TECHNOLOGIES FOR CITIES MANAGEMENT AND CONTROL

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Introduction

The demand, greater and greater, of instruments and systems able to support actors of health and public security protection has induced to borrow experiences and instruments born and developed in different application systems on the topic of the city living security .

In this ambit Datamat has developed an offer line based on the valorization, in city contexts, of its own experience in planning and implementation of " real time " systems.

We immediately have to clear up that the same concept of real time systems does not mean "to act hastily", but simply that answer times of machines are absolutely predictable and constant, also in presence of disturbing elements and of facts not planned, independently from machine loads, giving then execution, times certainty and availability of information certainty.

This presupposes the use of processing technologies very different from personal computers, both in terms of *performance*, and above all in terms of reliability. The PC turns out, in fact, to be a machine which is little efficient and little suitable to real-time phenomena management and for operative applications where an eventual stop machine can compromise the performances of the entire system.

Even if they initially used proprietary technology, also the real time systems had then the chance to use standard not-proprietary systems, with the possibility of beginning to transform these systems created for particular applications in systems of wider use and consumption, exceeding, this way, the old control and acquisition systems (the so-called SCADA systems, Supervisory Control and Data Acquisition) and allowing then the realization of systems for the tele-control of remote appliances.

Video-monitoring systems

The most famous and most used in city contexts "real time" technology is perhaps that of video monitoring.

Its applications are numerous and more and more evolved: from the video monitoring of strategic points on elevated vehicular flow roads, we passed to the video monitoring in stadiums during the events at risk for security, to the control of places and manufactures submitted for protection for historical, artistic reasons, etc. up to the video monitoring of illicit refuse disposal sites and places at risk; etc.

For these systems in the past it was used an analogical technology, with systems of analogical mixing based on tape-recordings, with consequent rapid decay of recordings quality, the old video matrices.

These realities have been completely exceeded from new technologies: the typology of platforms used by Datamat in fact is based on the approach to the total digital management of the image, from the shot to the editing.

This offers an elevated ability of analysis in deferred time, able to leave images useful to the acknowledgement both of people and objects, but, above all, the further advantage of a video monitoring system which is totally digital and gives the possibility to insert functionality of configurable "*motion detection*". With such a function it is possible to alert the images recording and transmission only when a certain number of pixel of the images shooted is excited, that is when a *true motion* is perceived, a movement that answers to the configuration criteria: I do not alert myself, then, for example, for the passage of a stray dog, but I do when a certain mass of pixel begins to move, in a well defined area. Evidently the possibility to send an *interrupt* only when the pre-shaped event occurs avoids the necessity of binding an operator to a monitor round-the-clock, with the relative problems of attention decrease.

A case, little but concrete, of application of these technological opportunities has been realised for the monitoring of sites at pollution risk.

It is custom in Southern Italy, and particularly in the periphery, that during weekends some people, operating after their own job, illicitly execute small restructuring works. This, beyond producing an economic and social damage, induces the phenomenon of the illicit refuse disposal sites, apparently negligible phenomenon, but that, instead, unfortunately creates situations of environmental contamination: it can be enough to put ten cubic meters of broken off floor tiles under a fly-over, and in a week, those ten cubic meters will become one hundred cubic meters of tyres, dishwashing machines no more usable, that is such a negative phenomenon of emulation for which preventing, in this case, is fundamental because the reclamation costs are very high.

It has to be emphasised that in this application the video monitoring is more aimed to catch the event rather than to shoot the wrongdoer face or the vehicle plate used to commit the crime: it is a system useful simply to alert, to send the images towards operating headquarters giving, therefore, the possibility to act quickly, to take part also catching the so-called flagrante delicto without necessarily having the documentation.

City Monitoring Networks

A technological and functional evolution of the video monitoring systems is linked to the development of city monitoring networks. These are systems of support to decisional processes relating to the city context based on the integration of information coming from different sensor networks (remote digital cameras, sensors traffic and transport, air, noise, meteo, etc), as well as on the connection of these information to the existing informative data banks on the territory. All these information are therefore centralised and represented in Operative Centres that allow to manage and co-ordinate activities also without the presence on the field.

Such centres constitute the transposition, in civil terms, of command, control and communication systems of typically military derivation where a general, who has troops in field, shapes a particular representation, a tactical scene regarding which an order is sent,

having the certainty that the orders are executed and having then a situation report after the intervention.

The city monitoring networks are based on scalable (that can be, therefore, realized for realities having various dimensions) and modular architectures that, just through such characteristic, can be addressed to different applicative objects.

Some examples can render, meaningfully, the utility of such networks.

- *Systems for the management and the electronic control of the accesses to the Limited Traffic Zones (ZTL).*

The realization of limited traffic zones (ZTL) on areas of regard in which limiting the private circulation, favouring the public transport, has to be accompanied by the realization of opportune technological systems of control. Such systems have to guarantee, besides, who is controlled, because if they have the necessity to approach the limited traffic zone they are protected by the fact that not everyone can go there.

The solution realised is based on the creation of a *Network of Remote Video Monitoring* (then called RVMR) of elevated affluence "strategic points". The scope of RVMR is that of increasing the efficacy of the remote sites control using more remote digital cameras (for every site) and reception, memorization and images reproduction systems (e.g. Operative Centres near the Headquarter of Municipal policemen and the Police Forces). Such network is connected to the Network for the electronic Consent of Access (RCA), system analogous to the telepass that through some trasponders supplied to the vehicles crossing a particular passage and through the integration with System Control Accesses (S.c.a.), permits to verify the number of accesses to particular zones and to signal eventual intrusions of vehicles not allowed.

- *Traffic control systems*

A project is currently realising an automated and centralised system of environment and traffic monitoring articulated through the following instruments:

1. a network dedicated to the monitoring of atmospheric pollution. Differently from the most conventional networks of air monitoring, the typology of analysers used in such a monitoring network allows to analyse only and exclusively those pollutants which are called city traffic pollutants (benzene, toluene, xilene) without finding other pollutants not directly linked to vehicular traffic.
2. a telecommunications network for:

- the Remote Video Monitoring of the elevated traffic crossings and distances,

- the remote management of traffic-lights,

- the management and the electronic control of the accesses to the ZTL,

3. the centralization and the representation of information inside Operative Headquarters.

The basic idea is that the traffic flow surveys insisting on a particular crossing, on a particular road, are not uprooted from what viceversa I am smelling with the analysers, therefore they integrate and they constitute the same database.

Through simulation models, it turns out then possible to conjecture the entity of the spreading, the dispersion of this polluting substance, in presence of particular meteorological conditions (direction, intensity of dominant wind; high or low pressure;..) and, in virtue of what found on the field by means of these analysers, we can imagine the scenes and allow those who have to take decisions to benefit from a supporting instrument (decision support system), a system that allow to take decisions: to stop traffic, to limit traffic at fixed hours, etc.

It is possible now to imagine to tele-control the crossings with traffic-lights, optimizing and synchronizing the traffic-lights in order to constitute a "red wave" or a "green wave", in order to reduce the vehicles times of standing, with effects both from the point of view of acoustic pollution and of the amount of pollutants emitted in the air.

- *Networks of tele-survey of vehicles used for public city and extracity transport.*

What often lacks in order to render the public transport attractive is the fact that the event is predictable: who is waiting standing at a ranging rod wants to know, really, how much they have to wait.

This presupposes, on one hand, a standard representation modality of hours and of delay with respect to scheduled time; on the other hand, delay data have not to be supplied in terms of space, but of time. The user, in fact, does not want to know the co-ordinates in latitude and longitude of the vehicle he is waiting for, but how much time he has to wait, where this datum is evidently connected to the traffic amount the vehicle will meet up to the stop where the user is waiting for.

In this sense it turns out fundamental the integration between a system of survey of the means position and systems of traffic flows appraisal, with a consequent esteem of the long-awaited times of distance.

In this way such networks concur to improve the service offered, stimulating the use and clearing therefore the city centres both from the point of view of the acoustic pollution and reducing the amount of pollutants emitted in the air.

The involvement of final user

A city monitoring network cannot be limited to acquire and to make available the information near the Operative Headquarter, but it also has to guarantee the information benefit by the users/citizens.

An important member of a city monitoring network is, therefore, inside the system of distribution of the information to the electronic multi-media informative kiosks. These informative kiosks, of "touch screen" kind, settled in more or less strategic points of the city, serve to represent the information, for example, about the pollution level, but more in general they constitute the whole of the Commune promotional pages, a sort of counter for people through which that particular administration is communicating what it is doing in that city. In

other words, every administration, after executing a certain number of interventions aimed to prevent or at least to neutralize or to repress negative events, if it does not complete this virtuous circle with the information to the public of what the new fixed standard is, it risks to make useless the intervention because it does not give the perception of what has happened in reality.

We, finally, have to emphasise that such systems, besides to communicate information, can also be used to acquire information from the public, to have a way on the risk perception from part of the citizens, a kind of new application of "customer satisfaction", of intervention consent. Beyond, in fact, the real state of threat, the perception of security represents an important parameter of appraisal of the adopted policies.

Conclusions

In conclusion, video monitoring systems and, more generally, city monitoring networks represent a further component of a city security system.

In fact, as well as a physical security aspect, of personal security, such systems allow to contrast those actions of micro-criminality put into effect first of all towards the environment, on the territory, on what belongs to everyone, and that for this reason is often assimilated as "res nullius", as what belongs to nobody. In reality, even if these micro actions of criminality spread on a not used territory today and, therefore, apparently do not influence the present perception of security, maybe in the middle-long term they can induce pollution able to produce mortal effects on the future generations.

On the other hand we have seen that such instruments can concur to raise the level of quality of life in the very same cities: the ZTL realization facilitates, favours who is controlled because they are protected by the fact that not everyone can go there and the residents, the inhabitants of the area defined at limited traffic certainly see the quality of their life growing quickly; on the other hand, the strengthening and/or the transport collective system speeding facilitates the access to the interested central area, without compromising the optimal use of the city centre.

In this sense the use of "*real time*" technologies, in particular if integrated with other technologies typologies, as dealt with in the present workshop, can do a lot, both in terms of prevention, and in terms of control, offering, therefore an important opportunity for the city management and the protection of its environmental and cultural goods.