LEARNING FROM SUCCESSES AND FAILURES

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The IChemE has a strong commitment to learning from accidents based on its long involvement with the Loss Prevention Bulletin, the Accident Data Base and training programs. In addition the topic forms an important part of the Institutions 'Technical Roadmap'.

The paper will describe current Institution activities relevant to 'Learning from Experience' and the plans which are being prepared for future developments.

In addition to the development of the LPB and toolbox talks the proposals include expansion of the archive role and the establishment of web-based systems for the more rapid sharing of experience.

The presentation will be used as an opportunity to test and refine the proposals with a wider cross section of safety specialists and to gain more input and support.

INTRODUCTION: IChemE TECHNICAL ROADMAP

In late 2005 IChemE Council identified a need for greater clarity in relation to the technical positioning of the Institution on key issues of public concern. A Strategy Task Force met in a number of workshop sessions supported by interaction with members to identify a set of priority topics. This work was supplemented by the key messages arising from the technical programme at the 7th World Congress of Chemical Engineering held in July 2005 and the output of a high level IChemE/RSC interface group convened by EPSRC. The Roadmap project was launched at the 2006 Assembly with the full backing of the members present (Ref 1).

The process of developing a Roadmap for 21 Century Chemical Engineering was targeted at putting the Institution and its constituent groups and members, in a position to make a meaningful contribution to public debate on issues where the discipline, in conjunction with others as appropriate, can play a significant role in delivering solutions.

Four key topic areas were originally identified, covering Biosystems through to Sustainability, to focus the production of position papers and involve all the Subject Groups: This paper will concentrate on some of the aspects of the Roadmap relevant to Safety, Health & the Environment with particular emphasis on 'Open Dialogue'.

The full roadmap can be downloaded from the Institutions website.

Based on input from members the section of the roadmap on safety, health & environment identified three key areas to work on.

RISK – ITS MANAGEMENT AND PUBLIC UNDERSTANDING

Chemical engineers and IChemE will seek to exert greater influence on the process sector, regulators and academia to develop and utilise new ways for cost effective and sustainable risk reduction. This may be carried cut in conjunction with other relevant professional bodies.

PERFORMANCE – HEALTH, SAFETY AND ENVIRONMENTAL CULTURE

IChemE will engage with corporate leaders, regulators, and other professional bodies to create cultures that deliver real improvements in H, S and E performance, and have benefits to all.

OPEN DIALOGUE – LEARNING FROM PAST SUCCESSES AND FAILURES

IChemE will work to influence industry groups and regulators to take a more proactive approach to passing on lessons learnt. We will strive to break down the barriers that blame and litigation create to prevent lessons from accidents being rapidly disseminated to those who would benefit through the adoption of 'just cultures' that focus on learning, not on establishing blame.

A report recording progress against the roadmap objectives was issued in 2008 (Ref 2). (Available on IChemE website.) This paper will provide further information on progress against the SHE objectives with particular emphasis on those elements relating to 'Open Dialogue'.

OPEN DIALOGUE

Following the publication of the 'Roadmap' members of the Safety & Loss Prevention Subject Group and the Loss Prevention Panel discussed the objectives in more detail. In addition presentations were made at ChemEng 08 and a one day meeting was held to obtain a better understanding of the Institution's current position and the strengths, weaknesses, opportunities and threats, (SWOT) relevant to 'Open Dialogue'. The outcomes have been translated into an action plan which is presented here and is being progressed at regular meetings.

There are three main elements to the action plan for 'Open Dialogue'

- Encourage learning from accidents within companies and the wider application of a 'Just Culture'
- Promotion of Open Dialogue and the sharing of lessons learned

- Improving the mechanisms for the sharing and retrieval of information from archives,

Each of these will be explored in more detail.

ENCOURAGE LEARNING FROM ACCIDENTS WITHIN COMPANIES

Whilst the HSE carry-out very effective investigations into major accidents, such as Buncefield, these investigations require considerable technical resources and this is only likely to be made available for accidents which either result in or have the potential to cause multiple injuries. Past records show that it is unlikely that there will be more than one incident a year within the UK which will justify in-depth investigation and reliance solely on HSE investigations will therefore miss many accident scenarios which could, under other circumstances, lead to major loss. The 'Swiss cheese' model of accident causation highlights the importance of investigating incidents of this type where one or more of multiple barriers of defence fail, often called 'Near misses' or 'Learning Incidents'.

It is therefore important that companies have in place effective procedures to:

- Identify a broad range of process 'learning incidents' which may warrant further investigation.
- A screening process to select those for detailed investigation
- Investigation procedures which ensure that root causes are identified and appropriate recommendations prepared.

To encourage individuals at all levels in an organisation to report incidents where there are failings in the defensive barriers it is important to establish an open culture in which employees feel free to report failures without fear of retribution, a 'Just Culture'. This topic was explored by Bond in a paper presented at Loss Prevention 2007 (Ref 3). Whilst many companies encourage the reporting of incidents where there are failings in protective systems it is doubtful if they have reached the same level of openness as the aviation industry.

The IChemE has an extensive range of training packages including one on accident investigation. Although this does not present information on the many methods which can be used to investigate incidents it does cover those factors which need to be considered in conducting an effective investigation. Initially a proposal was made to update and extend the Institution raining package on this topic. However since this proposal was made the Energy Institute has produced a new guidance document 'Guidance on Investigation and Analysis of Human & Organisational Aspects of Incidents and Accidents', (Ref 4). This comprehensive study was prepared with significant support from both industry and the HSE and in addition to providing guidance on ways of ensuring that human factor and organisational contributions to accidents are identified the document includes a comparison of 28 different accident investigation techniques.

Whilst it would still be possible for the IChemE to prepare an updated training module, the availability of the Energy Institute guidance will clearly reduce the value of any IChemE package. Therefore further work by the IChemE is not considered to be warrant at this time.

PROMOTION OF OPEN DIALOGUE AND THE SHARING OF LESSONS LEARNED

As noted above the foundation of learning from accidents must be effective procedures within companies. (This topic is considered in a parallel paper by Ken Patterson). Once an incident has been investigated, root causes identified and recommendations made these must be translated into action by:

- Action tracking
- Dissemination to other parts of the company where similar circumstances may arise
- Creation of a searchable archive which can be used to identify common weaknesses.

Important as the above procedures are for internal learning they will not be sufficient to minimise the likelihood of high consequence low frequency process related incidents to the levels currently demanded by society. To reach these standards requires that the learning from incidents be shared outside of the organization with those operating the same or similar technology.

Other industry sectors which rely on 'high integrity organisations', such as civil aviation, rail transport or nuclear power, recognise the importance of learning from a broad range of accidents. In the case of civil aviation or rail transport the requirement is incorporated into legislation with independent investigation bodies and well established methods to share the lessons learned across the whole industry.

In the USA the Chemical Safety & Hazards Investigation Board (CSB) has been established with a remit to investigate industrial chemical accidents and to disseminate the findings. No equivalent body exists in the UK or Europe and, as noted above, the HSE concentrates its resources on the very few incidents with the direct potential for major loss.

In these circumstances there is an extra responsibility on industry in the UK & Europe, and on institutions such as IChemE, to ensure that other mechanisms are in put in place to share learning across industry.

Some groups already provide limited sharing of 'lessons learned' between companies. These include:

- Sharing of incidents at meetings of 'Responsible Care Cells'
- Sector specific groups such as 'Reaction Hazards Forum'.
- Cross sector groups such as the International Process Safety Group (IPSG)

Whilst these groups provide a simply and effectively mechanism for sharing the results of accident investigations they all have a number of important limitations

- The groups are typically restricted to 20 to 40 members at most, only a very small proportion of the global

process industry. They are generally 'closed shops' to which only industry representatives are invited.
- The authorities are usually excluded
- Information is often shared verbally, sometimes with a few overheads
- Limited records are made and these are rarely searchable to access the learning from older incidents.
- Information is generally NOT shared outside of the group, a restriction which in some cases is supported by the organisation's charter.

These limitations can only be overcome by 'Open Dialogue' in which information is made available to those who need to know including those in other companies, other industries, regulators and universities. It was this thinking which led, over 30 years ago, to a group of Institution members establishing the **Loss Prevention Bulletin (LPB)** which continues to provide one of the most effective mechanisms for the wide dissemination of lessons learned from incidents. In particular the LPB offers:

- A concentration on process safety and on 'lessons learned'
- A high technical standard
- Peer reviewed papers
- An archive spreading over 30+ years and 1600+ incidents

To increase the range of incidents reported the panel is taking step to increase its industrial membership and seeking to improve its links to:

- UK Oil & Gas
- Institution branches
- Overseas links
- Other Institutions such as CIA, Royal Institute of Chemistry, Energy Institute etc.

How can we continue to build on this success?

There are some challenges to be met and questions to be answered.

- *In recent years number of reports submitted to the LPB from industry has fallen, can this be reversed?*
- *Legal liability is a concern but how real is the problem?*
- *Should legal liability be allowed to stand in the way of improvements in Process Safety?*

Do you have any other ideas on what could be done?

IMPROVING THE MECHANISMS FOR SHARING AND RETRIEVAL FROM ARCHIVES

The IChemE has a number of different ways in which the learning from accidents is disseminated, these include:

- Loss Prevention Bulletin
- Toolbox Talks
- Training package
- ICI Safety newsletters (now on Institution's web page)
- BP safety books
- Books by Trevor Kletz & others
- Accident Data Base

How easy is it to find and retrieve information on past incidents? The LPB on-line offers a search facility on all past articles but unfortunately currently this is limited to the searching of abstracts which sometimes do not reflect the full content of an article. It is unlikely that the methods currently used for information dissemination and retrieval used by the LPB will fully meet the needs of subscribers and Institution members in 5–10 years time and we need to review the balance between printed and web-based systems of dissemination.

We would be interested in views as to future developments. For example

- *Would a full text search facility be of value, if so what should it include*
- *Would a 'Wikki' approach to sharing 'lessons learned' be of value?*

Finally there is a question of payment. Whilst the on-line subscription to the LPB can be seen as very good value it is still an additional expenditure, something which is of particular concern to younger engineers who are perhaps in greatest need of information on what has happened in the past. This issue was raised at ChemEng 08 and we are planning to make reports on approximately 20 key reports from the **Loss Prevention Bulletin** on incidents such as 'Flixborough', 'Bhopal' and 'Piper Alpha' freely available from the Institutions website.

This has lead us to investigate the availability of older HSE reports where we have found that approximately 20 HSE reports on important investigations, including 'Flixborough', are now out of print and no longer easily available. We are planning to explore with the HSE whether we can improve access to these older reports.

Are you aware of other sources of information on 'lessons learned' where the access needs to be improved?

YOUR VIEWS ARE IMPORTANT

The Institution has been involved in 'Open Dialogue' and the sharing of lessons learned from incidents for many years and strongly believes that its continuance will remain vitally important to safety in the process industries. Improvements in this area will depend on the support of and contributions from SHE professionals working in the process industries and we would welcome you views on future development of the Institutions activities. In particular:

- *Does the Institution need to do more to improve the learning from accidents and to promote a 'Just Culture' within companies?*
- *What more can be done to improve the sharing of 'lessons learned' between organisations with an emphasis on 'Open Dialogue'?*

- *What improvements would you like to see in the mechanisms for sharing and retrieval of information from archives?*
- *Have we missed anything?*

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REFERENCES

1. IChemE, A Roadmap for 21st Century Chemical Engineering, May 2007,
2. IChemE, Technical Roadmap; Progress Report 2008.
3. Bond J, A Safety Culture with Justice: A way to Improve Safety Performance, Loss Prevention & Safety Promotion in the Process Industries, Edinburgh, 2007, IChemE.
4. Energy Institute, 'Guidance on Investigation and Analysis of Human & Organisational Aspects of Incidents and Accidents', 2008.