2,80 GHz processor, - RAM Memory of - 4GB,
- Storage capacity of HDD- 6 TB,
- Windows 7 operation system, 64 bit.

The access to the server and to the IP cameras from the closed surveillance circuit is secured with user and password.



The surveillance system is mainly devoted to the monitoring of the passengers flows in 10 public transport bus stations and 15 buses, but also brings a contribution to the increase of the security of all the people in the areas of the bus stations where they are installed. Since these cameras were installed up to now, no incidents have been recorded in the monitored areas.

The system displays the video stream in any combination both on a wall screen and on the monitor screen of the operator. The start-up of these operations is being made directly from the client application that is installed on the operator computer.

The operators from the monitoring center have full access to the functionalities offered by the surveillance cameras and the software. The access to these functionalities is restricted only to the rights given to the users by the system administrator. The functionalities of the application are the following:

- Selection of the cameras to be visualized on the screen;
- the software gives the possibility to select one or more cameras to be visualized in real time on the screen;
- The operator can select the visualization of a single camera or more cameras on the single screen.

An integrated technical documentation was implemented for three measures: e-ticketing, GPS and video surveillance equipment (02.04, 08.02, and 05.05). This path was chosen because those three measures form a block and is simpler and more efficient to create from the beginning a complex system for monitoring, security and management of public transportation in Craiova rather than separate systems with no integration between them.

B3 Situation before CIVITAS

The public transport in Craiova didn't offer enough security to passengers. The negative aspects regarding the lack of security in public transport system are more evident in peak hours and late in the night and especially affect the weaker category of passengers, namely old people, women and children, people who usually take the bus every day. As a consequence, many people prefer to use private transport, for example to take their children to school by own car or taxi rather than by bus or tram.

Some measures have been taken at the city level, but they were targeted to limit the negative aspects due to the violation of the traffic rules which endanger the lives of other road users. The Municipal Police already installed 8 surveillance cameras for traffic monitoring in the main road intersections in Craiova. The cameras were connected to a traffic monitoring centre at the Municipal Police and provided in real time information taken from the traffic.

The need for the surveillance cameras specially for public transport stations was a priority in Craiova and especially for RAT because the antisocial issues and the incidents increased in the past years.

Table 1 Fraudulent levels in Craiova

Statistics main activities of Romanian police in 9 months 2009	
INDICATORS	TOTAL
I. I. OFFENSES SOLUTION	236'451
- Volume crime - offenses per 100,000 inhabitants	1.1
- Committed in urban areas	143'337
- Committed in rural areas	92.95
- Committed abroad	164
- With losses over 200 thousand USD	1'435
I.1. Legal Crime	104'518
I.2. Economic Crime	46'155
I.3. Crime of another nature	85'778
I. a. SERIOUS CRIMES COMMITTED WITH VIOLENCE	
1 Murder	290
2. Attempted murder	287
3. Impact causing death	65
4. Serious injuries	447
5. Rape	766
6. Robbery - Total	2'009

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Statistics main activities of Romanian police in 9 months 2009	
death victim	8
7. Outrage	416
8. Infanticide	16

B4 Actual implementation of the measure

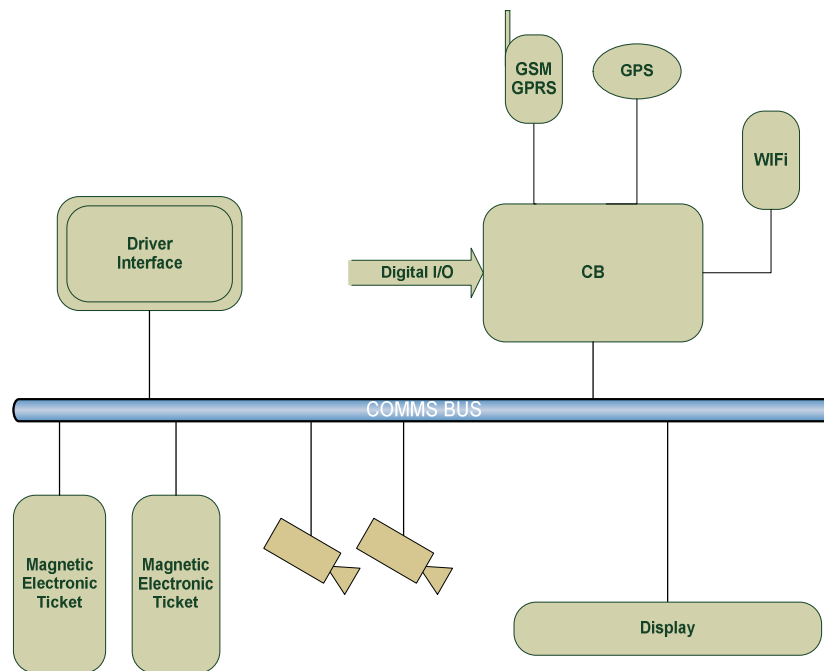
The measure was implemented in the following stages:

Stage 1: Planning and designing the measure (October 2008 – September 2009)

The research team together with the City Hall technicians decided and defined the integration of the surveillance cameras in the video surveillance system of the Municipality. Public procurement procedures and legislation for the purchasing phase of the equipment's were studied and defined. A portfolio of the companies that produce the equipment's was defined through a market analysis.

No	Item	Quantity
	IP cameras	10
	Access Units	3
	Subscribers	10
	DVR	1
	Video processing Software	1
	Put into service	

An overview schema of an integrated system is presented in the figure below:



Stage 2: Definition of methodology and measure concept (June 2009)

This activity was performed through a study on one of the RAT (Public Transport operator in Craiova) most important stations with large passenger flow and high risk of vandalism.

In this stage the stations and transportation vehicles, buses, which to be equipped with surveillance cameras have been identified.

On these basis the technical specifications for the system and the tender documentation has been prepared. The technical specification for the video-surveillance system have been integrated with the ones related to two other sub-system devoted to public transport management, developed in the same framework of the MODERN projects. These integrated systems are:

- the Vehicle monitoring system (AVM or GPS/GPRS system) and the associated Infomobility system developed through the measure M08.02;
- an e-ticketing system developed within the MODERN measure M02.04;
- the video-surveillance system subject of this measure.

These three sub-systems form an integrated system, which share most of the technical components of the overall architecture. All of them are connected to a common central dispatcher for data acquisition and PT management located in RAT headquarters.

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This work was the object of a specific deliverable; after its approval the documentation for the tender were prepared and the base for the surveillance system was defined.

Stage 3: Exploitation of the tender and contract definition

All the activities related to the preparation and the exploitation of the tender procedures were carried out regularly. The tender procedure has been exploited in the due time.

The call for tender and the related documents were published in January 2010. The tender procedure took place through the national tender electronic system. The tender winner was nominated in March 2010. The result of the tender was contested by 5 companies but all of them were rejected by National Claims Settlement Commission. Three of the participating companies have lodged appeals. The other two did not attend the tender. Current legislation allows anyone to submit appeals, even if it not participated in the tender. Public procurement legislation is already in a stage of revision and improvement at this chapter. Two of the contestant companies continue to claim the tender result in the Court of Law. These claims lead to a delay in implementation, the contestation process ending in June and the contract with the winner company was signed on 20 of June. Even in the third semester of the project the measure seems to be delayed, when the contract was signed the measure was recovered in the contractual timetable. The installation of the equipment started in June 2010 (month 20) together with the e-ticketing system.

Stage 4 : Test of the system (December 2009- May 2011)

The procurement and installation of the video-surveillance system was carried out by the provider ALIEN Concept Oradea together with the RAT technicians.

A specific schedule was agreed by RAT and the equipment provider in order to minimize the procurement time.

During the installation of the system components, functional tests were performed. Each stage of the testing has been specified in the system installation plan which was part of the contract. The installation plan included partial and final tests. The communication equipment and related software (communication and video processing software) were verified and tested, to assure a good connection between the field equipment and the central acquisition system installed in the RAT dispatcher centre.

The performance of the tested system reached all the specified parameters and the system was approved by RAT Craiova. The problems that the system had during the test phases weren't communicated to us by the equipment provider because the tender documents didn't specify step by step problem information.

The video surveillance cameras were installed on MAN Lion City type buses, using DVR for on board image storing and real time video transmission to the dispatcher centre.

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The central station (dispatcher) is located in the RAT control room which contains the integrated management system for the public transport fleet, including e-ticketing equipment, video surveillance devices and the GPS/GPRS tracking system and associated info-mobility system.

Stage 5: Installation and running of the overall system (June 2011- Sept. 2012)

After the finalization of the test the system was completely installed and started its operation.

The system was constantly monitored in order to intervene and correct any operational problems or technical and conceptual malfunctions.

During the operation of the system all the data necessary to perform the evaluation were collected.

B5 Interrelationships with other measures

The measure is related to other measures as follows:

- Measure 02.04 – Integrated e-ticketing system in Craiova
- Measure 08.02 – Info mobility tools for fleet management in Craiova

There is a synergic relation between them because of the same output level objectives. These three measures represent in a way one “smart measure” and the implementation of the equipment will be made on the same public transport vehicles.

C Impact Evaluation Findings

C1 Measurement methodology

C1.1 Impacts and Indicators

Table C1.1: Indicators.

No.	Impact	Indicator	Data used	Comments
2	Economy	Capital cost	Euros	The cost of the surveillance system
19	Transport	Quality of Service	Index %, qualitative	Face to face surveys to PT Perception of service quality of the surveillance system
14	Acceptance	Acceptance Level	Index %, qualitative	Face to face surveys to PT Acceptability of the surveillance system
13	Awareness	Awareness Level	Index %, qualitative	Face to face surveys to PT referring to having heard of surveillance system, understand the aim of the measure and the potential benefits and disadvantages of the measure.
17	Security	Perception of security	Index %, qualitative	Face to face surveys to PT
	Local indicator	Frauds level (%)	%	Recorded data to the RAT Dispatcher

Detailed description of the indicator methodologies:

Indicator 2 (Capital cost) – The capital cost from the budget of the project

Indicator 19 (Quality of Service) – Survey based on the perception of service quality

Indicator 17 (Perception of security) – Survey based on the perception of people security

Indicator 13 (Awareness level) – Survey based on the perception of benefits or disadvantages of the surveillance cameras in public transport vehicles and stations

Indicator 14 (Acceptance level) – Survey based on the perception of the acceptance of surveillance cameras in public transport stations and vehicles

The surveys were made to see the impact on PT users of the surveillance system installed on the RAT buses and stations.

150 questionnaires were distributed for the indicators 13, 14, 17 and 19 and we received back 100 filled questionnaires. The questionnaires were disseminated in bus stations, inside buses, sent by e-mail, or in some workshops organized by the evaluation team.

The feedback for evaluation (BAU situation) was 100 – filled questionnaires and the feedback for ex-post evaluation were 131 filled questionnaires. The questionnaires for BAU situation were disseminated to public transport users in stations, inside buses and during workshops organized by MODERN project team. The workshops were organized during the Communication Campaign and seminar presentation that took place between 3 - 5 May 2010, 6-7 hours per day in the street and in a pavilion located in the prefecture square (downtown).

In the agreement with the target group the e-mail and phone were kept for further contact for ex-post evaluation period.

The feedback of 100 and 131 questionnaires is satisfying for a population of 300.000 people in Craiova.

To be sure of obtaining such a sample we launched a number of questionnaires -150. The most important questions are:

The questionnaires were structured in 2 sections:

1. General information about citizens (job, age, gender, education level, contact data)
2. Questions referring to the measure split by indicator type:

a. Quality of service:

The most important questions were:

1. How do you estimate the quality of public transport in your city?
2. Do you consider that the quality of services in PT have been improved lately?

b. Perception of security:

The most important questions were:

1. How safe is PT now?
2. Have you had any unpleasant event on PT?
3. Lately, has people security increased?

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c. Awareness level

The most important questions were:

1. Have you heard about the measure?
2. Do you recognize the logo of the project?
3. Do you understand the aim of the project and the potential benefits and problems of the measures?
4. Have you noticed some benefit recently?

d. Acceptance level

The most important questions were:

1. How useful do you think the implementation of the measure is?
2. Do you accept or not the implementation of measure?

Local indicator: “Frauds level”- monthly reports of fraudulent passengers and antisocial incidents collected by RAT dispatcher is reported to us. The dispatcher is notified by a PT user of a fraudulent incident and the dispatcher records the notify in a database record. The fraud level is recorded only if the dispatch receives a notification from the PT user, else the fraud level is not registered.

C1.2 Establishing a Baseline

The negative aspects of the security lack in public transport system are more obvious in peak hours and late at night and affect more passengers, especially old people, women and children, people who usually take the bus every day. As a consequence, many people prefer for example to take their children to school by car or taxi not by bus or tram. A consequence of this is that at morning hours when the children are coming to school there are areas that have a very high congestion rate.

It should be said however, that some measures have been taken at the city level in order to limit the negative aspects due to the violation of traffic rules which endanger the lives of other road users. The municipal police has already installed 8 surveillance cameras for traffic survey only, in the biggest road crossroads in Craiova. The cameras are connected to a traffic monitoring center and provide in real time information taken from the traffic.

Unfortunately the legislation in Romania is old and the cameras can't be used directly to administer fines. The procedure is that after a notice has been issued, if the court of justice considers the tapes are released for justice intent.

With the coming of Ford in Craiova the City Council and the municipality are more engaged in the modernization of the road infrastructure and the safety of transport and that of the people that ride the buses or trams every day.

To establish a baseline for this measure it can be said with confidence that, before MODERN project, the municipality didn't take any measures to reduce the fraudulence levels in buses or trams and it would have not been implemented in the future.

The following tables illustrate the answers given by the people interviewed through a questionnaire they had to fill and the information is part of the indicator 19 (quality of service).

Indicators and respective parameters	Ex-Ante values
Indicator 19 – Very Dissatisfied	25%
Indicator 19 – Somewhat dissatisfied	55%
Indicator 19 – Satisfied	19%
Indicator 19 – Don't know	1%

Indicators and respective parameters	Ex-Ante values
Indicator 19 – Very Uncomfortable	24%
Indicator 19 – Somewhat Uncomfortable	53%
Indicator 19 – Uncomfortable	22%
Indicator 19 – Don't know	1%

The following table illustrates the answers given by the people interviewed through a questionnaire they had to fill and the information is part of the indicator 17 (perception of security).

Indicators and respective parameters	Ex-Ante values
Indicator 17 – Unsafe	34%
Indicator 17 – Somewhat safe	55%
Indicator 17 – Safe	9%
Indicator 17 – Very Safe	2%

The following table illustrates the answers given by the people interviewed through a questionnaire they had to fill and the information is part of the indicator 13 (awareness level).

Indicators and respective parameters	Ex-Ante values
Indicator 13 – Fairly well understand	41%
Indicator 13 – Well understand	19%
Indicator 13 – Very well understand	36%
Indicator 13 – Don't know	4%

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The following table illustrates the answers given by the people interviewed through a questionnaire they had to fill and the information is part of the indicator 14 (acceptance level).

Indicators and respective parameters	Ex-Ante values
Indicator 14 – Accept	92%
Indicator 14 – Don't accept	0%
Indicator 14 – Don't know	8%

Indicators and respective parameters	Ex-Ante values
Indicator "Frauds Level"	14

Indicators and respective parameters	Ex-Ante values
Indicator 2 – Capital costs	0

C1.3 Building the Business-as-Usual scenario

As mentioned earlier, before MODERN, the municipal police has already installed 8 surveillance cameras for traffic surveillance only, in the biggest crossroads in Craiova. In the absence of the MODERN project it is unlikely that Craiova Municipality would have installed cameras in stations and public transport vehicles, in the next future.

Normally in Craiova people don't walk more than one hour distance. This means that a person walks around 1 or 1.5 km per day. In this context Public Transport is a very important mean of commuting for most people.

The public transport in Craiova is mainly for people going to work in the morning, for children going to school and for older citizens that can't walk anymore long distances.

The urban development plan for Craiova for the next years is structured mainly for modernizing the transport infrastructure, and not to modernize the vehicles or to improve public security.

Therefore, Business as Usual scenario can be considered the same as the ex-ante situation as the Municipality of Craiova doesn't have a plan to introduce in Public Transport this kind of systems.

It cannot be estimated how much it will increase or decrease because frauds in a city are dependent on many factors that we can't control or assume.

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Indicators and respective parameters	BAU values 2009
Indicator 19 – Very Dissatisfied	25%
Indicator 19 – Somewhat dissatisfied	55%
Indicator 19 – Satisfied	19%
Indicator 19 – Don't know	1%
Indicators and respective parameters	BAU values 2010
Indicator 19 – Very Dissatisfied	25%
Indicator 19 – Somewhat dissatisfied	55%
Indicator 19 – Satisfied	19%
Indicator 19 – Don't know	1%
Indicators and respective parameters	BAU values 2011
Indicator 19 – Very Dissatisfied	25%
Indicator 19 – Somewhat dissatisfied	55%
Indicator 19 – Satisfied	19%
Indicator 19 – Don't know	1%
Indicators and respective parameters	BAU values 2012
Indicator 19 – Very Dissatisfied	25%
Indicator 19 – Somewhat dissatisfied	55%
Indicator 19 – Satisfied	19%
Indicator 19 – Don't know	1%

Indicators and respective parameters	BAU values 2009
Indicator 19 – Very Uncomfortable	24%
Indicator 19 – Somewhat Uncomfortable	53%
Indicator 19 – Uncomfortable	22%
Indicator 19 – Don't know	1%
Indicators and respective parameters	BAU values 2010
Indicator 19 – Very Uncomfortable	24%
Indicator 19 – Somewhat Uncomfortable	53%
Indicator 19 – Uncomfortable	22%
Indicator 19 – Don't know	1%
Indicators and respective parameters	BAU values 2011
Indicator 19 – Very Uncomfortable	24%
Indicator 19 – Somewhat Uncomfortable	53%
Indicator 19 – Uncomfortable	22%
Indicator 19 – Don't know	1%
Indicators and respective parameters	BAU values 2012
Indicator 19 – Very Uncomfortable	24%
Indicator 19 – Somewhat Uncomfortable	53%
Indicator 19 – Uncomfortable	22%
Indicator 19 – Don't know	1%
Indicators and respective parameters	BAU values 2009

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Indicator 17 – Unsafe	34%
Indicator 17 – Somewhat safe	55%
Indicator 17 – Safe	9%
Indicator 17 – Very Safe	2%
Indicators and respective parameters	BAU values 2010
Indicator 17 – Unsafe	34%
Indicator 17 – Somewhat safe	55%
Indicator 17 – Safe	9%
Indicator 17 – Very Safe	2%
Indicators and respective parameters	BAU values 2011
Indicator 17 – Unsafe	34%
Indicator 17 – Somewhat safe	55%
Indicator 17 – Safe	9%
Indicator 17 – Very Safe	2%
Indicators and respective parameters	BAU values 2012
Indicator 17 – Unsafe	34%
Indicator 17 – Somewhat safe	55%
Indicator 17 – Safe	9%
Indicator 17 – Very Safe	2%

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Indicator 13 – Well understand	19%
Indicator 13 – Very well understand	36%
Indicator 13 – Don't know	4%
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Indicator 13 – Fairly well understand	41%
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Indicator 13 – Very well understand	36%
Indicator 13 – Don't know	4%
Indicators and respective parameters	BAU values 2011
Indicator 13 – Fairly well understand	41%
Indicator 13 – Well understand	19%
Indicator 13 – Very well understand	36%
Indicator 13 – Don't know	4%
Indicators and respective parameters	BAU values 2012
Indicator 13 – Fairly well understand	41%
Indicator 13 – Well understand	19%
Indicator 13 – Very well understand	36%
Indicator 13 – Don't know	4%
Indicators and respective parameters	BAU values 2009
Indicator 14 – Accept	92%

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Indicator 14 – Don't accept	0%
Indicator 14 – Don't know	8%
Indicators and respective parameters	BAU values 2010
Indicator 14 – Accept	92%
Indicator 14 – Don't accept	0%
Indicator 14 – Don't know	8%
Indicators and respective parameters	BAU values 2011
Indicator 14 – Accept	92%
Indicator 14 – Don't accept	0%
Indicator 14 – Don't know	8%
Indicators and respective parameters	BAU values 2012
Indicator 14 – Accept	92%
Indicator 14 – Don't accept	0%
Indicator 14 – Don't know	8%

Indicators and respective parameters	BAU values 2009
Indicator “Frauds Level”	14
Indicators and respective parameters	BAU values 2010
Indicator “Frauds Level”	15
Indicators and respective parameters	BAU values 2011
Indicator “Frauds Level”	8
Indicators and respective parameters	BAU values 2012
Indicator “Frauds Level”	3

Indicators and respective parameters	BAU values 2009
Indicator 2 – Capital costs	0
Indicators and respective parameters	BAU values 2010
Indicator 2 – Capital costs	0
Indicators and respective parameters	BAU values 2011
Indicator 2 – Capital costs	0
Indicators and respective parameters	BAU values 2012
Indicator 2 – Capital costs	0

C2 Measure results

The results are presented under sub headings corresponding to the areas used for indicators – economy, energy, environment, society and transport.

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C2.1 Economy

Cost of the cameras installed in 10 stations and 15 buses.

Table C2.1.1: the cost of the cameras installed in 10 stations and 15 buses

Indicator	Ex-Ante 2009	BAU 2009	Ex-Post 2010	BAU 2010	Ex-Post 2011	BAU 2011	Difference Ex-Post - Ex Ante	Difference Ex-Post - BAU
Indicator 2' – Capital cost	0	0	0	0	39'000 €	0	39'000 €	39'000 €

From the table above it is clearly shown that without this project the Municipality wouldn't have invested in security systems for Public Transport.

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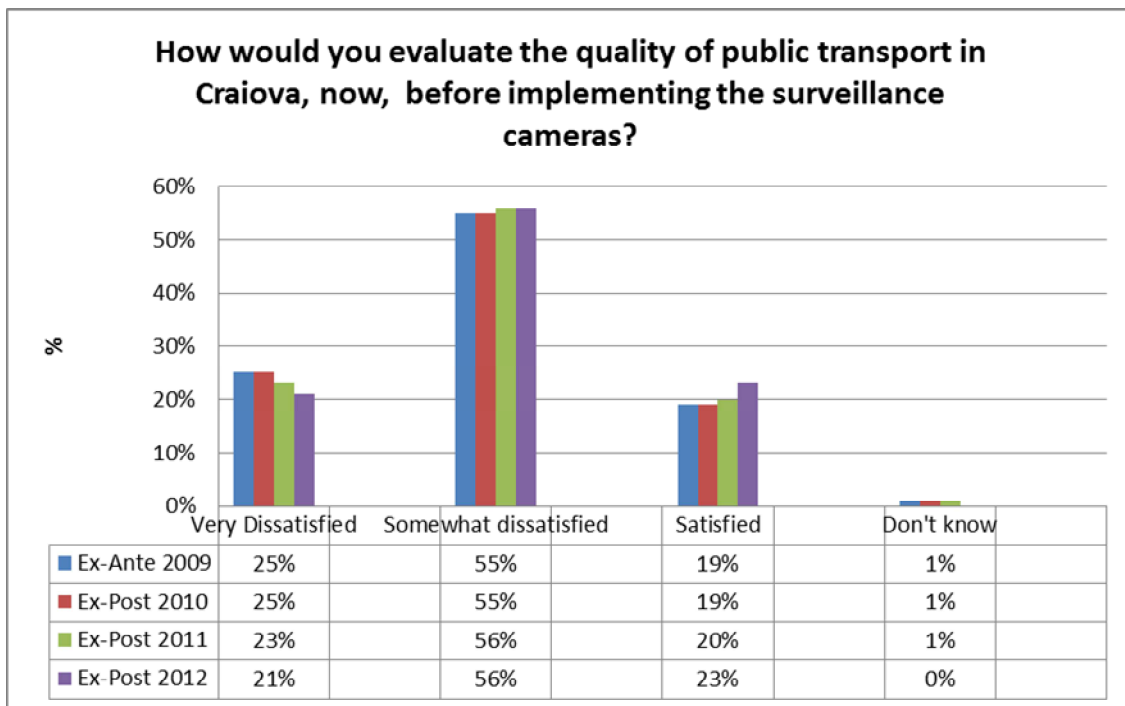
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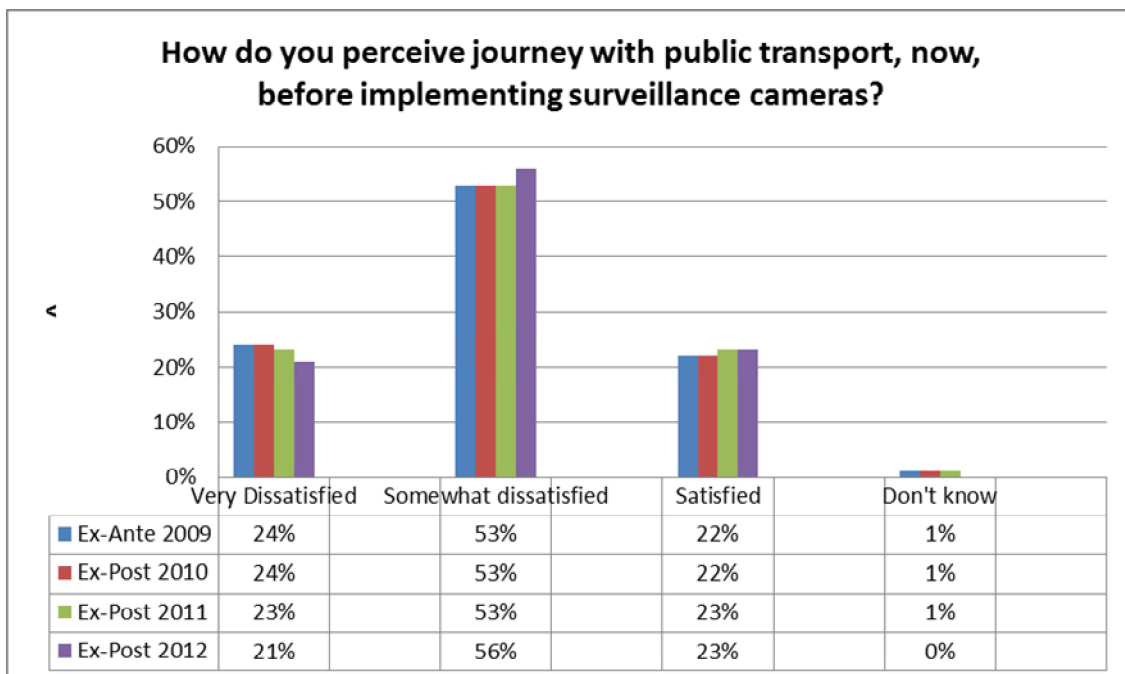
C2.4 Transport

Indicator	Ex-Ante 2009	BAU 2009	Ex-Post 2010	BAU 2010	Ex-Post 2011	BAU 2011	Ex-Post 2012	BAU 2012	Difference Ex-Post - Ex Ante	Difference Ex-Post - BAU
Indicator 19 Quality of Service	25 % very dissatisfied 55 % somewhat dissatisfied; 19% Satisfied 1 % don't know	25 % very dissatisfied 55 % somewhat dissatisfied; 19% Satisfied 1 % don't know	25 % very dissatisfied 55 % somewhat dissatisfied; 19% Satisfied 1 % don't know	25 % very dissatisfied 55 % somewhat dissatisfied; 19% Satisfied 1 % don't know	23 % very dissatisfied 56 % somewhat dissatisfied; 20% Satisfied 1 % don't know	25 % very dissatisfied 55 % somewhat dissatisfied; 19% Satisfied 1 % don't know	21 % very dissatisfied 56 % somewhat dissatisfied; 23% Satisfied	25 % very dissatisfied 55 % somewhat dissatisfied; 19% Satisfied 1 % don't know	-4% very dissatisfied 1% somewhat dissatisfied 4% Satisfied	-4% very dissatisfied 1% somewhat dissatisfied 4% Satisfied
	24 % very uncomfortable 53% somewhat comfortable 22% comfortable 1 % don't know	24 % very uncomfortable 53% somewhat comfortable 22% comfortable 1 % don't know	24 % very uncomfortable 53% somewhat comfortable 22% comfortable 1 % don't know	24 % very uncomfortable 53% somewhat comfortable 22% comfortable 1 % don't know	23 % very uncomfortable 53% somewhat comfortable 23% comfortable 1 % don't know	24 % very uncomfortable 53% somewhat comfortable 22% comfortable 1 % don't know	21 % very uncomfortable 56% somewhat comfortable 23% comfortable	24 % very uncomfortable 53% somewhat comfortable 22% comfortable 1 % don't know	-3 % very uncomfortable 3% somewhat comfortable 1% comfortable	-3 % very uncomfortable 3% somewhat comfortable 1% comfortable

Table C2.4.1: quality of service results



Picture 1 C2.4.1



Picture 2 C.2.4.2

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As it can be seen from the pictures above, the dissatisfied value from the ex-ante period is dropping from 25% to 21% for the first question and from 24% to 21% for the second question. On the contrary, the number of satisfied persons begun to increase in 2011 and 2012. The limited increase is partly due to the fact that these kind of changes in the perception of the quality of public transport need time to be consolidated. So we expect that these values will increase in the future to respectable numbers.

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C2.5 Society

Table C2.5.1: Society indicators values

Indicator	Ex-Ante 2009	BAU 2009	Ex-Post 2010	BAU 2010	Ex-Post 2011	BAU 2011	Ex-Post 2012	BAU 2012	Difference Ex-Post - Ex Ante	Difference Ex-Post - BAU
Indicator17 (Perception of security)	34 % unsafe; 55% somewhat safe; 9% safe; 2 % very safe;	34 % unsafe; 55% somewhat safe; 9% safe; 2 % very safe;	34 % unsafe; 55% somewhat safe; 9% safe; 2 % very safe;	34 % unsafe; 55% somewhat safe; 9% safe; 2 % very safe;	32 % unsafe; 53% somewhat safe; 13% safe; 2 % very safe	34 % unsafe; 55% somewhat safe; 9% safe; 2 % very safe;	29 % unsafe; 54% somewhat safe; 15% safe; 2 % very safe	34 % unsafe; 55% somewhat safe; 9% safe; 2 % very safe;	-5 % unsafe; -1% somewhat safe; 6% safe; 0 % very safe	-5 % unsafe; -1% somewhat safe; 6% safe; 0 % very safe
Indicator 13(Awareness level)	41% fairly well understand; 19% well understand; 36% very well understand 4% don't know	41% fairly well understand; 19% well understand; 36% very well understand 4% don't know	41% fairly well understand; 19% well understand; 36% very well understand 4% don't know	41% fairly well understand; 19% well understand; 36% very well understand 4% don't know	36% fairly well understand; 25% well understand; 38% very well understand; 1% don't know	41% fairly well understand; 19% well understand; 36% very well understand 4% don't know	5% fairly well understand; 51% well understand; 44% very well understand;	41% fairly well understand; 19% well understand; 36% very well understand 4% don't know	-36 fairly well understand; 32 well understand; 8 % very well understand	-36 fairly well understand; 32 well understand; 8 % very well understand
Indicator 14 (Acceptance level)	92 % accept; 8 % don't know	92 % accept; 8 % don't know	92 % accept; 8 % don't know	92 % accept; 8 % don't know	95 % accept; 5 % don't know	92 % accept; 8 % don't know	95 % accept; 2% don't accept 3 % don't know	92 % accept; 8 % don't know	3 % accept; 2% don't accept -5 % don't know	3 % accept; 2% don't accept -5 % don't know

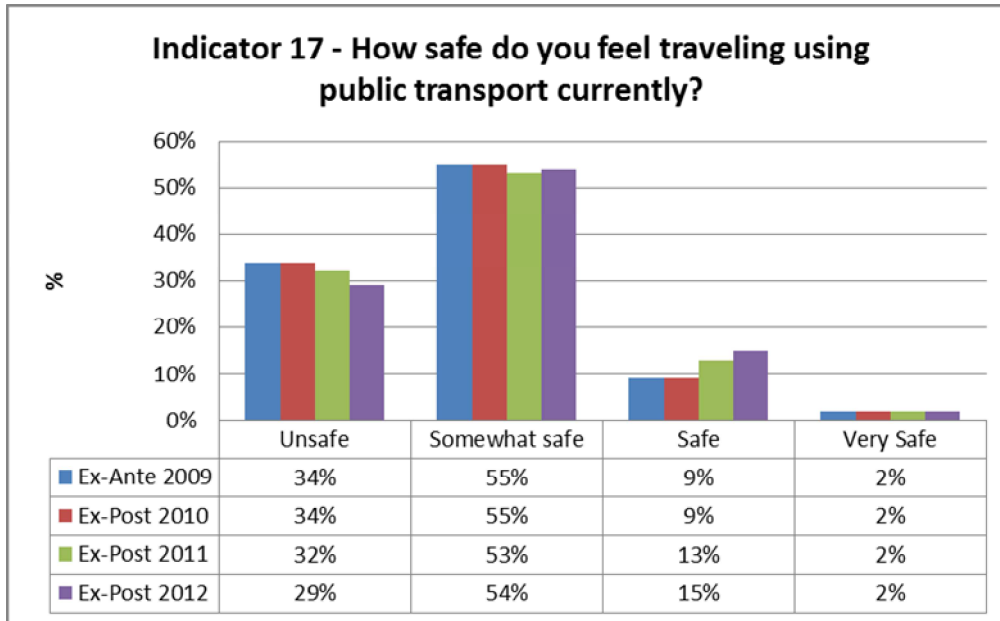
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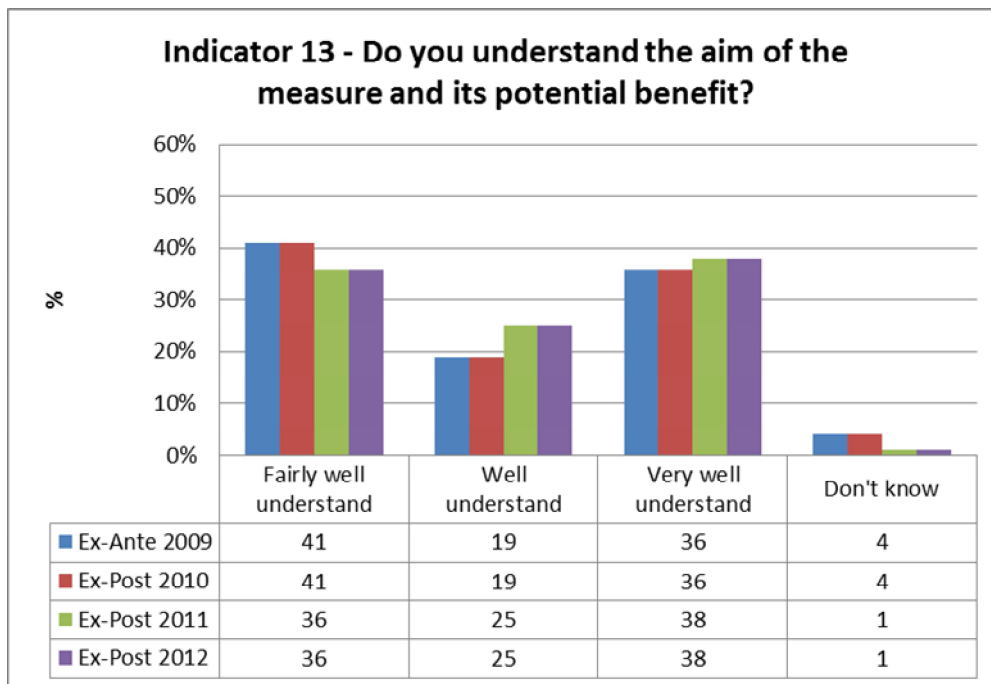
Measure number: 05.05

Indicator	Ex-Ante 2009	BAU 2009	Ex-Post 2010	BAU 2010	Ex-Post 2011	BAU 2011	Ex-Post 2012	BAU 2012	Difference Ex-Post - Ex Ante	Difference Ex-Post - BAU
Local indicator: "Frauds level"	About 13-14 /year	About 13-14 /year	About 13-14 /year	About 13-14 /year	0 antisocial events on lines "9" and"E1R"	About 13-14 /year	3 antisocial events(on lines "9" and"E1R") after 6 months of operation system	About 13-14 /year	Decrease by 50% lines "9" and"E1R"	Decrease by 50% lines "9" and"E1R"



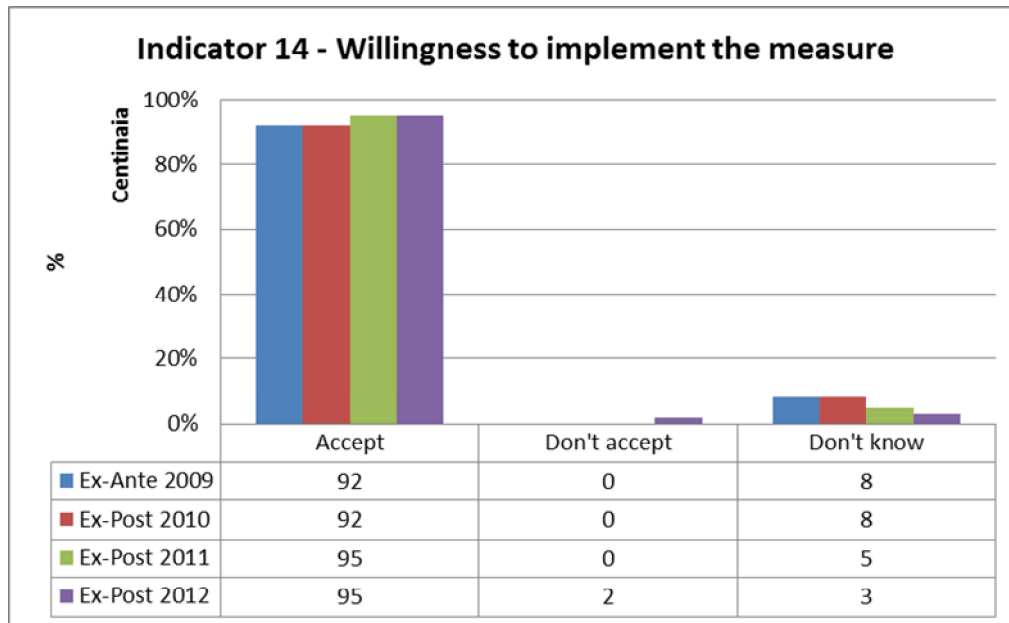
Picture 3 C2.5.1

In the picture above at the question How safe do you feel traveling using public transport currently?, there is an improvement in the feeling of safety of the PT users. The values increase from 9% to 15% in two years and the system is only implemented on 15 buses, that is 8% of the total bus fleet of RAT Craiova.



Picture 4 C2.5.2

The picture above shows that the measure is very well understood: 38% of the PT users understand what are the advantages and results of this measure.



Picture 5 C2.5.3

As we can see from the picture above all the population of Craiova that uses PT in some form, accept as a positive fact the implementation of this measure.

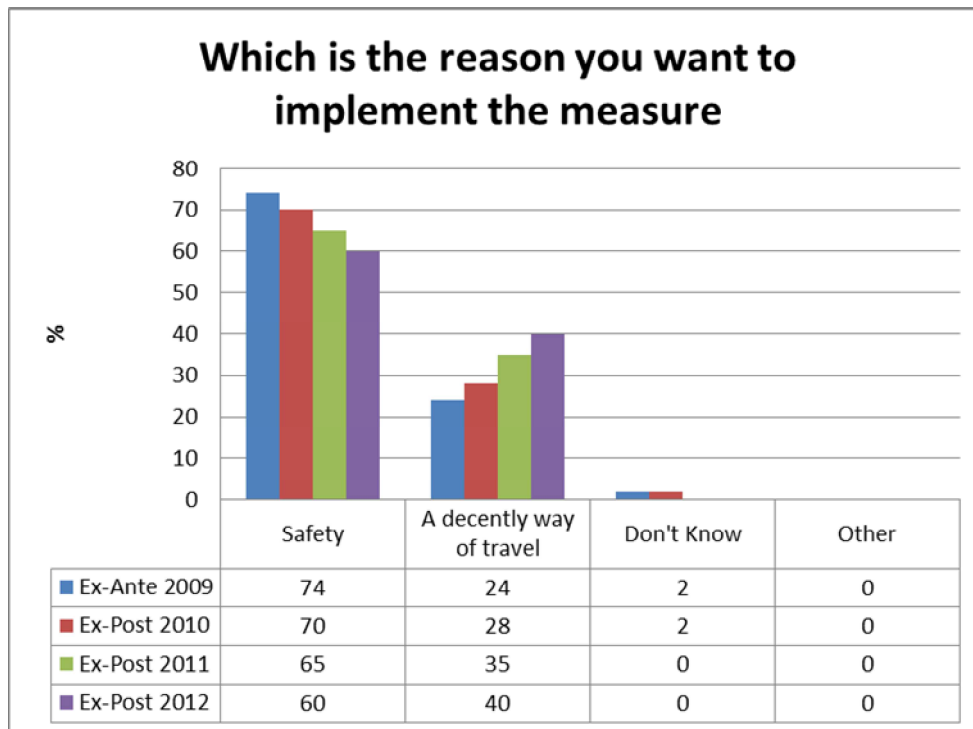


Figure 6 Implementing reason

In the questionnaires one of the questions was about the reasons why this measure should be implemented. As you can see from the figure above an average 65% of the interviewed people want the implementation of this measure as they want more secure public transport vehicles and stations. As expected, after the implementation of the measure, the “security ” answer decreased, while the answer “a decent way of travel” increased. This is due to the fact that, when people feel themselves safe, then they want more quality in PT.

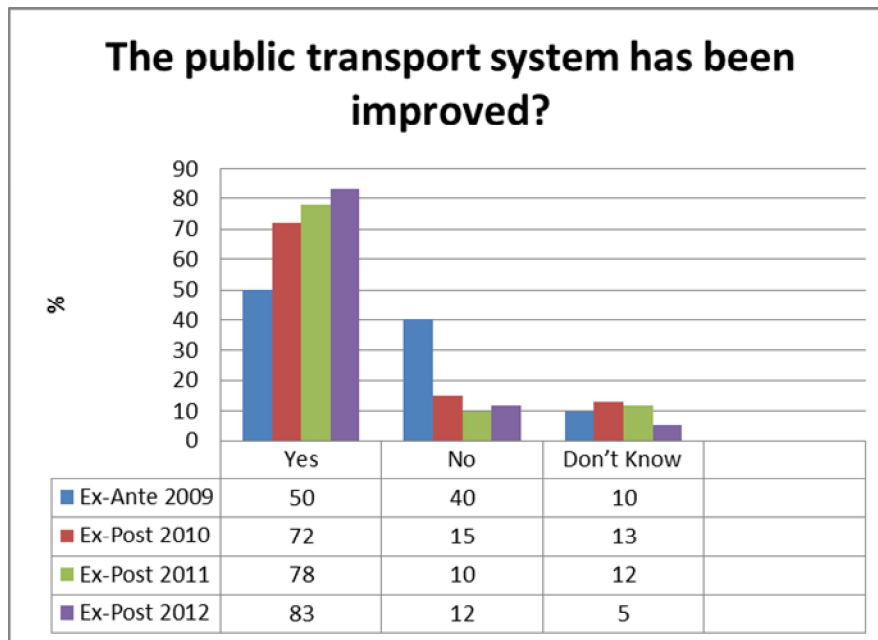
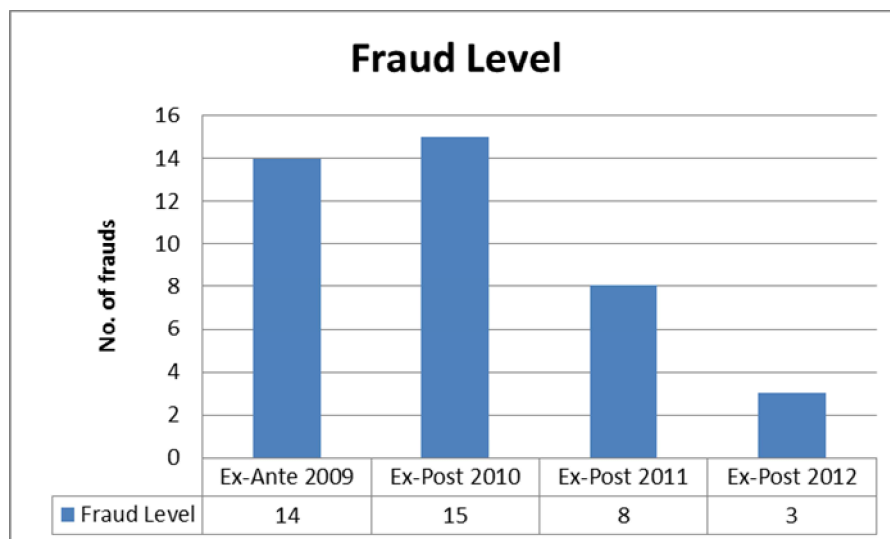


Figure 7 Improvement of the PT



Picture 8 C2.5.4

The fraud level was almost the same in 2010 as in the ex-ante period but in 2011 and 2012 the number of frauds drastically decreased. This decrease should be due to the surveillance system implemented in the PT system.

C3 Achievement of quantifiable targets and objectives

No.	Target	Rating
1	To install video surveillance cameras in 10 stations and 15 buses	**
2	To decrease fraudulent and antisocial issues by 10% in PT	**
3	To increase the perception of security by 3 %	**
NA = Not Assessed O = Not Achieved * = Substantially achieved (at least 50%) ** = Achieved in full *** = Exceeded		

C4 Up-scaling of results

RAT Craiova intends to upscale the measure to trams but it depends on the Municipality budget. Trams have a higher average occupancy and an implementation of a surveillance system is needed in order to make trams more pleasant to public transport travelers.

The upscaling of the results is needed but when and how it will be applied is not known, therefore an evaluation of the impact if this measure can be upscaled can't be done at this moment.

C5 Appraisal of evaluation approach

The evaluation strategy of this measure has been focused on surveys (face to face and by e-mail) to public transport users in order to analyze their perception of the service quality, security, and frauds level. At the same time, the awareness and acceptance level were assessed.

The number of distributed questionnaires in the ex-ante survey was 150 and the feedback was 100. The number of distributed questionnaires in the ex-post survey (August 2011) was 150 and the feedback was 131.

Each person involved in the ex-ante survey provided to us the telephone number and the e-mail address in order to be involved in the ex-post surveys, too.

The people involved in these surveys were 80% youth (mainly students that use public transport) and 20% people over the age of 35.

The indicator "Fraud level" has been assessed following the recording from each surveillance camera placed on 10 stations and 15 buses.

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C6 Summary of evaluation results

The key results are as follows:

Key result 1 – Taking into consideration the surveys done by PT users, the perception of security increased by 4 % and people feel more protected from pocket or bag thieves

Key result 2 – The frauds level decreased by 50% because thieves or agitators are discouraged by surveillance cameras that keep recording the antisocial events. On the other hand, people still block the ticket boxes in stations.

Key result 3- From the surveys, people`s satisfaction concerning the quality of service increased with 4%, also, 95% of surveyed people consider the surveillance system useful and 80% noticed the benefits of the system.

C7 Future activities relating to the measure

Continuous dissemination of the survey`s results will make the municipalities from other cities aware of the benefits that come with a system like this and will see our good practices in order to implement the surveillance system to protect the people of their cities.

In the future, Craiova Municipality intends to install surveillance cameras in all important intersections having as the main target traffic monitoring but also public safety.

D Process Evaluation Findings

D.0 Focused measure

X	0	No focused measure
	1	Most important reason
	2	Second most important reason
	3	Third most important reason

D.1 Deviations from the original plan

The deviation from the original plan comprised:

Deviation 1 – Number of PT vehicles and stations endowed with video surveillance cameras: In the original plan 10 buses, 5 trams and 5 passenger stations were foreseen to be equipped with surveillance cameras. During the project, RAT Company considered more useful to install all the internal surveillance cameras on 15 new buses of the fleet, renouncing to install it on 5 trams. Then, the number of the stations was increased from 5 to 10, as the financial resources achieved allowed a larger number of the monitored stations. This of course gave the possibility to have a better level of service.

D.2 Barriers and drivers

D.2.1 Barriers

Preparation phase

Cultural – People feel uncomfortable because of the cameras recording them

Technological – Technological problems, it means the system won't allow the real-time transmission of data just recorded, that leads to a difficult real-time detection of antisocial incidents.

Implementation phase

Cultural – Peoples feel uncomfortable because of the cameras recording them

Planning – The period for tender was very long because of appeals, so the implementation of surveillance cameras system was delayed

Technological – Technological problems, it means the system won't allow the real-time transmission of data just recorded, that leads to a difficult real-time detection of antisocial incidents.

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Operation phase

Cultural – There are people who do not agree being kept under observation and consider the video surveillance system as an invasive tool in terms of its own privacy.

Technological – The system working in the buses doesn't allow the real time transmission of data just recording and the antisocial incidents are viewed on request and in case of complaints.

D.2.2 Drivers

Preparation phase

Organizational – IPA's research team is professional and there was a strong and clear leadership. The measure leader is a professional and highly motivated person to implement the surveillance system in Craiova.

Implementation phase

Planning – Positive results of testing during surveillance system installation

Organizational – IPA's research team is professional and there was a strong and clear leadership. The measure leader is a professional and highly motivated person to implement the surveillance system in Craiova.

Operation phase

Planning – Positive results of testing during installation and operation

Organizational – The technical team is professional and there was a strong and clear leadership. The measure leader is a professional and highly motivated person to implement the surveillance system in Craiova.

D.2.3 Activities

Preparation phase

Cultural – Implementation team and Local Dissemination Manager organized public events during which they explained the positive aspects of the surveillance system for personal security.

Organizational – Meetings of the measure team with RAT top management to emphasize the importance of the measure to obtain their maximum facilitating support. The measures

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M02.04, M08.02 and M 05.05 are implemented on the same vehicles and work as an integrated system.

Technological – The research team needed additional know-how to solve the data transmissions and try to offer a real time transmission. They tried to establish some collaboration with extern experts to solve the problem.

Implementation phase

Cultural – The implementation team and the Local Dissemination Manager organized public events during which they explained the positive aspects of the surveillance system for personal security.

Planning – The evaluation team for offers tried to be very quick to recover the wasted time with tender procedures.

Organizational – Meetings of the measure team with RAT top management to emphasize the importance of the measure to obtain their maximum facilitating support. The measure M02.04 and M08.02 and M 05.05 are implemented on the same vehicles and work as an integrated system.

Technological – The research team needed additional know-how to solve the data transmissions and try to offer a real time transmission. They tried to establish some collaboration with extern experts to solve the problem.

Operation phase

Cultural – The implementation team and the Local Dissemination Manager organized public events during which they explained the positive aspects of the surveillance system for personal security.

Technological – Monitoring the system in order to adjust, remove malfunctions if necessary and set up the technical parameters so that it operates in optimal mode and provides trust to travelers.

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D.3 Participation

D.3.1. Measure Partners

Measure partner 1 Leading Role – IPA – IPA SA is a 47 year old Romanian industrial R & D company and it is the Romanian national institute for research and development, engineering in energy, automation and IT, with a large experience in European projects in technology transfer and information dissemination.

Measure partner 2 Principle Participant – RAT – Craiova Public Transport Company is the main public transport operator in the whole Oltenia region. In Craiova Municipality (320,000 inhabitants) it provides the citizen transport by trams, buses and micro-buses it owns (250 vehicles), transporting 65 millions of travellers every year.

Measure partner 3 Occasional Participant – LCM – The Local Council of Craiova Municipality (Primaria Municipiului Craiova) was organized and functions according to Law No. 215/2001 regarding Local Public Administration with the subsequent modification and completion.

D.3.2 Stakeholders

Stakeholder 1 – Alien Concept Company- The company is one of the best from Romania regarding the production of video – surveillance cameras equipment for buses and passenger stations. The company supplies all the necessary equipment, installs it and makes the requested tests.

Stakeholder 2 – Local Police – In Craiova it was set up a video monitor centre belonging to the Local Police in order to survey the big intersections of the city. This Police monitor centre can be connected to RAT video monitor centre (10 bus stations), in order to have more information for solving antisocial incidents.

D.4 Recommendations

D.4.1 Recommendations: measure replication

Study, Demo platform, Equipment – To study what kind of investment will be made in the demo area to keep the initial place of surveillance cameras in stations and not to be forced to change it.

D.4.2 Recommendations: process (related to barrier-, driver- and action fields)

PT users, Cameras, Safe environment, Afraid – The initial view of the people that use the public transport every day is that the municipality is spying on them with the cameras every time. This feeling is only at the beginning and after a period they realize that those

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cameras are helping them to get a much nicer ride and a safer environment. For other cities that want to implement the surveillance system in their public transport the indignation of the people who use PT every day is just temporary, but after a while everything is ok.

Annex 1 – Ex-ante questionnaire

Instructions

This survey is part of an European project - MODERN (Mobility, development and reducing energy consumption) and aims to collect your experiences in traveling by buses

Surveillance System to be applied consists of cameras installed in 10 stations and 15 buses and communication equipment that will transmit images from monitored sites to RAT dispatcher.

Your answers will be treated confidentially.

Thank you for your participation!

Ex-ante questionnaire

M 05.05: PUBLIC TRANSPORT SECURITY PROGRAM IN CRAIOVA

1. Gender: F M

2. Age:

Up to 15	15-24	25-45	45-54	55-65	over 65

3. Background (the last education institution graduated):

· master	· faculty	· secondary school	· primary school

4. Labor market status:

employed	unemployed	student

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5. Public transport user

yes no

Awareness level

6. Do you know the MODERN project and measure?

yes no Don't know

7. How important are the following sources of information concerning installing the camera surveillance system on buses and stations?

	unimportant	Rather unimportant	Rather important	Very important	I don't know
Transport Company of Craiova- RAT website	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
Media	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
Colleagues/acquaintances	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
Forums or similar on the internet	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
Other, please specify below:	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆

8. Do you understand the aim of the measure and its potential benefit?

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fairly understand	well understand	well understand	very well understand	Don't know

Acceptance level

9. What is your opinion related to installing camera surveillance system in buses and stations?

Less good	good	Quite good	Very good	Don't know

10. Willingness to implement the measure:

Accept	Do not accept

11. Which is the first reason for which you want to implement the measure?

<input type="checkbox"/> 1	safety
<input type="checkbox"/> 2	A decently way to travel
<input type="checkbox"/> 3	Other, specify
<input type="checkbox"/> 4	Do not know

Quality of services

12. How would you evaluate the quality of public transport in Craiova, now, before implementing the surveillance cameras?

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Very dissatisfied	Somewhat dissatisfied	satisfied	Very satisfied	Don't know

13. How do you perceive journey with public transport, now, before implementing surveillance cameras?

uncomfortable	Somewhat Comfortable	Comfortable	very Comfortable	Don't know

14. Have you ever filled questionnaires for the project -MODERN?

<input type="checkbox"/> _1	Yes
<input type="checkbox"/> _2	no

Perception of security

15. How safe you feel traveling by public transport currently?

unsafe	Somewhat safe	Quite safe	safe	Very safe

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Annex 2 – Ex-Post Questionnaire

Instructions

This survey is part of an European project - MODERN (Mobility, development and reducing energy consumption) and aims to collect your experiences in traveling by buses

The Surveillance System has applied consists of cameras installed in 10 stations and 15 buses and communication equipment that transmits images from monitored sites to RAT dispatcher

Your answers will be treated confidentially.

Thank you for your participation!

Ex-post questionnaire

M 05.05: PUBLIC TRANSPORT SECURITY PROGRAM IN CRAIOVA

1. Gender: F M

2. Age:

Up to 15	15-24	25-45	45-54	55-65	over 65

3. Background (the last education institution graduated):

· master	· faculty	· secondary school	· primary school

4. Labor market status:

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employed	unemployed	student

5. Public transport user

yes no

Awareness level

6. Do you know about the progress of the measure?

yes no Don't know

7. How important are the following sources of information concerning installing the camera surveillance system on buses and stations?

	unimportant	Rather unimportant	Rather important	Very important	I don't know
Transport Company of Craiova- RAT website	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
Media	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
Colleagues/acquaintances	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
Forums or similar on the internet	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
Other, please specify below:	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆

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8. Do you understand the benefits of the measure after implementation and for the near future?

fairly understand	well understand	very well understand	Don't know

Have you noticed the benefits of the measure lately?

yes no don't know

Acceptance level

10. What is your opinion related to installing camera surveillance system in buses and stations?

Less good	good	Quite good	Very good	Don't know

11. Willingness to keep and extend the surveillance system to more PT vehicles and stations:

Accept	Do not accept

12. Which is the first reason for that you want to keep and extend the surveillance system to more PT vehicles and stations in the near future?

<input type="checkbox"/> 1	safety
<input type="checkbox"/> 2	A decently way to travel
<input type="checkbox"/> 3	Other, specify:.....
<input type="checkbox"/> 4	Do not know

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Quality of services

13. How would you assess the quality of public transport in Craiova, now, after implementing the surveillance cameras?

Very dissatisfied	Somewhat dissatisfied	satisfied	Very satisfied	Don't know

14. How do you perceive journey with public transport, now, after implementing the surveillance cameras?

uncomfortable	Somewhat Comfortable	Comfortable	very Comfortable	Don't know

15. Do you think the public transport services have been improved lately?

yes	no	Don,t know

16. Have you ever filled questionnaires for the project -MODERN?

<input type="checkbox"/> 1	Yes
<input type="checkbox"/> 2	no

Perception of security

How safe do you feel traveling by public transport after the implementation of the surveillance system?

unsafe	Somewhat safe	Quite safe	safe	Very safe
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Do you think the public transport has been safer lately?

Safer than before	no safer than before	Don't know

The questionnaires were completed by the following class of people:

female	male
39 %	61%

Up to 15	15-24	25-45	45-54	55-65	over 65
3%	2%	22%	38%	20%	15%

citizen passing through or living in the city center	Car owner passing through city center
47 %	53%