

BENEFITS OF S2S NETWORK FOR SME'S S2S, A GATEWAY FOR PLANT AND PROCESS SAFETY

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The main objective of the European network S2S, "A gateway for plant and process safety" is to promote safety and research on safety in chemical and related industries. From its very beginning, the idea of S2S was to seize the experience of the involved institutions in benefit of the SME's and – as a consequence – in benefit of the world-wide community.

All experts are aware that safety knowledge is split in many sources – such as books, papers, reports, internet, etc. –, and that results of R&D are not always easy to be located and accessed. The main challenge of S2S has been compiling the available safety-related information, reviewing and organising it in an easy way for better comprehension of users. The compiled information is offered in the web portal of S2S (<http://www.s-2-s.org>) as a wide database.

The operators of small process plants are expected to be the main users of the information compiled, but other stakeholders are also expected to find the resulting system of interest. Industrial entities with that handle, process or store hazardous chemicals will especially find the material to be useful as they endeavour to improve the level of safety in their organisation.

Some tools for safety training and auto-assessment on subjects such as risk analysis, safety management, hazardous substances, chemical reaction hazards, industrial fires, toxic releases and explosions are available in the above mentioned database. The auto-assessment is intended to give advice whether the user should perform a deeper safety study or ask for external help.

This safety-related information and knowledge is being offered together with online vulnerability screening assessment tools, as a means to reduce accidents and incidents, and their environmental and societal impact. The intention is to create an important process safety information management system and repository, supporting not only safety practitioners in SMEs (small and medium-sized enterprises) that are carrying out chemical reactions or handling/storing chemical substances.

More information being compiled in support of SME's are the results of RTD Projects of National or European level, as well as the compilation on "Legislation and Standardisation" applicable to them. The network is developing roadmaps of principal legislation in Process Safety in European countries, illustrating the transposition from European into national legislation.

S2S organises "National forums" and carries out "Prospective activities" with the participation of SME's working in the field of chemical industry. National forums are a tool to disseminate information about results of S2S, and giving support for the set of prospective activities, which are collecting, listing and prioritising safety research topics of interest for the industry. It is desired that the final list is proposed for being included in the Strategic Research Agenda, which is being developed by the European

Technology Platform for Industrial Safety, and that will be submitted to the European Commission to prepare its 7th Framework Programme.

BACKGROUND

The world chemical production of chemical industry in 2001 reached about 1,878 € billion (source: CEFIC). The European Union is currently having a 28% of the total chemical sales in the world, occupying a second place after Asia if Japan is considered in it, or a first place if no (Figure 1).

However, trends shown in Figure 1 indicate a very strong acceleration of the Asian production and a declining participation of Europe. Experts accept two possible scenarios for the European chemical industry in 2015. A moderate bad situation could have a 23% of the total market, and a worst case in which European industry has a 16% only.

Obviously, different factors are favouring the displacement of chemical production to Asia. However, almost two of them are related with safety. One is the strong social concern against chemistry in Europe. The other might be the consequence of the same factor in the form of a solid body of laws constraining the competitiveness of the chemical industry in our countries.

Recent studies agree that in Europe there are more than 2,000 explosions per year during handling and storage of combustible materials. Furthermore approximately 20 accidents are related with “runaway reactions”, and an average of one industrial fire happens every day, causing losses for approximately 100,000 € or more.

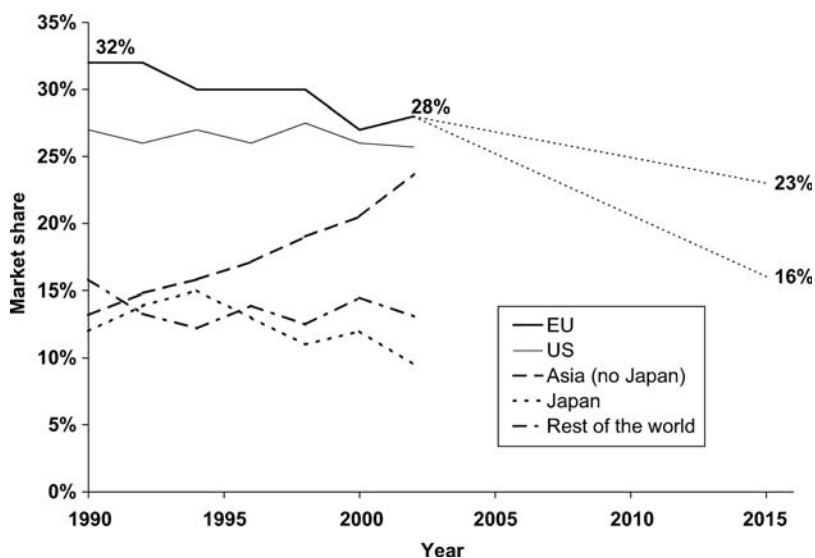


Figure 1. Chemical market distribution (sales volume). Source: CEFIC

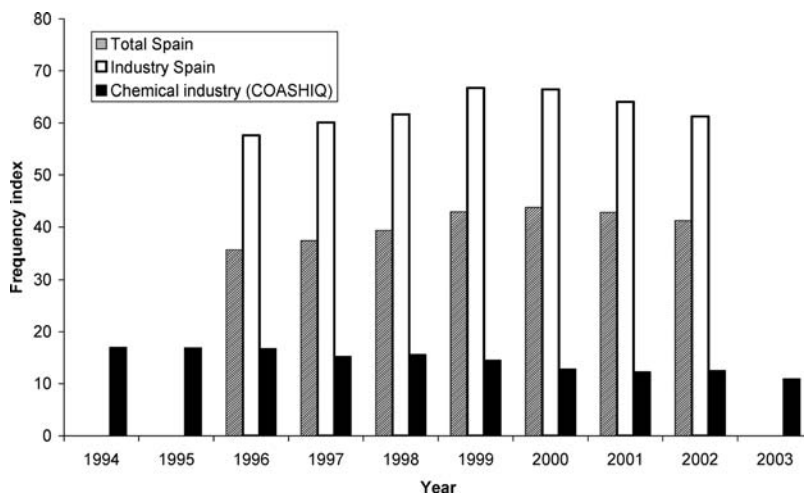


Figure 2. Frequency index – in which the frequency index – FI, number of accidents with at least 1 day of absence at the workplace per million of worked hours – values in Spain

Moreover, when compared with other economical sectors, chemical industry has an excellent safety level as shown in Figure 2 in the case of Spain. It is also important to notice that the chemical sector has obtained a strongest reduction of the accidents. It is observed a reduction of about 40% for the period 1994–2003 in Spain (Figure 2), but also in Europe there is a reduction of a little more than 21% for the period 1996–2000 (Figure 3).

Despite of this, any occurrence in chemical industry has a great social impact, which induces it to be rejected by the community, becoming one of the main concerns of authorities, which promote new rules and laws. At the end, citizens retain that chemistry and chemical industry is one of the main problems of nowadays.

SME'S IN EUROPE

The **Observatory Report 2003/7** of the European Commission records that there are 25,3 million non-primary private enterprises in Europe, from which 99.8% are craft and small and medium-sized enterprises (SME). “Within the group of SMEs, the vast majority of over 90% are micro businesses with less than 10 employees. In fact, the typical European enterprise is a micro business employing 3 persons. Crafts and small businesses employ more than 53% of Europe’s workforce (around 95 million people) and are responsible for half of Europe’s total turnover. The average company size in Europe is 5 occupied persons. Small businesses and craft enterprises are therefore the rule in Europe and not the exception. Small enterprises and craft businesses are a key source of jobs and a

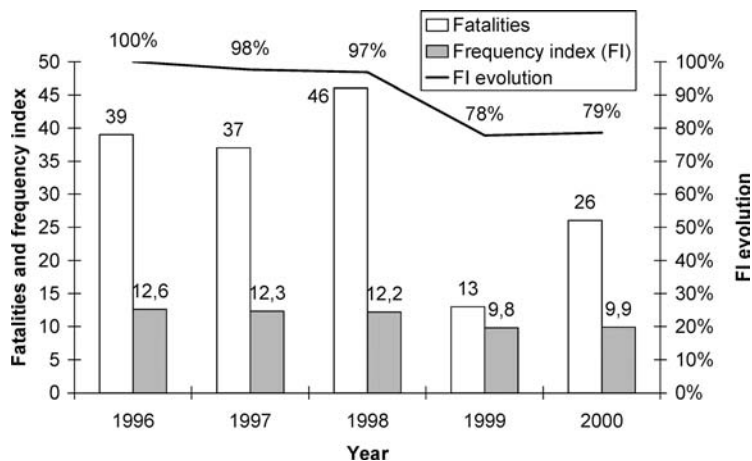


Figure 3. Number of accidents and death and frequency index (FI) Chemical industry in European Union. Source: CEFIC

breeding ground for business ideas...” (“Craft and Small Businesses” European Commission-Enterprise and Industry Directorate-General E/3).

In Spain the figures are not different 99.87% from the total of private enterprises excluding fishing and agriculture are SME’s.

This quick observation leads us to believe of the importance to increase the safety knowledge of this economic sector, as well as to identify needs and research gaps to help them to have a sustainable development. In this context S2S is addressing its efforts to improve the safety culture for the small businesses.

S2S – A GATEWAY FOR PLANT AND PROCESS SAFETY

S2S was created in November 2002 to contribute giving an answer to this situation. S2S is a European Union funded network, integrating the work of the former European networks *HarsNet*, *Prism* and *Safetynet*. The aim of S2S is to improve the synergy between all actors working in plant and process safety, and to create a tool offering the existing knowledge on this area to all people working in chemistry from universities to industry, passing through research centres with a especial focus on small and medium size industries. Nowadays, S2S includes more that 30 institutions working for the improvement of process safety.

In order to arrive to as much people as possible, S2S creates a web site with the aim to be the portal for the process safety in Europe. In the portal, users can find useful information organised by main topics in a list which structure was defined inside the network or through a glossary ordered by alphabetic system.

In the web portal, users may take an auto-assessment in risk analysis and safety management – about hazardous substances, chemical reaction hazards, industrial fires, toxic releases and explosions. There is also available a compilation of conceptual information about the common terminology used for safety aspects.

S2S is also working in best practices, legislation, standardisation and different tools to perform self-assessment regarding to hazardous properties of chemicals and industrial processes.

S2S is compiling and reviewing the available safety information organising it in an easy way for the better comprehension of the end-users.

This transfer of knowledge will have also effect in the protection of human health, environment, and industrial facilities, since the end-users will have access to the results of the most recent and novel research works.

For accomplishing its objective, S2S network is working on

- compiling useful and necessary terms in the field of safety organising them in a logical way,
- compiling existing methodologies to help the SME's to run its self-assessment to recognise possible risks in their process,
- compiling existing training packages, normally developed by another RTD European projects, that will give the basic knowledge to people working in safety divisions of the industry,
- doing easily accessible legislation and standardisation information useful to process safety,
- making a pattern to access to the information in a simple way,

Because the aim of S2S is to become the safety reference point in Internet for industrialist the creation of the webportal has been done in a unique searchable database structure, which will include the results in the most speaking languages in Europe. Initially we consider English, German, Spanish, French and Italian, but in a near future we are thinking on another languages according the interest on the European countries for having its information in their own languages. It is very important to avoid misunderstandings due to a language comprehension.

The main page has been designed at such way, that users can know what type of information is included in there, and to offer them the easiest way to select the one that they need.

The main page of S2S webportal (Figure 4) has eight *main sections*, which will conduct the user into the topic of its interest:

- 1) Material Safety Data Sheets
- 2) Safety Management
- 3) Chemical Reactions
- 4) Explosions
- 5) Industrial Fires
- 6) Measurement Methods
- 7) Protective Equipment
- 8) Human Factors.

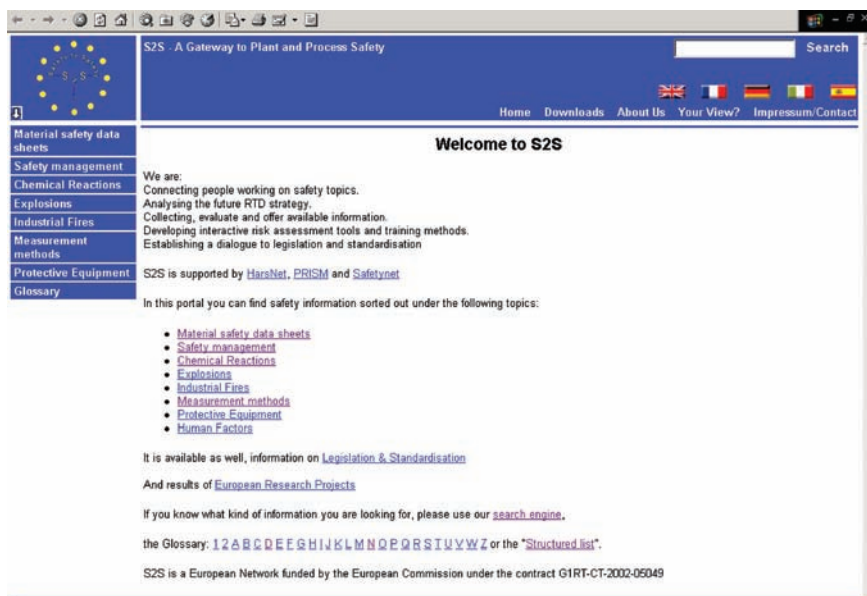


Figure 4. S2S web portal organisation. Main page

These eight sections are kept at the left side of the frame of the screen in order to facilitate the access to them from what ever point the user is. On this side, and with the same purpose, there is a permanent link to the glossary and to a translation section.

Typical parts such as a return to the main page “Home”, the “Impressum/contact” containing the address of the task leader responsible for the web of S2S, and “About us” with addresses of the other members of the network are permanently shown at the top of the screen. On that side you can find also other permanent links to a one page for expressing your opinion about the portal “Your opinion”, one section to get as a pdf file all our selected documents “Downloads” and the possibility to get the information on the initial selected languages by clicking on the flags. Furthermore, as it is usual in Internet, a “search engine” will support the user to perform his searching by keywords.

When a section is clicked a new page is open showing the specific information available for this topic as it is shown in Figure 5 for safety management.

In general, for each main section, as for safety management, the information is placed under one of the following terms:

1. **Structured list** (Figure 6): It has been created an information and knowledge management system, which offers on-line access information for safety. In there it has been included most of terms usually utilised in safety, its definitions, usefulness and

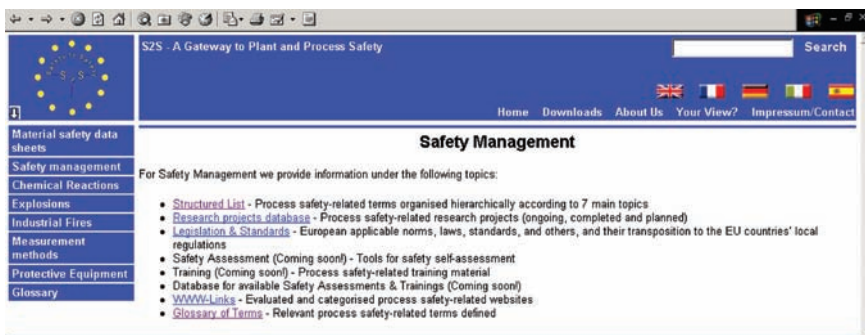


Figure 5. Safety management page

references for more information. This structured list is the gate to go into those safety concepts, as well as, to the assessment methodologies, which can be ran by the interested users to make their self-assessment to detect possible hazards in their chemical processes.

At the beginning of the Structured list a short explanation about what is the structure of the list to guide the users through it.

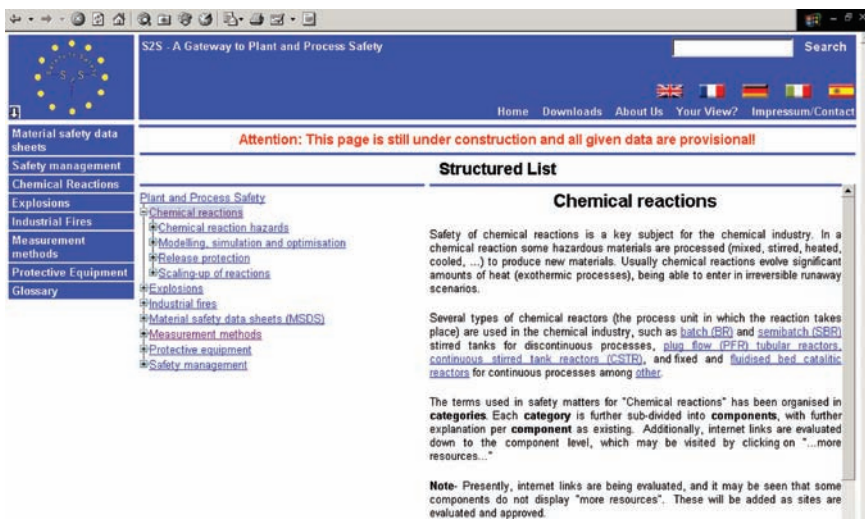


Figure 6. Structured list of safety terms usually utilised by the industry

S2S - A Gateway to Plant and Process Safety

Attention: This page is still under construction and all given data are provisional!

Research projects

Research area: Industrial Fires Country: Germany Search

ACRONYM	Research area	Country	Action
FIMEX	Industrial Fires	Germany	View Project Data
FIREDETTEX	Industrial Fires	Germany	View Project Data
IMOS	Industrial Fires	Germany	View Project Data

Figure 7. Some of the results of the search for research projects on industrial fires in Germany

- Research project database** (Figure 7): A database with, as much as possible old and current projects and networks, has been created. This database intends to include the existing research projects on safety developed by universities, research institutions, national authorities or private bodies.

From an analysis of this information, the S2S members will be able to recognise what is the lack of research existing to perform best practices in process safety. This work is being done with nearly collaboration the SME's. Prospecting activities and National forums are being organised with the objective to obtain the actual needs in safety, from the main actors including and emphasising in industry. The results obtained will be submitted to European Commission as proposal to be investigated in the future. This part of work is being done in collaboration with the European Technology Platform for Industrial Safety (ETPIS).

- Safety assessment:** It offers assessment methodologies and training packages, which are being made freely available via the structured list. The results will increase safety awareness in both SMEs and major industries, which will help reducing incidents and their environmental impact. The assessment methods will allow the identification of the hazards in the process industries, including the safe handling of substances, the best way to carry out chemical processes, how to avoid vapour and dust explosions, industrial fires and toxic releases. They will enable the assessment of the risk and provide guidance on the selection and design of adequate control measures. In Figure 8 and Figure 9 it is shown some screens on this topic.
- Training packages:** S2S is compiling existing training packages developed around Europe that will give basic knowledge to people working in safety divisions of the industry. The intention is to provide training tools by which technical staff could minimise the risk of the plant and improve their working methodology.
- Legislation and standards:** In this subsection, the user can find the harmonised directives and associated standards, as well as a roadmap of principal legislation in Process Safety, illustrating the transposition from the European to the national legislation.

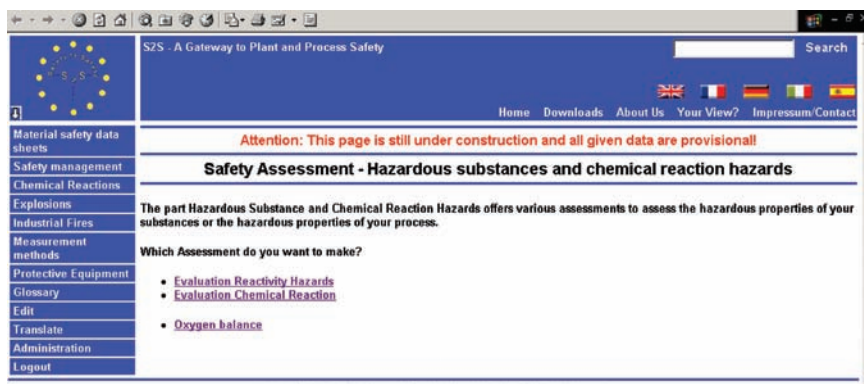


Figure 8. Safety assessment

The aim is to compile all legislation in force in every EU country, in order to help the SME's in searching for the information – necessary and important for their safety. In Figure 10 a model page – in that case for Spain – is shown.

6. **Glossary** (Figure 11): It is a list of terms and key words sorted alphabetically. This way will help the user to go directly into the subject of his interest by simply using words.
7. **Links of interest**: When it is possible a list of links of interest is shown to complete the information found in the portal. It is intended to organise this links under different topics, like databases, lessons learnt, software or consultants, for instance (Figure 12) to facilitate the search of information.

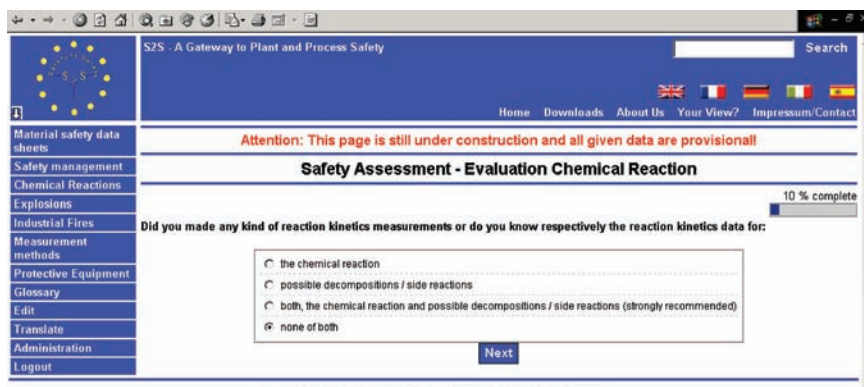


Figure 9. Example question within safety assessment self-evaluation

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Legislation & Standardisation

Type: Any Country: Spain Keywords: Any Search

Identification	Type	Country	Action
R. D. 108/1991	Decrete	Spain	View data
R. D. 1196/2003	Decrete	Spain	View data
R. D. 1254/1999	Decrete	Spain	View data
R. D. 1378/1999	Decrete	Spain	View data

Figure 10. Some results in legislation & standardisation

8. **Questions and Answers:** Finally, there is a section to compile the most frequent questions and answers in the field of plant and process safety.

BENEFITS OF S2S NETWORK FOR SME'S

- Reaching the interest of small and medium enterprises working in the field of chemical production,
- promoting industrial safety,
- spreading existing knowledge,
- making a joint effort in order to discover what topics are necessary to improve process safety,
- organising and creating a coherent strategy and action plan to deliver agreed programs of research activities and optimise the benefits of all actors,

S2S - A Gateway to Plant and Process Safety

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Glossary

ABCDEFGHIJKLMNOPQRSTUVWXYZ Search!

- [Warning equipment](#)
- [Washing and drying systems for clothing](#)
- [Water contamination](#)
- [Water solubility](#)
- [Weat](#)
- [Wetting](#)
- [What-if analysis](#)
- [Wind measuring apparatus](#)

Figure 11. Glossary

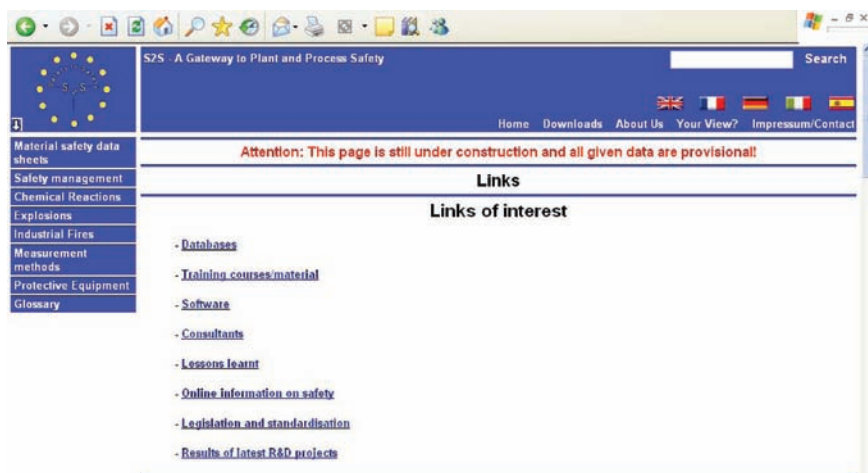


Figure 12. Links' page.

- elaborating and following-up a strategic research agenda (SRA),
- promoting and encouraging the R&D activities as main key for innovation of the technology, and for generating sustainable competitiveness of the EU.

ACKNOWLEDGEMENT

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