UN/SCEGHS/5/INF.3

Sub-Committee of Experts on the Globally Harmonized System of Classification and Labelling of Chemicals
(Fifth session, 7-9 July 2003, agenda item 6)

CAPACITY BUILDING

Developing and Implementing a National Chemical Hazard Communication and GHS Action Plan

Guidance Document

Transmitted by UNITAR

Developing and Implementing a National Chemical Hazard Communication and GHS Action Plan

Guidance Document

Working Draft
October 2001

UNITAR

ILO

IOMC

INTER-ORGANIZATION PROGRAMME FOR THE SOUND MANAGEMENT OF CHEMICALS

A cooperative agreement among UNEP, ILO, FAO, WHO, UNIDO, UNITAR and OECD

Using This Guidance Document

This document is intended as framework guidance for countries that choose to address chemical hazard communication issues using a systematic, country-driven approach. It recognises that countries have different starting points from which their respective chemical hazard communication systems can be strengthened. The document also acknowledges the opportunities presented by related international developments for addressing national systems.

The guidance is flexible in nature – it is not meant to be prescriptive in any sense. Each country can consider and make decisions regarding the issues raised in accordance with its own preferences and priorities. It is hoped that this guidance document can play a constructive role in this process.

UNITAR gratefully acknowledges the long-term financial support provided by the Swiss Agency for Development and Cooperation (SDC) and, more recently, the Netherlands Minister for Development Cooperation.

For additional information, please contact:

Training and Capacity Building Programmes in Chemicals and Waste Management
United Nations Institute for Training and Research (UNITAR)
Palais des Nations
CH- 1211 Geneva 10
Switzerland
FAX: + 41 22 917 8047
Email: cwm@unitar.org

International Labour Office (ILO)
4, route des Morillons
1211 Geneva 22
Switzerland
FAX: +41 22 799 6878
Email: safework@ilo.org

Note to Reviewers

This draft Guidance Document, developed by UNITAR and ILO in cooperation with IOMC POs, is intended for use by Project Countries during the pilot phase (2001-2003) of the programme *Assisting Countries to Develop and Implement National Chemical Hazard Communication and GHS Action Plans*. It is complemented by an *Implementation Manual for Project Countries*. It is hoped that Project Countries and other interested reviewers will make use of the guidance provided in this document and provide critical feedback on the working draft prior to finalisation. Specifically, we ask that the following questions are considered when reviewing the document:

- Is the scope of the document appropriate? Is the information provided too general or too detailed? What additional information or issues should be included, if any?
- Is the guidance and information provided in the document practical? Too theoretical?
- Is the presentation of the information (e.g. language, format) user-friendly?
- Is the information and guidance provided consistent with the needs and circumstances of developing countries and countries with economies in transition with respect to hazard communication?
- Is the guidance in Parts 2 and 3 useful? What are some possible ways in which the suggestions and related guidance could be made more relevant and useful?
- Are there additional types of information that should be included in annexes in order to make the document more valuable to the user?

This draft will be further developed taking into account the general outcomes and ideas generated in the Project, as well as specific comments and feedback on the draft. Your contribution to the further development of this document is sincerely appreciated.

Table of Contents

INTRODUCTION TO THE GUIDANCE DOCUMENT 1

PART I: INTRODUCTION TO CHEMICAL HAZARD COMMUNICATION 3

1.1 What is Chemical Hazard Communication? 3
1.2 Benefits of Chemical Hazard Communication 4
1.3 Classification of Chemicals: A Starting Point for Hazard Communication 6
1.4 Chemical Hazard Communication Tools 9
1.5 The Importance of Comprehensibility 15
1.6 Supportive Measures 16
1.7 Key Sectors Involved in Chemical Hazard Communication 17
1.7.1 Industrial Production Sector 17
1.7.2 Agriculture Sector 17
1.7.3 Consumer Sector 18
1.7.4 Transport Sector 18
1.8 Other Affected and Interested Sectors 19
1.9 Chemical Classification and Hazard Communication Policies and Systems 20
1.10 The Globally Harmonized System for the Classification and Labelling of Chemicals (GHS) 27
1.11 Challenges and Opportunities for Developing Countries 32

PART II: DEVELOPING AN ACTION PLAN 34

2.1 Getting Started 34
2.2 Preparing a Situation Analysis 39
2.3 Developing Objectives 42
2.4 Considering Key Issues Within Each Sector 43
2.5 Cross-Sectoral Issues 47
2.6 Developing an Implementation Strategy 50

PART III: IMPLEMENTING AND EVALUATING ACTIVITIES 53

3.1 Implementing Specific Activities 53
3.2 Monitoring Activities and Evaluating Impact 54

ANNEXES 55

Annex A: Decision Tree for Classifying a Particular Hazard: Flammable Liquids in the GHS 57
Annex B: ILO Report on the Responses to the Call on Chemical Hazard Communication 59
Annex C: Paragraphs Relevant to the GHS from Chapter 19, Agenda 21 61
Annex D: Summary of Classification and Labelling Elements for Flammable Liquids in the GHS 63
Annex E: Draft Table of Contents from GHS Final Document 65
Annex F: Glossary 67

Introduction to the Guidance Document

An integral aspect of advancing the sound management of chemicals is the development of a national system through which chemical hazards are communicated to workers, consumers and the public. It is important to know what chemicals are present and/or used in a country, their hazards to human health and the environment, and the means to control them. Furthermore, this inherently complex knowledge must be organised in such a way that essential information about the hazards and corresponding protective measures can be identified and conveyed to different types of users in a comprehensible format (hazard communication).

Chemical hazard communication systems entail benefits and possible uses for governments, industries, workers and members of the public. If successful, such a system can make a significant contribution towards reducing the incidence of chemical-related illness and injuries. An effective programme of chemical hazard communication can thus be considered as a necessary tool for achieving sustainable economic and social development.

Hazard communication in the chemicals context includes:

- systems for creating and using chemical labels;
- systems for creating and using chemical safety data sheets; and
- training in chemical hazard communication, including the development of other tools to increase public awareness and worker safety.

The subject of hazard communication is also an integral element within the areas being addressed under the Globally Harmonized System for the Classification and Labelling of Chemicals (GHS). In October 2000, the third session of the Inter-governmental Forum on Chemical Safety (Forum III) highlighted the harmonization of classification and labelling of chemicals as a Priority for Action beyond 2000. In particular, the IFCS agreed that "guidance and other tools necessary for the implementation of the GHS should be made available to interested parties prior to Forum IV. All countries are encouraged to implement the GHS as soon as possible with a view to have the system fully operational by 2008".

This Guidance Document attempts to assist interested countries to develop and implement an effective national action plan for chemical hazard communication. This should be achieved through a systematic process involving all affected and interested parties. Key decision-makers and stakeholders may also consider how new hazard communication activities could strengthen chemicals legislation and policy in general.

While this version of the Guidance Document has been developed primarily for the countries formally participating in the pilot phase of the programme, it is hoped that it will also prove useful to other countries interested in initiating efforts to strengthen national chemical hazard communication infrastructures. Upon completion of the pilot phase in 2003, programme documents will be revised to incorporate the practical lessons learned by the pilot countries and to more adequately reflect the range of experiences that can occur in developing a

national chemical hazard communication action plan as a result of regional, cultural, economic and other differences among countries.

Part I of the Guidance Document provides an introduction to the chemical hazard communication concept and the potential benefits it offers, particularly to developing countries. **Part II** gives suggestions on how countries might organise the process of developing a national chemical hazard communication action plan and provides practical step-by-step guidance regarding the development of such an action plan. In particular, an overview of key questions and decisions that will need to be addressed both for sectoral and cross-sectoral chemical hazard communication issues is presented. **Part III** outlines potential implementation and evaluation activities, with particular emphasis on high-impact, low-cost activities, which can be undertaken as part of initiating implementation of the national action plan.

Part I: Introduction to Chemical Hazard Communication

This part of the Guidance Document provides an introduction to the concept of chemical hazard communication and its potential benefits to government, industry, workers and the public. The basic components of hazard communication, the key sectors involved, and the hazard communication process are outlined. Selected national chemical classification, labelling and hazard communication systems are described to illustrate how chemical hazard communication activities play-out in different national and cultural settings. An overview of the international policy framework for chemical hazard communication – including the GHS – and a summary of the activities of international organisations related to hazard communication are also provided.

1.1 What is Chemical Hazard Communication?[1]

The production and use of chemicals are fundamental components in the economic development of all countries, whether they are industrialised or developing. In one way or another, chemicals affect directly or indirectly the lives of all humans and are essential to our food supply (fertilizers, pesticides, food additives, packaging), our health (pharmaceuticals, cleaning materials), and our well-being (appliances, fuels, etc). The first step leading to the safe use of chemicals is to know their identity, their hazards to health and the environment and the means to control them.[2] This knowledge should be available with reasonable effort and cost. Furthermore, this inherently complex knowledge must be organised in such a way that essential information on the hazards and corresponding protective measures can be identified and conveyed to the user in a format that is easy to understand. The hazard classification and labelling process, along with appropriate training and eduction, is a primary tool for establishing an effective information transfer so that the degree of the hazard the chemical represents for people and the environment can be recognised, the correct preventive actions be chosen, and safe use achieved. While the possible audiences vary with the system involved, the ultimate purpose remains the same.

The information can be conveyed in a variety of ways. Information provided on or with the container of the hazardous chemical is common to all the systems currently in existence in the form of labels, placards, posters or markings. This information generally includes some indication of the hazard(s) involved, in text form and/or with symbols. In addition to the hazard information, the container information may also include statements regarding safe use or handling, or other types of precautionary measures.

[1] Parts of section 1.1 are drawn from IOMC/ILO/HC2/99.4, "Hazard Communication in the 21st Century", Discussion Paper presented by the Secretariat, Second Meeting of the ILO Working Group for the Harmonization of Chemical Hazard Communication (Geneva, 26-27 January 1999).

[2] **N.B.** Terms such as "chemical identity" and others are defined in the Glossary to this Guidance Document as found in Annex F.

More detailed information may also be provided to those exposed to hazardous chemicals. In the workplace, for example, safety data sheets (SDSs) may be made available. In the transport sector, a document such as the North American Emergency Response Guidebook may supplement the information on placards or markings.[3] The detail on these types of information sources may vary from system to system, thus necessitating generation of multiple documents for the same chemical to comply with differing systems.

In most workplace and transport chemical hazard communication systems, training of users to access the information and take proper steps to protect themselves is also a necessary component. This training may vary by the type and duration of potential exposures. In consumer settings, however, the container label may be the only communication mechanism available to provide information to promote safe handling and use.

1.2 Benefits of Chemical Hazard Communication

Existing hazard classification and labelling systems address potential exposures to potentially hazardous chemicals in all types of use situations, including production, storage, transport, workplace use, consumer use, and presence in the environment. These systems are intended to protect people, facilities, and the environment. The basic goal of hazard communication is to ensure that employers, employees and the public are provided with adequate, practical, reliable and comprehensible information on the hazards of chemicals, as well as appropriate education and training, so that they can take effective preventive and protective measures for their health and safety. This is sometimes referred to as the "right-to-know" principle.[4] Thus, an effective hazard communication system entails benefits and possible uses not only for governments, but also for industries, workers and members of the public. However, to be as beneficial as possible to users, chemical hazard communication should not only be in one

[3] The Emergency Response Guidebook (ERG 2000) was developed jointly by Canada, the US and Mexico for use by fire-fighters, police, and other emergency services personnel who may be the first to arrive at the scene of a transportation incident involving dangerous goods. It is primarily a guide to aid "first responders" in quickly identifying the specific or generic hazards of the material(s) involved in the incident, and protecting themselves and the general public during the initial response phase.

[4] Aspects of the "right-to-know" principle are referred to in Agenda 21: "Furthermore, in the more specific context of environment and development, the need for new forms of participation has emerged. This includes the need of individuals, groups and organizations to participate in environmental impact assessment procedures and to know about and participate in decisions, particularly those which potentially affect the communities in which they live and work. Individuals, groups and organizations should have access to information relevant to environment and development held by national authorities, including information on products and activities that have or are likely to have a significant impact on the environment, and information on environmental protection measures." (Agenda 21, Chap. 23, para. 2). "Joint (employer/worker) or tripartite (employer/worker/Government) collaborative mechanisms at the workplace, community and national levels should be established to deal with safety, health and environment, including special reference to the rights and status of women in the workplace. … Governments and employers should ensure that workers and their representatives are provided with all relevant information to enable effective participation in these decision-making processes." (Agenda 21, Chap. 29, paras. 7 & 8).

direction. Rather, in order to continuously improve hazard communication techniques, feedback from users should be given. Chemical hazard communication should be an interactive process.[5]

A chemical hazard communication system can provide governments with tangible benefits: fewer chemical accidents and incidents; lower health care costs; improved protection of workers and the public from chemical hazards; and improved reputation on chemicals issues both domestically and internationally. Benefits to industry include a safer work environment, (thus improving relations with employees); an increase in efficiency and competitiveness; reduced costs due to fewer accidents and illnesses; and improved corporate image.

Workers and the general public also benefit from chemical hazard communication by the provision of information to those exposed to chemicals. With this information – along with appropriate training and education – there can be: decreased health risks in the workplace and for consumers; improved level of knowledge regarding chemical hazards; more efficient and effective use of resources (e.g. consumers may use less of a given chemical and apply it more effectively); and greater awareness regarding less-hazardous alternatives.

The benefits of an internationally harmonized chemical hazard communication system – the GHS – are discussed below in section 1.10.

[5] See section 1.5 on "comprehensibility".

1.3 Classification of Chemicals: A Starting Point for Hazard Communication

Classification is the identification of the hazard of a chemical by assigning a category of danger using set criteria. Hazard classification generally involves three 3 steps:

1. identification of relevant data regarding the hazards of a substance or mixture;
2. subsequent review of those data to ascertain the hazards associated with the substance or mixture; and
3. a decision on whether the substance or mixture will be classified as a hazardous substance or mixture and the degree of hazard, where appropriate, by comparison of the data with agreed hazard classification criteria.

The Globally Harmonized System harmonizes the classification criteria – from several existing systems – for evaluating health, environmental and physical hazards of substances and mixtures. The information for classification may be obtained from tests, literature, practical experience, or the criteria used in other systems, such as the international rules on the transport of dangerous substances (e.g. the UN Recommendations on the Transport of Dangerous Goods, UNRTDG). Tests that determine hazardous properties which are conducted according to internationally recognised scientific principles can be used for purposes of a hazard determination.

For example, if a substance has an initial boiling point lower than or equal to 35° C and a flashpoint lower than 23° C, then it may be classified as "highly flammable". That is, experts have determined – on the basis of these criteria – that this substance is highly capable of being ignited or burning in air. Under the GHS, for example, acceptable methods for classifying hazards have been harmonised and guidance will be provided to countries implementing the GHS on how to classify chemicals under the GHS.[6] The list of classification categories used in the GHS is outlined below.[7]

Physical Hazards: Flammable Liquids, Flammable Solids, Flammable Gases, Flammable Aerosols, Pyrophoric Liquids, Pyrophoric Solids, Self-Heating Substances, Substances which in contact with water release flammable gases, Oxidizing Substances: Liquids, Oxidizing Solids, Oxidizing Gases, Organic Peroxides, Self-Reactive Substances, Explosives, Corrosive to Metals, Gases Under Pressure.

Health Hazards: Acute Toxicity, Skin Irritation/Corrosion, Eye Irritation/Serious Eye Damage, Respiratory or Skin Sensitization, Germ Cell Mutagenicity,

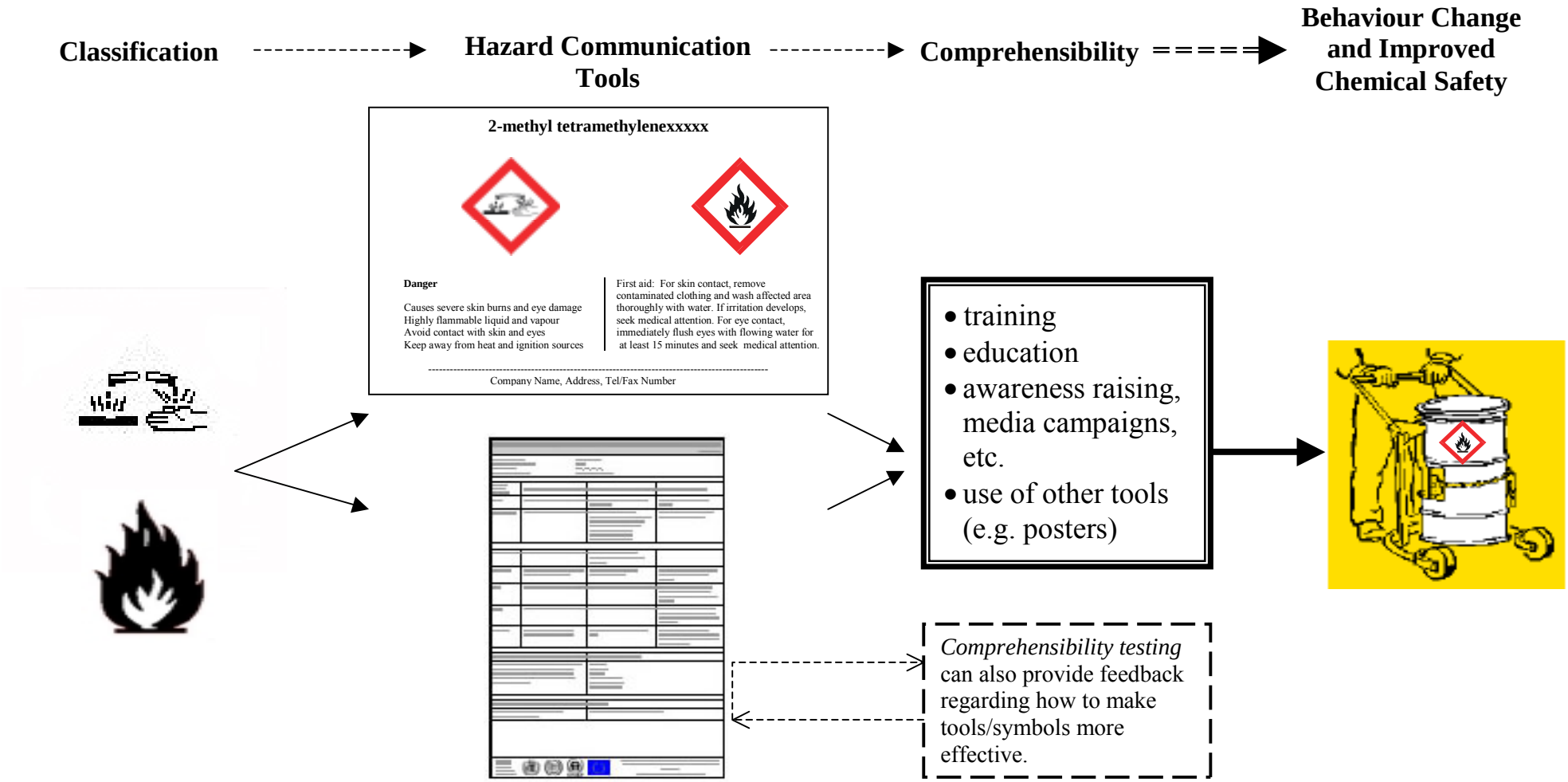
[6] An example of how to classify a chemical in the GHS is found in Annex A.

[7] Please refer to the GHS Final Document for more precise definitions of these categories.

Carcinogenicity, Toxic to Reproduction, Target Organ Systemic Toxicity – Single Exposure, Target Organ Systemic Toxicity – Repeated Exposure.

Environmental Hazards: Hazardous to the Aquatic Environment

Figure 1.1: The Classification and Chemical Hazard Communication Process



1.4 Chemical Hazard Communication Tools

Once a substance has been classified (e.g. substance X is found to be toxic or flammable), this hazard must be communicated to target audiences. The main tools of chemical hazard communication are *labels* and *safety data sheets* (SDS) that contain the hazard information in the form of hazard pictograms and signal words, for example. The aim is to identify the hazardous properties of chemicals that may constitute a health, property or environmental risk during normal handling or use, and provide information in a suitable manner.

Labels

A label, on a barrel or container containing the substance, is designed to draw attention to the inherent danger to persons handling or using the chemical. The label is the basic tool to keep the user informed of the classification and the most important safety precautions.

Countries with advanced hazard communication systems have developed their own standards for how chemical information is to appear on a label. While existing systems vary, the basic components of a label are often quite similar. Under the chemical hazard communication provisions of the GHS, for example, a label must include the following information:

- product identifier;
- supplier identifier;
- the chemical identity of the substance (in the case of a preparation, the chemical identities of the hazardous components);
- hazard pictograms;
- signal words;
- hazard statements (a set of standard phrases which appear on user labels for packaged goods); and
- precautionary information.

Attracting the user to read the label can only be successful if the essential messages on the label are kept as simple and direct as possible. If a label is too complex, too technical, or badly laid out, the product may not be used correctly and the user may be exposed to unnecessary risks.

The labels on the barrels or containers should be in the official national language(s) (and if possible, local languages as well). Hazard pictograms established for the physical, health and environmental hazard categories listed in section 1.3 should be used on the label. The pictogram forms an integral part of the label and is intended to give an immediate idea of the types of hazards that the substance or the preparation may cause. Some examples of hazard pictograms are shown in Box 1.1.

To specify the type of danger, pertinent standard hazard statements should also be included in the label (e.g. “toxic in contact with skin” or “irritating to respiratory system”). Advice on the

precautions necessary in the handling of chemicals should also be given on the label using precautionary information.

The particular needs of the intended target audience may however influence which standard label components are used. In **transport**, for example, the label, placard and transport documents are all used in the UN system to inform those in the transport chain about the hazardous characteristics of the goods being transported and to identify the specific applicable requirements, and to provide the core information required to mitigate against the effects of an accident or unforeseen release of the hazardous chemical. The transport system is based mainly on physical and acute hazards. In **workplace** labelling, the label is also only one element of a multi-component system of chemical hazard communication, the other elements being the safety data sheet and training. The label can be regarded as a snapshot of the chemical hazard(s) to be used as a primary message or alert for the worker who is then directed to the SDS for more detailed information; this information is also obtained through training in the hazard communication system. Finally, in communicating the potential hazard of **consumer products,** the label plays the major role in the provision of information. It is designed to provide the user with information about all the potential health, environmental and physico-chemical hazards of the product and basic advice on using the chemical safely.

BOX 1.1 Some Chemical Hazard Pictograms Used on Labels

Flammable

Corrosive

Dangerous to the Aquatic Environment

Toxic

Source: These hazard pictograms are taken from the GHS to visually represent chemical hazards.

Safety Data Sheets (SDS)

The chemical supplier, manufacturer or importer should be able to provide detailed information about the chemical on a *safety data sheet*. Chemicals that are used in the workplace are usually accompanied by a SDS. In certain countries, the manufacturer or importer has the obligation to find and give adequate information about a chemical for assessment of its health and environmental hazards, for labelling and for its handling. Safety data sheets have been prepared by manufacturers on many dangerous substances and preparations. These should go together with the product to the user in the workplace.

Safety data sheet information can be found under several names, such as:

- chemical safety card;
- chemical info-sheet;
- material safety data sheet (MSDS);
- product safety data sheet; and
- health and safety data.

The SDS should provide comprehensive information about a chemical substance or mixture for use in a workplace setting. It can be used by both employers and workers as a source of information about hazards, including environmental hazards, and to obtain advice on safety precautions. The information in a SDS acts as a reference source for the management of hazardous chemicals in the workplace. The SDS is product related and, usually, may not be able to provide specific information that is relevant for a specific workplace where the product may finally be used, although where products have specialized end uses the SDS information may be more workplace-specific. The SDS is therefore a resource that enables an employer to develop an active programme of worker and environmental protection measures, including training, which is specific to the individual workplace.

The information in the SDS should be presented using the following 16 ordered headings:

1. Identification.
2. Hazard(s) identification.
3. Composition/information on ingredients.
4. First-aid measures.
5. Fire-fighting measures.
6. Accidental release measures.
7. Handling and storage.
8. Exposure controls/personal protection.
9. Physical and chemical properties.
10. Stability and reactivity.
11. Toxicological information.
12. Ecological information.
13. Disposal considerations.
14. Transport information.
15. Regulatory information.
16. Other information.

The 16-heading SDS format shown here is based on the GHS, but is also common to many other international standards such as ISO 11014-1, the ILO standard under Chemicals Recommendation R177, and the US ANSI Standard Z400.1

Information Sources for Labels and SDS

There are many sources of information for generating labels and SDS. Some national chemical hazard communication systems have classification lists which indicate which label elements should be assigned to a given category of hazard. The GHS is also based on currently available data (i.e. the GHS permits the use of existing data already used to classify chemicals) and has standardized label elements. The classification information required to generate a label can also be found in some on-line databases, which are often searchable by chemical name or CAS number.

Regarding SDS, there are two different types of chemical safety data sheets: chemical safety data sheets prepared by working groups of experts containing information based on laboratory tests and validated/peer-reviewed knowledge; and chemical safety data sheets prepared by the manufacturer or retailer. There are also websites, such as the US National Institute for Occupational Health and Safety (<http://www.cdc.gov/niosh/msds.html>) and Interactive Learning Paradigms Inc. (<http://www.ilpi.com/msds/>), that provide a listing of where SDS for various substances and mixtures are available on the internet.

In the context of the GHS, the SDS should be produced for all substances and mixtures which meet the harmonised criteria for physical, health or environmental hazards under the GHS and for all mixtures which contain substances that meet the criteria for carcinogenic, toxic to reproduction or target organ systemic toxicity in concentrations exceeding the cut-off limits for SDS specified by the criteria for mixtures. The competent authority may choose also to require SDSs for mixtures not meeting the criteria for classification as hazardous but which contain hazardous substances in certain concentrations. Once it is clear that a SDS is required for a substance or a mixture, then the information to be included in the SDS should in all cases be provided in accordance with GHS requirements. The SDS should provide a clear description of the data used to identify the hazards and additional information may be required by competent authorities.[8]

One source for validated (i.e. peer-reviewed) data sheets on pure substances – ICSCs – are available from the International Programme on Chemical Safety (IPCS).[9] An ICSC

[8] For more information about GHS SDS requirements, see Chapter 1.4 of the GHS Final Document.

[9] While there are significant similarities between the headings in an ICSC and an SDS, they are nevertheless not the same. The SDS is the fundamental source of important health and safety information but, in many instances, can be technically complex. The ICSCs, on the other hand, set out peer-reviewed summaries of key data. The ICSC should not be a substitute for an SDS, as workers should be provided with information on the exact chemicals, the nature of those chemicals used on the shop floor and the risk posed in any given work place. However, the ICSC can be thought of as a useful information source for SDS development.

summarizes essential health and safety information on chemicals for their use at the "shop floor" level by workers and employers in factories, agriculture, construction and other work places. ICSCs are not legally binding documents, but consist of a series of standard phrases, mainly summarizing health and safety information collected, verified and peer reviewed by internationally recognized experts, taking into account advice from manufacturers and Poison Control Centres.

For more information on ICSCs, see these websites:

- http://www.ilo.org/public/english/protection/safework/cis/products/icsc/index.htm
- http://www.cdc.gov/niosh/ipcs/icstart.html#legal

1.5 The Importance of Comprehensibility

The purpose of providing chemical hazard information is to effect a change in behaviour in the user to follow appropriate precautionary measures and avoid the occurrence of an adverse effect from handling or using the chemical. However, in order to bring about this behaviour change, it is important that the information provided to the chemical user or handler is *comprehensible*. Comprehensibility refers to the ability of the individual reading a label, warning, or safety data sheet to understand the information sufficiently to take the desired action. Comprehensibility is different from readability because the latter is simply a measure of the grade level of the written material, while the former is a measure of how well the receiver of the information understood it. A warning about incompatible chemicals may be written at the correct reading level for a specific audience, for example, but may do such a poor job explaining the hazard that the warning isn't understand by most of the intended audience. Additionally, the same warning may be highly comprehensible to a population of chemical workers but poorly understood by firefighters with the same educational level but different work experiences. Finally, achieving comprehensibility does not ensure that the informed individual will take the actions prescribed in the warning or label. This final, behavioral step is affected by a complex mix of attitudes, experiences, motivations, and potential consequences that are specific to each individual in a particular situation.[10] Moreover, users of chemicals in developing countries may have very different cultural backgrounds or socio-economic conditions from those countries where many hazard communication tools have been developed, and thus particular attention should be paid to the use of appropriate tools and training.

Comprehensibility Case Study: Symbols in Zimbabwe

In 1991, for example, a survey was conducted on the comprehensibility of the triangular hazard symbols developed in Zimbabwe, European symbols, as well as a set of words/phrases used on the International Chemical Safety Cards.[11] About 100 persons in various workplaces in agriculture, chemical and hotel and catering industry were interviewed. The four coloured warning triangles have been developed in Zimbabwe for pesticides. The colours (green, yellow, red and purple) indicate different levels of danger. Overall, 21 % on the workers put all four triangles in the proper order, 17 % put them partly correct while 63 % did it incorrectly. The agricultural workers had best knowledge of these symbols. Of the European symbols, the skull-and-crossbones "toxic" symbol had the highest level of recognition (90 %), followed by "flammable" (69 %) and the "harmful" X having the lowest recognition (15

[10] Text adapted from IOMC/ILO/HC2/99.Inf.2 and the GHS Final Document. Countries can use strategic *comprehensibility testing* to assess the effectiveness of key elements of a chemical hazard communication system, thereby indicating where limited training and awareness raising resources can be most usefully allocated. It can also help to identify what other hazard communication tools, such as posters, pamphlets, other messages or complementary symbols and pictograms, could form part of an effective national system. See also Section 2.5.

[11] IOMC/ILO/HC2/Inf.1 (December 1996).

%). Regarding the set of words/phrases, it was found that the words used in the headings of the International Chemical Safety Cards were more widely understood than the words used in the text boxes of the cards. It was also found that the chemical workers had a better understanding of the meaning of the words. The best understood heading was "first-aid".

Comprehensibility in the GHS

Comprehensibility of the information provided was one of the most important issues addressed in the development of the GHS. The aim of the harmonised system is to present the information in a manner that the intended audience can easily understand. The GHS identifies some guiding principles to assist this process:

- information should be conveyed in more than one way;
- the comprehensibility of the components of the system should take account of existing studies and literature as well as any evidence gained from testing; and
- the phrases used to indicate degree (severity) of hazard should be consistent across different hazard types.

For further information about comprehensibility, please see:

- Annex 6 of the GHS Final Document;
- Comprehensibility Testing Methodology available from the ILO.

1.6 Supportive Measures

In addition to the tools of chemical labels and SDS, and the need to ensure comprehensibility, there are a number of supportive measures that are crucial to the success of an effective chemical hazard communication system. Appropriate *training* for target audiences who are required to interpret label and/or SDS information and take corresponding precautionary measures is one such activity. Training requirements should be appropriate for and commensurate with the nature of the work or exposure; key target audiences include workers, emergency responders, those involved in label and SDS preparation, and the transport and supply of hazardous chemicals. Consumers should also be provided with *education* regarding interpreting label information on products that they use. Other tools, such as *awareness raising* campaigns, the use of posters, brochures and the media, can all assist in ensuring that the chemical hazard communication process is as successful as possible in improving chemical safety.

1.7 Key Sectors Involved in Chemical Hazard Communication

It is important to identify and consider the needs of the different sectors – or target audiences – that are the primary end-users of the hazard communication system. This section considers the four key sectors – industrial production, agriculture, consumers, and transport – and the types of issues that they face. Different target audiences can receive and use the information conveyed about hazardous chemicals in different ways. Factors to be considered should include the potential use of products, availability of information other than the label and the availability of training. There are, nevertheless, certain characteristics that are the same across the different target audiences. For example, both workers and emergency responders use labels in storage facilities, and products such as paints and solvents are used both by consumers and in workplaces.

1.7.1 Industrial Production Sector

Workers at factories, storage facilities, construction sites, drilling sites and at small and medium sized enterprises (SMEs) can be at risk of exposure to industrial chemical hazards whether, for example, through a leak from barrels in storage or through airborne contamination in a factory using a particular chemical to produce another product. Employers and workers need to know the hazards specific to the chemicals used and or handled in the workplace, as well as information about the specific protective measures required to avoid the adverse effects that might be caused by those hazards. In the case of storage of chemicals, potential hazards are minimised by the containment (packaging) of the chemical. A starting point for providing this information is the label, though the label is not the sole source of this information, which is also available through the SDS and workplace hazard and risk management systems. Workplace hazard and risk management systems should also provide training in hazard identification, precautionary measures and the use of SDS. The nature of training provided and the accuracy, comprehensibility and completeness of the information provided in the SDS may vary.[12] However, compared to consumers for example, workers can develop a more in-depth understanding of hazard symbols and other types of information.

1.7.2 Agriculture Sector

Farmers and farm workers are at risk from exposure through the use of different agricultural chemicals, such as pesticides and fertilizers. The WHO places the total cases of pesticide poisoning in the agricultural sector at between 2 and 5 million each year, of which 40,000 are fatal.[13] Barrels containing pesticides, for example, may not be properly labelled or the hazard

[12] The standardisation of the SDS format in the GHS and the use of ICSCs to generate SDS could help improve this situation.

[13] Quoted in V. Forastieri, "Challenges in providing occupational safety and health services to workers in agriculture", *African Newsletter on Occupational Health and Safety*, vol. 11, no. 2 (August 2001): p. 34.

information on the label may not be comprehensible due to linguistic reasons. It may be that farmers spraying crops with a pesticide do not have access to, or understanding of, an SDS on that particular chemical. Workers in the agricultural setting also may have a lower level of literacy, and so visual symbols and other hazard communication tools (such as orally-communicated information) take on added importance.

1.7.3 Consumer Sector

Consumers are exposed to a wide variety of chemicals in their daily lives, from potentially toxic bleaches or dyes to flammable haircare products to pesticides used in gardens. Children may also be exposed to chemical hazards via consumer products. In the consumer sector the label in most cases is likely to be the sole source of information readily available. The label, therefore, needs to be sufficiently detailed and relevant to the use of the product. Moreover, consumer education is more difficult and less efficient than education for other audiences. Providing sufficient information to consumers in the simplest and most easily understandable terms presents a considerable challenge. The issue of comprehensibility is of particular importance for this sector, since consumers rely solely on label information.

1.7.4 Transport Sector

Those involved in the transport sector need information concerning general safe practices that are appropriate for all transport situations. For example, a driver will have to know what has to be done in case of an accident irrespective of the substance transported (e.g. report the accident to authorities, keep the shipping documents in a given place). Drivers may only require limited information concerning specific hazards, unless they also load and unload packages or fill tanks. Workers who might come into direct contact with dangerous goods, for example on board ships, require more detailed information. In all cases, labels, placards, transport documents and SDS are key tools. The transport sector has long been a focus of international efforts on hazard communication, primarily through the UN Committee of Experts on the Transport of Dangerous Goods (UN CETDG). This Committee elaborated the first internationally recognised classification and labelling system for the purpose of transporting dangerous goods, the UN Recommendations on the Transport of Dangerous Goods (UN RTDG). The UN RTDG cater for a wide range of target audiences, although transport workers and emergency responders (see Section 1.8 below) are the principal ones. Others include employers, those who offer or accept dangerous goods for transport or who load and unload packages of dangerous goods into or from transport vehicles or freight containers.

1.8 Other Affected and Interested Sectors

In addition to the four key sectors outlined above, there are others with an important role in chemical hazard communication. One such group are emergency responders. Those involved in responding to chemical emergencies such as spills, leaks or explosions – whether in a factory setting, storage facility or in a road accident – need several types of hazard communication tools.

In the case of an industrial accident, for example, workers and emergency responders need to know what mitigation and control measures are appropriate. In such a situation, they may require information that can be seen from afar. They may also then require expert assistance with regards to how to treat a particular chemical emergency, such as a spill, in a given environment (e.g. knowledge of factory design to help contain a chemical spill in a particular facility).

Fire-fighters and those first at the scene of an transport accident also need information that can be distinguished and interpreted at a distance. Such personnel are highly trained in the use of graphical and coded information. Labels are required to provide immediate summary information regarding the chemical at hand, as well as detailed information found in an SDS regarding how a chemical should be handled.

For agricultural or consumer poisoning incidents, the information needs of medical personnel responsible for treating victims may differ from those of fire fighters. In this case, the role of poison control centres and others with toxicological expertise is important.

1.9 Chemical Classification and Hazard Communication Policies and Systems

International work to improve and standardize systems for classification and labelling of chemicals was underway as early as the 1950s. Initial efforts focussed on the development of measures for the safe transport of dangerous goods. However, national and regional systems have also since been created, and there have been efforts in the field of chemical safety in the workplace.[14] This section outlines some of those systems. And while the principles for the various classification, labelling and hazardous communication schemes outlined in this section are related, the differences among them nevertheless engendered confusion and underscore the usefulness of the globally harmonized approach of the GHS which is outlined in section 1.10.

International Policy Recommendations and Agreements

Agenda 21

At UNCED in 1992, governments agreed to language regarding classification and labelling of chemicals in Agenda 21, Chapter 19 on "Environmentally Sound Management of Toxic Chemicals, Including Prevention of Illegal International Traffic in Toxic and Dangerous Products":

> 19.24. Adequate labelling of chemicals and the dissemination of safety data sheets such as ICSCs (International Chemical Safety Cards) and similarly written materials, based on assessed hazards to health and environment, are the simplest and most efficient way of indicating how to handle and use chemicals safely.
>
> 19.25. For the safe transport of dangerous goods, including chemicals, a comprehensive scheme elaborated within the United Nations system is in current use. This scheme mainly takes into account the acute hazards of chemicals.

Chapter 19 also included the mandate for completion of the GHS – see section 1.10 below.

The Intergovernmental Forum on Chemical Safety

The Intergovernmental Forum on Chemical Safety (IFCS), established in 1994, has as one of its functions to "promote international agreements and commitments on harmonized classification and labelling of chemicals". The IFCS had subsequently encouraged the development of a GHS; at Forum II in 1997, for example, the IFCS recognized that "substantial progress has been made through cooperation among partners in achieving the

[14] Annex B summarises the results of an ILO country-based survey on the "Responses to the Call on Chemical Hazard Communication".

targets in Chapter 19, especially in relation to…moving toward a globally harmonized system for the classification and labeling of chemicals".

ILO Chemical Convention 170 and Recommendation 177

The purpose of Convention 170 and Recommendation 177 concerning safety in the use of chemicals at work, adopted by the International Labour Conference (77th Session, 1990), is to protect workers against the risks associated with the use of chemicals at their workplace. It applies to all branches of economic activity in which chemicals are used. It covers all chemicals without exception and provides for specific measures in respect of hazardous chemicals. The Convention sets out the responsibilities of competent authorities, suppliers of chemicals, employers and workers. The Convention came into force in November 1993, and to date, 9 countries have ratified it.[15]

The Convention requires that classification systems be established. In addition, it states that all chemicals should be marked to indicate their identity and that hazardous chemicals should be labelled so as to provide essential information on their classification, their hazards and the safety precautions to be observed. It also requires that chemical safety data sheets for hazardous chemicals be provided to employers. Chemical suppliers are responsible for ensuring that chemicals have been classified, marked and labelled and have chemical safety data sheets.

In 1993, ILO elaborated a "Code of Practice for the Safety in the Use of Chemicals at Work", which provides guidance on the implementation of Convention 170. The practical recommendations of the Code cover all the elements necessary to ensure an efficient flow of information from manufacturers or importers to users of chemicals, and enable employers to formulate measures to project workers, the public and the environment. The subjects covered include classification systems, labelling and marking, chemical safety data sheets, design and installation, control measures, work systems, personal protection, information and training, medical surveillance, emergency procedures, monitoring and reporting, and confidentiality.[16]

FAO International Code of Conduct on the Distribution and Use of Pesticides

The 1985 International Code of Conduct, amended in 1989, was developed to address a number of difficulties associated with the use of pesticides in developing countries where adequate regulatory infrastructures are frequently lacking. It was recognized that in order to

[15] The ratifying countries are: Brazil, Burkina Faso, China, Colombia, Mexico, Norway, Sweden, Tanzania, Zimbabwe.

[16] More recently, the 89th session of the International Labour Conference adopted in June 2001 a Convention and Recommendation on Safety and Health in Agriculture. The Convention (No. 184) and Recommendation (No. 192) address a range of chemical safety issues including: importation; classification; packaging and labelling; disposal of chemical waste, obsolete chemicals and empty containers; risk assessment; and provision of adequate and appropriate information.

remain relevant the Code must evolve in order to reflect changing needs of countries and that there was a need to monitor progress in the observance of the Code. One of the basic functions of the Code is to serve as a point of reference, particularly until such time as countries have established adequate regulatory infrastructures for pesticides. The objectives of the Code are to set forth responsibilities and establish voluntary standards of conduct for all public and private entities engaged in or affecting the distribution and use of pesticides. The Code suggests how to distribute the responsibilities between government, industry and others. The twelve articles of the Code are supported by a set of detailed technical guidelines which provide guidance on their implementation. Article 10 of the Code specifically addresses "Labelling, packaging, storage and disposal" of pesticides.

The Rotterdam Convention on Prior Informed Consent (PIC)

The 1998 Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade is an instrument for formally obtaining and disseminating the decisions of importing countries as to whether they wish to receive future shipments of a certain chemical and for ensuring compliance to these decisions by exporting countries. The Parties to the Convention "desir[e] to ensure that hazardous chemicals that are exported from their territory are packaged and labelled in a manner that is adequately protective of human health and the environment" (Preamble).

In cases where export does take place, the Convention provides for the provision of labels. In Article 13 on "Information to accompany exported chemicals", the Convention states that:

> Without prejudice to any requirements of the importing Party, each Party shall require that both chemicals listed in Annex III and chemicals banned or severely restricted in its territory are, when exported, subject to labelling requirements that ensure adequate availability of information with regard to risks and/or hazards to human health or the environment, taking into account relevant international standards. (13.2)

And regarding the provision of safety data sheets:

> With respect to the chemicals referred to in paragraph 2 that are to be used for occupational purposes, each exporting Party shall require that a safety data sheet that follows an internationally recognized format, setting out the most up-to-date information available, is sent to each importer. (13.4) The information on the label and on the safety data sheet should, as far as practicable, be given in one or more of the official languages of the importing Party. (13.5)

International Norms and Standards

UN Recommendations on the Transport of Dangerous Goods

At the United Nations level, work related to the transport of dangerous goods is coordinated by the Economic and Social Council (ECOSOC) Committee of Experts on the Transport of

Dangerous Goods, which produces the "Recommendations on the Transport of Dangerous Goods", also called the "Orange Book". In 1957 this Committee elaborated the first internationally recognized classification and labelling system for the purpose of transporting dangerous goods by sea, air, road, rail and inland waterways.

The UN Recommendations on the Transport of Dangerous Goods address the following main areas:

- lists of dangerous goods most commonly carried and their identification and classification;
- consignment procedures: labelling, marking, and transport documents;
- standards for packaging, test procedures, and certification; and
- standards for multimodal tank-containers, test procedures and certification.

Within this system of classification, listing, packing, marking, labelling, placarding and documentation in general use, carriers, consignors and inspecting authorities benefit from simplified transport, handling and control and from a reduction in time-consuming formalities. In general, their task is facilitated and obstacles to the international transport of such goods reduced accordingly.

ISO 11014-1: International Standard for Safety Data Sheets

In 1994, the International Organization for Standardization (ISO) developed a standard format for safety data sheets to create consistency in providing information on safety, health and environmental matters for chemical products. In order to establish uniformity, certain requirements are laid down as to how information on the chemical product shall be given (for instance the wording, numbering and sequence of the headings). The ISO SDS standard uses the 16-heading format similar to the one outlined above in section 1.4.2.

WHO Recommended Classification Of Pesticides By Hazard And Guidelines To Classification

The WHO Recommended Classification of Pesticides by Hazard was approved by the 28th World Health Assembly in 1975 and has since gained wide acceptance. Guidelines were first issued in 1978, and have since been revised and reissued at 2-yearly intervals. The hazard referred to in the Recommendation is the acute risk to health (that is, the risk of single or multiple exposures over a relatively short period of time) that might be encountered accidentally by any person handling the product in accordance with the directions for handling by the manufacturer or in accordance with the rules laid down for storage and transportation by competent international bodies. The classification distinguishes between the more and the less hazardous forms of each pesticide in that it is based on the toxicity of the technical compound and on its formulations. In particular, allowance is made for the lesser hazards from solids as compared with liquids. The classification is based primarily on the acute oral and dermal toxicity to rats since these determinations are standard procedures in toxicology.

FAO Guidelines on Good Labelling Practice for Pesticides

The 1995 FAO "Guidelines on Good Labelling Practice for Pesticides" give guidance on the preparation of labels and specific advice on content and layout. They are intended for use by those in industry involved with label preparation and also by national regulatory personnel involved with the approval of labels and the specification or recommendation of suitable text and layout. The Guidelines contain four main sections with appendices. The first section identifies the main objectives and considerations in preparing a label. The second section identifies the information which must appear on a label. The third section deals with writing a label with maximum clarity and consideration of the level of knowledge of users. The Guidelines include pictograms that communicate key safety information to users in different countries and with varied levels of literacy. The fourth section discusses the establishment of toxicity and hazard classifications for a product. The appendices contain examples of labels, hazard statements, agricultural practice statements and other summaries of specific and generic label contents which can help to clarify the general text.

Examples of Regional and National Approaches

Mexican National System

In Mexico, standards cover the packaging, labelling and storage of pesticides for domestic use and for use in various occupational settings. The provisions on labelling are user-oriented; labelling for transport is covered in other standards. Observance of the standards is mandatory. The labelling requirements for packaging include: name and type of product; number of containers in the package; name and address of manufacturer; serial number; date of manufacture; instructions for storage and transport; any symbols required by regulations; country of origin.

The standards set out very detailed provisions regarding the size, design, colour and text of labels on pesticide containers. Pesticides must be classified according to the WHO's four-level scale of acute toxicity and corresponding information presented on their labels. Colours are defined in terms of the Pantone system used by printers. Specific phrases are given for certain circumstances. Where additional text must be used, the standard requires that the language be clear, simple, brief and free of any interpretation that would give an exaggerated idea of the qualities of the product. Everyday words should be used and technical jargon avoided. Spanish must be used, and the language of the country of destination may also be used on products for export.

The EU Requirements for Classification and Labelling of Substances

Dangerous substances which are placed on the EU market have to be labelled according to their classification in Annex I of the 1967 Directive 67/548/EEC, which at present contains approximately 2350 existing and 214 new substances. For dangerous substances not in Annex I, the manufacturer, distributor and importer is obliged to apply a provisional classifications and labelling following the criteria in Annex VI of this directive.

The Directive introduced common provisions on the:

- classification of dangerous substances (since placing a substance into one or several defined classes of danger characterises the type and severity of the adverse effects that the substance can cause);
- packaging of dangerous substances (since adequate packaging protects from the known danger(s) of a substance); and
- labelling of dangerous substances (since the label on the packaging informs about the nature of the danger(s) of the substance inside and about the safety measures to apply during handling and use).

U.S. Hazard Communication Standard

The US Occupational Safety and Health Administration's (OSHA) Hazard Communication Standard (HCS) is designed to ensure that information about chemical hazards and associated protective measures is disseminated to workers and employers. This is accomplished by requiring chemical manufacturers and importers to evaluate the hazards of the chemicals they produce or import, and to provide information about them through labels on shipped containers and more detailed information sheets called material safety data sheets (MSDSs). All employers with hazardous chemicals in their workplaces must prepare and implement a written hazard communication program, and must ensure that all containers are labelled, employees are provided access to MSDSs, and an effective training program is conducted for all potentially exposed employees. The HCS provides workers the "right-to-know" the hazards and identities of the chemicals they are exposed to in the workplace. When workers have this information, they can effectively participate in their employers' protective programs and take steps to protect themselves. In addition, the standard gives employers the information they need to design and implement an effective protective program for employees potentially exposed to hazardous chemicals.

Canada's Workplace Hazardous Materials Information System

The Workplace Hazardous Materials Information System (WHMIS) is Canada's hazard communication standard in the workplace. The key elements of the system are cautionary labelling of containers of WHMIS "controlled products", the provision of material safety data sheets (MSDSs) and worker education programs. WHMIS is implemented through coordinated federal, provincial and territorial legislation. Supplier labelling and MSDS

requirements are set out under the *Hazardous Products Act* (*HPA*) and associated *Controlled Products Regulations*. The *Hazardous Products Act* and its regulations are administered by the Product Safety Bureau of the Government of Canada Department of Health, commonly referred to as Health Canada.

Each of the thirteen provincial, territorial and federal agencies responsible for occupational safety and health have established employer WHMIS requirements within their respective jurisdiction. These requirements place an onus on employers to ensure that controlled products used, stored, handled or disposed of in the workplace are properly labelled, MSDSs are made available to workers, and workers receive education and training to ensure the safe storage, handling and use of controlled products in the workplace. WHMIS balances workers' "right-to-know" with industry's right to protect confidential business information and includes a mechanism for ruling on claims for exemption from disclosure of confidential business information as well as appeals to these rulings.

1.10 The Globally Harmonized System for the Classification and Labelling of Chemicals (GHS)

An important new tool that countries can draw upon to develop their national chemical hazard communication systems is the UN Globally Harmonized System for the Classification and Labelling of Chemicals (GHS). While many national and regional chemical hazard communication systems are similar in intent (i.e. they are designed to protect people from experiencing adverse effects), there are significant differences in their specific provisions with regard to the criteria used to classify the chemicals, and the warning phrases, symbols, or other hazard communication components used to convey the information. The result is a patchwork of sometimes conflicting and diverse national and international requirements. Because of the variations in classification criteria, the same chemical may be classified as having different degrees of hazard, and thus require different warning statements, depending on the classification system being applied in a given situation. Symbols and terminology vary from system to system. For example, a chemical in the United States may be classified as being flammable for purposes of transport, but not for workplace use. Or it may be considered carcinogenic in the United States, but not in the EU.

The GHS, therefore, represents an important step in harmonizing national systems worldwide and improving chemical safety across all relevant sectors. Countries have been encouraged to use this key resource in their own activities on chemical hazard communication, in accordance with their own needs and capabilities.

Development of the GHS

In 1989, ILO adopted a Resolution concerning the harmonization of systems of classification and labelling for the use of hazardous chemicals at work (and in 1990, Chemical Convention 170 concerning safety in the use of chemicals at work as discussed previously). In response to the resolution, ILO evaluated the size of the task of harmonizing classification systems and issued a report which was further reviewed at a consultation of experts (Geneva, 14-15 November 1991) and presented to the Director General of ILO in December 1992 after appropriate updating to reflect recent developments.

By this time, the need for a global system had been endorsed by the international community in Chapter 19 of Agenda 21, resulting from the 1992 UNCED. In Programme Area B, "Harmonization of classification and labelling of chemicals", it was stated that:

> A globally harmonized hazard classification and compatible labelling system, including material safety data sheets and easily understandable symbols, should be available, if feasible, by the year 2000.[17]

[17] The other Chapter 19 paragraphs relevant to the GHS are reproduced in Annex C.

The process of developing a harmonized system was undertaken by an IOMC Coordinating Group for the Harmonization of Chemical Classification Systems, which brought together experts representing existing national, regional and international systems of classification and labelling of chemicals, as well as representatives of interested international organizations of suppliers, employers, workers, consumers and environmental groups. Different focal points for the various components of the GHS were established: the UN Committee of Experts on the Transport of Dangerous Goods (physical hazard criteria), the OECD (health and environmental hazard criteria and mixture classification), and the ILO (physical hazard criteria and hazard communication).

A Working Group on Harmonization of Chemical Hazard Communication (WG/HCHC) was established in 1998 to address issues regarding hazard symbols, colours, and written information used on labels; the preparation of chemical safety data sheets and instructions; the comprehensibility of precautionary statements used on both labels and in chemical safety data sheets; and training related to these areas.

The technical work on developing the GHS was completed in 2001. In order to assist countries to implement the GHS, the technical GHS Document (the "Purple Book") integrates these harmonized elements and provide definitions and procedures to classify and label chemical products. The purpose of the Document will be to provide governments with a comprehensive tool for national implementation.

Also as of 2001, responsibility for implementation of the GHS rests with the UN ECOSOC, which has created a Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling (the "parent committee") which will deal with administrative issues, as well as a Sub-Committee on the Globally Harmonized System (SCEGHS) which will maintain, update and promote the technical GHS Document as well as manage implementation issues. Another Sub-Committee on the Transport of Dangerous Goods (SCETDG) will continue to manage the UN RTDG.

An Overview of the Globally Harmonized System

The GHS provides a comprehensive tool for chemical classification and hazard communication. It will apply to all chemicals and mixtures of chemicals.[18] The GHS includes the following elements:

- harmonized criteria for classifying substances and mixtures according to their health, environmental and physical hazards; and
- harmonized hazard communication elements, including requirements for labelling and safety data sheets.[19]

[18] Food additives, pesticide residues, pharmaceuticals and cosmetic products intended for consumer use are not covered under the GHS in terms of labelling for intentional intake. However, these types of chemicals *are* covered where workers may be exposed, and in transport if potential exposure warrants.

[19] Annex D gives an example of the Classification and Labelling Elements for Flammable Liquids in the GHS.

The GHS document describes the classification criteria and the hazard communication elements by hazard (e.g., acute toxicity; flammability). In addition, decision logics for each hazard have been developed, as well as examples of classification of chemicals to illustrate how to apply the criteria.[20]

Regarding chemical hazard communication elements more specifically, the GHS addresses the essential tools common to the major existing systems[21]:

- labelling: minimum data element requirements; graphic hazard pictograms (symbols, colours, frames); comprehensibility of written and graphic hazard warnings; method for the selection of proper hazard pictograms, signal words, and hazard statements;
- chemical safety data sheets: format; data elements; harmonization of phraseology; phraseology comprehensibility; means of dissemination on a worldwide basis; and
- training in hazard communication: (workplace, transport, emergency responders, consumers) harmonization of principles for the elaboration of training packages for compilers and users.

According to the report of IFCS Forum III held in October 2000, the GHS will become a practical and coherent global standard for chemical hazard communication within the workplace, for those involved in work-related activities, for the transportation system, and for consumers. And as a priority for action beyond 2000, the IFCS recommended that guidance and other tools necessary for the implementation of the GHS should be made available to interested parties prior to Forum IV in 2003 and that all countries should implement the GHS as soon as possible with a view to have the system fully operational by 2008.

As regards specific benefits of the GHS, international harmonization will:

- enhance the protection of people and the environment by providing an internationally comprehensive system for hazard communication;
- provide a recognised framework for those countries without an existing system;
- reduce the need for duplicative testing and evaluation of chemicals; and
- facilitate international trade in chemicals whose hazards have been properly assessed and identified on an international basis.

Implementation Issues

One of the key factors which will determine ultimately the success of the GHS world-wide is the extent to which countries will both recognize the potential benefits of the GHS and develop the necessary infrastructures to implement and operate the system at the national

[20] The (draft) Table of Contents of the GHS Document is reproduced in Annex E.

[21] The major existing systems that formed the basis for the GHS were: the requirements of systems in the United States for the workplace, consumers and pesticides; the requirements of Canada for the workplace, consumers and pesticides; the European Union directives for classification and labelling of substances and preparations; and the United Nations Recommendations for the Transport of Dangerous Goods. See section 1.9 above.

level. This recognition will be of particular importance to the developing countries and countries with economies in transition that did not take a direct part in the technical work of harmonization. Additionally, appropriate training and education will be required regarding the how to ensure the proper use of GHS tools in different national contexts.

In addition to the implementation guidance provided in the GHS Final Document, there is an initiative that will help countries to determine the role of a national classification, labelling and hazard communication system within their chemicals management system. This initiative will ask countries to "describe their implementation of the GHS and the expected changes necessary to implement the GHS".[22] New Zealand, for example, has incorporated elements of the GHS as part of their Hazardous Substances and New Organisms Act.[23]

Widespread adoption of the System will occur only if adequate funding is made available to countries needing to build appropriate legal and technical infrastructures. It is estimated that the annual cost to participating countries and organizations is around USD 3 million.[24] Forum III recommended that "all countries subject to their capacities and capabilities, should take account of the development of the GHS in any proposed changes to existing systems for classification and labelling, and in the implementation and enforcement of their chemicals legislation" (IFCS/FORUM III/23W).

Providing Building Blocks for National Regulations

The harmonized elements of the GHS may be seen as a collection of *building blocks* from which to form a regulatory approach. While the full range is available to everyone, and must be used if a country or organization chooses to cover a certain effect when it adopts the GHS, the full range does not have to be adopted. As long as the hazards covered by a sector or system are covered consistently with the GHS criteria and requirements, it will be considered appropriate implementation of the GHS. If, for example, a national system covers the carcinogenicity of a chemical, the harmonized classification scheme and harmonized label/SDS elements must be followed.[25]

[22] See the paper presented by Germany at the first session of the ECOSOC Subcommittee of Experts on the GHS in July 2001, document ST/SG/AC.10/C.4/2001/5.

[23] More information about the New Zealand legislation can be found at <www.hsno.govt.nz/hs.shtm>.

[24] Commission on Sustainable Development, "Management of toxic chemicals and hazardous and radioactive wastes: Report of the Secretary-General", E/CN.17/2001/PC/19 (2001), para. 10.

[25] However, there are some label elements which may be used (e.g. for national comprehensibility reasons) that have not been standardised in the GHS. For example, additional label information or precautionary statements/symbols may be used at the discretion of the Competent Authority or supplier. However, such additional information should not be confusing or contradict the information used in the main label elements (such as the pictogram, signal word or hazard statement).

The GHS Final Document states that a national implementation program should consider both domestic production and chemical imports, and resources available for the implementation and maintenance of the system. Competent authorities will decide how to apply the various elements of the GHS based on the needs of the competent authority and the target audience.

Some initial implementation issues to consider from a national viewpoint are:

- Have adequate instructions, information, training and resources been given to industry – both domestic and importing manufacturers – to be able to comply with implementing the GHS?
- Is sufficient time given to allow industry to implement and maintain the system, e.g. to hire necessary staff to handle the workload associated with the system?
- Is sufficient time given to allow for a reasonable transition to the new system (e.g. the use of existing labelling stock, or allow for products already in the supply-chain without requiring re-labelling)?
- Are there ministries/agencies ready to implement and maintain the systems, e.g. do they have adequate staff to handle the workload associated with the system?
- What is the relationship between government and industry in the context of a self-implementing (both classification and hazard communication) system?
- Development of mechanisms to ensure participation of labour and consumer organizations in the implementation strategy.

For more detailed information about the structure of the GHS and guidance for how the GHS can be implemented, please consult the GHS Final Document.

1.11 Challenges and Opportunities for Developing Countries

Countries with either limited or non-existent national hazard communication infrastructure face particular challenges with regards to trying to limit and reduce the negative effects of chemical use in various sectors. Particular problems with regard to mis-labelled chemicals in the workplace, lack of understanding of labels on chemicals that are used, and infrequent training in chemical safety are all challenges faced in particular by developing countries.

In 1996, for example, an FAO Questionnaire on the State of Implementation of the International Code of Conduct on the Distribution and Use of Pesticides found that fifty-nine percent of responding developing countries stated that pesticide labels either did not include or only partly included recommendations that were consistent with those of recognized research and advisory agencies in the country of sale of the pesticide. Moreover, thirty-two percent pointed out that no warnings were given on the label, in the appropriate language(s), against the re-use of containers and instructions for the safe disposal or decontamination of empty containers.[26]

There can also be significant differences between and within developing countries. For example, large companies – often multinationals – often have experience with and information about chemical hazards and are present in developing countries. Whereas in small companies or among agricultural workers with low literacy there is very little information addressing chemical hazard communication.

Lessons Learned in Southern Africa

A 1997 ILO study conducted in workplaces in Lesotho, Malawi, Namibia, Swaziland and Zimbabwe found that most of the companies surveyed had developed measures to control the manufacture, use and import of chemicals and to ensure that systems and tools for chemical hazard communication were developed and implemented at workplaces.[27] Three of the countries already had regulatory provisions requiring labels on chemical containers, safety data sheets (including warning symbols), and employee training in chemical handling. Regarding employee recognition of warning symbols on chemical containers, the level of recognition ranged from 81% to 67% for both “toxic” and “flammable”, to 0% for “oxidizing” (the lowest level of recognition). However, the study also found that SDSs were seldom supplied and that when they were supplied, employees had no access to them. Furthermore, training and education of employees in chemical safety was found to be minimum to non-existent in most surveyed workplaces.

[26] The results of the full survey (based on 1993 data) can be found at http://www.fao.org/waicent/faoinfo/agricult/AGP/agpp/pesticid/.

[27] IOMC/ILO/HC2/Inf.4 (November 1997).

The following recommendations resulted from the study:

- National databases of all chemicals used and relevant hazard information should be developed in consultation with manufacturers, importers and suppliers of chemicals. There should be close coordination and maintenance of updated records among the responsible government agencies.
- Information on SDSs should be written in the language and manner understood by the majority of employees and accessible to those using and handling chemicals. National chemical warning symbols for labels should be developed with particular attention paid to harmonization with international symbols.
- Training and education of employees should be intensified in the country and in the workplace.

By preparing a National Chemical Hazard Communication Situation Analysis, a country could effectively identify many of the challenges posed by having a limited chemical hazard communication system, as well as identify needs and opportunities that might be met by developing such a system.[28]

The GHS, for example, could provide those countries that do not currently have a chemical hazard communication strategy in place with a framework for initiating such a strategy. Combined with a programme to improve internal capacity for hazard communication and strategies to deal with implementing the harmonized system, a chemical hazard communication action plan can play an effective role in a national programme for the sound management of chemicals, as well as directly decrease risks to human health and the environment.

[28] The topic of preparing a National Chemical Hazard Communication Situation Analysis is discussed further below in section 2.2.

Part II: Developing an Action Plan

2.1 Getting Started

Thinking through preparatory tasks and considerations can help to ensure that a solid foundation has been laid for initiating the development of an action plan and implementation of selected activities to support chemical hazard communication. Key to the success of this process, which is usually initiated by a "lead organisation", is the active involvement of concerned ministries and stakeholders external to government, at the national level. One way to achieve broad participation in the chemical hazard communication action plan development and implementation process is to establish a Coordinating Committee comprised of representatives of the various stakeholder groups. And as chemical hazard communication and the GHS directly affects four key sectors, it is suggested that development of the Action Plan and related activities be undertaken by Working Groups (see section on "establishing sectoral working groups" below) on the following:

- industrial production sector;
- agriculture sector;
- consumer sector; and
- transport sector.

In other words, the identification of stakeholders, completion of a situation analysis, development of objectives, consideration of key issues, development of recommendations for action and all other steps outlined below should all be done on a sectoral basis. It may be useful to conceive of the main national action plan as consisting of four sectoral "mini-action plans", as advised by the sectoral working groups, taking into consideration important cross-sectoral issues. The cross-sectoral issues include:

- legal implementation;
- training and capacity building;
- comprehensibility; and
- emergency response.

All the preliminary tasks below are concrete, first steps that will facilitate effective action plan development and implementation. Also at this stage, consideration can be given to what kinds of training might be useful in the early stages of action plan development (e.g. a substantive national workshop on chemical hazard communication or the GHS for those stakeholders that will be most closely involved in developing and implementing the action plan). This would also involve consideration of what local and outside expertise and resources could be mobilised to assist with the training.

Understanding the Context

It is important to clearly understand *why* a chemical hazard communication action plan is being developed. This involves identifying the motives or "driving forces" for initiating action and understanding key issues. Developing such an understanding provides a critical foundation for the action plan development process and helps to confidently communicate intentions to decision-makers. This may involve determining, for example, the relevance of international activities such as the GHS, and if certain national legislation or infrastructure might be required. Such thinking helps provide an initial overview for the plan, helps to guide the identification of appropriate partners within the government and public, and serves as a starting point for the situation analysis (see Section 2.2).

The subject area of chemical hazard communication, and in particular the proper development and use of chemical labels and SDS, may have been determined by a country to be a priority area for action. For example, a recent review by a Ministry of Environment may have concluded that chemicals are widely imported and used without proper labeling nor accompanied by SDSs. The result has been many incidents of chemical misuse and damage to human health and the environment, including: poisonings, transport problems (accidents), improper use (in agriculture and households), occupational exposure to labourers, etc. Alternatively, it may be that a government has just learned that a Globally Harmonized System for the Classification and Labelling of Chemicals (GHS) will be available for national implementation in 2003, and identified it as an entry point or opportunity to add value to its current system. Either of these sample "driving forces", or others, could be the key to why development of a chemical hazard communication action plan is being considered.

Identifying Partners Within Government

Certain ministries within government will likely be suited to assume a "traditional" role in the development of a strategy for chemical hazard communication. Certain ministries often have a mandate that covers sectors where chemical hazard communication is applied, such as transport, agriculture, industry and consumer products (e.g. Ministry of Transport, Agriculture, Industry and Consumer Protection, respectively).

It is also necessary to identify other partners within the government who have the potential to become involved in the chemical hazard communication action plan phases. Those partners who have broader mandates (when compared to finite sectors) directly related to chemical hazard communication (such as Labour, Health and Environment Ministries and Customs Agency) can also play a central role. Others, such as the Coast Guard (if it exists), Fisheries/Natural Resources, and Research Institutes within government may also make a strong contribution.

In some countries, sub-national governments (e.g. local/regional/provincial) or regulatory agencies may also participate as partners in the development of a chemical hazard communication action plan. For example, if worker safety training is typically the

responsibility of a provincial regulatory agency, then the national government may be unable to achieve the development of a successful hazard communication action plan without the cooperation and participation of these entities.

It is also important at this stage to begin to identify possible avenues for financial support for implementation of the action plan. While firm financial commitment is not critical nor likely at this juncture, identifying possible support and raising awareness regarding the development of the action plan early on can help to pave the way for more focused solicitation for support for implementation (see section 3.1). Awareness-raising can include providing information regarding what chemical hazard communication is, what opportunities it can provide, and the implications and responsibilities it holds for those who will be involved in and affected by its implementation. The "buy-in" and support of decision-makers will be needed to secure necessary human and financial resources for the action plan.

Developing a Stakeholder Involvement Plan[29]

While not all interested and affected parties (hereinafter called stakeholders) will need to be directly involved in developing and implementing the action plan, it is nevertheless important to understand who the stakeholders are and to ensure that their perspectives and concerns are taken into account early on. Involving key non-governmental stakeholders may also be of practical relevance, since their actions and commitment will likely be essential to the implementation and success of the action plan.

In a sectoral approach to plan development, the organization that is taking the lead for each sector may engage its own unique set of stakeholders. Representatives of emergency responders, for example, may be more involved in the activities of the transport working group than the group on consumer products (which may require participation from poison control experts instead). Each lead organization, therefore, should consider stakeholder involvement issues, such as: identifying relevant potential stakeholders and their interests; identifying the context and mechanisms for stakeholder involvement; identifying a time frame; and inviting stakeholders to participate. The specific nature of stakeholder involvement in a process such as this generally depends on a number of factors, including the nature and context of the issue, the time frame for developing the action plan, the legal mandate within which the lead organisation operates, and the availability of resources for stakeholder involvement.

While the list of stakeholders interested and capable of participating in the development and implementation of a chemical hazard communication action plan may vary among countries and across sectors, in many cases representatives from the following groups may be involved:

- National industry associations;

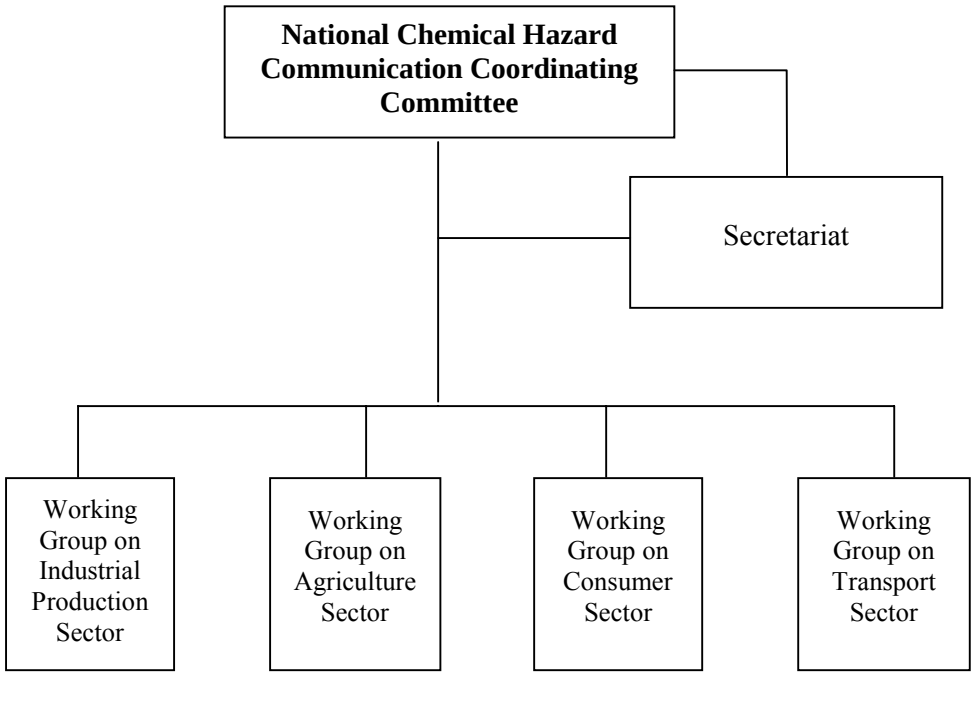
[29] Further guidance on conducting a stakeholder analysis, identifying mechanisms for stakeholder involvement and ensuring successful stakeholder participation is available in the document: UNITAR/IOMC, *Guidance on Action Plan Development for the Sound Chemicals Management* (Working Draft, July 2001), Part II.

- National chemical industry associations;
- Major companies, including multi-national corporations;
- Universities with environmental or hazard communication programmes;
- Research institutes with environmental or hazard communication programmes;
- Labour groups;
- Environmental groups; and
- Other public interest groups.

Establishing Sectoral Working Groups

In order to assist the Coordinating Committee in developing the overall action plan, it can be useful to establish Working Groups to develop particular aspects of the plan. Four sectoral Working Groups – on industrial production, agriculture, consumers, and transport – can be established in order to carry out the greater part of action plan development by undertaking sector-specific action plans (see Box 2.1). Any Working Groups that are created should follow the multistakeholder approach outlined above.

Box 2.1: Proposed Management Structure for Action Plan Development



Ensuring Sound Coordination

Key to the success of the national chemical hazard communication action plan is ensuring sound coordination of the many tasks and activities involved in strategy development, both between the sectoral Working Groups and between the Working Groups and the Chemical Hazard Communication Coordinating Committee.

The Coordinating Committee can include representatives of stakeholders and government ministries, many of whom would have been identified during the above activities on identifying governmental partners and developing a stakeholder involvement plan. The committee can meet early on in the development process, and among its first orders of business should be drafting and reaching agreement on tools that can guide their work, including:

- terms of Reference, containing, for example, guidance on how decisions would be made, the roles, commitment and expectations for the various participants;
- a workplan for the process, outlining project activities, milestones and dates; and
- a budget for the development of the action plan.

Developing draft Terms of Reference, workplan and budget will help to further define the action plan and help ensure that each member of the lead organisation is in agreement concerning important administrative and organisational details relevant to developing a national chemical hazard communication action plan. In considering such administrative and organisational issues, key decisions will need to be made on relevant:

- expected outcomes;
- resources required;
- timelines;
- sequence of events;
- responsibilities; and
- monitoring procedures.

The Coordinating Committee and the Working Groups should also begin to consider some key questions regarding the scope and form of the action plan. For example, will the action plan cover all relevant sectors (e.g. industry, agriculture, consumers, and transport), or only one sector to start (e.g. agriculture)? How will this choice be made? What are the resource implications of this choice? What is relationship between a national chemical hazard communication action plan and the broader national chemicals management system? Will other aspects of national chemicals management regulation need to be modified as a result of a hazard communication initiative? Will the action plan entail use of only the main hazard communication tools (labels and/or SDS) or will other tools be used as well (e.g. posters, dramatizations, etc.)?

2.2 Preparing a Situation Analysis[30]

Countries need to identify and assess their infrastructure and available national expertise relevant to hazard communication (a "situation analysis") in each of the four key sectors: industry, agriculture, consumers, and transport. Experts from the various sectors will assess national infrastructure in those sectors and a summary of the national situation will conclude the document.

This national assessment will include a review of: relevant legal and regulatory frameworks; institutional, administrative and technical capacities; and on-going and planned hazard communication activities of governments, agencies, industry, public interest groups and other relevant organisations. It is also expected to identify gaps or weaknesses in the current national infrastructure and may provide insight into potential challenges, as well as opportunities, in the area of chemical hazard communication. This important document will help to catalyse informed and co-ordinated action during the action plan development phase.

Once all the available sectoral and general information related to hazard communication has been compiled into a coherent National Hazard Communication Situation Analysis, this document will be used as a main reference by the Coordinating Committee and Working Groups throughout the design of the national hazard communication action plan. The situation analysis may also play an important role in identifying critical issues that need to be addressed in consultation with concerned parties in order to ensure that that hazard communication action plan will receive broad policy support. The process of collecting the information for the national chemical hazard communication assessment is an important means for contacting key individuals and sources of expertise that should be involved in the development of the national action plan. For these reasons, the national chemical hazard communication situation analysis is one of the key documents to be prepared during the development of the chemical hazard communication action plan.

The situation analysis should include identification of the problems, causes (including root causes) and contributing factors that pose challenges that should be addressed through successful implementation of the hazard communication action plan. The situation analysis should reveal the strengths and weaknesses in the country concerning hazard communication among various sectors and outline reasons for or causes of the existence of weaknesses. Each sectoral working group, for example, could undertake an analysis that identifies key problems in that sector. For example, it may be that a cause of the improper labeling of pesticides, which in turn results in poisonings among farmers, is due to a lack of expertise and infrastructure on labeling in the country.

Identifying core problems can involve the use of a "problem tree" to facilitate the exercise. A problem tree is simply the problems set out in a hierarchical order (see Figure 2.1). First, core problems are identified and written down. Then, for each core problem, causes are identified

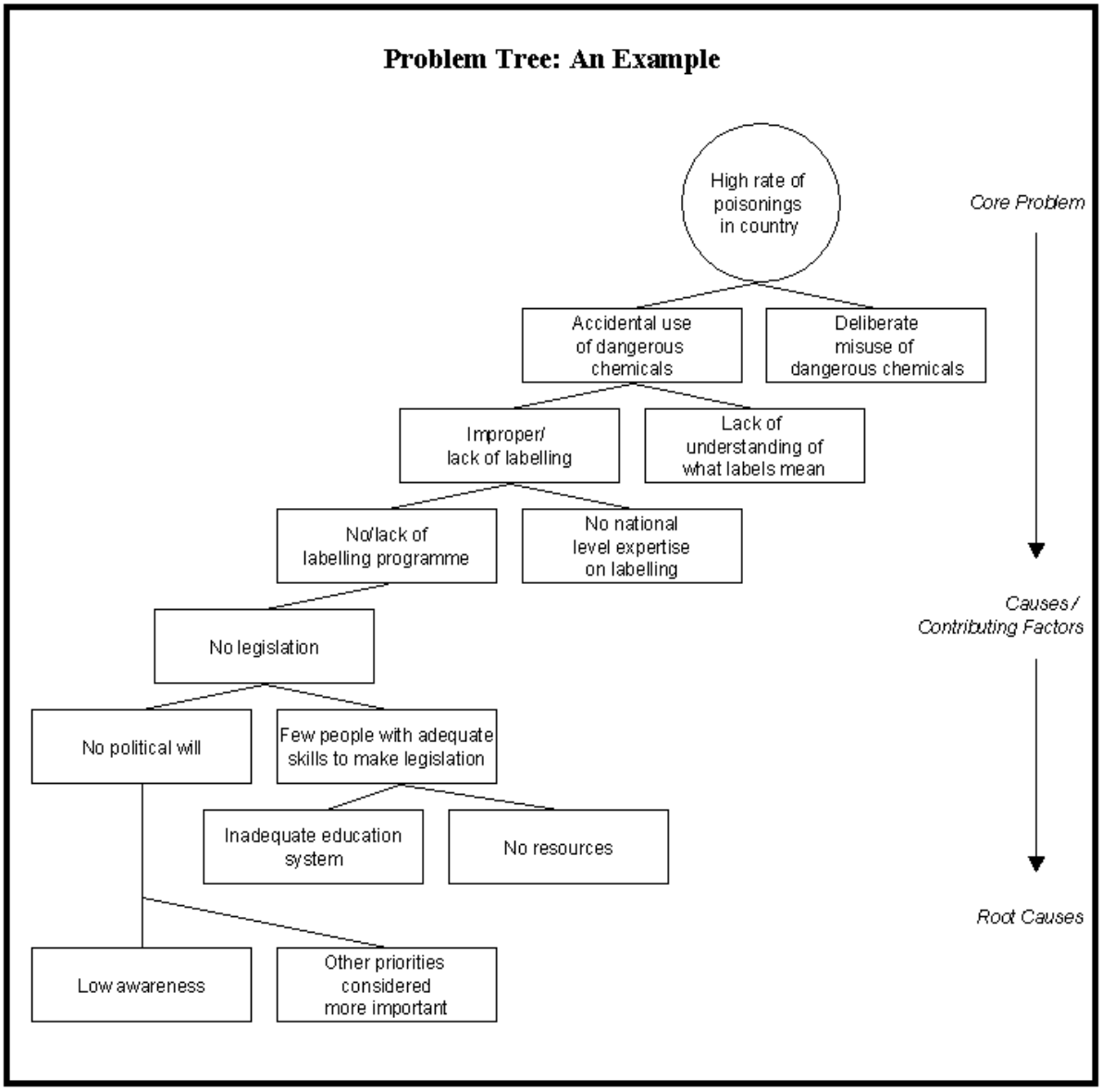
[30] Detailed guidance for preparing a situation analysis is found the separate UNITAR/ILO/IOMC document *Preparing a National Chemical Hazard Communication Situation Analysis*.

and written beneath the core problems. Causes can be identified for a number of additional levels. Once a considerable number of causes have been identified, the problem tree can be reviewed and causes rearranged as necessary. Resulting from this exercise would be a "problem statement", consisting of a list of the problems identified.

Suggested Output:

- a completed National Hazard Communication Situation Analysis, including four sectoral problem statements.

Figure 2.1: Sample Problem Tree



2.3 Developing Objectives

The underlying intent of chemical hazard communication is to induce behavioural change in the workplace and among consumers in a way that increases chemical safety. An effectively implemented action plan will help to reduce chemical-related incidents and accidents in the workplace and among consumers, and promote the protection of human health and the environment.

Keeping in mind that the goal for the project is to "develop a chemical hazard communication action plan though collaboration between various government bodies as well as parties outside of government, and begin implementation of selected activities", countries will need to establish a number of objectives that will accomplish this goal. The completion of the situation and problem analyses in the previous step will assist the identification of appropriate objectives. Consideration should be given to possible objectives in all relevant sectors, as well as to cross-sectoral issues.

Objectives are not actual activities or tasks but rather are what will be delivered upon completion or at specific stages of the action plan. Objectives explain the future desired situation and can therefore also be considered to be the criteria for success. In other words, even if the strategy is implemented within the budget and on time, what else does it take to be successful? Identifying objectives will help, along with defining the goal, to provide focus that can be used as a charter for the components and activities of the action plan which are discussed below.

A useful tool for helping to ensure that important aspects of the objectives are identified and addressed is the "SMART method":

> ***S**pecific*: Clear about what, where, when and how the situation will be changed.
> ***M**easurable*: Able to quantify the benefits and change.
> ***A**ssignable*: Able to be assigned to someone or some organisation for completion.
> ***R**ealistic*: Able to be achieved within budgeted time and resources.
> ***T**ime-related*: State the duration in which the goal can be achieved.

One possible *objective* that may serve as a useful example would be to ensure the effective use of chemical labels, SDS and other hazard communication tools in some/all relevant sectors (more sector-specific "sub-objectives" could also be possible).

Suggested Output:

- The output of this phase is a sound set of objectives across all sectors for an effective chemical hazard communication action plan.

2.4 Considering Key Issues Within Each Sector

This section addresses the key issues that will be faced by each of the sectoral working groups as they develop their recommendations for action. While each working group will go through a similar process of addressing issues common to all sectors, there are also important questions to be addressed that are sector-specific. For example, while all sectors will need to assess the comprehensibility of any labels that might be used in that sector, the transport sector will be particularly concerned with ensuring the comprehensibility of acute hazard symbols.

It is important to identify and consider the needs of the different sectors – or target audiences – that are the primary end-users of the hazard communication system. Particular attention should be paid to a discussion of the manner in which these target audiences will receive and use the information conveyed about hazardous chemicals. Factors considered should include the potential use of products, availability of information other than the label and the availability of training. The following paragraphs consider the four key sectors – industry, agriculture, consumers, and transport – and the types of issues and decisions that might be faced.

These questions are meant as starting points, and chemical hazard communication Coordinating Committee and Working Groups are encouraged to consult other relevant references to obtain more in-depth information and guidance on the substantive issues related to each aspect of strategy development as they develop their recommendations for action. The challenge is to consider practical issues such as feasibility and resources, while also ensuring that the action plan will provide an effective framework that will serve its objectives and result in improved chemical hazard communication.

Key Issues/Questions for the Industrial Production Sector

Employers and workers need to know the hazards specific to the chemicals used and or handled in the workplace, as well as information about the specific protective measures required to avoid the adverse effects that might be caused by those hazards. In a factory handling industrial chemicals, for example, SDS ought to be available and, with proper training, factory workers should comprehend and be able to act on the information in the SDS.

- Are any laws or regulations in place governing hazard communication in the industrial sector? If so, how can these laws be improved in line with the objectives of this programme?

- Will all factories and industry workplaces be covered by hazard communication activities? If so, how will this be assured?

- Which hazard communication tools are most appropriate for this sector? What standard(s) should be used (e.g. GHS standard for labels and for SDS; etc.)?

- How will comprehensibility of hazard communication tools be ensured in the industrial sector?

- What special considerations need to be taken into account (e.g. local language of factory workers) in providing hazard communication tools to this sector?

- If a classification and labelling system for industrial chemicals is already being used, how will it be adapted for the GHS (e.g. for GHS classification criteria, labels, SDS format, etc.)?

- Will adjustments (for national comprehensibility reasons) need to be made to GHS-derived labels?

- How will access to GHS-relevant information be ensured?

- What other hazard communication tools should be developed? If so, who will develop them? Should brochures or posters in local langauge(s) be produced and distributed? Does the media have a role to play?

Key Issues/Questions for the Agriculture Sector

In the agricultural sector, farmers spraying crops with a pesticide may not have access to, or understanding of, an SDS on that particular chemical. And as workers in the agricultural setting might face greater concerns about illiteracy, visual symbols and other hazard communication tools (such as orally-communicated information) take on added importance.

- Which hazard communication tools are most appropriate for this sector? What standard(s) should be used? (e.g. GHS label requirements; etc.)

- How will comprehensibility of hazard communication tools be ensured in the agricultural sector?

- Will all farmers undergo training in hazard communication? If so, how will this be achieved?

- What special considerations need to be taken into account (e.g. literacy rates of local farmers) in providing hazard communication tools to this sector?

- What other types of hazard communication tools could be effectively employed in the agricultural sector? (e.g. awareness raising campaigns among farmers)

- If a classification and labelling system for agricultural chemicals (pesticides, fertilizers, etc.) is already being used, how will it be adapted for the GHS (e.g. for GHS classification criteria, labels, SDS format, etc.)?

- Will adjustments (for national comprehensibility reasons) need to be made to GHS-derived labels?

- How will access to GHS-relevant information be ensured?

Key Issues/Questions for the Consumer Sector

The label in most cases is likely to be the sole source of information readily available to the consumer. Consumer education is more difficult and less efficient than education for other audiences. Providing sufficient information to consumers in the simplest and most easily understandable terms presents a considerable challenge. The issue of comprehensibility is of particular importance for this sector, since consumers rely solely on label information.

- What initiatives or activities already exist that may be built on to improve chemical hazard communication to consumers? What new awareness raising activities can be developed and implemented?

- What hazard communication tools are most appropriate for the consumer sector? Why?

- To what chemical hazards are consumers most exposed? E.G. use of detergents, dyes, bleaches, pesticides, etc.?

- If a classification and labelling system for consumer products (detergents, dyes, bleaches, etc.) is already being used, how will it be adapted for the GHS (e.g. for GHS classification criteria, labels, SDS format, etc.)?

- Will adjustments (for national comprehensibility reasons) need to be made to GHS-derived labels?

- How will access to GHS-relevant information be ensured?

- What other hazard communication tools should be developed? If so, who will develop them? Should brochures or posters in local language(s) be produced and distributed (e.g. displaying information posters at places where consumer chemical products are purchased)? Does the media have a role to play?

Key Issues/Questions for the Transport Sector

All those involved in the transport sector need information concerning general safe practices that are appropriate for all transport situations.

- What regulations or standards related to hazard communication in the transport sector are already in existence? Do different regulatory regimes exist for different transport types? If so, can they be harmonised?

- What hazard communication tools are most appropriate for the transport sector?

- If the country has been implementing the UNRTDG, will changes be required due to this action plan? If so, what changes?

- If a classification and labelling system for the transport sector is already being used, how will it be adapted for the GHS (e.g. for GHS classification criteria, labels, SDS format, etc.)?

- Will adjustments (for national comprehensibility reasons) need to be made to GHS-derived labels?

- How will access to GHS-relevant information be ensured?

- What other hazard communication tools should be developed? If so, who will develop them? Should brochures or posters in local language(s) be produced and distributed? Does the media have a role to play?

2.5 Cross-Sectoral Issues

In developing a chemical hazard communication action plan, countries will also need to address key cross-sectoral issues – such as development or amendment of legislation and training activities – that will be necessary components of the action plan whether selected activities cover only one or all related sectors. These issues may be considered at the national level by the Coordinating Committee or specific working groups related to the cross-sectoral issues could be established.

Legal Implementation

Another cross-sectoral component are the various legal issues related to the action plan that will need to be considered. These include establishing the legal authority for the use of chemical labels and SDS, particularly if new laws are being considered as part of the action plan. New hazard communication requirements may need to be integrated into existing environmental, labour and public safety regulations, for example, in which case it will be important to ensure that particular elements of the strategy are not unnecessarily duplicative of existing requirements.

Voluntary vs. Legally-binding Requirements

- Will various components and activities be legally-binding or voluntary? (e.g. will new/revised laws be required or will guidelines suffice?) What are the potential advantages and drawbacks of each?

- What are resource implications of either choice?

Legal Basis

- What existing laws can potentially accommodate hazard communication elements like labels and SDS? Will they require amendment or will new laws be required?

- What government ministry or ministries – or competent authority – are empowered under existing laws to implement hazard communication activities?

- What is the timeframe for implementation of the action plan? For example, 2, 4 or 5 years? What are the implications of each option?

- The GHS implementation target is 2008 – can this be achieved? Why or why not?

- Are there implications of undertaking new/changed laws regarding chemical hazard communication for *other* national legislation (such as laws regarding notification of existing or new chemicals)? For example, will proper workplace labelling of a toxic

chemical have consequences for how that chemical, or similar new chemicals, are regulated nationally (such as new restrictions on use)?

Compliance and Enforcement

- For those components or activities that are legally-binding, how will they be enforced? If voluntary, what monitoring activities will be necessary and who will be responsible?

- How will it be ensured that imported chemicals comply with national labelling requirements, for example? Will customs officials be responsible or another ministry?

- What can be done to ensure that the necessary resources exist so that hazard communication activities continue?

- What are resource implications of different enforcement strategies?

Training and Capacity Building

Another key cross-sectoral area for consideration relates to the need for training and capacity building for the use of particular hazard communication tools (labels, SDS, other supporting measures) and the overall approach to implementing action plan activities.

- Is there experience and expertise within the country to ensure proper implementation and to assist with training? Where is this expertise found (i.e. in government, industry, labour groups, universities, occupational health and safety committees in workplaces, etc.)?

- What types of training activities need to be undertaken to ensure a high rate of success of the action plan?

- Who will undertake training regarding labels?

- Who will undertake training regarding SDS?

- Who will undertake training regarding monitoring and enforcement of hazard communication programs and activities? Should joint workplace committees, with worker and management representation, be used/established, for example?

- What are the resource implications of different levels of training activity?

Comprehensibility

It is of crucial importance that chemical hazard communication tools, like labels and SDS, are comprehensible to their target audiences.

- Who will be involved in generating labels and SDS?
- What information should be provided on labels?
- What appearance should the labels have (e.g. use of colour, size, etc.)?
- In which sectors and on what label and SDS elements (symbols, signal words, hazard statements) should strategic comprehensibility testing be undertaken?[31] Who should undertake such testing?
- How will the findings of such testing be incorporated into the development of chemical hazard communication tools (e.g. will different or additional symbols or hazard statements in local languages be required)?
- How can comprehensibility of chosen label elements and SDS information be ensured?
- What provisions can be made for provision of information in local languages?
- Should provision be made for a mechanism to update the information on the labels and in SDS?

Emergency Response

Those involved in responding to chemical emergencies such as spills, leaks or explosions – whether in a factory, on a farm, on a roadway or in a home – need several types of chemical hazard communication tools.

- How can information systems for emergency responders be improved?
- How can coordination among different emergency responders (e.g. fire fighters, paramedics, etc.) be improved?
- Where can emergency responders find the necessary information? What role should be given to poison control centers or national CIS centres?
- What chemical hazard communication tools are most appropriate for the emergency response sector?

[31] The Comprehensibility Testing Methodology developed by the University of Cape Town and available from the ILO can assist in this task.

2.6 Developing an Implementation Strategy[32]

Once the various recommendations for action and activities have been selected, the "nuts and bolts" or organisational detail of the activities can be developed. Even the most complex activities can be planned, executed, and their attainment measured with confidence, resulting in a comprehensive "blueprint" to guide implementation of the action plan.

A key issue facing a country developing a chemical hazard communication action plan is to consider their priorities for implementation. Given limited resources, it is important to decide:

- Will chemical hazard communication activities be implemented in all sectors or only in selected/priority sectors?
- Will implementation of the GHS be the main focus of implementation activities?

Breaking Down Activities into Tasks

The first step is to break down activities into tasks which are easier to organise and manage. Each activity will therefore be equal to the sum of its tasks. The level of detail in which activities are broken down is of particular importance. Activities should only be broken down to a level which enables the Coordinating Committee to effectively estimate time and resource requirements and provides enough information for those responsible for the particular activity. In some cases, activities may be simple enough that they will not need to be broken down into tasks.

Defining Resource Requirements

This step helps to determine the resource inputs required to complete each activity and related tasks. Identifying the resources required will also help to facilitate the assignment of responsibilities later. While consideration of resource implications for each component would have taken place in section 2.4, the identification here will be developed to a finer level of detail and will be recorded in the implementation strategy. Moreover, resources required for each task will also be considered here.

Resource requirements are determined by considering each activity and task and by identifying the related type and amount of resource. Resource types that should be considered include:

- *Human Resource*s: knowledge and skills; person-hours for each knowledge or skill; estimated cost;
- *Facilitie*s: types; space and hours required; estimated cost;
- *Equipmen*t: types; hours required; estimated cost;

[32] Further guidance on developing an implementation strategy can be found in UNITAR/IOMC *Guidance on Action Plan Development for Sound Chemicals Management* (Working Draft, July 2001), section 3.4.

- *Material/Supplies*: types; quantity; estimated cost; and
- *Any special requirements*: unique skills, resources, etc.

Totalling the costs for each activity and task can provide a general estimate of the total cost of the action plan.

Allocating Responsibilities

This step helps to determine who will be responsible for completing each activity and task. At this stage (as human and financial resources may not be adequately secured), it may be wise to assume that identified participants will be available to participate as agreed upon in this step, while keeping in mind that, in reality, responsibilities may need to be adjusted. Again, various tools can be used to facilitate this step.

Key questions include:
- Have the capability, skills and expertise of each team member been taken into account before allocating activities and tasks?
- Who has the responsibility for each activity / task?
- Who has the appropriate knowledge?
- Whose commitment is required?
- Does each team member understand what is required of them?

Developing Realistic Timelines

Developing realistic timelines for each activity requires making estimates of the duration of each task and establishing likely start-up and completion dates. Timelines will have been developed, to some extent, in the *Defining Resource Requirements* step above. Where activities or tasks are of a technical nature, it may be necessary to consult with those who have the related technical knowledge or expertise in order to make realistic estimations.

Issues to consider, which may result in an underestimate of the time required, include:
- omission of essential activities and tasks;
- failure to accurately account for interdependence of activities or tasks;
- failure to account for time required for ordering and delivery of equipment;
- failure to accurately account for competing resources, i.e. scheduling the same person or equipment for simultaneous activities or tasks; and
- a desire to impress with the promise of rapid results.

At this stage, it is also useful to develop milestones by which the implementation of activities can be monitored and managed. Milestones are key events that provide a measure of progress and a target for the participants to aim at. The simplest milestones are the dates estimated for completion of each activity.

Key questions include:

- What is the estimated start-up, duration and completion time of each activity?
- Have experts been consulted to ensure that estimations are realistic?
- Have realistic milestones, which correspond to the activity timelines, been established?

Clarifying Logical Sequence of Activities

Once activities have been broken down into sufficient detail (i.e. into tasks), the activities and tasks should be related to each other to determine their sequence of implementation and identify any dependencies. There are a variety of tools which can help to outline the sequence of activities for implementing the action plan.

Key questions include:

- In what order should related activities be undertaken?
- Is the activity dependent on the start-up or completion of any other activity?

Suggested Output:
The output of this section is a detailed Implementation Strategy comprising the goal, objectives, possible options, activities and tasks of the national chemical hazard communication action plan.

Part III: Implementing and Evaluating Activities

This section of the Guidance Document outlines the "implementation phases" for the action plan. With action plan development complete, attention can now turn to putting the agreed-to plan into action.

3.1 Implementing Specific Activities

- Raising Awareness of the Benefits of Chemical Hazard Communication Activities

Acceptance of and commitment to the proposed activities of the action plan from relevant decision-makers must be sought from the beginning of the process to help ensure effective implementation. Important elements for this phase include raising awareness of the potential benefits of taking action (i.e. benefits of chemical hazard communication) to decision-makers, securing adequate human and financial resources, institutionalising the project, and finally, successfully implementing planned activities.

- Securing Adequate Human and Financial Resources

The national Coordinating Committee would likely play a significant role in obtaining commitment for action plan activities as it would be the body most familiar with it and would have spent considerable time identifying relevant actors. Following the obtainment of commitment for the action plan, however, the Coordinating Committee may transfer more responsibility to those involved in the actual implementation of the plan. Careful consideration should be given regarding how to mobilise both internal and external resources in order have an effective and sustained system for chemical hazard communication in the medium and long-term.

- Institutionalising the Action Plan

High-level approval and support are key to institutionalising the action plan. The greater the degree to which chemical hazard communication activities are integrated into how government, industry and other stakeholders conduct their daily activities, the greater the chances of the action plan succeeding.

- Implementing Planned Activities

Potential activities will depend on the decisions reached during the AP development phase, but may include:

  - sectoral awareness raising workshops;
  - sectoral training courses on chemical labels and SDS;
  - development of chemical hazard communication legislation;
  - development of other hazard communication tools (e.g. brochures, posters, etc.);
  - establishment of national CIS center, poison control center or other information source (e.g. database for chemical hazard communication).

3.2 Monitoring Activities and Evaluating Impact

This phase concerns ascertaining the degree of success in achieving the objectives and goal. Successful implementation of any National Action Plan is not possible without developing mechanisms for monitoring progress in implementing agreed action/activities and evaluating if sub-goals and strategic goals have been reached. If results fail to meet expectations, adjustments will need to be made to the Action Plan, as appropriate. The development of the action plan should be monitored right from the initial phase of getting started to the implementation of specific action plan activities.

Key questions include:

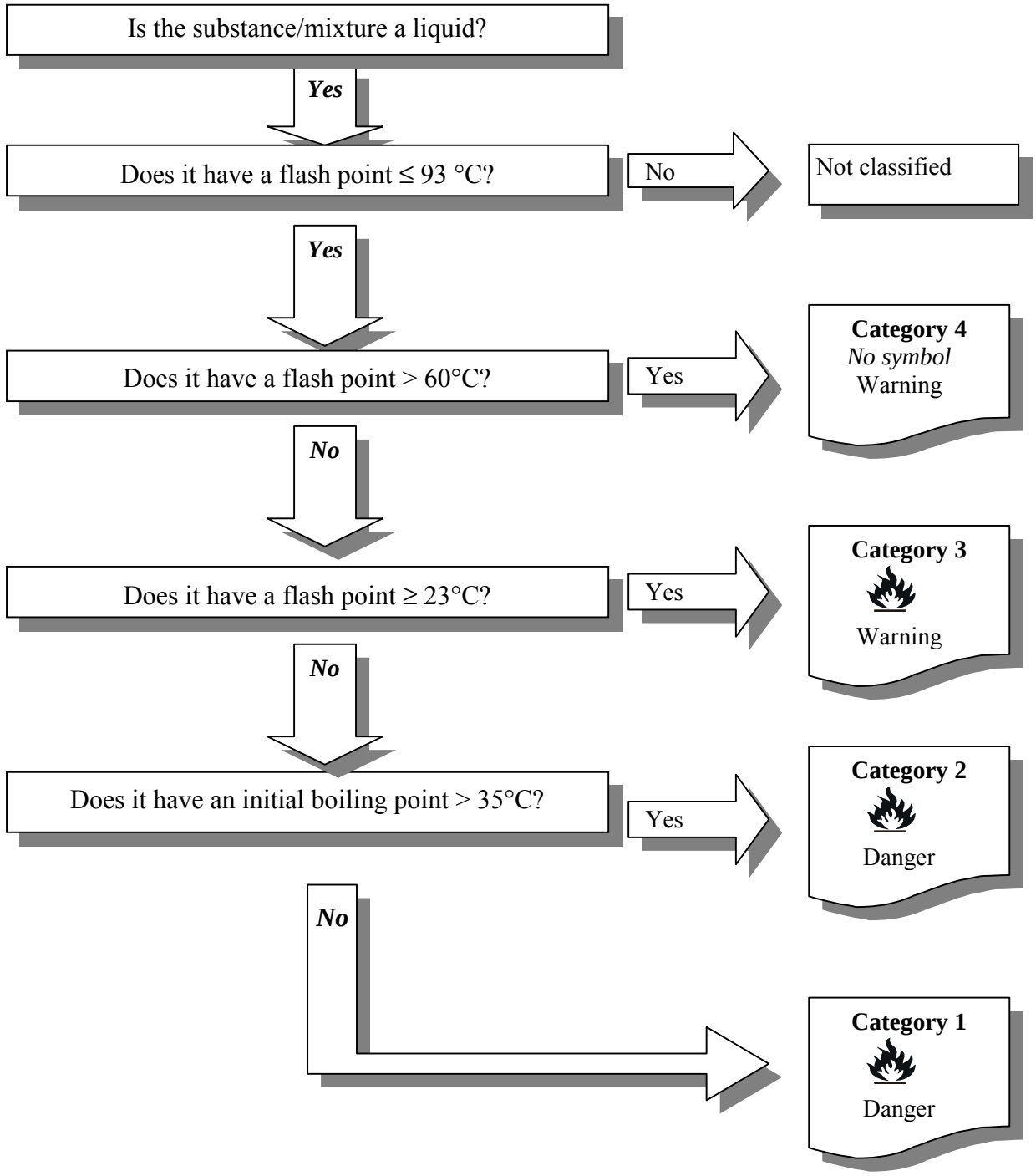
- Were activities implemented as planned (eg. within budget allocation and time frames)?
- Did particular activities resulted in the desired effect? Was the goal and the objectives listed in Part II achieved? If not, why not?
- If not, what further action is required (for example, the objectives or goal may need to be adjusted)?

If national implementation of the GHS was the selected option for achieving the stated goal, if may also be useful to complete a country-based evaluation of the GHS experience (it's usefulness, applicability, strengths and weaknesses) for feedback to the international level.

Suggested Output: An evaluation of the impact of the Action Plan followed by (if necessary) additional action.

ANNEXES

Annex A: Decision Tree for Classifying a Particular Hazard: Flammable Liquids in the GHS



Annex B: ILO Report on the Responses to the Call on Chemical Hazard Communication

In 1996, the IOMC published the results of a survey regarding national chemical hazard communication systems. Countries were asked for background material on the different aspects of chemical hazard communication, in particular comprehensibility studies and the procedures used in the implementation of hazard communication systems. The collected information has then served as background information for the development of the GHS.

The survey compiled the following table of similarities and divergences among the different chemical hazard communication systems for workplaces:

Table: Similarities and divergences among the different chemical hazard communication systems for workplaces

	Austr-alia	Canada	Japan	Korea	Mexico	Portugal	Sweden	UK	USA	Zimbabwe
LABELS	yes	yes	yes	yes	yes	yes	yes	yes	yes	?
Text	yes	yes	yes	yes	yes	yes	yes	yes	yes	?
Symbols	no	yes	no	yes	yes	yes	yes	yes	no	yes
Colours	no (no)	no (no)	no (no)	yes (yes)	yes (yes)	no (yes)	no (yes)	no (yes)	no (no)	? (yes)
Format	no	yes	no	yes	yes	yes	yes	yes	no	?
SAFETY DATA SHEETS	yes	yes	yes	yes	?	yes	yes	yes	yes	?
Headings	yes	yes	yes	?	?	yes	yes	yes	yes	?
Symbols	no	no	no	?	?	no	no	no	no	?
TRAINING	yes	yes	yes	?	?	?	yes	no	yes	?

Labels: If labels are required by regulations or recommended. Text: If any specific written information is required or recommended on the label. Symbol: If any specific symbols are required or recommended on the label. Colours: If the label is required or recommended to have specific colours; if symbols are required or recommended to have specific colours are indicated within the parentheses. Format: If the label is required or recommended to have a specific size, shape or design.

Safety Data Sheets: If data sheets are required by regulations or recommended. Headings: If standardized headings are required or recommended on the data sheet. Symbols: If specified symbols are required or recommended on the data sheet.

Training: If training is required or recommended.

?: No indication in the document received.

Source: This report is available as IOMC/ILO/HC2/99.Inf.1. Additionally, a review of hazard communication based on a literature search can be found in IOMC/ILO/HC2/99.Inf.2, "Hazard Communication: A Review of the Science Underpinning the Art of Communication for Health and Safety" (May 23, 1997).

Annex C: Paragraphs Relevant to the GHS from Chapter 19, Agenda 21

19.26 Globally harmonized hazard classification and labelling systems are not yet available to promote the safe use of chemicals, inter alia, at the workplace or in the home. Classification of chemicals can be made for different purposes and is a particularly important tool in establishing labelling systems. There is a need to develop harmonized hazard classification and labelling systems, building on ongoing work.

19.27. A globally harmonized hazard classification and compatible labelling system, including material safety data sheets and easily understandable symbols, should be available, if feasible, by the year 2000.

19.28. Governments, through the cooperation of relevant international organizations and industry, where appropriate, should launch a project with a view to establishing and elaborating a harmonized classification and compatible labelling system for chemicals for use in all United Nations official languages including adequate pictograms. Such a labelling system should not lead to the imposition of unjustified trade barriers. The new system should draw on current systems to the greatest extent possible; it should be developed in steps and should address the subject of compatibility with labels of various applications.

19.29. International bodies including, *inter alia*, IPCS (UNEP, ILO, WHO), FAO, the International Maritime Organization (IMO), the United Nations Committee of Experts on the Transport of Dangerous Goods and OECD, in cooperation with regional and national authorities having existing classification and labelling and other information-dissemination systems, should establish a coordinating group to:

- Evaluate and, if appropriate, undertake studies of existing hazard classification and information systems to establish general principles for a globally harmonized system;
- Develop and implement a work plan for the establishment of a globally harmonized hazard classification system. The plan should include a description of the tasks to be completed, deadline for completion and assignment of tasks to the participants in the coordinating group;
- Elaborate a harmonized hazard classification system;
- Draft proposals for standardization of hazard communication terminology and symbols in order to enhance risk management of chemicals and facilitate both international trade and translation of information into the end-user's language;
- Elaborate a harmonized labelling system.

19.31. Governments and institutions and non-governmental organizations, with the collaboration of appropriate organizations and programmes of the United Nations, should launch training courses and information campaigns to facilitate the understanding and use of a new harmonized classification and compatible labelling system for chemicals.

Annex D: Summary of Classification and Labelling Elements for Flammable Liquids in the GHS

(*source:* adapted from GHS Final Document, draft of 30 August 2001)

Hazard category	**Criteria**	**Hazard communication elements**	
1	Flash point <23° and initial boiling point ≤ 35°C	Symbol:	
		Signal word:	Danger
		Hazard statement:	Extremely flammable liquid and vapour
2	Flash point < 23°C Initial boiling point >35°C and	Symbol:	
		Signal word:	Danger
		Hazard statement:	Highly flammable liquid and vapour
3	Flash point ≥ 23°C and ≤ 60°C	Symbol:	
		Signal word:	Warning
		Hazard statement:	Flammable liquid and vapour
4	Flash point > 60°C and ≤ 93°C	Symbol:	No symbol used
		Signal word:	Warning
		Hazard statement:	Combustible liquid

Annex E: Draft Table of Contents from GHS Final Document

(draft of 30 August 2001)

1. Introduction

Chapter	*Title*
	Foreword
1.1	Purpose, Scope and Application of the GHS
1.2	Classification of Hazardous Substances and Mixtures
1.3	Hazard Communication: Labelling
1.4	Hazard Communication: Safety Data Sheets

2. Physical Hazards

Chapter	*Title*
2.1	Explosives
2.2	Flammable Gases
2.3	Flammable Aerosols
2.4	Oxidizing Gases
2.5	Gases under Pressure
2.6	Flammable Liquids
2.7	Flammable Solids
2.8	Self-Reactive Substances
2.9	Pyrophoric Liquids
2.10	Pyrophoric Solids
2.11	Self-Heating Substances
2.12	Substances which on contact with water release flammable gases
2.13	Oxidizing Liquids
2.14	Oxidizing Solids
2.15	Organic Peroxides
2.16	Corrosive to Metals

3. Health and Environmental Hazards

Chapter	*Title*
3.1	Acute Toxicity
3.2	Skin Corrosion/Irritation
3.3	Serious Eye Damage/Eye Irritation
3.4	Respiratory or Dermal Sensitisation
3.5	Germ Cell Mutagenicity
3.6	Carcinogenicity
3.7	Toxic to Reproduction
3.8	Target Organ Systemic Toxicity – Single Exposure
3.9	Target Organ Systemic Toxicity – Repeated Exposure
3.10	Hazardous to the Aquatic Environment

4. General Considerations for the Implementation of the GHS

Chapter	*Title*
4.1	Implementation and Maintenance
4.2	Resources

Annexes

Annex	*Title*
1	Definitions and Abbreviations
2	Allocation of Label Elements
3	Classification and Labelling Summary Tables
4	Precautionary Statements, Pictograms
5	Consumer Product Labelling Based on the Likelihood of Injury
6	Comprehensibility Testing Methodology
7	Examples of Arrangements of the GHS Label Elements
8	An Example of Classification in the Globally Harmonized System
9	Guidance on Aquatic Hazards
10	Draft Guidance Document on Transformation/Dissolution of Metals and Metal Compounds in Aqueous Media Dissolution Protocol
11	Testing of Aerosols
12	Possible Areas of Future Work

Annex F: Glossary

acute toxicity	a toxic effect that occurs immediately or shortly after a single exposure
alloy	an alloy is a metallic material, homogeneous on a macroscopic scale, consisting of two or more elements so combined that they cannot be readily separated by mechanical means. Alloys are considered to be mixtures for the purpose of classification under the GHS
ANSI	American National Standards Institute. Created US National Standards on labels (ANSI Z129.1) and SDS (ANSI Z400.1)
boiling point	the temperature at which a liquid changes to a vapour state, at a given pressure. For mixtures, the initial "boiling point" or the "boiling range" may be given
carcinogen	carcinogen means a chemical substance or a mixture of chemical substances which induce cancer or increase its incidence
chemical identity	chemical identity means a name that will uniquely identify a chemical, this can be a name that is in accordance with the nomenclature systems of the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS), or a technical name.
chronic toxicity	a toxic effect that occurs after repeated or prolonged exposure. Chronic effects may occur some time after exposure has ceased.
classification	identification of the hazard of a chemical by assigning a category of danger using set criteria
comprehensibility	comprehensibility refers to the ability of an individual reading a label, warning, or safety data sheet to understand the information sufficiently to take the desired action
corrosive	a substance which causes destruction of, or damage to, materials or living tissues on contact

C.A.S. Number	A number assigned to specific chemicals by the Chemical Abstracts Service. (An organization operated by the American Chemical Society which indexes chemical information).
dermal toxicity	toxic effects resulting from skin exposure to a substance
explosive	a chemical that causes a sudden, almost instantaneous release of pressure, gas and heat when subjected to sudden shock, pressure or high temperature
exposure limit	limit set to minimise occupational exposure to a hazardous substance
flammable	that a substance is capable of being ignited or burning in air
flash point	The lowest temperature (corrected to a standard pressure of 101.3 kPa) at which the application of an ignition source causes the vapours of a liquid to ignite under specified test conditions
hazard	the inherently dangerous properties of a chemical
hazard category	this is the term used in the GHS to describe the division of criteria within each hazard class i.e. oral acute toxicity has five hazard categories and flammable liquids has four hazard categories. These compare hazard severity within a hazard class and should not be taken as a comparison of hazard categories more generally.
hazard class	This is the term used in the GHS to describe the nature of the physical, health or environmental hazard i.e. carcinogen, flammable solid, oral acute toxicity.
hazard statement	A hazard statement means a phrase assigned to a hazard class and category that describes the nature of the hazards of a hazardous product, including, where appropriate, the degree of hazard.
hazard warning	any words, pictures, symbols, or combination thereof appearing on a label or other appropriate form of warning which convey the hazards of the chemical(s) in the container(s)

health hazard	a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees
ICSC	international chemical safety cards
inhalation	breathing in
IOMC	Inter-Organization Programme for the Sound Management of Chemicals (UNEP, ILO, FAO, WHO, UNIDO, UNITAR, OECD)
IPCS	International Programme on Chemical Safety (ILO, UNEP and WHO)
irritant	A substance which will cause an inflammatory response or reaction of the eye, skin or respiratory system
ISO	International Organization for Standardization. Have created international standard for SDS (ISO 11014).
LC50	Lethal Concentration 50%; means the concentration of a material in air which causes the death of 50% (one half) of a group of test animals.
LD50	Lethal Dose 50%; the amount of a material, given all at once, which causes the death of 50% (one half) of a group of test animals.
label	an appropriate group of written, printed or graphic information elements concerning a hazardous product, selected as relevant to the target sector(s), that is affixed to, printed on, or attached to the immediate container of a hazardous product, or to the outside packaging of the hazardous product
label element	A label element means one type of information that has been harmonized for use in a label, e.g. pictogram, signal word.
mixture	mixture or solutions composed of two or more substances in which they do not react

MSDS	material safety data sheet; see SDS (safety data sheet) below
Oral LD50	Oral Lethal Dose 50%; the concentration of a substance, orally administrated which will produce 50 percent mortality in the animals tested
oral toxicity	adverse effects which result from taking a substance into the body via the mouth
oxidising agent	a chemical other than a blasting agent or explosive that initiates or promotes oxidation in other materials, possibly causing fire either of itself or through the release of oxygen or other gases
physical hazard	a chemical for which there is scientifically valid evidence that it is: a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidising agent, pyrophoric, unstable (reactive) or water-reactive substance
pictogram	a pictogram means a composition that may include a symbol plus other graphic elements, such as a border, background pattern or colour that is intended to convey specific information.
precautionary statement	a precautionary statement means a phrase (and/or pictogram) that describes recommended measures that should be taken to minimize or prevent adverse effects resulting from exposure to a hazardous product, or improper storage or handling of a hazardous product.
product identifier	a product identifier means the name or number used for a hazardous product on a label or in the SDS. It provides a unique means by which the product user can identify the substance or mixture within the particular use setting e.g. transport, consumer or workplace.
pyrophoric	a chemical that will ignite spontaneously in air.
risk	the probability that a substance will cause harm in the circumstances of its use

R phrases	risk phrases : a set of numbered standard sentences which appear on user labels for packaged goods (e.g. R23 : Toxic by inhalation)
SDS	safety data sheet; a document that describes the properties and uses of a substance, that is, identity, chemical and physical properties, health hazard information, precautions for use and safe handling information
signal word	a word used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label.
substance	chemical elements and their compounds in the natural state or obtained by any production process, including any additive necessary to preserve the stability of the product and any impurities deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition.
supplemental label element	a supplemental label element means any additional non-harmonized type of information supplied on the container of a hazardous product that is not required or specified under the GHS. In some cases this information may be required by other competent authorities or it may be additional information provided at the discretion of the manufacturer/distributor.
symbol	a graphical element intended to succinctly convey information.
systemic toxicity	the adverse effects caused by a substance, affecting the body in a general rather than a local manner
S phrases	safety phrases : a set of numbered standard sentences which appear on user labels for packaged goods (e.g. S 15: Keep away from heat)

technical name	A name that is generally used in commerce, regulations and codes to identify a substance or mixture, other than the IUPAC or CAS name, and that is recognized by the scientific community. Examples of technical names include those used for complex mixtures (e.g., petroleum fractions or natural products), pesticides (e.g., ISO or ANSI systems), dyestuffs (Colour Index system) and minerals.
toxicity	inherent capacity to produce injury. Adverse effects resulting from overexposure to a material, generally via the mouth, skin, eyes or respiratory tract

The United Nations Institute for Training and Research (UNITAR) was established in 1965 as an autonomous body within the United Nations with the purpose of enhancing the effectiveness of the United Nations through appropriate training and research. UNITAR is governed by a Board of Trustees and is headed by an Executive Director. The Institute is supported by voluntary contributions from governments, intergovernmental organizations, foundations and other non-governmental sources.

The International Labour Organization is the UN specialized agency which seeks the promotion of social justice and internationally recognized human and labour rights. It was founded in 1919 and is the only surviving major creation of the Treaty of Versailles which brought the League of Nations into being and it became the first specialized agency of the UN in 1946. The ILO formulates international labour standards, provides technical assistance and promotes the development of independent employers' and workers' organizations and provides training and advisory services to those organizations. Within the UN system, the ILO has a unique tripartite structure with workers and employers participating as equal partners with governments in the work of its governing organs.