The IRAM Web app

Description of the internet application of the Integrated Risk Assessment Method (IRAM)

https://www.fms.nrw.de/lip/authenticate.do

The internet application of the „Integrated-Risk-Assessment-Method (IRAM)“ reflects the results of the *easyTools* and later projects within the European IMPEL network (www.impel.eu) dealing with risk assessment questions.

Content

This description provides information on fundamental principles of IRAM, like f. ex. “The Rule” to calculate the risk category, the meaning of inspection effort or the possibilities of steering parameters. It explains the registration with the web app and describes the result presentation. Another focus is on the functions of the app especially for coordinators, inspectors and on new features in 2013. A detailed description can be found in the Guidancebook, which can be downloaded from the website. A quick guide with screen shots is also available there for a rapid entry into the process.

Fundamental principles of IRAM

IRAM makes a distinction between two different kinds of assessment criteria: **impact criteria (IC)** and **operator performance criteria (OPC)**. Impact criteria such as emissions, environmental sensitivity etc. are used to assess the possible impacts of different hazards to the environment and the human health. Operator performance criteria are used as a measure for the probability of the occurrence of an impact. In combination the impact and the operator performance criteria describe the environmental and health risk of the assessed inspection object (e.g. an industrial installation). IC are scored for each inspection object by the responsible inspector according to the presetting by the coordinator. E.g. 0 = no impact, 1 = low impact, 2 = moderate impact, …, n= maximum impact. OPC are scored by the inspector in the following

way: -1 = good operator performance, 0 = moderate operator performance and 1 = bad operator performance.

From the scores of the operator performance criteria the average is calculated by the program – the **Operator Performance Term (OPT).** The OPT can take the values of "-1", "0" or "1". The OPT is added to each impact score by the program giving the risk profile. As a result the risk category will be one step lower for "-1" and one step higher for "1" (see below).

"The Rule" to calculate the risk category

In IRAM the minimum number of highest risk scores determines the risk category and consequently the inspection frequency: "x" or more than "x" highest scores result in a risk category with the same score (and an inspection frequency related to this score as set by the coordinator). If there are less than "x" highest scores the risk category and inspection frequency will be one step lower. In IRAM the number "x" is free to choose under "Minimum number of highest score". For up to 5 impact criteria the number of highest scores may be 1, for up to 10 it may be 2 and for up to 15 it may be 3.

Inspection effort

In IRAM the sum of the (weighted) impact scores are related to the inspection effort; the higher the scores the more effort has to be put into the inspection and more time is needed for the inspection. If all scores are at maximum level the result of the inspection effort is 100%. The inspection effort output from IRAM (i.e. how much time or effort is needed for the inspection) is actually reported as a range of 4 categories in 25% increments. The highest range (100% - 75%) is termed "D" and the lowest (0% to 25%) "A". Coming from this the coordinator may assign fractions of the maximum inspection time to the A, B and C inspection effort categories.

Steering parameters

IRAM offers a lot of steering parameters to make it fit for different demands of the inspection tasks and the inspection authorities. The most important is the minimum number of highest scores (see above). The default value is "2".

Other steering parameters are:

Lowest risk category (safety net) – the resulting risk category of the assessment cannot be lower than the set value. The default value is “1”.

Highest risk category – the resulting risk category of the assessment cannot be higher than the set value. The default value is “5”.

Maximum possible score (of an impact criterion) – the inspector cannot score higher than the set value; it is also used for the determination of the inspection effort. If the maximum score of a specific criterion is lower compared to other criteria it cannot induce the highest inspection frequency (kind of weighting). The default value is “5”.

Shift of score (weight) – is used to put a weighting term (addition) on this specific impact criterion. The default value is “0”; the weight should be in the range from “-2” to “2”.

Inspection weight – is used to put a weighting factor (multiplication) on the inspection effort of this specific impact criterion. The idea behind it is that some kinds of inspections needs more effort and takes more time than others. The inspection weight will also be multiplied with the maximum score to give the maximum inspection effort of the specific criterion. The default value is “1”; the weight should be in the range from “1” to “10”.

Weight of criterion – is used to put a weighting factor (multiplication) on this specific operator performance criterion. The default value is “1”; the weight should be in the range from “1” to “3”; fractions are also possible. In spite of this multiplication the result of the mean value will not be smaller or bigger than -1 or 1. The advantage of weighting is that the most important operator performance criterion (e.g. compliance) will count more than the others.

Finally – beginners should start with the default values and only introduce other steering values when they are familiar with the method.

Result presentation

Under “Risk profile” the calculated risk scores for every impact criterion of the inspection object are displayed. The risk profile indicates which criteria are more important and which are less. The information of the risk profile can be used for the inspection planning. No impact criterion scored with “0” can be in- or decreased by the operator performance or a weighting factor. No risk score can be lower than “0”.

Under “Inspection profile” the weighted impact criteria (shift of score and inspection weight: see above) are displayed. The scores tell us how much inspection effort is needed for every criterion in relation to the other criteria. The information of the inspection profile can be used for inspection planning.

The risk category is calculated from the highest score of all risk criteria and the number of highest score. If the number is bigger than or equal to “minimum number of highest score” the risk category will be identical to the highest score. If the number is smaller than that the risk category will be identical to the highest score minus 1. If the risk category would be bigger than “highest risk category” it will be reduced to “highest risk category”. If – on the other hand – the risk category would be lower than “lowest risk category” it will be increased to “lowest risk category” (safety net!).

From the sum of weighted impact scores (sum of inspection profile) the “inspection effort (%)” is calculated as a percentage of the “Maximum inspector effort”. The inspection effort output from IRAM (i.e. how much time to inspect) is reported as a range of 4 categories in 25% increments. The highest range (100 – 75%) is termed “D” and the lowest (0 – 25%) is “A”.

The risk category is assigned to an inspection frequency (in month) given by the coordinator. Also the latest date of the next inspection is calculated by using the inspection frequency and the date of the last inspection.

As an alternative the “Sum of risk profile” or the “Mean of risk profile” can also be used to determine risk categories if appropriate.

Linear mean value method

An alternative approach to the integrated risk assessment method is realised with the linear mean value method. It is independent from IRAM and should only be used if IRAM seems to be inadequate for the specific inspection task. In the linear assessment approach all risk criteria (there is no distinction between impact and operator performance criteria) are considered as equal and are combined in a linear equation together with weighting factors:

$$\text{Risk} = (RC_1 * WF_1 + RC_2 * WF_2 + \ldots + RC_n * WF_n) \,/\, (WF_1 + WF_2 + WF_n)$$

with RC = Risk criterion and WF = Weighting Factor

Registration and functions of the web app

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For registration the “Register” button on the start page has to be pressed. A registration form will be displayed in which the user has to fill in the following data: first name, surname, user identification, email address and the language. After the button has been pressed an email containing the password will be forwarded to the user’s email address. After the user has got the password he can log into the app by entering the user ID and password on the start page of the IRAM tool.

To provide access to assessment forms for a new registered inspector the coordinator has to activate in the next step the account of the inspector (see below Functions of the coordinator level).

To get an easy and flexible tool four types of registered users of IRAM were developed: authority, coordinator, group leader and inspector. These users have different levels of access into the system.

The authority has the highest level of authority in the IRAM tool. Its responsibilities are:

- Granting coordinator status to nominated users
- Deleting registered users
- Keeping contact with the host of the app

The coordinator has the following responsibilities:

- Putting the inspectors of his administration under his coordination
- Development of forms for specific inspection tasks (f.ex. waste shipment) including determination of steering parameters
- Setting up inspection groups and promoting inspectors to group leaders

The group leader is an inspector who has

- an overview of all assessment results of the assigned inspectors. On this basis he can drew up inspection programs for the next year.
- In addition he has the right to change the risk assessments of the assigned inspectors.

The inspector has the lowest level of authority in the IRAM tool.

- His responsibility is to fill in the data into the form developed by the coordinator.

Functions of the coordinator level

The coordinator will be set by the authority or the IRAM administrator after nomination by the competent authority.

After logon into the system using ID and password the coordinator gets five menus:

- Forms – which includes the Integrated Risk Assessment for Inspection Planning template
- Master data – containing the User Administration template
- Folders A - Z – which cover all folders developed within the tool
- Forms A – Z – which contain all IRAM forms developed within the tool
- Search - which facilitates to find a certain form by following criteria: title, author or keywords
- Support – with the source code and the description of the Java script used for the programming of the tool

The User Administration template (under master data) allows changing the coordinator's inspection identification data including password. Also under this field the coordinator can choose the inspectors who will be under his coordination by marking the box corresponding to the inspector's ID/name. Unmarking this box will release the inspector from his coordination.

For every inspection task a specific template should be used, f.ex. for waste shipment. For this purpose the coordinator can develop a specific template or copy an existing one, change it and store it under a new name. Examples are provided in the Guidancebook.

The coordinator can create a new form for risk assessment under Master data, then Template Inspection Tasks, then pressing the button "New record". As a first step the coordinator has to choose the method he wants to use for risk assessment:

- IRAM by marking the box corresponding to Integrated Risk Assessment Method

  or

- LMVM by marking the box corresponding to Linear Mean Value Method

Using the “+”-button beneath the impact criteria box and operator performance criteria box new criteria can be created. Here the name and the graduation of score (between “0” and “maximum score”) have to be set for each criterion. For this the coordinator can use the examples given by the guidance book or the inspection authority can develop new ones.

Under the IRAM method the coordinator has to set the steering values like lowest/highest risk category, minimum number of highest score, maximum score, weight term/factor and inspection weight. The lowest risk category should be set according to regulatory request (f.ex. for IPPC/IED installations the minimum inspection frequency must be at least one inspection every three years). The steering values set by the coordinator are mandatory for the inspectors under his coordination.

Every form developed by the coordinator will be stored in the folder “Master data”. Also a compilation of these forms will be found under the drop down menu of “Template Inspection tasks” and “Data Browser”.

Functions of the inspector level

The inspector has the lowest level of authority in the IRAM tool. His responsibility is to fill in the data into the form developed by the coordinator.

The inspector enters into the system using ID and password. Under menu “Forms” on the start page of IRAM he can open the folder “Integrated Risk Assessment for Inspection Planning” where the forms developed by his coordinator can be found. For flexibility reasons a compilation of these forms will be found under drop down menu “Inspection task” from the IRAM form.

First the ID-number and the name of the inspection object (e.g. IPPC installation, Seveso establishment, waste water purification plant or landfill) must be entered by the responsible inspector. Also the date of the last inspection and the address data can be entered for identification purposes.

Then the inspector has to enter values for “lowest risk category” and “highest risk category”. For that he/she has to check if there are any regulatory demands or an inspection task (like at least one inspection every three years for IPPC/IED installations). The corresponding risk category has to be entered in the “lowest risk category” cell. If after the calculation the risk category will be lower than that it will be increased to the set value for “lowest risk category”. All other results will remain un-

changed. Also if the calculated risk category will be higher than the value entered for the “highest risk category” it will be decreased to this value. All other results will remain unchanged.

In the next step the scores for all impact criteria (IC) have to be entered according to the settings of the coordinator. The range of scores is from “0” to “maximum score”. The description of each score from this range is set by the coordinator and can be seen under the corresponding drop down menu.

Next the scores of the operator performance criteria (OPC) have to be entered. The range of scores is from “-1” to “1”. The description of each score is set by the coordinator and can be seen under the corresponding drop down menu.

After clicking the calculator button on top of the form the results of the calculation are shown in and under the “Risk and inspection profile” box. The tool will calculate the following parameters:

- Risk ranking number
- Highest score
- Number of highest scores
- Risk category
- Maximum inspection effort (100%)
- Sum of inspection profile
- Inspection effort (percentage)
- Inspection category
- Inspection frequency (in month)
- Latest date of next inspection
- Sum of risk profile and
- Mean of risk profile

All entered and calculated data can be downloaded into inspector’s computer by clicking “Download XML” or “Download CSV” buttons. The XML and CSV files will be named according to the ID of the inspection object and date of assessment. The tool will also develop a printable file (PDF) if the “Print” button is pressed.

The XML files can also be uploaded into the IRAM tool for recalculations with changed risk scores or with different steering values. This could be done with the help of the “Upload XML” button.

The XML and CSV files can be read into databases to see all data together and compare them.

In 2013 the IRAM web based application was developed further by the IMPEL project IED/IRAM Inspection Program. The aim of the project was to use the IRAM app also for drawing up of inspection programs as demanded by the IED. From now on all IRAM assessment data are stored within the IRAM database and can be used for the needs of an inspection program within the app. There is a new table (data browser) within the folder “Forms” were the conducted risk assessments are displayed.

In this table the name and ID-number of the installation, the inspection task, risk category, inspection category and inspection frequency, the latest date of the next inspection and the status of the risk assessment are displayed. For reasons of data protection the name of the installation is no longer obligatory but optional. To see the calculated date of the next inspection the date of the last inspection has to be typed in during the assessment. The status distinguishes between “in use” (the typed in data can still be changed), “completed” (the typed in data cannot be changed any longer) and “archive” (the data shall not be used any longer, e.g. incorrect entry or installation is closed down). The data set can be completed by the inspector within the risk assessment form. Completed data sets can be copied and used for a new assessment. A completed data set can be reset to “in use” or put into archive by the coordinator.

For optimal use as an inspection program the data browser comes up with a lot of filter and sorting functions.

Most changes of the app were introduced for coordinators:

1. Under “Master data” the coordinator can use the data browser “Template Inspection Tasks” to browse all risk assessment forms of all coordinators and copy them for his own purposes. Modifications or forms are only possible within own or copied forms.
2. At the bottom of the form an inspection frequency (in month) can now be introduced for each inspection category.

3. The coordinator can now also use the data browser under forms and see all risk assessments done by the inspectors under his coordination.
4. The coordinator can select individual assessments of his inspectors and change them. At the top of the form he can also change the inspector for this specific installation or for all installations of this inspector, e.g. in case of staff change.
5. The coordinator can complete and reset assessments or put them into the archive.
6. The coordinator can create inspection groups and promote inspectors to group leaders.

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