

SIAR Web-GIS in Regione Piemonte: a Public Administration tool about Seveso installations

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SIAR is the information system in Regione Piemonte that collects data on establishments covered by Seveso Directives, whose aim is to prevent major accidents involving dangerous substances and limit their consequences for man and the environment.

SIAR, designed by Regione Piemonte, ARPA (the regional Environmental Protection Agency) and Regional Fire Brigade and implemented by CSI Piemonte, allows to deal with an high number of documents and data, both geographical and alphanumeric, which can be used by public administrations with different responsibilities and skills on the subject.

SIAR is a useful tool with an update inventory, that can be used in sharing information between different institutions; it is also a flexible and powerful tool, helpful both during ordinary activity (inspections, emergency and land-use planning) and in case of accidents, to carry out external emergency actions.

1. Introduction

Seveso Directives (82/501/EEC called Seveso I, replaced by Seveso II Directive 96/82/EC, then amended by Seveso III Directive 105/2003/EC), aim to ensure high levels of protection against accidents involving dangerous substances. Operators of plants are required to send a notification to the competent authority, reporting the quantities of hazardous substances involved, describing processes, possible accidents and safety measures taken to prevent them. On the other hand, the competent authority must ensure that safety reports submitted are accurate and complete and organises a system of inspections, in order to audit that safety measures are reasonable.

Beside, public administrations have to draw up external emergency plans and ensure that their land-use policies take account of the need to maintain appropriate distances between establishments covered by Seveso Directive and residential areas, areas of public use and areas of particular natural sensitivity or interest.

Italian regulation on Seveso plants (D.P.R. 175/1988, then D. Lgs. 334/1999 as amended by the D. Lgs. 238/2005, and other specific acts) results complex and articulated, because different public administrations are involved, with different responsibilities.

In this context, in order to support competent authorities in their risk management related decision making processes and land-use policies, Regione Piemonte adopted in 1992 a Regional Law, that stated the implementation of a specific information system and began to develop it since 1993: that is SIAR, short for “Sistema Informativo Aziende a Rischio”, in English “Information System on Major Accidents”.

The objective of this paper is to present current characteristics and the trends of development of the information system implemented in Regione Piemonte as a technical support to the competent authority on Seveso establishments.

2. S.I.A.R: contents and functions

SIAR is composed by alphanumerical modules (db Oracle, ArcSDE 8.1.3 and middle tier Bea Web Logic 7) and a geographical module or GIS component (ArcIMS 4.0.1).

The system contains administrative and technical data, provided by operators in their safety reports, such as quantities of dangerous substances, processes characteristics, safety measures, incidental scenarios and any accident or near miss declared.

Thanks to the GIS component, establishments can be represented in their geographical context, together with more sensitive elements, like rivers, routes, railways, schools, hospitals, department stores and other locations frequented by the public.

In the system there is the possibility to perform queries on data, both geographical and alphanumerical.

Even if it has been developed specifically for major accidents plants, the system allows also to collect and evaluate information regarding technological risk from a wider point of view; in fact, SIAR contains about 500 establishments, more than those strictly covered by Seveso Directive: there are also establishments which have been covered in past times and currently no more, or which have never been, because they use dangerous substances in lower quantities than the values specified by the regulations in force.

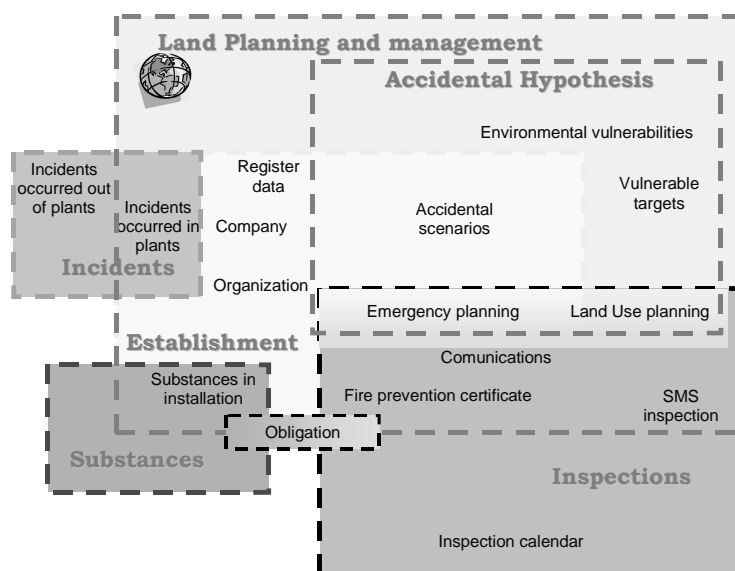


Figure 1 SIAR System – Contents

Access to the system is implemented through a network of Public Administration that assure limited accesses only to authorized person with a digital certificate: security is guaranteed by a certification system that allows different possibilities of use in consideration of user profile (reader, compiler, etc.).

2.1 Dangerous substances database and establishment obligation

SIAR dangerous substances database refers to Council Directive 2004/74/EC, adapting to technical progress for the twenty-nine time Council Directive 67/548/EEC on the approximation of the laws, regulations, packaging and labelling of dangerous substances that has been adopted in Italy with a national act in 2006. It classifies quite 3,630 chemical substances giving also concentration limits for mixtures and preparations.

The database is open: the user can enter new substances or mixtures, also those not classified yet, as further new technical information become available. In the database CAS, EEC and index number are stored, with the classification that indicates the kind of danger of the substance and the categories of danger, like toxic, flammable, oxidizing, dangerous for environment.

An important application of this part is the algorithm to made the sum of the quantities of hazardous substances or categories that are present in the establishments to verify exclusions and check the nature of the obligation, as specified in Annex I of 96/82/EC.

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Data di riferimento:	05/03/2007		(gg/mm/aaaa)				
esegui la verifica							
Verifica assoggettabilità art. 6.8							
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2 - tossiche	Dato inserito	Dato calcolato (escluso nominali):					
		198.0					
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FORMOSIR PF74 - liquido		99	50	200	1.98	4.95E-1	
Adempimento risultante da norma di legge			T6	F6	N6		
			0E0	0E0	0E0		
Esente sottosoglia			T8	F8	N8		
			0E0	0E0	0E0		
Adempimento risultante da inventario			T6	F6	N6		
			3.96	0E0	0E0		
Art. 6 D.Lgs. 334/99 + D.Lgs. 238/05			T8	F8	N8		
			9.9E-1	0E0	0E0		

Figure 2 Determination of Establishment obligation

2.2 Inspection activity and planning

Inspection activity concern inquiries of Safety Reports and verifications about the Safety Management System (SMS) adopted by establishments.

Safety Report verification consists of auditing that safety measures are reasonable to prevent and to mitigate accidental events. At the end of inquiry Authorities express a technical judgement and advices aimed to improve the safety level of the establishment.

Inspections about the Safety Management Systems are performed by Environmental Protection Agency, Fire Brigade and ISPESL (technical-scientific body in the National Health Service that deal all aspects of occupational safety, health and prevention). The inspection programs are defined by Environment Ministry and Regional Administration. SIAR allow to organize data concerning inspection activity, registering meetings, documents, etc. Beside, the system elaborates the inspection calendar on the basis of previous activities and in consideration of the judgement obtained by the establishments.

The Calendar is adopted by Regione Piemonte in his program.

2.3 Incidental scenarios and land use planning

Each establishment is divided into logic units (i.e. storage facilities or synthesis reactors) and for each one incidental hypothesis are identified (i.e. rupture of a hose carrying flammable fluids). Each hypothesis could evolve into different types of scenarios (i.e. release of flammable vapour or ignition and consequent fire) and the same scenario could differ for other parameters, like the amount released and the atmospheric stability class that influences on the distance that a toxic cloud can reach.

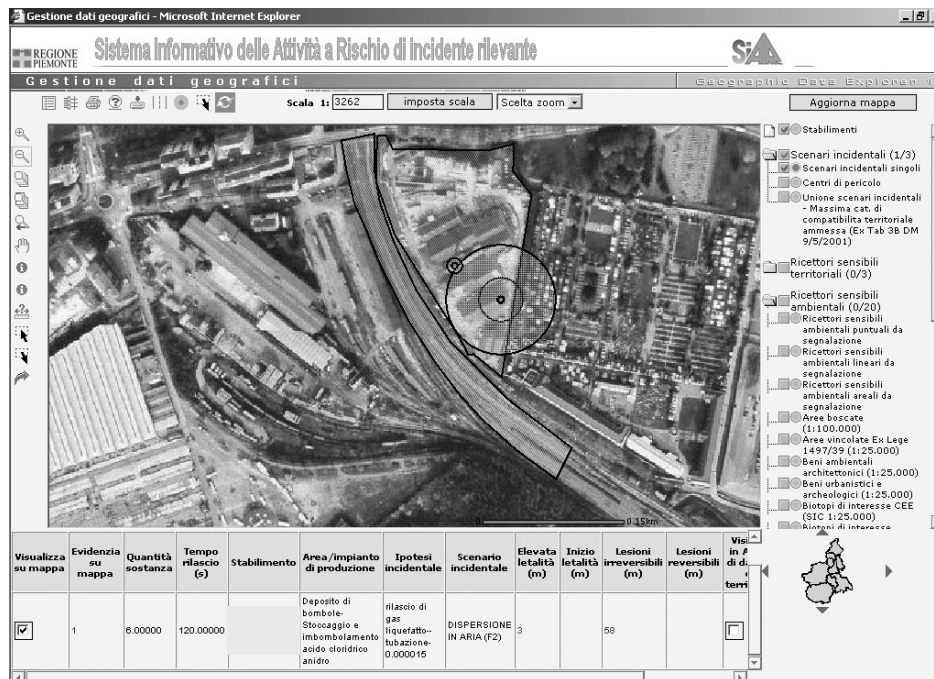


Figure 3 Accidental scenarios

Two different flags characterize scenarios provided by operators in the safety report and those calculated by the technical team of the competent authority; only scenarios validated by the competent authority will be shared to some local administrations, like the town councils, in order to make necessary changes in their urban development scheme.

Possible scenarios could be simply displayed on GIS with four circles for each establishment, representing four zones with different consequences, painted with graduated colours: in the first zone, the possible effect is related to high lethality, in the second one, the possible effect is lethality, in the third zone the possible effect is irreversible damages and in the last one only reversible damages are possible. They could be displayed all at once or grouped by type, using different colours according to the different types of scenarios (fires, toxic releases, explosions).

SIAR will automatically show the envelope according to the values and chosen colours for each of the classes. Selecting a point of the layout, SIAR will display the frequency value obtained by adding each different scenarios values.

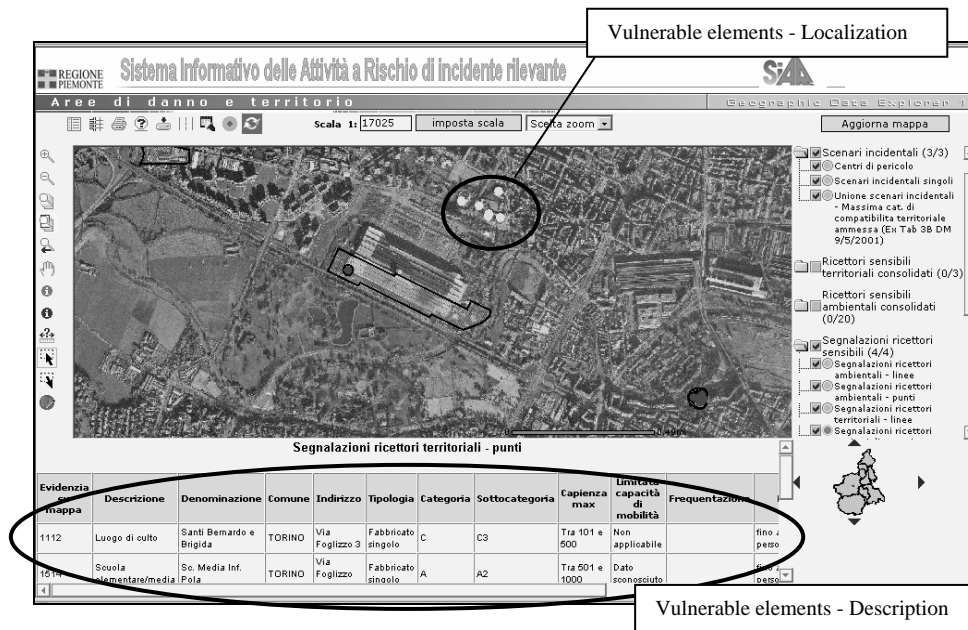


Figure 4 Vulnerable elements identification

2.4 Accidents database

A database of accidents provides a rational basis for evaluating process safety and comparing improvement alternatives. The experience gained from the analysis of past accidents could be used to project emergency plans, assess the risk induced by new technologies and understanding potential hazard. Seveso II Directive states the competent authorities are required to notify all major industrial accidents involving dangerous substances.

SIAR has a specific database of accidents reported in Regione Piemonte: for each event date, place, substances involved, consequences, suspected causes identified and emergency measures taken are specified.

According to the implementation of a Safety Management System in the establishments, SIAR will take into account also selected near miss and not only major accidents. Extracting the lessons learned allows to prevent the recurrence of similar accidents and to mitigate their consequences.

2.5 Considerations

As it has been pointed out, the information system SIAR is a useful tool to support Public Authorities in responding to Seveso Directive requirements and in particular concerning: management of administrative and technical data about establishments; checking of obligation; inspection definition; visualisation on geographic context of establishments, damage area and vulnerable elements.

Beside, SIAR can support also in defining development programs and policies for Regione Piemonte; particularly because:

- it represents a tool of land knowledge and readability, allowing to find out and analyze main critical situations peculiar of Regione Piemonte in Seveso matter (for example, typology of vulnerabilities near establishments, localization of plants in urban centre, typology of substances present, etc.);
- it constitutes a first step in the process of informatization of Public Administration, particularly aimed to an integrated management of environmental problems related to the productive activities;
- it allows to share information and data between different authorities involved, optimizing their collaboration.

3 Future developments

SIAR system is a dynamic and flexible tool that require continuous upgrading in order to answer to user necessities. Main developments and improvements foreseen for the system concern the following issues:

- possibility of integration with other information systems of the Environmental Regional System;
- application of SIAR in the Emergency Management in order to extract information about substances and vulnerabilities involved;
- interaction with the Transport system to merge information about establishments and about goods transport;
- access to the system for plant operators, to submit documents and information and to consult data available concerning the establishment.

4. References

P.F. Ariano, B. Basso, A. Robotto, G.N. Ruggiero, 2001, The major accidents hazards information system in Regione Piemonte, ESREL 2001 European Safety & Reliability International Conference "Towards a safer world", proceedings, Turin.