

Extending the Application of CARAT to Planning and Analysis

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Background

- OECD Workshop - Paris - 1995
- Presentations by various organizations
- Use of terms was inconsistent
- Methodologies were difficult to compare

Purpose of CARAT

- To make more transparent the various approaches to risk assessment
- To promote understanding of, and communication about, chemical accident risk assessment processes
- To facilitate communication concerning chemical accident risk assessment

The CARAT

- does not attempt to harmonize or establish standard terminology or
- to make judgement on the value of various risk assessment methodologies.
- captures only what risk assessment professionals understand to be the state of understanding of particular laws, regulations, or procedures

The CARAT

- Can be considered as a "translation engine"
 - captures the intended meaning of a risk assessment item
 - "translates" it into objective or operational language.

Scope of the Entries

- Definitions of words and phrases
- Laws and regulations concerning risk assessment of hazardous facilities
- Guidelines, policies or codes related to risk assessment
- Specific risk assessment studies

Hierarchy of the Entries

- *Generic elements*, a set of related, operationally defined process steps
- *Sub-elements*, one of the operationally defined process steps contained in a Generic Element
- *Terms*, the concept which is the subject of the process defined in the Sub-element
- *Categories*, a set of examples used to give specific operational meaning to a Term
- *Descriptors*, single examples illustrative of specific operational situations in the Category.

Generic Elements

- Pre-assessment
- Hazard identification;
- Hazard release and exposure scenarios;
- Source and subject interaction; and
- Expression of the risk
- Post-assessment

Entries

New
Open
Finalize

[Instructions](#)[View Report](#)[Session Map](#)[References](#)

Select a Generic Element

Pre-assessment

Identification of aspects of the risk assessment process that are not captured by Generic Elements I to IV, and are judged to precede them, e.g., scope, or purpose of the risk assessment

Element I

Identification of [sources](#) with the [potential](#) to cause [undesired outcomes](#) to [subjects of concern](#) that is the focus of the estimation of [likelihood](#)

Element II

Identification of [sequences of events](#) that can lead to loss of containment of the [potential](#) to cause [undesired outcomes](#) and its entry into a [domain](#) defined by [specified](#) boundaries. Identification of the basis for estimating the distribution of both the released potential and the [subjects of concern](#) within this domain

Element III

Identification and description of how the [specified undesired outcome](#) is related to the intensity, time and [mode of contact](#) of a specified [potential](#) to cause the undesired outcome to the [subjects of concern](#)

Element IV

Consists of two parts: Part A: Identification of the methods for estimating and expressing the [likelihood](#) of a [specified](#) effect and describing the [quality](#) of such estimates. Part B: Identification of the basis for comparing derived estimates of likelihood to specified [guidelines](#) and describing the dependence of these estimates on [explicitly](#) specified assumptions

Post-assessment

Identification of aspects of the risk assessment process that are not captured by Generic Elements I to IV, and are judged to follow them, e.g., the risk assessment/risk management interface

Sub-elements and Terms

- Element I
 - *Sub-element I i*: Identification of sources with the potential to cause undesired outcomes to subjects of concern
 - *Term I i*: Sources with the potential to cause undesired outcomes
 - *Sub-element I ii*: Identification subjects of concern
 - *Term I ii*: Subjects of concern
 - *Sub-element I iii*: Identification undesired outcomes to subjects of concern
 - *Term I iii*: Undesired outcomes to subjects of concern

Categories

- **Element I, Sub-element I, Term 2:
Subjects of concern**

- People
- □□□□□□□□□□/□□□□□□□□□□
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Other Aspects

- use of other descriptors.
 - Wording that better describes the meaning under that category.
 - The system adds the new item to the existing list.

Query Capability

- A “Comparison” facility allows the user to make a side-by-side comparison
- A comparison can be made at the element, term, category, or descriptor levels.
- CARAT can perform searches for entries that contain either certain combinations of hierarchical descriptor details
- can be conducted in Boolean ‘and/or’ mode

Entry Reports

About
Example
Index

Comparisons

About
Example

Definitions

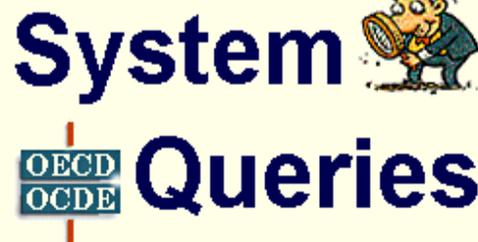
About
Example
Index

Descriptor
Queries

About
Example

Hierarchy
Queries

About
Example



[Regulatory Entries](#)



[Definitions](#)



[Risk Assessment Guidances](#)



[Specific Risk Assessments](#)

There are several ways that the Chemical Accident Risk Assessment Thesaurus (CARAT) database can be searched.

1. Reports may be generated for Regulatory entries, for Specific Risk Assessment cases, for Risk Assessment Guidance documents, or for other classes of entries. To run such a report, click on Entry Reports on the left panel.

For an index of all Entry Reports, click on Index under Entry Reports on the left panel.

2. A comparison of the details of Regulatory entries, Specific Risk Assessment cases, Risk Assessment Guidance documents, or Definitions among these entries in any combination can be made by selecting Comparison on the left panel.
3. Reports of definitions of words and phrases associated with risk assessment processes may be obtained by clicking on Definitions on the left panel.

For an index of all Definition Reports, click on Index under Definitions on the left panel.

4. Generalized searches of the operational language used to characterize all entries can be made by selecting Descriptor Queries on the left panel.
5. Generalized searches based on the hierarchical structure of the CARAT can be made by selecting Hierarchy Queries on the left panel.

More information about any of these searches and an illustration of example reports can be obtained by selecting "About" or "Example" for any of the search types above.

Elements
 Sub-Elements
 Categories
 Descriptors

More specific

Ordinance on Protection Against Major Accidents (Ordinance on Major Accidents, OMA), 27 February 1991	
Hans A. MERZ	
Switzerland	Ernst Basler + Partners Ltd.
Regulation or Law	10/9/98 8:50:36 PM

e explicit *i* implicit *c* criteria *t* tools

 Full report

Element I

Identification of sources with the potential to cause undesired outcomes to subjects of concern that is the focus of the estimation of likelihood

			1	Identification of sources with the potential to cause undesired outcomes to subjects of concern
			1	1 Substances
<i>e</i>	<i>c</i>	<i>t</i>	1	1 1 Explosive
<i>e</i>	<i>c</i>	<i>t</i>	1	1 2 Flammable
<i>e</i>	<i>c</i>	<i>t</i>	1	1 3 Reactive
<i>e</i>	<i>c</i>	<i>t</i>	1	1 4 Oxidizing
<i>e</i>	<i>c</i>	<i>t</i>	1	1 5 Toxic to humans
<i>e</i>	<i>c</i>	<i>t</i>	1	1 6 Toxic to ecosystems
<i>e</i>			1	1 7 Carcinogenic substance
<i>e</i>			1	1 8 Teratogenic substance
<i>e</i>			1	1 0 Genetically modified micro-organisms

Application of the CARAT

- Comparing various laws and regulations, definitions or specific risk assessments.
- Companies can put specific standards, guidelines, risk assessments, or other risk-related applications into the system and use the comparison feature to determine where the specific input may be at variance with the legal system in the country. e.g. NOVA

Application of the CARAT

- The system source code can be obtained from the OECD
 - enter specific standards and codes of practice
 - compare work from the various sites to assure that the requirements have been met.
 - Act as a repository for specific risk assessments
 - provide an archive facility for those wishing to update risk assessments on a regular basis

Extension of the CARAT to Planning

- Company requires a risk assessment
- Consultant is not familiar with specific facility and technology
- CARAT database can be used to develop the detailed requirements

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Finalize

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Session Map

Identification of sources with the potential to cause undesired outcomes to subjects of concern

1 *Substances*

1 *Energy*

1 *Physical situations*

1 *Legally specified sources*

1 *Other sources*

Identification of subjects of concern

2 *People*

2 *Ecosystems/environment*

2 *Cultural assets*

2 *Property and physical systems*

2 *Facilities*

2 *Other subjects of concern*

Identification of undesired outcomes to subjects of concern

3 *Undesired outcomes for people*

3 *Undesired outcomes for ecosystems/environment*

3 *Undesired outcomes for cultural assets*

3 *Undesired outcomes for society*

3 *Undesired outcomes for facilities having the release*

3 *Undesired outcomes for property*

3 *Undesired outcomes for other classes of subjects*





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Undesired outcomes to subjects of concern

5 Undesired outcomes for facilities having the release				
5	<i>e</i>	<i>i</i>		<i>c</i> <i>t</i>
5 1	<input type="checkbox"/>	<input type="checkbox"/>	Injury to people within a facility	<input type="checkbox"/> <input type="checkbox"/>
5 2	<input type="checkbox"/>	<input type="checkbox"/>	Death of workers within a facility	<input type="checkbox"/> <input type="checkbox"/>
5 3	<input type="checkbox"/>	<input type="checkbox"/>	Property damage	<input type="checkbox"/> <input type="checkbox"/>
5 4	<input type="checkbox"/>	<input type="checkbox"/>	Business interruption	<input type="checkbox"/> <input type="checkbox"/>
5 5	<input type="checkbox"/>	<input type="checkbox"/>	Loss of good will	<input type="checkbox"/> <input type="checkbox"/>
5 6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Legal sanction	<input type="checkbox"/> <input type="checkbox"/>
5 U	<input type="checkbox"/>	<input type="checkbox"/>	Undefined undesired outcome for facilities	<input type="checkbox"/> <input type="checkbox"/>
5 0	add		<input type="text"/>	

Submit Reset

Extension of the CARAT to Incident Reporting

- Risk assessment studies of hazardous materials predict:
 - those events that could happen,
 - the frequency at which they could happen,
 - the distribution of the material taking into account meteorological and topographical conditions, and
 - the outcomes associated with the scenario

Incident Investigations

- Incident investigations of hazardous materials incidents document:
 - those events that happen,
 - the frequency at which they happen,
 - the distribution of the material using actual meteorology and topography, and
 - the outcomes associated with the scenario

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5 0	add		<input type="text"/>	

Submit Reset

Conclusions

- The CARAT database is an effective method to capture risk assessment guidance
- The CARAT could be used to develop the scope and details required for risk assessments
- Incidents can be documented using the CARAT structure and used to validate risk assessment laws, regulations, and guidance