Project no. 516235

MISS

MONITOR INTEGRATED SAFETY SYSTEM

Instrument: STREP

Thematic Priority: Sustainable Surface Transport

D13 Final Management Report M30

Period covered: from 01/01/2006 to 30/06/2007

Date of preparation: 30 June 2007

Start date of project: 01/01/2005

Duration: 30

Project coordinator name: Ing. Pietro Luminasi
Project coordinator organisation name: PROBO

Revision: 0.2

Revision History

SINTRA	Template
UNIUD	Project Execution, Role and Results
BLIC	Role and Results
SRM	Role and Results
UNIUD	Publishable results
COI	Dissemination Knowledge description
SINTRA	Harmonization
SRM	Table Dissemination of knowledge
CRF	
SINTRA (FF)	Enhancing and supervising draft

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1. Publishable Final Activity Report

1.1 Publishable executive summary

The MISS project proposes an innovative platform to dynamically sense and predict natural and infrastructure conditions in order to improve the safety and the efficiency of road transport operations in a multi-environmental scenario. This project wants to increase citizens' and road operators' safety by enabling an intelligent and dynamic road surveillance network and by streamlining the tasks of law enforcement and road maintenance agencies and organizations.

1.2 Project execution

The MISS project envisages various innovative technologies that can be seamlessly combined with existing legacy systems.
In particular, the following innovative solutions have been proposed:

- a Unified Operative Centre that enables road maintenance and fire brigade officers to share information effectively,
- mobile units that can effectively exchange data with the UOC (i.e. acquisition of digital images (or short video sequences) to record road conditions).
- Risk Assessment System combined with Traffic Flow Models.

The platform is composed by two main components:

1. the **"Unified Operative Centre" (UOC)** aimed at improving vehicles' safety and mobility**.** The UOC has to support and integrate the activities of different structures at provincial level. It manage the road monitoring activities of these organisations: Urban Police, Civil Protection and Road Maintenance Services, and will support operational, and planning decisions, extending road knowledge, and using Information Technology tools to store and to extract all needed information.
   The UOC shares technological and human resources, leaving the three entities' services virtually separated. In this way it will be possible to reduce, both management and structural costs.

   Further application could be easily developed and implemented for other local fleet managers, such us public transport operators and fire brigades.
2. an innovative on-board kit installed on fleet cars and will include a black box named **"MISS Storage & Communication Unit" (MSCU)**, where infrastructure data and road events can be stored. In case of need, they can be sent to the UOC via a radio communication network.

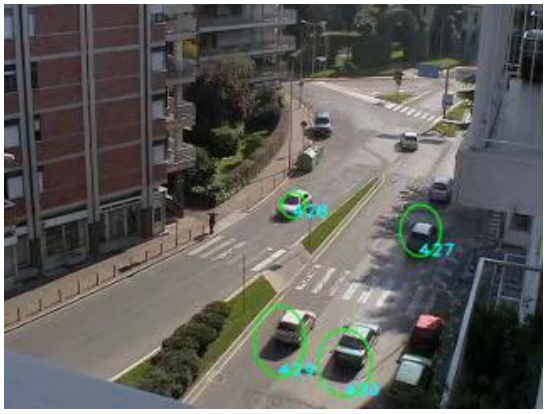
The MSCU on-board platform includes an automotive PC, a GPRS/GPS/TETRA communication and localization device, a small touch-screen LCD display, a USB 2 camcorder and an advanced storage unit.
The new Solid State Disk based on NAND Flash technology has been developed specifically for the MISS Project and will enable higher transfer rates using a newly released interface named SATA – Serial Advanced Technology Attachment and will be able to respond quicker and provide real time assistance.

Comment [L1]: FOR EUNICS PLEASE INSERT THE PC MODEL

The innovative aspects are:

1. Information about road traffic has to be supplemented by information gathered by Police officers, Fire Department officers etc, and has to be effectively and reliably exchanged. Due to the reliability needs, the **Tetra** system has been employed in the MISS Project. Tetra is an innovative data&voice transmission system. It is designed for emergency situations, when almost instantaneous communication is required, both between individuals and within a group of an unlimited size. Priority calls can be made, backed by call pre-emption if required, and, on occasions, all-informed communication. It offers fast call set-up time, group communication support, direct mode operation between radios, packet data and circuit data transfer services, frequency economy and security features. The integration of Tetra infrastructure in the MISS project has demonstrated data exchange between actors more reliable and effective. Tetra transmitting devices are integrated in the MSCU.

2. Within the MISS project , research has been conducted on automatic road traffic monitoring systems. In particular, the focus was on detection of anomalous traffic events that could lead to dangerous situations or accidents. A market review of existing **Automatic Traffic Surveillance systems** evidenced the fact that current applications provide only basic functionalities (i.e. speed of the traffic flow, detection of queues), but are unable to actually detect potentially dangerous events. More sophisticated techniques have been investigated in the MISS project. In fact, a road traffic monitoring system has to operate in crowded and complex environments where anomalous events have to be distinguished from the normal course of actions. What constitutes an anomalous event can be automatically detected as a deviation from common patterns of activity. Studied algorithms are based on the analysis of of the movement of vehicles and pedestrians. They can support behaviour-understanding modules by grouping vehicles trajectories into common patterns of activity (clusters) in order to readily identify anomalous events. To experimentally validate the proposed approach, after a thorough survey of the state of the art, relevant functions and procedures to be developed have been identified and designed. Results obtained so far have been published in the proceedings of prestigious refereed international conferences.



Final results will be submitted to accredited international journals in the field of automotive and Intelligent Transportation Systems (ITS) research.

3. Integration of effective and reliable alerting system with Dynamic Traffic Assignment (DTA) and an Accident Risk Rating, geo-coded in a GIS network produces a great added value of the project. When an anomalous event occurs (and is detected), the possible influence on traffic flow in the whole province can be precisely predicted. Risk Assessment System can even delimit the areas where accidents are likely to happen. Information about risk is vital for province authorities because road network optimization process should be based on that information. The MISS Computing Platform includes the development of a **Risk Assessment Algorithm (MISS-RAA)** able to produce quantitative measures (e.g. probability) for assessing the risk associated with a specific section or location due to roadway conditions, weather conditions and the prevailing traffic conditions. Risk management consists of five main procedures: Hazard analysis, Consequence analysis, Risk Calculation, Risk Evaluation and Risk Treatment. The RAA is composed of the first four procedures. Risk Management requires the establishment of a transport network monitoring system that capable of retrieving the roadway conditions, the weather conditions, and the traffic conditions. The transport monitoring system is usually comprised of automated detection systems and manual dedicated observers. Automated detection devices are either stationary (installed at the roadway infrastructure) or mobile (installed in dedicated vehicles (e.g. police cameras). Manual observation is conducted usually by police officers or dedicated personnel of the transport companies. The MISS RAA platform also provides a transport model that is based on Dynamic Traffic Assignment (DTA) model that will produce estimates of the traffic conditions for various types of incidents and the associated potential rerouting options.

Four complementary Pilot Applications have been set up to demonstrate the main features of the platform.

Bologna (I) - Pilot Application

The principal demonstration took place in Bologna. The UOC implemented different application profiles for each operator role in every organization (Road Maintenance Unit, Provincial Police and Provincial Civil Guard in the province of Bologna).

In the Province of Bologna pilot site, the UOC framework integrates the existing GIS map data, but, adopting the “cartographic project” concept, it was possible to share some layers among the three organizations and, at the same time, to specialize the profile making available other layers for one organization only.

All the necessary activities to create the infrastructure for the UOC have started and the implementation of on board unit on the testing vehicles has been done.

Furthermore, MISS partners have worked towards the development of the Risk Assessment System of the provincial road network of Bologna. The three-year geo-coded accident database that is maintained by the Province of Bologna has been analysed by means of advanced statistical methods, such as the classification and regression trees. Following the accidents database analysis, the researchers have converted the VISUM model of the road network of the Province of Bologna into a geo-coded GIS network with the related Origin-Destination matrices, zones and centroids. This converted datasets have been modelled by means of the VISTA system (Visual Interactive System of Transportation Algorithms). This procedure included the necessary steps in order to complete a Dynamic Traffic Assignment: Cell generation, Demand Profile, Dynamic User

Equilibrium, Dynamic Path Generation and Final Simulation. The final result is the development of an accident risk rating, geo-coded in a GIS network, of the Province of Bologna road network. An on-line opinion stated preference questionnaire addressed to expert bus drivers in Bologna will provide extra data helpful to define and classify road risks for operators and citizens.

Berlin (D) - Pilot Application

The demonstration of MISS equipment planned for the public transport application for the Berlin test site aimed at the improvement of traffic safety for buses, passengers and private road traffic. The MSCU will be used for fast reaction against illegal parking on reserved lanes and at bus stops. A bus equipped with a digital video camera has documented illegal parking on the spot and enabled dispatchers to initiate immediate enforcement actions. Since data privacy of private persons is tackled by taking images of stops, the intended operation was negotiated with the commissioner for data privacy of the state of Berlin to fulfil all legal demands.
Furthermore, a digital camera (or camcorder) attached to mobile unit has allowed automatic inspection of bus stops, performed during the normal operation of the bus.
Additionally, the researchers have compiled an online expert opinion stated preference questionnaire for the Berlin pilot. This has lead to the development of a risk assessment algorithm for the Berlin network.

Saarbrücken (D) - Pilot Application

The Institute of Information and Communication of Saarbrücken has tested the MISS platform as pilot in co-operation with the Saarbrücken Technical Help Desk Brigade which is responsable for all PA environment in the greater City of Saarbruecken. The co-operation with the technical brigade includes the installation of the UOC (Unified Control Centre) in the existing centre of operations. Then main activity was the in dept analysis of the UOC Software as the men-machine interface and the trial to integrate the MISS model in the existing fleet management and the special gis file format (digital city map) of Saarbruecken in the system. As mentioned, it is very important to test the possible integration of the MISS platform with pre-existing systems. The carried out activities have been:

- introducing the MISS model in the future planning of the fire brigade after the successful implementation of the Tetra system.
- evaluation of the UOC software in the Saarbruecken back-end environment and the PA WAN and LAN to test usability in given environments
- *On-line analysis:* through online evaluation, cars can be diverted in real time in case of an accident or a traffic jam and GPS allow the exact vehicle localization.
- On – and *Off-line analysis:* evaluation of offline data serves to offer a simulation of traffic density and traffic flow in the Internet. The tests have been carried out in pre-defined scenarios in order to cover as much eventualities as possible and in order not to disturb the technical help brigades work.

Nicosia (Cyprus) – Pilot Test
The pilot test in Nicosia carried out a virtual trial on the Dynamic Traffic Assignment (DTA) model Visual Interactive System for Transport Algorithms (VISTA) and the Risk Assessment Algorithm that will be developed by scientific and technical partners.
The following sub-tasks have been undertaken: retrieval of the accident records for the City of Nicosia, retrieval of the traffic flow characteristics data for the transport network, development of

a calibrated VISTA model for the selected Nicosia transport network, development of an prototype MISS-RAA for the City of Nicosia, case Studies on RAA and the impact of incidents.

All the MISS developments can be monitored on the project web site : www.missproject.net, along with a brief description of the results.

1.3 Final Plan for using and dissemination the knowledge

1.3.1 Exploitable knowledge and its Use – UTH/HIT

This section will only present exploitable results, defined as knowledge having a potential for industrial or commercial application in research activities or for developing, creating or marketing a product or process or for creating or providing a service.
*It should provide an overview, **per exploitable result**, of how the knowledge could be exploited or used in further research (if relevant). This should be created by the project coordinator obtaining input from each contractor that owns the knowledge and has an active role in its exploitation.*
Both past and planned future activities should be included. Where applicable please also include an explanation of why planned activities mentioned in previous reports have been discontinued or altered.

Exploitable Knowledge	*Exploitable product(s) or measure(s)*	*Sector(s) of application*	*Timetable for Commercial use*	*Patents or other IPR protection*	*Owner & Other Partner(s) involved*
Wireless Communication	*TETRA integraion*	*Road Safety*	*2008*		*PROBO*
On Board Unit		*Road Safety*	*2008*		*EUNICS*
GIS integration		*Road Safety*	*2008*		*PROBO*
UOC Platform	*Road safety tool (integration with PNSS)*	*Road Safety*	*2008*		*PROBO*
Solid Flash Disk	*High capacity of Storage*	*Road Safety*	*2008*		*SANDISK*
Risk Assessment	*???*	*Road Safety*	*2008*		*CTL*
Dynamic Traffic Assign	*???*	*Road Safety*	*2008*		*UTH*
Video Processing	*???*	*Road Safety*	*2008*		*UNID*

Comment [L2]: All Partners have to fill this column

***The overview table should be accompanied by a short text per exploitable result**, addressing the following issues (only when relevant):*

- *What the exploitable result is (functionality, purpose, innovation etc.);*
- *Partner(s) involved in the exploitation, role and activities*
- *How the result might be exploited (products, processes) - directly (spin offs etc) or indirectly*
- *(licensing) – on an individual basis or as a consortium/group of partners;*
    - any technical and economic market considerations – commercial and technical thresholds etc.
    - any obstacles identified which might prove to be barriers to commercialization
        - the existence or development of similar or competing technologies / solution elsewhere

Comment [L3]: PLEASE PROVIDE A SHORT TEXT FOR EACH EXPLOITABLE RESULTS

        - third party rights (eg patents belonging to competitors), standards,…
        - analysis of any (potential) non-technical obstacles
    - any form of non-commercial use or impact, relating e.g. to the development of new standards or polizie
- Further additional research and development work, including need for further collaboration and who they may be;
- Intellectual Property Rights protection measures (patents, design rights, database rights, plant varieties, etc – include references and details);
- Any commercial contacts already taken, demonstrations given to potential licensees and/or investors and any comments received (market requirements, potential etc.);
- Where possible, also include any other potential impact from the exploitation of the result (socio-economic impact).
-

The exploitable commercial results are represented by:

1) **Technical specifications of a multi-entity monitoring system (UOC) for road supervision and hazard real time management**
2) **Integration of SALE OPERATIVE background software application with external legacy land information systems.**
3) **On-board unit testing for compact vehicles to alert UOC for 16 different events**
4) **Risk mapping software application from historical accidents statistics, based upon Vista environment**
5) **Scalable smart video analysis software for hazard recognition**

The technical partners involved in the results 1,2 and 3 are EUNICS, Teletec and SINTRA
The partners involved in the results 4 is CTL
The technical partners involved in results 5 are BLIC, SANDISK and UNIUD.
A spin off company is expected to be generated from UNIUD working team for the intelligent video streaming processing.

1.3.2 Dissemination of knowledge – UTH/HIT, COI, SRM, UNIUD

The dissemination activities section include past and future activities and will normally be in the form of a table maintained by the coordinator or any other person charged with controlling the dissemination activities.

The main purpose of COI dissemination actions it to raise local authorities awareness of MISS technology. It is intended to demonstrate all profits that it can bring for urban societies. COI plans to publish information gained during project works at National, and international conferences. Of course the activities will not be restricted to conferences.
COI intends to promote MISS project via its web page www.mwi.pl, the results are also planed to be disseminated using "Poland Development Gateway" Portal www.pldg.pl.

It is planed to submit articles to local and regional newspapers. Regional radio stations (for example RDM Małopolska) are also taken under consideration as an effective tool of improving MISS awareness in Poland.

COI will identify relevant Polish conferences to publish conclusions derived from data gathered during Project such as:

- Transport System Telematics Conference (http://www.tst-conference.org)
- International Conference Transport of 21st CENTURY (http://www.it.pw.edu.pl/transport21/)

The annual conference organized by COI for the 11-th time in Zakopane will be The main tool of MISS dissemination. That conference is extremely important for MISS dissemination since COI annual conference gathers almost all local authorities representatives that are interested in new technologies utilization.

During MISS project COI was involved in tasks related to determination of markets and Marketing, Dissemination and Promotion, Determination of the final products and services.
COI analysis and activities were focused on MISS utilization and dissemination in eastern Europe with special emphasis on Poland since it is a biggest potential market in that area.

Polish cities where MISS technology is applicable were chosen and a relevant marketing actions were taken or are plane to be taken. In effect of above-mentioned actions local authorities of Cracow has decided to initiate a process of MISS technology utilization. Since local authorities are interested is functionalities that are beyond MISS capabilities Krakow authorities has joined the consortium in order to participate in project Merge that is based on MISS achievements.

The positive reaction of Cracow local authorities and interest of other polish cites are a prove of that description of final products and services, and the analysis of possibilities of future development (that were one of COI's project tasks) were done properly.

Overwiew Table

Planned /Actual date	Type	Type of audience	Countries addressed	Size of audience	Partner responsible/involved
M7	Fusion 2005 Conference	Scientists	International	700	UNIUD (speech)
M9	ICIAP 2005 Conference	Scientists	International	500	UNIUD (speech)
M9	IEEE - ICIP 2005 Conference	Scientists	International	2500	UNIUD (speech)
M9	National Conference	Local Police Bodies	National	1.000	Regulus (brochure)
M10	AICA Conference	Scientists, Industry	Italy	300	UNIUD
M10	IIR National Conference	Public Bodies	Italy	550	Province of Bologna (speech)
M13	Europolis - Interantional Fair	Public Bodies	Italy	15.000	SRM (stand)
M13	International Meeting	Transport technicians	World	9.000	HIT (speech)
M17	International Meeting	Transport technicians	World	2.500	HIT (speech)
M17	IEEE-Video surveillance 2006	Scientists	International	1.700	UNIUD
M18	DTA 2006 International Meeting	Researchers	European countries	600	HIT (speech)
M18	TRA 2006 International Meeting	Transports technicians and local authorities	European countries	2.500	HIT – SRM (speech)
M19	Fusion 2006 Conference	Scientists	International	700	UNIUD (speech)

M20	ICPR 2006 Conference	Scientists	International	2500	UNIUD
M21	Innotrans - International fair	Manufacturers transports technicians and local authorities	World	45.000	BVG - BLIC Leaflet distribution
M22	ERTICO London International Meeting and exhibition	Manufacturers transports technicians and local authorities	World	2.500	HIT – SRM (speech)
M22	IEEE - ICIP 2006 Conference	Scientists	International	2500	UNIUD
M23	Ecomondo – International Fair	Public Bodies	International	4.000	SRM (panels)
M26	USA TRB International Meeting	Transport technicians	World	2.500	HIT (speech)
M30	ERTICO Aalborg - International Meeting and exhibition	Manufacturers transports technicians and local authorities	World	2.500	HIT – BLIC (speech)

1.4 Results of the project

DESCRIPTION OF THE OVERALL RESULTS OF THE PROJECT

The Monitor Integrated Safety System (MISS) project has developed an integrated platform comprised of state-of-the-art technological and algorithmic solutions to severe traffic safety problems.
The main functionality of the MISS platform are here after briefly outlined:

1. **To detect** infrastructure hazards - such as debris on the road, pavement deterioration and stalled vehicles
2. **To communicate** data on detected hazards via a high-speed wireless communication network to the centralised UOC.
3. **To record** short video and audio
4. **To process** the raw data (recorded, fused and coupled with existing data in a geo-coded database) and produce reliable targeted information for various types of users (travellers, emergency vehicles, vehicle fleets, other).
5. **To share** targeted information among different executive monitoring units.

It is an integrated framework for sensing, collecting, communicating, processing, and disseminating information on roadway hazards. Specifically, the MISS platform consist of:

1. An innovative on-board vehicle-based detection kit called MISS Storage & Communication Unit (MSCU)
2. Existing communication technologies (via a GPRS or TETRA network) to exchange information with a Unified Operative Centre (UOC)
3. A geo-reference database to store this information on a geo-coded network as raw data
4. Advanced algorithms to fuse the detected real-time data gathered by several organizations with static infrastructure and historical traffic and control information, so that reliable and consistent traffic information can be shared.
5. Based on the results of the elaboration, secondary descriptive (*what the network prevailing condition is*) and prescriptive (*what a vehicle shall do to avoid hazards and congestion*) information is produced. In addition, dynamic route planning algorithms have been developed specifically for emergency vehicles (police, fire department, Emergency Medical Services (EMS), hazardous materials response, towing services, other) to/from the scene of an incident.
6. Intelligent communication schemes to allow targeted information dissemination to clerical staff and drivers, based on their location and projected route (e.g. if they are likely to be in a problematic area, they will be informed), and to avoid problems with information overloading

MISS relies as much as possible on existing mature sensing and communication technologies, which makes it low risk in terms of successful deployment, with innovative algorithms specifically designed for this purpose. The data fusion and descriptive-prescriptive information algorithms account for traffic flow models to enhance the raw data collected by the on-board devices. Current state-of-the-art technology is usually limited to infrastructure-based systems that at best detect existing vehicle speeds and recommending a safer speed limit (e.g., the British Intelligent Speed Adaption – ISA system funded by the EU and the British Government). Independently

automobile manufacturers are designing vehicle safety features such as the intelligent braking system, intelligent cruise control, vehicle telematics, and Automatic Crash Notification systems (ACN) (e.g. General Motor's OnStar system).
One of the objectives of the project is to shift the complexity and the major part of the equipment cost from the vehicle to the transport infrastructure. This will be achieved by avoiding the installation of expensive and complex on-board autonomous systems.

Partner	Role	Results
BLIC	Technical partner and support partner for BVG demonstration: Development of application for MISS onboard unit for public transport, verification of MISS concept and demonstration of onboard unit MSCU for public transport applications (togetner with BVG)	• Verification of MISS concept for public transport applications • MISS use cases for public transport applications • Demonstration (results outstanding)
BVG	Demonstration partner: Demonstration of MISS concept and onboard unit MSCU for public transport applications (together with BLIC)	Demonstration of MISS MSCU in a public transport bus
UNIUD	The goal was to study innovative algorithms for road traffic analysis in order to detect anomalous (and therefore possibly dangerous) events. Given the nature of the exploratory study conducted, its outcomes are not part of the main MISS demonstrators, but will be showcased separately. Responsible for the Scientific Dissemination of the project. In addition to producing the scientific publications relevant to the research conducted within the project, UNIUD is also coordinating the submission of a journal paper	Specific attention has been focused on the high-level analysis of vehicle trajectories and on the interpretation of trajectories in order to achieve semantic understanding of the monitored scene and identify anomalous traffic events. The developed advanced algorithms on the novel concept of trajectory clustering, provide information about the behavior of individual moving objects in order to estimate and/or predict possible dangerous situations For major detail please refer to ANNEX II

	that will describe the final outcomes of the MISS project.	
SRM	User needs analysis Follower for possible implementation on bus fleets Dissemination items	- a deep analysis of the risk assessment of the network, to be applied to public transport (for what SRM is responsible for service control) to avoid accidents and dangerous behaviours, - the knowledge of potential use of the MISS equipment on bus fleet in Bologna and possible integration with Bologna PTO control centre; - the participation to events to present the MISS results.
SINTRA	Quality Manager Administration and Financial Management Deployer and Technical Support for the web site Technical support for PROBO Pilot	Public Web Site
CRF	State of the art and MSCU requirements Service platform requirements and state of the art constraints	Contribution on new on board device Contribution on new services platform
PROBO	Formal coordinator of the project Supervisor of the Pilot Application in the area of Bologna	Assessment of the UOC platform for multi-entity management
IKS		
Teletec		
SANDISK		
CERTH		
AUTH		
CTL		

COI		

2 Final Management Report

This deliverable is the final management report covering all the project activities form project *month 1 to month 30 (January 2005 to June 2007)* both inclusive.

Contract Amendments:	1. During the Kick off meeting the Consortium decided to insert a new German Partner in order to support the BVG partner about demonstration activities (1st Amendment of the project). 2. Budget Reallocation between CRF, M-SYS, SINTRA and REGULUS 3. REGULUS was acquired by a new big ICT Italian company named EUNICS. M-SYSTEMs changed is legal name in SANDSIK IL Ltd. The point 1 and 2 generated some delay and the consortium decided to ask a contractual extension of 6 months.
Budget	The actual consumption of resources along the project ranged between and of the planned compared to a rough estimation of the planned consumption. In any case the budget is behind the original schedule, considering the delay generated by the Contract Amendments.
Deliverables	All the deliverables has been delivered. *Please refer to Deliverable list table.*
Project Activity	The project activity is structured in seven workpackages. WP1 – Project Management (SINTRA) WP2 – User Needs, service scenario and user requirements (CRF) WP3 – System Design (REG) WP4 – Prototype Implementation (REG) WP5 – On field testing and demonstration (PROBO) WP6 - -Industrial Exploitation (CERTH) WP7 – Dissemination and Promotion (SRM)

2.1.1 Consortium description

Participant	Country	Role	Function	Org.
PROBO	IT	Test User Contractual Coordinator	Pilot site of the whole system	PUB
M-SYS	IL	Component manufacture and system integrator	Project Technical coordination + HW storage design, prototyping, testing +System integration	IND
REG	IT	Communication Integrator	Specialized IT Provision, Computing Platform, Communication Integration	SME
CERTH	GR	Research	Knowledge Dissemination, Risk Model Designer	PUB
SINTRA	IT	Manager	Administration and Financial Management Deployed	SME
CRF	IT	R&D	User requirements, research studies	IND
UNIUD	IT	R&D	Advance research requirements, video processing	PUB
SAAR	DE	Test User	Test User on field demonstration	PUB
AUTH	GR	R&D	Research analysis on cooperative supervision algorithms	SME
COI	PL	Test User	Eastern dissemination	PUB
SRM	IT	Disseminator	Dissemination and cross-exchange	PNC
BVG	DE	Test User	Test user on field demonstration	PUB
CTL	CY	R&D	Risk Assessment Model Designer	SME
BLIC	DE	Test User	Test site implementation Test user (together with BVG)	SME

2.1.2 Consortium management and Corrective Actions

The project coordination and quality tasks are managed by the Province of Bologna with the support of Sintra, who have the responsibility for managing meetings (preparation, coordination, documentation), managing project delivery dates (partner coordination for production and quality of deliverables), and producing management documentation (progress reports, final reports, documentation for project reviews). A public and restricted web site is maintained: www.missproject.net.

During the first 12 months of the project SINTRA realized and (the Consortium approved) the deliverable D11 Quality Plan at months 3, D12 Interim Progress Report at M6 and M12, furthermore realized and managed the official web site www.missproject.net D71.
Also SINTRA wrote the Consortium Agreement with the contributions of each partner and it was signed by all partners.
SINTRA with the support of EUNICS and BLIC provided the new version of the Technical Annex and the CPF forms.

Incorporation of BLIC and Shifting of workload from BVG to BLIC. For this project it was foreseen to assign an important task to BVG (Berliner Verkehrsbetriebe).
Meanwhile there was an significant change at BVG a) in the overall resources of BVG for R&D-projects and b) due to a national project for "integrated traffic management in the city of Berlin" running in parallel. Therefore the remaining personal capacity for MISS is significantly smaller than anticipated.

Notwithstanding the R&D results of MISS are still very interesting for BVG and will be considered as a tool for collecting data, for forecasting traffic situation and for real-time traffic management with a new quality management system to be developed. Both projects (MISS and the national project IQmobility) fit together very well without overlapping.

To ensure that MISS can be carried out as planned BVG proposed to the MISS- Consortium to incorporate Berlin located consulting company BLIC into the project. BVG co-operates with BLIC since more than 15 years on the subjects of integrated control- and information systems. furthermore BLIC has additional experiences on the use of floating car data. They will give their special knowledge to the MISS- project and take over the greater part of the foreseen tasks of BVG. BVG will stay in the MISS project with a small workload to link both mentioned projects.

For the prototyping part BLIC will take the responsibility for the preparation in close contact to BVG. In co-operation with BLIC, BVG is prepared to test one MCSU on board of a bus.

Responsibility transfer among SANDISK IL, SINTRA and EUNI, CRF
Part of the responsibilities about the definition for MSCU, have been moved from SANDISK IL to EUNI. EUNI is analyzing D2.1 and working on D3.1 to find the product able to satisfy the large part of MSCU requirements. SANDISK IL maintains the design and the development for a new storage device, to be integrated inside the on-board kit defined.

During the second year the technical Partner REGULUS was acquired by a new big IT company named EUNICS (EUNI), SINTRA with PROBO managed this administrative step with the EU Commission. EUNI entered officially in the Consortium the 1st of July 2006.

The Consortium asked 6 months of delay because during the second part of the 2006 year after an unexpected delayed produced by COMPUTRON, the provider of the On-Board Unit.

Meetings

During the project life the Coordinator organized 3 International meeting and 1 Workshop Meeting

Place	When
Kick off Meeting – Bologna + Workshop	24th – 25th January 2005
II International Meeting - Berlin	17th – 18th May 2005
Workshop Meeting – Bologna	*28th June 2005*
III International Meeting Cyprus	19th – 20th September 2005
IV International Meeting - Torino	16th January 2006
V International Meeting – Bologna	29th May 2006
VI International Meeting - Thessaly	27th – 28th November 2006

The minutes and presentations are stored in the MISS web site www.missproject.net .

Some photos from Workshop Meeting

2.1.3 List of deliverables

Del. no. [1]	**Deliverable name**	**WP no.**	**Lead particip-ant**	**Nature** [2]	**Dissemination level** [3]	**Delivery date** [4] (project month)	**Delay (**in months**)**
D11	Quality Plan	1	5	R	CO	3	
D12	Interim Progress Report + Cost Statement Audited	1	5	R	CO	6,12	
D13	Final Report	1	1	R	PU	30	
D21	State of the art and MSCU requirements	2	6	R	PU	3	+1
D22	Service platform requirements and state of the art constraints	2	6	R	CO	7	
D23	Definition and data requirements and state of the art constraints	2	13	R	CO	7	
D31	On-board Unit Definition	3	3	R	CO	9	+2
D32	Unified operative centre design	3	3	R	CO	9	
D33	System Final specs	3	3	R	CO	11	
D41	On-board Prototype Unit	4	2	P	CO	15	+2
D42	UOC Prototype	4	2	P	CO	15	
D43	Service Applications	4	2	P	CO	15	+2
D51	Pilot Design and Set-up	5	1	D	CO	12	
D52	On-field validation report	5	1	R	CO	30	
D61	Draft Industrial Exploitation Plan	6	6	R	CO	20	+1
D62	Final Industrial Exploitation Plan	6	6	R	PU	30	
D71	Project web site	7	12	P	PP	3	
D72	Dissemination Final Plan	7	12	R	CO	6	
D73	Report on raising public participation and awareness	7	12	R	PU	30	

[1] Deliverable numbers in order of delivery dates: D1 – Dn

[2] Please indicate the nature of the deliverable using one of the following codes:
R = Report
P = Prototype
D = Demonstrator
O = Other

[3] Please indicate the dissemination level using one of the following codes:
PU = Public
PP = Restricted to other programme participants (including the Commission Services).
RE = Restricted to a group specified by the consortium (including the Commission Services).
CO = Confidential, only for members of the consortium (including the Commission Services).

[4] Month in which the deliverables will be available. Month 1 marking the start of the project, and all delivery dates being relative to this start date.

2.1.4 Project TimeTable - Gantt

MISS PROJECT																														
	G	F	M	A	MA	J	L	A	S	O	N	D	G	F	M	A	MA	J	L	A	S	O	N	D	G	F	M	A	MA	J
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
WP1																														
T11																														
T12																														
T13																														
D11			>>																											
D12						>>						>>																		
D13																								>>						>>
WP2																														
T21																														
T22																														
T23																														
D21			>>																											
D22							>>																							
D23							>>																							
WP3																														
T31																														
T32																														
T33																														
D31									>>																					
D32									>>																					
D33											>>																			
WP4																														
T41																														
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D61																							>>							
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WP7																														
T71																														
T72																														
T73																														
D71			>>																											
D72						>>																								
D73																								>>						>>

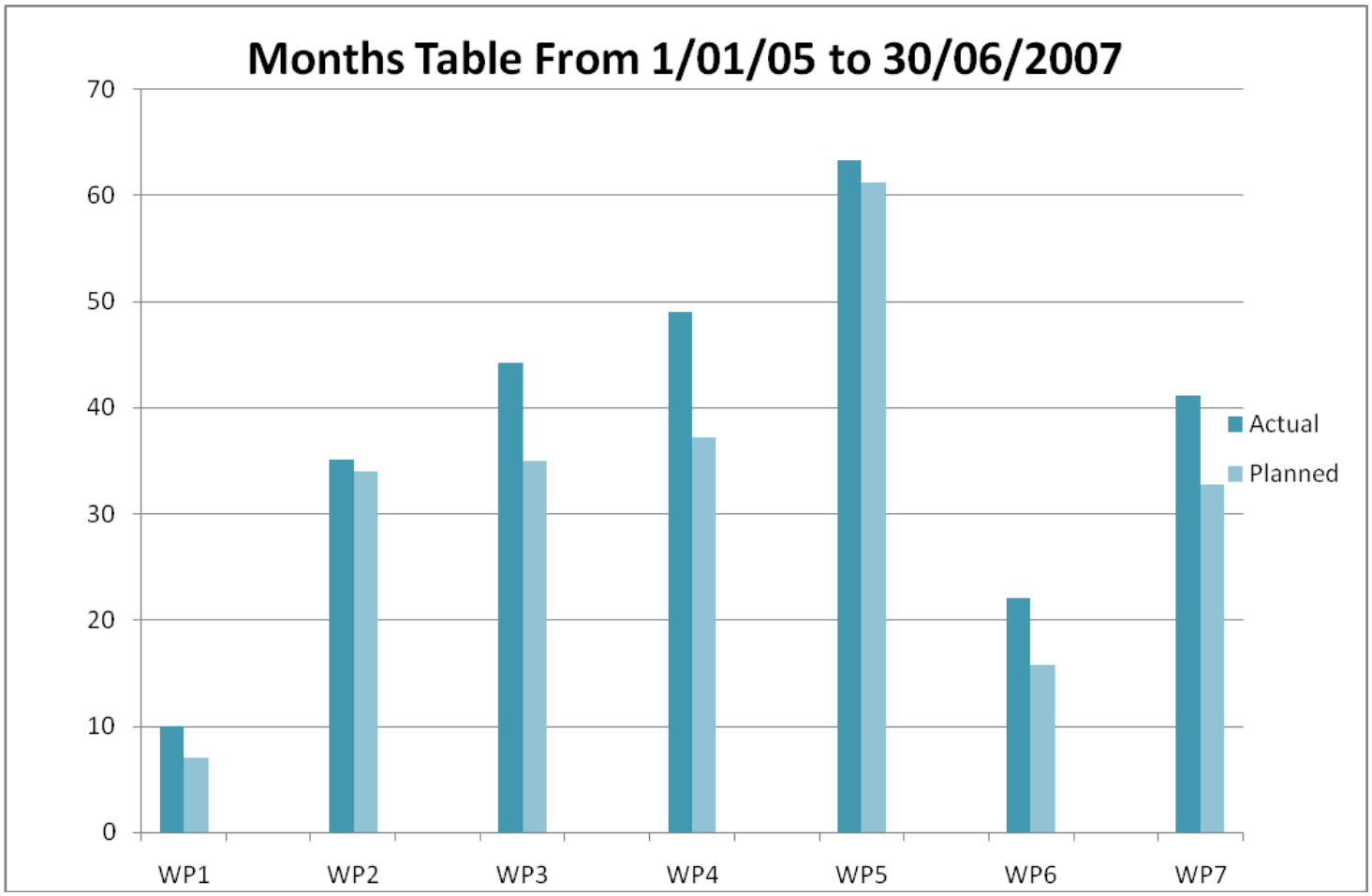
2.2 Form C Financial statement per activity for the contractual reporting period

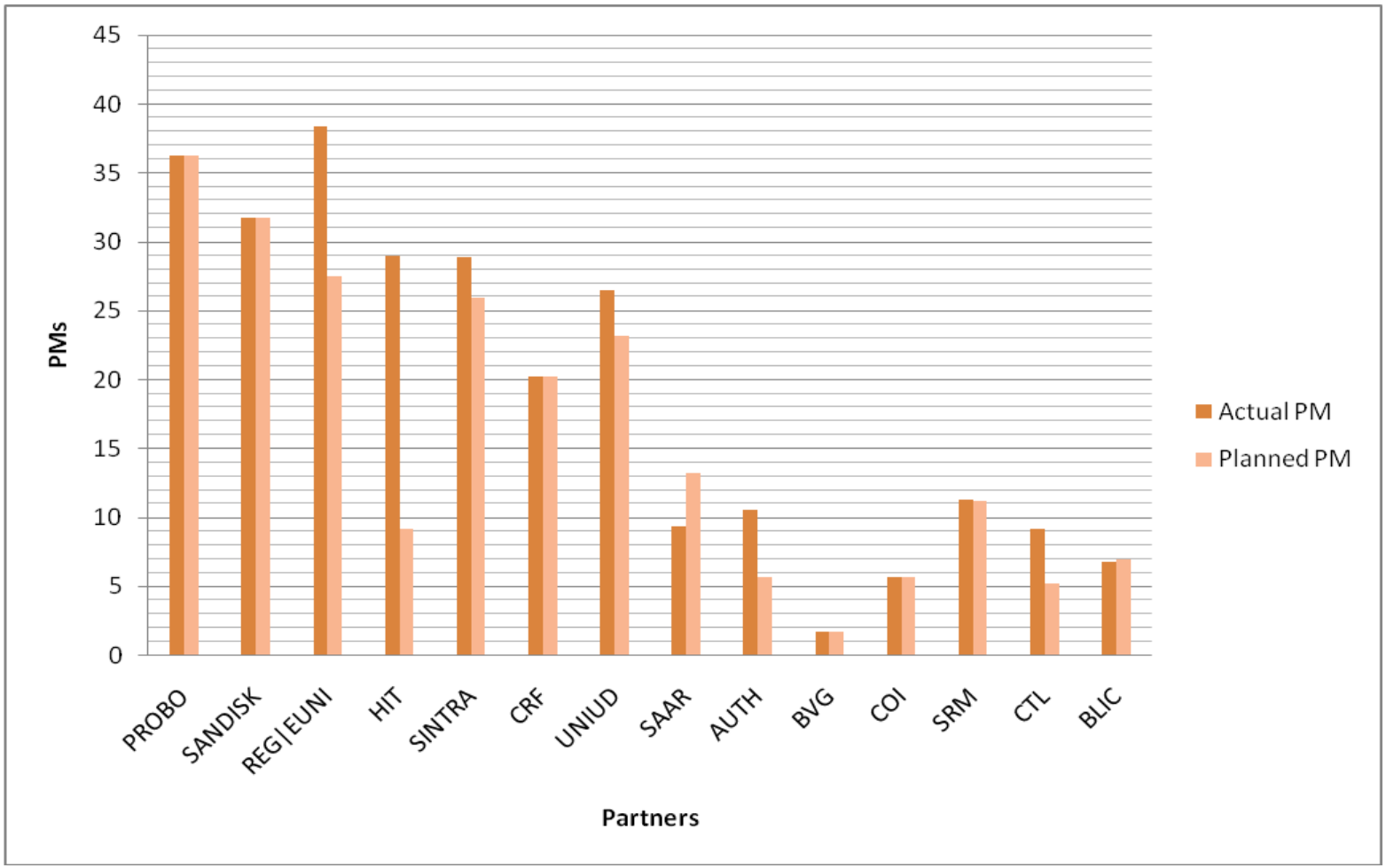
(see Appendices 5-11)

The financial analysis refers to all 30 months of the project, and it considers figures estimated for June 2007 inclusive. Though this month was not concluded at the time of writing this report, some of partners provided estimations up to the end of the project in order to give a more clear picture of the project status and progress. Therefore, these figures must be considered as a draft analysis. Formal cost statement will follow the completion of the project along with formal audit.

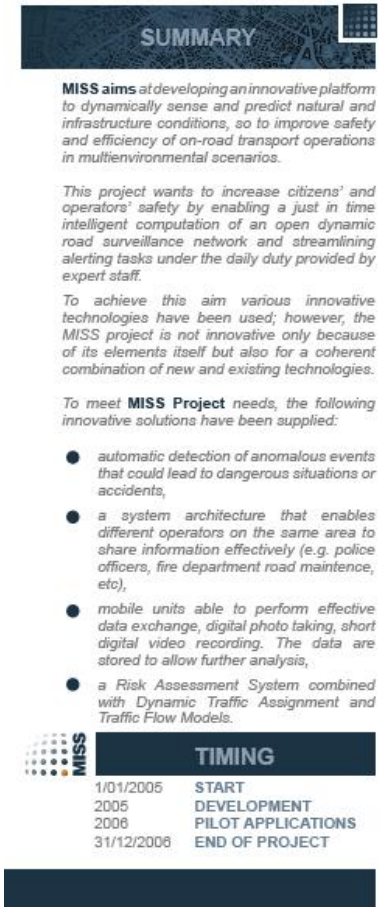
It is important to note that the project suffered a budgetary stress along the project duration, specially due to the second payment refers to the reporting period of the 2005 year.

The tables and figures depicted below illustrates the analysis of the actual resources compared to the estimated consumed budget at this final stage. The actual consumed resources are reported under the estimated figure for the whole project activity because some partners were unable to provide budget estimations before the end of the project


Months Table From 1/01/05 to 30/06/2007
70
60
50
40
30
20
10
0
WP1
WP2
WP3
WP4
WP5
WP6
WP7
Actual
Planned


45
40
35
30
25
20
15
10
5
0
PMs
PROBO
SANDISK
REG|EUNI
HIT
SINTRA
CRF
UNIUD
SAAR
AUTH
BVG
COI
SRM
CTL
BLIC
Partners
Actual PM
Planned PM

3 ANNEX I – Project Brochure



SUMMARY

MISS aims *at developing an innovative platform to dynamically sense and predict natural and infrastructure conditions, so to improve safety and efficiency of on-road transport operations in multienvironmental scenarios.*

This project wants to increase citizens' and operators' safety by enabling a just in time intelligent computation of an open dynamic road surveillance network and streamlining alerting tasks under the daily duty provided by expert staff.

To achieve this aim various innovative technologies have been used; however, the MISS project is not innovative only because of its elements itself but also for a coherent combination of new and existing technologies.

To meet **MISS Project** *needs, the following innovative solutions have been supplied:*

- *automatic detection of anomalous events that could lead to dangerous situations or accidents,*
- *a system architecture that enables different operators on the same area to share information effectively (e.g. police officers, fire department road maintence, etc),*
- *mobile units able to perform effective data exchange, digital photo taking, short digital video recording. The data are stored to allow further analysis,*
- *a Risk Assessment System combined with Dynamic Traffic Assignment and Traffic Flow Models.*

TIMING

1/01/2005	START
2005	DEVELOPMENT
2006	PILOT APPLICATIONS
31/12/2006	END OF PROJECT

CONSORTIUM

- Provincia di Bologna
- SRM - Reti e Mobilità SpA
- BVG
- Aristotele University of Thessaloniki
- IKS
- BLIC
- CTL
- M-Systems
- Regulus
- Hellenic Institute of Transport
- Sintra
- Centro Ricerche
- Università degli Studi di Udine
- Cities on Internet Association

MISS

The MISS project can be monitored on the web site:
www.missproject.net

MISS

Monitor Integrated Safety System

INNOVATIVE SOLUTIONS TO IMPROVE SAFETY AND EFFICIENCY OF ON-ROAD TRANSPORT OPERATIONS

Sixth Framework Programme

FP-516235

MAY 2006

PLATFORM AND ARCHITECTURE (UOC - MSCU)

The **"Unified Operative Centre" (UOC)** aims at improving vehicles' safety and mobility. The UOC has to support and integrate the activities of different structures or sectors operating in the same area. It will manage the road monitoring activities of organisations such as urban police, civil protection units, road maintenance units, fire brigades and public transport operators. It will also support operational decisions, extend road knowledge, store and extract all needed information,using Information Technology tools.
The UOC will share technological and human resources, leaving all the entities services virtually separated, thus reducing management and structural costs.
Further application could be easily developed and implemented for other local fleet managers, such us public transport operators.

An innovative high performing on-board kit will be installed on fleet cars and will include a black box named **"MISS Storage & Communication Unit" (MSCU)**, it provides interactive input and processing of natural or infrastructure information or traffic accidents as well as documentation by digital images. The data will be sent to the UOC via a radio communication network.

INNOVATIVE ASPECTS (ADAE - RAA - TETRA)

A market review of existing Automatic Traffic Surveillance systems evidenced the fact that current applications provide only basic functionalities (i.e. speed of the traffic flow, detection of queues), but are unable to handle potentially dangerous events. The MISS Consortium is investigating innovative **Algorithms for the Detection of Anomalous Events (ADAE)**, that must be able to operate in crowded and complex environments. These events could lead to dangerous situations or even to accidents .

When an anomalous event occurs (and is detected), the possible influence on traffic flow in the whole area can be precisely predicted. Risk Assessment System will even identify the areas where accidents are likely to happen. MISS Computing Platform includes the development of a **Risk Assessment Algorithm (MISS-RAA)** that will produce quantitative measures (e.g. probability) for assessing the risk associated with a specific section or location due to roadway conditions, weather conditions and prevailing traffic conditions.

Automatically gathered information about traffic has to be supplemented by information gathered by Police officers, Fire Department officers, Public Transport Operators etc, information has to be effectively and reliably shared. Due to the reliability needs, the **TETRA** Digital Comunication System of the Emilia Romagna will be implemented in the MISS Project. Tetra is an innovative data&voice transmission system; it is designed for emergency situations, when almost instantaneous communication is required, both among individuals and within a group of an unlimited size. Priority calls can be made, backed by call pre-emption if required, and, on occasions, all-informed communication.

The integration of Tetra infrastructure in the MISS project makes data exchange among actors more reliable and effective. Tetra transmitting devices are integrated with MISS mobile on board devices.

PILOT APPLICATIONS (CAR - BUS - FIRE BRIGADE)

BOLOGNA (I) - Service Car

The main demonstration application will take place in Bologna.
The UOC will implement different application profiles for each operator role in every organization (Road Maintenance Unit, Provincial Police and Provincial Civil Guard in the Province of Bologna): this is a very innovative feature, not implemented in any similar solution on the market.
In the Province of Bologna pilot site, the UOC framework integrates the existing map GIS data.
All the necessary activities to create the infrastructure for the UOC have started and the implementation of 10 MSCU on the same number of new vehicles will be done in summer 2006. Furthermore, MISS partners have worked towards the development of the Risk Assessment System of the provincial road network of Bologna.
The three-year geocoded accident database that is maintained by the Province of Bologna has been analysed by means of advanced statistical methods, such as Classification And Regression Trees (CART).
The final result is the development of an accident risk rating GIS network in the area of the Province of Bologna.

Berlin (D) - Bus

The demonstration of MISS equipment planned for the public transport application for the Berlin test site aims at the improvement of traffic safety for buses, passengers and private road traffic. The MSCU will be used for fast reaction against illegal parking on reserved lanes and at bus stops.
A bus equipped with a digital video camera will document illegal parking on the spot and will enable drivers to initiate immediate enforcement actions if necessary for traffic safety reasons.
Probably critical issues of data privacy are considered by early involvement of the commissioner for data privacy of the state of Berlin.

Saarbrücken (D) – Help Desk

The Institute of Information and Communication of Saarbrücken will test the MISS platform as pilot in cooperation with the Saarbrücken IT Help Desk.This cooperation includes the installation of the UOC in the existing Help Desk managment center so to test the possible integration with other pre-existing operative systems. The MISS MSCU will be installed in a technician car and the tests will be carried out in pre-defined scenarios in order to cover as much eventualities as possible and in order not to disturb daily work and timetables.

Nicosia (Cyprus) – Virtual pilot

The pilot test in Nicosia will be based on the Dynamic Traffic Assignment (DTA) model Visual Interactive System for Transport Algorithms (VISTA) and the Risk Assessment Algorithm that will be developed by scientifical and technical partners.
The same studies and simulations done for the Province of Bologna will be applied to Nicosia transport network, developping a MISS-RAA prototype for the City of Nicosia.

4 ANNEX II

SPECIAL UNIUD FOCUS

Within the MISS project, UNIUD has conducted research on advanced computer vision algorithms for road traffic surveillance. The goal was to study innovative algorithms for road traffic analysis in order to detect anomalous (and therefore possibly dangerous) events. Given the nature of the exploratory study conducted, its outcomes are not part of the main MISS demonstrators, but will be showcased separately.

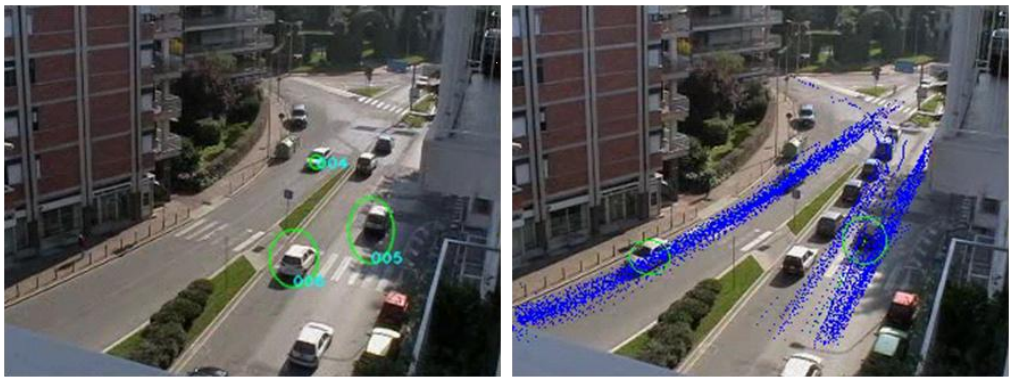
UNIUD was also responsible for the Scientific Dissemination of the project. In addition to producing the scientific publications relevant to the research conducted within the project, UNIUD is also coordinating the submission of a journal paper that will describe the final outcomes of the MISS project.

UNIUD RESULTS

While many works have been developed in the field of video-based traffic monitoring and several commercial systems are available on the market, they are mostly involved with the low-level aspects of the problem that is with the detection and tracking of moving objects. In the framework of the MISS project, more advanced strategies to improve the ability of existing technologies and algorithms in the detection of traffic incidents have been investigated by UNIUD.

Specific attention has been focused on the high-level analysis of vehicle trajectories and on the interpretation of trajectories in order to achieve semantic understanding of the monitored scene and identify anomalous traffic events. The developed advanced algorithms on the novel concept of trajectory clustering, provide information about the behavior of individual moving objects in order to estimate and/or predict possible dangerous situations *Figure 1.*

Obtained results are promising and show potential for future development and have been published to international conferences as described in the Dissemination Plan. UNIUD plans to further develop the research algorithms in order to experiment their integration in the UOC a follow-up research project with the same consortium.



(a) (b)

Figure 1.(a) Tracked vehicles and (b) matched trajectory clusters.

The research conducted by UNIUD within the MISS project has been published in refereed international conferences. A paper, to be submitted to a prestigious journal in the filled of Intelligent Transport systems, is also being prepared.

	M9	ICIAP "International Conference on Image Analysis and Processing", organized every two years by the Italian group of researchers affiliated to IAPR (GIRPR) with the aim to bring together researchers in image processing and pattern recognition from around the world, took place in Cagliari, Italy on 6th-8th September 2005. UNIUD presented a paper titled "Vehicle detecting and tracking for Traffic Monitoring". (http://csia.unica.it/notizie/com_unica_it/2005/iciap_05.pdf).
	M9	**IEEE (Institute of Electrical and Electronics Engineers) – "International Conference on Image Processing (ICIP)" is widely regarded as the most prestigious forum for the presentation of technological advances and research results in the fields of theoretical, experimental, and applied image and video processing and took place in Genova, Italy on 11th-14th September 2005. (www.icip05.org). UNIUD presented a paper titled "A Multi-camera approach to sensor eveluation in video surveillance".**

	M10	AICA, the Italian Association for Informatics and Automatic Calculation – Annual Congress of the Association took place in Udine, Italy 5th-7th October 2005. UNIUD presented a paper titled "Event detection for Traffic Monitoring". (http://web.uniud.it/AICA2005/pp1024x768.html)
	M19	ISIF IEEE Information Fusion 2006: purpose of the conference is to advance the profession of FUSION technologies, propose approaches for solving real-world information fusion problems, recognize emerging technologies and foster information transfer. It took place in Firenze (I), on July 2006. UNIUD presented a paper.
	M7	**ISIF IEEE Information Fusion 2005: purpose of the conference is to advance the profession of FUSION technologies, propose approaches for solving real-world information fusion problems, recognize emerging technologies and foster information transfer. It took place in Philadelphia, PA, USA on 24th –25th July 2005 (www.fusion2005.org) UNIUD attended presenting a paper titled "Sensor quality evaluation in a multi-camera system".**
	M17	The Sixth IEEE International workshop on Visual Surveillance (VS) 2006. It Took Place on 13th May 2006 in Graz (Austria). UNIUD presented a paper.
	M22	ERTICO – ITS congresses and exhibitions I London - MISS partners agreed to focus mainly on this event in order to present relevant results of the project. HIT and SRM/UNIUD already submitted papers. SRM/UNIUD/REG contribution to the interactive discussion is titled "MISS EU PROJECT-An integrated approache to road safety". (www.ertico.com www.itsworldcongress.com).
	M22	IEEE-ICIP-International Conference on Image Processing will take place in Atlanta, GA, USA in October 2006. UNIUD already presented a paper titled "Activity analysis for video security systems" which has been accepted.