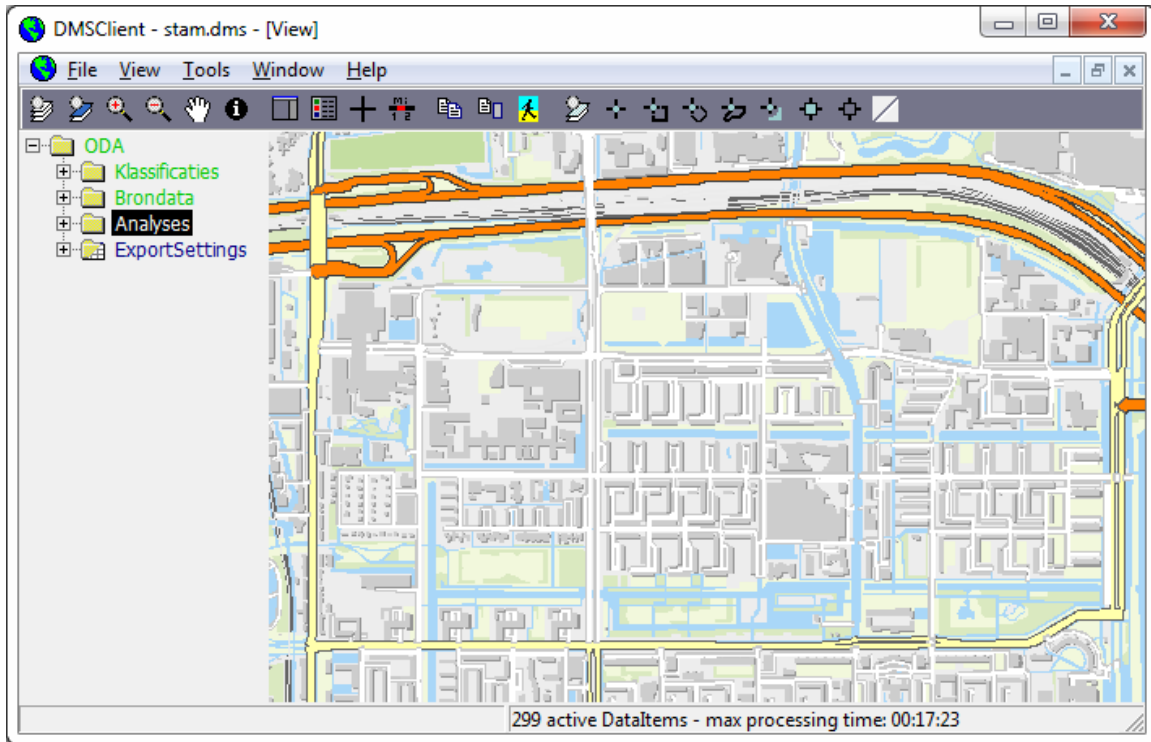# USER GUIDE

GeoDMS GUI

VERSION 7.309

Object Vision
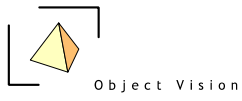
User Guide GeoDMS GUI 7.309

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Object Vision

Table of Contents

O b j e c t   V i s i o n

PART I GENERAL STRUCTURE

1. Introduction

1.1 Main components of a GeoDMS project

A GeoDMS project contains the following components:
- The GeoDMS Engine (Geographic Data and Model Server), a generic set of DLL's that control, retrieve, store and calculate the primary data and model results
- The GeoDMS GUI, a generic client application that visualizes the primary data, the model results and the calculation logic with a set of primary data viewers. Furthermore, it supports the user in extending/editing the model logic, importing and exporting new primary data and savings all these 'settings' in a new configuration.
- The (default) configuration. A hierarchical set of configuration files that describe the primary data, the model logic, and the way to visualize both. For this User Guide, the Landuse Scanner demo configuration is used.
- A set of primary data files that are configured in the configuration.

This user guide mainly focuses on the GeoDMS GUI. How to set up a configuration is described in the modeler's guide. Both guides can be found on the website of Object Vision (https://www.geodms.nl). Information about the example data can be retrieved as metadata in the system (see paragraph 5.4, Detail Pages > Metadata).

The GeoDMS GUI is the user interface of the system. As mentioned above the purpose of the application is to:
- View all the primary data and model results. A hierarchical structure is used in the configuration to find the requested information (data element). This hierarchical structure of so-called tree items is presented in a Treeview. With a set of viewers, the primary data, as well as the model logic, can be visualized.
- Adapt or extend the model logic or the way to visualize data by initiating new cases, create new or edit existing expressions and classifications. Also, data can be exported in different data formats.
- Store and retrieve the settings of the visualization of the primary data or model results in a desktop or the complete configurations with all calculation rules in/from a new configuration.

The GeoDMS GUI is a Windows-based application. This user guide does not describe the generic Windows functionality like how to close, maximize or minimize a window. For more information on these topics refer to your Windows user guide. An Internet connection and installed browser are preferred, as the most actual help can be found at the above-mentioned website.

1.2 How to read this guide

This guide focuses mainly on the end-user, who views the primary data, calculates model results, initiates new cases and makes limited extensions and editions to the configuration. A detailed description of the structure of the client application, the different viewers and the composers are, therefore, described. This user guide does not contain sufficient information for modelers to set up a new configuration or a new

calculation scheme. For this purpose, we refer to the modeler's guide, describing the basics on how to configure a model with the GeoDMS.

This user guide is split into two parts. Part 1 describes the generic structure of the application, the menu options and the three main panels in the desktop (the Treeview, the Detail Pages and the Eventlog). Part 2 focuses on the data viewers that can be used to visualize primary data, model results and calculation/model logic.

1.3   System requirements

See for the latest information on the system requirements the Object Vision website.

1.4   Installation Instructions

See for the latest installation instruction the Object Vision website.

2. Desktop components

2.1 Main components of the application

After activating the application, the following window is presented:
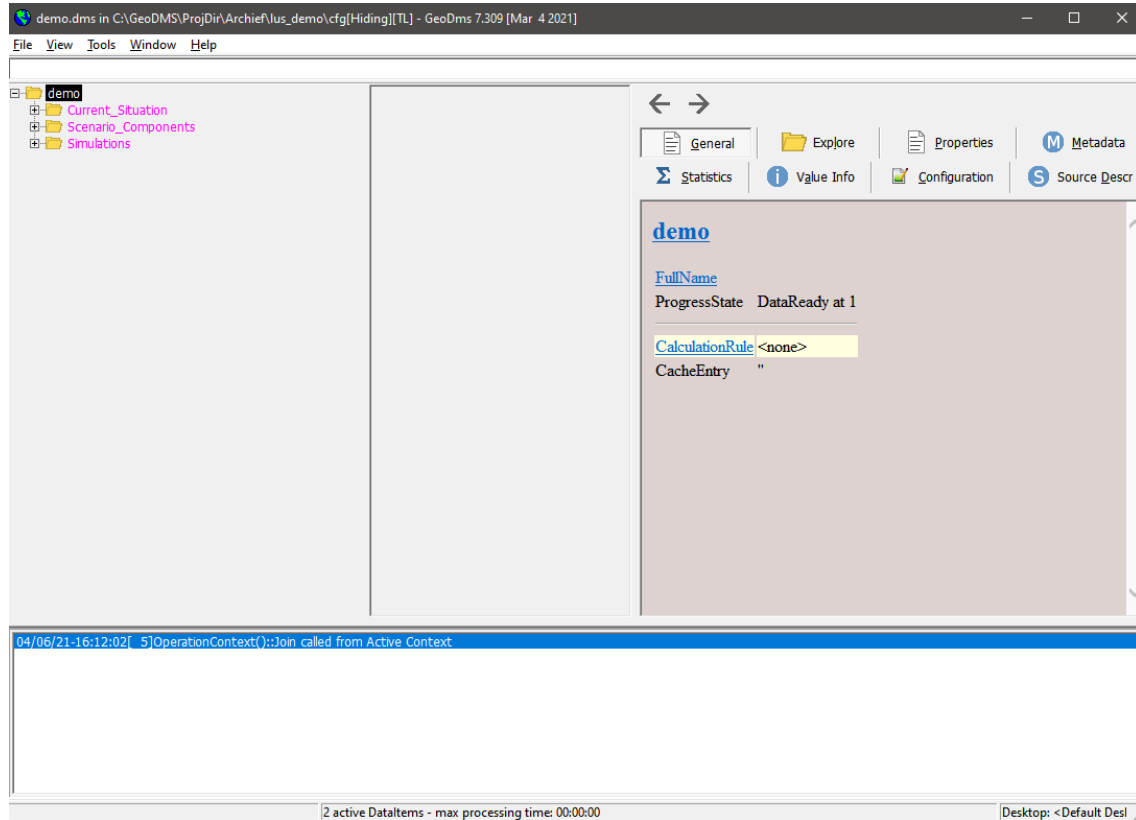
Figure 2.1: Main window of the GeoDMS GUI

In this main window the following components can be distinguished:
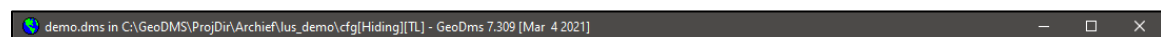
Figure 2.2: Title bar with the product name and opened configuration

Figure 2.3: Menu bar with main menu options

Figure 2.4: An editable item path that can be used to jump to other items (use F5 or mouse-click to search)

Figure 2.5: Toolbar with view-specific tools (only visible after opening an item)
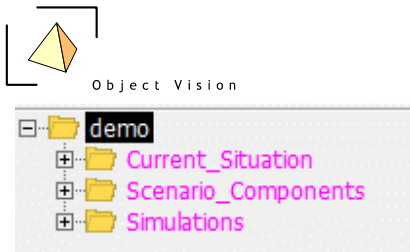
Figure 2.6: Treeview with root item expanded.
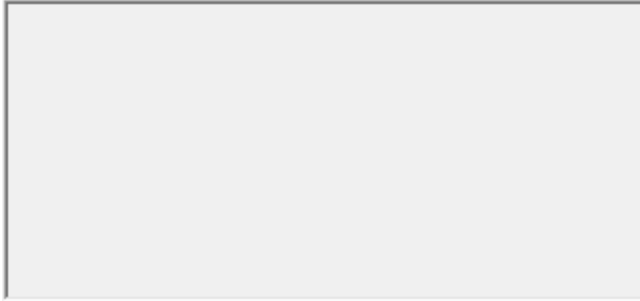
Figure 2.7: View area in which data viewers can be activated.
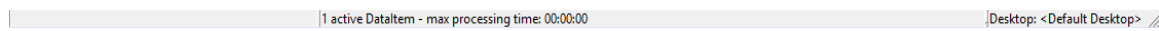
Figure 2.8: Status bar presenting hints and status information.

These components, except for the Treeview and Toolbar, are always visible. The Treeview can be closed (and re-opened) with the menu option View>Tree, or with the ALT-0 keyboard combination, the toolbar with the ALT-3 keyboard combination.

Two more components are always positioned at a fixed location. The Detail Pages, to be opened and closed with the menu option View>Detail Pages, or with the ALT-1 keyboard combination, are always positioned at the right side of the main window. The following figure shows an example of the Detail Pages for the root item:
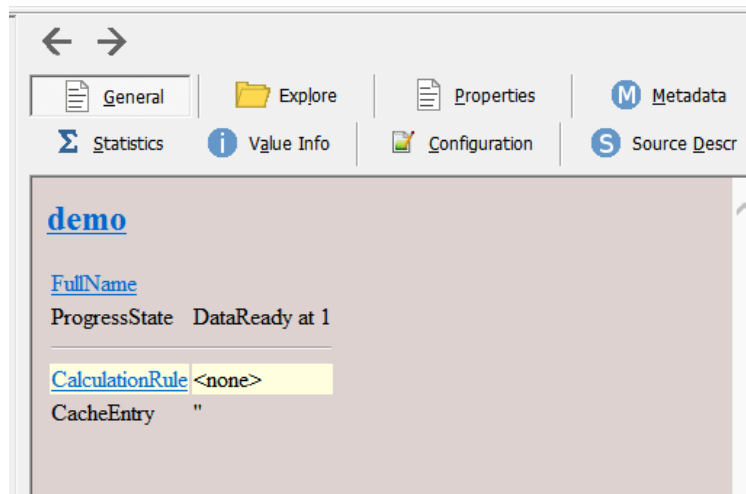
Figure 2.9: Detail Pages opened for the root tree item.

The Detail Pages are a set of tabs that present information on the selected Treeview item. These pages will be described in detail in chapter 5.

The third component that is always opened at the bottom of the main window is the Eventlog view. This view can be opened and closed with the menu option View>

Object Vision

Eventlog, or with the ALT-2 keyboard combination. The view shows the events that are executed by the application, as presented in the following example:
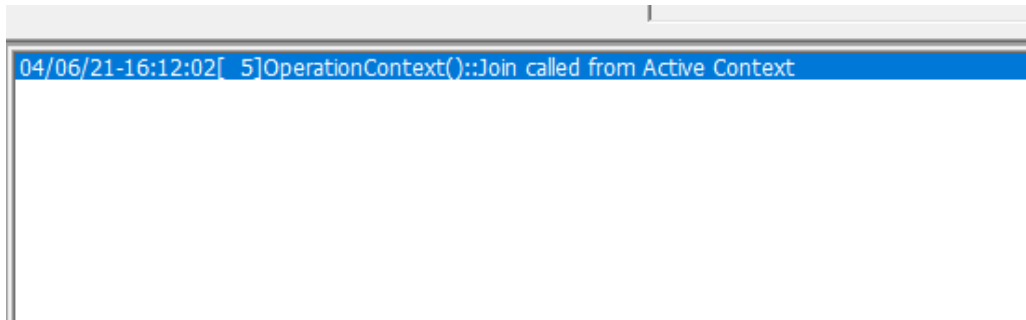
Figure 2.10: Eventlog view with start-up events of the GeoDMS GUI

This Eventlog is mainly interesting for experienced users to analyze which actions are executed. The messages occurring in this log will not be described in this guide.

The three mentioned components (Treeview, Detail Pages and Eventlog) have a fixed position. The size of these components can be adapted with a minimum and maximum size. The appearance of these components, the width of the Treeview and the Detail Pages and the height of the Eventlog is stored in the user-specific configuration settings of the registry. This means the next time the application is opened, the size of the components will be maintained.

Object Vision

3. Treeview

3.1 Introduction

The Treeview is the main navigation component of the application. It presents the hierarchical structure of a configuration in a view like the Windows Explorer. By default, the root and the first level items are shown (the root item is expanded). Each item in the tree (called a tree item) is presented with a name and an icon. The main function of the icons is to show the default viewer for each tree item. In paragraph 3.2 these icons are explained.

The selected item in the Treeview is the active item in the application. This is an important concept, as many functions of the application work on the active tree item. By clicking the right mouse button a pop-up menu can be activated, with a set of menu options that work on this active tree item. This also applies to most main menu options and to the Detail Pages. The pop-up menu options and most main menu options are described in chapter 4. The Detail Pages are described in chapter 5.

3.2 Icons used in the Treeview

The main purpose of the icons is to show which default viewer is used for an item. Double-clicking or pressing the Enter key on a selected tree item activates this viewer. The following icons are used to indicate this default viewer:

🌐	A data item that can be viewed on a map. This implies the domain of the data item has a geographic relation (see modeler's guide for how to configure a geographic domain unit). Dependent on the geographic domain, the data is visualized in a grid, point, arc or polygon layer.
▦	A data item that cannot be visualized on a map (it has no geographic relation) but can be viewed in a Table.

The following two icons do not indicate the default viewer but indicate data items with a specific function (classifications and palettes, see chapter 10).

⬛	A data item that contains a classification (a set of classes). A classification can be made or edited with the classification and palette composer, see chapter 10
🎨	A data item that contains a palette (a set of color values that correspond to a classification). A palette can be edited with the palette composer, see chapter 10

Not all tree items are data items. For the non-data items (these items cannot be viewed with a primary data viewer), the following icons are in use:

📁	A tree item with no data items and subitems that also have no data items. The icon is used for containers grouping other containers or units.
🗃	A tree item with no data item, but with data items as subitems. All subitems of this item with the same domain unit can be viewed in a Table.
Σn	A tree item with no data item and no subitems, e.g. a unit.
📏	A tree item with no data item and no subitems, e.g. a unit with cdf property.

Object Vision

Tree items can have a different status and have corresponding text colors, three status types are distinguished:
1. *Valid (blue)*: the results are calculated and the integrity checks configured for the item and its suppliers are met.
2. *Not Calculated (pink)*: the items are not checked and not calculated.
3. *Failed (red)*: the application failed in updating the results or the integrity checks are not met. In the first case, the results are not available; an error is raised indicating what problem occurred while updating the tree item. In the second case, the results are available and can be presented in a view; a warning color indicates the results are not valid.

The application controls when and how to update tree items. If a user requests a view on a data item, the required tree items are first updated, before the results are presented in the view. If a tree item has become valid, this status is 'stored' until changes are made in the calculation rules. This means the second time the same view (or another view requiring the same data items) is requested, the data item is already valid and the results can be visualized immediately.

Object Vision

4. Main and pop-up menu options

4.1 Introduction

The main and pop-up menu options are related. With the pop-up menu options, the user can activate functions on the selected tree item. The related main menu options also function on the selected tree item. The main menu additionally contains a set of generic functions like saving a configuration or tiling the viewer windows. In this chapter, the main menu options are described. If the option can also be activated from the pop-up menu option this is indicated by (P). Some options can only be activated from the pop-up menu, this is also indicated.

4.2 Menu options

4.2.1 File Menu

Open Configuration File	Ctrl+O
Reopen current configuration	Alt+R
New Desktop...	
Open Desktop...	
Set Startup Desktop	
Save Desktop to File	
Export Primary Data	>
Export Viewports	Ctrl+X
1 c:\geodms\projdir\archief\lus_demo\cfg\demo.dms	
2 c:\geodms\projdir\vestadv\runs\s2d_d_restwarmte.dms	
3 c:\geodms\projdir\rslight2021_ontwikkel\cfg\rslight2021.dms	
4 c:\geodms\projdir\nldb\cfg\stam.dms	
5 c:\geodms\projdir\archief\ruimtebeslag\cfg\ruimtebeslag.dms	
6 c:\geodms\projdir\rslight2021\cfg\rslight2021.dms	
7 c:\geodms\projdir\archief\rslight_2020\cfg\rslight_2020.dms	
8 c:\geodms\projdir\vestadv\runs\s3b_b_lt30_70.dms	
9 c:\geodms\projdir\ruimtevoorwerken\cfg\stam.dms	
10 c:\geodms\projdir\ovgtfs_stripped\cfg\main.dms	
11 c:\geodms\projdir\tools\bag_verdichting_cfg\geocode.dms	
12 c:\geodms\projdir\verdichting\cfg\verdichting.dms	
13 c:\geodms\projdir\nzlijn\cfg\nzlijn.dms	
14 c:\geodms\projdir\vestadv\runs\s3a_b_lt30_30.dms	
15 c:\geodms\projdir\kvdv\cfg\kvdv.dms	
16 c:\geodms\projdir\vestadv\runs\s0_referentie.dms	
17 c:\geodms\projdir\archief\ruimtevoorwerken\cfg\stam.dms	
18 c:\geodms\projdir\lus_demo\cfg\demo.dms	
19 c:\geodms\projdir\vestadv\runs\s1a_b_luchtwp.dms	
20 c:\geodms\projdir\vestadv\runs\s2a_b_restwarmte.dms	
21 c:\geodms\projdir\vestadv\runs\s4a_gg_b_hwp.dms	
22 c:\geodms\projdir\tools\brt\cfg\gml2fss.dms	
23 c:\geodms\projdir\vestadv\runs\s4d_gg_d_hr.dms	
24 c:\geodms\projdir\ovgtfs\cfg\main.dms	
25 c:\geodms\projdir\rslight_2020_80p2\cfg\rslight_2020.dms	
26 c:\geodms\projdir\bouwjarenanalyse\cfg\verdichting.dms	
27 c:\geodms\projdir\rslight_2020\cfg\rslight_2020.dms	
28 c:\geodms\projdir\geodms_academy\cfg\network.dms	
29 c:\geodms\projdir\bouwjarenanalyse\cfg\bouwjarenanalyse.dms	
30 c:\geodms\projdir\geodms_academy\cfg\basics.dms	
Exit	

Figure 4.1: File menu.

Open Configuration File: Open a Windows file dialogue to select a new configuration. The current configuration is closed with a question whether the changes must be saved.

Reopen current configuration: Reopens the current configuration with the current and active expanded item and desktop. If a configuration is edited, this way the configuration can easily be reopened in the same state.

New Desktop: Create a new desktop, based on a desktop template. A desktop is defined as the set of opened map and data viewers, including the specification of the:

- set of layers and their order in each map view with the properties
  - visible
  - for thematic layers, the used classification
- The area of interest in each map view
- The set of columns, column widths and sort order in each Table

After activating this option, a dialogue is presented in which a desktop template can be chosen. This offers the possibility of making a new desktop, based on an existing desktop functioning as a template. If no desktop templates are available, only the empty desktop option can be activated to make a new desktop. In the next dialogue, a name must be specified for the desktop. The active desktop name is presented in the status bar of the application: Desktop: <Default Desktop>

Open Desktop: Open a dialogue to select a desktop from the available desktops in the current configuration. The selected desktop is opened.

Set Startup Desktop: Open a dialogue to select a desktop in the current configuration that is used as start-up desktop each time the current configuration is opened.

Save Desktop to file: Saves the desktops in the active configuration to a separate configuration file.

Export Primary Data (P): Export primary data to a bitmap, .dbf (or Shapefile), ASCII grid or .csv file. The option is only active for the relevant data items. Select the menu option and choose from the submenu the requested data format.

Export Viewports: Exports the set of opened viewports to bitmaps. A viewport is the part of the map view, in which the actual geographic data is shown. The export settings (including export directory and file names) are configured in the ExportSettings configuration. Activating this option results in a new dialogue, in which all active viewports are shown and selected. From this list, you can also select a subset of the viewports to be exported. Information about the number of pixels/bitmaps per viewport is also presented.

Recent configurations: The recently opened configurations are presented, to easily select one of these configurations. The number of configurations is limited to nine.

Exit: Exit the application.

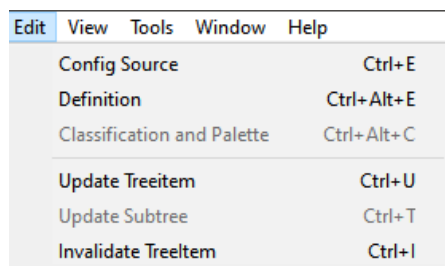### 4.2.2 Edit Menu (only in Administrator mode)

Figure 4.2: Edit menu.

Config Source (P): Edit the config source of an item with the DMS editor (Notepad ++ or Crimson Editor is advised, see here). The editor needs to be specified in the Tools > Options > General Settings > DMS editor option (see 4.2.4). The DMS editor is activated with the relevant dms file and if supported by the editor, the correct line and position. After editing and saving, use the File > Reopen current configuration open to open the configuration in the same state (expanded and active item and desktop).

Definition (P): Activate
- The Edit Classification and Palette dialogue if the selected data item is a classification class's item. See chapter 10 for more information on classifications and palettes.
- The Edit Palette dialogue if the selected data item is a color palette.
- The Expression dialogue for all other items. This dialogue is used to set or edit the expression of a tree item. See chapter 11 for more information on the Expression dialogue.

Classification and Palette (P): Activate the Edit Classification and Palette dialogue for all data items for which a classification and palette is configured. This classification and palette can be configured for the data item itself or for its values unit. See chapter 10 for more information on classifications and palettes.

Update TreeItem (P): Update a data item with the status invalidated. The option is only enabled for invalidated data items. The result of the action can be a valid data item (update succeeded) or a failed data item (update raised an error).

Update Subtree (P): Update the subitems of a tree item. The option is only enabled for tree items with invalidated subitems. The result of the action can be a valid set of subitems (update succeeded) or one or more failed items (update raised an error).

Invalidate TreeItem (P): Explicitly invalidate an item to ensure it will be recalculated when the results are requested in a view.
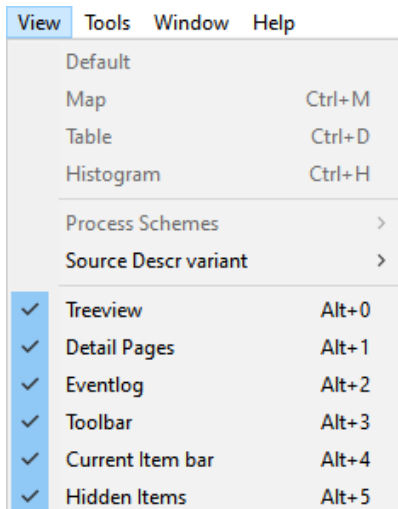
4.2.3 View Menu

Object Vision

Figure 4.3: View menu.

Default (P): Activate the default viewer for the selected data item. This option is only enabled for data items. The default viewer for all data that can be visualized in a map is the map view. For all other data items, the default viewer is the Table view.

Map (P): Activate the map view for the selected data item. In a submenu, the layer type must be chosen (in this version only default is implemented). See chapter 7 for more information on the map view and the layer types. The map view option becomes enabled if the selected data item can be visualized in a map view.

Table (P): Activate the Table for the selected data item. See chapter 8 for more information on the Table. The Table option becomes enabled if the tree item can be visualized in a Table.

Histogram (P): Activate the histogram for the selected data item. See chapter 9 for more information on the histogram. The histogram option becomes enabled if the tree item can be visualized in a histogram.

Process Schemes (P) (only in full mode): Activate the process scheme for the selected tree item. In the submenu, the process scheme type must be selected.

Source Descr variant (P): Opens the Detail Page Source Description to show which data sources are used to calculate the active item. This Source Descr variant has 4 options:
- **Configured Source Descriptions**: For storages for which a Source property is condigured, the contents of these properties are shown. If not, the file/db names are presented.
- **ReadOnly Storage Managers:** All file/db names are presented used to read data from (configured with StorageReadOnly = True).
- **Non ReadOnly StorageManagers**: All file/db names are presented used to wrote data to.
- **All Storage Managers:** All file/db names are presented.

Treeview: Show or hide the Treeview at the left side of the main window. See chapter 3 for more information on the Treeview.

Object Vision

Det<u>ai</u>l pages: Show or hide the Detail Pages at the right side of the main window. See chapter 5 for more information on the Treeview.

E<u>v</u>ent log: Show or hide the Eventlog window at the bottom side of the main window.

T<u>o</u>olbar: Show or hide the toolbar at the top side of the main window.

Current Item bar: Show or hide the current item address bar at top side of the main window.

Hidden Items: Toggle between the full mode (formerly known as administrator mode) or the mode which hides the hidden items.

4.2.4 Tools Menu
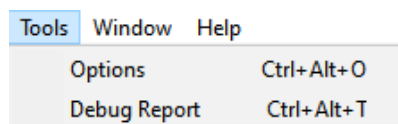
Figure 4.4: Tools menu

<u>O</u>ptions: activate the following dialogue to set some general properties:
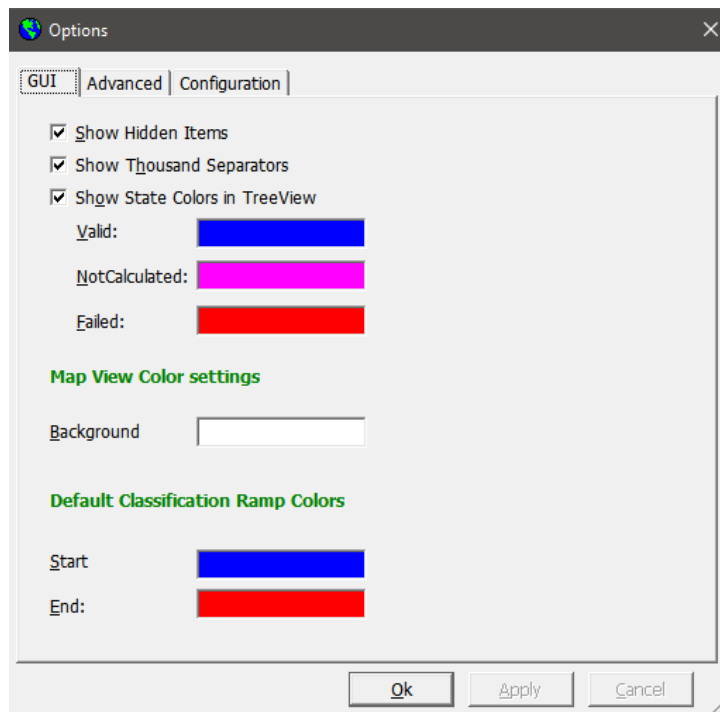
Figure 4.5: GUI settings dialogue

The dialogue is split up into three tabs. The GUI tab gives settings for the Graphical User Interface (GUI). These settings are stored in the configuration specific config.ini files. The Advanced settings tab is used to configure settings that apply to all configurations. These settings are stored in the user-specific registry setting. The Configuration tab contains configuration specific setting that can be overruled for the local machine. These settings are stored in the registry.

Object Vision

In the GUI settings tab the following settings can be configured:

Show Hidden Items: The application can be configured in two modes:
- User mode. The show hidden items check box is not selected ☐.
- Administrator mode. The show hidden items checkbox is selected ☑.

There are two differences between both modes:
- Hidden tree items. A tree item can be configured hidden by configuring the DialogType property to hidden. In the user mode, these items are not shown in the Treeview, the Detail Pages and the process schemes. In the administrator mode, all items are shown.
- Advanced options menu. In the administrator mode, the tab Advanced in this options dialog is available.

Show Thousand Separators: toggle between showing thousand separators in values.

Show State Colors in Treeview: The state of an item (as described in 3.2) is visualized in different colors in the Treeview. The colors for Valid, NotCalculated or Failed items can be selected in this dialogue.

Map View Color settings - Background color: Activate the button to select the background color of the map views of the current configuration

Default Classification Ramp Colors: In the classification and palette composer (see chapter 10), colors are default chosen for the first and the last class. These colors can be selected with this dialogue.

If the Administrator mode is selected, the Advanced settings tab is available and therein the following settings can be configured:

Paths - LocalDataDir:
The LocalDataDir is used as the base directory for (temporary) results like the CalcCache. See https://www.geodms.nl/Folders_and_Placeholders
for more information on directories and placeholders in the GeoDMS. The default setting for the LocalDataDir is C:\LocalData. This default setting can be overruled here.

Paths - SourceDataDir:
The SourceDataDir is used as the base directory for (large, read-only) sourcedata files, often used in multiple projects. See https://www.geodms.nl/Folders_and_Placeholders
for more information on directories and placeholders in the GeoDMS. The default setting for the SourceDataDir is C:\SourceData. This default setting can be overruled here.

External programs - DMS editor: the path to an external text editor, including some parameters for how to position the cursor at a specific location in a configuration file. This functionality is used if errors occur in the configuration. If a text editor is configured, the GeoDMS GUI can open the configuration file and, if supported by the editor, indicate to the position in the file where the error was noticed. The following parameters can be set:
%F: file
%L: line number in the file
%C: column number in the file

Object Vision

The exact syntax for the configuration depends on the used editor, see here.

Multi-Tasking (formerly known as: Parallel Processing)

0. **Suspend View Updates to favour GUI**. This option allows a user to interact with the system, even if the system is calculating results or updating views. The option can cause some errors and is therefore not supported in the user mode.
1. **Tile/segment tasks**. This option is used to allow the GeoDMS to calculate segments or tiles of data simultaneously. It is advised to keep this option to the default settings for the GeoDMS version.
2. **Multiple operations simultaneously**. This option is used to allow the GeoDMS to calculate multiple operations on different data items simultaneously. It is advised to keep these options to the default settings for the GeoDMS version.

TraceLogFile. If this option is selected, a trace.log file is generated by the application. The trace.log file logs information about the calculation processes and can be used for debugging purposes. If the option is not selected, the file is not generated.

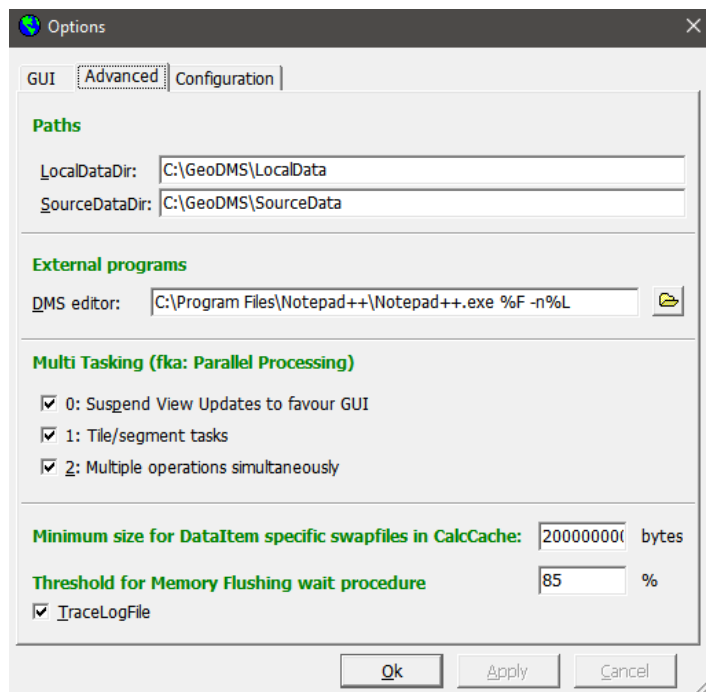The Advanced configuration tab presents the following dialogue:

Figure 4.6: Advanced options dialogue

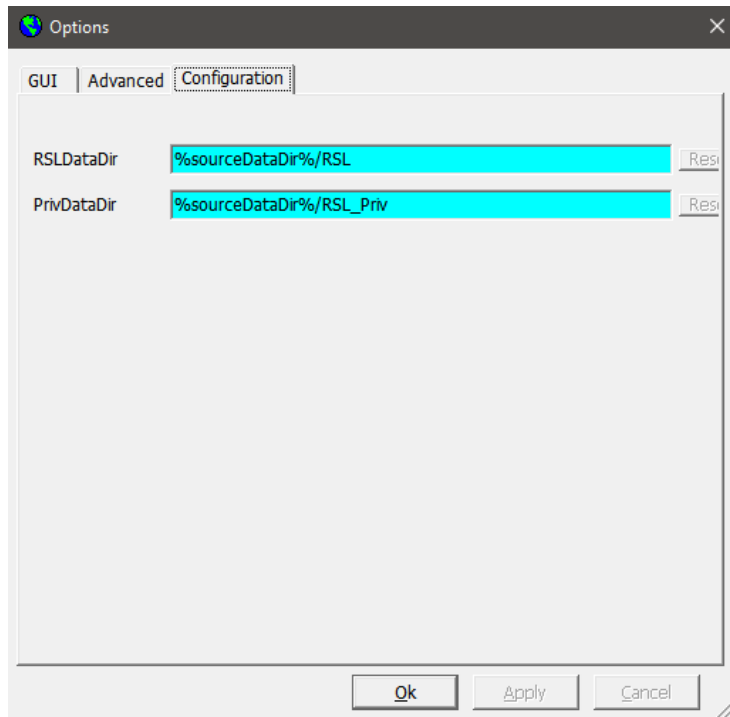The Configuration tab could present the following dialog:

19

Object Vision

Figure 4.7: Configuration options dialog

The presented settings in this dialogue result from the items configured in the /ConfigSettings/Overridable container of a project configuration. The values in the blue boxes correspond to the values configured in the project configuration. The values in the dark green boxes are overruled for the local machine (and stored in the registry). With the Reset button, they can be reset to the configured values.
NOTE, this page could empty if there is nothing configured in a overridable container.

4.2.5 Windows Menu

Figure 4.8: Windows menu

Tile Horizontal: Tile the currently opened data viewers horizontally.

Tile Vertical: Tile the currently opened data viewers vertically.

Cascade: Cascade the currently opened data viewers.

Close: Close current open data viewer.

Close all: Close all currently opened data viewers.

Close all but this: Close all opened data viewers except the currently active data viewer.
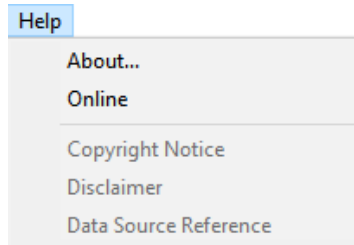

4.2.6   Help Menu

Figure 4.9: Help menu

About: Open the About box for information on the version and development team of the application

Online: Open the Internet Browser installed on the local machine with the URL specified for the Help file in the Tools > Options dialogue.

Copyright Notice: An optional reference to the Copyright information for an application

Disclaimer: An optional reference to a Disclaimer for an application

Data Source Reference: An optional reference to a description of the data sources, to be used in reports with results of the application.
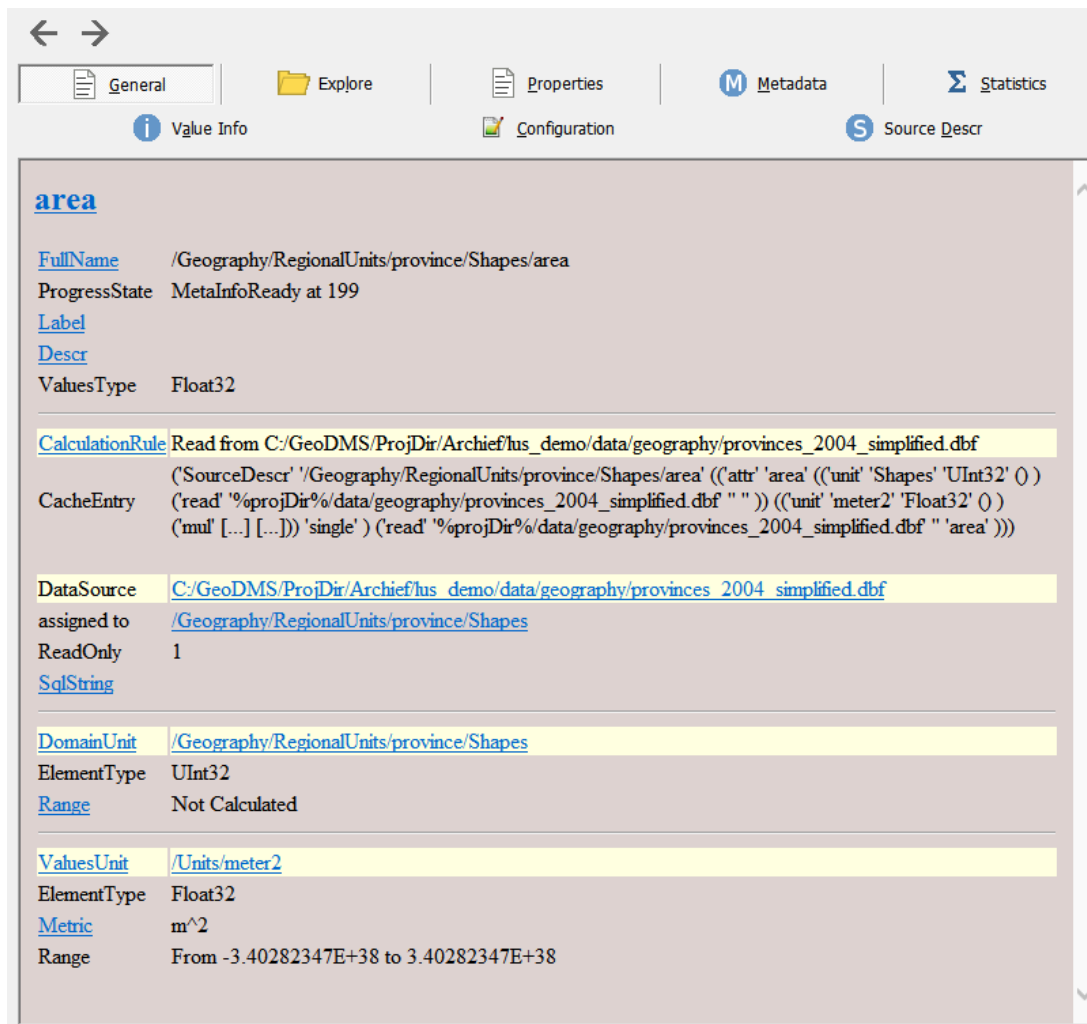
Object Vision

5. Detail Pages

The Detail Pages present a detailed overview of information on the selected tree item.

The Detail Pages show (generated) HTML documents, like an Internet Browser, with hyperlinks and a back and forward button. If the text refers to a tree item, clicking the hyperlink means this item is activated. If the text is the label of a property, a dialogue is presented related to this property.

5.1 General

This page presents the most relevant properties of a tree item and its related domain and values units (if applicable). The following example shows the General page for the tree item: *Geography/RegionalUnits/Province/Shapes/area*

Figure 5.1: General (G) detail page

This Detail page shows:
-   The full name, status, label, description and values type of item and if configured the class diagram to be used for classification of the data.

And, if the tree item is a data item:

- A calculation rule (expression) for a data item for which an expression is configured. The ParseResult and CacheEntry are based on this calculation rule.
- A storage for a data item read from a data source, with an indicator if the storage is ReadOnly (label ReadOnly = 1) or read and write (label ReadOnly = 0) and optional a SqlString.
- The Domain Unit for which the item is available, including the element type, if relevant the geographic projection and the range (nr elements) of the domain.
- The Values Unit in which the data item is configured, including the element type, the metric, the range of the values, the number of elements and, if configured, the classification scheme for the values unit.

5.2 Explore

The Explore detail page shows the name, description and storage type of the items in the NameSpace of the selected tree item. The following example shows the Explore detail page for the tree item: *Units*
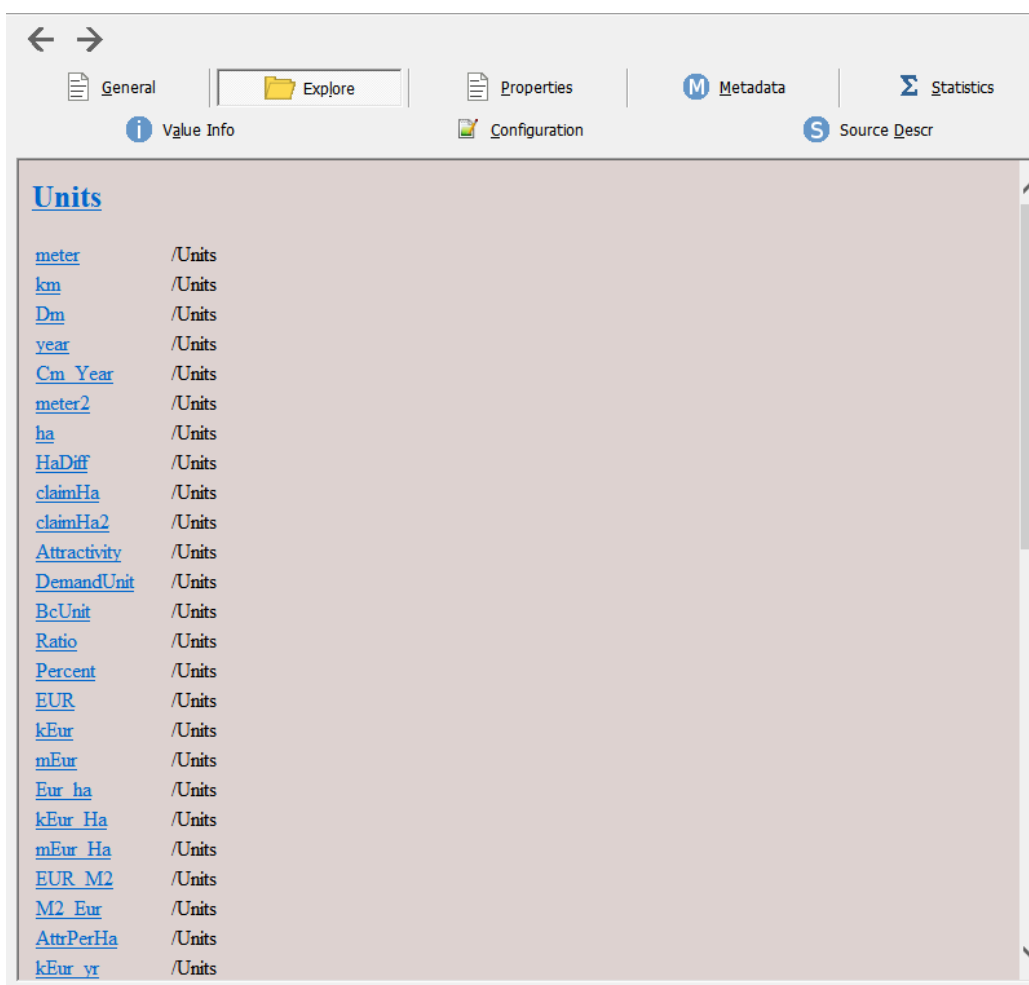
Figure 5.2: Explore detail

Object Vision

5.3 Properties

This page shows all properties of a tree item. The following example shows a part of the properties detail page for the TreeItem: *geography/RegionalUnits/province/shapes*
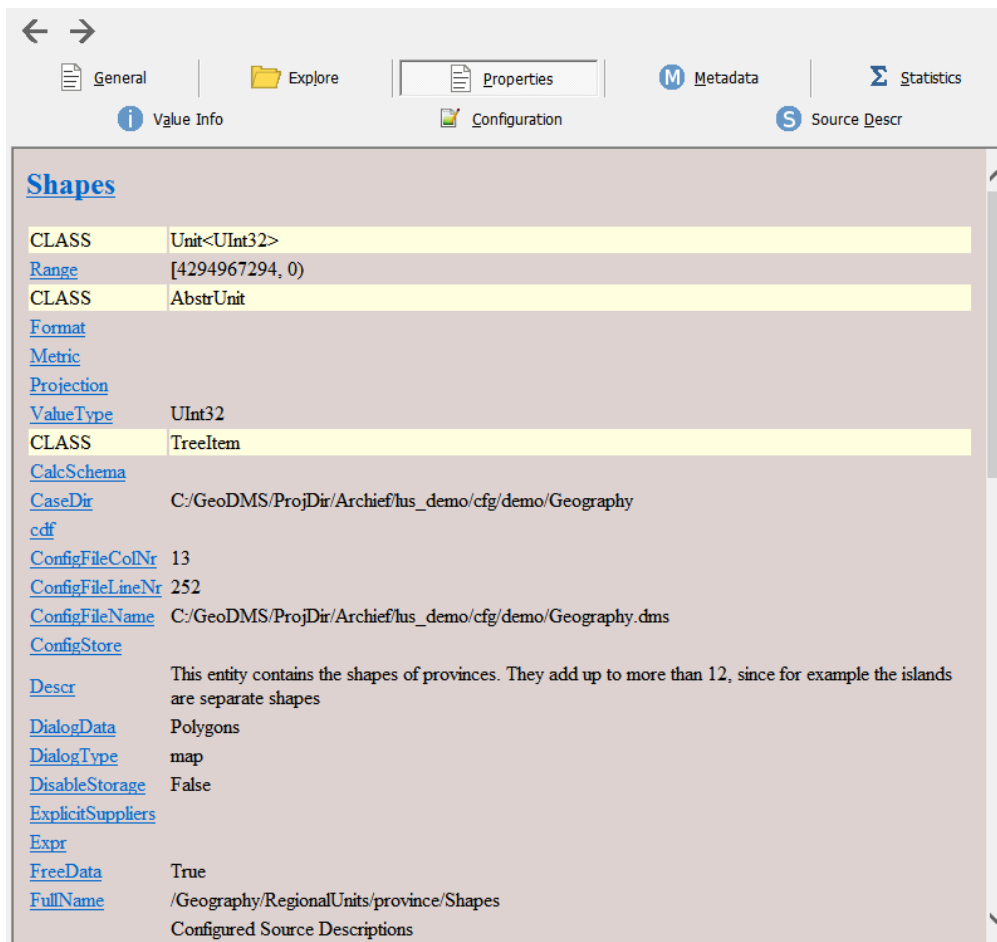
Figure 5.3: Properties detail page

The Properties page shows all relevant properties of the selected item, including system properties, indicated by the keywords CLASS. By double-clicking on a property row, a dialogue is activated with the whole text of the property and its current value, as shown in the following example for the property full name:
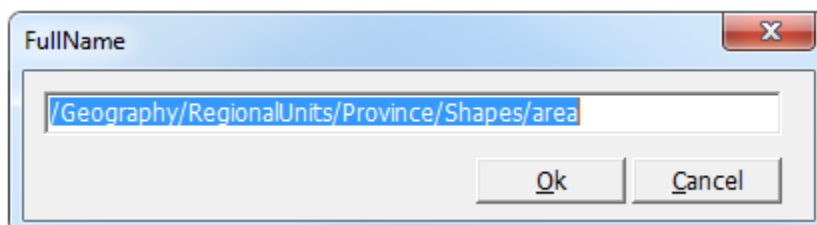
Figure 5.4: Textbox presenting the full name of the selected tree item

This text box can be used to copy information to the Windows clipboard. In the administrator mode (see chapter 4, menu option Tools > Options > Administrator mode), the textbox can also be used to set values for some properties. This

functionality is only advised for experienced users, as setting incorrect values for properties can create an unstable system, resulting in multiple errors.

5.4 Metadata
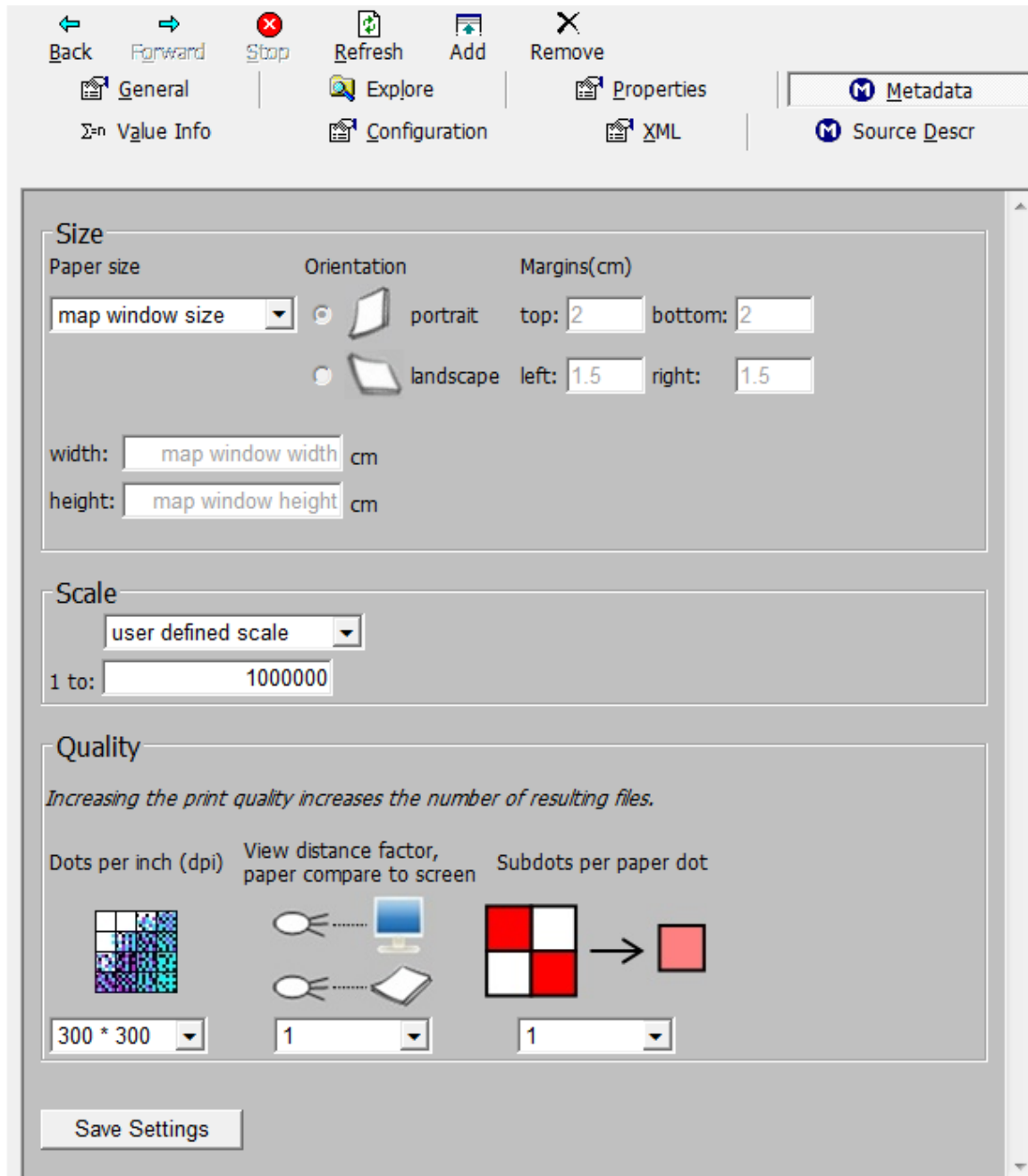
For more information on a tree item, an URL property can be configured that refers to a document on the local machine or on the web. The document (which can be a .html file or any other file format that is supported by Internet Explorer and which application is installed on the local machine, like MS Excel, MS Word, etc.) is presented in the detail page Metadata. An example for the RuimteScanner item: /StudieGebieden/Nl2008/brondata/Beleid/Ruimte/STREEKPLANNEN/streek10

Figure 5.5: part of Metadata detail page

The metadata detail page can also be used to specify the export settings for exporting map viewports to bitmaps. Open the metadata detail page on the item: *ExportSettings*

Figure 5.6: Metadata detail page for item ExportSettings

Object Vision

In this dialogue the following options can be configured:

Size
- **Paper size:**
  The paper size defines the export area of the resulting bitmap. The following options are available:
  - map window size: the export area is the area of interest visible in the map view
  - A specific paper size: the export is based in the center point of the area of interest in the map view and the selected paper size.
  - User-defined: the width and height options become enabled. The export is based in the center point of the area of interest in the map view and the specified paper width and height.
- **Orientation:**
  For specific and user-defined paper sizes, this option indicates if a landscape or portrait export is desired.
- **Margins:**
  For specific paper sizes, margins can be set. The margins influence the width and height of the resulting bitmap.

Scale
The user can define the scale of the resulting map view with the following options:
- **User-defined:** the 1 to .. option becomes enabled to indicate that 1 cm in the map is the specified value in cm's in the real world
- **Based on map windows:** the same scale is used as in the exported map window
- **A specific scale:** the available options are the 'optimal' scale levels for the background map layers. It is recommended to use one of these scale levels, for the nicest map results.

Quality
- **Dots per inch(dpi):**
  This quality setting indicates how many dots will be printed per inch, based on the allowed dpi of the printer. Increasing this number results in better quality maps (if supported by the printer), but also results in more/larger bitmaps. MS Office products like PowerPoint usually assumes images to be around 100 dpi, this means the image size needs to be adjusted if files with larger dpi are imported.
- **View distance factor:**
  A factor indicating if the result is to be seen at the distance of a screen of e.g. of a poster, which is usually looked at from a larger distance. A large view distance factor means the objects in the map are presented larger. The default value is 1.
- **Subdots per paper dot:**
  For future use, the default value is 1

After adjusting these values, activate the save settings button to save the settings for the current session. If the application is ended, these settings are not saved to the configuration. The next time the application is run, the original settings apply again.

Object Vision

5.5   Statistics

This detail presents general statistics about a numeric data item. The example presents the detail page for the item: Current_Situation/Current_landuse/predominant_2010

```
Statistics for /Current_Situation/Current_landuse/predominant_2010:


ValuesType    UInt8


Count    : 351,000

Maximum  : 8

Minimum  : 0

Sum      : 1,990,307

Average  : 5.67039031

Variance : 5.68713808

StdDev   : 2.38477552

Nr Nulls : 0

Nr Values: 351,000
```
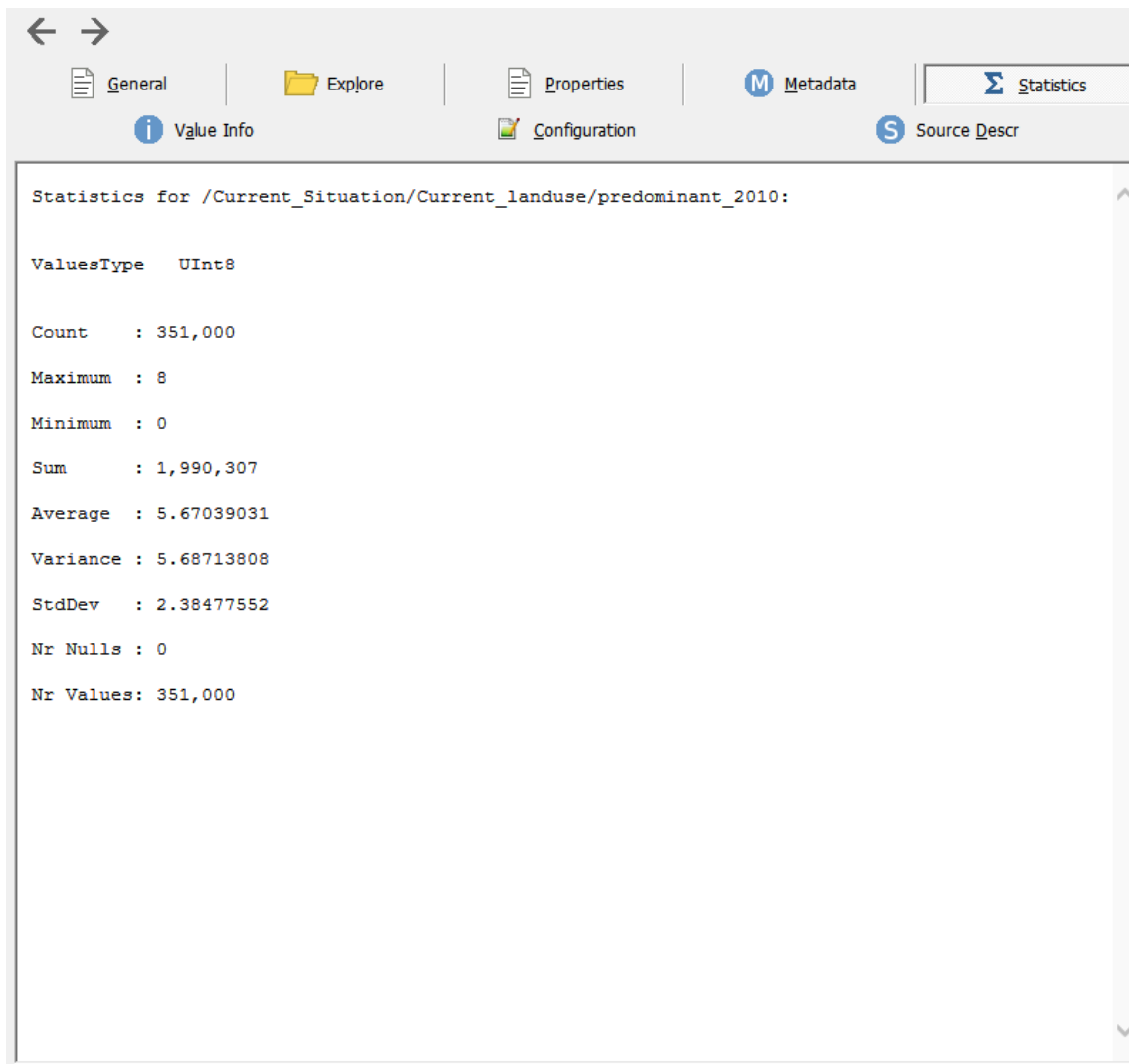
Figure 5.7: Detail page Statistics

In this page the following statistics are presented:

ValuesMetric: the metric of the values unit of the data item (if specified)
ValuesType: the value type of the values unit of the data item
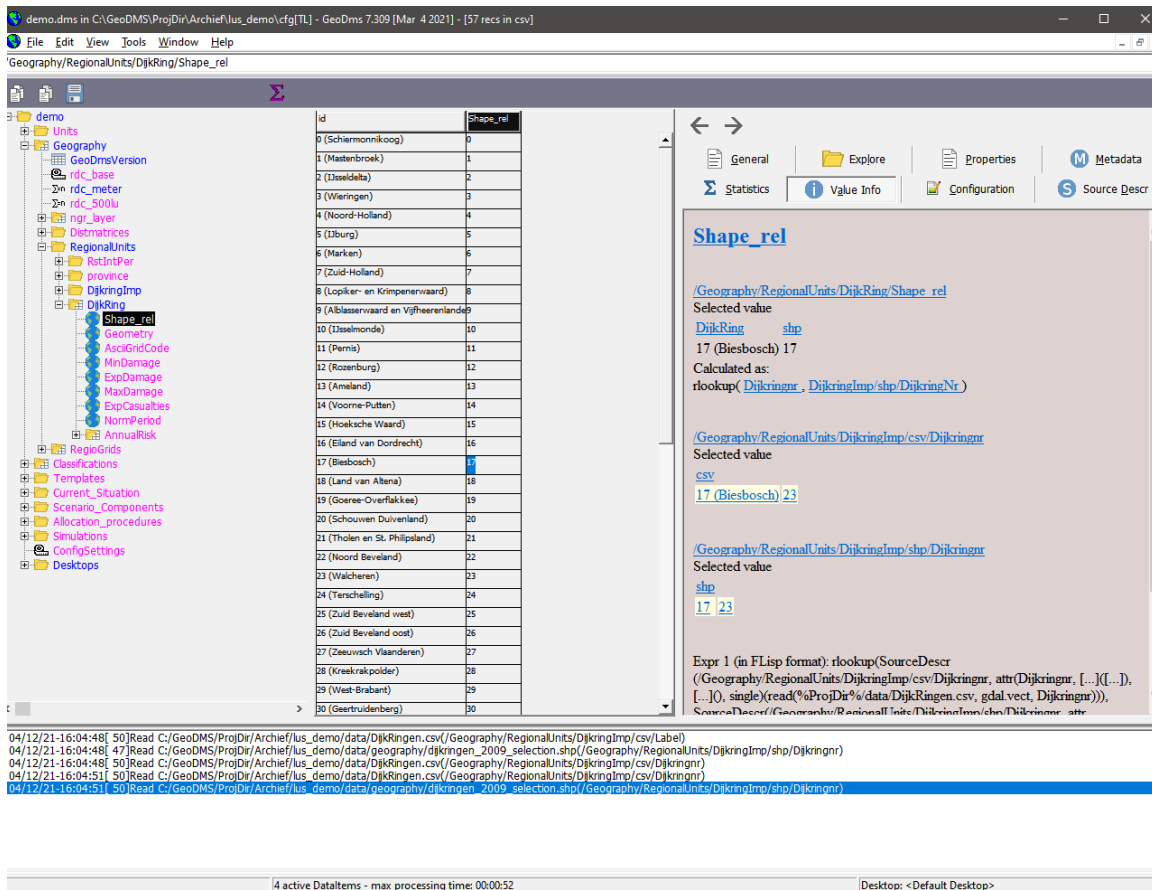
Count: number of items of the data item
Maximum: maximum value of the data item
Minimum: minimum value of the data item
Sum: sum of all values of the data item
Average: average value of the data item
Variance: variance of the data item
StdDev: standard deviation of the data item
Nr Nulls: number of missing data elements of the data item
Nr Values: number of non-missing data elements of the data item

The Statistics is only shown if the data item is valid (as it can take some time to update a tree item). If the item is not yet calculated, a message is shown that the data item is invalidated. In that case, press the Ctrl-U combination to update the tree item first. If the item is not a data item or not numeric, a message is shown which indicates the statistics cannot be shown.

The results in the Statistics view can differ slightly from calculated aggregated values. The Statistics view calculates all present values in a float64 format. If an aggregation is performed on a float32 data item, the results are round off after the calculations to a float32 format.

5.6   Value Info

The construction of a data value in the Table or map view is activated by selecting a cell in the Table or by activating the I-tool in the map and selecting a certain grid cell in the map. If the value info page is the active detail page, all the steps are presented on how a data value is constructed from the source data and the performed calculations:

Figure 5.8: construction of a data value in the data grid view for the tree item: /Geography/RegionalUnits/DijkRing/Shape_rel

If e.g. the cell with the value 17 is selected in the table and the detail page info value is active, the information as shown in the example is presented. This information describes how the value is calculated and which suppliers are used. The next sentences

indicate the values of the suppliers. Use the hyperlink to find out how these values are calculated and what their suppliers are.

5.7 Configuration

The configuration tab shows the configuration syntax of the selected item (and if available, it's subitems). The following example presents the configuration detail page for the tree item: *Units/Eur_Ha*
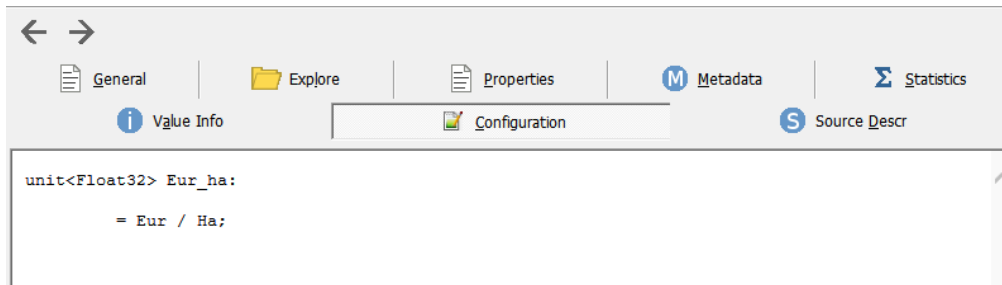
Figure 5.9: Detail page Configuration

More information on how to configure with the GeoDMS can be found in the GeoDMS Academy on https://www.geodms.nl/GeoDMS_Academy.

Object Vision

5.8 Source Description

This detail page describes, if relevant, information about all sources used to calculate a data item. If a source property is configured for a data item, this information is presented, of not the data sources names (files) is presented. See section 4.2.3 about the different Source Descr variants. An example is shown in the next figure:
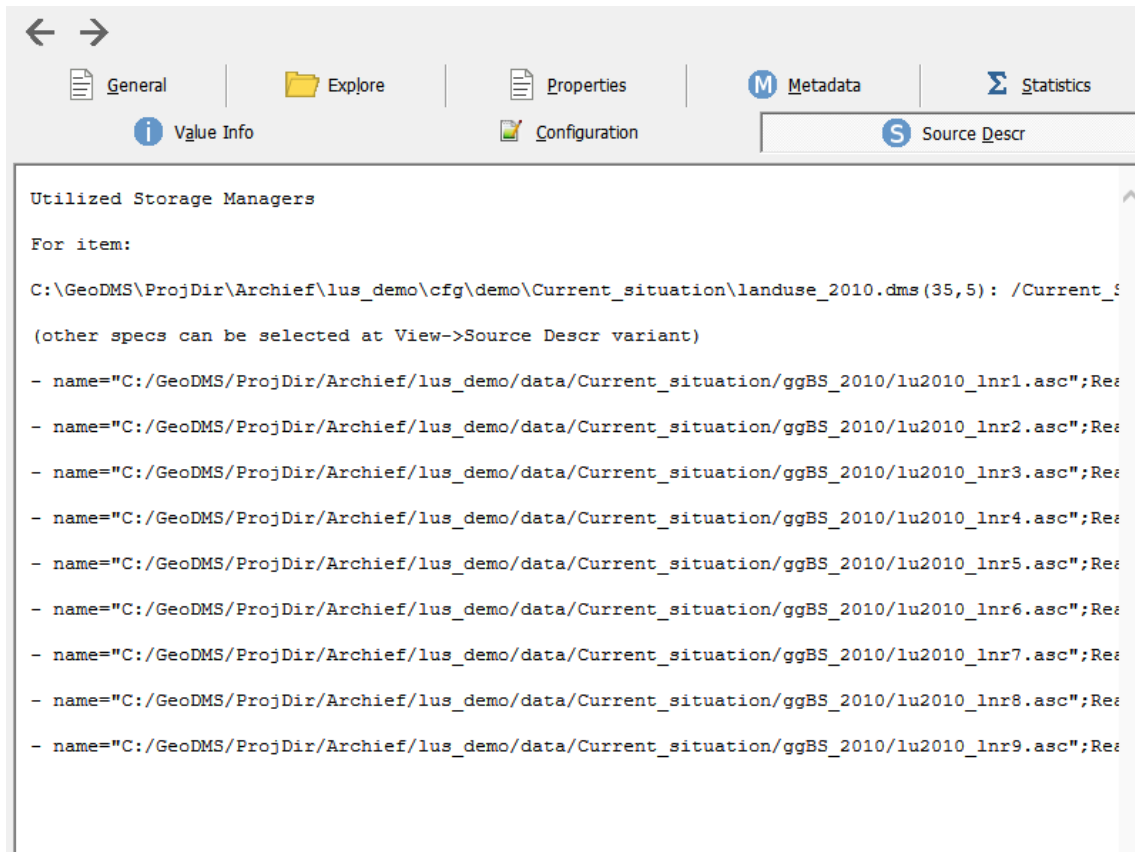
Figure 5.10: Detail page Source Description

Object Vision

PART II VIEWERS

6. Data visualization

The set viewers in the GeoDMS GUI are used to visualize source data and calculated model results. As most data in the applications are geographically related, the main viewer is the map view. This map view is configured as the default view for all items that are geographically related. More information on the map view can be found in chapter 7. The default view is activated by double-clicking on a tree item, by selecting a tree item and pressing the Enter key or by activating the default view action from the main or pop-up menu. The default viewer for data items is indicated in the Treeview by the presented icon (see paragraph 3.2).

For data items that cannot be visualized in a map (like a parameter), the default view is the Table. All data items can be visualized in a Table, by activating the Table view main or pop-up menu item. The Table is described in detail in chapter 8. The third type of view that can be applied to primary data is the histogram view. This view is not configured for any item as the default view but can be activated with the histogram view main or pop-up menu item. The histogram is described in chapter 9.

As well as the views for the primary data, the GeoDMS GUI also offers views on the configured calculation and model logic. Therefore, the so-called process schemes are implemented, allowing the user to get a scheme of the subitems, suppliers and calculation logic of a tree item. These process schemes are described in detail in chapter 11.

All views are positioned in the view area of the application. The first view is always opened maximized. Be aware that the minimum, restore/maximize and close buttons of this view are located at the top right corner of the window in the main menu bar, as shown in the next figure:
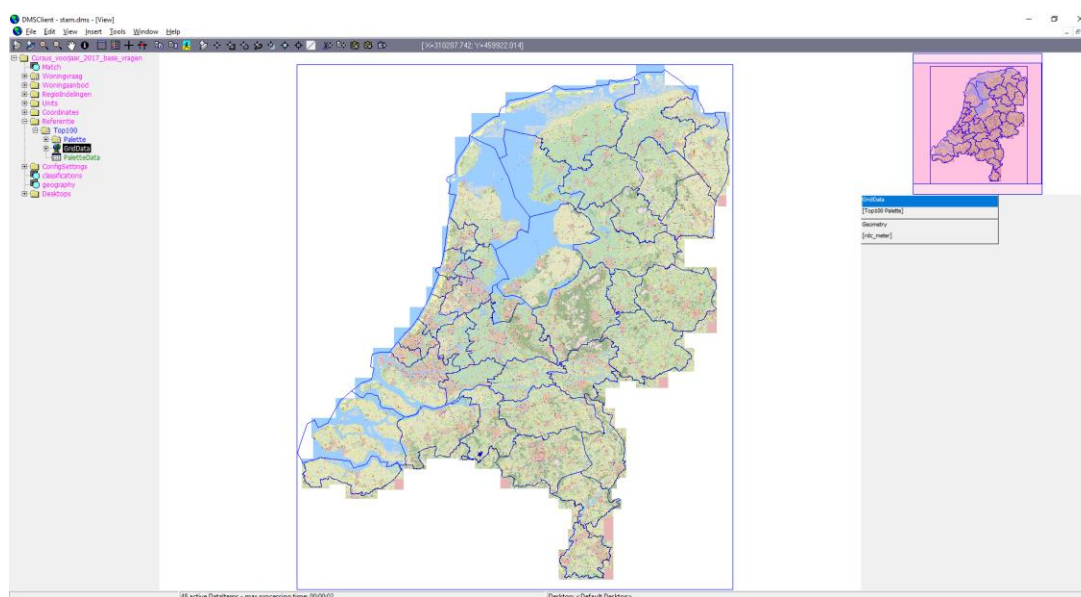
Figure 6.1: Map view
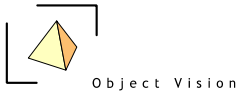
If a second view is opened, this view is opened maximized if the other views are also maximized. Otherwise, the window is opened in the normal Windows state.

Each viewer has its own set of tools in the taskbar when the view is activated. In Figure 6.1 the tools of the map view are presented. All views are listed in the Window main menu option. With this menu option the views can be tiled, cascaded and all windows can be closed.

Object Vision

7. Map View

7.1 Introduction

The map view presents data items that can be geographically located. Each map view has a projection, indicating the coordinate system. In Dutch applications, the projection used is usually the "Rijks Driehoek (RD)" coordinate system for all geographically related data items (other coordinate systems are possible, but the source data is usually in RD Coordinates). A map view consists of layers, each layer is related to one or more data items. All geographically related data items using the same projection can be combined in the same map view window. They can also be opened in multiple separate map views. The number of opened map views is not limited.

In the example of Figure 6.1 a map view is presented with three layers:
- Two reference layers with province boundaries and with a top100 grid.
- A dominant land use thematic grid layer.

In paragraph 7.2 the available layer types for a GeoDMS map view are described. A map view can be activated from the Treeview by selecting tree items that can be geographically related. These items are indicated with a map icon ( ).

A new map can be created or a layer can be added to an existing map by selecting a tree item and activating one of the following actions listed in the table. The result of the action, based upon whether there is already an active map view opened, is described.

Action	No active map view	Active map view
Double click on selected tree item	New map window	Layer opened in active map view with same coordinate system
Enter key on selected tree item	New map window	Layer opened in active map view with same coordinate system
Main/pop-up menu option Default View	New map window	Layer opened in active map view with same coordinate system
Main/pop-up menu option Map View	New map window	New map window
Ctrl-M on selected tree item	New map window	New map window
Drag and drop to view area/active window	New map window	Layer opened in active map view with same coordinate system

A reference grid layer can be configured as a background layer. This means in all map views this layer is visualized automatically when the view is created (see the modeler's guide for how to configure a default layer).

Object Vision

7.2 Layer types

In a map view, layers can be visualized in different ways. Within the GeoDMS a difference is made between:

Reference/background layers:
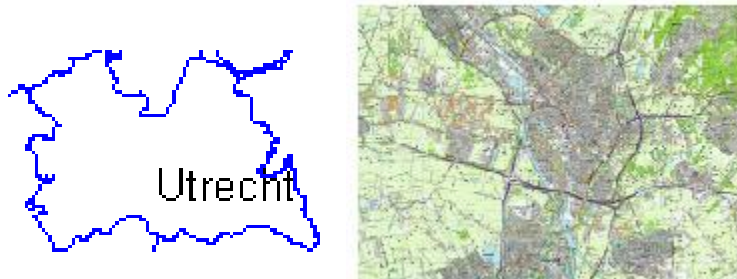
Figure 7.1: Examples of reference/background layers with polygons/labels and grid data

Layers that are used to refer in an intuitive way how the data is to be visualized. Reference layers are usually:
- topographic polygon layers (showing the boundaries of areas like in the example above), sometimes with a label configured (as in the example)
- Grid layers which can present different detail information at different zoom levels.

In GeoDMS applications one or a set of reference layers is often configured as default layer (see the modeler's guide for how to configure a default layer). The default layer (set) has by default one entry in the legend.

Attribute data layers:
Layers use to present data related to a geographic domain. This domain consists of geographic objects, which can be grid cells, polygons, arcs or point as in the following examples:

Figure 7.2: Examples of attribute data layers with grid, polygons, arcs and points data

In these layers, the features (grid cell, polygon, arc, point) are visualized with one or multiple visualization styles (colors, symbols, size etc.). The possible styles are dependent on the layer type. The style values refer to classes in a classification scheme. This implies that a palette (e.g. color, size, symbol) and, if the data item is not yet classified, a classification is needed to visualize a data item as a thematic layer. If no classification is found for the data item or its values unit (see chapter 10 for more information), a data item cannot be visualized thematically.

Layers can be activated with the actions listed in paragraph 7.1. The grid layer type is activated for each numeric data item with a grid domain as domain unit. For the vector data types (polygon, arc and point), the geographic format specified for the values

Object Vision

unit of the feature data item, determines if the data is visualized as point, arc or polygon (see the modeler's guide how to configure these values types).

A specific theme of a layer is a text label. Text labels can be used for polygon and point layers.
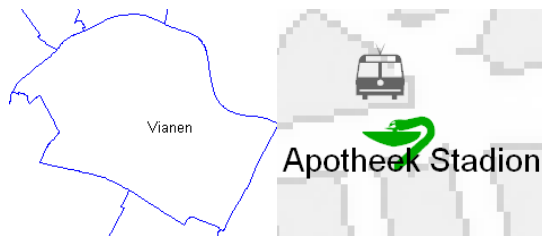
Figure 7.3: Examples of labels for polygon and points layers

7.3   Active Layer

The active layer is an important concept in each GeoDMS map view. The active layer is the layer on which the layer-specific (toolbar) functions are executed.

A layer can be activated from the legend (see 7.5). In this legend the active layer is indicated by a blue background color in the title as in the next figure (the last column contains the counts):

Figure 7.4: Examples of an active layer in the Legend

The user can switch between active layers by clicking on the layer title. There is always only one active layer (activating one layer deactivates all other layers). By default, the last layer added to the map view becomes the active layer.

7.4   Tools

When a map view is then activated, the set of specific map view tool buttons is presented in the toolbar. By default, the 'Zoom in'-tool is activated, as this is often the first action performed. For the neutral state (arrow that performs no action on the map view) deactivate the zoom or selection state by re-clicking on the same tool.

Object Vision

The following buttons are available to adapt or query the map view (not all tools might be visible for a specific project, this can be configured in the config.ini file):

Fit to all layers: action to enlarge or reduce the zoom level and pan the area to make the extents of all layers fit in the active map view.

Fit to active layer: action to enlarge or reduce the zoom level and pan the area to make the extents of the active layer fit in the active map view.

Zoom in: zoom in tool, presenting the cursor as a magnifying glass with a plus sign, which can be used to zoom in, in two ways:
- Click with the left mouse button at the top left corner of the requested area of interest. Keep the left mouse button pressed and move the mouse to the bottom right corner, a rectangle is drawn on the map. Release the mouse button and the map zooms into the requested rectangle.
- Click with the left mouse button on a position in the map and release the button. The map is zoomed in with a fixed zoom factor and the cursor position as center.

The Zoom in tool is configured as default tool. The neutral state (no tool active) can be achieved by activating this button.

Zoom out: zoom out tool, presenting the cursor as a magnifying glass with a minus sign, which can be used to zoom out until the full extent of the map is reached. Click with the left mouse button on a position in the map and release the button. The map is zoomed out with a fixed zoom factor and the cursor position as center.

The following six tools are used to (de)select objects. The selected features of polygons, arcs and points are colored light blue. For grid cells, a hedge style for both interior as the border is used to indicate selected cells.

Selected features are by default added to the earlier selection. Keep the Control key pressed to deselect features. Activate the 'Select none'-tool to reset the whole selection in the active layer.

Toggle layout: action to toggle between three layout options of the map view. By default, the legend and the overview map are visible in each map view. With the toggle layout tool, the user can select between three options:
- Legend and overview map visible (default)
- No legend and no overview map visible
- Only legend visible, no overview map

The tool presents a picture of the layout that will be presented if the tool is activated. The default tool shows an empty layout of the view area. If the tool is activated no legend and no overview map will be presented. The tool itself is now changed to the following picture:

It shows a legend area in the right part of the view area. If the tool is now activated, a legend is presented but no overview map. The tool is again changed to the following picture:

It now shows both a legend area and an overview map area. If the tool is now activated, a legend and an overview map are presented (the default status of the map view). The tool is changed to its original picture.

Toggle palette: action to toggle between three options of showing/hiding palette information the legend. By default, palette information is presented in the legend if the number of entries in the palette is less or equal than 32.
With the toggle palette tool, the user can select between three options:
- show palette information for each layer with palette information in the legend
- show palette information for the active layer with palette information in the legend
- show no palette information for each layer in the legend

Activate the button to select the next option. The picture of this button will not change.

Toggle Needle Controller: action to toggle between showing and hiding a horizontal and vertical grid line, called a needle controller, in the map view. These grid lines can be used for accurate navigation (X and Y coordinates are always visualized in the toolbar).

Toggle Scale bar: Action to toggle between showing and hiding a scale bar in the bottom right corner of the map view.

Copy visible area: action to copy the visible contents of the active map view to the clipboard. In case the legend is visible, this legend is also copied to the clipboard. The legend can be made (in)visible with the Toggle layout button.

Copy full legend: action to copy the full contents of the legend to the clipboard. The size of contents of the clipboard is limited, if the data to be copied exceeds the maximum size of the clipboard, an error is generated.

Export viewport: exports the active viewport to one or a set of bitmaps, using the specified export settings. See paragraph 5.4 for information on how to edit these settings. All viewports can be exported by using the File > Export Viewports menu option.

Object Vision

7.5 Legend

The legend of the map view has two functions. The first function is the legend function for a map, explaining which layers occur in the map including their values units and, if applicable, their classifications schemes. The second function is to activate layer specific functionality of the layers in the map view.

An example of a legend for a map view is presented in Figure 7.5:

predominant_2010		
[LUclasses]		
■	residential	11864
■	industrial	3229
■	recreation	2421
■	agriculture	99588
■	nature	17699
■	buildinglot	979
■	infrastructure	372
■	water	113235
■	exterior	101613
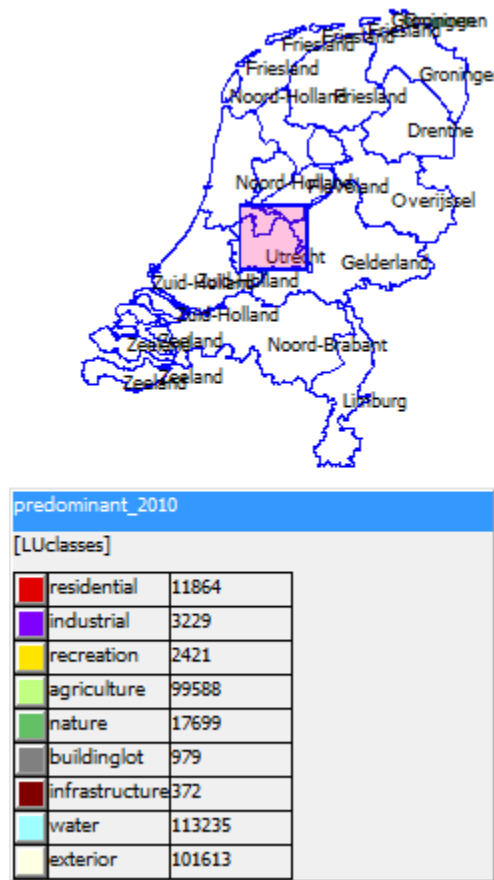
Figure 7.5: Map view legend with an overview and two layers

The upper part of the legend presents an overview map with the full extent of the contents of the configured default layer(s). See the modeler's guide for how to configure a default layer. The purple transparent area indicates the visible part in the map view. The overview is used for a geographic reference, but can also be used for navigating by dragging the purple area. The overview window is default visible but can be made invisible with the pop-up menu from this Legend (see 7.5.1 pop up menu).

All layers in the map view are presented in the legend. The sequence indicates the drawing order. The layer at the bottom is drawn first, the following layers are drawn next, so the layer at the top of the legend is drawn above all layers.

Each layer in the legend is presented with a title (the name of the data item that was requested, or in case this item has a label property configured, its label). Below the title, the values unit of the data item is shown. If the information tool is used, the

Object Vision

value for the specific object selected in the active layer in the map is also presented in this line.

For layers with a classification scheme configured, the palette colors, classes, labels and a count of the number of entries in the class are default shown in the legend control, in case the number of entries is less than 15. If symbols are defined in the scheme, these symbols are also presented. With the pop-up menu the user can hide or visualize this palette information for the layer in the legend.

With the ▣ button, the palette information can be shown for no, the active, or for all layers. The width of each column can be adapted. Click with the left mouse button on the line between the columns, keep the mouse down (a different cursor appears) and drag the width of each column to the requested size.

The colors, labels and class values of calculation schemes can be edited from the legend. To edit a color, double-click on the color in the legend for a Windows color dialogue. To edit the class values or labels, click on the specific cell in the legend. Type a new value or use the F2 key to edit the current value. To edit other aspects of the scheme, like the number of classes, use the Edit Palette pop up menu option for the palette dialogue (see chapter 10).

A layer in the map view and related in the legend has a visible or hidden state. If a layer is hidden in the map view, this is shown in the legend with a grey color. The user can toggle between the hidden and visible state by double-clicking on the layer title. By default, a layer is always visible.

With the Ctrl key pressed and the arrows up and down and left and right, it is possible to scroll in the legend. The Ctrl-Home and Ctrl-End key combinations move directly to the top and end of the legend. Scrolling becomes relevant if the legend information does not fit in the visible area of the screen.

Layer-specific functions and some general map settings can be activated from a pop-up menu, which is shown if a user clicks with the right mouse button on the layer in the legend. The options presented are described in the next paragraph.

7.5.1 Pop up menu
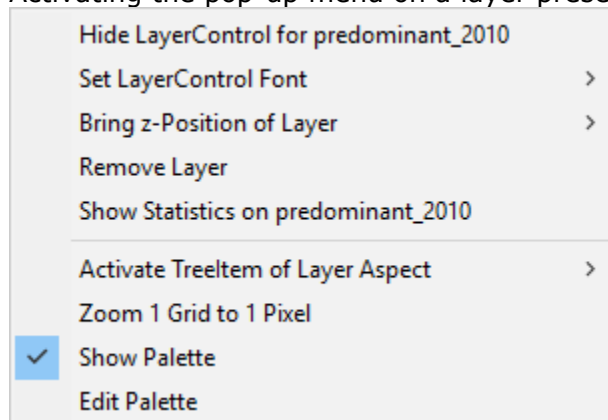Activating the pop-up menu on a layer presents the following menu:

Figure 7.6: pop-up menu for the legend

Object Vision

The following options are available
- **Hide LayerControl for *layer***
The layer is not visualized in the layer control (e.g. background layers can be made hidden when exporting a legend). A right mouse click on the layer control on an empty area offers the option to make the hidden layers visible again.
- **Set LayerControl Font:**
Three options are available for the size of the layer font in the legend. The default option is small. The user can set the font size to medium or large.
- ***Bring z-Position of Layer*:**
The sequence of layers in the legend corresponds to the drawing order in the map view. This order can be changed with the four submenu options. Grid layers drawn above other layers are visualized transparently.
Only the relevant submenu actions are enabled for the user:
    - **To Top:** The layer will be drawn above all other layers. In the legend, the layer is moved to the top. The option is only available in case the layer is not yet the top layer in the drawing order.
    - **To Bottom:** All other layers will be drawn above this layer. In the legend, the layer is moved to the bottom. The option is only available in case the layer is not yet the last layer in the drawing order.
    - **Up:** The layer is positioned one step higher in the draw order. In the legend, the layer is moved one place higher. The option is only available in case the layer is not yet the top layer in the drawing order.
    - **Down:** The layer is positioned one step lower in the draw order. In the legend, the layer is moved one place lower. The option is only available in case the layer is not yet the last layer in the drawing order.
    The sequence can also be adapted for dragging and dropping the layer.
- **Remove *layer*:** The layer is removed from the map view.

Based on the type of layer some additional layer specific options are available:
- **Show Statistics on *layer*:** presents a dialogue box with the same statistics as presented in the Detail page, Value Info (see 5.5)
- **Classify with:** if one or more classifications are available for the data item shown as attribute layer, these are presented here. The user can select from the relevant classifications.
- **Activate TreeItem of Layer Aspect**: for each aspect the thematic data and, if used, class breaks and aspect values can be activated. The submenu's present the relevant aspects and items and their parents. With a left mouse click, the requested item becomes activated. The dominant ggModel layer has only a brush color aspect, so only this Activate option is presented in the example.
- **Select SubLayer(s), (not for grid layers);** the different style aspects used to draw a layer can be activated separately. The style aspects differ for the different layers types. Therefore, the set of submenu options differ per layer type. A ✔ indicates a style aspect is active (visible). For polygon and point layers, labels can be activated with the Select SubLayer >Label > Visible menu option.
- **Zoom 1 Grid to 1 Pixel (only for grid layers):** The layer is zoomed to the level at which each grid cell corresponds to one pixel. This is often the most elegant level to present a grid.
- **Show Palette (only in case a palette item is used for visualization):**
This option toggles between showing and hiding the palette and label information in the legend of the classification scheme used for the data item. A ✔ character before the menu option indicates the information is shown.

- **Edit Palette**
  This option activates the edit classification dialogue (see chapter 10) to edit the classification/palette used to draw the layer.
  The Edit classification dialogue presents a table, the table tools (see chapter 8.3) can be used for this table.

The pop-up menu can also be activated by right mouse clicking in the map view. The layers visible in the map view are shown and the similar functions are available for these layers and for the general map view/legend options.

O b j e c t   V i s i o n

8. Tables

8.1 Activating a Table

The Table presents data items or a set of data items of the same domain unit in a Table. All data items can be visualized in Table. The Table is the default view for items that cannot be visualized in a geographic view, these items can be:

- Data items for which the domain unit cannot be georeferenced (parameters or other data items for which there is no geographic domain, like the label data item of a classification). These items are indicated by an ▦ icon.
- Containers with data items as subitems (first level subitems). The first data item of this container determines the domain unit of the Table, all data items that have this same common domain unit are visualized in the grid. These items are indicated by an ▦ icon.
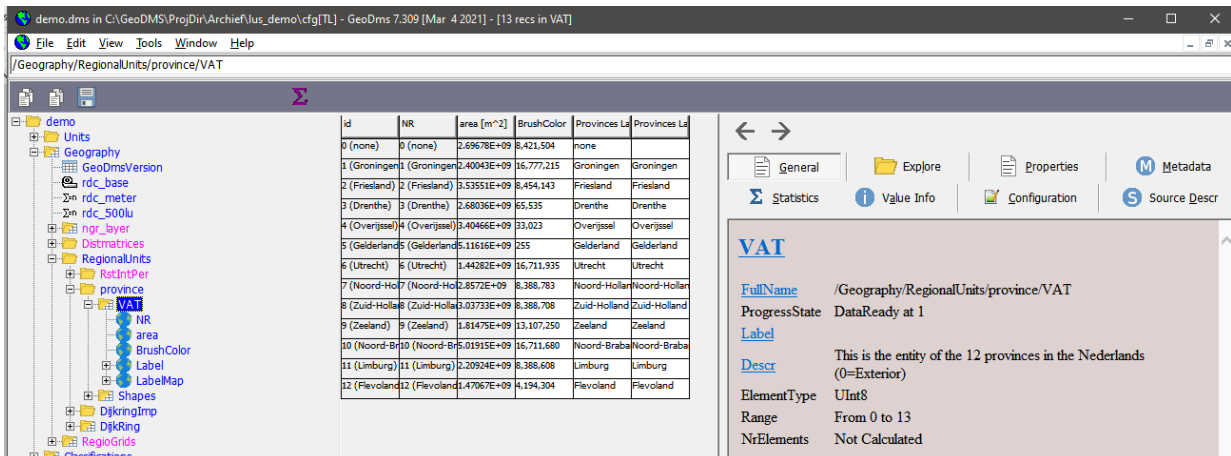
As with the map view, a new Table can be activated for a tree item, or the tree item can be added to an already opened Table (if this opened view is of the same domain unit as the requested data item). The following table shows the possible actions to visualize a tree item in a Table and the results of the actions:

Action	No active Table for the requested domain unit	Active Table with same domain unit as requested data item	Active Table for another domain
Double click on selected tree item (only if the Table is the default viewer, indicated by the ▦ or ▦ icon)	New Table window with the requested data item or all the subitems at the first level of the found domain.	Data item or subitems at the first level with the same domain unit are added to the active grid.	New Table window with the requested data item or all the subitems at the first level of the found domain.
Enter key on selected tree item (only if the Table is the default viewer, indicated by the ▦ or ▦ icon)	New Table window with the requested data item or all the subitems at the first level of the found domain.	Data item or subitems at the first level with the same domain unit are added to the active grid.	New Table window with the requested data item or all the subitems at the first level of the found domain.
Main/pop-up menu option Default View (only if the Table is the default viewer, indicated by the ▦ or ▦ icon)	New Table window with the requested data item or all the subitems at the first level of the found domain.	Data item or subitems at the first level with the same domain unit are added to the active grid.	New Table window with the requested data item or all the subitems at the first level of the found domain.
Main/pop-up menu option Table View	New Table window with the requested data item or all the subitems at the first level of the found domain.	New Table window with the requested data item or all the subitems at the first level of the found domain.	New Table window with the requested data item or all the subitems at the first level of the found domain.
Ctrl-D on selected tree item	New Table window with the requested data item or all the subitems at the	New Table window with the requested data item or all the subitems at the	New Table window with the requested data item or all the subitems at the

Object Vision

	first level of the found domain.	first level of the found domain.	first level of the found domain.
Drag and drop to view area/active window	On empty view area: New Table window with the requested data item or all the subitems at the first level of the found domain	Data item or subitems at the first level with the same domain unit are added to the active grid.	Another view: Not allowed to drop the item.

8.2 Table

Activating the Table for the tree item: *Geography/RegionUnits/Province/VAT* results in the following table:

Figure 8.1: Table View

The mentioned tree item is a domain unit with 13 elements. All subitems have VAT as domain unit. Therefore, all these subitems are shown in the table.
The first column shows the index number(id). The other columns contain the data items requested. Some columns are colored a darker grey, indicating their values cannot be edited. Columns with values that can be edited are colored light grey.

The width of the columns can be adapted by moving the mouse to the header row (in light grey background color with the labels of the presented data item), on the border between two columns. Click with the left mouse button, keep this button pressed and move the mouse to the left or the right to change the size of the columns.
The sequence of columns can be adapted with drag and drop on the column header of a label. Click with left mouse button on a header, keep the mouse pressed and move the mouse to the requested position.

In the table, a cell or a column can get the focus. Click on a cell or a column header to set the focus. Also, a focus rectangle can be used to set the focus to multiple cells. Therefore, first set the focus to one cell and use the arrow keys to enlarge the focus rectangle (colored black). Also in a focus rectangle, there is always one focus cell (colored blue).

If the Detail page Value Info is active, the whole path of how this selected data value in the Table is constructed is shown (see paragraph 5.6). The focus cell in the table is related to the information tool in the map view. If information is requested on a feature in the map view, the cell of the record of this feature receives the focus and vice versa.

A column receives the focus by a left mouse click on the label of the column in the header row. With a right mouse click on the label a pop-up menu for the column is activated, with the options:

- **Sort on *data item name:*** To sort values ascending or descending
- **Relative Display**: to present the numeric values as percentage of the total
- **Copy *data item name:*** To copy the values of the item to a new data item with the name: *data item name* + Copy + *SequenceNr,* mainly relevant in classifications
- **Remove *data item name***: to remove the selected column from the Table.
- **Ramp Values**: to ramp the values of a distribution, mainly relevant in classifications. This option is only available for not derived, numeric data items with more than one entry.

8.3 tools

If the Table is active, the following tools are available in the toolbar:

Copy text: Copy the highlighted contents of the table as semicolon delimited text to the clipboard. String attributes are quoted.

To highlight a cell, click on the cell with a left mouse click. Use the arrow keys to enlarge or diminish the set of highlighted cells.

To copy the whole table:
1. Highlight only one cell, a single highlighted cell will copy the whole table.
2. Un-highlight all cells, click with the left mouse click on a highlighted cell and press the Escape key.

Copy image: Copy the visible contents of the active table as an image to the clipboard.

Save to csv: Save the highlighted contents of the table as semicolon delimited text to a file. String attributes are quoted. The path of the file is indicated by a dialog.

Σ

Group by: Group the data by the unique values in the selected column.

9. Histogram View

9.1 Histogram view

A histogram presents a graph with a frequency distribution of the occurring data values in a data item. If the data item is not classified (the value type of the values unit is not uint8), a classification is needed before a histogram can be made. Only the class values are used for the histogram view, not the palette colors or the labels. The following example shows the histogram for the data item: *Current_Situation/Current_landuse/predominant_2010*

Figure 9.1: Histogram view

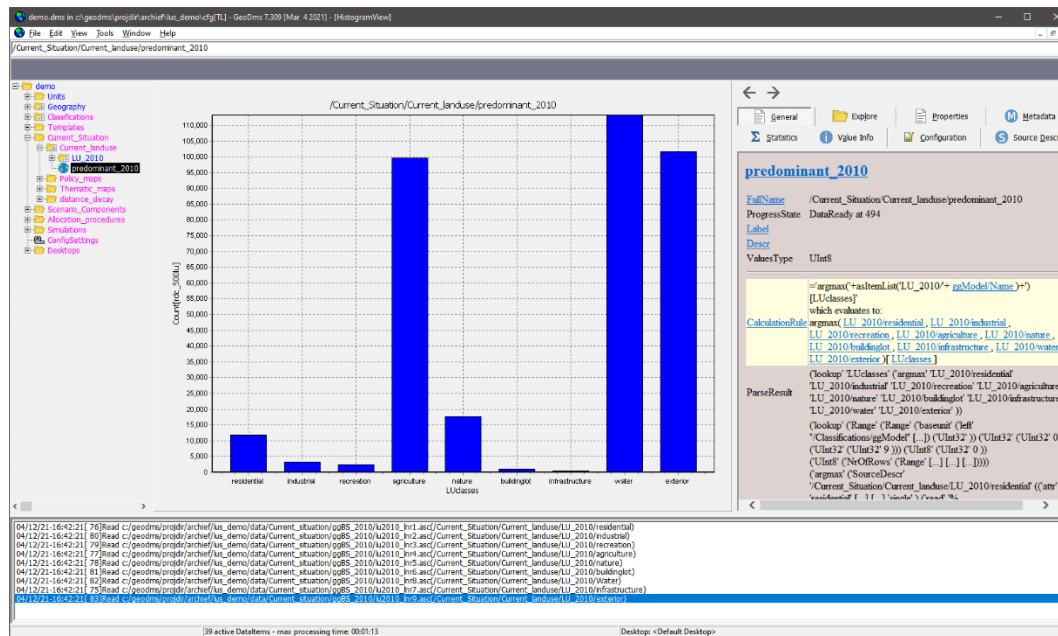The values on the x-axis correspond to the land use classification. The y-axis shows the count of the number of occurrences in the domain of the original data item, in this case, land use classes. The full name of the presented data item is shown in the graph title.

A histogram can be activated with the main or pop-up menu Histogram View (Ctrl H) if the tree item is a numeric data item (not a parameter).

Object Vision

10. Insert Classification and Palette

10.1 Classifications and palettes

Classifications are used to classify numeric data items into a set of classes. A classification is mainly used in primary data viewers to group relevant sets of elements. These groups are visualized using the same visualization style. In the GeoDMS GUI themes (colors, sizes, symbols and styles) are used to visualize classes of an attribute layer in a map view. The classification and palette editor can for the moment only be used to specify colors (other themes need to be configured in the dms configuration files, see the modeler's guide). The set of colors for each class in a classification scheme is called a palette. Often also a label is requested for a class in classification that, if used, is shown in the legend of a primary data viewer.
The next table shows where classifications in the GeoDMS GUI are used, depending on the requested data item:

Data type	Thematic map layer	Histogram	Export to bitmap
Unclassified one dimensional numeric data item (value type int8, (u)int16/32, float32/64)	Classification: obl Palette: obl Label: opt	Classification: obl Palette: nu Label: nu	Classification: obl Palette: obl Label: nu
Classified one dimensional numeric data item and Boolean (value type uint8 and Boolean)	Classification: opt Palette: obl Label: opt	Classification: opt Palette: nu Label: nu	Classification: opt Palette: obl Label: opt
Non numeric data item (value type = string)	Classification: np Palette: np Label: np	Classification: np Palette: np Label: np	Classification: np Palette: np Label: np
Point, arc and polygon data (value types (s)(d)(f)(i) point/arc/polygon)	Classification: np Palette: np Label: np	Classification: np Palette: np Label: np	Classification: np Palette: np Label: np
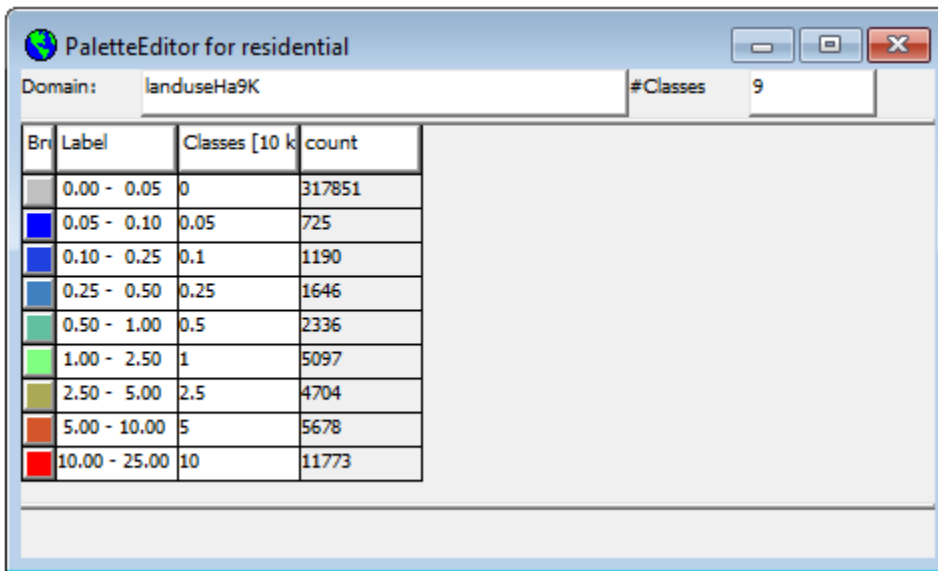
obl: obligatory
opt: optional
nu: not used
np: not possible

Classifications and palettes in the GeoDMS can be configured for both data items as well as units. If a classification or palette is needed for the requested user action (as presented in the table), the GeoDMS GUI first checks for the requested data item if these are available. If not, the GeoDMS GUI checks for the values unit of the requested data item if a classification and palette is configured. In case no classification and/or palette is found for both data item and values unit, a default classification is generated.

Classifications including palettes and labels can be inserted or edited with the Insert/Edit Classification and Palette dialogue. Select the data item or unit for which a classification needs to be configured and activate the Insert Classification and Palette main or pop-up menu option (or the Ctrl F keyboard combination). Use the Edit Classification and Palette main or pop-up menu option (or the Ctrl + Alt + C keyboard combination) to edit the classification and palette of a data item or unit. Be aware, if a data item has no classification configured, the Edit Classification and Palette option edits the classification configured for the values unit.

10.2 Insert Classification and Palette dialog

The editor can e.g. be activated from the legend in the map view. Activate a map view for the item: */Current_Situation/Current_landuse/LU_2010/residential*
Activate the palette editor with the Edit Palette pop up menu option for this layer, the following view appears:

Figure 10.1: PaletteEditor for /Current_Situation/Current_landuse/LU_2010/residential

This view with the classification scheme contains a Table, as described in chapter 8. The table tools can be used for this table. This Table contains a Brush color, label, classes and count column. The count column is grey, indicating its values cannot be edited. The sequence of the columns and the width can be adapted as described in paragraph 8.2.

Classes are always increasing and connected. In the table, the start value of each class is presented. The end value is the start value of the next classes, presented in the next row. The last class is always infinite.

The pop-up menu of the table view with some different options is available for the columns of the Table. See the column description for their specific menu options.

Object Vision

BrushColor: individual colors can be edited by double-clicking on a specific color cell. A Windows color dialogue appears. The pop-up menu option for this column contains the following options:

> Remove BrushColor
> Change Color   >
> Classify residential >
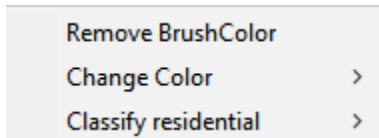
- **Remove BrushColor:** to remove the column from the view
- **Change Color:** Select a color from a palette editor or set the color to fully transparent
- **Classify *original data item*:** to classify the original data item, see the class's column.

Label: individual labels can be edited by activating the cell and typing a new label or by pressing the F2 function key and editing the current label. The pop-up menu option for this column contains the following options:

> Remove Label
> Classify residential >
> ReLabel

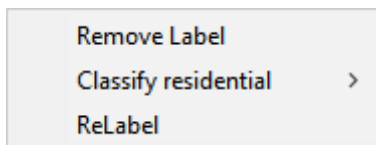- **Copy Label**: to copy the label column to a new color data item, with the name of the original item, the extension Copy and a sequence number. This way label columns that cannot be edited (e.g. because read from an ODBC source) can be copied, the copy item can be edited.
- **Remove Label:** to remove the column from the view
- **Classify *original data item*:** to classify the original data item, see the class's column.
- **ReLabel**: to relabel the contents of the label column with derived labels from the class boundaries
- **Copy Table *class unit***: to copy the whole classification scheme.

Classes: individual classes can be edited by activating the cell and typing a new class value or by pressing the F2 function key and editing the current class value. The pop-up menu option for this column contains the following options:

> Relative Display (as % of total)
> Remove Classes
> Classify residential >
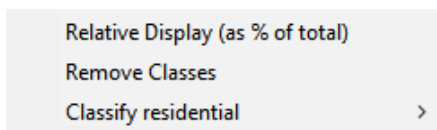
- **Relative Display**: to present the values as % of the total
- **Remove Classes:** to remove the column from the view
- **Classify *original data item.*** This option is used to classify the original data item. First, specify the number of requested classes in the #class's text box. Next, select one of the four types of classifications that are available:
  - *Unique values* (available for all data items with a number of unique occurrences that fits in the range of the domain unit): a class is added for each value that occurs in the data item. The number of classes is based on

the number of unique occurrences. The maximum number of classes is dependent on the domain unit of the class unit.

- *Equal counts* (available for all data items): the occurring data items are split up into classes with, as far as possible, an equal count of occurrences in each class. The class breaks are first set to the number of sorted data elements (excluding the no data values) divided by the number of requested classes. Each class break is checked to determine whether the next data element has the same value as the data element at the break. If this is the case, the class break is increased to the next data element, until a data element is found with a new value. If this data element is not found before the next class break, the last class break is removed and the number of classes is decreased by one class
- *Equal intervals* (available for all items): the range of the data in a data item, or the specified range of a values unit, is split up in intervals of the same size. If no range is specified the default range for the value type of the unit is used.
- *JenksFisher (natural breaks):* applies the [JenksFisher classification method](#) to minimize the variance within each class.
- *Logarithmic intervals* (available for all items with a minimum value of zero): the range of the data in a data item or the specified range of a values unit is split up in intervals of the same size using a logarithmic distribution. If no range is specified the default range for the value type of the unit is used.

11. Expression dialogue

11.1 Expressions

The model logic in the GeoDMS is implemented by configuring expressions for tree items. An expression is a calculation rule combining operators, data items and constants. In the default configuration, expressions are set to a number or tree items. Expressions can be edited or new expressions can be set with the Expression dialogue.

Select a tree item and activate the main or pop-up menu option Edit Definition (or the Ctrl-Alt-E keyboard combination). The Expression Dialog is presented. If the item has an expression configured, this is shown in the dialogue.

11.2 Expression dialogue

The following example shows the dialogue for the tree item: The following example shows the dialogue for the tree item: *RegioIndelingen/Gemeente/Corop_rel*
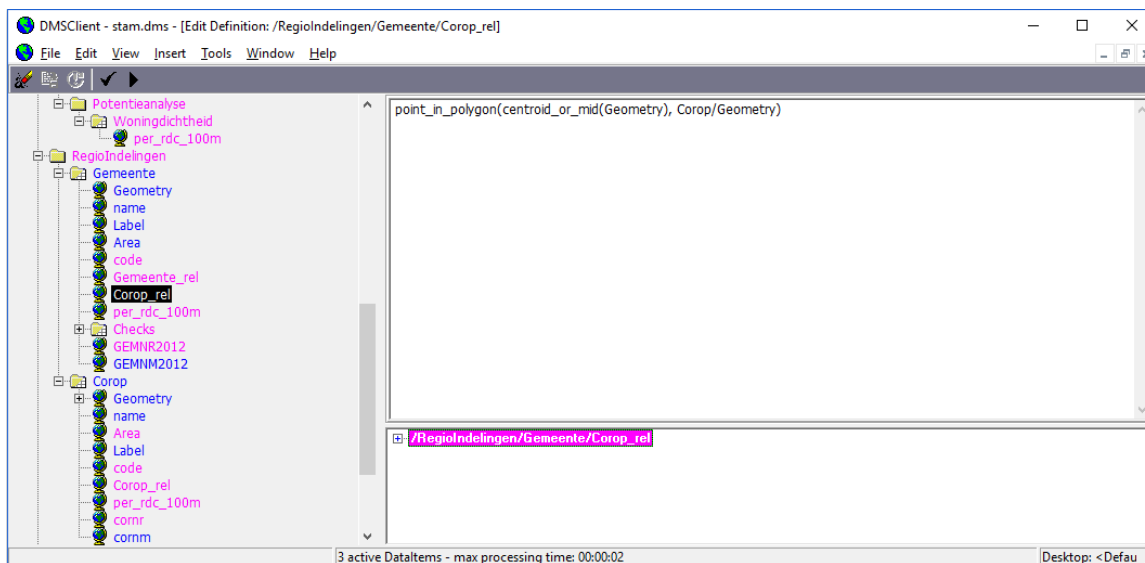
Object Vision

Figure 14.1 Expression dialogue

The expression dialogue consists of two parts. In the Expression box, the expression is shown. The Dependencies box at the bottom shows the dependencies (tree items with their full names) derived from the expression.

Tree items can be dragged into the Expression box from the Treeview and from the dependencies box. They can also be typed, but by using drag and drop typing errors in tree item names are expelled. Constants can be typed in the Expression box.

The contents of the expression dialogue can be copied to the Window clipboard by selecting the text (keep the left mouse button pressed, while moving over the text), clicking the right mouse button over the pop-up menu and choosing the copy option. The main menu option Edit Copy or the Control C keyboard combination cannot be used for this purpose, as they only apply to copying tree items.

11.3 Tools

If an expression dialogue is activated, the set of specific expression dialogue buttons is presented in the toolbar. The following buttons are available:

Clear expression: Button becomes enabled if an expression dialogue is not empty. Activate the button to remove the whole expression and clear the expression box.

Apply changes: Button becomes enabled if the configured expression is edited or a new expression is configured for the selected tree item. The apply changes tool first checks the syntax. If this is correct the new expression is stored in the tree item. If errors occur they are presented to the user.

51

Reset original expression: Button becomes enabled if the configured expression is edited or a new expression is configured for the selected tree item. The reset original expression resets the expression box to the original configured expression of the tree item selected when the dialogue was activated.

Syntax check: This button is used to check the syntax of the expression for following topics:
- Correct number of arguments for the operators
- Correct type of the arguments (e.g. a unit cannot be summed with a data item)
- Known tree items (e.g. a tree item with an incorrect name cannot be found)
- Correct domain and values units in calculations. Depending on the operators, combining items with a different domain and values units can cause errors.

The √ sign on the button can appear in four different colors:

Grey: no expression is configured, so the expression cannot be checked (disabled state).

Black: an expression is configured but not yet checked for a valid syntax.

Green: an expression is configured, checked and the syntax is correct.

Red: an expression is configured, checked but an error occurred in the syntax.

Update check: This button is used to check if the data item can really be updated. The syntax needs to be valid, but this does not guarantee the data item can be updated. (e.g. the file from which the primary data should be read is absent, or corrupt, or the data could cause divisions by zeroes, etc.). To be sure the data item can be updated, the update check can be activated, although this can take some time as it actually updates the tree item.

The ▸ sign on the button can appear in four different colors:

Grey: no expression is configured, so the expression cannot be checked (disabled state).

Black: an expression is configured but not yet checked for an update.

Green: an expression is configured, checked and can be updated.

Red: an expression is configured, checked but an error did occur while updating

Object Vision

12. Export primary data

12.1 Introduction

Data items in the GeoDMS refer to primary data that can be stored in different formats. For some data items, with a limited amount of data, the primary data is stored in the configuration, like parameters and classifications. But for most data items the primary data is stored in external files. The GeoDMS reads the external files when the data is requested for viewing or calculating. In the configuration is specified which external data sources are used. The data does not explicitly have to be imported but is linked via the configuration. The external data formats that can be used within the GeoDMS are described [here](#).

Most data items configured in the GeoDMS can be exported. This applies to both source data as well as model results. Based on the data item, the data can be exported to the following formats:
- Ascii grid
- Bitmap (*.tif or *.bmp)
- Table (*.dbf with a *.shp and *.shx if possible)
- CSV table (semicolon separated values)

Exporting data is an action, not resulting in a new (set of) tree item(s). The export option can be activated from the main File > Export primary data menu option or from the pop-up menu Export primary data, from which in a submenu a format needs to be selected. In paragraph 15.3 the different export formats and their dialogues are described.

12.2 Exporting primary data

Source data and model results can be exported to four different formats if the conditions that apply to the data formats are met.

12.2.1 ASCII grid
Grid data can be exported to an ASCII grid interchange format. Activate e.g. the main or pop up menu option Export Primary Data > ASCII grid for the container: *Referentie/Top100/GridData.* The following dialogue appears:
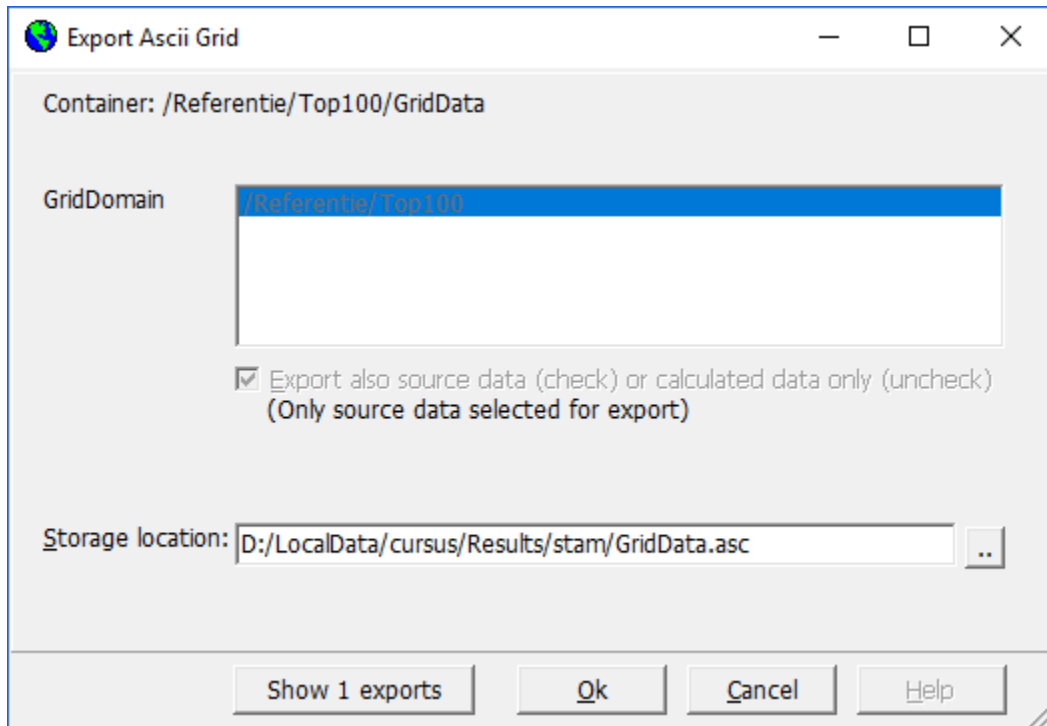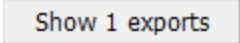
Figure 12.1: Export ASCII grid dialogue

The Grid domain indicates the domain unit(s) for the selected grid items. The 89 grid subitems of this container will be exported if the Ok button is selected. The following options are available:

The **Export also source data (check) or calculated data only (uncheck)** option is only available if the container would also contain source data, this is in this example not the case. If a container would also contain source data, this option can be used to indicate if these source items need to be exported as well (the option need to be checked).

The **Storage location** specifies the path to which the files will be exported. By default, the data items will be exported to a subdirectory of the results directory of the active configuration, named according to the container name, with as filename the name of the tree item and the extension .asc. A new directory and or file name can be chosen with the [...] button next to the Storage location textbox, which activates a Windows file dialogue.

The button [Show 1 exports] shows the list of data items that will be exported. This option can only be used to view the list of items, not to make selections.

12.2.2 Bitmap (.tif or *.bmp)*
In the GeoDMS, Tiff and bitmaps of 255 colors are supported as export formats. This means a data item must be classified into a maximum of 255 classes, and for each class, a color value is written in the bitmap.

To export data to tiff or bitmap, three items must be configured:
- the storage location, path and file name of the result file

- a classification (unless the data item is a classified data item of values type (u)int8)
- a palette (with the color values for each class in the classification)

Classifications and palettes can be configured for a data item or for the values unit of the data item. Activate e.g. the pop up menu option Export Primary Data > Bitmap for the tree item: *Referentie/Top100/GridData.* The following dialogue appears:
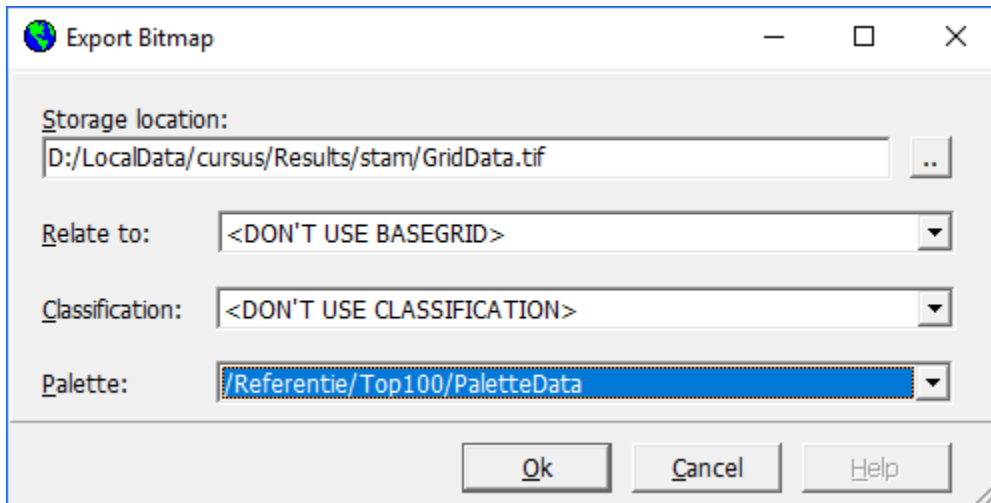

Figure 12.2: Export Bitmap dialogue

The **Storage location** specifies the name of the file that will be created. By default, the data item will be exported to the results directory of the active configuration, with as filename the name of the tree item and the extension .tif. Change the extension to .bmp to export to a bitmap file. A new directory and or file name can be chosen with the button next to the textbox, which activates a Windows file dialogue. Together with the bitmap file, a bitmap/tiff world file is exported (with the extension tfw/bmpw), containing the coordinate information. This file is used e.g. by ArcView or ArcExplorer to 'map' the bitmap in a used coordinate system.

In the **Relate to** combo box a base grid can be selected, if available

The **Classification** combo box presents the classifications configured for the data item or for the values unit of the data item. The default classification is selected, but another classification can be chosen with the combo box. If a data item is already classified, the text doesn't use classification appears. A classification is not necessary but, if available, still can be chosen.

The **Palette** combo box presents the available palettes for the selected classification. Often only one palette is available, but it is possible to configure multiple palettes for a classification (in the current version this is only possible with a text editor in the configuration files, not with the user interface of the application).

==12.2.3== Table (*.dbf with a *.shp and *.shx if possible)
If the to be exported data a vector data set is, it can be exported to an ESRI shapefile. Which also creates a .dbf file and if possible a .shx file.

When selected, a windows pop up will ask where to save the file.

Object Vision

12.2.4 *CSV table (semicolon separated values)*
When exporting a table, this can be saved as a .csv-file. In GeoDMS, it is always exported with a semicolon separator instead of a comma.

When selected, a windows pop up will ask where to save the file.