SAFETYNET — a European network for process safety

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Abstract

SAFETYNET is a European Thematic Network on Process Safety funded under the Brite–Euram Programme. The aim of this network is to reduce the time delay between research results and their practical use in industry in order to stimulate further development and adoption of technologies in the field of process safety. This is mainly done in areas related both to the safe operation of process plants and production facilities and to the prevention of accidents. © 2001 Elsevier Science B.V. All rights reserved.

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1. Introduction

Statistics have shown that in Europe alone there are: (a) more than 2000 explosions per year during the storage and handling of combustible materials, (b) 20 accidents per month involving runaway reactions and (c) one large fire (on average) a day leading to a loss of more than 100,000 Euro. This journal's forum has repeatedly hosted articles and surveys that deal with these matters, examples being "Risk assessment and management of

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environmental chemicals" by Weisburger [1], "The relationship between risk of death and risk of dangerous dose for toxic substances" by Franks et al. [2], "The absolute and relative ranking approaches for comparing and communicating industrial accidents" by Kirchsteiger [3], and the findings of the conference "Risk 97" edited by Ale [4].

With these statistics in mind, it becomes very clear why process safety is a very important matter. Research in areas of process safety has as its objective the minimisation of risk stemming from a potential accident by reducing both accident frequency and magnitude and/or probability of consequences, as stated by Papazoglou [5].

A significant gap appears, however, between the generation of research results and new information and their use by industry, especially by small and medium enterprises (SMEs). In an effort to reduce this gap a European Thematic Network on Process Safety funded under the Brite-Euram Programme has been established and called SAFETYNET.

The network links between industrial enterprises, such as manufacturers, service providers, legislative bodies, research organisations and information outlets lead to rapid adoption of safety techniques and stimulation of further developments. As a result, knowledge on all aspects of health and safety in the areas of fire, explosion and process hazards becomes as widely disseminated as possible by the creation of new and wider partnerships.

SAFETYNET has been designed to provide extensive opportunities for its members and associates to

- discuss general aspects of process safety;
- promote new ideas from the results of the world-wide effort in safety research;
- advise on new safety technologies — analyse and solve specific safety problems;
- gain information on new legislation and standards and how they affect interested enterprises.

2. Organisation and activities

The consortium that formed SAFETYNET and applied for financial support at the EU comprised 34 organisations from 15 EU member countries. After its funding selection, SAFETYNET gave to every interested party the opportunity to become an associate member of the network by signing a "Letter of Interest". Associates have the same opportunities for providing and receiving information as do the main partners. At present, SAFETYNET has over 100 participants from 19 countries. The main co-ordinating body is Prosicht GmbH in Germany and each country has a National Focus Point (NFP) that co-ordinates and helps the information diffusion in his or her own country.

The activities under the umbrella of SAFETYNET comprise three thematic areas: (a) chemical hazards, (b) fire hazards, and (c) explosion hazards. Each of these areas has its own group (or cluster) and all members of SAFETYNET belong to one or more clusters and work under the management of two cluster leaders. These leaders, together with the project co-ordinator, form the SAFETYNET Steering Committee (S.C.) charged to resolve any issue regarding both scientific and practical aspects of network operation. Moreover, the activities of SAFETYNET can be divided into two types: (a) the electronic ones and (b) the "physical" ones.

2.1. Electronic activities

- A monthly electronic newsletter which includes news from the EU, information on upcoming conferences and seminars, conference and research reports, contact search, presentation of new projects and developments, European standardisation, opportunities for co-operation and any other short messages with relevant news. All participants and associates can submit items for publication.
- An internet portal at the e-mail address www.safetynet.de (see Fig. 1) with the following structure.
  - The operation of several databases providing information on participating organisations, areas of current research, research activities, opportunities for co-operations, location of testing facilities, products and test-measurement equipment.
  - The operation of a library with information on research programmes (containing about 600 summaries of research projects funded by the commission and relevant literature), project proposals, Ph.D. research currently underway and sources of information on standards, regulations and legislation.
  - The organisation of seminars on the Internet web page on a regular basis covering fire, explosion and chemical hazards research, incident reports and general process safety articles, where discussion of the papers is organised in a written form and papers are available for downloading.
  - The organisation of Internet Conferences, like the second Internet Conference on Process safety in March 2000, with a broader catalogue of scientific topics.

Fig. 1. A computer snapshot from the SAFETYNET home page.

○ References to other web-addresses (useful links) with relevance to the subjects SAFE-TYNET promotes, examples being accident databases, chemical databases, EU research promotion gateways, etc.

2.2. "Physical" activities

- The organisation of two plenary international meetings, one in Denmark and one in Greece, and of several national ones (in 15 countries) in which members and associates meet and discuss the approaches developed in the different areas of industry to identify hazards and to prevent accidents. In such a way techniques are compared, contacts are enabled, research results are discussed, the partners and their fields of interest are presented, complementary research is initiated and information is distributed in a more direct way.
- Arrangements for the exchange of personnel either between research organisations or between research organisations and industry, so as to diffuse expertise currently gathered in academic institutions. Using the existing research infrastructure in Europe in an optimum way by stimulating the adoption of new results and the development of human resources does this.
- The creation of new partnerships by using the existing research and test facilities in two ways: (a) common proposals to research funding organisations, such as the EU or national bodies, and (b) transfer of already acquired results to organisations outside the network in the form of co-operation or of consultancy.
- The establishment of a steering committee, which meets on a half-yearly basis and promotes the activities of the network.

3. Evaluation of activities

SAFETYNET has lived the first half of its funded life. The experiences gained during this period are discussed below.

The idea that the proposers of SAFETYNET had in mind was the formation of a common European market in process safety where interested parties could easily find information on research work done in Europe, could get in contact with the responsible persons and had the opportunity to create new partnerships.

The intended objectives have been achieved by building an electronic network to reach as many interested persons as possible, as rapidly as possible, by offering on the internet sources of information developed via traditional networks.

A general review of the number of interactions with the SAFETYNET electronic network shows the following results.

3.1. The newsletter

Free distribution of the newsletter started in April 1999 to less than 100 addresses; by April 2000 the newsletter was being distributed to about 410 addresses and by October 2000 to more than 450 addresses. Most of those receiving it have subscribed to the newsletter by

themselves and there is a monthly increase of approximately 20 in the number of subscribers. The newsletter has proved to be an excellent medium to distribute information to interested people all over the world. The content of the newsletter is, however, mainly provided by the co-ordinator (Prosicht GmbH); there is a very limited input from the other partners.

3.2. Electronic publishing

Use of the web site started in January 1999 with about 200 users per month and a monthly download volume of about 18 MB. In the period January–April 2000, on average 2000 users per month visited the web site, while the download volume has increased from 20 to 100 MB per month (see Figs. 2 and 3). At the 2nd Internet Conference, which was organised by SAFEYNET in March 2000, and at the November 1999 seminar, each presented paper was downloaded on average about 80 times during the event and about 140 times in the 2-month period following the event. It has been observed, however, that people do not ask questions during the events, but only take the opportunity to download the papers. The reason may be that they have no questions immediately to hand to pose in relation to the topic. Therefore, a new application "Open discussion on actual questions" has been integrated into the main SAFETYNET page (see Fig. 1). By means of this application everybody has the opportunity to ask a question without any restriction on either the topic or the time.

3.3. The web page

The SAFETYNET web site is an information source of high interest and this has been stated explicitly by Internet surfers to the webmaster (Nebuloni [6]). On average, about 99 users per day are requesting information on the web site. During the first half of the project more and more information has been published and, in parallel, the downloaded information
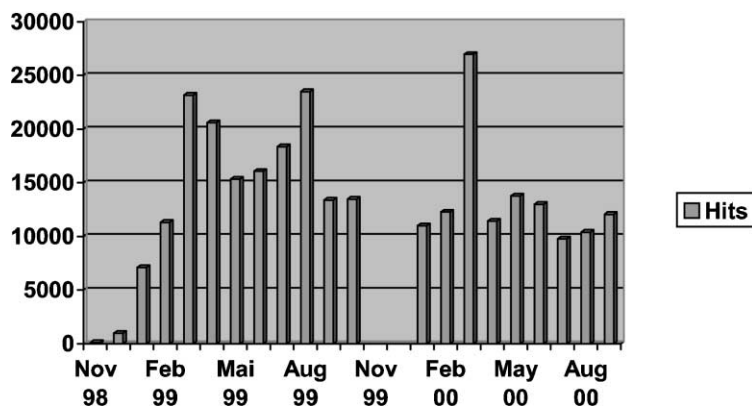

Fig. 2. Hits per month at the SAFETYNET web address (NB: The reduction of hits at the end of the year 1999 is explained by the restructuring of the web-site. In the introductory web page of SAFETYNET there are now less small buttons and pictures. By opening the main page each downloaded button will give a hit. Therefore, the total number of hits has decreased. This has changed in March 2000 during the Internet Conference. During November and December the web counter (webalizer) was out of order.).
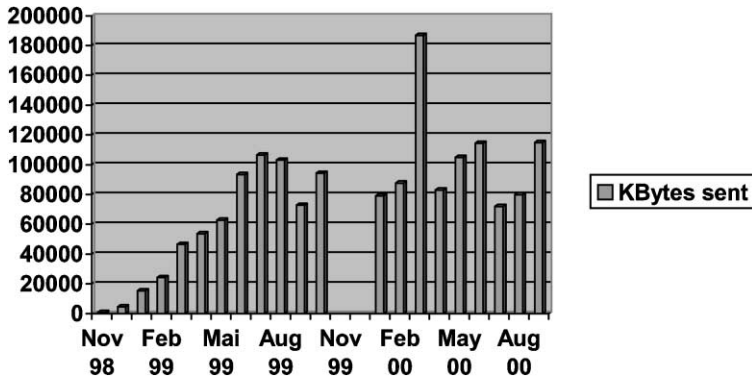
Fig. 3. KB send out from SAFETNET web server. (NB: The very high download volume in March 2000 results from the 2nd Internet Conference on Process Safety organised in this period.).

is constantly increasing. The hourly access analysis for SAFETYNET homepage shows also that more users from other time zones are using this home page. The access to this site is much higher than the access to other documents in the field of process safety. On this evidence, the SAFETYNET web site seems to be fulfilling a very useful function.

Co-ordinators of various EU-funded projects are asking to use the SAFETYNET site as one part of their exploitation plan. It is often not possible, nor does it make sense, for those projects to build up a separate distribution service when there is already one available with a large number of interested users. The SAFETYNET home page has therefore had integrated into it a new application called "other EC-projects". In April 2000, as a first action, the final report of the RASE-project (EU Project No: SMT4-CT97-2169, SMT-programme) was published on the web.

4. Building an electronic network-discussion of results

SAFETYNET's operation, both electronic and physical, has shown that there are merits in and limitations to such an electronic network; these also give an indication of how useful the whole venture is.

4.1. Limitations

4.1.1. The participants

The participants come from a very inhomogeneous group of organisations — manufacturing industry, research organisations, national risk authorities and consultancy firms. How these organisations use electronic information differs a lot. Some prefer the computer for communications but others choose the traditional way of paper and ordinary mail. This influences the level of input to the network, which varies from no input from people who put a low priority on computer communications, to more than requested from those who are very competent with computers and the web. SAFETYNET, therefore, appears to be a venture well ahead its time in using modern methods of communication.

4.1.2. The priority of electronic tasks

Another problem concerns the way people handle tasks communicated by electronic means. It appears that the priority given to electronically submitted tasks is lower than that given to tasks distributed either in a meeting or by normal mail. People appear to store electronic mail in a file and do the paperwork on their desk first, essentially putting tasks requested by e-mail into abeyance. As a result, regular reminders are necessary. In relation to the published information on the Internet (e.g. the seminars) there is rarely the opportunity to attend to it without interruption. At a normal seminar or conference people attend without there being phone calls, meetings or conversations with colleagues to distract them, but this is probably rare with internet seminars.

4.1.3. The different expectations of SAFETYNET's audience

Expectations of SAFETYNET vary with the interests of its audience. That part of the audience that works in the process safety industries wants general and practical information, while that part more involved in research expects more detailed and specialised information. It is not possible for a general network on process safety to offer both in satisfactory depth, but would be possible for a network concentrating on one topic, such as runaway reactions The main objective of SAFETYNET is, however, to act as a gateway offering information on where it is possible to find a solution to problems arising in the many areas of process safety.

4.1.4. Communication language

A good knowledge of English is necessary for effective use of SAFETYNET. Those without skills in the English language may be faced with difficulties in understanding very technical matters and this may obstruct the real exchange of information.

4.1.5. Contact with SMEs

One of the main problems that an electronic network like SAFETYNET has is how to reach appropriate people in the small and medium enterprises (SMEs). It has been observed that only users who are already knowledgeable feel concerned enough to investigate solutions to their safety problems. People from SMEs often do not realise that they have a problem that could be resolved through such a network.

4.2. Merits

4.2.1. Number of participants

There is no practical limitation on the number of participants, as additional partners strengthen the consortium at no cost. In practice, it is possible for every interested party to participate in the network, to retrieve and send information with no cost or further liabilities, simply respecting very general ethical rules (e.g. no damage to the site, no diffusion of misleading or offensive information, etc.)

4.2.2. Total cost

The total costs per partner for participating in a network like SAFETYNET are lower compared to traditional associations/networks. Less cost and time is spent travelling and the amount of effort is lower for a given result.

4.2.3. No time delay

Electronic networks enable the diffusion of information to any point in the world with no time delay apart from that expected from standard Internet connection.

4.2.4. Electronic seminars/conferences

Since scientific events like seminars or conferences are now possible on the Internet, the avoidance of travel by the participants, means that time, energy and money are saved. All the necessary equipment (computer, modem, printer) is available at each participant's workplace, so any e-conference can be held with much less preparation but without any decrease in scientific value. In addition, modern multimedia offer the possibility to process even complex documents and perform further work on them if required.

4.2.5. Availability of information

It is not always possible for everybody wishing to participate in an electronic event to be available at the time the event is held. Electronic network events allow a post-conference participation, so that information about the main topics can be obtained even if opportunity for an immediate discussion is no longer there. The possibility to contact any conference partner does, however, still remain.

In summary, the use of such an electronic network as SAFETYNET offers more merits than limitations. The Steering Committee, however, is always keen to improve the SAFE-TYNET service and seeks proposals for any improvements that can be made.

5. Proposals for improvement

Some of the suggestions for improvement that have been put forward by SAFETYNET members and associates are given below.

5.1. Practical information

SAFETYNET should be enhanced with more "applied" information; up to now the network has offered limited access to practical matters of everyday safety. Members have requested the possibility to find on the web properties of materials or other safety related information that would enable them to deal more effectively with inherent risks. To that end SAFETYNET offers links to addresses where this information is available.

5.2. Enhance databases

It has been proposed that a list of safety studies undertaken by participants should be added to the web site with a link to titles and abstracts of studies already published. The problem is that most of these studies are proprietary and thus confidential.

5.3. Revise the contents of e-seminars

It has been suggested that more general themes should be adopted at the electronic seminars, which up to now have often focused on very specific subjects of interest to only

a very small group of members. Rather, they should be concerned with more common subjects that are of broad concern, i.e. on more applied matters. There should also be more information available on the website without having to download the actual papers. Issues affecting and concerning SMEs, such as c*riteria for accepting risks in different countries*, *safety management systems*, *safety criteria*, *methods for measurement and assessment of safety*, *creating routines in management systems* and *third party revisions*, should have priority in upcoming e-seminars.

To this end, SAFETYNET will propose subjects for forthcoming seminars that combine research aspects and practical problems.

5.4. Facilitate discussions

A facility for discussions on topics of immediate interest has also been requested by means, for example, of a chat site where members could discuss "problems of the moment". People often have less time to discuss and take interest in specified subjects decided in advance by the Steering Committee, but could find very useful a site where their own specific problems could be discussed. A chat site with no restrictions on time or subject was integrated in the SAFETYNET web page in March 2000.

5.5. Revise the classification

There has been a discussion on whether to alter the clusters so that they fit more closely with the interests of the SAFETYNET members. It was proposed that headings such as "Hazard identification", "Accident prevention" and "Consequence reduction" depict SAFETYNET's activities better than do the current "Chemical", "Explosion" and "Fire" headings. Many research projects cover all three of these topics and in many cases a fire follows an explosion and vice versa, while chemicals are involved both in fires and explosions. This proposal has been adopted by SAFETYNET's mid-term meeting.

6. Epilogue-exploitation possibilities

SAFETYNET with the aim of reducing the time delay between research results and their practical use in industry in order to stimulate further development and adoption of technologies in the field of process safety. This is mainly done in areas related both to the safe operation of process plants and production facilities and to the prevention of accidents. The SAFETYNET web site has proven to be a popular and useful reference for process safety, where both academics and practitioners can find useful information and links. It is not the intention of SAFETYNET to always offer tailor-made solutions to practical problems but rather offer information about where it is possible to get the answers. SAFETYNET is a valid means for publication. A publication on the Internet has the same meaning as a publication in a journal and can be cited in the same way as for any other publication, e.g. "Title" published at www.safetynet.de, 1999.

As more and more information is published on the SAFETYNET web site, more and more information is requested for publication. The development of a system to procure all this information is another task for SAFETYNET.

SAFETYNET has been in contact with other thematic networks, like HarsNet. It has been agreed that HarsNet will participate in the seminars of SAFETYNET and will present a paper on its activities when the first results are obtained. Furthermore, HarsNet will use the newsletter of SAFETYNET to publicise its reports.

SAFETYNET is also in contact with the new network on human factors called PRISM and it is intended that the latter is included in the activities of the former.

SAFETYNET's co-ordinating body (Prosicht) has applied for and received from the EU (INCO programme) an additional funding called SAFECON to enable researchers from European Countries in pre-association agreement with the EU to participate in the SAFETYNET mid-term meeting and to present their research work and capabilities. The partners of SAFETYNET and the invited researchers were thus able to make closer contact with each other and consider new consortia for future scientific ventures.

Up to now, SAFETYNET is a funded network, but consideration needs to be given to its continuation once EU funding ends. Owing to SAFETYNET's structure and capabilities its continuation through a commercial scheme could be considered. A strong point of SAFETYNET is the high number of users visiting its website and requesting information, an aspect that could be used to obtain an income for further activities by two different ways: (a) a pay-per-view system for seminars and conferences papers, although this would mean a higher administrative effort, and (b) publication of commercial information, creating a virtual exhibition of products and services offered by various providers.

In any event, SAFETYNET has proved itself as an important outlet for the exploitation and dissemination of process safety information, and every attempt will be made to ensure that it continues once EU funding ends.

Acknowledgements

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