COMMITTEE OF EXPERTS ON THE TRANSPORT OF DANGEROUS GOODS AND ON THE GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS

Sub-Committee of Experts on the
Transport of Dangerous Goods

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GLOBAL HARMONIZATION OF TRANSPORT OF DANGEROUS GOODS REGULATIONS WITH THE UN MODEL REGULATIONS

Implementation of the GHS for Transport

Transmitted by the Experts from Germany and the United Kingdom

Introduction

1. One important target audience for the Globally Harmonised System of Classification and Labelling of chemicals (GHS) is world-wide transport. That is, inter alia, why transport experts are involved in that work and the Sub-Committee of Experts on the Transport of Dangerous Goods (SCE TDG) is the focal point on physical hazards.

2. Thus implementation of the GHS for the transport sector is done by international, regional and national provisions regulating safe transport by using criteria and some labelling elements of the GHS as appropriate for transport.

Information

3. To assist implementation of the GHS as a part of chemical safety management, guidance and training material is essential to support the application and monitoring of these complex provisions, both for adoption by competent authorities and its application by industry. Hence UNITAR, as a specialised UN body, is very active in developing appropriate training courses and material.

4. As an interim result of this effort, UNITAR presented Inf. 22 to the meeting of the UN SCE GHS in December 2007 and invited delegations to comment. From a transport perspective, the Expert from Germany and the UN Secretariat of the SCE TDG have sent comments to UNITAR to include information about implementation of the GHS for the transport sector in this training material and to underline, that by implementing the provisions for transport of dangerous goods either by acceding the existing international and regional codes and agreements including associated EU directives or by implementing corresponding provisions in national

legislation and standards, substantial progress can be made for transport and chemical safety as one important step to implement the GHS.

5. Both comments received general support from the Expert from the United Kingdom. The comments given by the Expert from Germany were inserted in a copy of the UNITAR INF. 22 and can be found as an attachment of this INF. Paper. The Secretariat, and others, may wish to add comments further to those given to this INF. Paper.

Action to be taken

6. The SCE TDG is invited to

- take note of the work of UNITAR on training courses and material and the comments submitted to UNITAR,
- endorse the principle that application of the existing and regularly updated provisions on transport of dangerous goods forms an important part of the implementation of the GHS,
- support the view that this should also form part of any material for training and support of the implementation of the GHS,
- convey this message to the SCE GHS and UNITAR,
- invite UNITAR to promote the implementation of the TDG provisions as an important part of the overall GHS implementation in its work and information campaigns and materials,
- propose that a report by UNITAR to the SCE TDG on the activities undertaken would be welcome.

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Annex to UNSCETDG/33/Inf 48

The following text was presented by UNITAR to the UNSCEGHS for its 14th session from 12th to 14th of December 2007 as Document UNSCEGHS/14/Inf.22

The text further includes comments from Germany supported from the United Kingdom and submitted directly to UNITAR

"CAPACITY BUILDING

Draft BASIC GHS TRAINING COURSE

Transmitted by the United Nations Institute for Training and Research (UNITAR)

((includes comments from Gregor Oberreuter, Federal Ministry for Transport, Building and Urban Affairs - BMVBS, Germany))

Background

In response to strong demand from pilot countries and others, and supported by the discussions at the November 2005 Global GHS Workshop and the UNITAR/ILO Programme Advisory Group, UNITAR/ILO are developing GHS training courses. The training courses are being developed by experts engaged by UNITAR, supported by a technical advisory group that provides feedback to course materials as they evolve.

The first course is an introduction to the GHS, and is designed to provide a background on the GHS, a context for the system, and a focused overview, including a description of its requirements. It is expected that there will be a wide and diverse audience for this course, and that it might be provided in modules so choices can be made about what material to include when presenting it.

The second course is more technical, and will focus on hazard classification and the development of GHS labels and safety data sheets (SDSs). This course is targeted to chemical manufacturers and formulators who will be responsible for creating and distributing labels and safety data sheets in accordance with the GHS. The second course is still being developed.

Basic GHS Course

A draft of the basic GHS training course has been developed and is provided in this INF document. Ultimately, UNITAR/ILO would like to provide these courses in an e-learning platform. To that end, the initial course has been developed in a textbook form that can be adapted to such a platform later. The purpose of this INF document is to request the Subcommittee to comment primarily on course contents. Please note that this draft provides the content of the basic course. However, the graphics are indicative placeholders and will be updated and improved as the course evolves, and the layout and format of the course will be

further developed after comments are received. Comments on additional illustrations that might be useful would also be appreciated.

Once comments have been received, this course will be expanded into a multimedia training package. There will be a companion PowerPoint presentation developed to compliment the text version of this course, in order to provide workshop/classroom training sessions on the GHS. It is expected that pilot testing of the training course materials will be conducted during 2008 as part of activities of upcoming national GHS capacity building projects to be initiated next year. Eventually, the course will be developed into an e-learning platform in order for interested parties to be able to take the course online.

After pilot testing the training course, UNITAR will provide the Subcommittee with information on feedback received, as well as provide the Subcommittee with further opportunities to comment on the complete training course package.

UNITAR invites participants of the Subcommittee to review the introductory course and to provide comments both during the meeting, as well as in writing following the discussion. Any written comments on the draft from the SCEGHS should be sent to Cheryl Chang at cheryl.chang@unitar.org before 15 February 2008.

Introduction to the
Globally Harmonised System of Classification and Labelling of Chemicals (GHS)

DRAFT

Course Objectives:

- Understand how and why the GHS was developed
- Understand the purpose, objectives and benefits of the GHS
- Understand the scope and application of the GHS
- Learn the basic elements of the GHS
- Understand the GHS in relation to other international agreements and standards

Contents:

Chapter 1: Background, Context and Scope and Application of the GHS

Chapter Objectives:

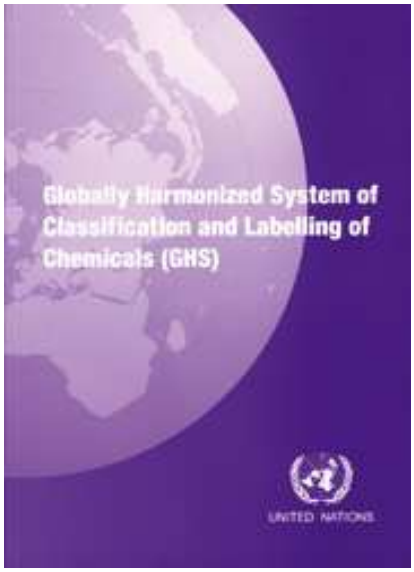
- Learn what the GHS is
- Understand why the GHS was developed
- Learn how the GHS was developed

Lesson 1: Background on the GHS

This lesson will show:

- What is the GHS
- What is the 'Purple Book'
- Why and how the GHS was developed
- What the role of the GHS is in chemical safety management
- Who is responsible for the GHS
- How GHS relates to other international agreements and standards on chemicals

1.1 The GHS



The Globally Harmonised System of Classification and Labelling of Chemicals (GHS) is an international system for standardizing and harmonizing the classification and labelling of hazardous chemicals. The GHS is a logical and comprehensive approach for:

- defining the health, physical, and environmental hazards of chemicals;
- applying agreed hazard criteria to classify chemicals based on their hazardous effects; and
- communicating hazard information on labels and Safety Data Sheets (SDS).

The GHS document, a United Nations publication known informally as "The Purple Book", outlines the provisions of the GHS in four parts: an introductory section outlining the scope, definitions and hazard communication elements (including labelling); classification criteria for physical hazards; classification criteria for health hazards; and classification of environmental hazards. Further information and guidance are provided in annexes. The GHS document in all six UN languages can be found at: http://www.unece.org/trans/danger/publi/ghs/ghs.html

1.2 why was the GHS developed?

Chemicals can help grow food, produce a large variety of essential goods, promote hygiene, control insects and other pests, cure disease, purify water, and address a number of other aspects of human life around the world. As such, they contribute to improving the standard of living in many countries, and are used everywhere for a variety of purposes. But their use also involves risks to the health and safety of people, as well as the environment. The first step to controlling and managing those risks is to identify the chemicals involved, as well as determine what health, physical and environmental hazards their use may pose.

How extensive is chemical use? It is difficult to determine a precise number of chemical products in commerce since many are mixtures that are unique to a single manufacturer. But in 2007, the Chemical Abstracts Service reported that there were more than 32 million registered chemicals in the world. While all of these chemicals are not produced on a regular basis, the number of products to which people are potentially exposed is enormous. The potential for harm is thus great, particularly because many of these chemicals have not been adequately tested for their possible adverse effects. Chemicals can cause a broad range of health effects, from simple irritation to cancer or death, as well as effects to the environment. They also pose safety hazards through such effects as flammability and explosivity.

Many countries have developed systems for providing information on the hazardous properties of chemicals, and recommending control measures aimed at ensuring their safe production, transport, use, and disposal, as well as emergency response. However, these existing systems vary with regard to the definitions of hazards, as well as the information required to be transmitted on labels and safety data sheets. As a result, multiple labels and safety data sheets for the same product are generally required when a product is being shipped to multiple jurisdictions. This process is costly and time-consuming for the companies involved. It creates potential technical barriers to trade for all of industry, and effectively precludes many smaller companies from participating in international trade. In addition, these varying labels and safety data sheets affect the protection of those exposed to the chemicals. Users and handlers of chemicals may see different and inconsistent label warnings or safety data sheet information for the same chemical. This creates confusion, particularly when different hazard classes are used or different recommendations are made for procedures to follow in emergencies or protective measures to follow when exposed.

In other countries, there either are no requirements for classifying and labelling chemicals, or the requirements are limited to a certain sector such as pesticides or transport. The development and maintenance of a chemical classification and labelling system requires extensive resources in a country implementing such an approach. In some countries, it has not been feasible to develop or maintain such a system, and thus chemical users may have had little or no access to information about the chemicals to which they are exposed. This lack of information limits the possibility of designing appropriate protective programs, and thus increases the potential for adverse effects to occur as a result of uncontrolled exposures.

BMVBS: it should be clarified that the supply chain for GHS does not only include supply and use as understood e.g. in the EU chemicals legislation, but as the GHS is cross-sector applicable, also includes logistics like transport and storage and that implementation of the GHS for TDG is included in the UN RTDG and the international modal codes and agreements on the transport of dangerous goods, e.g. IMDG Code, ICAO-TI, ADR, RID, ADN or by national provisions for TDG like CFR 49 of the USA or the Australian Dangerous Goods Code.

It is anticipated that, when implemented, the GHS will:

(a) enhance the protection of human health and the environment by providing an internationally comprehensible system for hazard communication;
(b) provide a recognized framework for those countries without existing system;
(c) reduce the need for testing and evaluation of chemicals; and;
(d) facilitate international trade in chemicals whose hazards have been properly assessed and identified on an international basis.

(GHS text "Purple Book", Paragraph 1.1.1.4)

Thus the GHS was developed to improve chemical safety and health by providing consistent, comprehensive information on hazards and protective measures through labels and safety data sheets. In addition, the harmonised approach is expected to facilitate trade in chemicals.

1.3 benefits of the GHS

Implementation of effective chemical hazard communication based on the GHS provides benefits for governments, companies, workers, and members of the public. The GHS will have maximum value if implemented in all sectors of a country's regulatory system for chemical hazard communication. Specific benefits that are anticipated for each of these groups with global implementation of the GHS include:

Global Benefits

Possible global benefits of GHS implementation include:

- improved consistency and comprehensibility of hazard information, leading to a reduction in harmful exposures to chemicals and chemical-related accidents;
- decreased global inconsistencies in the information provided to users;
- greater confidence in the quality and content of chemical information received from other countries;
- improved transparency for international trade in chemicals with hazards that have been identified based on an internationally-agreed process;
- more effective use of scarce resources (*e.g,*. reduced animal testing by avoiding testing and evaluation against multiple classification systems, regulatory authorities not having to repeat the work of other authorities, etc.);
- assurance of consumers and workers' 'right to know' about the hazards and identities of chemicals; and
- improved global environmental management and protection.

BMVBS: There is one huge benefit missing: The GHS has the aim and permits to use one set of criteria for classification which is to be used for all types of legislation and down-stream-consequences to classify and label hazards in a harmonised way. So ideally, with one classification of a substance or product you can apply all types of down-stream-legislation world-wide, you don't need several classifications of the same product any more. This should be highlighted.

Benefits to Governments

The tangible benefits to governments include:

- improved protection of workers and the public from chemical hazards;

- reduction in the costs of enforcement;
- improved communication of chemical hazards both domestically and internationally;
- avoiding duplication of efforts in creating national systems; and
- lower health care costs.

BMVBS: harmonised provisions for classification and labelling reduce cost for multiple provisions and legislation, it's implementation and monitoring, they further ease inter-ministerial and inter-agency co-operation and co-ordination. This should be highlighted as well.

Benefits to Industry

Benefits to industry for adopting the GHS include:

- safer work environments and improved communication with employees;
- fewer accidents and illnesses;
- maximization of expert resources with minimum labour and costs;
- increased efficiency and reduced costs in compliance with hazard communication regulations; and
- improved corporate image and credibility.

Benefits to Workers and Civil Society

Benefits of the GHS to workers and civil society include:

- improved safety for workers and others through consistent and simplified communications on chemical hazards and practices to follow for safe handling and use; and
- greater awareness of hazards, resulting in safer use of chemicals in the workplace and in the home.

1.4 HOW was the GHS developed?

In 1992, the United Nations Conference on Environment and Development (UNCED)—often referred to as the "Earth Summit"--adopted a program of work to address issues related to the global management of chemical safety. This program recognized that unlike some other safety and health issues that countries deal with, the way chemicals are managed in each nation affects other nations as well. The extensive trade in chemicals, the fact that chemical emissions can easily cross national borders environmentally, and the important role that chemicals play in modern life, all contributed to the recognition that a global approach to their safe use needed to be developed and implemented.

> The international mandate that provided the impetus for completing this work was adopted in the 1992 United Nations Conference on Environment and Development (UNCED), as reflected in Agenda 21, para. 19.27:
>
> "A globally harmonised hazard classification and compatible labelling system, including material safety data sheets and easily understandable symbols, should be available, if feasible, by year 2000".
>
> (GHS text "Purple Book", Paragraph 1.1.2.3)

Key to the eventual management of chemical risks is an agreed, comprehensive and scientific approach to identifying and classifying the hazards of chemicals. While a number of countries already had such systems, they differed with respect to how hazards were defined, as well as how they were communicated. A global approach needed to be developed, harmonizing these varying systems into one

that could be implemented around the world. The GHS was the result of an agreement in Agenda 21 to undertake a process to achieve a harmonised system, building on existing approaches. Its completion involved substantial work by numerous countries, multiple international organizations, and many stakeholder representatives. It was developed based on a consensus process with the parties involved.

The completed GHS was subsequently adopted in 2002 by the UN Economic and Social Council (ECOSOC) Subcommittee of Experts on the GHS (SCEGHS) and endorsed by ECOSOC in 2003, as a non-mandatory recommendation. Both the Intergovernmental Forum on Chemical Safety (IFCS) and the World Summit on Sustainable Development (WSSD) have endorsed a global GHS implementation target of 2008.

1.5 What is the GHS based on?

On the advice of experts consulted by the ILO, the following existing systems for classifying and labelling chemicals were used as the primary basis for the elaboration of the GHS:

(a) Requirements of systems in the United States of America for the workplace, consumers and pesticides;
(b) Requirements of Canada for the workplace, consumers and pesticides;
(c) European Union directives for classification and labelling of substances and preparations;
(d) The United Nations Recommendations on the Transport of Dangerous Goods.

BMVBS: It should be highlighted, that the UN RTDG are a model regulation, which can readily be implemented and that the UN RTDG are already implemented in international codes and agreements for the various modes of transport (see above).

1.6 basic principles of harmonisation

The following agreed principles of harmonisation were adopted early in the process of the GHS development to guide the work, and provide the underlying philosophy for the approach (see paragraph 1.1.1.6 of the Purple Book):

(a) The level of protection offered to workers, consumers, the general public and the environment should not be reduced as a result of harmonizing the classification and labelling systems;
(b) The hazard classification process refers principally to the hazards arising from the intrinsic properties of chemical elements and compounds and mixtures thereof, whether natural or synthetic (*though in some cases it is necessary also to take into account hazards from other properties, such as the physical state of the substance or mixture (e.g. pressure and temperature) or properties of substances produced by certain chemical reactions (e.g. flammability of gases produced by contact with water)*;
(c) Harmonisation means establishing a common and coherent basis for chemical hazard classification and communication, from which the appropriate elements relevant to means of transport, consumer, worker and environment protection can be selected;
(d) The scope of harmonisation includes both hazard classification criteria and hazard communication tools, e.g. labelling and chemical safety data sheets, taking into account especially the four existing systems identified in the ILO report (*1992 ILO Report on the Size of the Task of Harmonising Existing Systems of Classification and Labelling for Hazardous Chemicals)*;

(e) Changes in all these systems will be required to achieve a single globally harmonised system; transitional measures should be included in the process of moving to the new system;
(f) The involvement of concerned international organisations of employers, workers, consumers, and other relevant organisations in the process of harmonisation should be ensured;
(g) The comprehension of chemical hazard information, by the target audience, e.g. workers, consumers and the general public should be addressed;
(h) Validated data already generated for the classification of chemicals under the existing systems should be accepted when reclassifying these chemicals under the harmonised system;
(i) A new harmonised classification system may require adaptation of existing methods for testing of chemicals;
(j) In relation to chemical hazard communication, the safety and health of workers, consumers and the public in general, as well as the protection of the environment, should be ensured while protecting confidential business information, as prescribed by the competent authorities.

1.7 WHO DEVELOPED THE GHS?

Following adoption of the international mandate for harmonisation of existing chemical classification systems, a decision had to be made regarding responsibility for coordinating the work to develop the GHS. A number of different international organizations had ongoing work that was related to the topic, and it was clear that a truly harmonised system would involve several sectors and multiple organizations. An internationally harmonised approach to classification and labelling for purposes of transport had already been developed and implemented, and needed to be taken into account in the new approach. Some activities related to developing a harmonised approach had already been undertaken in the International Labor Organization (ILO) and the Organization for Economic Cooperation and Development (OECD). A number of countries had expressed interest regarding the process, and stakeholders also wanted to be involved.

Ultimately, a Coordinating Group for the Harmonisation of Chemical Classification Systems (CG/HCCS) was established under the auspices of the Interorganization Programme for the Sound Management of Chemicals. The IOMC involved the different international organizations responsible for some part of the commitments made at the Rio Summit. The ILO provided the Secretariat for the Coordinating Group, which was informal and involved interested countries, affected organizations, as well as stakeholders.

The CG/HCCS identified the work that needed to be completed to achieve a harmonised approach, and considered the organizations that had the expertise to accomplish that work. As a result, it was determined that the physical hazard criteria would be addressed jointly by the United Nations Committee of Experts on the Transport of Dangerous Goods (UNCETDG) and the ILO. The UNCETDG had already harmonised physical hazards for purposes of transport, and these thus formed the basis for the approach used in the GHS. The existing criteria were examined to determine what changes might need to be made to accommodate the other sectors, but otherwise the transport approach remained largely intact. In the area of health and environmental hazard criteria, the OECD Chemicals Group was asked to be the focal point for both substances and mixtures. The work was related to their ongoing expertise in testing of chemicals, and built on discussions already held in that forum regarding harmonisation. Communication of information on labels and safety data sheets was assigned to the ILO, in recognition of ongoing work they had undertaken in this area.

The CG/HCCS itself was responsible for ensuring that all of the work was completed, and synthesizing it into a document that constituted the GHS. The work in these organizations was done with input from stakeholders, primarily industry and labor, and completed on a consensus basis.

After the GHS was completed, a permanent home for the system was created in the United Nations. What was formerly the Committee of Experts on the Transport of Dangerous Goods (TDG) is now the Committee of Experts on TDG and GHS. There are two subcommittees under this committee, one dealing with TDG and one with GHS.

1.8 WHO IS responsibilE for IMPLEMENTING the GHS?

The UN Economic and Social Council's Subcommittee of Experts on the GHS (UNSCEGHS) is responsible for the maintenance, updating and promotion of the GHS at the international level. Over 30 countries have joined the Subcommittee, and participate in discussions regarding implementation of the GHS. Other countries attend as observers, and stakeholder representatives participate as well.

> The UNSCEGHS is responsible for maintaining the GHS and promoting its implementation. It provides additional guidance as needs arise, while maintaining stability in the system to encourage its adoption. Under its auspices, the document is regularly revised and updated to reflect national, regional and international experiences in implementing requirements into national, regional and international laws, as well as experiences of those doing the classification and labelling .
>
> (GHS text "Purple Book", Foreword)

The UNSCEGHS has the following functions:

(a) To act as custodian of the GHS, managing and giving direction to the harmonisation process;
(b) To keep the GHS system up-to-date as necessary, considering the need to introduce changes, ensure its continued relevance and practical utility, and determining the need for and timing of the updating of technical criteria, working with existing bodies as appropriate;
(c) To promote understanding and use of the GHS and to encourage feedback;
(d) To make the GHS available for worldwide use and application;
(e) To make guidance available on the application of the GHS, and on the implementation and use of technical criteria to support consistency of application; and
(f) To prepare work programmes and submit recommendations to the committee.

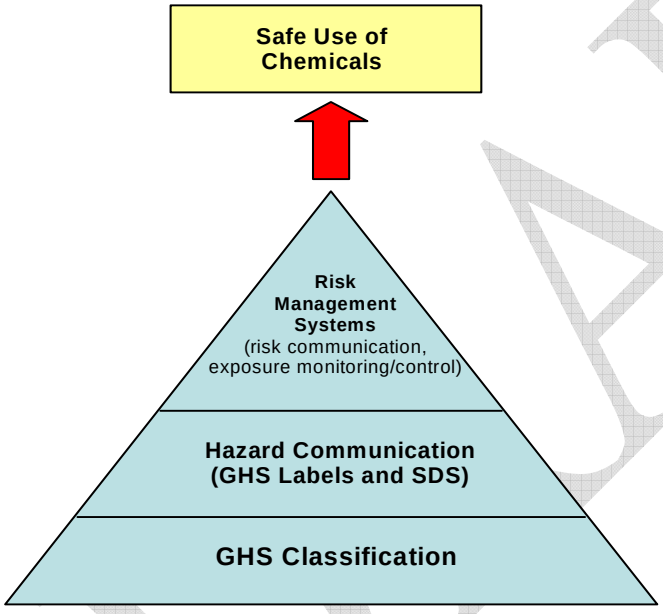
Further information on the UNSCEGHS can be found on their webpage at < http://www.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html>.

The UN Economic Commission for Europe (UNECE) provides the Secretariat functions for both the Committee of Experts on the Transport of Dangerous Goods and the GHS, and the two subcommittees that function under that committee. UNITAR and ILO are the designated focal points for capacity building for GHS implementation. There is also a World Summit for Sustainable Development (WSSD) Global Partnership for Capacity Building to Implement the GHS. This partnership is coordinated by UNITAR, ILO and the OECD. See http://www.unitar.org/cwm/ghs_partnership/index.htm

The GHS is a non-mandatory recommendation. Its provisions do not constitute a model standard or regulation, but provide guidance and explanation regarding the harmonised approach. Once a country decides to implement the provisions through its national regulatory structure, the system will then be mandatory in that country. Competent authorities are responsible for overseeing implementation on a national or regional basis.
BMVBS: It should be added, that implementation could also be done by a regional body (like the EU) or by amending existing international codes and agreements.

1.9 GHS as the basis for national chemicals management programmes

The GHS is an important new tool that countries can use as a basis for establishing comprehensive national chemical safety programs, as shown in Figure 1 below. The first two steps in any programme to ensure the safe use of chemicals are to identify intrinsic hazard(s) (i.e. classification) and then to communicate that information. Implementation of the GHS can thus provide the underlying infrastructure for implementation of a chemical safety management program. Without information about the identities and hazards of chemicals, such a program cannot be effectively implemented.



To proceed further up the pyramid, some existing national, regional or international programs also include risk management systems as part of an overall program for the sound management of chemicals. The general goal of these systems is to minimize exposure, resulting in reduced risk. With or without formal risk management systems, the implementation of GHS promotes the safe use of chemicals.

BMVBS: Why safe transport does not appear here?

Figure 1 GHS as the basis for National Chemicals Management Systems

The GHS can therefore play a central role as it effectively transfers practical and reliable information about chemical hazards to users. It can assist with providing information for the entire chemical supply chain. The GHS can therefore provide all countries with a consistent means of classifying and labelling hazardous chemicals and help to ensure that coherent information is provided on all imported and exported chemicals worldwide.

1.10 GHS IN RELATION TO OTHER INTERNATIONAL AGREEMENTS AND STANDARDS

While the GHS is an important standard in itself that countries may integrate into national and regional legislation and standards, implementation of the GHS also facilitates the implementation of other international agreements concerned with chemicals management.

GHS and the Strategic Approach to International Chemicals Management (SAICM)

The importance of implementing the GHS is recognised in the Overarching Policy Strategy (OPS) of SAICM – GHS implementation is identified under the overall objective of "knowledge and information":

(h) To promote implementation of the common definitions and criteria contained in the Globally Harmonised System of Classification and Labelling of Chemicals;

GHS is also included as a SAICM work area in the Global Plan of Action, including 8 distinct activities (see Annex 1 of SAICM). In particular, SAICM GPA activity #250 states "Make available sufficient financial and technical resources to support national and regional GHS capacity-building projects in developing countries and countries with economies in transition." Participants in SAICM negotiations stressed the importance of training and capacity building for implementing the GHS as part of SAICM. This is international recognition of the importance of countries and regions moving forward to include the GHS capacity building and implementation into overall chemicals management strategies and national SAICM implementation programmes.

BMVBS: As PIC is an international convention, PIC could make the application of the GHS criteria and labelling provisions mandatory – as least for the chemicals being subject to PIC and to the countries being contracting parties of PIC. So there it could read "shall" instead of "should".

GHS and the Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade

The Rotterdam Convention is intended to allow countries to monitor and control the trade in certain hazardous chemicals, including facilitating information exchange about the characteristics of the traded chemicals. It therefore has close links to hazard identification and communication issues and the GHS.

The text of the Convention refers to a "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). Article 13 requires that chemicals, listed in Annex III, when exported are 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. Parties also shall require that chemicals to be used for occupational purposes have a safety data sheet that follows an internationally recognized format, setting out the most up-to-date information available. 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. The references to an "international standard" and format for labels and SDS are references to the GHS.

BMVBS: As POP is an international convention, it could make the application of the GHS criteria and labelling provisions mandatory – as least for the chemicals being subject to POP and to the countries being contracting parties of POP. So there it could read "shall" instead of "should" or "may".

GHS and the Stockholm Convention on Persistent Organic Pollutants (POPs)

The Stockholm Convention aims to protect human health and the environment from persistent organic pollutants (POPs). The Convention text underlines "the importance of manufacturers of persistent organic pollutants taking responsibility for reducing adverse effects caused by their products and for providing information to users, Governments and the public on the hazardous properties of those chemicals" (Preamble). In Article 10 on "Public information, awareness and education", the Convention encourages parties to use safety data sheets, reports, mass media and other means of communication.

As with the Rotterdam Convention, countries may use the GHS as a basis for the information to be provided on the characteristics of the chemicals, as well as for a format for communication tools such as SDS.

GHS and the Basel Convention on the Control of Transboundary Movements of Hazardous Waste and their Disposal

The Basel Convention Joint Correspondence Group with UN SCEGHS has been working towards harmonisation of hazard classification systems and to improve consistency at the international level on the use of classification systems for wastes and chemicals. Use of the GHS can help to define hazardous characteristics of wastes under the Basel Convention while satisfying the needs of both international instruments.
BMVBS: A chapter on Transport of Dangerous Goods should be added here to complete the relations of GHS to existing international instruments.

GHS and the International Chemical Control Toolkit (Control Banding)

The International Chemical Control Toolkit (Chemical Toolkit) has been developed by ILO based on an approach to risk assessment and management called "control banding". This approach groups workplace risks into "control bands" based on combinations of hazard and exposure information. It can also be applied to non-chemical workplace hazards. Recommended controls are provided based on these risks. As this banding technique is semi-quantitative or qualitative depending on the application, it is particularly relevant for use in small and medium-sized enterprises, developing nations, and, in the case of chemicals, where access to specialist advice is unavailable or where no occupational exposure standard has been set. It may also be useful for environmental risk assessment and management, as health and environment controls are complementary, and often inseparable, at the workplace level. Control banding employs the GHS hazard categories and statements, and a number of developing countries are involved in pilot testing this tool.

More information about control banding is available at:
www.ilo.org/public/english/protection/safework/ctrl_banding/index.htm

Other Chemical Instruments

In addition to those instruments discussed here, there are a number of others that may be affected by the GHS, or interface with its provisions. For example, there are international guidelines for labelling of pesticides under the World Health Organization and the Food and Agriculture Organization. The criteria used for these labels are likely to be changed to be consistent with the GHS in the near future.

There have also been discussions within the UN on issues related to the Montreal Protocol and labelling regarding ozone depletion that have not yet been resolved. Other possible areas include the Chemical Weapons Convention, and regional organizations such as the Sahel Pesticide Committee. Ideally, all of these instruments and systems will ultimately be based on common criteria for classification and labelling.

Test Questions:

1. What does the acronym GHS mean?
2. Name three benefits that result from implementation of the GHS.
3. Name one other international agreement related to GHS.
4. Who is responsible internationally for maintainance and implementation of the GHS?

Lesson 2: Scope and Application of the GHS to Chemicals and Sectors

This lesson will show:

- What chemicals are covered in the GHS
- Sectors affected by the GHS
- How the hazard communication components are applied in the GHS
- The Building Block approach
- Principles of hazard vs. risk
- Principles of consumer product labelling based on the likelihood of injury

1.11 what chemicals are covered by the GHS?

The GHS applies to pure chemical substances, their dilute solutions and to mixtures of chemical substances. "Articles" as defined in the Hazard Communication Standard (29 CFR 1910.1200) of the US Occupational Safety and Health Administration, or by similar definition, are outside the scope of the system.
(GHS text "Purple Book", Paragraph 1.3.2.1.1)

The GHS covers all hazardous chemicals. There are no complete exemptions from the scope of the GHS for a particular type of chemical or product. The term "chemical" is used broadly to include substances, products, mixtures, preparations, or any other terms that may be used by existing systems. The goal of the GHS is to identify the intrinsic hazards of chemical substances and mixtures and to convey hazard information about these hazards.

"Articles", as defined in the OSHA Hazard Communication Standard (HCS) (29 CFR 1910.1200): "*a manufactured item other than a fluid or particle: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical (as determined under paragraph (d) of this section), and does not pose a physical hazard or health risk to employees*", or by similar definitions, are outside the scope of the GHS.

BMVBS: It should be mentioned that the UN RTDG and other TDG provisions go beyond chemicals being substances and mixtures by including articles and wastes as well as by also addressing hazards not covered by GHS like infectious, radioactive.

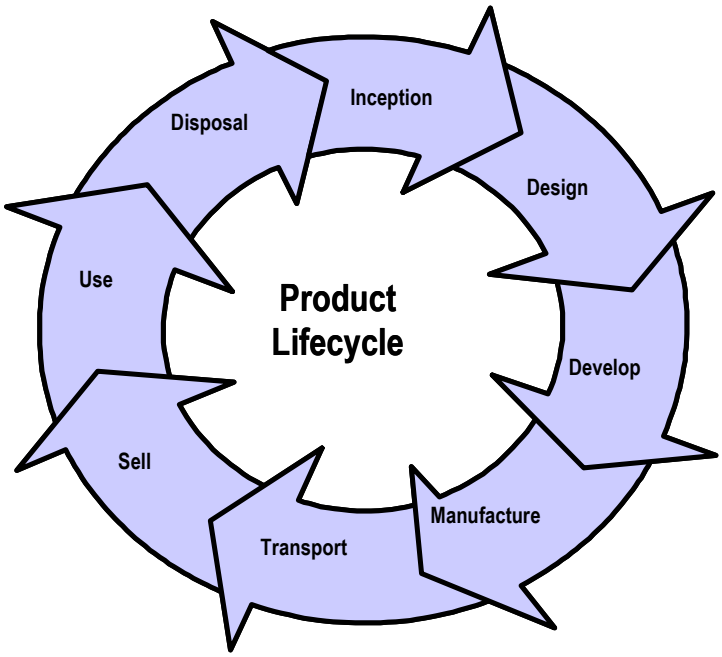
1.12 Application of the Hazard communication components in the ghs

The mode of application of the hazard communication components of the GHS (e.g. labels, safety data sheets) may vary by product category or stage in the life cycle.

(GHS text "Purple Book", Paragraph 1.1.2.5)

The need for GHS labels and/or Safety Data Sheets is expected to vary by product category or stage in the chemical's lifecycle from research/production to end use. For example, pharmaceuticals, food additives, cosmetics and pesticide

residues in food will not be covered by the GHS at the point of consumption, but will be covered where workers may be exposed (workplaces), and in transport. Also, the medical use of human or veterinary pharmaceuticals is generally addressed in package inserts and is not part of existing hazard communication systems. Similarly, foods are generally not labelled under existing hazard communication systems. The exact requirements for labels and Safety Data Sheets will continue to be defined in national regulations. However, national requirements are expected to be consistent with the detailed discussion of scope provided in Chapter 1.1 of the GHS document. This discussion reflects the practical realities countries with existing systems have already dealt with, and provides guidance for countries implementing such a system for the first time.



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BMVBS: STORAGE IS MISSING IN THE SCHEME AS WELL AS IN THE TEXT

1.13 SECTORS AFFECTED BY the GHS

The provisions of the GHS affect four key sectors involved in chemical hazard communication. They include (1) industrial workplace, (2) agriculture, (3) transport, and (4) consumer products. The following sections provide an overview of each of the four sectors from a GHS perspective.

Industrial Workplace

Chemicals produced in factories and used in workplaces are a central component to many countries' economies. However, they may pose dangers to those at risk of exposure, whether directly in the factories or in surrounding communities, and may be a hazard to the environment if released.

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. The tool most commonly used for providing this information is the label. However, the label is not the sole source of this information. It 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 in the SDS may vary. However, compared to consumers for example, workers can develop a more in-depth understanding of hazard symbols and other types of information when properly trained.

Agriculture

Pesticides are in wide-spread use around the world and may pose hazards to those producing or using them, as well as to the environment in which they are used. Farmers and farm workers are at risk from exposure through the use of different agricultural chemicals, such as pesticides and fertilizers.

The objective of hazard communication in the agriculture sector is therefore to provide appropriate information related to chemicals (pesticides, insecticides, etc.) used in this sector and to relevant target audiences (e.g. farmers and their families). The key tool used to communicate hazard information in the agriculture sector is the label, although there may also be information in leaflets or other sources. As distributors may repackage pesticides, ensuring that labels are consistent at all stages is also important. As with all sectors, training on the proper understanding and use of the label information and the chemicals is important.

Transport

Chemicals and products containing chemicals are transported around the world via road, rail, water and air and may pose a hazard not only to those directly involved in their transport, but also to communities on the transit route and the environment in the case of an accident. The objective of hazard communication is therefore to ensure that those involved in the transport sector have information concerning general safe practices that are appropriate for transport situations. Drivers require information concerning specific hazards in the event of an accident and additional information if they also load and unload packages or fill tanks. Workers who might come into direct contact with dangerous goods in transit, for example on board ships, require detailed information. In all cases, labels, placards, transport documents ~~and SDS~~ are key tools.

BMVBS: SDS is not a tool used in transport, it should be omitted here.

The transport sector has long been a focus of international efforts on hazard communication, primarily through the UN Sub-committee of Experts on the Transport of Dangerous Goods (UN SCETDG). This body 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).
BMVBS: the modal international codes and agreements for TGD shall be included here to complete the information, as the UN RTDG are not by itself a binding regime.

Workers involved in transporting chemicals/dangerous goods and emergency responders are the principal target audiences. Classification and labelling for the transport of dangerous goods is now based on the GHS and it is expected that application of the GHS will be similar to application of current transport requirements. Containers of dangerous goods will be marked with pictograms that address acute toxicity, skin corrosion, physical hazards, and environmental hazards. It also addresses further hazards like infectious and radioactive properties. But it does not address long term hazards like chronic toxicity. The additional label elements of the GHS, such as signal words and hazard statements, are not ~~expected to be~~ adopted in the transport sector.

BMVBS: This is to complete the information and to point on the need to apply the TDG provisions also for complete implementation of the GHS.

Consumer Products

Consumers are exposed to a wide variety of hazardous chemicals in their daily lives, such as certain bleaches, paints, dyes, garden pesticides and cleaning products. Children may also be exposed to chemical hazards via products used in the home. Ensuring the provision of comprehensible information on consumer products so that they are used appropriately is the objective of hazard communication in this sector. In the consumer sector the label in most cases is likely to be the sole source of information readily available to consumers. The label, therefore, needs to be sufficiently clear 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 problems of making readily comprehensible information available to consumers are also made more difficult by the wide range of chemicals and uses in the home. Some products contain many dozens of chemicals all with different properties. The issue of comprehensibility is therefore of particular importance for this sector, since consumers may rely mainly on label information and would benefit from education and awareness.

Others Affected by GHS

In addition to the sectors covered by the GHS, there are other organizations and areas that may be impacted by its implementation. These include, for example, customs officials in countries where they may be used to assist with enforcement of labelling requirements. In addition, coverage of aquatic toxicity, and perhaps other environmental effects in the future, may impact or interface with environmental authorities in countries or regions.

1.14 Building block approach

The GHS classification and communication requirements can be thought of as a collection of building blocks. In regulatory schemes, coverage and communication of hazards vary by the needs of target audiences/sectors. Accordingly, the GHS was designed to contain the hazard endpoints and communication tools necessary for application to known regulatory schemes. The GHS is structured so that the appropriate elements for classification and communication, which address the target audiences, can be selected by competent authorities consistent with their scope of regulatory coverage.

However, where a system covers something that is in the GHS, and implements the GHS, that coverage should be consistent. For example, if a system covers the carcinogenicity of a chemical, it should follow the harmonised classification scheme and the harmonised label elements.
(GHS text “Purple Book”, Paragraph 1.1.3.1.5.1)

If a competent authority chooses to cover a certain effect when it adopts the GHS, it should also adopt all of the harmonized elements associated with that effect. However, it is not necessary for each competent authority to cover all

hazard classes, or hazard categories within a class. Countries can determine which of the building blocks will be applied in different parts of their systems (consumer, workplace, transport, pesticides, etc.). As long as the hazard classes and categories covered by a sector or system are consistent with the GHS criteria and hazard communication requirements, it will be considered appropriate implementation of the GHS.

For example, in **the transport sector**, it is expected that application of the GHS will be similar to application of current transport requirements and will consider physical hazards (e.g. flammability, etc), acute toxicity hazards (e.g. acute dermal toxicity, skin ~~irritation~~ corrosion, etc), and environmental hazards (e.g. toxic to aquatic environment). Packagings, Containers, Vehicles and Tanks for the ~~of~~ transport of dangerous goods will be marked with pictograms that address these hazards. However, the other label elements of the GHS, such as signal words and hazard statements are not ~~expected to be~~ adopted in the transport sector.

The (partly coloured) transport pictogram of the same hazard class and category according to GHS may replace the GHS pictogram (e.g. the flame in a red diamond shape for flammability).

BMVBS: these corrections are needed for precision.

In **the workplace**, most of the GHS elements are expected to be adopted, including GHS labels that have the harmonised core information under the GHS (signal words, hazard statements and symbols, etc.) and safety data sheets. Employee training to help ensure effective communication is also anticipated.

While physical hazards are important in the workplace and transport sectors, consumers may not need to know some of the specific physical hazards in the type of use they have for the product.
(GHS text "Purple Book")

For **the consumer sector**, it is expected that labels will be the primary focus of GHS application. These labels will include the core elements of the GHS (signal words, hazard statements and symbols, etc.), subject to some sector-specific considerations in certain systems (e.g., risk-based labelling under Annex 5). The appropriate GHS hazard criteria are expected to be adopted.

1.15 'hazard' and 'risk'

The goal of the GHS is to identify the intrinsic hazards of chemical substances and mixtures and to convey hazard information about these hazards. The GHS is not intended to harmonise risk assessment procedures or risk management decisions.

The GHS is not intended to harmonise risk assessment procedures or risk management decisions (such as establishment of a permissible exposure limit for employee exposure), which generally require some risk assessment in addition to hazard classification.

(GHS text "Purple Book", Paragraph 1.1.2.6.1)

The concept of risk or the likelihood of harm occurring, and subsequently communication of that information, is introduced when exposure is considered in conjunction with the data regarding potential hazards. The basic approach to risk assessment is characterised by the following formula:

HAZARD x EXPOSURE = RISK

Thus, if either hazard or exposure is minimised, the risk or likelihood of harm will be minimised. Successful hazard communication alerts the user to the presence of a hazard and the need to minimise exposures and the resulting risks.

Consistent with the building block approach, countries are free to determine which of the *building blocks* will be applied in different parts of their systems. (GHS text "Purple Book", Paragraph 1.1.3.1.5.1)

All existing systems for conveying information (workplace, consumer, and transport) include both hazard and risk in some form. They vary in where and how they provide the information, and the level of detail they have regarding potential exposures. For example, exposure of the consumer to pharmaceuticals comprises a specific dose that is prescribed by the physician to address a certain condition. The exposure is intentional. Therefore, a determination has been made by a drug regulatory agency that for the consumer, an acceptable level of risk accompanies the specific dosage provided. Information that is provided to the person taking the pharmaceutical conveys the risks assessed by the drug regulatory agency rather than addressing the intrinsic hazards of the pharmaceuticals or its components. These types of situations are not addressed by the GHS.

1.16 consumer product labelling based on the likelihood of injury

BMVBS: It should be mentioned, that this chapter of the GHS is addressed to some countries only and does not serve as a general chapter.

It has been recognised that some systems of classification and labelling of hazardous chemicals provide information about chronic health hazards in consumer products only after considering additional data regarding potential exposures to consumers under normal conditions of use or foreseeable misuse. These systems thus provide information based on an assessment of risk, or the likelihood of injury occurring from exposure to these products. Where this exposure assessment and determination of likelihood of injury reveal that the potential for harm to occur as a result of the expected exposures is insignificant, chronic health hazards may not be included on the product label for consumer use. Annex 5 of the GHS addresses this approach.

Though the GHS does not address harmonisation of risk-based labelling of consumer products, it outlines certain general principles of this process:

(a) *All chemicals should be classified based on GHS classification criteria*

The first step in the process of classifying hazards and communicating information should always be classification of intrinsic hazards based on the GHS criteria for substances and mixtures;

(b) *Risk-based labelling can only be applied by the competent authorities to the chronic health hazards of chemicals in the consumer product setting. All acute health, environmental and physical hazards should be labelled based on intrinsic hazards*

The hazard classification should lead directly to labelling of acute health effects, environmental and physical hazards. The labelling approach that involves a risk assessment should only be applied to chronic health hazards, e.g. carcinogenicity, reproductive toxicity, or target organ systemic toxicity based on repeated exposure. The only chemicals it may be applied to are those

in the consumer product setting where consumer exposures are generally limited in quantity and duration;

(c) *Estimates of possible exposures and risks to consumers should be based on conservative, protective assumptions to minimise the possibility of underestimating exposure or risk*

Exposure assessments or estimates should be based on data and/or conservative assumptions. Assessment of the risk and the approach to extrapolating animal data to humans should also involve a conservative margin of safety through establishment of uncertainty factors.

For example, this process is consistent with US Consumer Product Safety Commission Guidelines and with other national and international guidelines on conducting risk assessments. A substance or product under evaluation for chronic hazard labelling for consumer use in the US must satisfy a two-part test. First, it must present one of the chronic hazards covered, i.e. be classified as a chronic hazard based on specific criteria. Second, a risk assessment must be carried out to establish whether it has the potential to cause substantial illness or injury during or as a result of "reasonably foreseeable handling or use or from ingestion by children". If the result of the risk assessment indicates the risk is very low, the substance or product need not be labelled for chronic hazard. In other words, whether a given substance is labelled for a chronic effect depends not only on whether it is hazardous, but also on exposure and risk.

Test Questions:

1. What chemicals are covered by the GHS?
2. What sectors are covered by the GHS?
3. Is risk covered by the GHS?
4. Do competent authorities have to adopt all hazard classes and categories? Why or why not?

Chapter 2: Technical Overview of the GHS

Chapter Objectives:

- Be familiar with the main elements of the GHS
- Understand who is responsible for development of the elements
- Learn what hazards are covered by the GHS
- Learn what the GHS hazard communication tools include and how the information is obtained by users

Lesson 1: Classification

This lesson will show:

- How classification is done under the GHS, and who is responsible for it
- What health, physical, and environmental hazards are covered under the GHS

2.1 WHAT IS HAZARD CLASSIFICATION AND WHO IS RESPONSIBLE FOR IT?

One of the most important aspects of the GHS is its harmonised approach to hazard classification. A "hazard class" is basically just the hazardous effect, e.g., flammable liquid is a hazard class. Within classes, there may be categories of hazard. In other words, the class is divided into different levels of hazard, or categories. The highest level of hazard is in the first category, and the level of hazard decreases with each succeeding category. For flammable liquids, the GHS includes four different levels of hazard or categories. Hazard classification is a determination of which hazard classes and categories apply to a particular chemical. The GHS provides a systematic process to assess the hazards of the chemicals, and subsequently classify them to characterize their hazardous effects. As described in the GHS (1.3.2.2.2), the process involves three steps:

1. **Identification of relevant data** regarding the specific hazard of the substance or mixture.
2. Subsequent **review and quality** check of those data to ascertain the hazards associated with the substance or mixture
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.

Hazard classification thus involves a thorough search of the scientific literature including data bases to identify any information relevant to the assessment of the hazards of the chemical involved. The GHS does not require testing according to mandatory test methods for health and environmental hazards — hazard classification for these hazards is to be done based on existing data. However, the data must then be reviewed and evaluated to determine the quality, and consistency with accepted scientific principles regarding such work. Once the relevant data are assembled and reviewed, the findings supported by the studies must be compared to the criteria in the GHS for characterizing the effect to determine whether the chemical meets the definition of hazard, and how severe the potential effect is—in other words, whether it

falls within a hazard class (such as acute toxicity), and which category under that class aligns with the available data.

As might be expected based on this description, this is a process that requires some professional expertise and judgment to accomplish, and involves a scientific evaluation of data regarding the hazardous effects of chemicals. This includes individual chemical substances, as well as mixtures or formulations. The GHS, as well as the underlying systems it is based on, anticipates that classification will be performed ~~only~~ mainly by those who produce the chemicals or formulate them into mixtures, or competent authorities if they choose to do so. The vast majority of facilities or individuals impacted by the GHS will thus not be involved in the classification process, and therefore do not need to become familiar with the detailed criteria in the GHS, or the process to evaluate chemicals. Suppliers of chemicals will be required by national or regional or international requirements to perform a hazard classification for their products, and ensure that when shipped, they are accompanied by the appropriate hazard communication information. Users of chemicals, including small to medium sized enterprises (SME) will then have the necessary information to ensure that protective measures are implemented to reduce or eliminate any possible hazardous effects. A separate training course on the hazard classification process will be available for those who will be implementing the process and thus must be familiar with these details in the GHS.

For physical hazards, testing according to prescribed test methods is mandatory for classification. The tests are prescribed in the GHS itself and in the United Nations Manual for Test and Criteria, which forms part of the UN RTDG and is made mandatory by referenced in the binding international codes and agreements for TDG like IMDG-Code, ADR etc. This means, that implementation of the GHS for physical hazards indirectly requires to establish testing institutes and to provide necessary testing equipment.

BMVBS: This differentiation is very important to not mislead the users of the GHS world-wide.

2.2 HOW WERE THE HAZARD CLASSIFICATION CRITERIA DEVELOPED?

The health and environmental hazard classification criteria in the GHS were developed in the OECD, and were based on a comparison and analysis of existing systems, as well as a review of the most current scientific information regarding the health effects being covered. The scope of health effects in the GHS includes all of the different types of effects found in the existing systems that have already been identified as the basis for the harmonisation process (i.e., the existing systems for classification and labelling in Canada, Europe and the United States, as well as the international transport system). While the scope of health effects covered under these systems was generally similar, there were often differences in the type of data required to consider a chemical covered by the system, as well as in the cut-offs or other approaches used to limit the chemicals that fall within a particular criterion. These were thus the subject of negotiation among the participants to find approaches that were equally protective as the current systems, but also sufficiently pragmatic to ensure that coverage is appropriate.

The health and environmental criteria also include an approach to covering mixtures for each of the hazard classes. This is particularly important since most chemical products in commerce are mixtures, and many of them have not been tested to determine their hazard potential. The approach to mixtures is tiered as follows:

(a) Where test data for a particular effect are available for the complete mixture, the classification of the mixture is always based on that data.

(b) Where test data are not available for the mixture itself, then bridging principles included and explained in each specific chapter should be considered to use available information.

(c) If bridging principles cannot be applied, estimate hazards based on the known ingredient information.

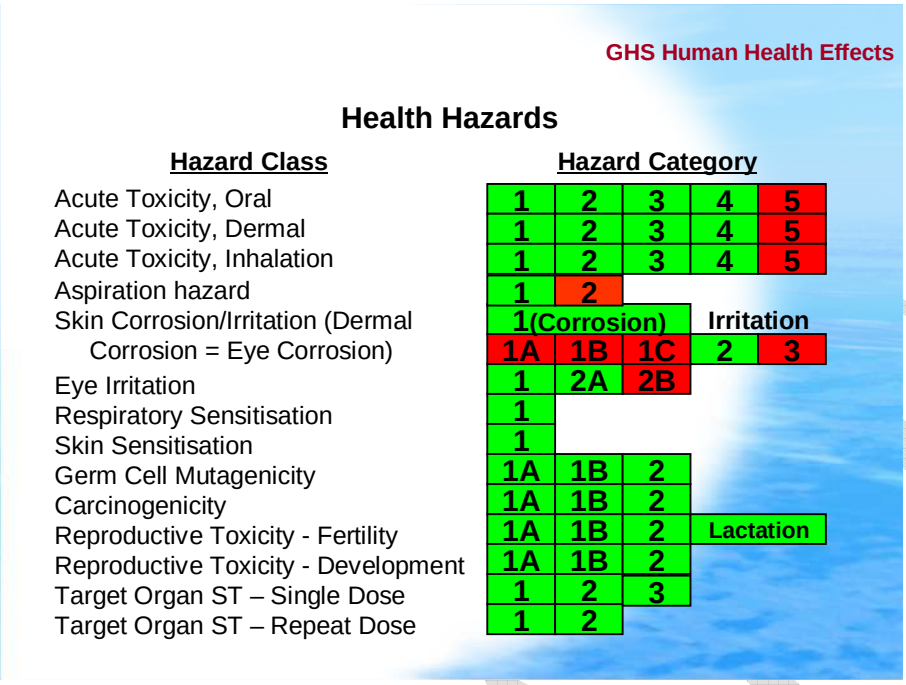
The physical hazard criteria were developed using a somewhat different process in the UN Subcommittee of Experts on the Transport of Dangerous Goods, in coordination with the ILO. In this case, there were already internationally harmonised criteria available for these hazards for purposes of transport. The challenge in terms of GHS was to ensure that the criteria also met the needs of other sectors (such as the workplace), where protective measures might be different given the different exposures that are encountered. Thus the development of the physical hazard criteria involved review and refinement of a longstanding approach to broaden its application to other sectors, rather than attempting to merge differing approaches from a number of existing systems such as was done for health and environmental hazards.

2.3 HEALTH HAZARDS COVERED BY THE GHS

The GHS includes a full range of acute and chronic health effects that may occur from exposure to substances or mixtures:

1. Acute toxicity
2. Skin corrosion/irritation
3. Serious eye damage/eye irritation
4. Respiratory or skin sensitization
5. Germ cell mutagenicity
6. Carcinogenicity
7. Reproductive toxicity
8. Specific target organ systemic toxicity (TOST) – Single exposure
9. Specific target organ systemic toxicity (TOST) – Repeated exposure
10. Aspiration hazard

The following chart also indicates the number of hazard categories included for each health hazard class in the GHS (the most severe level of hazard is on the left, and the level of hazard decreases with the following categories):



2.4 ENVIRONMENTAL HAZARDS COVERED BY THE GHS

The GHS currently covers only one environmental effect: aquatic toxicity. It is expected that other effects may be added in the future. The criteria address the following aspects of aquatic toxicity:

- Hazardous to the aquatic environment
  - Acute aquatic toxicity
  - Chronic aquatic toxicity
    - Bioaccumulation potential
    - Degradability

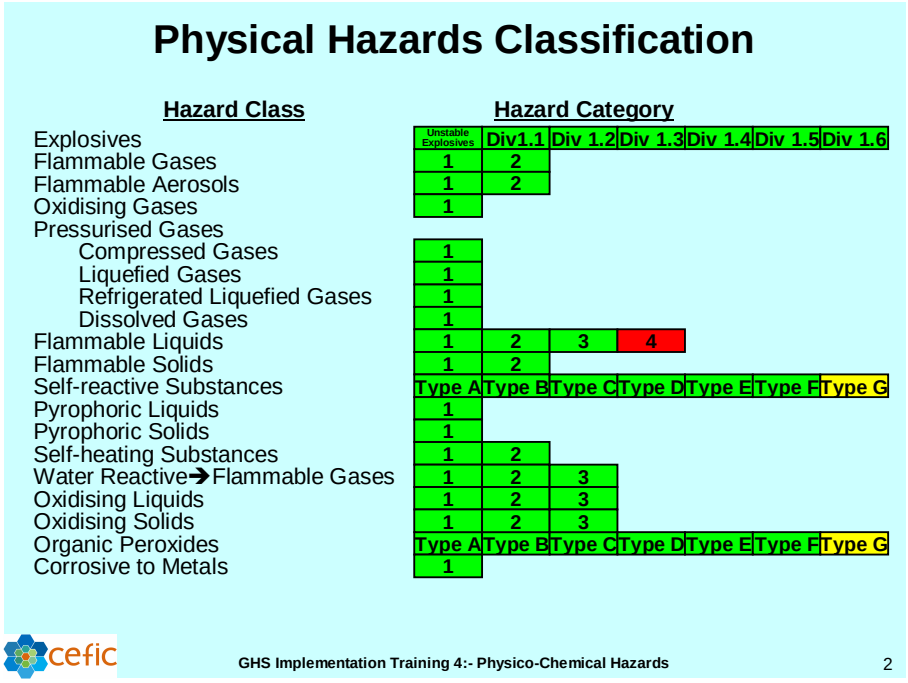
2.5 PHYSICAL HAZARDS COVERED BY THE GHS

The GHS includes a wide spectrum of hazardous physical effects that chemicals may pose:

1. Explosives
2. Flammable gases
3. Flammable aerosols
4. Oxidizing gases
5. Gases under pressure
6. Flammable liquids
7. Flammable solids
8. Self-reactive substances and mixtures
9. Pyrophoric liquids
10. Pyrophoric solids
11. Self-heating substances and mixtures

12. Substances and mixtures which in contact with water, emit flammable gases
13. oxidising liquids
14. Oxidizing solids
15. Organic peroxides
16. Corrosive to metals

The following illustrates the hazard categories associated with each physical hazard class in the GHS:



2.6 FUTURE HAZARD CLASSES AND CATEGORIES

It is recognized that as science evolves, there may be additional hazard classes that should be added to the GHS. It is expected that the need for this will be raised in the United Nations Subcommittee of Experts on the GHS, and criteria will subsequently be developed within the GHS process rather than regions or countries developing them on their own. In this way, the GHS will remain scientifically up-to-date, but the criteria will be harmonised from the outset rather than after being developed in other systems. Similarly, if there is a need to update or revise existing GHS criteria, this too will be done within the processes of the system so all countries and regions have input, and any changes will be implemented at approximately the same time.

Test Questions:

1. What does hazard classification mean?
2. What is the difference between a class and a category?
3. Who performs hazard classification under the GHS?
4. What types of hazards are covered by GHS?

Lesson 2: Hazard Communication

This lesson will show:

- The purpose of hazard communication in the GHS
- The core label elements on a GHS label
- How to read a label and find the GHS information
- How to identify the elements of a Safety Data Sheet (SDS) in the GHS
- How to find information in a GHS SDS
- How confidential business information is addressed in the GHS

2.7 HAZARD COMMUNICATION TOOLS IN THE GHS

The purpose of the GHS is to ensure that information is available about a chemical's hazards, and ways to protect people from experiencing adverse effects as a result of exposure. The hazard classification process addressed in Lesson 1 provides a harmonised approach to evaluating the hazards of chemicals. This helps to ensure that chemical hazards are assessed in a consistent manner across countries, and that evaluators will come to the same conclusions regarding a chemical's hazardous effects.

Once the hazards are identified, the information must be provided to all downstream users and handlers, as well as to professionals who are providing services or designing protective measures for those exposed. The hazard communication provisions of the GHS help to ensure that this information is then provided in a consistent manner around the world. If hazard communication is done effectively, the information will be used to minimize chemical exposures and implement the proper controls for the chemical. This will reduce the risks to those exposed.

To be effective, the information must be accurate, comprehensive, and presented in an understandable manner. Information needs, as well as the means available to address those needs, may vary by sector. As countries implement the GHS, it is expected that they will consider the needs of each sector when determining which building blocks of the system to apply in those sectors.

There are three primary means of providing information regarding chemicals: labels, safety data sheets (SDS), and training. The particular circumstances in each sector determine which of these means can or should be implemented in that sector. The factors that should be considered include the following:

- Potential use of the product.
- Availability of information other than the label.

- Availability of specific training.

When considering the different sectors covered by the GHS, their needs may be addressed through the following means:

- **Workplace/industrial sector:** labels, SDS, specific training
- **Agriculture:** labels, specific training, SDS in some situations
- **Consumers:** labels
- **Emergency Responders:** labels, placards, specific training, transport documents
- **Transport:** labels, placards, transport documents, specific training like for drivers or safety advisors and general training for all personal involved in the transport chain

Labelling. In all sectors, information can be provided through labelling. For the consumer sector, the label is likely to be the only information available to the user regarding the hazards of the chemical and protective measures. Depending on a country's particular regulatory approach, this may also be true in other sectors such as agriculture. The GHS definition for the term "label" is as follows:

> **Label** means 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 a hazardous product.

Labelling is the information that is available at the point of use for the product. It provides an immediate source of information for users to determine the hazards of the product they are using or handling. Labelling is most useful and effective when the hazard and precautionary information is concisely presented so readers can determine the important messages easily. Given that it is attached to the container or the outside packaging, it is somewhat limited in terms of the amount of information that can be provided.

Safety Data Sheet. In some sectors, more information is needed than can be provided on a label. In addition, those professionals who need to review the information regarding a chemical to provide services for those exposed (such as a physician), or who will be designing protective programs (such as an occupational hygienist), require additional data and are not necessarily present at the site where the chemical is to be used. The GHS thus also includes provisions for safety data sheets to provide more detailed information regarding a chemical's hazards and other aspects of safe chemical use. The safety data sheet (SDS) addresses 16 categories of information about each chemical, and is used primarily in workplaces and by professionals determining what protective measures are needed in various circumstances. The SDS is a comprehensive source of information about a chemical, and can be used as a reference document to obtain information about recommendations for exposure limitations, regulatory controls, and other data that may be useful when determining how to control risks of exposure.

The hazard communication tools included in the GHS—labels and safety data sheets—are to be prepared by suppliers of the hazardous product based on the hazard classifications made in accordance with the system.

Training. The third major means of providing information is training. The GHS recognizes that training is important to implement in those sectors where it is feasible, and that appropriate training helps to ensure that hazard communication is effective. However, the system itself does not include harmonised training provisions. It is anticipated and encouraged by the GHS that training will be provided in many different areas as countries implement the GHS. This would include training for government officials, chemical producers, employers, workers including transport related personel, emergency responders, and others in the life cycle who will be accessing information provided as a result of the GHS. Unlike labels and safety data sheets, training can be specific to the site where the chemical is used or handled, and is delivered at that location rather than by a supplier. The consumer sector is the most difficult to reach through training programs since the home is the usual site of use or handling, but countries have explored various innovative approaches to address this situation such as introducing training about symbols in schools.

Comprehensibility. Whatever means are implemented in a sector to convey information, the GHS recognizes that it is important to ensure that the information is comprehensible. When the GHS was developed, studies regarding comprehensibility were reviewed, and agreed principles were included in the design of the GHS, including the following:

- Information should be conveyed in more than one way.
- Comprehensibility should consider the findings of existing studies and data.
- Phrases indicating degree of hazard should be consistent across different hazard types.
- Words and phrases should retain comprehensibility when translated into other languages.
- Format and color of the label elements and SDS format should be standardized.

However, as countries implement, they may find it useful to perform some testing of comprehensibility in their own populations. This can be particularly helpful in determining where training should be focused, or other issues regarding implementation. More information about comprehensibility testing can be found on UNITAR's web page at: www.unitar.cwg/ghs_partnership/CT.htm

2.8 HAZARD VS. RISK COMMUNICATION

The GHS is based on the hazards of a substance or mixture of substances. The hazards identified are the properties of a chemical that have the potential to cause adverse effects. These hazards may be health, physical, or environmental. However, the risk of actually experiencing such an effect varies based on other aspects that determine the degree of exposure.

The GHS requires the provision of information on labels and safety data sheets based on hazard. It is difficult for a chemical producer to be aware of all of the conditions under which a product may be used, and thus to make a determination regarding the risk in any downstream situation. With the information about hazards, consideration can also be given to the conditions where the chemical is used, and determinations about protections can thus be made based on the potential risk in the specific situation.

For example, a chemical may pose significant health consequences in a workplace because it is highly toxic when inhaled. However, the workplace may already address this concern by having the chemical contained in enclosed systems with appropriate ventilation provided. In this case, the chemical is still highly toxic, but the risk of exposure has been reduced by the engineering controls, and thus the risk of

the adverse effect occurring has been reduced as well. However, if the same chemical is being handled in open containers in another workplace, with workers being exposed to the vapors, then action must be taken to reduce the potential exposures and thus the accompanying risks. Again, the hazard remains the same, but the risk differs based on the conditions of use.

The GHS is a hazard communication system, but the hazard information leads to the identification and mitigation of associated risks. There is one potential exception in the GHS regarding risk communication. Countries may choose to address the chronic health hazards of chemicals on consumer labels by addressing risk. Since consumers often only have access to labelling for chemicals in terms of information sources, some countries may choose to provide risk information for chronic health effects on the labels.

It should be noted that the transport sector has been harmonised with the other sectors in the GHS, but maintains an approach to hazard communication that can be distinguished from the other sectors as well. This will be addressed below under the discussion on symbols and pictograms.

2.9 CONFIDENTIAL BUSINESS INFORMATION

The GHS is based on the disclosure of information about chemical identities and the percentage of ingredients in a composition, in addition to information about hazards and precautionary measures. In some situations, chemical manufacturers may consider such information to be confidential business information or a trade secret. Laws regarding protection of such information vary from country to country. Such laws usually govern all aspects of such information, not just disclosure for purposes of protecting safety and health or the environment. The developers of the GHS thus recognized that it would not be possible to harmonise such laws through the GHS process. But the system addresses several aspects related to confidential business information (see 1.4.8 of the GHS).

First, it is recognized that there are situations where businesses have a legitimate need to protect information such as the chemical identity. While these situations are less frequent than they were years ago given the more sophisticated abilities now available to analyze materials and determine their ingredients, there are cases where the name of a chemical identity would give a competitor information that would not easily be obtained otherwise. But it is also recognized that such information is often critical to safety and health, or environmental protection, and therefore must be available. Thus the GHS suggests that countries implement a system that allows chemical manufacturers to protect legitimate business concerns in terms of the specific chemical identity of an ingredient, or the percentage of the ingredient in a mixture, but also establishes a process through which that information can be obtained to protect people where necessary. Specifically, the GHS includes the following principles:

(a) For information otherwise required on labels or safety data sheets, CBI claims should be limited to the names of chemicals, and their concentrations in mixtures. All other information should be disclosed on the label and/or safety data sheet, as required;

(b) Where CBI has been withheld, the label or chemical safety data sheet should so indicate;

(c) CBI should be disclosed to the competent authority upon request. The competent authority should protect the confidentiality of the information in accordance with applicable law and practice;

(d) Where a medical professional determines that a medical emergency exists due to exposure to a hazardous chemical or a chemical mixture, mechanisms should be in place to ensure timely disclosure

by the supplier or employer or competent authority of any specific confidential information necessary for treatment. The medical professional should maintain the confidentiality of the information;

(e) For non-emergency situations, the supplier or employer should ensure disclosure of confidential information to a safety or health professional providing medical or other safety and health services to exposed workers or consumers, and to workers or workers' representatives. Persons requesting the information should provide specific reasons for the disclosure, and should agree to use the information only for the purpose of consumer or worker protection and to otherwise maintain its confidentiality;

(f) Where non-disclosure of CBI is challenged, the competent authority should address such challenges or provide for an alternative process for challenges. The supplier or employer should be responsible for supporting the assertion that the withheld information qualifies for CBI protection.

2.10 UNDERSTAND AND READ GHS LABELS

The GHS label consists of several label elements. The term "label element" is defined in the GHS as follows:

> **Label element** means one type of information that has been harmonised for use in a label, e.g., pictogram.

Labels on chemicals address a broad range of information related to the use of the chemical, from hazard information to instructions for use. The harmonised information under the GHS focuses on the label information that addresses the hazard of the chemical, and the degree of severity of the hazard. In addition, the GHS requires other information to identify the chemical and its producer, and to provide precautionary information. Chemical producers are also free to continue using a label to provide other types of information, but the harmonised information required by GHS is to be considered the "core" information on the label, and is to appear together so it can be easily identified by chemical users.

The harmonised label elements required on a GHS label are:

- **Symbol** (a graphical element intended to succinctly convey information; the symbols always appears on the GHS label in a **Pictogram** which is a graphical composition that may include a symbol plus other graphic elements, such as a border, background pattern or color that is intended to convey specific information);

BMVBS: Shouldn't it be added, that there are two versions of the symbol available, one with just a red frame in a diamond shape frame and one with additional information expressed by colours or wording in a framed diamond shape as for TDG?

- **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; the GHS uses "Danger" and "Warning" as signal words); and,

- H**azard Statement** (a statement 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).

Once a chemical producer classifies a chemical, the GHS specifies the symbol, signal word, and hazard statement for each hazard class and category identified for that chemical. This means that all products that have a particular hazard should also have that hazard conveyed using the same symbol, signal word, and hazard statement. This consistency in message should help to improve hazard communication, and ensure that clear messages are provided to product users.

In addition to this core information that is harmonised, the GHS also requires the supplier to provide the following:

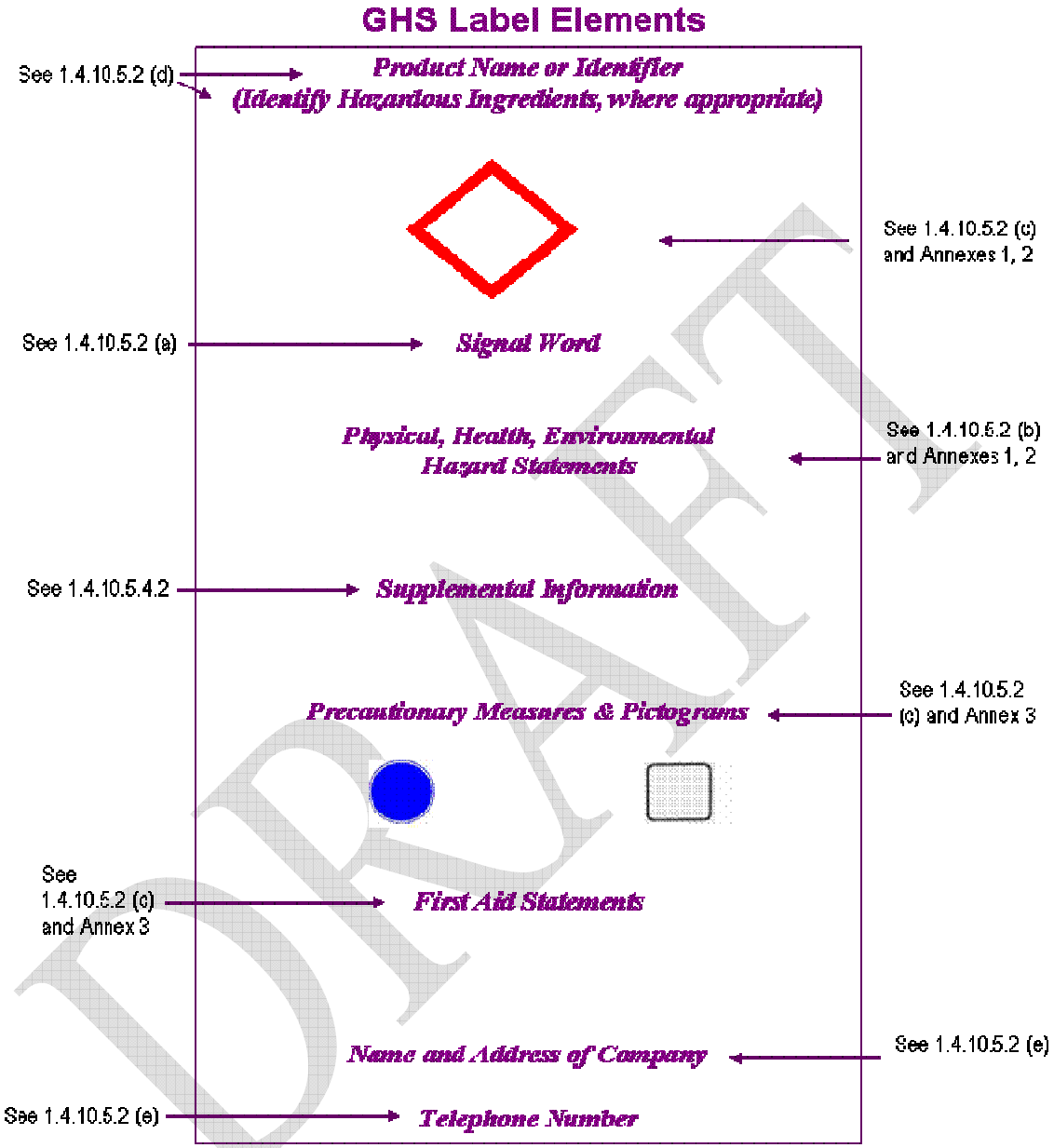
- **Product identifier** (the name or number used for a hazardous product on a label or in the safety data sheet; it provides a unique means by which the product user can identify the substance or mixture within the particular use setting, e.g., transport, consumer, or workplace);

- **Supplier identification** (the name, address and telephone number of the manufacturer or supplier of the substance or mixture); and,

- **Precautionary statement** (a phrase (and/or pictogram) that describes recommended measures that should be taken to minimize or prevent adverse effects resulting form exposure to a hazardous product, or improper storage or handling of a hazardous product).

The GHS does not specify a format for labels, allowing the producer to determine how the information is displayed as long as the core information is presented together. The following illustration indicates the information expected on a GHS label and includes references to the paragraphs in the GHS that require the information indicated:

Figure 4.8



Harmonised Core Information

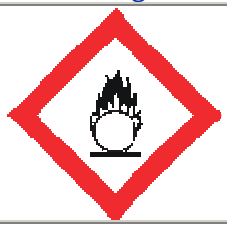
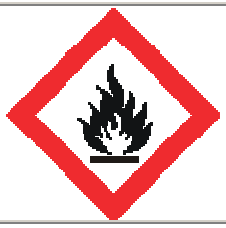
Symbols and Pictograms

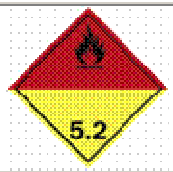
Symbols and pictograms are often used in labelling to represent hazards in a graphic form. This serves to capture the attention of the label reader since the pictograms usually stand out from the other textual information. In addition, it provides an alternative means of conveying a hazard when there may be language or literacy issues, and reinforces the information provided in written form.

The GHS has nine symbols to convey hazards covered by the system. These symbols are to be presented in a pictogram that includes a black symbol on a white background presented in a red diamond-shaped frame. This design was developed to address harmonisation of the transport sector with other sectors. In transport, pictograms are used without text to convey the hazards covered. These pictograms include a symbol, a diamond shape, and backgrounds for the symbol that have different colors and convey additional information. The GHS uses the same symbols as transport for the hazards both systems cover, as well as includes a diamond shape. But the GHS has additional symbols, a red frame, and white background. Thus the transport approach is consistent with the other sectors, while still differentiating the information specific to transport in a way that will make the pictograms easily identifiable in a transport emergency. This is particularly important for those types of packages that only have an outer packaging that must address information for all sectors—such as a large drum. Where a hazard is covered by transport, and thus the transport pictogram appears on the label, an additional GHS pictogram will not be present on the label for the same hazard. The GHS includes examples of how these situations can be addressed in such a way as to be comprehensible for all sectors. It should be noted that preparation of labels for transport purposes has not been addressed in this training program in any detail, and other training materials available for that sector should be consulted for compliance purposes.

The GHS includes some rules regarding presentation of pictograms for products that have multiple health effects. As can be seen in the illustration that follows, there are three symbols that address health hazards. The skull and crossbones is used for highly toxic chemicals, while the health hazard symbol is for a range of significant health effects. In addition, the exclamation mark is used for certain health effects such as irritation. If a product has the potential to cause an effect that warrants use of the skull and crossbones or the symbol for health hazard, but also has another effect that would have an exclamation mark symbol, the exclamation mark will not be used. It does not appear to be necessary to indicate that a less severe health hazard (expressed as an exclamation mark) is also present when a severe health hazard has already been warned about with a skull and crossbones symbol. When a package is going to be transported, the precedence for allocation of physical hazard symbols under the transport system ~~should~~ shall be followed. There will often be cases where the outer packaging is marked for transport, while the inner packaging will have GHS pictograms. But on inner packagings, the GHS symbol may be replaced by the TDG symbol of the same hazard as well.

BMVBS: Needed for clarification.

GHS Pictograms and Hazard Classes		
		
• Flame over circle	• Flame	• Exploding bomb
▪ Oxidizers	▪ Flammables ▪ Self Reactives ▪ Pyrophorics ▪ Self-Heating ▪ Emits Flammable Gas ▪ Organic Peroxides	▪ Explosives ▪ Self Reactives ▪ Organic Peroxides
		
▪ Skull and crossbones ▪ Acute toxicity	▪ Corrosion	▪ Gas cylinder
		
• Health Hazard	• Environment	• Exclamation mark
• Carcinogenicity • Respiratory Sensitizer • Reproductive Toxicity • Target Organ Toxicity • Mutagenicity • Aspiration Toxicity	▪ Environmental Toxicity	▪ Irritant ▪ Dermal Sensitizer ▪ Acute toxicity (harmful) ▪ Narcotic Effects ▪ Respiratory Tract ▪ Irritation

Transport "Pictograms"		
		
Flammable Liquid Flammable Gas Flammable Aerosol	**Flammable solid Self-Reactive Substances**	**Pyrophorics (Spontaneously Combustible) Self-Heating Substances**
		
Substances, which in contact with water, emit flammable gases (Dangerous When Wet)	**Oxidizing Gases Oxidizing Liquids Oxidizing Solids**	**Explosive Divisions 1.1, 1.2, 1.3**
		
Explosive Division 1.4	**Explosive Division 1.5**	**Explosive Division 1.6**
		
Compressed Gases	**Acute Toxicity (Poison): Oral, Dermal, Inhalation**	**Corrosive**
		
Marine Pollutant	**Organic Peroxides**	

Signal Words

Signal words serve two purposes on the GHS label: to get the attention of the reader, and to indicate the degree of severity of the hazards. There are two signal words used in the GHS. “Danger” is used to convey the more severe hazards, and “Warning” is used to convey the less severe hazards. The GHS specifies which signal words are to be used for each class and category of hazard.

Hazard Statements

The GHS includes statements that describe the hazards covered by the system. They are specified for each class and category of hazard. The statements describe the hazard, and also reflect the degree of severity of the hazard. For example, flammable liquids are addressed in 4 hazard categories. The most highly flammable category requires the following hazard statement: "Extremely flammable liquid and vapour". The least flammable category requires a statement that simply says: "Combustible liquid."

Allocation of Harmonised Label Elements

The following illustration is an example of how the GHS specifies the label elements for one hazard class and its categories. This is repeated in the GHS for all of the health, physical, and environmental hazards that are covered. For this particular hazard—acute oral toxicity—there are 5 hazard categories of decreasing severity. The categories are defined by the oral lethal dose data available on the chemical, expressed in milligrams/kilogram. For each category, the label elements are specified. In the area of pictograms, the skull and crossbones is used to indicate the more severe toxicity Categories 1 through 3. Category 4 is given the pictogram with the exclamation mark to indicate there is a hazard, but it is not as severe as the previous categories. Category 5, which is only used in special limited circumstances, does not have a pictogram. This is in part to indicate that the hazard is expected to be less severe. Similarly, the signal word assigned begins with the most severe—danger—for the first 3 categories, and then changes to "warning" for the less severe categories 4 and 5. The hazard statements for each category also reflect the change in degree of severity of the hazard as they progress through the categories. The first two refer to death as a possible consequence, while Category 3 refers to toxicity, and Categories 4 and 5 convey potential harm. Thus the hazard information as well as the degree of severity of the hazard is provided in each of the label elements. This helps to ensure that the information is comprehensible, and that the message is conveyed appropriately. Other hazard classes are addressed similarly in the GHS.

ACUTE ORAL TOXICITY -					
	Category 1	**Category 2**	**Category 3**	**Category 4**	**Category 5**
LD_{50}	< 5 mg/kg	> 5 < 50 mg/kg	> 50 < 300 mg/kg	> 300 < 2000 mg/kg	> 2000 < 5000 mg/kg
Pictogram					No symbol
Signal word	Danger	Danger	Danger	Warning	Warning
Hazard statement	Fatal if swallowed	Fatal if swallowed	Toxic if swallowed	Harmful if swallowed	May be harmful if swallowed

Other Required Information

In addition to the harmonised label elements assigned to each hazard class and hazard category, the GHS also requires other information to be included on the GHS label.

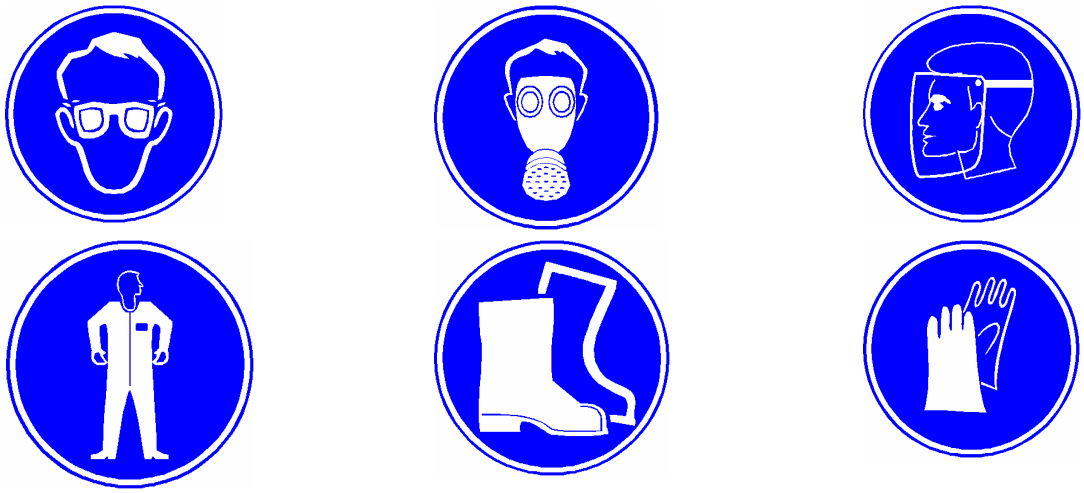
Precautionary Statements. The GHS requires suppliers to provide precautionary statements to help prevent adverse effects from occurring. Harmonised text has not been agreed to for these precautionary

statements, but the system provides statements that may be used and they have been codified for easy reference. It is anticipated that harmonised precautionary statements will eventually be part of the system as well.

For the purposes of the GHS, there are five types of precautionary statements: **general** (statements that are appropriate for a broad range of products, such as "Read label before use"; **prevention** (such as "Wear face protection"; **response** (in case of accidental spillage or exposure, emergency response and first-aid, such as "Get immediate medical advice"); **storage** ("Keep container tightly closed"; and **disposal** (Dispose of contents/container to... … in accordance with local/regional/national/international regulations (to be specified). The GHS provides a matrix that links the appropriate precautionary statements to each hazard class and category. Preparers of labels thus have a ready source for such statements, and can see clearly how they relate to the hazard classification for the product. Precautionary statements allow users or handlers of chemicals to be aware of what steps to take to protect themselves, and thus provide an immediate source of important information at the site of use.

While precautionary statements are expected to be the primary means of conveying such information under the GHS, the system recognizes that pictograms are also sometimes used. For example, these pictograms are provided in a GHS appendix. They are taken from a European Union directive and provide graphic illustrations of the types of protective equipment that may be required in different situations

These pictograms are not required under the GHS, or harmonised, but countries may require their use in their own countries—particularly for workplace labels in situations where protective clothing is required for safe use and handling.



Product Identification. The GHS specifies how a label is to address identification of the product. For substances, the chemical identity is required. The situation is more complicated for mixtures or alloys. In this case, the chemical identities are required for:

- All the ingredients/alloying elements contributing to the hazard of the mixture/alloy (as specified by the competent authority); or

- All the ingredients/alloying elements contributing to the following hazards when they appear on a product label:
    - Acute toxicity;
    - Skin corrosion/serious eye damage;
    - Germ cell mutagenicity;
    - Carcinogenicity;
    - Reproductive toxicity;
    - Skin/respiratory sensitization;
    - Specific target organ systemic toxicity.

If the substance or mixture is covered by the UN transport requirements, the proper shipping name and UN number ~~should~~ shall be provided. The transport provisions also include dangerous articles and wastes,

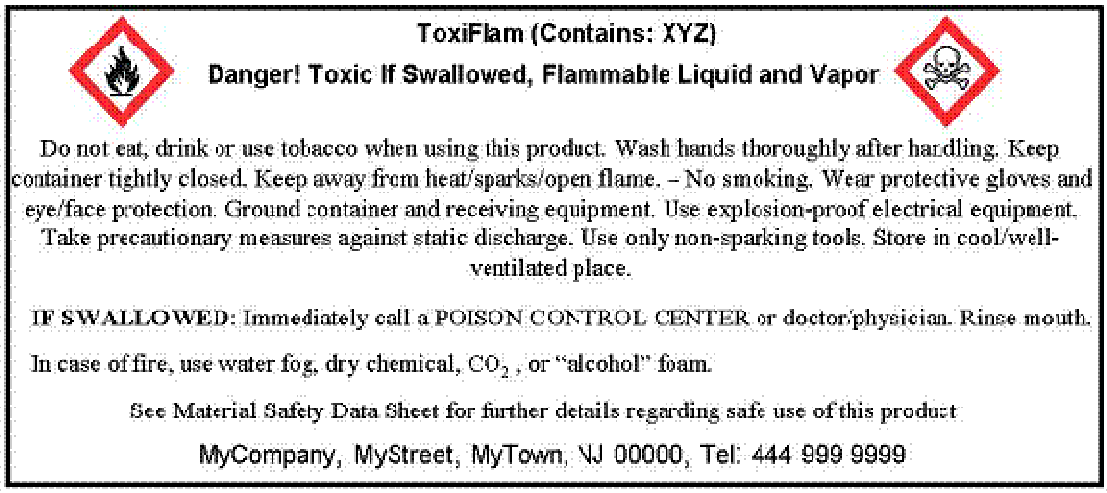
In response to concerns raised regarding the feasibility of providing chemical identities for all hazardous ingredients for complex mixtures, the GHS allows competent authorities for workplaces to authorize inclusion of this information on an SDS for the product rather than on the label. In addition, a competent authority's rules regarding confidential business information may supercede the disclosure requirements in this part of the GHS. It may be that manufacturers will be permitted to withhold the specific chemical identity of a chemical, or the percentage it represents in the composition, under procedures that require disclosure for safety and health purposes and subject to protections regarding further disclosure.

Supplier Identification. In order to ensure that the supplier can be reached in case of an emergency or other need for additional information, the GHS requires the name, address, and telephone number to appear on the label for the substance/mixture.

Supplementary Information. While the GHS focuses on the information necessary to protect the safety and health of users, as well as protection of the environment, there are clearly many other information items that could be included on a label. Such supplementary information is permitted, but may not contradict the required label information. Some types of supplements could include information about the physical state of the chemical; additional protective measures that have not been addressed in the precautionary statements; and directions for use. Competent authorities may also use supplementary information to address current requirements that are not included in the GHS.

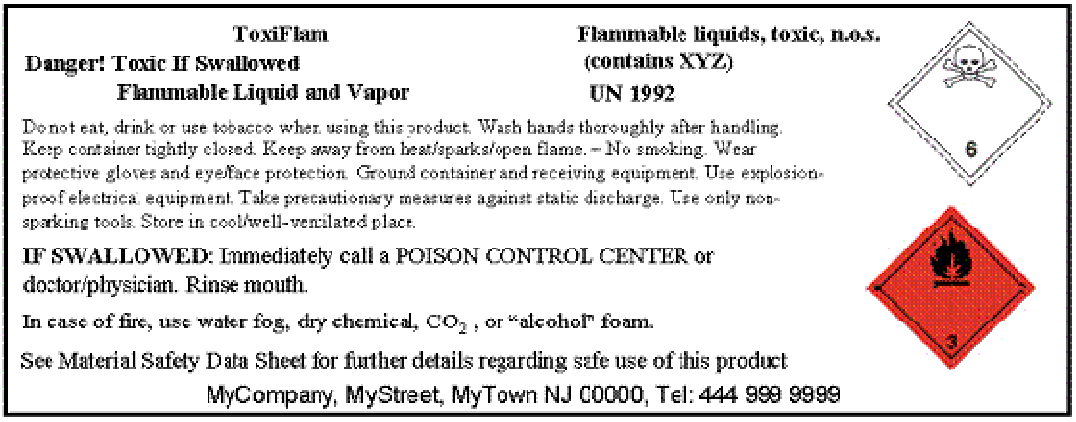
Updating Labels. Competent authorities implementing the GHS will establish provisions for updating the information when the classifications change or other information develops which affects the label elements.

A GHS Label. The following is an example of a GHS label, incorporating all of the required elements discussed:



Reading this label, the user would find that the product is acutely toxic by the oral route, as well as flammable. The signal word indicates the hazard is significant, as does the skull and crossbones in the pictogram. There are a number of precautionary statements that provide the user with information about how to handle the product to keep it from burning and to avoid exposure. If the user needs more information, the label indicates that the SDS provides further details.

This label would not be used on the outer packaging of a container for purposes of transport since it does not include the transport pictograms. A transport-compliant label for the same product would be as follows:



Note: The minimum sizes of the TDG pictograms are defined in the transport provisions.

The non-transport user would receive all of the same information as on the previous label, but the pictograms will appear different. The shape is the same, and so is the symbol, but the backgrounds are different and the symbols are smaller. The meaning for the non-transport user of the product is the same. The UN shipping name has also been added.
It should also be noted that competent authorities may allow the use of alternative labels in the workplaces under their authority. The GHS labels with all of the required information will be provided by suppliers with their products. In workplaces, however, there are many different containers used in process that will also require labels. Labelling systems for workplaces have evolved that provide

information in different formats, such as using colors to designate the type of hazard (e.g., red for flammability). Competent authorities should consider whether employers will be required to develop GHS labels that are the same as labels on supplied containers in all workplace situations.

2.10 UNDERSTAND AND READ A GHS SAFETY DATA SHEET (SDS)

The GHS label provides a brief description of the hazards of the chemicals involved, as well as the means to protect people from experiencing adverse effects. Since it is affixed to the container of the product, it is limited in the amount of information that can be presented. Given the broad range of chemical products present in workplaces, the extent of exposure that workers have to them, and the need to have comprehensive chemical safety programs to address both the safety and health and the environmental effects of the chemicals, more information is needed in this sector. Safety data sheets are comprehensive sources of information about substances and mixtures. This information serves to help develop protective measures for exposed workers, as well as provides information to protect the environment. As with labels, the SDS is based on hazard. The supplier is to provide information about the intrinsic properties of the chemicals involved. However, the SDS also provides information related to risk management for the product. For example, exposure limits are provided. Based on knowledge of the exposures in a workplace, and comparison to these recommended limits, employers can make decisions about necessary risk mitigation procedures in a workplace.

Safety data sheets have a varied audience. They may be accessed by workers, emergency responders, health professionals providing services to workers, safety engineers, occupational hygienists, and other professionals designing protective programs. It is very difficult to design a document that can serve all of these audiences well. In addition, the information is often quite technical, which can also lead to issues regarding comprehensibility in those users who do not have extensive training in the areas addressed.

The SDS requirements under the GHS establish an order of information for 16 sections that address different categories of data. To help serve the needs of the various audiences, the information that appears in the beginning of the SDS is provided in lay terms, suitable for a broader audience, while later sections contain more technical data and regulatory information that is of interest to certain targeted groups.
The SDS is to be provided for:

- All substances/mixtures meeting GHS harmonised criteria for physical, health, or environmental hazards;
- Mixtures containing substances meeting criteria for carcinogenicity, toxicity for reproduction, or specific target organ toxicity, in concentrations exceeding cut-off values;
- Other substances/mixtures not meeting the criteria for classification as hazardous, but containing hazardous substances in certain concentrations, if required by the competent authority.

The following describes the 16 sections of the SDS, in the order they are to appear. The headings in bold are required to be used. The information that should appear in each section is described in the column on the right:

1.	**Identification of the substance or mixture and of the supplier**	▪ GHS product identifier. ▪ Other means of identification. ▪ Recommended use of the chemical and restrictions on use. ▪ Supplier's details (including name, address, phone number, etc.). ▪ Emergency phone number.
2.	**Hazards identification**	▪ GHS classification of the substance/mixture and any national or regional information. ▪ GHS label elements, including precautionary statements. (Hazard symbols may be provided as a graphical reproduction of the symbols in black and white or the name of the symbol, e.g., flame, skull and crossbones.) ▪ Other hazards which do not result in classification (e.g., dust explosion hazard) or are not covered by the GHS.
3.	**Composition/information on ingredients**	**Substance** ▪ Chemical identity. ▪ Common name, synonyms, etc. ▪ CAS number, EC number, etc. ▪ Impurities and stabilizing additives which are themselves classified and which contribute to the classification of the substance. **Mixture** ▪ The chemical identity and concentration or concentration ranges of all ingredients which are hazardous within the meaning of the GHS and are present above their cut-off levels. ***NOTE**: For information on ingredients, competent authority rules for CBI, if applicable, take priority over the rules for product identification.*
4.	**First aid measures**	▪ Description of necessary measures, subdivided according to the different routes of exposure, i.e., inhalation, skin and eye contact, and ingestion. ▪ Most important symptoms/effects, acute and delayed. ▪ Indication of immediate medical attention and special treatment needed, if necessary.
5.	**Fire fighting measures**	▪ Suitable (and unsuitable) extinguishing media. ▪ Specific hazards arising from the chemical (e.g., nature of any hazardous combustion products). ▪ Special protective equipment and precautions for fire-fighters.
6.	**Accidental release measures**	▪ Personal precautions, protective equipment and emergency procedures. ▪ Environmental precautions. ▪ Methods and materials for containment and cleaning up.

7.	**Handling and storage**	▪ Precautions for safe handling. ▪ Conditions for safe storage, including any incompatibilities.
8.	**Exposure controls/ personal protection**.	▪ Control parameters, e.g., occupational exposure limit values or biological limit values. ▪ Appropriate engineering controls. ▪ Individual protection measures, such as personal protective equipment.
9.	**Physical and chemical properties**	▪ Appearance (physical state, colour, etc.) ▪ Odour. ▪ Odour threshold. ▪ pH. ▪ melting point/freezing point. ▪ initial boiling point and boiling range. ▪ flash point. ▪ evaporation rate. ▪ flammability (solid, gas). ▪ upper/lower flammability or explosive limits. ▪ vapour pressure. ▪ vapour density. ▪ relative density. ▪ solubility(ies). ▪ partition coefficient: n-octanol/water. ▪ auto ignition temperature. ▪ decomposition temperature.
10.	**Stability and reactivity**	▪ Chemical stability. ▪ Possibility of hazardous reactions. ▪ Conditions to avoid (e.g., static discharge, shock or vibration). ▪ Incompatible materials. ▪ Hazardous decomposition products.
11.	**Toxicological information**	▪ Concise but complete and comprehensible description of the various toxicological (health) effects and the available data used to identify those effects, including: ▪ information on the likely routes of exposure (inhalation, ingestion, skin and eye contact); ▪ Symptoms related to the physical, chemical and toxicological characteristics; ▪ Delayed and immediate effects and also chronic effects from short- and long-term exposure; ▪ Numerical measures of toxicity (such as acute toxicity estimates).
12.	**Ecological information**	▪ Ecotoxicity (aquatic and terrestrial, where available). ▪ Persistence and degradability. ▪ Bio accumulative potential. ▪ Mobility in soil. ▪ Other adverse effects.
13.	**Disposal considerations**	Description of waste residues and information on their safe handling and methods of disposal, including the disposal of any contaminated packaging.

14.	**Transport information**	▪ UN Number. ▪ UN Proper shipping name. ▪ Transport Hazard class(es). ▪ Packing group, if applicable. ▪ Marine pollutant (Yes/No). ▪ Special precautions which a user needs to be aware of or needs to comply with in connection with transport or conveyance either within or outside their premises.
15.	**Regulatory information**	Safety, health and environmental regulations specific for the product in question.
16.	**Other information including information on preparation and revision of the SDS**	

Unlike the label, the SDS can be a complicated and lengthy document. This is particularly true when complex mixtures with multiple hazards are covered by an SDS. Most SDS users will not be reading the document from start to finish. It is basically a reference document, and will be accessed by users when they are searching for a particular piece of information regarding the product. For example, if a worker has been involved in an accident and has gotten a chemical on his or her skin, the SDS may be referred to in order to determine what first aid measures are to be taken to respond to this situation. Therefore, the most important thing to learn about the SDS is what information is available on it, and where that information can be found in the document. It is also important to know where the documents are maintained in the workplace, and how they can be readily accessed.

For workers, emergency responders, and small employers, the information in sections 1 through 10 are likely to be the most useful as well as the most accessed areas. Professional users designing protection programs or providing services to workers are likely to access sections 11 through 16 in addition to the information in sections 1 through 10.

Test Questions:

1. What is the purpose of the information provided under the GHS?
2. What are the primary means of conveying information about chemicals in the GHS?
3. What is the difference between hazard and risk communication?
4. What kind of information is considered Confidential Business Information under the GHS?
5. What label elements are harmonised under the GHS?
6. What other information is required on a GHS label?
7. What are the signal words used in the GHS?
8. What does a GHS pictogram look like? How is it different from a transport pictogram?
9. Are workplace labels the same as GHS labels?
10. What is an SDS used for?
11. How many sections are in an SDS?

Chapter 3: Other Issues Related to Implementation

3.1 STAKEHOLDER ROLES IN IMPLEMENTATION

Implementation of the GHS and sound chemical hazard communication requires initiatives, activities and capacities for three distinct actors: government, industry and civil society. Each of these groups has their distinct roles and responsibilities, as briefly outlined below. Through a partnership approach their activities can be made complimentary and thus facilitate the coherent implementation of the GHS in all four sectors.

Government

Government is typically responsible for establishing and maintaining an effective legal and institutional infrastructure for chemical hazard communication. This can include laws covering all aspects of the GHS, including classification, hazard communication (labels and safety data sheets) and training and enforcement, and the administrative and institutional infrastructure to implement and enforce these laws or regulations, including the role of customs and inspectorates (e.g. for worker health and safety, the environment, farms, transport, consumer safety, etc.). In particular, governmental authorities need to determine the obligations for classification and labelling throughout the supply chain and for the various sectors (which may have different requirements). This could include, for example, ensuring legislation specifies how to classify, who is responsible for classification and outlining responsibilities throughout the supply chain or providing labelling requirements for import or information databases on chemicals placed on the market. Governments also typically consult industry and civil society on their proposals for legislation, implementation and monitoring, such as via public hearings or “comment periods”, or inform the public via education and outreach programmes.

A number of types of government bodies are typically involved in GHS implementation. While some ministries are particularly interested in a specific sector (e.g. the Ministry of Transport is usually responsible for chemical hazard communication in the Transport sector), other governmental partners may have an interest in more than one sector (e.g. Ministries of Industry, Health and Environment, Customs Authorities, Agriculture, etc.). Others, such as the Coast Guard (if it exists), Ministries of Fisheries or 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. For example, if worker safety training is typically the responsibility of a provincial regulatory agency, then the national government may be unable to develop a successful GHS implementation strategy without the cooperation and participation of these entities.

Business and Trade

Business and trade groups, including the chemical industry, have the responsibility for applying the classification and labelling requirements for chemicals at the workplace and throughout the supply chain or life cycle. Companies that produce chemicals and/or place them on the market therefore need to ensure that they have the necessary expertise available to identify and collect information on the chemicals they are responsible for, to apply the classification criteria and to develop labels and safety data sheets. Manufacturers and other suppliers such as re-formulators (including many SMEs) are responsible for providing this information. Distributors may repackage products and therefore need to ensure the appropriate continuity of labelling.

Employers and companies (both producer and user) also have a responsibility to train their staff in the correct interpretation and use of applicable hazard communication tools, such as labels and SDS. Companies will also need to have in place systems to collect information from the supply chain (e.g. on the effects of particular chemicals on workers) that may lead to revised hazard communication efforts and recommendations for risk management interventions.

Companies also often have a wider responsibility to ensure the safe use of the chemicals they produce or place on the market. This may be a result of "corporate social responsibility", product stewardship, liability for damage to human health and the environment, or the application of industry standards such as Responsible Care®. Such a responsibility may mean that information on the effects of, and exposure to, chemicals, in addition to that already available, may need to be generated. Any additional data should of course be applied to the various hazard communication tools covered by GHS.

Some groups in business and trade that may be involved with GHS implementation include:

- industrial chemicals associations;
- pesticides producers associations;
- transport industry associations;
- consumer product associations;
- major companies, including multi-national corporations; and
- user industries (e.g. paint, plastics, detergents, etc).

Civil Society

Civil society groups represent the interests of individuals joined together for a common purpose, such as environmental or human health protection. In the context of the GHS these groups represent individuals who are exposed to chemicals and affected by ineffective chemical hazard communication. Furthermore, these individuals may not be aware of or have sufficient resources to participate in GHS activities. Thus, civil society should play an important role in GHS capacity building and implementation. Certain civil society groups, however, may be more interested in GHS activities than others. This includes environmental NGOs, consumer or human health advocacy groups, and labour unions. Other groups, such as women and children's groups, or community organizations may also be interested in participating in GHS implementation activities as a means to achieve their objectives. This would not include organizations or associations representing manufacturers or industry groups, as sound chemical hazard communication is already an integral component of their business actions.

The role of civil society is threefold. First, civil society groups have a key role in gathering information on the current status of hazard communication among constituents and other members of civil society. Second, civil society can influence the development of a GHS implementation strategy by informing government and industry decision makers on the priorities of the people they represent. This can be through working with government to shape appropriate legislation for implementing the GHS or demanding more compliance from industry. Finally, through training and awareness raising activities, civil society can contribute to on-the-ground implementation of the GHS.

There are many creative ways that elements of civil society can contribute to the effective integration of GHS into society. This includes partnerships among the various parties; introducing the concept of chemical classification and labelling in schools; and involvement of universities in developing unique training approaches.

3.2 Legislative options for GHS IMPLEMENTATION

In paragraph 23(c) of its Plan of Action adopted in Johannesburg on 4 September 2002, the World Summit on Sustainable Development encouraged countries to implement the new GHS as soon as possible with a view to having the system fully operational by 2008.

Subsequently, in its resolution 2003/64 of 25 July 2003, the United Nations Economic and Social Council invited Governments to take the necessary steps, through appropriate national procedures and/or legislation, to implement the Globally Harmonised System as soon as possible and no later than 2008.
(GHS text "Purple Book", Foreword)

Although the GHS is a tool that harmonises chemical classification and hazard communication world-wide, implementing the GHS is likely to have different implications for different countries, depending on a number of factors, such as existing industrial infrastructure, legal frameworks and implementing capacities.

Thus, a non-chemical producing country would not need to develop the depth of GHS implementing capacity in comparison to a highly industrialized country. For example, significant progress towards GHS implementation can already be made by introducing import control measures requiring GHS-based labelling and SDSs, as well as occupational GHS requirements. A country with major chemical production capacities, however, would need to develop a more comprehensive approach to GHS implementation, including development of capacity for hazard identification and hazard assessment.

The UNITAR has developed and published a Guidance Document to support implementation of the Globally Harmonised System of Classification and Labelling of Chemicals (GHS): "Developing a National GHS Implementation Strategy" which provides guidance for countries that choose to develop a National GHS Implementation Strategy through a systematic, country-driven process.

The document has two parts. Part A provides a background and context for the GHS. It first introduces the concept of chemical hazard communication and provides an overview of key GHS provisions. It then discusses the key sectors affected by GHS implementation (i.e. industrial workplace, agriculture, transport and consumer products), as well as key actors involved in GHS implementation at the national level (i.e. government, business and trade, and civil society). Part B provides guidance on developing a National GHS Implementation Strategy. Suggestions are provided to assist in conducting a situation and gap analysis, developing sector-specific implementation plans and completing a National GHS Implementation Strategy (NIS) document. Part B also addresses supporting activities such as comprehensibility testing and organization of GHS workshops.

Course References:

This course is based on materials published in the following literature sources:

- UN (2007) Globally Harmonised System of Classification and Labelling of Chemicals (GHS), Second revised edition, United Nations, New York and Geneva, 2007.
- UNITAR (2005) Developing a National GHS Implementation Strategy, Guidance Document to support implementation of the Globally Harmonised System of Classification and Labelling of Chemicals (GHS), Pilot edition, 15 August 2005, Geneva, Switzerland.
- US Occupational Safety and Health Administration (OSHA) Guide to the Globally Harmonised System of Classification and Labelling of Chemicals (GHS), 2006.

BMVBS: The UN RTDG and the modal codes and agreements for TDG should be included here, because without transport implementation of the GHS is incomplete. Furthermore the coming EU regulation on the GHS implementation are also an important source of information to be included here.

Acronyms/Abbreviations

The following list presents some acronyms and abbreviations used in this document.

CBI: Confidential Business Information
CG/HCCS: Coordinating Group for the Harmonization of Chemical Classification Systems
EU: European Union
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
ILO: International Labor Organization
IOMC: Inter-organization Program on the Sound Management of Chemicals
ISO: International Standards OrganizationI
LD_{50} : Lethal dose 50mg/kg: Milligram per kilogram
OECD: The Organization for Economic Cooperation and Development
SAICM: Strategic Approach to International Chemicals Management
SDS: Safety Data Sheet
SME: Small and medium sized enterprises
UN: United Nations
UNCED: United Nations Conference on Environment and Development
UNCETDG: United Nations Committee of Experts on the Transport of Dangerous Goods
UNCETDG/GHS: United Nations Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals
UNITAR: United Nations Institute for Training and Research
WSSD: World Summit on Sustainable Development

BMVBS: ADR, RID, IMDG Code, ICAO TI should be included here as well"