



Innovative strategies, methods and tools for occupational risks management
of manufactured nanomaterials (MNMs) in the construction industry

OPERATING MANUAL OF SCAFFOLD'S TOOLKIT FOR THE RISK MANAGEMENT OF MANUFACTURED NANOMATERIALS (MNMs) IN THE CONSTRUCTION SECTOR

Scaffold Public Documents - Ref.: Scaffold SPD18

Juan Antonio Ortega, Jesús Lopez. de Ipiña, Sonia Fernandez

April 2015



The Scaffold research has received funding from the European Community's Seventh Framework Programme (FP7/20072013) under grant agreement number 280535.

Disclaimer

This document was prepared following extensive consultation with a range of stakeholders (via workshops, meetings, surveys, interviews and document reviews):

- Representatives of the construction sector, including:
 - o European Construction Industry Federation (FIEC);
 - o European Federation of Building and Wood Workers (EFBWW);
 - o OHS Managers from several construction companies.
- Manufacturers of construction products;
- European and Spanish agencies for occupational safety;
- Manufacturers of personal protection equipment;
- Experts in nanosafety;
- Policy makers at European and national (Spain) levels.

The authors would like to place on record their thanks all those who contributed. In particular the authors would like to thank Domenico Campogrande (FIEC) and Rolf Gehring (EFBWW) for their advice and assistance throughout the Scaffold project.

The views expressed herein are solely those of the authors.

INDEX

| | |
|--------------------------------------|----|
| EXECUTIVE SUMMARY | 5 |
| 1. INTRODUCTION | 6 |
| 2. OBJECTIVES | 7 |
| 3. INSTALLATION | 8 |
| 4. MAIN SCREEN | 9 |
| 5. MODULE 1: LIBRARY | 11 |
| 5.1. Processes | 11 |
| 5.2. Products and applications | 12 |
| 5.3. NOAAs | 12 |
| 5.4. Hazards | 13 |
| 5.5. Exposure scenarios | 13 |
| 5.6. Measurement systems | 14 |
| 5.7. Control measures | 15 |
| 5.8. Good practices | 15 |
| 5.9. Database | 16 |
| 6. MODULE 2: CUSTOMIZATION | 17 |
| 6.1. General information | 17 |
| 6.2. Processes | 17 |
| 6.3. Tasks and scenarios | 19 |
| 7. MODULE 3: RISK MANAGEMENT | 28 |
| 7.1. Initial assessment | 28 |
| 7.1.1. Risk assessment | 29 |
| 7.1.2. Planning | 36 |
| 7.1.3. Checklist | 38 |
| 7.2. IMPLEMENTATION | 41 |
| 7.3. AUDIT | 41 |
| 8. MODULE 4: TOOLS | 42 |
| 8.1. RISK MANAGEMENT | 42 |
| 8.2. RISK ASSESSMENT | 42 |
| 8.3. PLANNING | 43 |
| 8.4. KPIS | 43 |
| 8.4.1. Adding a new KPI | 44 |
| 8.4.2. Calculating a KPI | 45 |

| | |
|---|----|
| 8.4.3. Plotting a KPI..... | 46 |
| 8.5. Procedures, records and manuals..... | 46 |
| 8.6. Training..... | 47 |
| 8.7. Regulations and standards | 50 |
| 8.8. Terms and definitions | 50 |
| 8.9. FAQ..... | 51 |
| 9. MODULE 5: HELP | 52 |
| 10. MISCELLANEOUS OPTIONS | 53 |
| 11. TOOLKIT MAINTENANCE | 54 |
| 11.1. XML files | 54 |
| 11.2. HTML and other files..... | 55 |
| 11.3. TRAINING | 56 |
| 10. LIST OF FIGURES AND TABLES | 57 |

EXECUTIVE SUMMARY

This document describes how to configure and use the final version of the RMM Toolkit software tool. This final version has been improved taking into account all the deficiencies and recommendations detected through an intensive testing (Scaffold report D5.8).

1. INTRODUCTION

The RMM Toolkit is a software tool to be used by OHS professionals to manage nano-risks in construction.

The application has two operation modes:

- ✓ Learning mode. This mode is provided to help the user get familiar with the tool using dummy data and browsing the contents.
- ✓ Risk management mode. This is the production mode, where the tool manages real data and provides information about NMN risk management for the company.

Besides, the application is divided into five modules:

- ✓ Module 1: Construction, aimed primarily at providing personalized information to companies in the construction sector about management of risks arising from MNMs (processes, products, NOAAs, hazards, exposure scenarios, control measures, good practices, etc.).
- ✓ Module 2: Company Profile, focusing on the introduction of data from the company that is being analyzed by the tool, in order to customize toolkit modules to their activities and risks. This module will use module 1 to facilitate data input and generate the company profile.
- ✓ Module 3: Risk Management, that enables the initial assessment, implementation, monitoring and auditing of RMM - guided step by step - using information and tools provided by modules 2 and 4. This module will be able to deploy two different setups, depending on the company profile (General or SME).
- ✓ Module 4: Tools. This module will content the tool-box for Risk management (RMM assessment, risk assessment, KPIs, planning, templates and examples of documents, etc.)
- ✓ Module 5: Help. User manual and information about the toolkit.

The operation and configuration of these modules will be described along this document. It is also explained how to customize the information and databases provided by the toolkit, to adapt it to the specific needs of each company.

2. OBJECTIVES

The aim of this operating manual is to provide the users a clear view about how to use the RMM Toolkit to manage the risks associated with NMNs in their companies.

3. INSTALLATION

The RMM Toolkit is a portable application, that is, it does not have external dependencies and can be executed without administrator privileges.

To install the application, just decompress the provided ZIP file in a folder in your hard drive. Once it has been installed, locate the file "Scaffold.exe". That is the executable file of the application. For convenience, you can create a shortcut to this file on the desktop. To do that, right-click on the icon, point to "Send to" and then click "Desktop (create shortcut)".

To execute the application, double-click on the "Scaffold.exe" file or on the desktop shortcut.

4. MAIN SCREEN

When the application is started, the following window appears, indicating that the tool is loading:



Figure 1 - Application startup

Once it has been loaded, it asks the operation mode to use in the following dialog:



Figure 2 - Mode selection

If you select the "learning mode", the application will disable modules 2 and 3 and you will be able to get familiar with the application browsing the contents of module 1 and the tools of module 4. Module 5, which contains the help, will also be enabled.

The risk management mode, on the other hand, disables the “risk management”, “risk assessment” and “planning” on module 4, as these tools will be accessed through module 3.

Once you have selected the operation mode, you will be able to access to the main window:

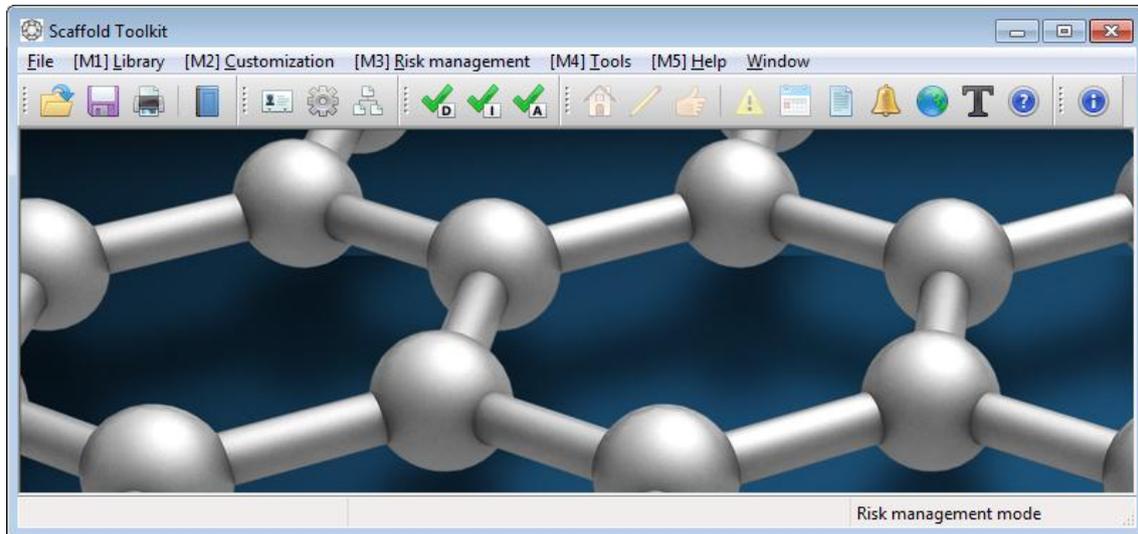


Figure 3 - Main window

As you can see, it is divided into several parts:

- Menu bar. It provides access to all the functions of the different modules of the application.
- Tool bar. It provides quick access to the most common functions of the application.
- Workspace. It is the place where all the application windows are shown.
- Status bar. It displays the mode in which the application is being used, that is, “risk management mode” or “learning mode”, the name of our company and if it is a SME.

5. MODULE 1: LIBRARY

This module provides information to companies in the construction sector about management of risks arising from MNMs. The menu contains the following options:

- Processes
- Products and applications
- NOAAs
- Hazards
- Exposure scenarios
- Measurement systems
- Control measures
- Good practices
- DB: exposure and efficiencies

When one of these options is selected, a window with the library is displayed. All the information can be accessed through this window, by clicking on the desired tab.

5.1. PROCESSES

The “Processes” tab shows the following content:

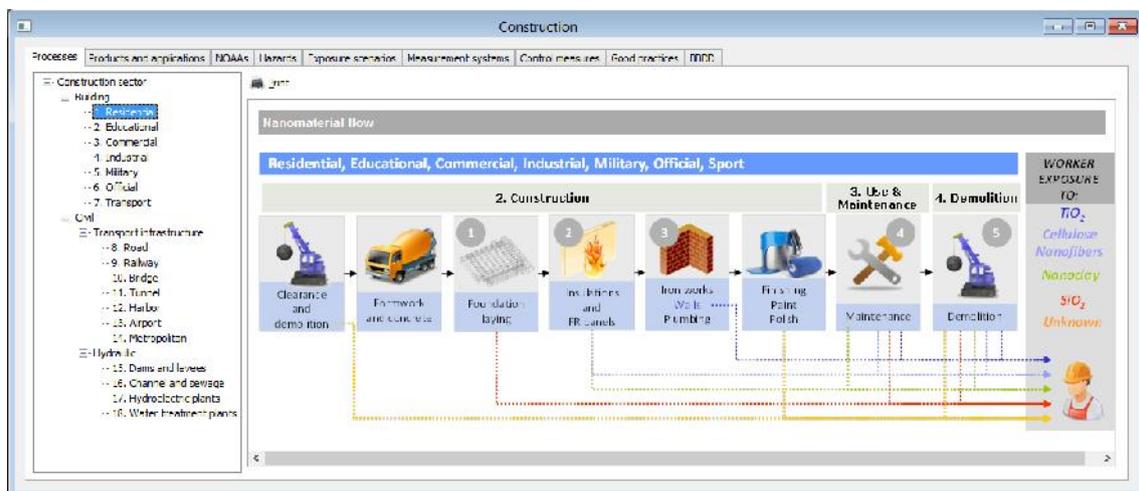


Figure 4 - Processes tab

If you click on any of the processes in the left side list, the right side content is updated with information about the tasks and NOAAs involved in the selected process. Besides, you can click on the tasks to get additional information about them. When doing so, a window like the following one is displayed:

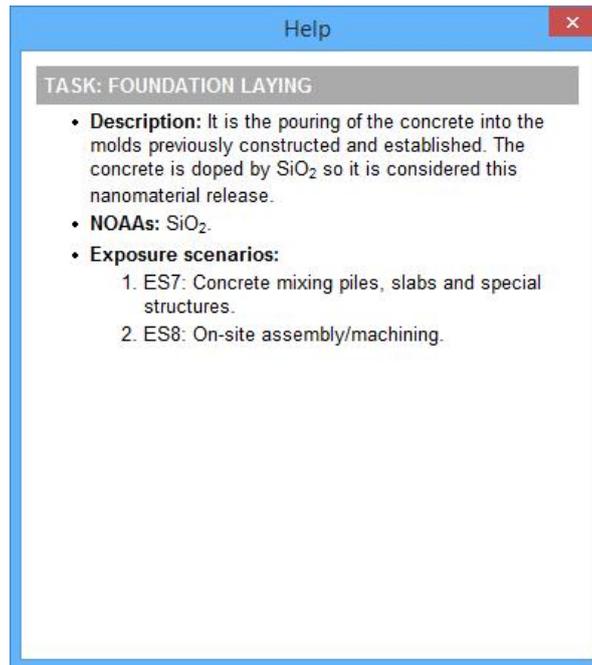


Figure 5 - Task information

5.2. PRODUCTS AND APPLICATIONS

The “products and applications” section looks like this:

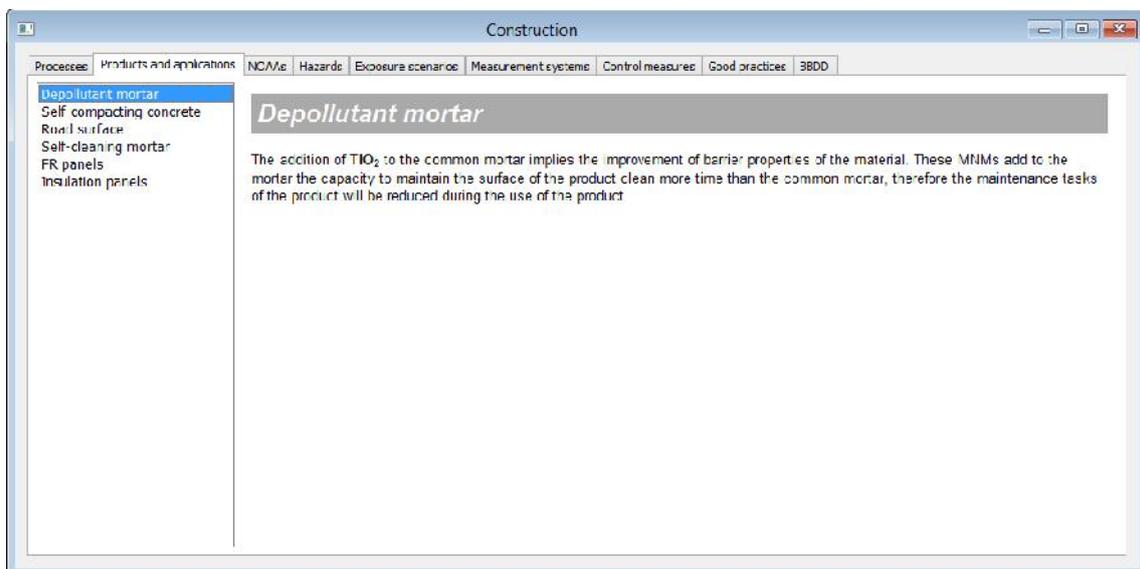


Figure 6 - Products and applications tab

As in the previous case, selecting a product in the left side list updates the right side content with information about the selected product.

5.3. NOAAS

The “NOAAs” tab gives you access to this content:

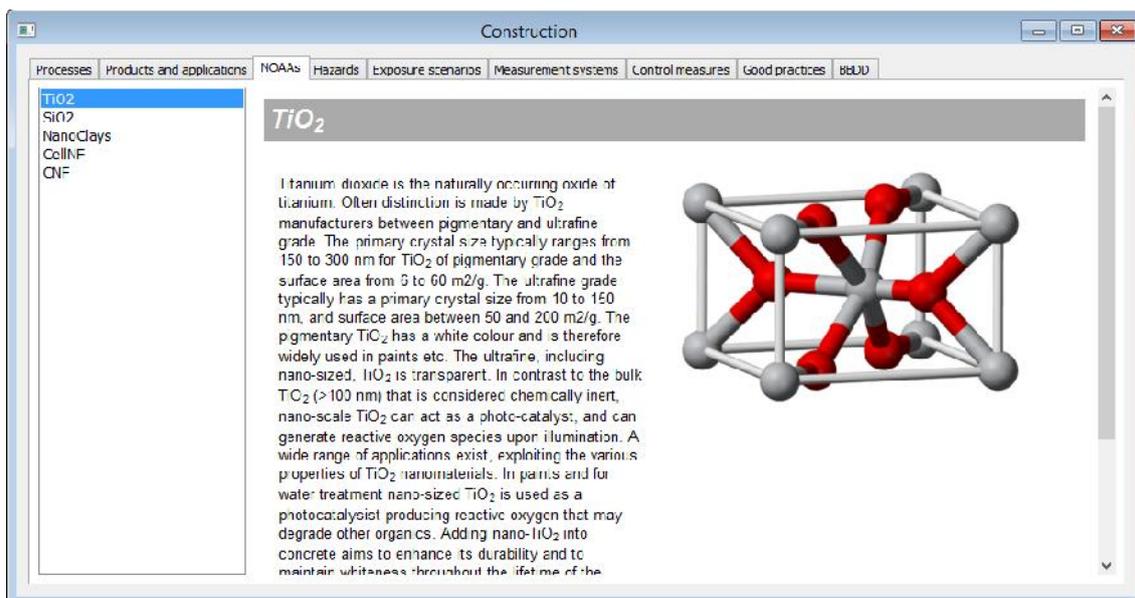


Figure 7 - NOAAs tab

This window works in the same way as the previous one.

5.4. HAZARDS

The "Hazards" section looks like this:

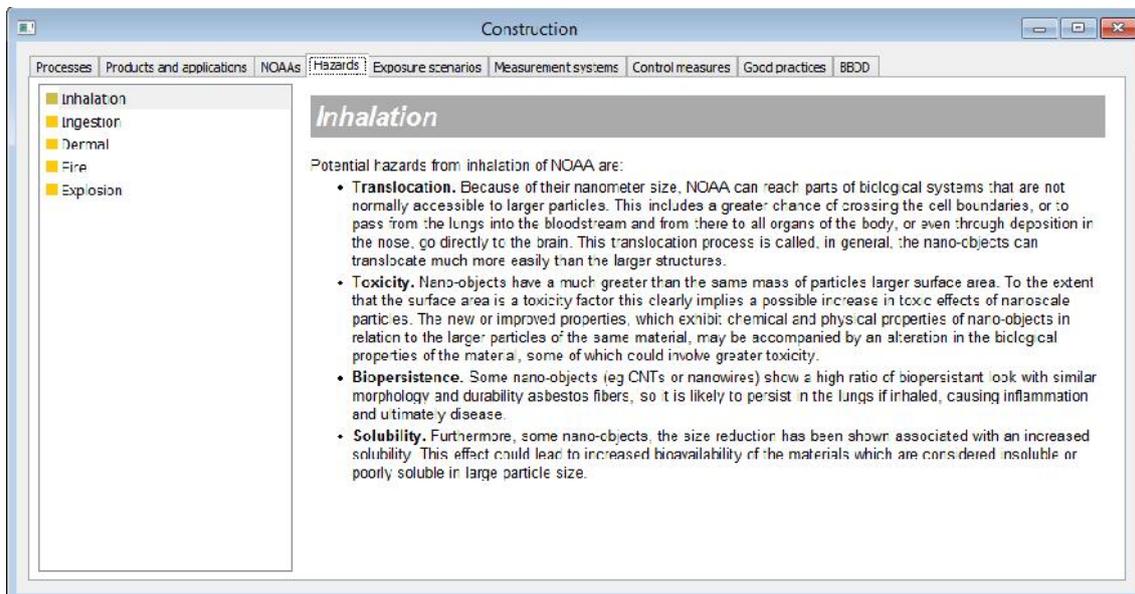


Figure 8 - Hazards tab

Once again, this window works in the same way as the previous ones.

5.5. EXPOSURE SCENARIOS

The "Exposure scenarios" tab gives you access to this content:

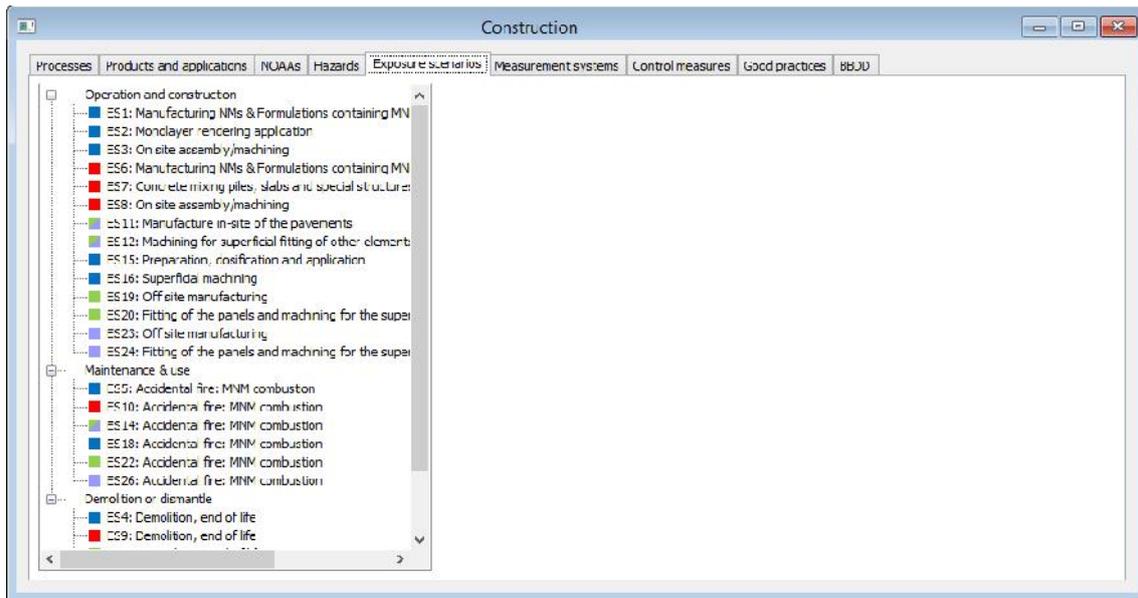


Figure 9 - Exposure scenarios tab

This window contains a tree with all the exposure scenarios gathered from the different processes considered in the application. At the right of each scenario, there is a square indicating the NOAAs involved, according to the following coding:

- Blue: TiO_2
- Red: SiO_2
- Purple: CNF
- Green: Nanoclays

5.6. MEASUREMENT SYSTEMS

This is how the "Measurement systems" window looks like:

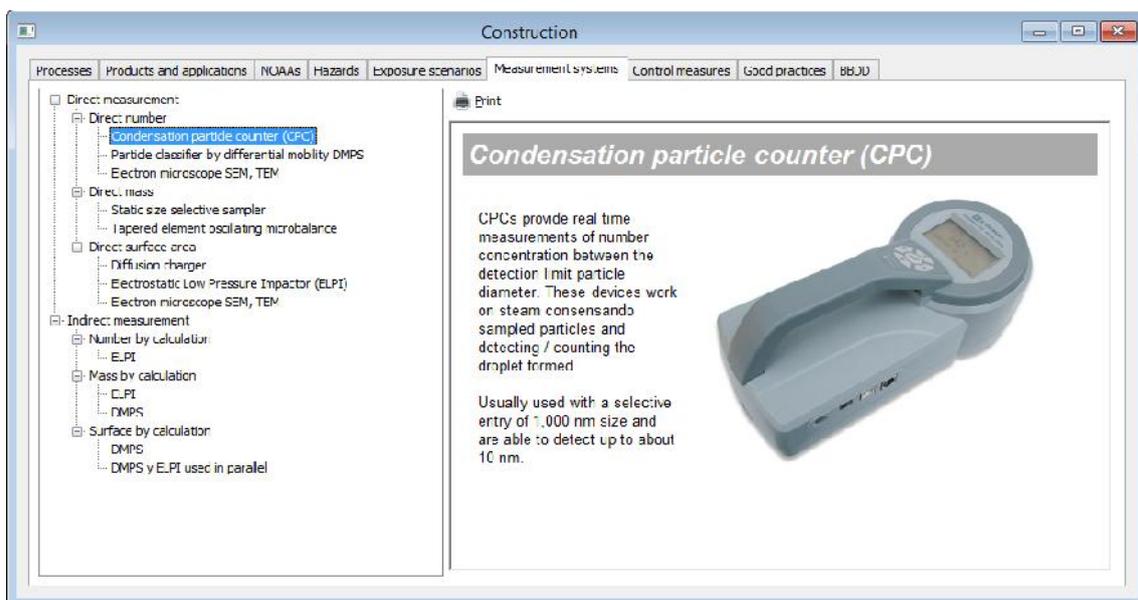


Figure 10 - Measurement systems tab

As in other tabs, the left side tree updates the right side content with information about different systems to measure NOAA concentration.

5.7. CONTROL MEASURES

The "Control measures" section gives you access to this content:

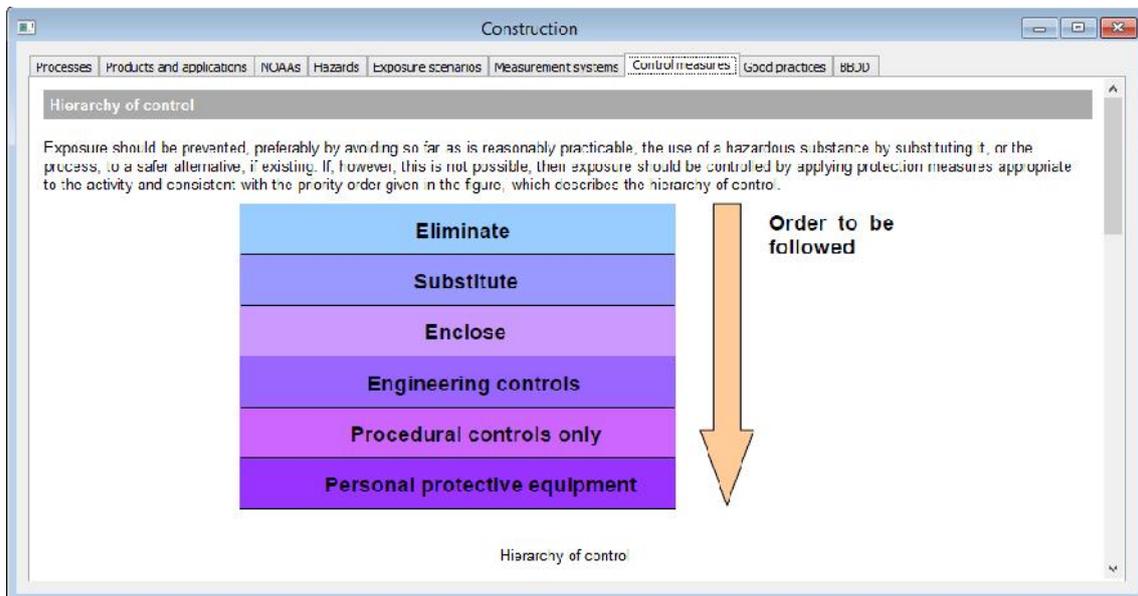


Figure 11 - Control measures tab

It provides information about control measures extracted from standard ISO TC 229/SC N.

5.8. GOOD PRACTICES

The "Good practices" tab looks like this:

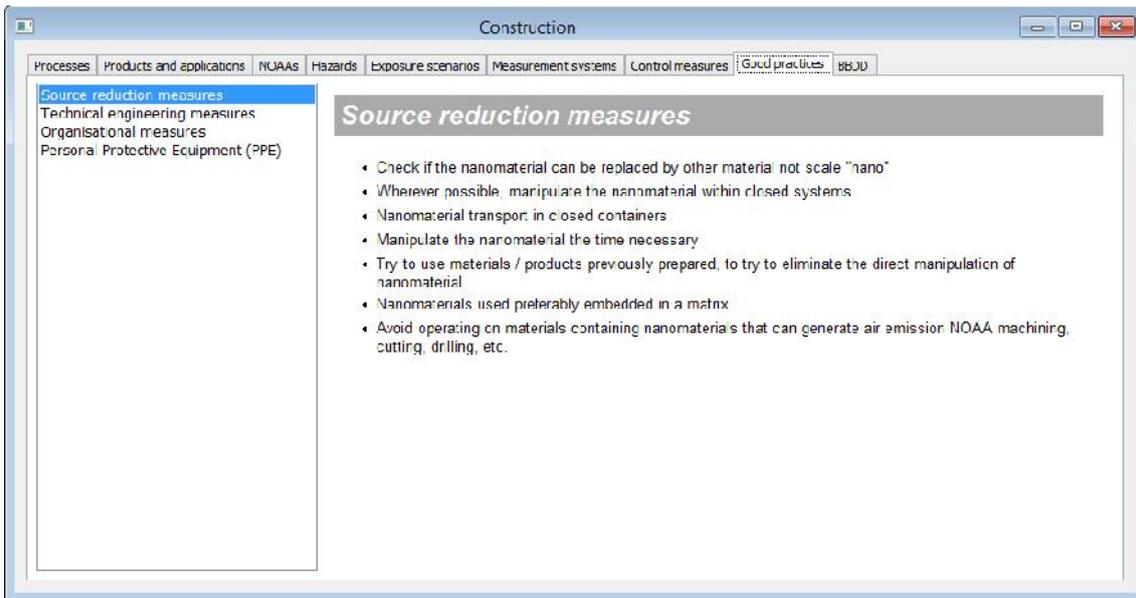


Figure 12 - Good practices tab

This window works in the same way as others with the same structure explained before.

5.9. DATABASE

The "Database" section provides measurements about NOAA exposition levels in different scenarios:

| PROCESS | | | | | | | |
|------------------|-------------|-------------|------|---|------------------|----------------------|------|
| PROCESS Operator | Nano-Object | Application | Code | Exposure Scenario | Task Description | Engineering Controls | Me p |
| Building | Nano-clay | FR panels | ES20 | On site assembly/Machining Control | Machining | Out door | 1 |
| Building | Nano-clay | FR panels | ES20 | On site assembly/Machining Material B | Machining | Out door | 1 |
| Building | Nano-clay | FR panels | ES20 | On site assembly/Machining Material C | Machining | Out door | 1 |
| Building | Nano-clay | FR panels | ES20 | Background | Background | Out door | 1 |
| Building | Nano-clay | FR panels | ES21 | Demolition-Composite (PA-50% FV) (control) | Shredding | Out door | 1 |
| Building | Nano-clay | FR panels | ES21 | Demolition-Composite (PA-40% FV) (Material B 5%nanoclay) | Shredding | Out door | 1 |
| Building | Nano-clay | FR panels | ES21 | Demolition-Composite (PA-30% FV) (Material C 5%nanoclay) | Shredding | Out door | 1 |
| Building | Nano-clay | FR panels | ES21 | Background | Background | Out door | 1 |
| Building | Nano-clay | FR panels | ES22 | Accidental fire: MNMs combustion Material A | Fire | | |
| Building | Nano-clay | FR panels | ES22 | Accidental fire: MNMs combustion Material C (1.25% nano-clay) | Fire | | |

Figure 13 - Database tab

6. MODULE 2: CUSTOMIZATION

The customization module allows you to adapt the toolkit to the specific processes, tasks, scenarios and NOAAs involved in your company. This module is only enabled when running the application in “Risk management mod”.

The menu contains the following options:

- General information
- Processes
- Tasks and scenarios

6.1. GENERAL INFORMATION

This option opens a dialog in which you can enter your company details:

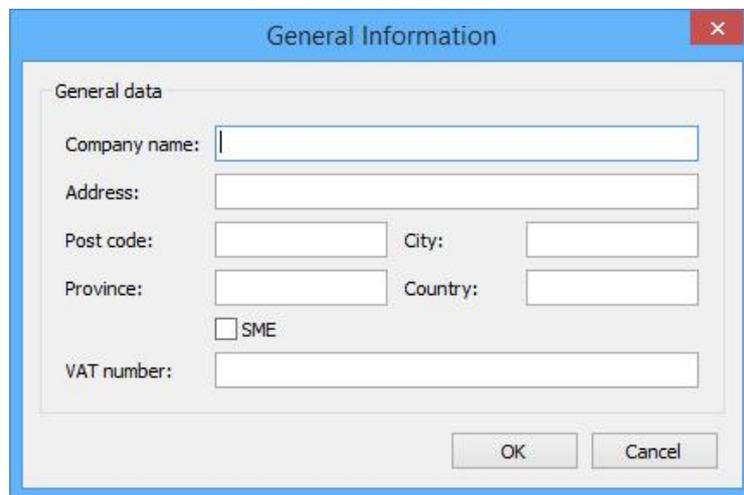


Figure 14 - General information window

As important point to note here is that you have to select whether your company is a SME or not, as the toolkit will customize some checklists for SMEs.

6.2. PROCESSES

Here, you can define the processes involved in your company. You can choose them from the list of predefined processes shown in the library or define a custom process. You can include as many processes as you need.

After selecting the menu option, the following window appears:

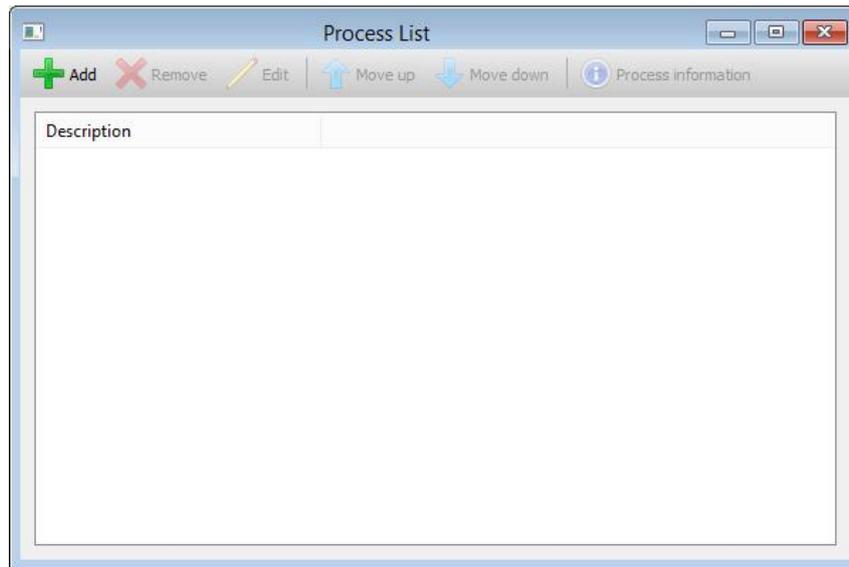


Figure 15 - Process list window

It contains a tool bar and a list of the processes. The tool bar buttons enable you to perform the following tasks:

- Add. Adds a new process to the list. Clicking on this button, opens the following dialog:

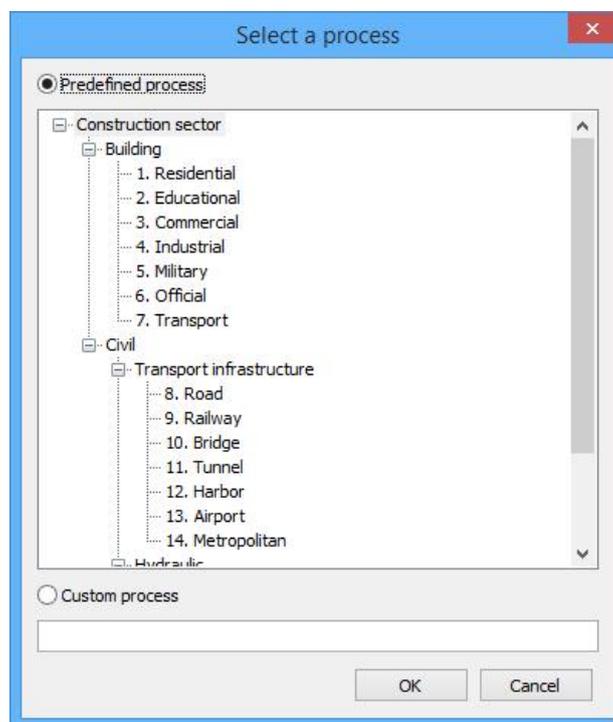


Figure 16 - Process selection

Here, you can select one of the predefined processes or enter the name of a customized one. In the latter case, you will have to click on the "Custom

process” radio button. Once you have selected the process, press OK. The window will then close and the process list will show the new process.

If you select a predefined process, a set of predefined scenarios and tasks will also be added to the process.

- Remove. Removes the selected process and all its associated tasks and scenarios.
- Edit. Edits the selected process, opening the same window as in the Add button.
- Move up. Moves up the selected process in the list.
- Move down. Moves down the selected process in the list.
- Process information. Opens a window with information from the library about the selected process. This only works with the predefined processes.

This is how the window will look like after adding some processes:

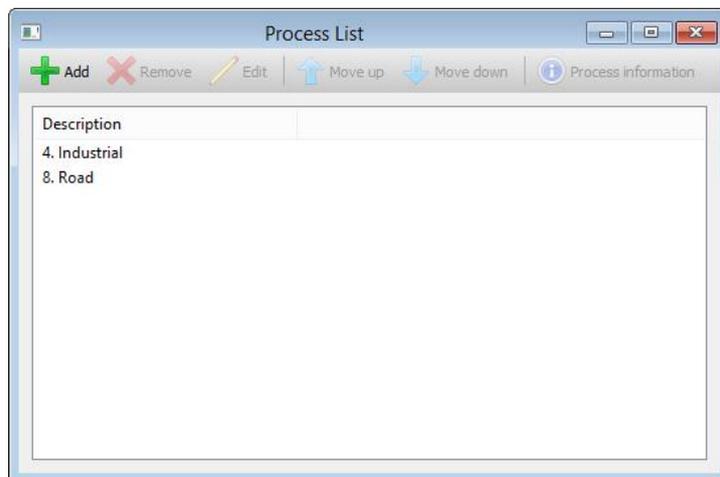


Figure 17 - Populated process list window

6.3. TASKS AND SCENARIOS

Once you have configured your processes, you have to add tasks and scenarios to them. Each process consists of a set of tasks, which, in turn, are made up of scenarios.

This is the window that appears after selecting this option:

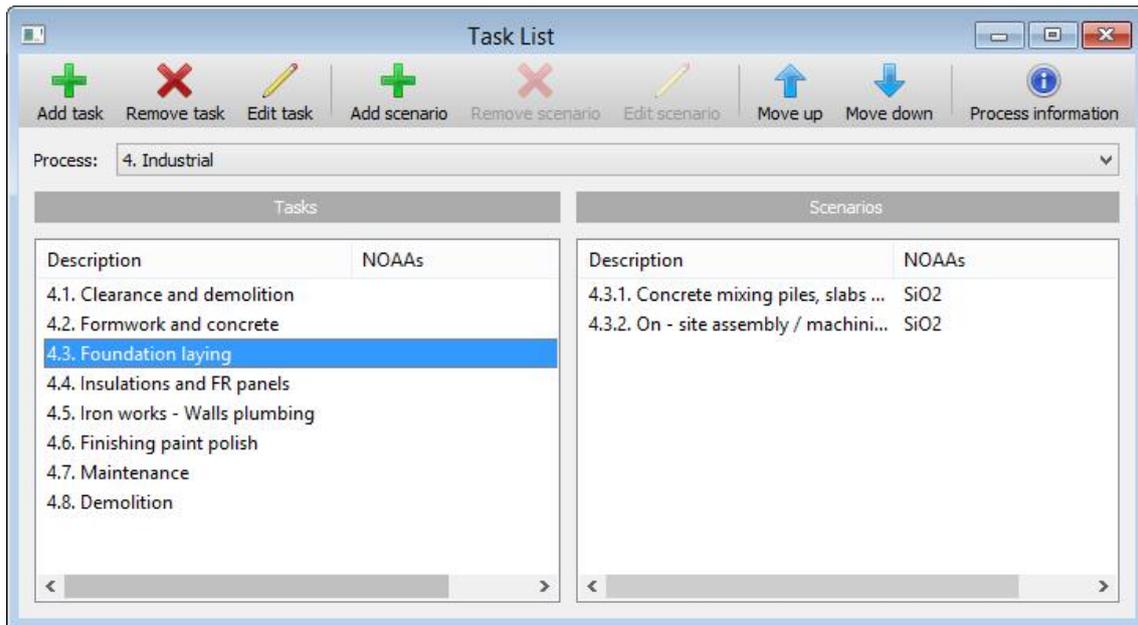


Figure 18 - Task list window

If you have selected predefined processes, you will see that this window will also show a set of predefined tasks and scenarios for each process. You can, however, modify or even remove them if needed.

The left side list of the window displays the tasks in which the selected process is broken down, which appears in a drop down component under the tool bar. Selecting another process will update the list of tasks. In addition, if you select a task, the right side list will be updated with the scenarios that make up the task.

The tool bar buttons provide the following functionality:

- Add task. Adds a new task to the selected process. Clicking on this button, will open a dialog prompting the name of the task:

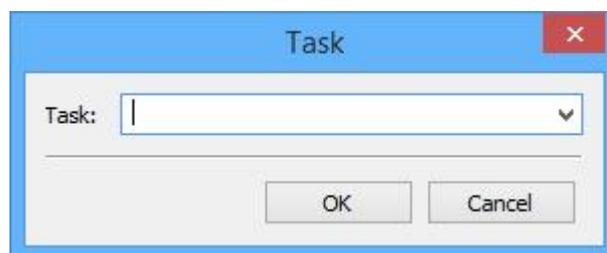


Figure 19 - New task dialog

Enter the name of the new task and press OK. The task will be added to the left side list.

- Remove task. Deletes the selected task and its associated scenarios.
- Edit task. Allows you to rename the selected task.
- Add scenario. Adds a new scenario to the selected task. Clicking on this button, will open a dialog to enter the details of the scenario. This dialog will be described below.

- Remove scenario. Deletes the selected scenario.
- Edit scenario. Enables you to change the details of the scenario.
- Move up. Moves up the selected task or scenario in the list.
- Move down. Moves down the selected task or scenario in the list.
- Process information. Opens a window with information from the library about the selected process. This only works with the predefined processes.

Scenario details

Adding or editing a scenario opens the following window:

The screenshot shows a window titled "Exposure Scenario" with a standard Windows-style title bar (question mark, close button). Below the title bar is a tabbed interface with the following tabs: "General data", "NOAA", "Hazards", "Measurement systems", "Control measures", "Good practices", and "Database". The "General data" tab is selected and contains the following fields:

- Process: A text box containing "4. Industrial".
- Title: An empty text box.
- Description: An empty text box.
- Type of process: A dropdown menu showing "Manufacturing / Production".
- Work groups: An empty text box.
- Products: An empty text box.
- Picture: A large empty rectangular area for an image.

At the bottom right of the dialog, there are two buttons: "OK" and "Cancel".

Figure 20 - Exposure scenario (general data)

This window is made up of several tabs, which contain information to describe the scenario:

- General data. This section allows you to enter general information about the scenario: title, description, work groups, products and an image associated to it. You also have to indicate the type of process, which will be used latter to customize the exposure banding flow chart.
- NOAA. This tab enables you to add the NOAAs involved in this scenario.

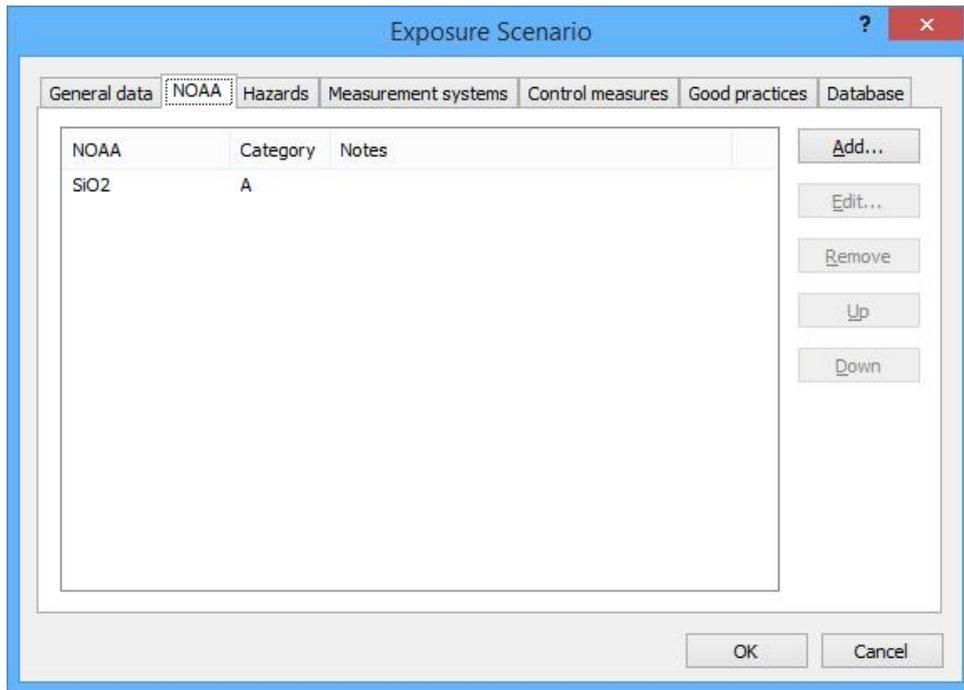


Figure 21 - Exposure scenario (NOAAs)

You can add, edit or remove NOAAs with the right side buttons. You can also move them up or down. When adding or editing a NOAA, the following window is displayed:

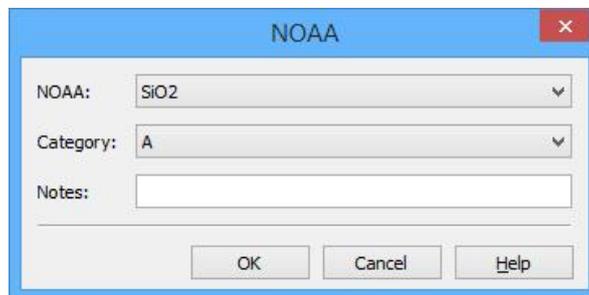


Figure 22 - Add NOAA to scenario

Here, you have to select the name of the desired NOAA and its category. You can also enter some notes. There is also a “Help” button that gives you access to the library, to get more information about NOAAs.

- Hazards. This tab allows you to select what hazards may affect the worker in this scenario. You can also enter some notes to each of them.

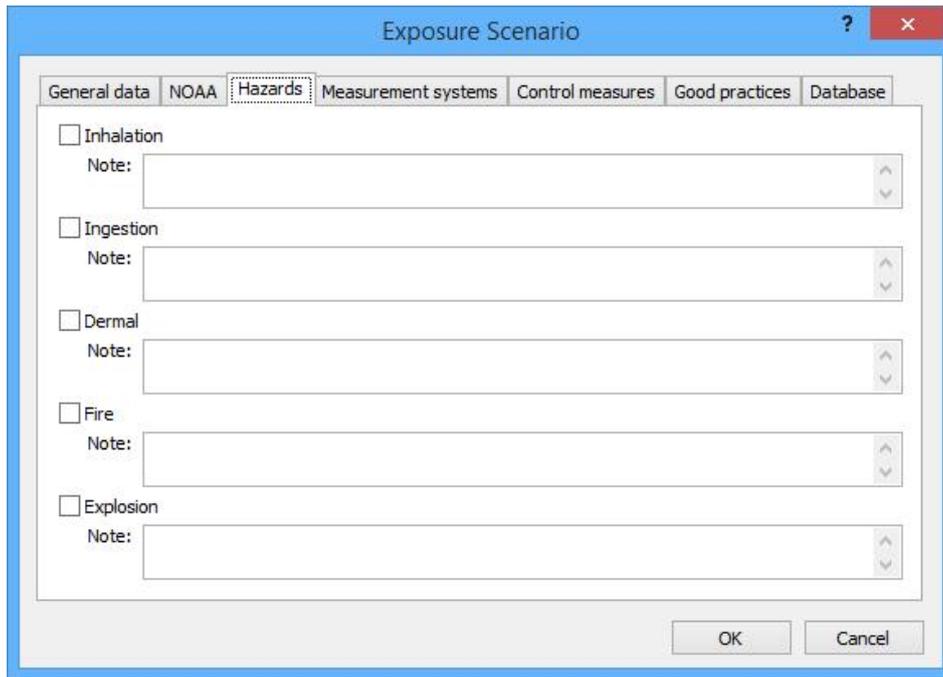


Figure 23 - Exposure scenario (hazards)

You can also get additional help by clicking on the question mark located at the top right corner of the window and then on one of the hazards. Doing that opens a window like this one:

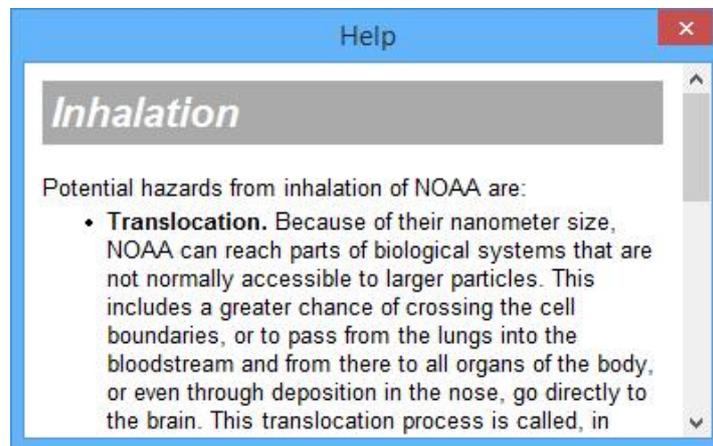


Figure 24 - Hazards help

- Measurement systems. Here, you have to select the measurement systems to be used in this scenario.

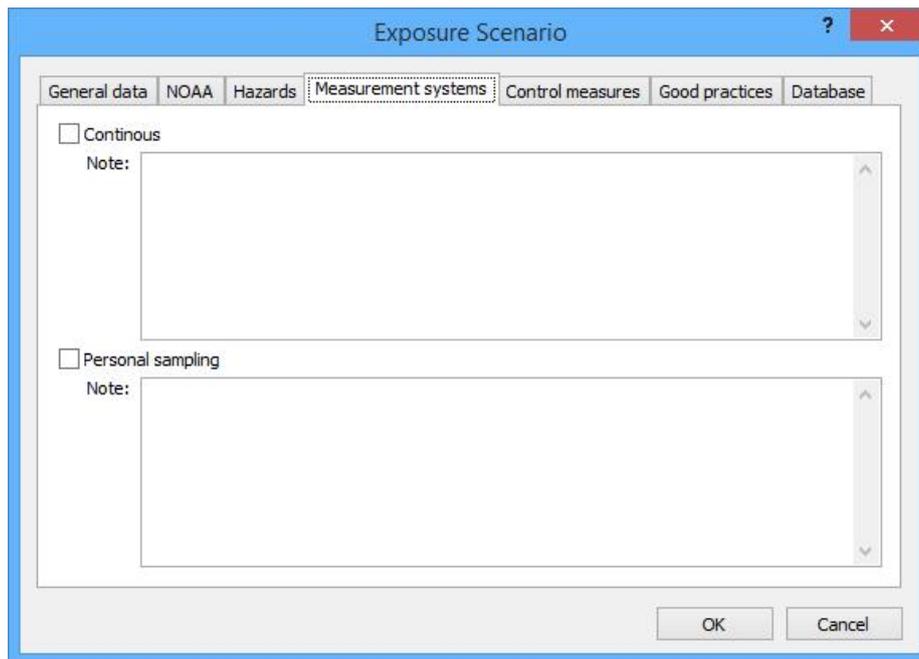


Figure 25 - Exposure scenario (measurement systems)

- Control measures. This section allows you to enter the control measures to be implemented in this scenario:

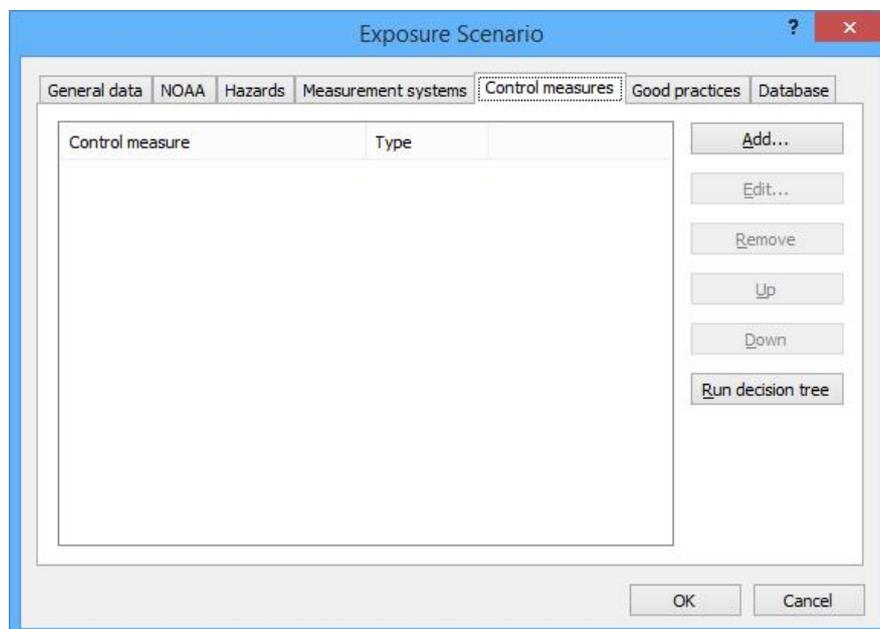


Figure 26 - Exposure scenario (control measures)

You can use the right side buttons to add, edit or remove control measures. You can also rearrange them using the "Up" and "Down" buttons.

When you add or edit a control measure, the following window is displayed:

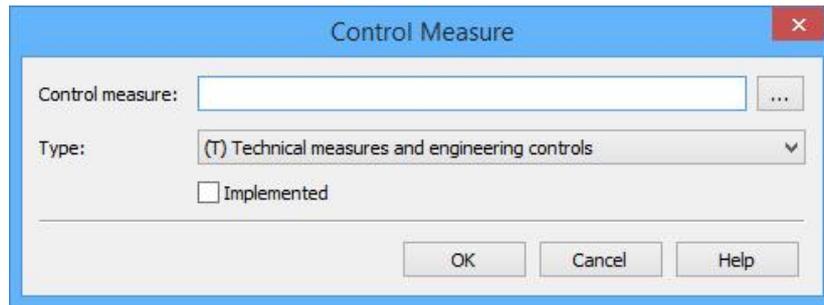


Figure 27 - Control measure dialog

Here, you have to enter the description of the control measure, its type (substitution, technical, organizational or PPE) and if it has been already implemented. You can also access to a list of available control measures by pressing the “...” button (available for technical and PPE types):

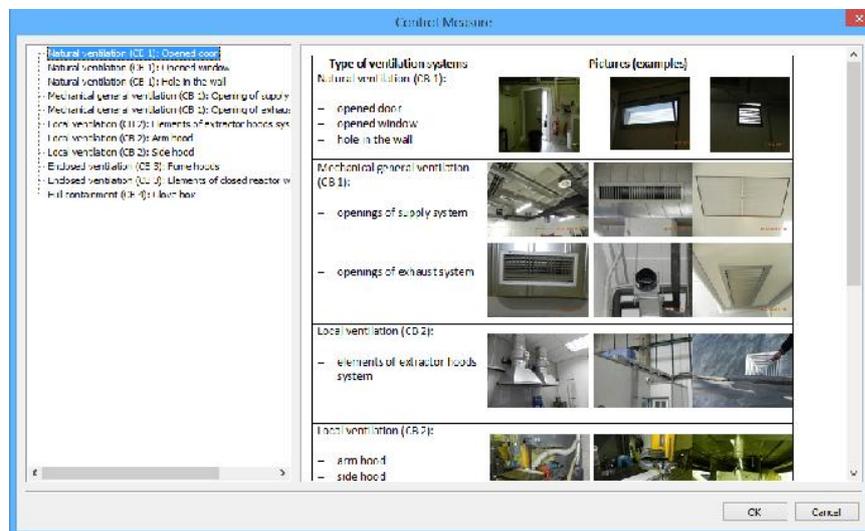


Figure 28 - List of available control measures

If you need further help, you can press the “Help” button to access to the library information. Once you have finished entering the control measure, press “OK”.

You can also run a decision tree to help you select the control measures needed for your processes. To execute it, click on “Run decision tree”. The following window will open:

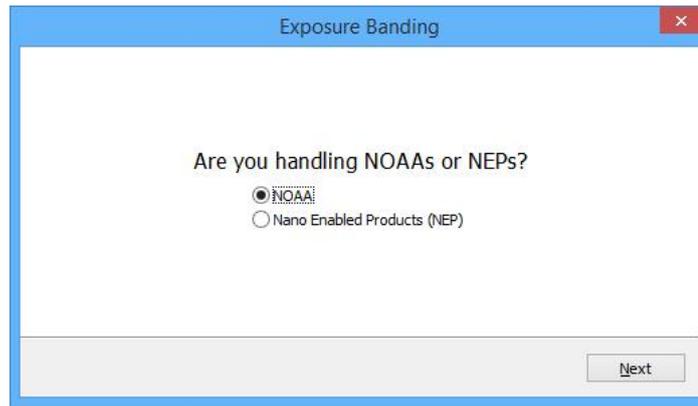


Figure 29 - Control measures decision tree

This dialog will guide you to select the control measures. Once you get to the end, it will display the resulting control measures and will add them to your scenario:

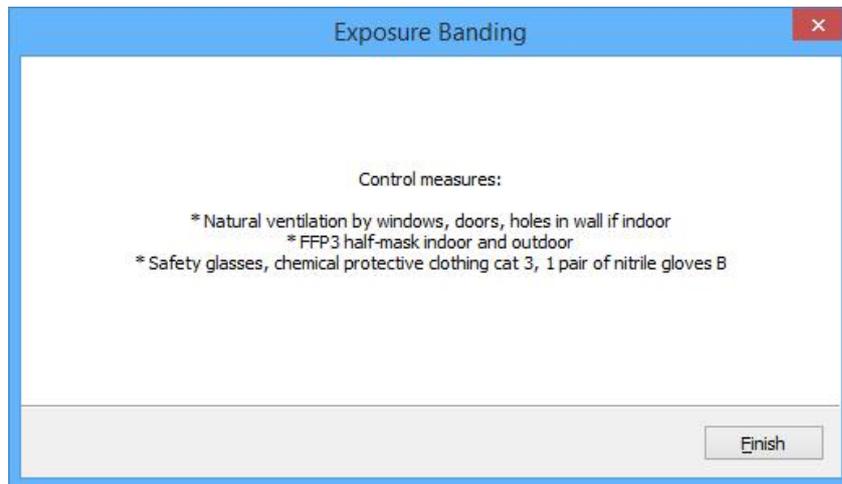


Figure 30 - Resulting control measures

- Good practices. This tab allows you to select what good practices should be followed:

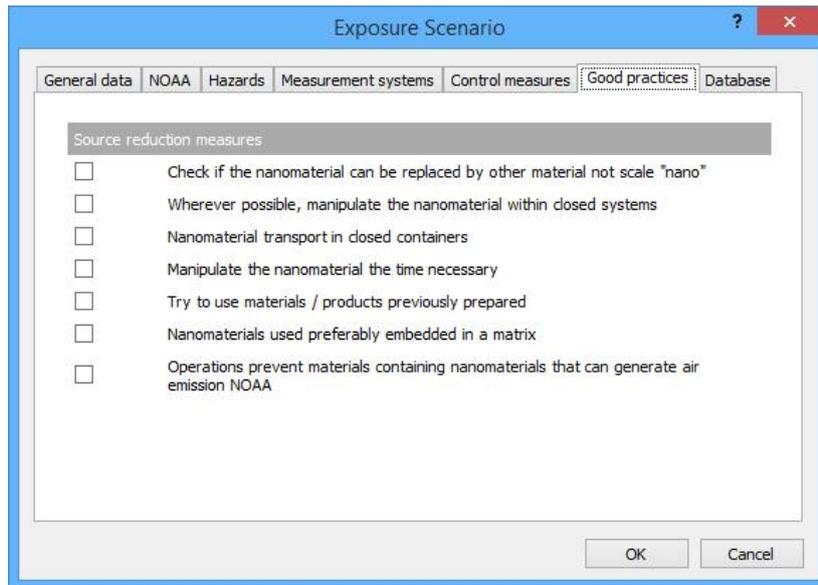


Figure 31 - Exposure scenario (good practices)

These good practices are updated according to the selected control measures.

- Database. This section enables you to enter the exposure level of the involved NOAAs, as well as the level of efficiency of the control measures:

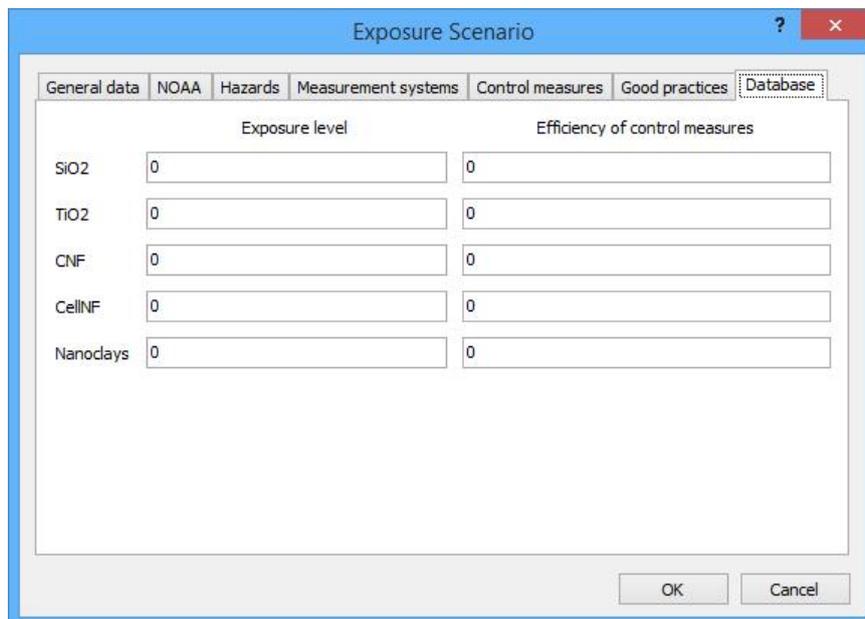


Figure 32 - Exposure scenario (database)

7. MODULE 3: RISK MANAGEMENT

This module enables the initial assessment, implementation and auditing of RMM guided step by step.

This menu offers the following options:

- Initial assessment
- Implementation
- Audit

7.1. INITIAL ASSESSMENT

After selecting this option, a panel is displayed at the left of the main window:

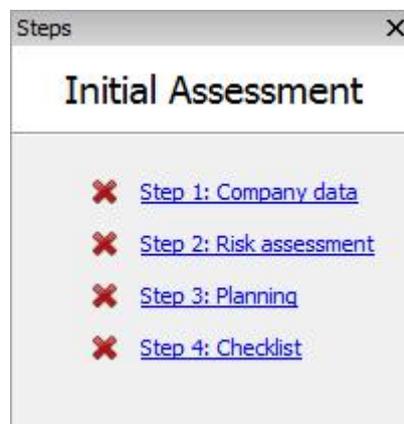


Figure 33 - Initial assessment panel

This panel guides you, step by step, through the initial assessment process. Clicking on each step opens a specific tool to complete it.

First, you have to enter your company details, if you have not done it yet. This process was explained on Module 2.

Then, click on "Step 2: Risk assessment". That will open the risk assessment tool.

7.1.1. Risk assessment

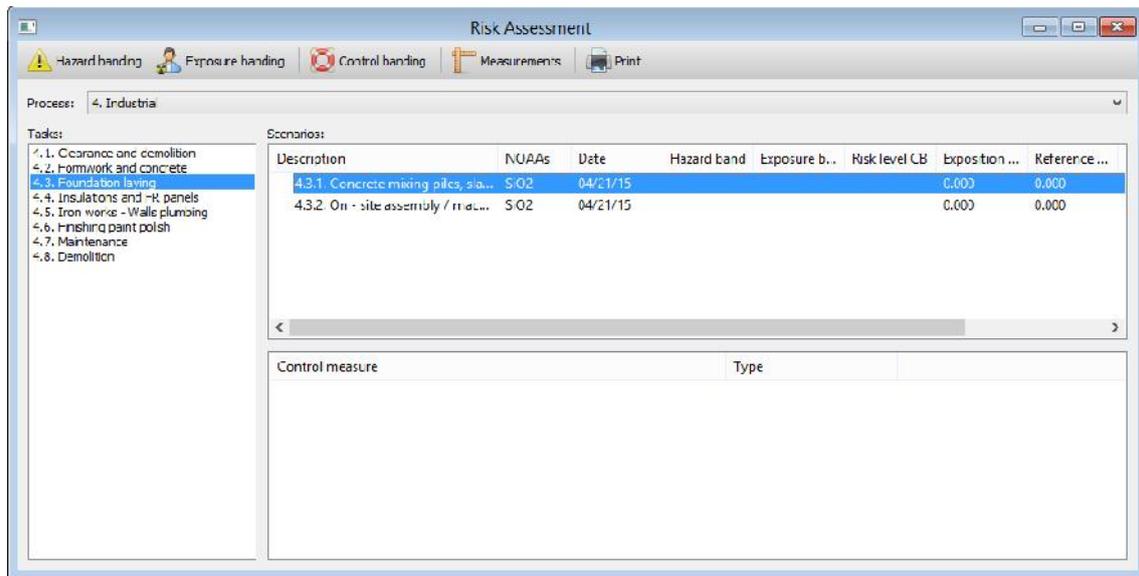


Figure 34 - Risk assessment tool

This tool allows you to calculate the risk level for each scenario and, therefore, for each task and process.

There are two methods to calculate the risk level:

- Control banding. This is a basic tool to be used when there are not any measurements available. You can enter the control banding values directly or following a flow chart.
- Exposure measurement. This method has preference over the previous one and it is based on actual measurements.

This window contains the following elements:

- Tool bar. A button bar to access to the most common functions.
- Process selector. A drop down that enables you to select the process you want to work with.
- Tasks. The list of tasks that make up the process.
- Scenarios. The list of scenarios that make up the selected task.
- Control measures. The list of control measures associated with the selected scenario.

The tool bar gives access to the following functions:

- Hazard banding. Runs the hazard banding flow chart.
- Exposure banding. Runs the exposure banding flow chart.

- Control banding. Calculates the resulting risk level after determining the hazard and exposure bands.
- Measurements. Allows you to enter direct measurements.
- Print. Prints the content displayed in the window.

Control banding

There are two ways of applying control banding to a scenario: directly or using flow charts.

To apply control banding directly, right click on a scenario and select "Set bands...". After doing that, the following window will be displayed:



Figure 35 - Manual banding dialog

Then, select the hazard band (A – E) and the exposure band (1 – 4). After that, press OK. You will see that control banding has been applied to the scenario and, therefore, a risk level has also been assigned:

| Scenarios: | | | | | | | |
|--------------------------------------|-------|----------|-------------|---------------|---------------|----------------|--|
| Description | NOAAs | Date | Hazard band | Exposure b... | Risk level CB | Exposition ... | |
| 4.3.1. Concrete mixing piles, sla... | SiO2 | 04/21/15 | A | 2 | 1 | 0.000 | |
| 4.3.2. On - site assembly / mac... | SiO2 | 04/21/15 | | | | 0.000 | |

Figure 36 - Risk assessment (scenarios)

The same objective can be achieved by using the flow charts. You will have to run two flow charts: one for hazard banding and another for exposure banding.

In order to access to the hazard banding flow chart, select a scenario and press "Hazard banding" on the tool bar. The following window will be displayed:



Figure 37 - Hazard banding flow chart

Here, you can check the "ISO 12901-2" and the "Stoffenmanager" tables for further help. To run the flow chart, answer to each question clicking on "Yes" or "No" as needed. Once you get to the end, it displays the assigned hazard band:



Figure 38 - Hazard banding result

Press "Finish". You will see that this hazard band has been assigned to the scenario:

| Scenarios: | | | | |
|--------------------------------------|-------|----------|-------------|---------------|
| Description | NOAAs | Date | Hazard band | Exposure b... |
| 4.3.1. Concrete mixing piles, sla... | SiO2 | 04/21/15 | E | |
| 4.3.2. On - site assembly / mac... | SiO2 | 04/21/15 | | |

Figure 39 - Hazard band result detail

Now, repeat the same procedure clicking on the "Exposure banding" button. Doing that will open the second flow chart:

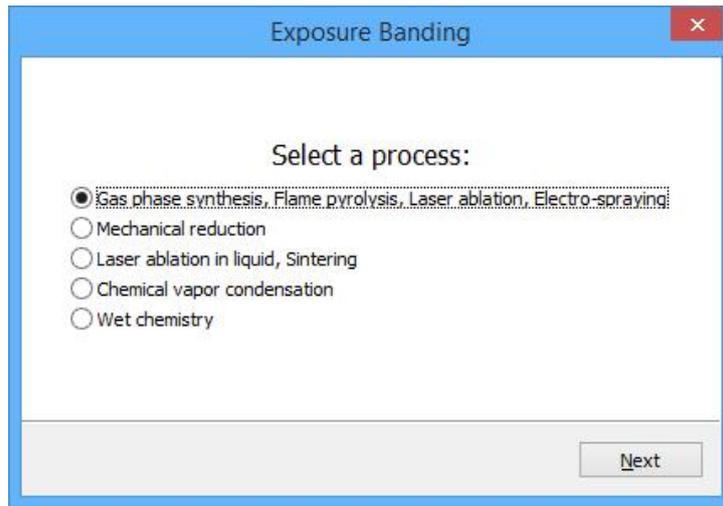


Figure 40 - Exposure banding flow chart

Again, select the instructions given until you get to the end of the flow chart. Then, it will display the resulting exposure band:



Figure 41 - Exposure banding result

This exposure band will be assigned to the scenario and the risk level will be calculated:

| Scenarios: | | | | | | |
|--------------------------------------|-------|----------|-------------|---------------|---------------|----------------|
| Description | NOAAs | Date | Hazard band | Exposure b... | Risk level CB | Exposition ... |
| 4.3.1. Concrete mixing piles, sla... | SiO2 | 04/21/15 | E | 4 | 5 | 0.000 |
| 4.3.2. On - site assembly / mac... | SiO2 | 04/21/15 | | | | 0.000 |

Figure 42 - Risk level detail

Direct measurement

In order to calculate the risk level using direct measurement, right click on a scenario and select "Set measurements...". You can also press the "Measurements" button on the tool bar. After doing that, the following dialog will be displayed:

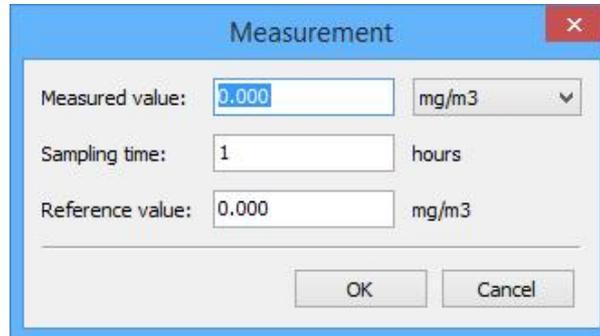


Figure 43 - Measurements dialog

Here, you have to enter the measured value, the sampling time in hours and the reference value. You can also configure the units used for sampling. After entering these values, the exposure value and the risk level will be calculated and displayed in the scenario line:

| Exposition value | Reference value | Exposure value | Risk level EM |
|------------------|-----------------|----------------|---------------|
| 0.050 mg/m3 | 0.100 mg/m3 | 50.00 | Medium |
| 0.000 | 0.000 | 0.00 | |

Figure 44 - Measurements detail

The risk level can be low, medium or high depending on the resulting exposure value. The thresholds for each level can be modified by right clicking on the scenario and selecting "Set risk thresholds...". Doing that opens the following dialog:



Figure 45 - Risk thresholds dialog

Here, you can configure the desired risk thresholds. Press OK and the risk level will be recalculated according to the new thresholds. If the resulting risk level is high and the scenario does not have any control measures, a warning message will be displayed:



This message will turn orange when we add control measures and they are not implemented yet:



And, finally, the message will turn green once we have added and implemented control measures to overcome the problems:



Control measures

The bottom right list of the window displays the control measures assigned to the selected scenario:

| Control measure | Type |
|---------------------|------------------|
| ✓ Control measure 1 | (S) Substitution |

Figure 46 - Control measures list

To add a new control measure, right click on the list and select "Add control measure...". Doing that will open the following dialog:

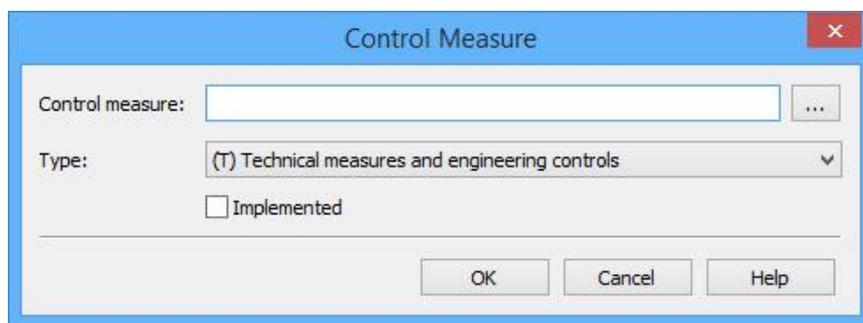


Figure 47 - Control measure dialog

Enter the details of the control measure and press OK. In case you need a list of available control measures, you can click on the “...” button. That will open a window in which you will be able to select the desired control measure:

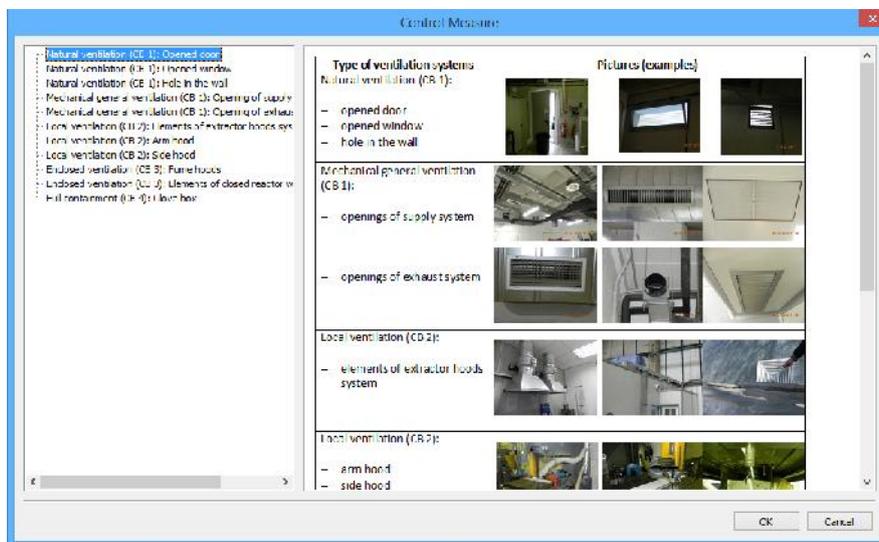


Figure 48 - List of available control measures

Once the control measure has been entered, it will be added to the list. If the control measure is already implemented, a green tick icon will appear at the left of the control measure. Otherwise, a red icon will be displayed. The warning message on top of the control measures list will be updated consequently.

You can also run a decision tree to help you select the control measures needed for your processes. To execute it, right click on a scenario and select the option “Run control measure decision tree”. The following window will open:

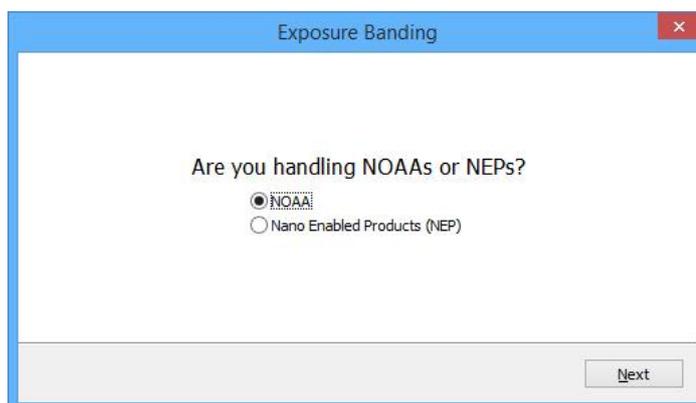


Figure 49 - Control measures decision tree

This dialog will guide you to select the control measures. Once you get to the end, it will display the resulting control measures and will add them to your scenario:

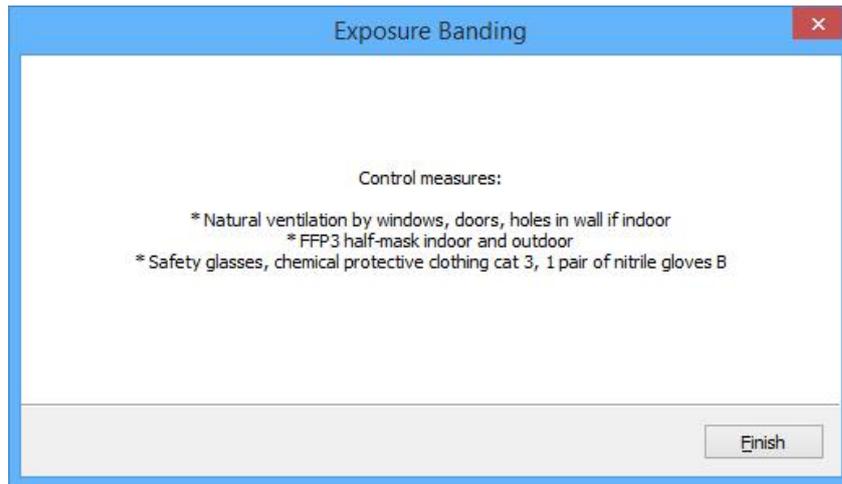


Figure 50 - Resulting control measures

7.1.2. Planning

Once the risk assessment has been completed, click on "Step 3: Planning" on the right side panel. The planning tool will open:

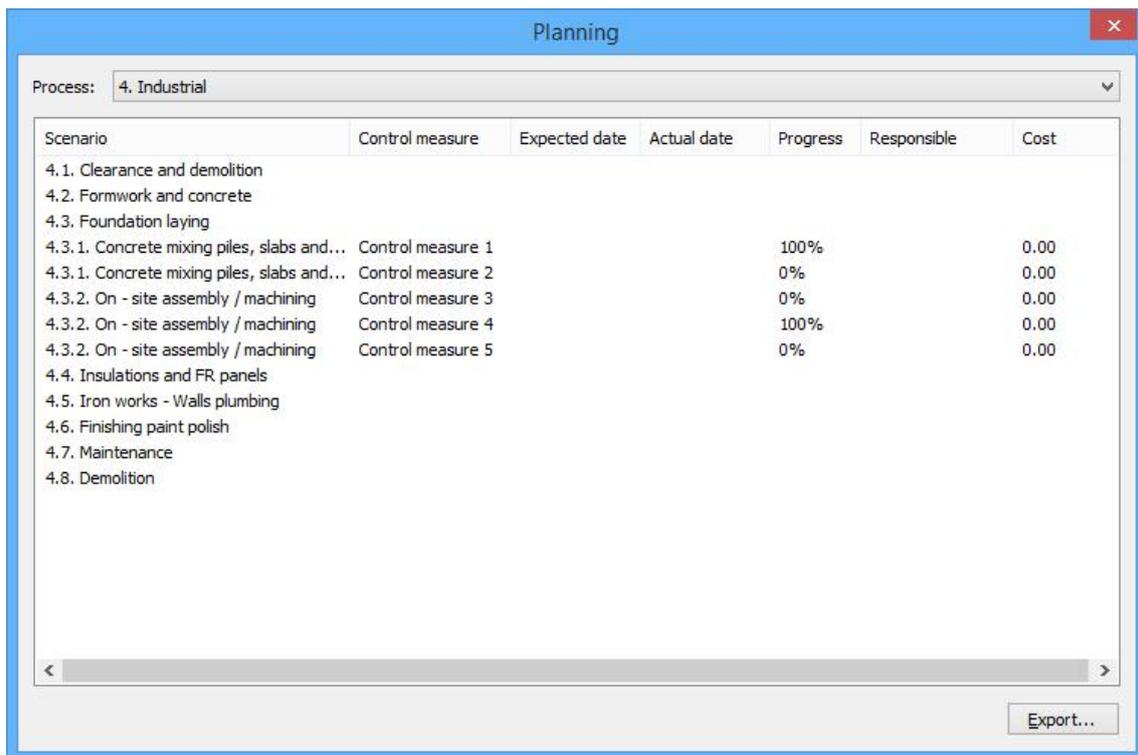


Figure 51 - Planning window

The contents of the planning are based on the control measures entered in the risk assessment tool. If a control measure was marked as implemented, it will appear here with a 100% progress.

At the top of the window, we can select the process we are working with. If the process is changed, the contents of the planning will be updated accordingly.

For each control measure, the following parameters can be configured here:

- Expected date. The date on which we expect to have the control measure implemented.
- Actual date. The actual date on which the control measure was implemented.
- Progress. The progress we have made implementing the control measure.
- Responsible. The person in charge of implementing the control measure.
- Cost. The monetary cost of implementing the control measure.

To edit these parameters, double click on a control measure. The following window will be displayed:

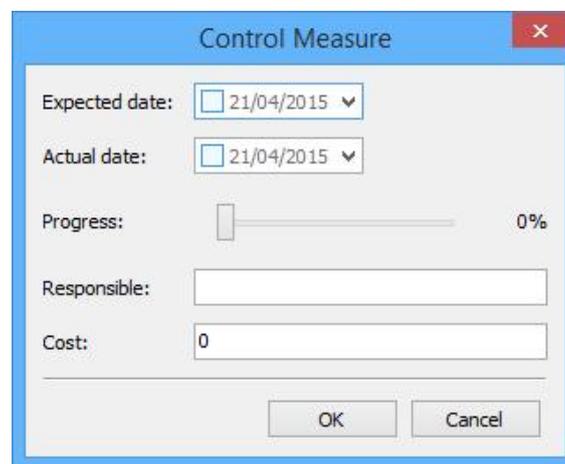


Figure 52 - Control measure planning

Here, you can configure the parameters described previously. When finished, press OK and you will see these new values updated in the planning window:

| Scenario | Control measure | Expected date | Actual date | Progress | Responsible | Cost |
|--|-------------------|---------------|-------------|----------|---------------|---------|
| 4.1. Clearance and demolition | | | | | | |
| 4.2. Formwork and concrete | | | | | | |
| 4.3. Foundation laying | | | | | | |
| 4.3.1. Concrete mixing piles, slabs and... | Control measure 1 | | | 100% | | 0.00 |
| 4.3.1. Concrete mixing piles, slabs and... | Control measure 2 | 05/21/15 | | 32% | John Anderson | 1200.00 |
| 4.3.2. On - site assembly / machining | Control measure 3 | 06/21/15 | | 18% | Rachel Fox | 800.00 |
| 4.3.2. On - site assembly / machining | Control measure 4 | | | 100% | | 0.00 |
| 4.3.2. On - site assembly / machining | Control measure 5 | | | 0% | | 0.00 |
| 4.4. Insulations and FR panels | | | | | | |
| 4.5. Iron works - Walls plumbing | | | | | | |
| 4.6. Finishing paint polish | | | | | | |
| 4.7. Maintenance | | | | | | |
| 4.8. Demolition | | | | | | |

Figure 53 - Planning detail

You can export this planning to Excel by pressing on the “Export...” button and selecting a destination file.

7.1.3. Checklist

Finally, to complete the initial assessment, you have to complete the diagnostic checklist. To do that, click on “Step 4: Checklist”. The following window will appear:

| Question | Yes | No | Comments |
|--|------------------------------|-----------------------------|----------------------|
| 4.1. Requirements for the Occupational Health and Safety MNMs Risk Management Model ? | | | |
| 1. What is the scope of the MNMs RMM? | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="text"/> |
| 5. Has your organization identified the external and internal context? | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="text"/> |
| 7. Has your organization identified the internal and external stakeholders affected to MNMs RMM? | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="text"/> |

[Next >](#)

Figure 54 - Diagnostic checklist

The checklist, which is based on Scaffold’s Guide for RMM implementation and audit in the SMEs (SPD16), consists of a list of questions grouped in different blocks. For

usability, the checklist has been split into different pages, which can be accessed using the arrow buttons and the drop down of the tool bar:

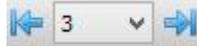


Figure 55 - Pagination control

In order to answer to the questions, click on “Yes” or “No” as needed. You can also add some comments at the right of the question.

When a question is answered with “No”, some hints may appear at the bottom of the window to help you meet the requirements of the question. For example, after clicking “No” on question 29, the following panel appears:



Figure 56 - Question hint

That panel gives you access to some flow charts and procedures. You can click on the blue links to access to them.

Besides, some blocks also provide hints based on the contents of Scaffold’s Guide for RMM implementation and audit in the SMEs (SPD16). To access to them, click on the blue question mark next to the block title:



Figure 57 - Checklist help button

Doing so opens a window like this one:

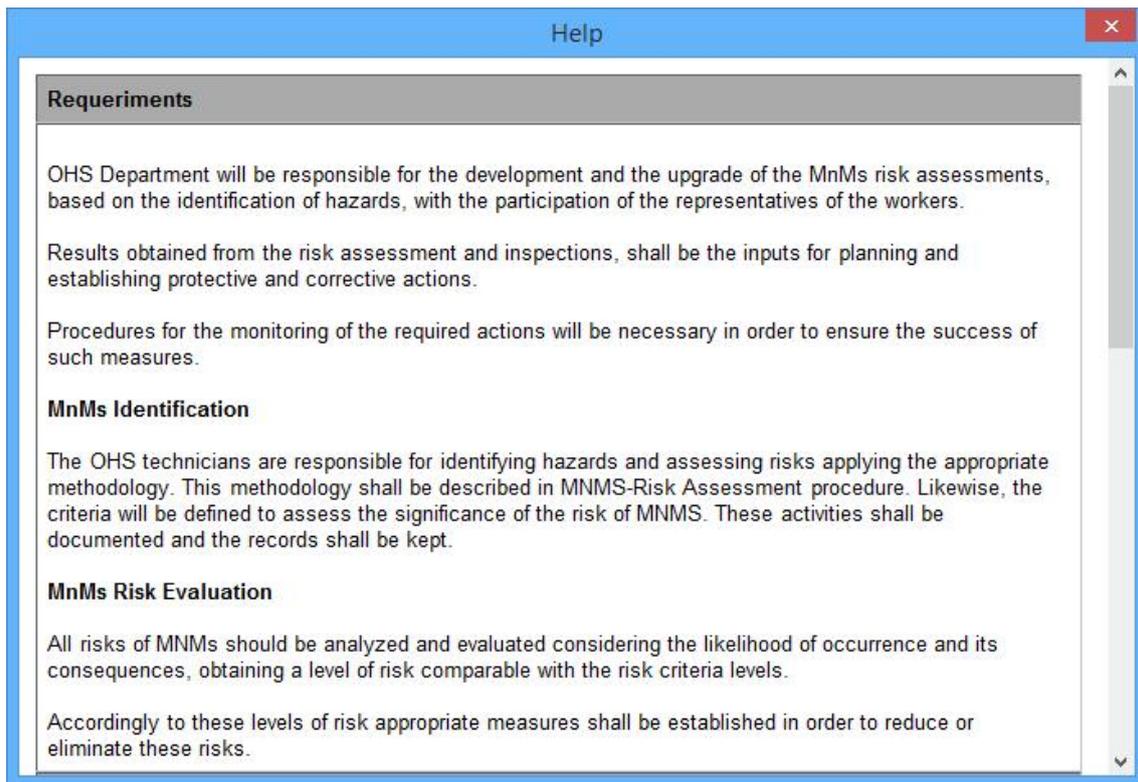


Figure 58 - Checklist help detail

Once you have finished answering the questions, validate your answers by clicking on the green tick icon ().

You can also view a histogram with your answers by clicking on this tool bar button: 

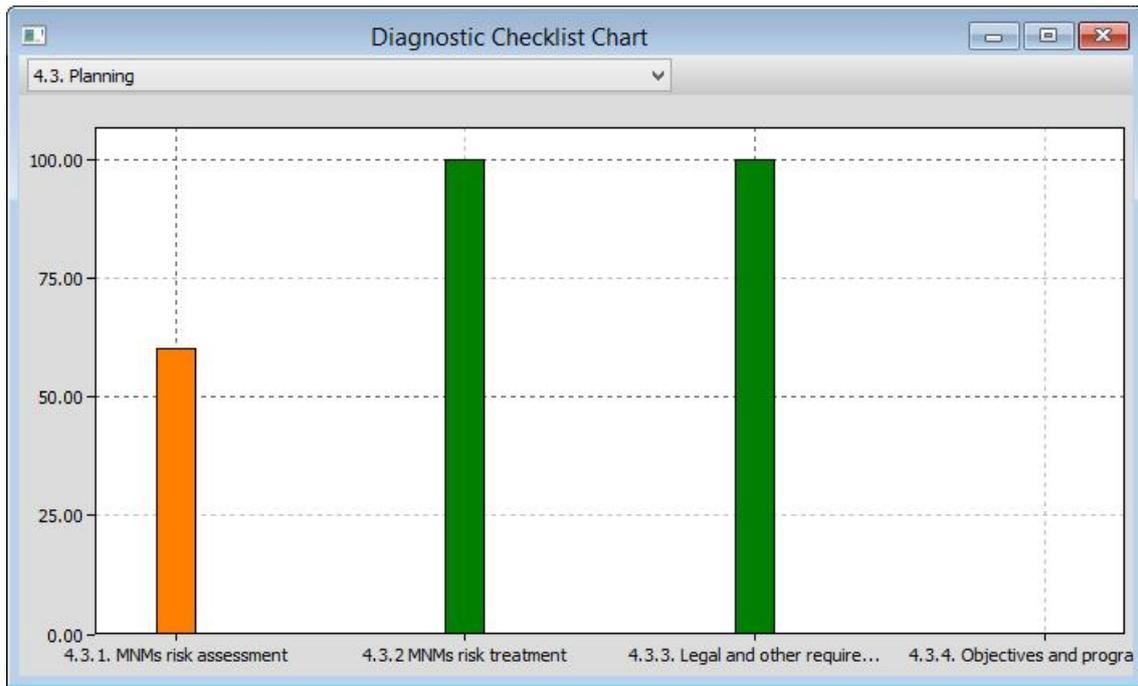


Figure 59 - Checklist chart

In case you need to clear all your answers, you can do that pressing the rubber button ().

Finally, you can print your answers with the printer button ().

7.2. IMPLEMENTATION

This option works in the same way as the previous one. It only changes the checklist, as its questions are now related to the implementation stage.

7.3. AUDIT

Again, this options works in the same way as the previous ones, but the checklist is now related to the audit stage.

8. MODULE 4: TOOLS

This module contains the toolbox for nanosafety management. The checklists, the risk assessment tool and the planning tool are disabled in risk management mode, as they must be managed from Module 3. The remaining options are enabled in both learning and risk management mode.

8.1. RISK MANAGEMENT

This option gives you access to the initial assessment, implementation and audit checklists. They work in the same way as explained in Module 3. The only difference is that they are not customized to our company.

8.2. RISK ASSESSMENT

The risk assessment tool works as explained in Module 3, but here it does not display our company processes, as it should be used to get familiar with it in learning mode.

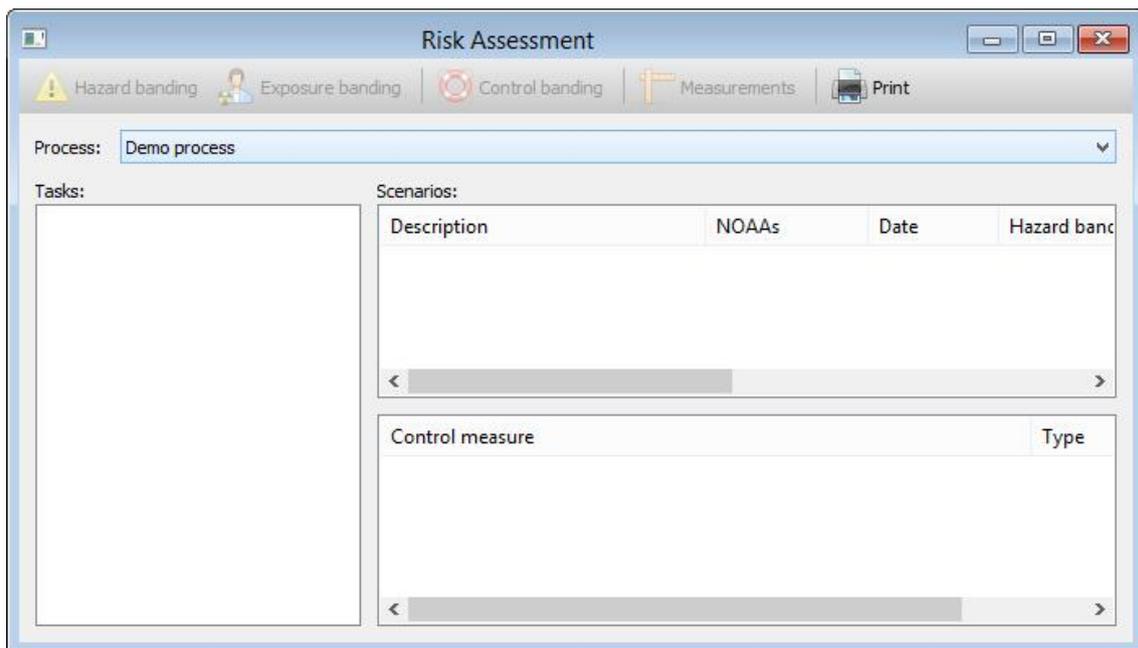


Figure 60 - Risk assessment tool in learning mode

In order to add tasks to test the tool, right click on the "Tasks" list and select the option "Add task...". Doing that will open the following window:

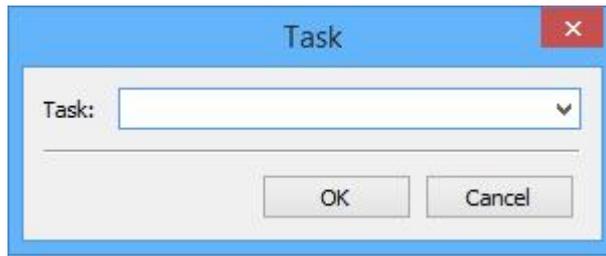


Figure 61 - New task dialog

Fill out the description of the task and press "OK". The new task will now appear in the risk assessment tool.

In order to add a new scenario, select a task and then right click on the "Scenarios" list and select the option "Add scenario...". After doing that, the following dialog will be displayed:

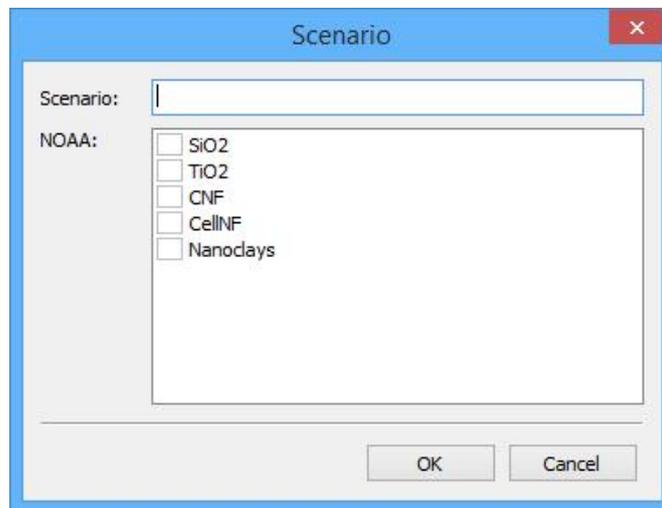


Figure 62 - New scenario dialog

Enter the name of the scenario and check the NOAAs involved in it. Then, click "OK". The new scenario will now appear in the risk assessment tool.

8.3. PLANNING

The planning tool works as explained for Module 3. The only difference is that here is not customized to our company.

8.4. KPIS

This tool allows you to define, implement and monitor a KPI system. The tool looks like this:

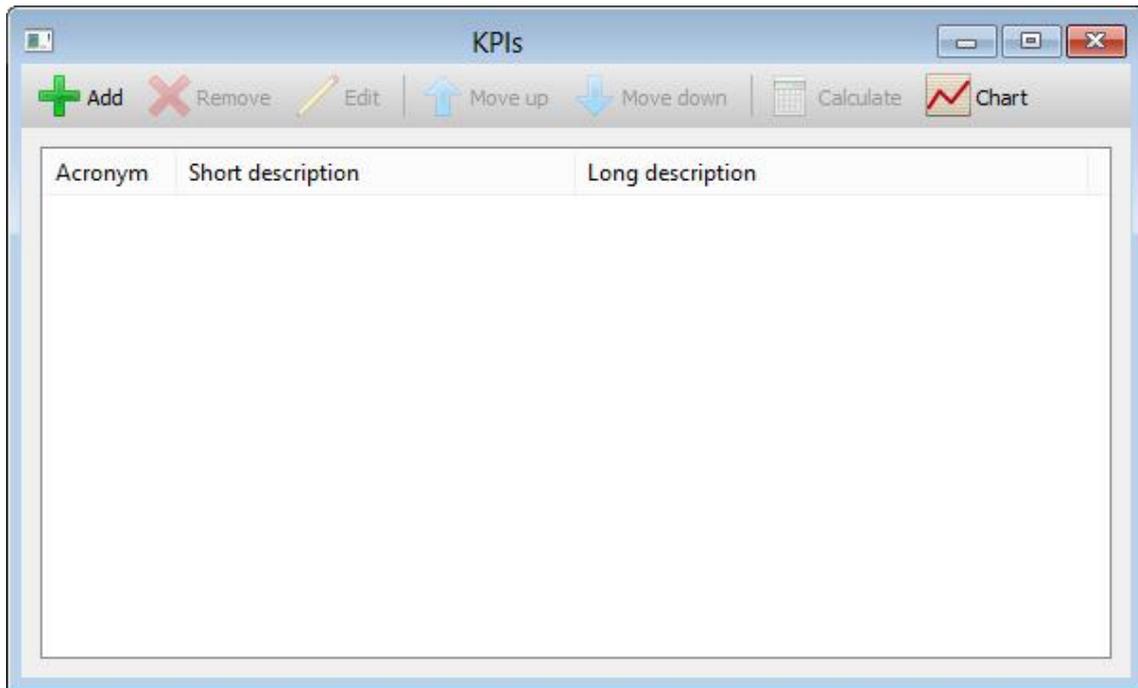


Figure 63 - KPI tool

It consists of a tool bar and a list of KPIs. The tool bar buttons give you access to the following functions:

- Add. Adds a new KPI. The window with the parameters to be filled out will be explained in the next section.
- Remove. Removes the selected KPI.
- Edit. Edits the selected KPI. The window to edit the KPI is the same as in the "Add" option.
- Move up. Moves up in the list the selected KPI.
- Move down. Moves down in the list the selected KPI.
- Calculate. Opens a CSV file, takes a list of values from it and calculates the selected KPI for each row.
- Chart. Displays a line chart with the evolution of the selected KPI. The KPI must have been calculated before.

8.4.1. Adding a new KPI

As explained before, the "Add" button allows you to create a new KPI. Pressing this button opens the following window:

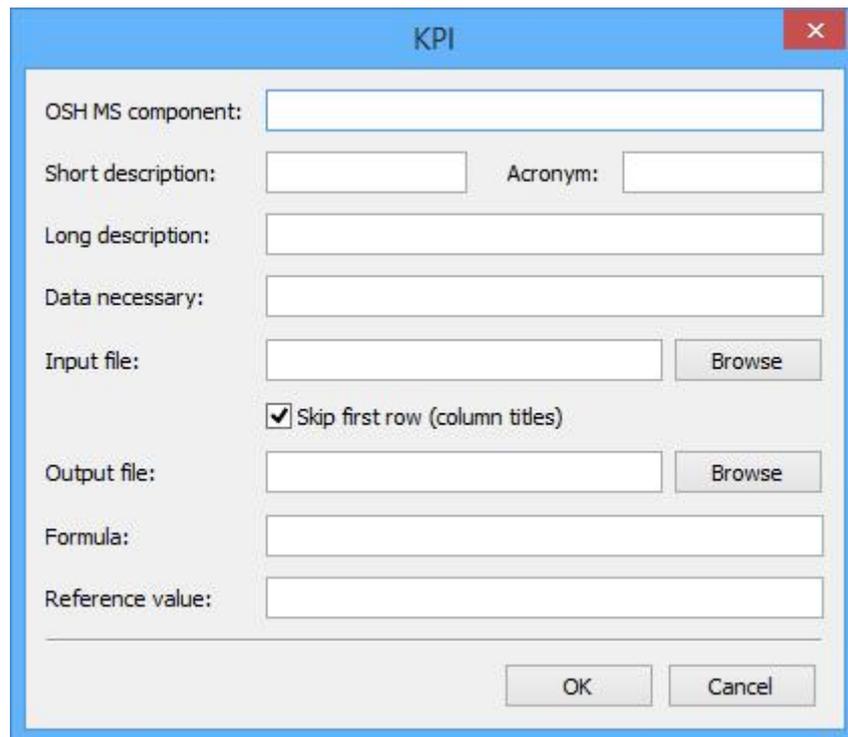


Figure 64 - KPI detail dialog

Fill out the information about the KPI, paying special attention to the following fields:

- Input file. Select a CSV file from which the input values to calculate the KPI will be taken. Excel has the ability to generate this file selecting the appropriate file type in the “Save as” dialog.
- Skip first row. Usually, the first row in Excel files contains the names of the columns instead of actual data. If this is your case, check this option to skip this row when calculating the KPI.
- Output file. Select a CSV where the calculated KPI values will be generated. This file will be overwritten each time the KPI is recalculated.
- Formula. Enter the formula to calculate the KPI. Here, each column of the file is referenced by a letter in alphabetical order. For example, the first column will be referenced as “A”, the second as “B” and so on. The formula may contain the following operators and functions:
 - Operators: +, -, *, /, % (module), ^ (power)
 - Functions: min, max, avg, sum, abs, ceil, floor, round, roundn, exp, log, log10, logn, root, sqrt, clamp, inrange.
 For example, this formula will add columns A and B then it will multiply the result by column C: $(A + B) * C$
- Reference value. Enter a reference KPI value, which will be represented with a line in the KPI evolution chart.

8.4.2. Calculating a KPI

To calculate a KPI, select it in the list and then press the “Calculate” button. That triggers the following actions:

- Reads the CSV input file. Each row should contain a set of values to be used to calculate the CSV using the KPI formula.
- Each row of the input file generates a KPI value. This KPI value is written to the output CSV file.
- The application stores internally the KPI evolution to be able to plot it.

If everything is correct, the application will display a message indicating that the KPI has been calculated successfully.

8.4.3. Plotting a KPI

To plot a KPI, select it in the list and then press the "Chart" button. If the KPI has been correctly calculated before, a window like this one will be shown:

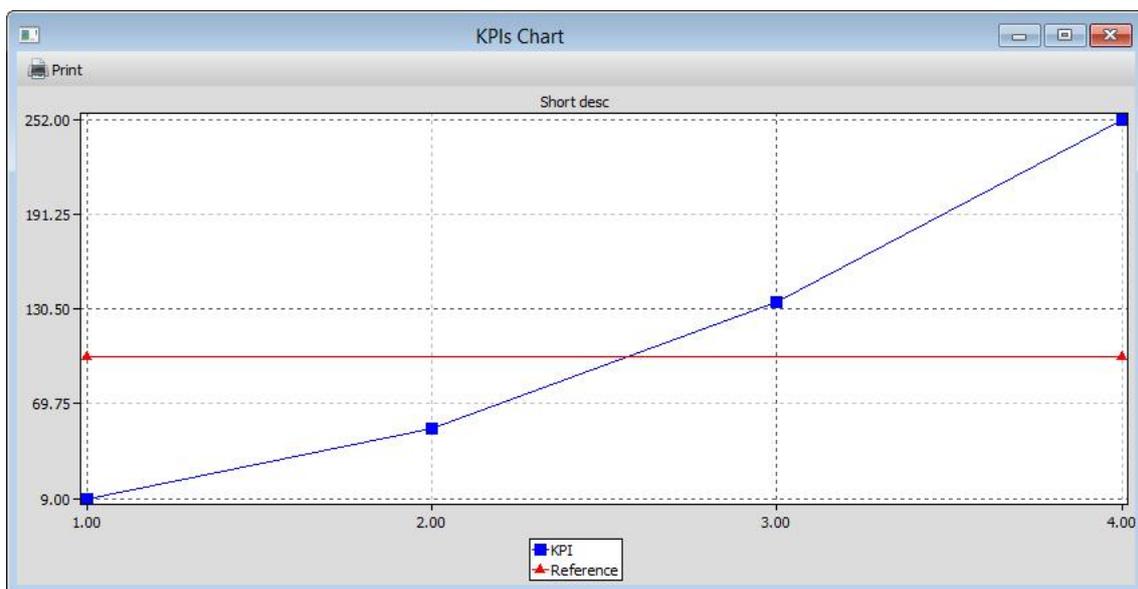


Figure 65 - KPI evolution chart

The blue line represents the KPI evolution, while the red one denotes the reference value.

You can print out the chart by pressing the "Print" button.

8.5. PROCEDURES, RECORDS AND MANUALS

This option opens a list of Word documents with procedures, records and manuals. Clicking on an item opens it in Word.

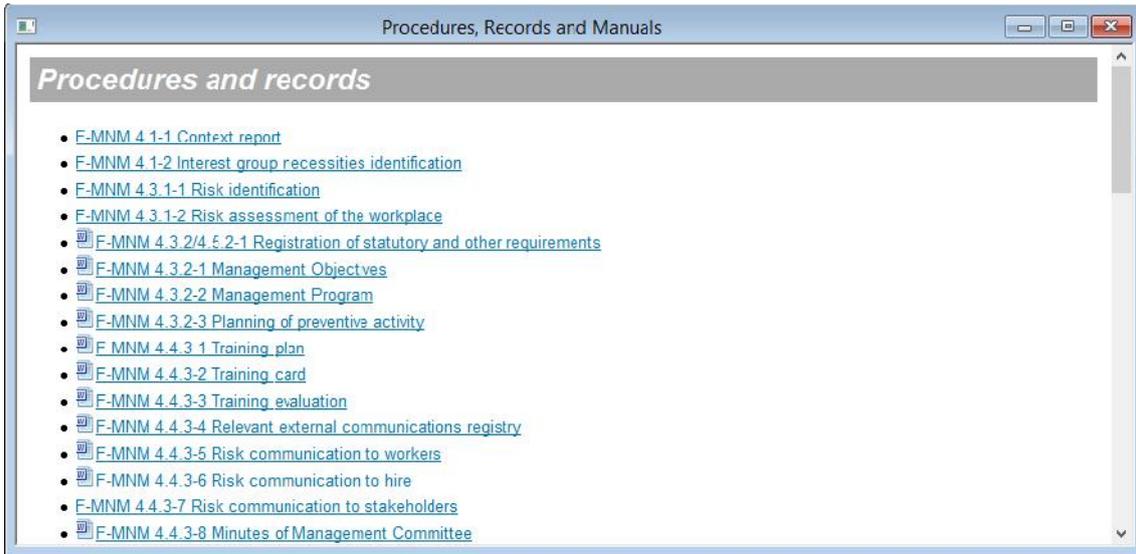


Figure 66 - Procedures, records and manuals

8.6. TRAINING

This option opens the following window:

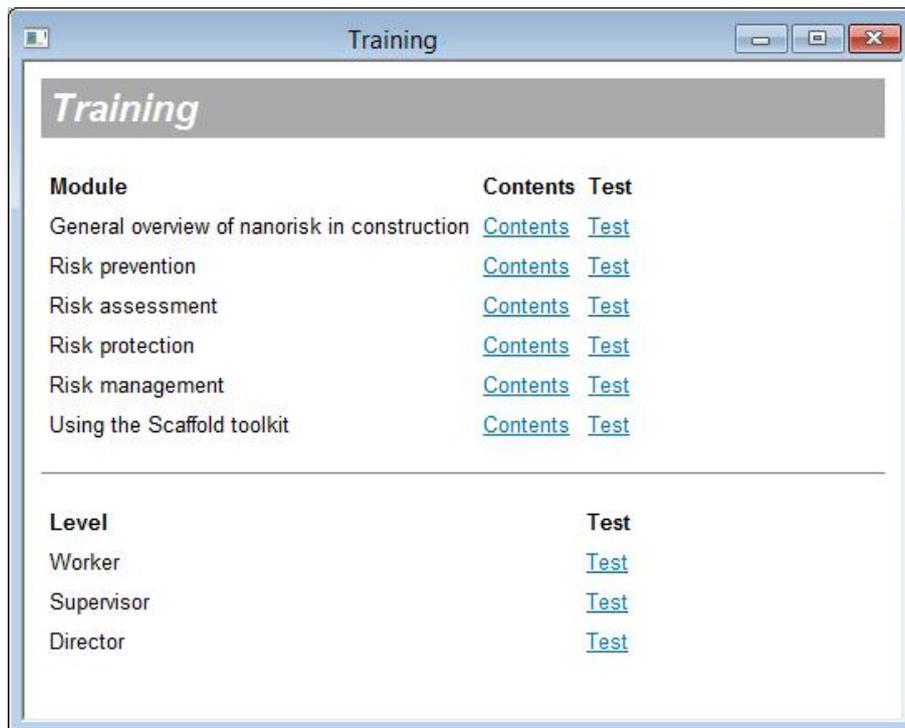


Figure 67 - Training tool

Here, you can learn about the following contents:

- Module 1: General overview of nanorisk in construction
- Module 2: Risk prevention

- Module 3: Risk assessment
- Module 4: Risk protection
- Module 5: Risk management
- Module 6: Using the Scaffold toolkit

Each module consists of a slides presentation and a test. You can access both of them through the “Contents” and “Test” links. Besides, there are three unified tests about all the modules at three levels: worker, supervisor and director.

The “Content” link opens a window with the slides. You can browse through all the pages with the arrows and the selector.

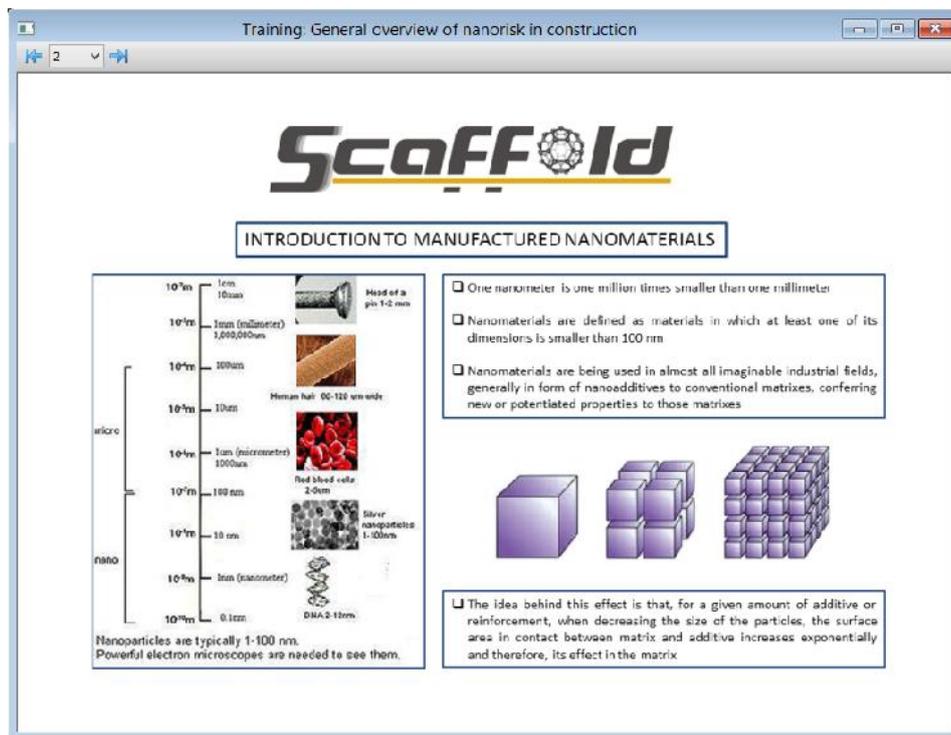


Figure 68 - Training content

The “Test” link opens a window with a test about the slides. You have to answer each question. Once you have answered a question, you can move to the next one by pressing the “Next” button. You can also go back at any time with the “Previous” button. Once you have finished the test, press the “Finish” button. Then, you will be able to see your score.

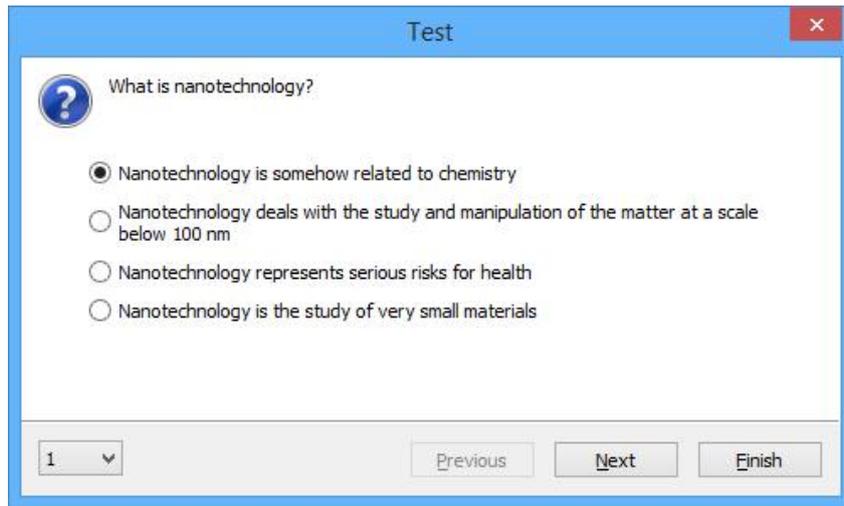


Figure 69 - Training test

The questions in the test can be configured executing the option “Training test configuration” from the “File” menu. That opens the following dialog:

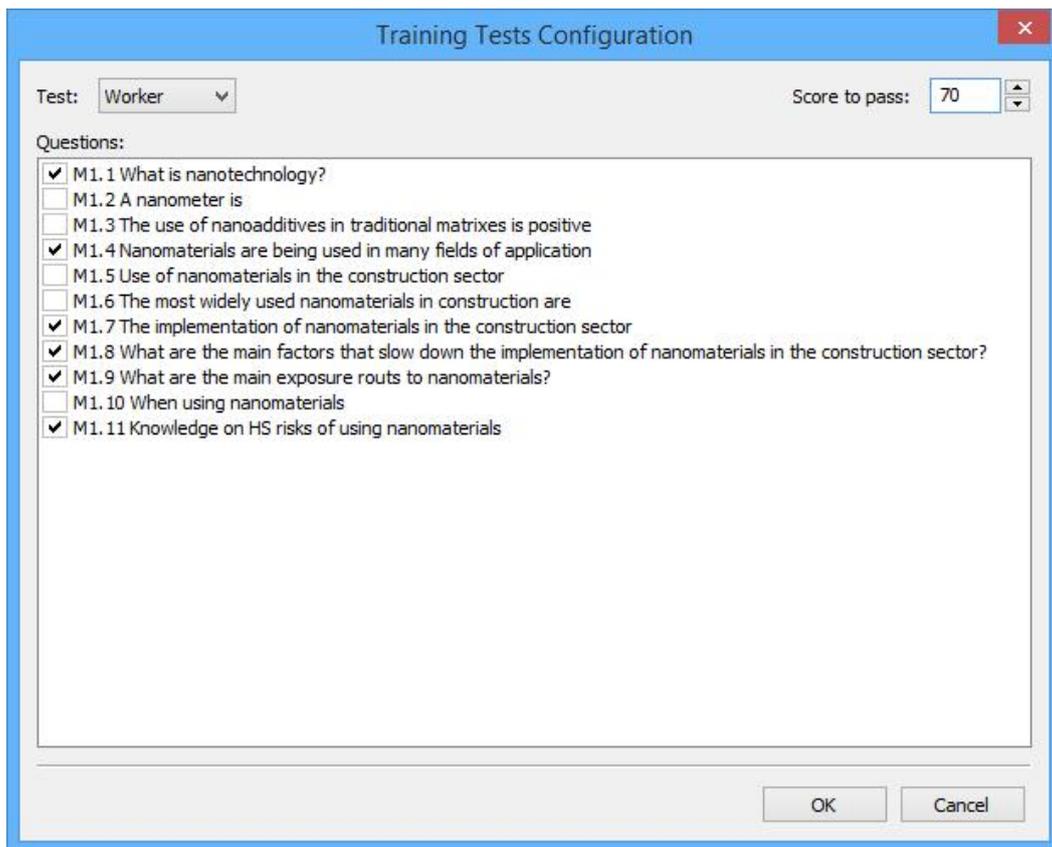


Figure 70 - Training test configuration

Here, you can select the questions to be included in each level and module. Furthermore, you can set the minimum score required to pass.

8.7. REGULATIONS AND STANDARDS

This option displays a window with a list of European and national regulations related to nanotechnology.



Figure 71 - Regulations and standards

8.8. TERMS AND DEFINITIONS

This option displays a window with a list of terms and definitions extracted from the European regulation.

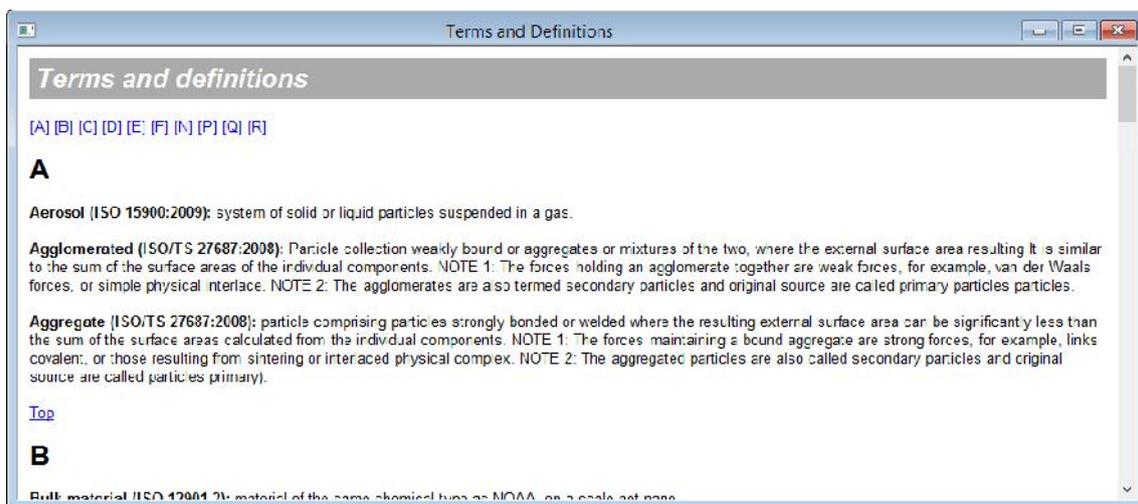


Figure 72 - Terms and definitions

8.9. FAQ

This menu entry opens a window that presents list of Frequently Asked Questions regarding management of risks associated with MNMs in the construction sector.

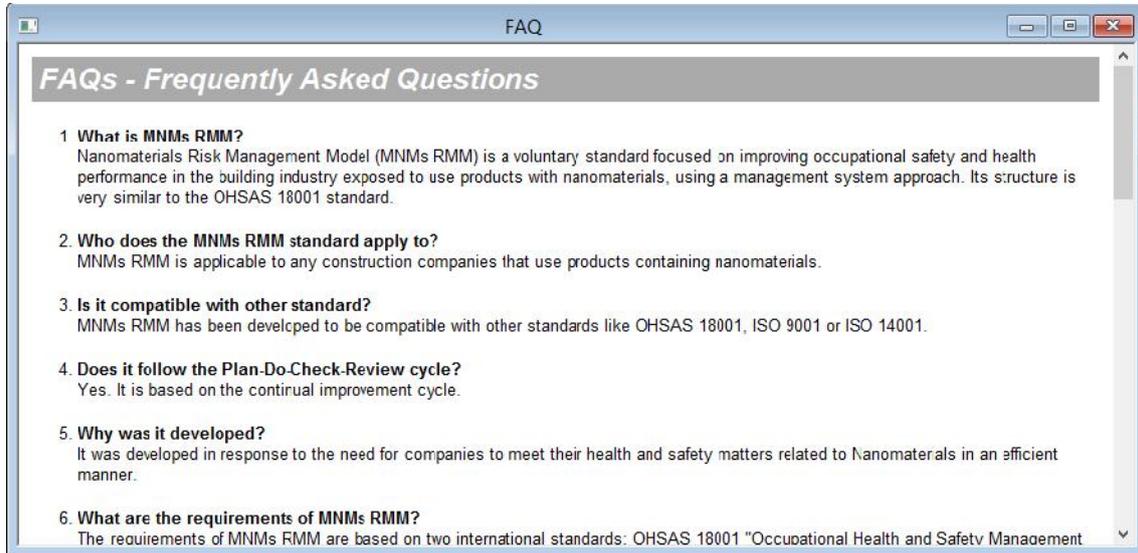


Figure 73 - FAQ

9. MODULE 5: HELP

This module gives you access to the following options:

- Help. Displays this help about.
- About. Displays information about the application.

10. MISCELLANEOUS OPTIONS

The application also contains two additional menus, called "File" and "Window". The "File" menu manages opening and saving files, printing and report generation, while the "Window" menu allows you to arrange and organize the opened windows.

The "File" menu offers the following options:

- Open. Opens a Scaffold file with all the information of our company (checklists, planning, risk assessment, KPIs,...), which must have been previously saved.
- Save. Saves to a file all the information and data entered in the toolkit.
- Export report to Word. Generates a Word file with a report containing all the information entered in the toolkit.
- Print report. Prints out a report with all the information and data entered in the toolkit.
- Training test configuration. Allows you to configure the questions to be included in each level and module in the training tool.
- Quit. Quits the application.

The "Window" menu contains the following utilities:

- Cascade. Arranges all the windows so they overlap with title bars visible.
- Tile horizontally. Arranges all the windows horizontally.
- Tile vertically. Arranges all the windows vertically.
- Next. Moves the focus to the next window.
- Previous. Moves the focus to the previous window.

11. TOOLKIT MAINTENANCE

The toolkit has the ability to be maintained and updated without needing to recompile the application, by means of XML, INI and HTML files. These files can be found in the folder where the toolkit is installed.

11.1. XML FILES

The XML files can be found in the "xml" folder. It contains the following files:

- Applications.xml. Contains the information displayed in the library under the "Products and applications" tab. Each XML node should contain the name of the entry and an HTML file with the description of the item. The HTML files are stored in the "html/applications" folder.
- Checklist.xml. This file contains all the questions presented in the checklists. Each question (node "question") should have the following attributes:
 - ID. A unique numeric identifier.
 - Stage. A string containing the stages in which this question should be shown: "d" for diagnostic, "i" for implementation and "a" for audit. For example, if a question should be displayed in diagnostic and implementation, the stage attribute should be set to "di".
 - Sme. If this question is specific for SMEs, this attribute should be set to 1.

To display a title bar, you have to use the "title" node. This node requires the following attributes:

- Level. Title level.
- Dp. The number of points that a question answered with "Yes" has to add to our score in the diagnostic stage.
- Ip. The number of points that a question answered with "Yes" has to add to our score in the implementation stage.
- Ap. The number of points that a question answered with "Yes" has to add to our score in the audit stage.
- DpSme, IpSme, ApSme. The same as the previous attributes, but for SMEs.
- Chart. Set this attribute to 1 if this section should be displayed in the chart.
- Help. An HTML help file for this section.

To add a page break, add a "break" node to the XML file.

- GoodPractices.xml. This file has a structure similar to the Applications.xml file. It contains the library information for the "Good Practices" tab.
- Hazards.xml. This file has a structure similar to the previous one, but for the "Hazards" library tab.
- MeasSystems.xml. This file is similar to the previous ones, but structured as a tree instead of a plain list. It contains the information related to the "Measurement Systems" tab.
- Noaas.xml. This file contains the list of NOAAs and an HTML with information for each one, which will be displayed in the "NOAAs" tab of the library.

- **Processes.xml.** This is one of the most important files. It contains all the information related to processes, tasks, scenarios and NOAAs for each scenario. A process should contain the following nodes:
 - **Name.** The name of the process.
 - **File.** An HTML file containing information about the process for the library.
 - **Tasks.** The list of tasks involved in the process.
 Each task node should contain the following information:
 - **Name.** The name of the task.
 - **Scenarios.** This optional element contains the list of scenarios involved in the task.
 Finally, each scenario node should contain the following information:
 - **Name.** The name of the scenario.
 - **Noaas.** The list of NOAAs involved in the scenario.
- **Scenarios.xml.** This file contains the information shown in the “Exposure Scenarios” tab of the library. Each scenario node must contain the following information:
 - **Name.** The name of the scenario.
 - **Mnm.** A comma-separated list of NOAAs.
 - **File.** An HTML file with information about the exposure scenario.

11.2. HTML AND OTHER FILES

The “html” folder contains, mainly, the HTML files and images that are shown in the library and in some tools:

- **Applications.** The “applications” subfolder contains the HTML files related to the “Products and applications” tab, referenced from the “applications.xml” file.
- **Checklists.** The “checklists” subfolder contains the HTML help files shown in the checklists. Besides, there is a file called “hints.ini”. This file contains the procedures and manuals shown at the bottom side of the checklist window when a question is answered with “No”. The name of each section of the file is the result of concatenating the word “question” and the numeric ID of a question. A section has to contain the following keys:
 - **ManualCount.** The number of manual documents displayed.
 - **ManualN.** The manual file N (starting in 0), taken from the “documents” folder, the separator “|” and the description to be displayed in the hint.
 - **ProcedureCount.** The number of procedure documents displayed.
 - **ProcedureN.** The procedure file N (starting in 0), taken from the “documents” folder, the separator “|” and the description to be displayed in the hint.
- **ControlMeasures.** The “controlMeasures” subfolder contains the HTML file related to the “Control measures” tab, referenced from the “controlmeasures.xml” file.
- **Database.** The “database” subfolder contains the HTML file shown in the “Database” tab of the library.

- GoodPractices. The "GoodPractices" folder contains the HTML files related to the "Good Practices" tab, referenced from the "goodpractices.xml" file.
- Hazards. The "Hazards" folder contains the HTML files related to the "Hazards" tab, referenced from the "hazards.xml" file.
- MeasSystems. The "MeasSystems" folder contains the HTML files related to the "Measurement Systems" tab, referenced from the "meassystems.xml" file.
- Module3. The "Module3" folder contains two HTML files containing the tables shown in the control banding tool:
 - ISO 12901-2
 - Stoffenmanager
- NOAAs. The "NOAAs" folder contains the HTML files related to the "NOAAs" tab, referenced from the "noaas.xml" file.
- Processes. The "Processes" folder contains the HTML files related to the "Processes" tab, referenced from the "processes.xml" file.
- RiskAssessment. The "RiskAssessment" folder contains several images that show several PPEs included in the control measures.
- Tasks. The "Tasks" folder contains the HTML files that are displayed when the user clicks on a task of a process diagram in the library.
- Documents.html. This file is displayed when selecting the option "Procedures, records and manuals" of Module 4.
- Faq.html. This file is displayed when selecting the option "FAQ" of Module 4.
- Regulations.html. This file is displayed when selecting the option "Regulations and standards" of Module 4.
- Terms.html. This file is displayed when selecting the option "Terms and definitions" of Module 4.

11.3. TRAINING

The training folder contains the slides and the questions shown in the training tool. It is divided into six folders, one for each module. Each folder contains the following items:

- Slides folder. Contains the slides shown in the module content. Each slide must be a PNG file numbered with a sequential file.
- Test.ini file. Contains the list of questions and answers for the module. Each question is described in a section named "[Qn]", where "n" is the question number. Each section consists of the following keys:
 - Question. The title of the question.
 - A1. First answer to the question.
 - A2. Second answer to the question.
 - A3. Third answer to the question.
 - A4. Fourth answer to the question.
 - Answer. The correct answer.

10. LIST OF FIGURES AND TABLES

| | |
|--|----|
| Figure 1 - Application startup | 9 |
| Figure 2 - Mode selection..... | 9 |
| Figure 3 - Main window | 10 |
| Figure 4 - Processes tab | 11 |
| Figure 5 - Task information..... | 12 |
| Figure 6 - Products and applications tab | 12 |
| Figure 7 - NOAAs tab | 13 |
| Figure 8 - Hazards tab..... | 13 |
| Figure 9 - Exposure scenarios tab | 14 |
| Figure 10 - Measurement systems tab..... | 14 |
| Figure 11 - Control measures tab | 15 |
| Figure 12 - Good practices tab | 16 |
| Figure 13 - Database tab | 16 |
| Figure 14 - General information window | 17 |
| Figure 15 - Process list window | 18 |
| Figure 16 - Process selection..... | 18 |
| Figure 17 - Populated process list window..... | 19 |
| Figure 18 - Task list window | 20 |
| Figure 19 - New task dialog | 20 |
| Figure 20 - Exposure scenario (general data) | 21 |
| Figure 21 - Exposure scenario (NOAAs) | 22 |
| Figure 22 - Add NOAA to scenario..... | 22 |
| Figure 23 - Exposure scenario (hazards)..... | 23 |
| Figure 24 - Hazards help | 23 |
| Figure 25 - Exposure scenario (measurement systems)..... | 24 |
| Figure 26 - Exposure scenario (control measures) | 24 |
| Figure 27 - Control measure dialog | 25 |
| Figure 28 - List of available control measures..... | 25 |
| Figure 29 - Control measures decision tree | 26 |
| Figure 30 - Resulting control measures | 26 |
| Figure 31 - Exposure scenario (good practices) | 27 |
| Figure 32 - Exposure scenario (database) | 27 |
| Figure 33 - Initial assessment panel..... | 28 |
| Figure 34 - Risk assessment tool..... | 29 |
| Figure 35 - Manual banding dialog | 30 |
| Figure 36 - Risk assessment (scenarios) | 30 |
| Figure 37 - Hazard banding flow chart..... | 31 |
| Figure 38 - Hazard banding result..... | 31 |
| Figure 39 - Hazard band result detail | 31 |
| Figure 40 - Exposure banding flow chart..... | 32 |
| Figure 41 - Exposure banding result..... | 32 |
| Figure 42 - Risk level detail..... | 32 |
| Figure 43 - Measurements dialog | 33 |
| Figure 44 - Measurements detail | 33 |
| Figure 45 - Risk thresholds dialog..... | 33 |
| Figure 46 - Control measures list..... | 34 |
| Figure 47 - Control measure dialog | 34 |

| | |
|--|----|
| Figure 48 - List of available control measures..... | 35 |
| Figure 49 - Control measures decision tree | 35 |
| Figure 50 - Resulting control measures | 36 |
| Figure 51 - Planning window | 36 |
| Figure 52 - Control measure planning | 37 |
| Figure 53 - Planning detail | 38 |
| Figure 54 - Diagnostic checklist..... | 38 |
| Figure 55 - Pagination control | 39 |
| Figure 56 - Question hint..... | 39 |
| Figure 57 - Checklist help button..... | 39 |
| Figure 58 - Checklist help detail | 40 |
| Figure 59 - Checklist chart..... | 41 |
| Figure 60 - Risk assessment tool in learning mode..... | 42 |
| Figure 61 - New task dialog | 43 |
| Figure 62 - New scenario dialog..... | 43 |
| Figure 63 - KPI tool | 44 |
| Figure 64 - KPI detail dialog..... | 45 |
| Figure 65 - KPI evolution chart..... | 46 |
| Figure 66 - Procedures, records and manuals..... | 47 |
| Figure 67 - Training tool..... | 47 |
| Figure 68 - Training content..... | 48 |
| Figure 69 - Training test..... | 49 |
| Figure 70 - Training test configuration..... | 49 |
| Figure 71 - Regulations and standards | 50 |
| Figure 72 - Terms and definitions | 50 |
| Figure 73 - FAQ..... | 51 |