The WP3 indicator catalogue software

Introduction to the usage of DEVOTool 0.64

2014-01-31 – initial version of manual (software version 0.64)

1 Introduction

The need of a software tool to host the indicator database became evident during the development of the DEVOTES WP3 Indicator Catalogue, as the amount of data became too large and complex to be handled in spreadsheet. The contributions to the indicator catalogue were collected from the DEVOTES partners into an Excel formatted catalogue (see Milestone 9 report). The DEVOTES software application DEVOTool (a placeholder codename for the tool for now) was written by MariLim (Torsten Berg) and the catalogue entries (the indicators and their associated metadata) transferred to the tool’s database format (see also Milestone 10 report).

2 Installation of the software tool

The DEVOTool software and database are provided as a zip file for the Windows operating system (Windows XP and newer) and as a dmg (disk image) for the MacOS X operating system (versions 10.5 to 10.8; 10.9 not yet tested).

For Windows:
- Unpack the zip file
- Save the file „DEVOTool-0.64.exe“ somewhere (just where you like)

For Mac:
- Mount the dmg file (by double-clicking)
- Drag the file „DEVOTool-0.64“ to your Applications folder (or wherever you like)

Then, the next steps are the same for both platforms:
- Save the file „indicatorcatalogue.db“ somewhere (or in the same place as the executable)
- Start DEVOTool-0.64 (e.g. by double-clicking the application)
- The programme should start and show the list of projects (this list will initially be empty)
- Load the database into the software (you will need to do that only once): In the programme menu go to "DEVOTool->Register project" (Windows) or “File->Register project” (Mac) and select the "indicatorcatalogue.db" file you just saved. It should then appear in the list of projects in the programme. Open the project file by double-clicking the entry (or simply single-click the entry and press the Open button in the lower right of the window),
- You should be taken to the main form of the project containing the list of indicators.

Note: A „project“ or „project file“ in the sense of the software is just a database file (like „indicator catalogue.db“) that contains all the data and information needed to work with. In this case, it is the list of indicators, their associated metadata and the corresponding (literature) references.
Important note: If you have downloaded an older version of the software or the catalogue before, make sure that you remove the old executable file (just delete it, no separate de-installation required). Also delete the old indicator database file before, if you download a new version of this database, so you do not get confused! However, if you replace the database file (by deleting it), all your analyses will be lost. We are working on making it possible to keep them when update the database. (You can, when you name the files differently, also keep older versions).

3 Basic usage of DEVOTool
There is a toolbar at the top of the window showing different icons representing the different views of the data in the project file using data forms („form“ in short):

The list of indicators and their basic properties is located under the „Indicators“ form. Additional metadata is located under the „Metadata“ form. The „Analyses“ form can be used to issue simple queries on the data in the database, but also more complex analyses. Under the „Sources“ form all sources (references) cited for the indicators and their metadata are listed.

When the database has been opened, you will get a message with some information about the catalogue. You can check the mark below the text if you do not want this message to show up every time the project file is opened. This message windows is also available via the menu:

Windows: DEVOTool->Project information
Mac: File->Project information

When dismissing the message window, the icons in the toolbar are enabled and you will be taken to the “Indicators” form and you can look at the data (Figure 1 and Figure 2).
Figure 1  
The DEVOTool indicator catalogue software (Windows version), when the database is opened.

Note: All following screenshots are taken from the Mac version, but the Windows version looks very much the same and there is no difference in functionality.

Figure 2  
The DEVOTool indicator catalogue software (Mac version), when the database is opened and an indicator is selected.
Within the forms you can select entries and also edit them. Under the forms which contents can be changed, you will find **small buttons**:

![Small Buttons](image)

The “plus”-button is for adding new entries, the “minus”-button is for deleted a selected entry, the “pen”-button is for editing an existing selected entry. The “nested square”-button is currently only available on the “Indicators”, “Metadata” and “Analyses” form and is used to make a copy of an existing selected entry. Thus, you can easily create new entries that have the same content as the original one and then edit the entry afterwards in order to change a single (or multiple) items within the entry. This saves time when only one or few items are different and the rest is remaining the same.

In some of the entry dialogs that appear when adding or editing data, **hierarchical items** appear. These are items that have a tree-like structure, just like directory trees on a computer:

![Hierarchical Items](image)

These items are shown using two panels. The upper panel shows the current path within the (tree-like) hierarchy. In the example above it is “Marine areas” which is the top-level item in this hierarchy. Clicking on one of the entries listed in the lower panel and marked with a “>” sign, will bring you to the next lower level in the hierarchy (for “4 Black Sea” this will be “4.1 Black Sea”) and the clicked item will be added to the path list in the upper panel. You can thus walk through the hierarchy and choose the item you need. If you want to get back up the hierarchy you can just click on the corresponding header item in the upper panel and the panels will adjust and show the items for the selected level in the hierarchy. If only an item in the upper panel is selected, then this item will be stored, otherwise the selected item from the lower panel will be stored when finishing the dialog.

### 3.1 “Indicators” form

In the Excel version of the catalogue, there were possibly several entries for a single indicator, if the indicator was applied for several sea areas (see MS9 report for details). They are recognised as the same indicator by the “id code” (now the Contributor code) that was unique for a single indicator. In this database, all unique indicators (“id code”-combinations) appear as individual indicator entries (if they have not been merged), the information included in the several rows in the Excel version are included.

On the left, there is the **list of indicators** (Figure 1 and Figure 2). You can sort the columns by clicking on the headers (which is where the title is). Clicking on an entry will display some basic properties of the indicator. The properties are divided into groups, shown with headers and alternating background colours. These are the **fields**:
• Indicator name – the name of the indicator
• Original name – the original name of the indicator when submitted by the contributor
• Contributor code – the code(s) which the contributor gave the indicator when submitting it
• RSC affiliation – indicates, whether the indicator is part of HELCOM corset, OSPAR common indicator set, Barcelona convention set or Bucharest convention set
• Last modification – automatically filled as soon as the dataset changes and show the date of the last change made
• Indicator description – general description of the indicator in order to understand what it covers
• Data requirements – which kind of data is needed for calculating the indicator
• Collection method – the field method or other method to apply when collecting the data for calculating the index
• Costs – qualitative indication of the costs associated with doing the data collection, analysis and evaluation
• Overall indicator status – automatically filled with the highest status from the set of metadata added under the "Metadata" form (section “Targets -> Settings”)
• Unit – the unit of the resulting value of the indicator (typically some SI unit or a unitless EQR)
• Confidence/uncertainty – qualitative description of the confidence or uncertainty connected to the resulting indicator value but also the field methods etc
• Sources – one or more reference to the indicator and its metadata from literature or other sources
• Observations/Remarks – free field for any information not covered by the other fields

If you are searching for a specific indicator, you can type the first few letters of its name into the search field above the list and see what happens. The list below will show all indicators beginning with the typed characters. This is a live search. The search is case-insensitive. You can also add wildcards: * = any amount of characters, ? = one single wildcard character) (Figure 3). If you start your search string with the * wildcard followed by some letters, you will get all indicators containing the typed letters. You can also get a filtered list of indicators by using the combobox below the search field. Click on it to see the options. Note, that the search field and the filter act together (Fig. 3).
3.2 "Metadata" form

All the different additional metadata entered for the indicators is located here. On the left is the same list of indicators from the “Indicator” form. In the middle of the form (blue part) is a structured list, dividing the different metadata into thematic sections. Just click around and see what is then shown in the right part of the form (Figure 5) where the actual corresponding metadata are
displayed (if present). If a section name is grey, this means there are no entries for the respective section, otherwise the name is in black.

Figure 5 The Metadata form.

The background colours of the columns to the right serve the purpose of grouping columns together that belong to the same type. E.g. the habitat type is represented in the catalogue as two columns with a pale brownish colour (Figure 6). The left column has the title “Habitat type”, the other column the title “Habitat specification”. This is one example of hierarchical items, where you can choose either to only pick one of the top-level habitat types (Seabed, Water column, Ice habitats -> listed in the left column only) or to go to the next deeper level and pick a habitat specification of the habitat type (e.g. “5 Shallow sublittoral sand”).

Figure 6 Example of coloured groups of columns belonging together thematically.

The following parameters of the metadata are hierarchical items with a tree-like structure and using this kind of grouping:

• MSFD criteria/indicators
• Biodiversity components
• Habitat types
• Geography

3.3 “Analyses” form
The “Analyses” form is where the indicator catalogue database can be queried according to various criteria. The form has two parts (Figure 7). The left side is a list of the stored analyses giving the name of the analysis. Here, you can select, add, edit and delete analyses. The right part of the
window shows the result of the analysis. The upper panel shows a graphical representation and the lower panel is the resulting list of indicators, potentially with several columns.

Figure 7: The “Analyses” form with one simple analyses selected.

In order to understand how analyses work, a full example is present here and followed by a description of the options available.

When adding a new analysis (using the “plus”-button), the following dialog window appears:

It has two tabs (Analysis and Columns). In the Analysis tab you can give the analysis a telling name (so you know what it does/shows). Below is a Query field. Here you can restrict the output of indicators to the ones that follow certain criteria. All fields used in the “Indicator” form and the “Metadata” form (and the “Sources” form) are listed here. In the leftmost button of the Query field you choose from which section (form) you want to query a field. For a detailed description of these queries, please refer to

Assume we only want to see the indicators that contain the string “seal” and are used in the Greater North Sea subregion. We have two criteria to apply here: the restriction to the name (containing the string “seal”) and the restriction to a certain subregion (Greater North Sea). This is how it is done:

1. Choose “All conditions must be met” in the field Relationship, because both restrictions must apply
2. In the Query field choose “Indicators:” in the leftmost button, then “Indicator name” in the next, “contains” in the 3rd button and type the string “seal” into the entry field
3. Click on the “plus”-button on the right of the line you just specified in order to add another criterion to the query.

4. In this new row, choose “Metadata:” in the leftmost button. The buttons on the right change to adapt to this choice. Then choose “Targets” in the next button to the right, then “Settings”. This is the same order as the metadata are listed in the “Metadata” form. In the next button, choose the parameter you need, which is “Marine areas”. Now there is the choice of just looking for entries that have a record containing marine areas or not and there is the options “is”. This is what we want in order to choose a specific value within the hierarchy of marine areas. Click on the button saying “choose ...”. A new dialog window appears where you can navigate to “2 North-East Atlantic Ocean” and then to “2.1 Greater North Sea [...].” You need to click on that last item in order to select it. Just leave the subdivisions alone that appear when you click. Now click OK.

The dialog should now look like this:

![Edit an analysis dialog](image)

Clicking OK here will save the analysis and show the result:

![Analysis result](image)

There are several things to note here. Doing a simple query like this will result in a block shown in the upper panel within the right part of the application window. This block is surrounded by a solid black line and represents the initial database output, marked as “Indicators & Metadata”. In the right corner of the upper brownish part of this block it says “6”. This number is always the **number of records returned** by the query. Below, and still inside the solid black line and thus in the block, is another brownish part, marked with “Indicator name”. This represents the column seen in the
resulting list below the visual representation of the query. There is one such part for each column in the query that is returned.

How do we add more columns? Suppose, you want to also display the “Contributor code” in another column. This is how that is done:

1. Click on the “edit”-button in the lower left corner of the window while having the “seals” analysis selected. The same dialog appears that we saw before. You can now edit the query, e.g. by adding more criteria or changing the existing ones.
2. Click on the second tab in the dialog named Columns
3. As first list, you will see a list of possible column to display in the result (named “Columns”). The column “Indicator name” is always pre-selected.
4. Add the column “Overall indicator status” by checking the respective checkbox
5. Click OK

The analysis is now repeated with these new settings. The specified column appears in the block and also in the resulting list of indicators:

![Diagram of the analysis result with columns added](image)

This is the basic use of the analyses. If you want to look into the indicators in the resulting list, just double-click on any entry and you are directly taken to the “Indicator” form with the selected indicator selected and displayed.

You can also add columns to the query coming from the set of metadata. So, you might want to also see which MSFD EU criteria the 6 indicators have been assigned to:

1. Again, click on the “edit”-button in the lower left corner of the window while having the “seals” analysis selected.
2. Click on the second tab in the dialog named Columns
3. Below the “Columns” is another list with “Metadata columns”.
4. Click the “add”-button below the list and choose: Link to MSFD -> Descriptor coverage -> MSFD descriptor. Then, click OK.
5. Click OK to save and close the dialog.

Now, another column will show up, listing (per indicator) all the values that have been recorded.
3.3.1 Supplementary functionality

There is a small menu at the lower right corner of the analyses window. It contains some useful features that can be applied to the selected analysis:

**Instant evaluation:**
This option is checked by default. This means that the analysis is executed as soon as it is selected in the left part of the analyses window. If the analysis is taking long time (e.g. because it contains many calculations), it can be handy to switch execution off. Then, you can still edit the analysis and change the settings, but it will not execute any longer saving some time. Checking the option again, execution will take place again the next time an analysis is being selected.

**Column statistics:**
At some point you might be interested in knowing a few numbers on the resulting list of indicators. Using this function you will get a list showing values for every column in the resulting list of indicators. The first column in the statistics indicates to which column from the result list the data applies to. The second column indicates the number of entries that are not empty in the resulting list (duplicate values are counted here, but not the empty ones). The third column indicates the number of unique values in the resulting list (grouping is done here, duplicate values are not counted, empty entries are not counted either). The fourth and last column indicates the number of entries per occurring value (including a count of empty values if they exist).

**Export table:**
You can also save the resulting indicator list into a text file than can be imported into spread sheets or other applications. Select “Export table …”, choose the appropriate options and save the data.

If you need a special sorting of the columns, just click into the column headers of the resulting list to sort them. Holding the Shift key down while clicking adds another column to the sorting as a second-level sorting column. You can even add more if this is needed. (The export of table data used the current sorting order). Smalls numbers in the column headers tell you what the sorting preference is.

Note: If you do not want to restrict the indicators in the output but want them all displayed, just leave the initial query empty and as it is shown when adding a new query. Note however, this may slow down the speed of the analysis.

3.3.2 Advanced analyses

Every analysis starts with the kind of query described here. From this point on you can add advanced analyses to an existing query. Suppose, we want to have a count of how many pressures are addressed by the indicators list in our result. This is where the possible actions on the blocks in the visual representation come into play. When you move the cursor into the different blocks, e.g. into the “Indicator name” part, a small control panel occurs:
This control panel allows the following actions: the “plus”-button adds another block to the analysis, the “minus”-button removes the current block from the analysis. The “edit”-button (diagonal pen) allows to edit the properties of the current block, the “connect”-button (line with vertical ends) allows connecting block with each other in order to make different calculations possible.

Back to the example, the pressures of the indicators cannot just be shown in an additional column of the result as we did with the “Overall indicator status” column. This is because there might be more than one metadata item assigned to the indicator. An indicator might be assigned to two or three or more pressures. **What we want is the number of pressures assigned** per indicator. This needs to be derived from the original indicator database (represented as the upper part of the initial block with the solid black line around) and can of course not be derived from either the “Indicator name” or the “Contributor code”. This is how it is done:

1. Move the mouse into the “Indicators & Metadata” part
2. Click on the “plus”-button of the control panel

A dialog appears where you specify what the new block you want to have should do:

3. Type a descriptive name into the Name field, e.g. “pressure count”
4. In the Item type field, choose “Count of attribute records & values” (already pre-selected)
5. Optionally, add a description into the Description field
6. Press the “Next”-button
7. Choose the attribute you want to count, navigating through the different possible options. Here, all countable attributes are listed. Under “Indicators”, only “Sources” are listed since this is the only indicator property that can occur more than once. Under “Metadata”, all metadata fields are listed, since all of them can occur more than once. Navigate to “Targets”, then “Pressures” (following the same order as the metadata is shown in the “Metadata” form) and finally “Pressure” which is the column from the “Metadata” form that contains the different pressures assigned. Ignore the list of pressures that now appears,
unless you want to count how many times e.g. the pressure “Marine litter” is used instead of the total count of pressures

8. In the field **Counting mode** choose the appropriate value. Typically we only want unique entries, not duplicates (which also is the default)

This is how the dialog looks like now:

Press OK now. The dialog disappears and the new block is drawn into the graphical representation of the analysis. The new block is connected to the original one by an arrow so you can see how they are related to each other in terms of orientation (which comes first, which is derived from which). At the same time another column was added to the result list named like the block and showing the counts for each indicator:
We can see that two of the five indicators are assigned to any pressure while one has a quite high number of 9.

**Note:** if you place the mouse cursor over the arrow it will be highlighted in red. Thus, you can see which blocks the arrow is connecting, especially if there are several overlapping connections.

We now want to also have the **number of descriptors which the indicators are linked to**. So we add another block originating from “Indicators & Metadata”:

1. Press the “add”-button on the block control panel of the “Indicators & Metadata” part
2. Name the block “descriptor count”
3. Choose the same Item type as before
4. Press “Next”
5. Navigate to Metadata -> Link to MSFD -> Biodiversity related MSFD criteria/indicators -> MSFD criteria/indicators -> Descriptor. Select that item. (Note: you can also count on individual values of this metadata item by choosing “Attribute values of ‘MSFD criteria/indicators’” and then selecting the value you might want to count)
6. Press OK

You should now have another block originating from the same initial block and you should have the appropriate column in the result list with the actual counts. Check the metadata to see that this is actually correct and what you wanted! This is how it should look like (here sorted on the last column in decreasing numbers):

Now, we want to add these two number columns together in order to show how simple calculations are done (which can be used for e.g. rankings). In order to do this we must create a new block that can do the summing and **connect existing blocks** this new block:

1. Move the mouse to the block “pressure count” and press the “plus”-button on the appearing control panel
2. Name the block “sum”
3. Choose Item type “Numerical aggregation”
4. Press “Next”
5. Choose the Function “Sum”
6. Press OK
7. Now the new block only sums the one originating block, but we also want to add the “D1 criteria count” to the sum, so ...
8. Move the mouse into the “D1 criteria count” block
9. Click on the “connect”-button. It turns red
10. Move the mouse into the “Sum” block and click on the “connect”-button there (if you sometimes accidentally click on the “connect”-button but did not want to, just click somewhere on the white background afterwards and the pending connection will be cancelled)

The two blocks are now connected to the “Sum” and the resulting column shows the sum:

If you have connected blocks this way or they have been connected automatically because you added a new block, you may later want to disconnect blocks again, e.g. because your analysis changes or you connected blocks by mistake. This is done the same way as connecting them. You just click on the two “connect”-buttons of the connected blocks (in arbitrary order) and the connection arrow will disappear again re-evaluating the analysis.

These example should make the procedure to build advanced analyses clear enough to explore the other possibilities currently implemented (more to come later).

3.4 "Sources" form
This form lists all current sources, i.e. the references to web sites, papers and other publications as well as unpublished sources. You can click on the sources in the list on the left and will be shown the corresponding entry in the right part of the "Sources" form (Figure 8).
All sources listed here can be used from the other forms when entries of indicators or metadata should be assigned to a certain source. Here, new sources are added before they can be used in the other forms. Note that you can click on a link (if given) to a reference and the software will open your web browser and take you to the corresponding web site.

4 Known bugs and limitations
Here is a list of some known bugs and limitations in the software. Do not report on these, we are working hard on fixing them:

- General: It is currently not possible to delete certain types of data, i.e. clear radiobuttons, remove list entries, remove hierarchic entries
- General: The hierarchy item chooser is currently a bit confusing to use, it should be easier to navigate and understand
- Analyses: No error checking yet, so you can connect blocks that are illogical or actually mathematically impossible to connect and evaluate
- Analyses: Layout of more complex analyses with many connected blocks does not look good if you add the blocks in an “unfortunate” order, since block connections will be drawn on top of each other and across blocks
- Analyses: The dialog for adding and editing blocks does not resize properly
- Analyses: It is not possible to abort a long-running analyses and you will not see any visual clue that the analyses is still running (so be patient)
- Tables (Mac version): The separator lines between the columns do not update properly when using the scroll function of the Magic Mouse (workaround: either use the scrollbars or click onto the scrollbar to update the separators)
5 Final words
DEVOTool is still work in progress. There are very definitely bugs and limitations you will encounter when using the software. Also, the user interface is far from finished including proper error reporting, online updates and more. Please do not comment on the visual appearance or certain missing functions right now.

All other feedback including detailed reproducible (!) bug reports is appreciated! Feedback can be sent to Torsten Berg, berg@marilim.de

6 License
The software is distributed under the following conditions:

DEVOTool is provided to interested parties at no cost.

All use of this software is conditional upon your compliance with the license terms which follow. If you do not agree to the terms of this license agreement, or do not comply with the terms and conditions of this agreement, you are not permitted to use this software and are required to remove DEVOTool from your computer system, and destroy all copies of the software.

DEVOTool, herein called the "software", is owned by MariLim aquatic research GmbH and is protected by German copyright laws. Upon your agreement to and compliance with the terms of this license agreement, MariLim grants you, herein called the "licensee", the following non-transferrable, non-exclusive rights of use.

MariLim has the right to terminate this agreement if the "licensee" fails to comply with any term or condition of this agreement. No title to the intellectual property in the "software" is transferred to you. The "licensee" does not acquire any rights to the "software" except as expressly set forth in this license.

MariLim grants the "licensee" the following rights regarding the use of the "software":

1. Use of the "software" for the "licensee's" personal or business purposes.
2. The "software" may be transferred to the hard disk of any computer, or network of computers, belonging to the "licensee".
3. The "licensee" may not distribute, sublicense, lease, sell, rent or otherwise transfer the "software", or any modification or derivative thereof, to any other individual or group for any reason.

Limitations of liability and disclaimer of warranty: there are no warranty rights granted to you, the "licensee", regarding the "software". The "software" and accompanying written materials are supplied to the "licensee" "as is" without warranty of any kind. MariLim does not guarantee, warrant, or make any representations, either expressed or implied, regarding the use, or the results of the use of the "software" or the generic written materials with regards to reliability, currentness, accuracy, correctness, or otherwise. The "licensee" assumes the entire risk as to the results and performance of the "software". MariLim shall not be liable under any circumstances, for any damages whatsoever, arising out of the use, or the inability to use, the "software", even if MariLim has been advised of the possibility of such damages.

Papers/reports and scientific results: In any publication or report, produced by the "licensee", using the "software", the partners must include an acknowledgment section with this text: "We thank
DEVOTES (DEVelopment Of innovative Tools for understanding marine biodiversity and assessing good Environmental Status) project, funded by the European Union under the 7th Framework Programme, ‘The Ocean of Tomorrow’ Theme (grant agreement no. 308392, www.devotes-project.eu) for the permission of use of DEVOTool and associated data.”