

DELIVERABLE SUMMARY SHEET

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Short Description:

This document describes the work and the results of the task 2.3a "*mark-up & editing tool*".

Objectives

To design and develop a "*mark-up & editing tool*" that should, on the one hand, support bi-directional links between different versions of the same guideline and, on the other hand, provide facilities to simple add new piece of knowledge to an existing guideline.

Procedure

A tool, called *Guideline Markup Tool (GMT)*, has been developed to fulfill the above goals. We have implemented all features, which support the transformation process between various versions of a guideline.

Results

The deliverable contains, after a short introduction, a detailed user manual that describes all features of the Guideline Markup Tool and therefore gives a good overview of the work that have been done and the solution we have produced. Additionally, this document contains a description of a use-case and short section regarding evaluation.

Partners owning: **all**

Partners contributed: **Vienna University of Technology, Fundacio Biblioteca Josep Laporte**

Made available to: **Public**

Complementary material to
Deliverable D2.3a:
"Mark-up & editing tool (prototype)"

Based on the User Manual of the
Guideline Markup Tool (GMT)

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Abstract

This document describes the work that has been done on the task T2.3a *mark-up & editing tool*. In this task we developed a tool to support the transformation process of clinical guidelines. The result is the *Guideline Markup Tool (GMT)* that has two main features. First, it can be used to connect related parts of different documents – either HTML or XML – using special links. Second, it facilitates the formalization process by providing special XML macros. The GMT is being used in subsequent tasks by our project partners to model a sample guideline, which will also be – besides the first real practical test – a good evaluation of our work.

Contents

1	Motivation & Background.....	2
2	User Manual of the Guideline Markup Tool	3
2.1	Introduction	3
2.1.1	Short Overview of Features	3
2.2	Installation	4
2.3	Getting Started	5
2.4	XML View	7
2.4.1	Standard XML-Editor Features.....	8
2.4.2	XML View Special Features.....	10
2.5	Links	11
2.6	Macros	12
2.7	HTML View	14
2.8	Miscellaneous Features.....	14
2.8.1	Undo / Redo	14
2.8.2	Project	14
2.8.3	XML-Languages	15
2.9	Future Work	15
3	Use-Case	16
3.1	Open HTML file.....	16
3.2	Create new 8HB file	16
3.3	Open Macros file	16
3.4	Insert Macros.....	17
3.5	Create and use Links	17
4	Evaluation.....	17
Appendix A: Keyboard Shortcuts		18
Appendix B: Preferences		20
Appendix C: Menu Bar.....		22
Appendix D: The Macro Language		26
D.1	The Document Type Definition (DTD).....	26
D.2	Sample Macros	29
Publications		29

1 Motivation & Background

In the Protocure II project, the formalization process of a guideline is done in multiple steps. First, the textual guideline is transformed to our intermediate representation 8HB, then this is translated to the semi-formal guideline representation language **Asbru** and finally to the XML-version of KIV, the formal language that is used to verify guidelines.

In addition, the Protocure II project focuses on the aspect of "Living Guidelines", that means that each guideline will be regularly reviewed and updated to incorporate new knowledge in medicine.

In the multiple-steps translation process each step relates to the next one and in each step there are chunks that have counterparts in the next step – the same holds for *living guidelines*, where each version of a guideline relates to the next version. This yielded to the demand for a possibility to connect chunks of different documents.

These issues and the fact that building a new XML document from scratch by hand can be a very tedious task, led us to the two basic ideas of the *Guideline Markup Tool (GMT)*: Links and Macros. On the one hand, the GMT enables the user to create and maintain links between two HTML or XML documents. These links should be inserted during the transformation process and can be used later for different purposes, for example to increase the comprehension of the transformation process or to locate parts in the source document that have no counterparts in the target document.

On the other hand, the GMT facilitates building of a new XML document by providing so-called macros. A GMT macro is combination of one or more XML elements together with their attributes, which can be inserted all at once.

During the work on the GMT, a third basic concept has arisen – the GMT should provide all necessary features of common XML editors (and some more), so the GMT user need not switch to another program during work with XML documents anymore.

"As a consequence of the distinction of representation levels, the construction of a formal guideline can be viewed as a series of transformations of information. In this task, in order to obtain bi-directional links between the original and transformed versions at each of the steps, we have developed a mark-up tool, which will allow the user to identify and relate pairs of fragments which are transcriptions of each other. Such kind of tool will be of great help, in particular in the transformation of the original knowledge into the intermediate representation. The mark-up tool will include editing and browsing facilities. These facilities will allow the user not only to set up links between different representations, but also to add those pieces of knowledge that are needed to refine the original guideline into a formal description."

Excerpt from the *Protocure II* project contract

In the following we will incorporate the GMT user manual¹, which will also be integrated into the GMT help feature.

¹ See also <http://hildegard.asgaard.tuwien.ac.at/~peter/GMT/manual/>

2 User Manual of the Guideline Markup Tool

2.1 Introduction

The *Guideline Markup Tool* (GMT) has been initially developed to support knowledge engineers in translating plain-text clinical guidelines (available as HTML files) to **Asbru** XML files by providing so-called "macros" each combining one or more **Asbru** elements together with their attributes. As a second main feature, it allows to establish and maintain connections (called links) between the original guideline and the **Asbru** representation. The GMT has been designed to additionally support any arbitrary XML language (in the context of the Protocure II project, this will especially be **Asbru**, 8HB and KIV-XML) and to permit links also between two XML files (or even between two HTML files). Besides these two main features, GMT is a full-featured XML editor (even with some special features, which no common XML editor provides).

The GMT is a Java application and should therefore run on (almost) any system. It has been extensively tested on Windows (Windows 2000 and Windows XP), but it should also run under Linux or MacOS, although I cannot guarantee that its behavior is the same on those systems.

2.1.1 Short Overview of Features

- Open two XML/HTML – Files at the same time
- Links between XML/HTML – Files
- XML – Macros
- Custom XML-Languages support
 - Convert original DTD to link-enriched DTD
 - Auto-recognize XML-Language on load of XML file
 - For each XML-Language Templates, Icons and the following special "Views" can be defined:
 - Highlight result of XPath expression
 - Filter: Show/Hide result of XPath expression
 - Folding: Expand/Collapse result of XPath expression
 - Apply XSL-File for information extraction
- Project: combines two XML/HTML files and a macro file
- Standard XML-Editor Features:
 - Change, Add or Remove Attributes
 - Insert arbitrary valid XML elements (and comment and text nodes)
 - XML-Clipboard: Cut/Copy/Paste of XML-Nodes – also between two (opened) XML files
 - Validate XML-Document against DTD
 - Change comment / text node value
- 4 Insert Modes when inserting with "Macro Insert", Paste or "Insertable Elements Dialog": Insert Into/As Child, Insert Before, Insert After, Replace; plus 2 additional insert modes for inserting elements: Convert and Wrap (see page 8)
- Undo / Redo of every action
- XPath-Bar: shows XPath expression for current XML node and allows easy evaluation of any XPath expression
- Treepath-Bar: "Jump-To" buttons for each element in the path to the current XML node

2.2 Installation

There are two ways of installing and running the GMT, either (i) by downloading the necessary files and executing it locally or (ii) by using *Java Web Start* (JWS). For both, a properly installed *Java Runtime Environment* (JRE), version 1.4 or higher, is needed. If you have not installed a JRE yet, you have to first download and install the appropriate JRE setup from <http://java.sun.com/getjava/manual.html>.

- **Install manually:**

Download an archive containing all necessary files to start the GMT plus some sample files, <http://www.asgaard.tuwien.ac.at/~peter/GMT/download/gmt.zip> (Windows) or <http://www.asgaard.tuwien.ac.at/~peter/GMT/download/gmt.tar.gz> (Linux), each has about 3.0 MB.

Then uncompress the downloaded package to a new directory. The directory will then contain the following files and folders: the GMT executable jar file, shell scripts to start the GMT, a config file that cause the GMT to start up with a sample project, a *samples* folder that contains sample HTML, XML, macros and project files, a *xmlLanguages* folder that already contains definitions for 8HB and Asbru and a *licenses* folder that contains license text files that are demanded to be re-distributed by the used Java libraries.

- **Java Web Start:** When using JWS, you are always up-to-date, using always the latest GMT version. First, you have to install JWS. If you have downloaded and installed the JRE, you have already got the JWS setup, which is located in your JRE directory (e.g. C:\Program Files\Java\j2re1.4.1\javaws-1_2-windows-i586-i.exe).

After installing JWS, go to the GMT homepage and click on the **Launch GMT** button. The *JWS-Application Manager* downloads all necessary .jar-files. Before the GMT will be executed the first time, you will be asked if you grant the GMT access to your computer's file system. The next time, you can start the GMT in the *JWS-Application Manager*, or, much easier, you can create a desktop-link to the JWS version of the GMT (in the *Java Web Start-Application Manager* select the GMT and go the "Applications" menu and choose "Create Link") and start it without executing the *JWS-Application Manager*. Every time you start the GMT this way, the *JWS-Application Manager* automatically checks if there is a newer version available.

Note: If your browser complains he does not know what to do with a .jnlp file, you have to register a new MIME-type in your browser:

<u>Name:</u>	JNLP File
<u>Extension:</u>	jnlp
<u>MIME-Type:</u>	application/x-java-jnlp-file
<u>Application:</u>	path to javaws.exe, e.g. C:\Program Files\Java Web Start\javaws.exe

2.3 Getting Started

If the GMT has been installed, it can be started using the enclosed batch script `gmt.bat` (Windows) or `gmt.sh` (Linux). Instead `gmt-light.bat` (or `gmt-light.sh`) can be used, which hides several advanced features and is recommended for new users. After the first start, the GMT loads a demo project (DCIS.project) containing three sample files (DCIS_with_links.html, DCIS.xml and 8HB-2.macros). The user interface can be seen in Fig. 1.

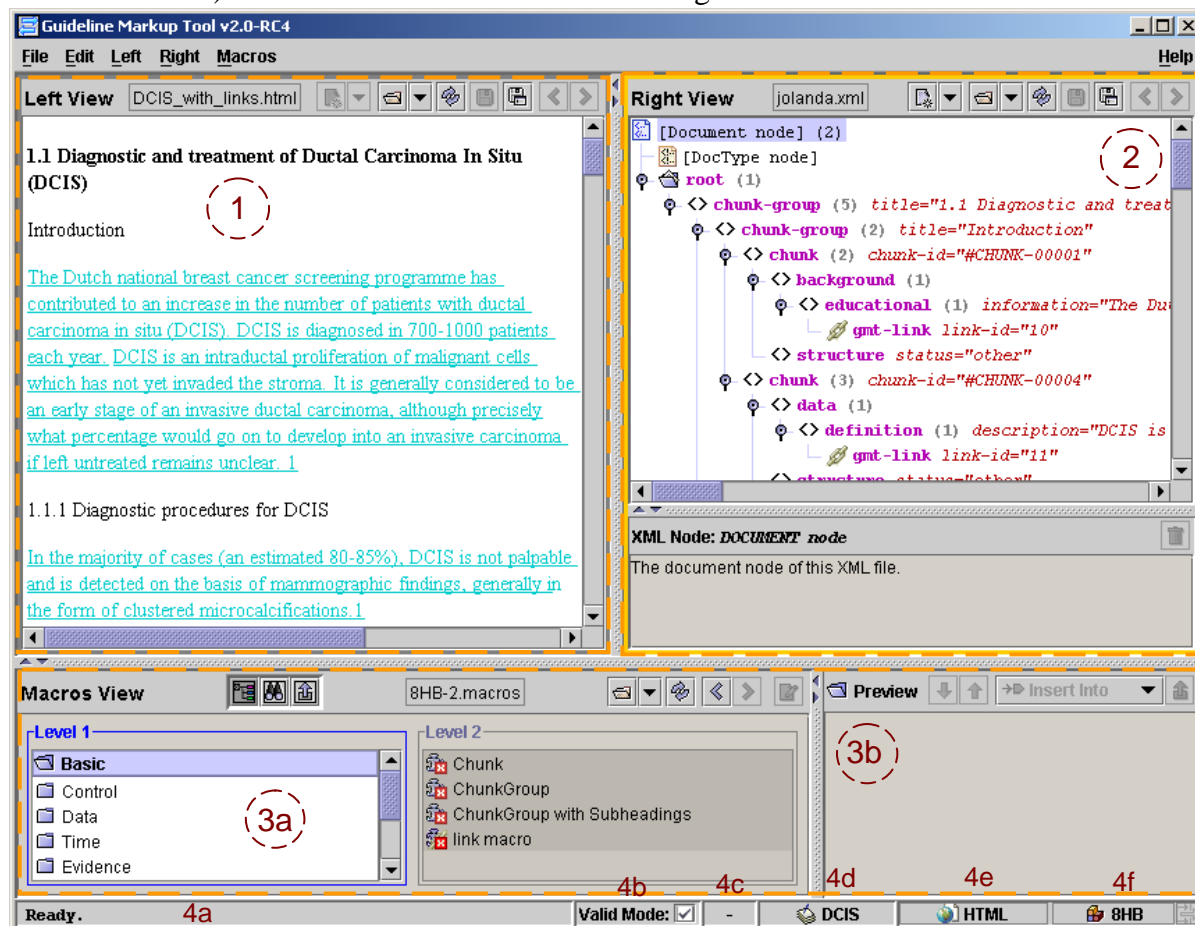


Fig. 1: Parts of Main Window¹

Parts of GMT user interface: ①,②: equivalent Views to either edit XML files (see section 2.4) or show HTML files (see section 2.7)

③: Macros part (see section 2.6) – a) either structure view, search view or insertable macros view, b) preview of the current macro


④: Status bar –

- a) info text box – shows information about menu items, buttons and current activities
- b) "Valid Mode" button – to enable/disable validity checks, which ensure that no action can result in an invalid XML document (is enabled by default)
- c) clipboard information – shows the last clipboard action (copy or cut)
- d) current project (see section 2.8.2) – double-click opens project properties dialog
- e)/f) the name of the current XML language (see section 2.8.3) of the left/right side – double-click opens XML language definition dialog; right-click shows a list of all defined XML languages for easier switching over to another language

Note: The size of the parts ①,② and ③ can be easily changed by moving the divider (| or ||) or to fully maximize or minimize click on the little-arrow-buttons (|/| or ||/|).

¹ Note: The screenshots in this document have been produced using JRE 1.4.x under Windows 2000/XP. The GMT may look different using on Linux or Apple or with the new JRE 1.5.

To start translating a guideline (HTML) to an XML language like Asbru the following initial steps has to be performed: First, open an HTML file. The second step is either to create a new XML file or to open an existing one. Finally, open an appropriate macro file.

- 1) **Open HTML file:** Click on the  button on either the left or right toolbar or select the "Open ..." menu item from the "Left"/"Right" menu, to show the file open-dialog:

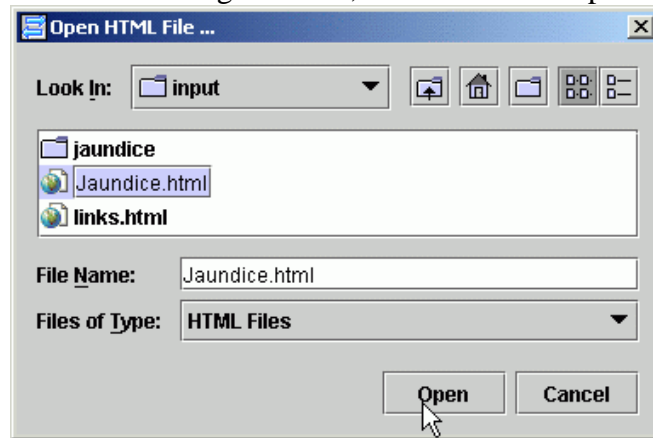





Fig. 2: "Open HTML File" – dialog

Change the "Files of Type" combo box to "HTML Files", select the HTML file you want to open and click on the **Open** button.

- 2) **New / Open XML file:** If you want to create a new XML file, either click on the  button on the toolbar or select "New ..." from the "Left"/"Right" menu. A file dialog is shown where you can enter the new (and the location) of the new file. The "New" command is only enabled, if an XML-Language has already been defined (see section 2.8.3).
Otherwise, click on the  button on the toolbar or select the "Open ..." menu item from the "Left"/"Right" menu to open an existing XML file. There are three possibilities to narrow the list of XML files down: Either change "Files of Type" to "XML Files", which will show only files with the extension ".xml", or switch to "Any XML Files", which will show all XML files regardless of their extension. Additionally, if XML-languages have already been defined in the GMT, the list of files can be narrowed to show only files of a specific XML-language (such as Asbru or KIV-XML).
- 3) **Open Macro file:** Click on the  button on the "Macros View" (③a) in Fig. 1) toolbar or select the "Open ..." menu item from the "Macros" menu to show the macro file open-dialog.

2.4 XML View

If an XML file is opened in any side (either left or right), its content is shown in a tree view as used in many conventional XML editors (see **Fig. 3**).

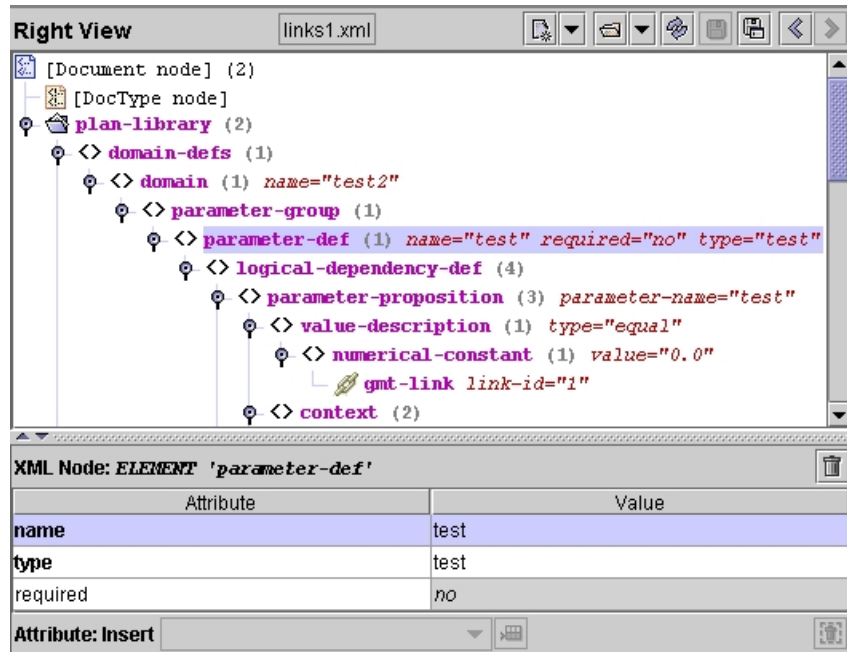


Fig. 3: XML part: toolbar, tree view and attributes table

The name of the current XML file is shown in the middle of the toolbar (above the tree view). If the current file has been changed and not yet saved, the filename is displayed using an italics font. On the right side of the toolbar, a set of buttons provide quick access to some useful features:

- : Creates a new (empty) XML document; the arrow button shows a list of pre-defined templates for the current XML language.
- : Shows the open file dialog to open any file (either XML or HTML); the arrow button provides quick access to recently opened files.
- : Reloads the current file (and tries to retain the current selection).
- : Saves the current file (is only enabled if changes have been made).
- : Saves the current file under a new name (Is only enabled if changes have been made).
- : "Go back" - Scroll to and select the previous selected element.
- : "Go forward" - Scroll to and select the next selected element after "Go back".

The XML tree view is able to represent all seven kinds of XML nodes:

- Document node: : root node of an XML document
- DocType node:
- Element node:
 - Top element:
 - Link element:
 - , if the XML parser reports an error, or if the parser reports a warning
- Comment node:
- Text node:
- CDATA node:
- Processing Instruction (PI) node:

The last three node types are rarely used and are only mentioned for the sake of completeness.

2.4.1 Standard XML-Editor Features

One design principle of the GMT was to reduce the need of the user to switch to another application (especially an XML editor) while working with the GMT. Therefore, the GMT provides all standard features of common XML-editors.

- 1) **Inserting Element:** The GMT can be used to insert any valid XML element in two different ways: either using the "Insertable Nodes Dialog" (see **Fig. 4**) or using the "All Elements Dialog" (see **Fig. 5**). The "Insertable Nodes Dialog" can be opened either by using the "Show Insertable Nodes" menu item in the "Edit" menu or by using the keyboard shortcut `Ctrl-I`.

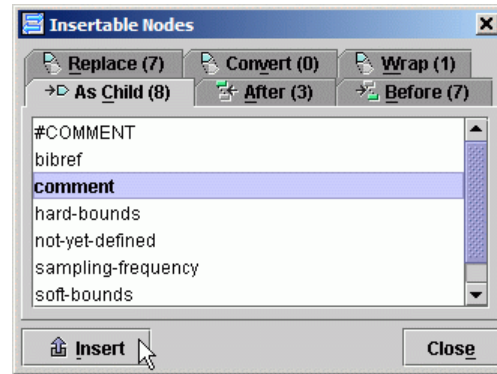


Fig. 4: Insertable Nodes Dialog

This dialog shows all nodes (elements plus comment and text nodes) that are valid to insert into the current XML document grouped by 6 different *insert modes*:

- **Insert As Child / Insert Into:** Inserts the selected node as a child into the current element (at the last possible position).
- **Insert After:** Inserts the selected node at the first possible position after the current node.
- **Insert Before:** Inserts the selected node at the first possible position before the current node.
- **Replace:** Replaces the current node with the selected node.
- **Convert:** Changes the old element to the new one retaining all child elements and attributes.
- **Wrap:** Surrounds the current element with the selected element, i.e. the new element will be inserted of the old element, which will become a child of the new element in return.

The "All Elements Dialog" (**Fig. 5**) can be opened either by using the "Show All Elements" menu item in the "Edit" menu or by using the keyboard shortcut `Ctrl-A`.

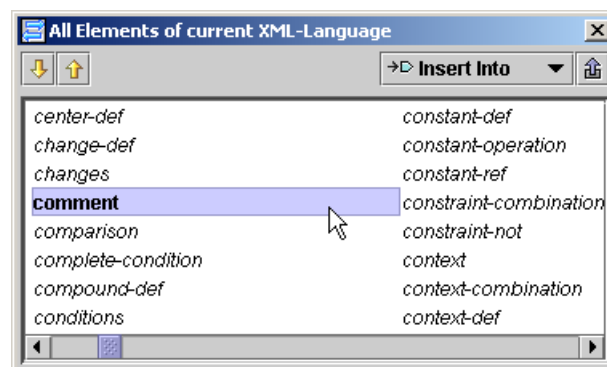



Fig. 5: All Elements Dialog

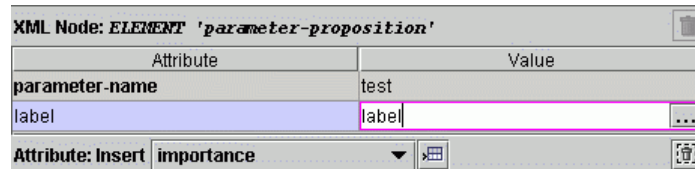
This dialog shows a list of all elements that are defined in the DTD¹ file. The selected element can be inserted based on the same 6 insert modes as described above. If the selected element is not allowed to be inserted regarding the current insert mode, it is crossed through. In addition, the next possible location, where the selected element can be inserted, can be searched using the

¹ DTD ... Document Type Definition. A DTD file defines the elements and attributes of an XML language and how they are structured. If an XML file contains a valid DOCTYPE line pointing to an existing DTD file, the GMT is able to retrieve and use information from the DTD (e.g. which elements are allowed to insert).

 (search downwards) and  (search upwards) buttons.

Note: in both dialogs, a node can be inserted not only by clicking on the insert button, but also by either double-clicking on the selected list item or by pressing the Return key.

- 2) **Remove Node:** To remove an XML node, select the corresponding tree node in the XML tree view and click on the  button in XML node info toolbar below the tree view (alternatively the Del key or the "Remove Node"-menu item can be used). Note that this feature is only enabled if it is allowed to remove the current node according to the DTD (this validity check can be disabled using the "Valid Mode" button in the status bar).
- 3) **Attributes:** If the currently selected XML node is an element, its attributes are shown in a table below the tree view.



Attribute	Value
parameter-name	test
label	label






Attribute: Insert importance 

Fig. 6: XML Attributes Table

- a) **Edit:** To edit an attribute value, just click inside the value column. Common copy-and-paste shortcuts can be used here – for example to copy a text from an HTML file on the other side, select it there, press Ctrl-C and paste it here using Ctrl-V. The  button shows a small edit window for more convenient editing of longer attribute values. If there is a fixed list of attribute values defined for this attribute in the DTD, a combo-box containing these values is shown instead of the editing field.
 - b) **Add:** To add a new attribute for the current element, use the combo-box below the table and the  button beside it – an input dialog is shown to enter a value for the new attribute.
 - c) **Remove:** To remove the current attribute, use the  button or the Del key. This feature is only enabled if this attribute is not required according to the DTD (*Note:* required attributes are shown using a bold font for the attribute name).
- 4) **XML-Clipboard:** XML nodes can be copied or cut and then pasted somewhere else (even in another XML file in the other side) using either the *Edit* menu in the main menu bar or the *Edit* sub-menu in the context menu. There are 4 insert modes for pasting the content of the clipboard - *Paste Into*, *Paste After*, *Paste Before* and *Replace* – that act the same as the first 4 insert modes for inserting elements (see previous page). Note that when using cut the chosen node will not be deleted until paste is invoked. After invoking copy or cut, the selected node gets a grey background (together with all its descendants). In case of cut, these nodes will be additionally shown crossed out. *Note:* cut is only enabled if the current node may be deleted.
 - 5) **Duplicate Node:** To duplicate the current node, use the "Duplicate Node" menu item (in the main menu or in the context menu) or its shortcut Ctrl-D. Note that this feature is only enabled if the same node may be inserted directly after itself again according to the DTD.
 - 6) **Validate:** The GMT makes use of two different methods for validating an XML document against its DTD: On the one hand, a validating XML parser is used that provides the GMT with error messages about invalid nodes on loading. Those nodes will be shown with this  icon and the error messages will be presented using tooltips. On the other hand, the GMT provides a validate feature (use either the menu item in the Left/Right menu or in the context menu or use the keyboard shortcut <F4>) that re-validates the internal representation of the XML document and highlight invalid nodes with red background color. This feature is only useful if the "Valid Mode" has been turned off.

2.4.2 XML View Special Features

Besides links and macros, the GMT provides some special XML features that were also not available in other XML editors:

- **Treepath-Bar:** This feature – activated either using the menu item "Show Treepath-Bar" in the View-submenu of the Left/Right menu (or in the context menu) or using the keyboard shortcut Ctrl-Shift-T – shows a special panel above the XML tree view that contains buttons for each ancestor element of the currently selected node. A sample of the treepath-bar, when an *Asbru plan* element is selected, can be seen in Fig. 7.




Fig. 7: Treepath-Bar

Clicking on one of these buttons would cause the XML tree view to scroll to the particular element and select it.

- **XPath-Bar:** Advanced users may use XPath to deeper investigate an XML document. The XPath-Bar can be used to apply any XPath expression to the current XML node. Expressions that result in one or more nodes (like the one seen in Fig. 8) would cause the resulting nodes be get highlighted. Expressions, which result in a single value (e.g. `count(//gmt-link)`, which would display the number of link endpoints in this XML document) are supported as well.





Fig. 8: XPath-Bar

- **Folding:** Folding means expanding or collapsing one or more XML tree nodes. There actions for expanding / collapsing all nodes of the current document, expanding / collapsing only the nodes of the current sub-tree in the *View / Folding* sub-menu. Additionally, there are two menu items that can be used to expand / collapse only specific nodes using XPath. Such folding XPath expressions can be pre-defined for each XML language.
- **Highlighting:** The "Highlight result of XPath" menu-item in the *View / Highlight* sub-menu provides the same functionality as the XPath-Bar. Additionally, pre-defined highlight XPath-expressions can be recalled in this menu. Furthermore, there are two useful highlight features regarding links: one allows to highlight all link endpoints in the current
- **Filter:** Filters – accessible through the *View / Filter* sub-menu – can be used to show or hide specific nodes. Aside from standard filters to toggle the visibility of all types of XML nodes (except elements), XPath can also be used here to show or hide any arbitrary set of nodes. Additionally, custom filters can be defined for each XML language and recalled later here.
- **Information Extraction:** This feature has already been successfully integrated in a previous XML editor¹ developed at our institute. The idea behind it is that if an element tree-node is collapsed the user has apparently no information about its child nodes. The solution is to optionally display short information about the child nodes instead of the attributes in the tree-node label. XSL files are used to store the information which "data" should be extracted for which element. A list of such XSL files can be pre-defined for each XML language.
- **Icons:** The default icon for elements  may be replaced by user-defined icons for particular elements of a specific XML language (e.g. for better distinction from other elements every *Asbru plan* element may get a special icon). Multiple icon-sets can be arranged and toggled using the *View / Icon-Sets* sub-menu.

Those features are described in more detail in the integrated help file.

¹ See <http://www.asgaard.tuwien.ac.at/tools/pixee.html>

2.5 Links

A link¹ can have one or more endpoints in each side – all of them are internally marked with the same unique link ID number. This means that links constitute a **m:n**-relationship between two files. The link ID number is shown in the status bar, if the mouse cursor is moved over a link end point. If a link endpoint is activated by clicking on it, all endpoints on the other side with the same link ID number will be highlighted. When the mouse cursor is moved over a GMT link endpoint (either in HTML or XML view), the cursor changes to . If this link endpoint has no counterpart in the other side,  is used for the cursor instead. Additionally, the status bar shows information about this link (current link ID number and number of counterparts).

- 1) **Insert new Link:** For both sides, you have to select the position where the two link end points should be inserted. In case of an XML, select the XML element, which should receive the special link element and in case of an HTML file, select the piece of text that should become the endpoint of the new link. Then choose "*Create new GMT Link*" from the Left/Right-menu or from the context menu. If a link is inserted into an HTML file, the selected text will become surrounded by pre-defined link delimiter characters (can be specified in the preferences dialog – see **Fig. 18** – default values are '[' and ']'), see 1.1.1 [\[Diagnostic procedures for DCIS\]](#).
- 2) **Insert new Endpoint:** Inserting only a new end point that belongs to an existing link is quite similar to inserting a new link as described above. If you select an existing link in one side, then a target in the other side and then choose "*Create new GMT Link*", the created endpoint in the other side gets the same link ID number. To "select" an existing link in an HTML file, select text so that the HTML link (or only a part of it) is in the selection.
- 3) **Activate Link:** Activating a link by clicking on it highlights all link endpoints in the other side with green background color. Both XML and HTML view scroll to the first link endpoint. The XML view additionally selects the first link endpoint. To activate a link endpoint in the HTML view, just click on the underlined text like in a conventional browser. For easier distinction from standard HTML links, the text of a GMT link end point is colored in cyan instead of blue. In the XML view, simply click on the link element (this can be changed to double-click in the XML tab of the preferences dialog, see **Fig. 19**). If the same link endpoint is activated again, the opposite side scrolls to next link end point.
It is also possible to activate more than one link at once by using the "Activate Links" menu item. In the HTML view, just select a text that contains link endpoints from different links first. In the XML view, just select any element before clicking on "Activate Links" menu item and all those links will be highlighted in the other side that have counterparts somewhere in the subtree.
- 4) **Synchronize Links:** "Synchronize" means in this context to re-map an endpoint to another link. This is a convenience method for changing the link ID number of a link endpoint instead of using the XML attributes table (see **Fig. 6**). Just select one link endpoint in each side and then invoke "*Synchronize GMT Link(s)*" for the side on which the link ID is to be changed.
- 5) **Remove End point:** For an XML file, this is done the same way as removing any XML node (see section 2.4.1, p. 9, Remove Node). For an HTML file, you first have to select a link endpoint and then choose "*Remove GMT Link(s)*" from the Left/Right-menu or from the context menu. In contrast to an XML file, it is possible to remove several GMT links in an HTML file together – just select text that contains all desired links. If you want to remove only one GMT link endpoint, you do not need to select text – just right-click on the link and invoke "*Remove GMT Link(s)*" from the context menu.
- 6) **"Dead Links":** If two linked files (either XML or HTML) are opened at the same time (one file left and one right), it is possible, that GMT links turn to so-called *Dead Links* after removing link endpoints or synchronizing links. A *Dead Link* is a GMT link that has no counterpart on the

¹ Note: A link can either connect an XML file and an HTML file, two XML files or even two HTML files. In case of an XML and an HTML file, it is regardless in which side the HTML file and the XML file have been opened.

opposite side. To remain consistency, the GMT checks for *Dead Links* after removing or synchronizing links and asks the user to remove them. This ensures that two corresponding files are always “in sync” regarding their links.

- 7) **Highlight Links:** There is a feature to highlight all link endpoints in the current HTML or XML document and another similar one to highlight all other link endpoints that have the same link id as the currently selected link endpoint. Both features ("Highlight all Links" and "Highlight same Links") can be found in the context menu of each side.
- 8) **Links Visualization:** This feature gives a good overview of the distribution of links inside an XML file. It can be activated in View-submenu of the context menu or of the Left/Right menu in the main menu bar. There are two different types of this feature - both use green as background color for link elements, cyan for parent elements of link elements, dark cyan for link related elements (depends on visualization type) and grey for all other elements.
 - a) Visualize "GMT-Links and ancestors" (**Fig. 9**): All ancestor elements of every link element will be colored and any element that does not contain a link element in its entire sub-tree will be grey.
 - b) Visualize "GMT-Links and descendants" (**Fig. 10**): All descendant elements of every element that is a parent of a link element will be colored and any element that has no link element as an ancestor will be grey.

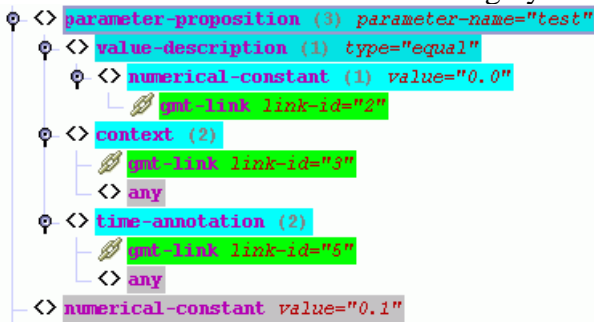


Fig. 9: Visualize "GMT-Links and ancestors"

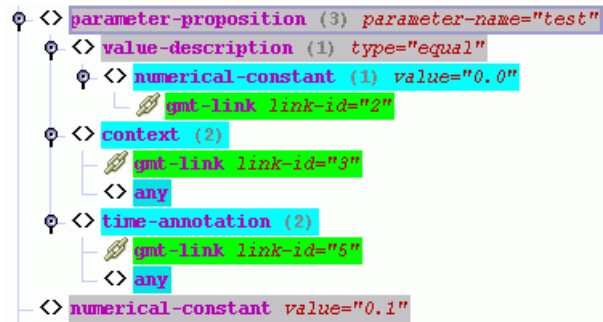



Fig. 10: Visualize "GMT-Links and descendants"

2.6 Macros

A macro defines a structure of XML elements. Instead of inserting only single elements (as in conventional XML editors), the usage of macros provides the opportunity to insert more than one XML elements at once. A macro file is again an XML file based on a self-designed XML-Language (see Appendix D: The Macro Language).

The GMT contains three different views for showing the contents of a macro file: *structure view*, *search view* and *insertable view*. After loading a macro file (either by using the  button or by using the "Open" menu item in the "Macros" menu), the hierarchical structure of the contained macros is shown in the structure view (see Fig. 11).

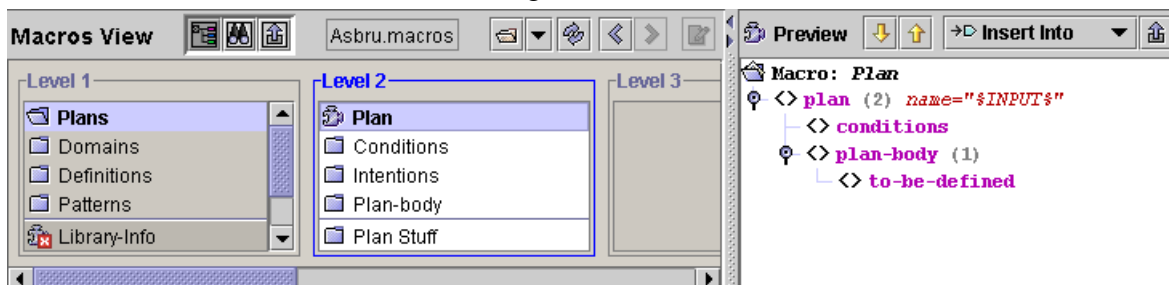








Fig. 11: Macros Structure View (& Macro Preview)

The structure view was designed as a replacement for a tree view, which would be normally used for representing hierarchical data, simply because of layout reasons. If a group list item (/) is selected, its child items are shown in the next list box to the right.

- 1) **Insert Macro:** First, select an element in an XML view, which should receive the contents of the macro. *Note: If the foreground color of a macro changes to red, when it is selected, this means the macro author has defined this macro as not complete, i.e. the macro is missing required child elements or attributes. This allows simpler macro files, but would also produce invalid XML code – so the user has to insert the missing elements manually.* Second, select an appropriate macro in the macros structure view that has an  icon (or  if it contains a link). A macro is marked with a  icon (and a darker background) to indicate that it is not allowed to be inserted into the currently selected XML element. Optionally change the insert mode (see below). Then click on the insert macro button  (above the macro preview tree) or use the shortcut **Ctrl-M**. *Note that since it is possible to have two XML files open at the same time, the GMT distinguish between active side (orange border) and inactive side (dark gray border) for determining in which side a macro will be inserted.*
 - a) **Insert Mode:** Like for inserting single elements (see section 2.4.1/1), several different insert modes are available for inserting macros. But since "Convert" and "Wrap" don't make sense regarding macros, the macro insert modes are: *Insert Into, Insert After, Insert Before, Replace*. If the current macro cannot be inserted according to the currently selected insert mode, the GMT automatically switches to the next valid insert mode (if there is one).
 - b) **Attribute Input:** If a macro is inserted that contains elements with attributes containing a special value (%INPUT%, see *Appendix D: The Macro Language*), a dialog is shown containing a special XML attributes table (similar to the one that is shown below the XML tree) where the user can enter all such attribute values.

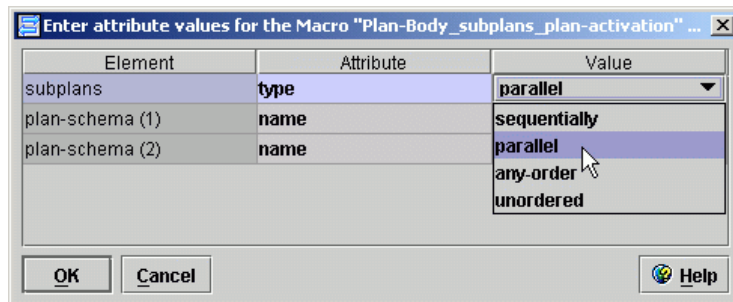







Fig. 12: Attributes Input Dialog

- 2) **Navigate:** There are several ways to "navigate" through the content of a macro file:
 - a) **Links:** A macro file may contain internal links to other groups (marked with a  icon), which can be activated either through double-clicking or by pressing enter.
 - b) **History:** The macros structure view provides a history mechanism like the HTML view and the XML view. This means that the previously used macros can be selected using the "Back"  and "Forward"  buttons. This feature can be very useful, especially after using a group-link  (see above).
 - c) **Search View:** Using the  button on the macros toolbar, the user can switch between the macros structure view and the macros search view (see **Fig. 13**). The search result lists all macros that contain the entered keyword in its name.

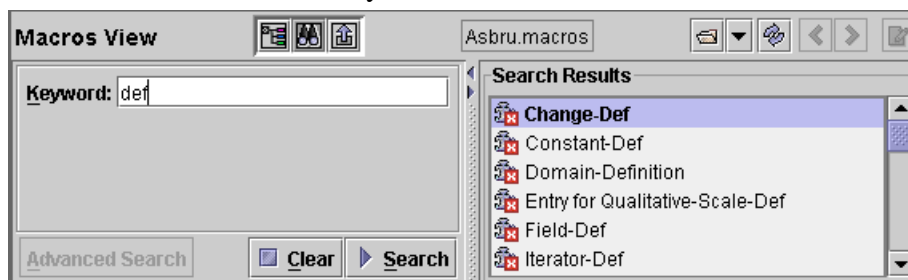



Fig. 13: Macros Search View

- d) **Insertable Macros View:** The  button on the macros toolbar switches to the "Insertable Macros View", which shows a list of all macros of the entire macro files that are insertable into the current XML document according to the currently selected macro insert-mode.

2.7 HTML View

The HTML view (see **Fig. 14**) is a simple HTML browser, which can distinguish between conventional HTML links and special GMT links.

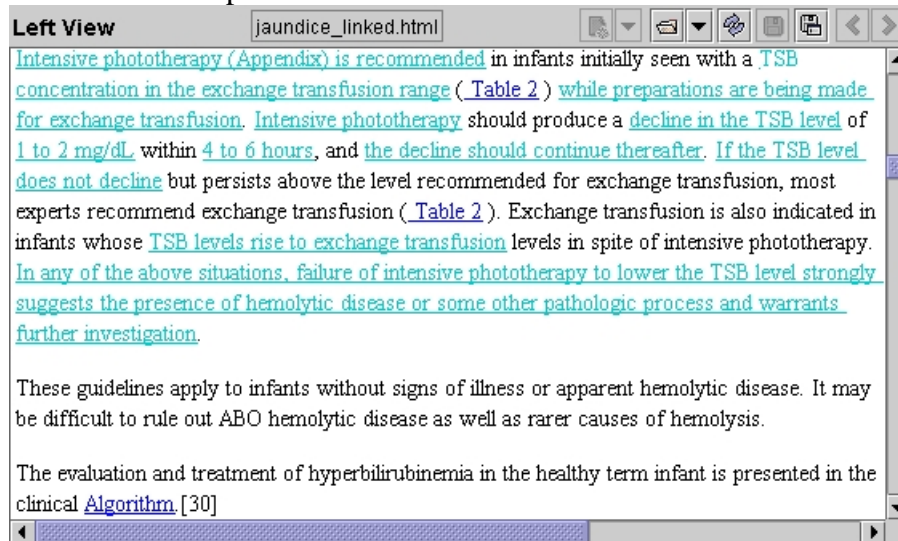


Fig. 14: HTML View

There are a few limitations regarding the HTML view due to the really bad implementation of the Java HTML viewing component that is used:

- The biggest problem is that the GMT extremely slows down, when loading large HTML files.
- The GMT may hang, if the entire HTML file is selected and then "Remove Link(s) is invoked.
- Undo/redo of creating or removing links does not work correctly multiple times if "Use GMT-Link delimiter" is activated in preferences.

2.8 Miscellaneous Features

2.8.1 Undo / Redo

Every action in the GMT that changes the content of one or both opened files (e.g. insert macro, remove XML node, ...) can be revoked using the Undo feature (found in the Edit menu, in the Edit sub-menu of each context menu, or using the keyboard shortcut `Ctrl-Z`). To do the undone feature again (or to revoke undo) use the Redo feature (found in the Edit menu, in the Edit sub-menu of each context menu, or using the keyboard shortcut `Ctrl-Shift-Z`). There is no limit for undo that means you can use the undo feature an arbitrary number of times, but note that if a file is closed, another file is opened or a new file is created, all undoable actions regarding the previous file are removed from the internal list of undoable actions. Undoing an action that induced a change in the other side (like creating a link) will also undo the change in the other side.

2.8.2 Project

A project combines two XML / HTML files (one for the left and one for the right side) and a macro file and therefore, projects facilitate the work with often used pairs or triples of files that belong together. If a project file is opened (using the File/Project/Open menu item), the files that are defined inside the project are loaded together. The name of the current project is always shown in the status bar (see Fig. 1, 4c).

The GMT always maintains the correlation between the current project and the currently opened files. That means, if one filename of the opened files changes (either through saving under a new filename, creating a new file, opening another file or closing the current file), the GMT either adjust the project, unset the project (and keep the files open), or close the project (this behavior can be set in the preferences dialog, see Fig. 17).

When creating a new project (using the File/Project/New menu item), the Project Properties dialog (see **Fig. 15**) is shown, whereas the fields for the left, right and macros file are already filled in with the currently opened files. To subsequently show the project properties dialog, just double click on the project name label in the status-bar.

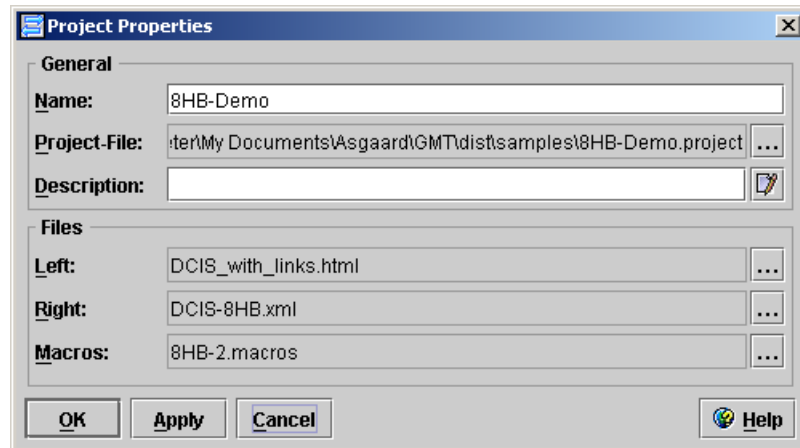


Fig. 15: Project Properties Dialog

2.8.3 XML-Languages

The GMT has been designed to work with any XML language. The properties of an XML language can be defined in the "XML Languages Properties Dialog" (which can be shown using the menu item of the same name in the file menu).

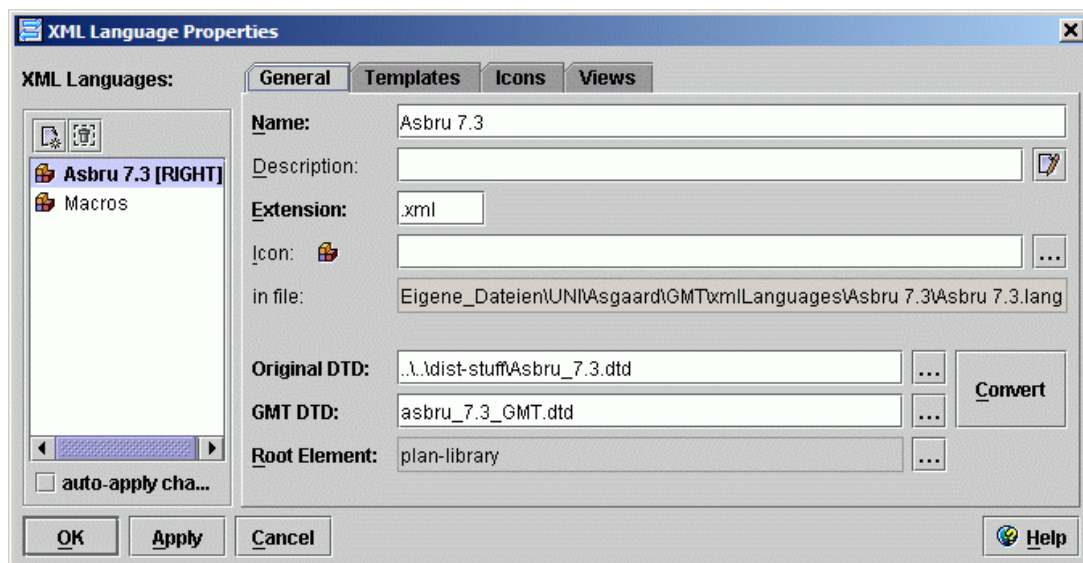


Fig. 16: XML Languages Properties Dialog

See the integrated help file for more information about XML languages.

2.9 Future Work


Here is a list of features that are planned for future releases:

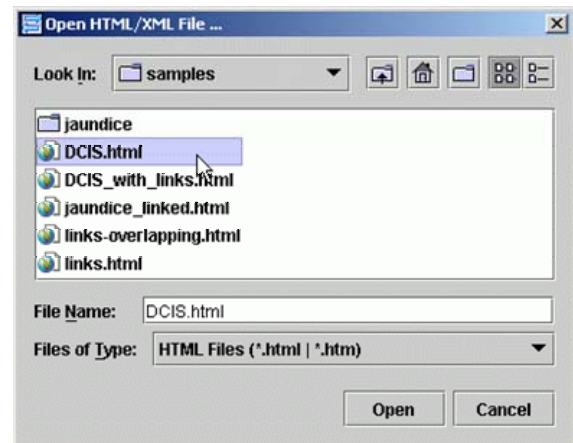
- Search & Replace in XML view and Search in HTML view
- Advanced Search for macros
- Drag-and-Drop of XML nodes
- Overlapping links in HTML view
- Visualization: using XSLT stylesheets to produce HTML, PDF or SVG reports
- Links to / from images in HTML
- Macros Editor

3 Use-Case

This section is intended to give a short demonstration of the work with the *Guideline Markup Tool*. Therefore, a simple use-case regarding the transformation of a textual guideline to the intermediate representation (8HB) has been devised. This use-case contains the following typical steps: opening an HTML file of the original guideline, creating a new 8HB XML file, opening the 8HB macros file, inserting macros into XML file (with and without links), creating links between HTML and XML file (without macros).

3.1 Open HTML file

First open the textual guideline that has to be available as an HTML file by clicking on the  button of the left main toolbar (the HTML file could also be opened in the right side, but it is more intuitive to have the "source" file at the left side and the "target" file at the right side). In the "Open HTML/XML File" dialog, ensure that the combobox "Files of Type" is set to "HTML Files" and then choose an HTML file like *DCIS.html*.




3.2 Create new 8HB file

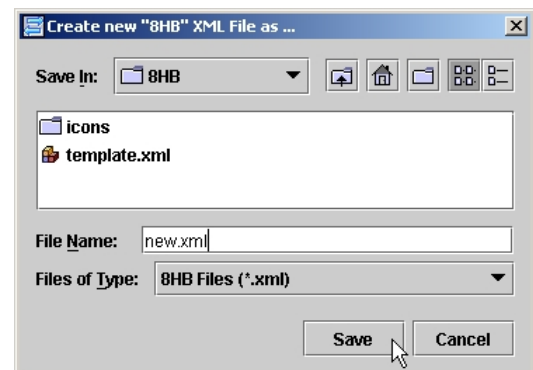
The second step would be to start a new 8HB file at the right side of the GMT. First, ensure that "8HB" is set as the current XML language of the right side by checking the XML language name label at the right side of the status bar.




If "8HB" is not set yet, right-click on the label and choose "8HB" from the list of XML languages.

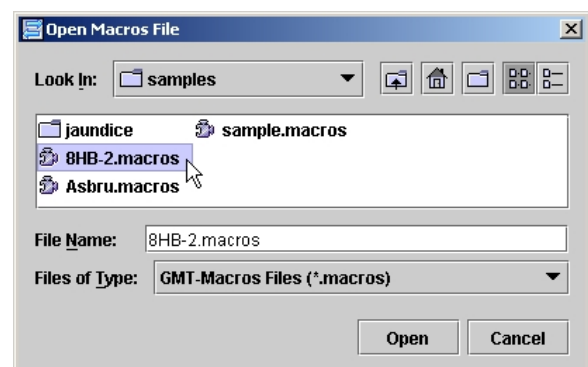


Then click on the  button in the right main toolbar and enter a name (and a location) of the new 8HB XML file in the file dialog. Note that the file dialog will always start up in the 8HB directory.

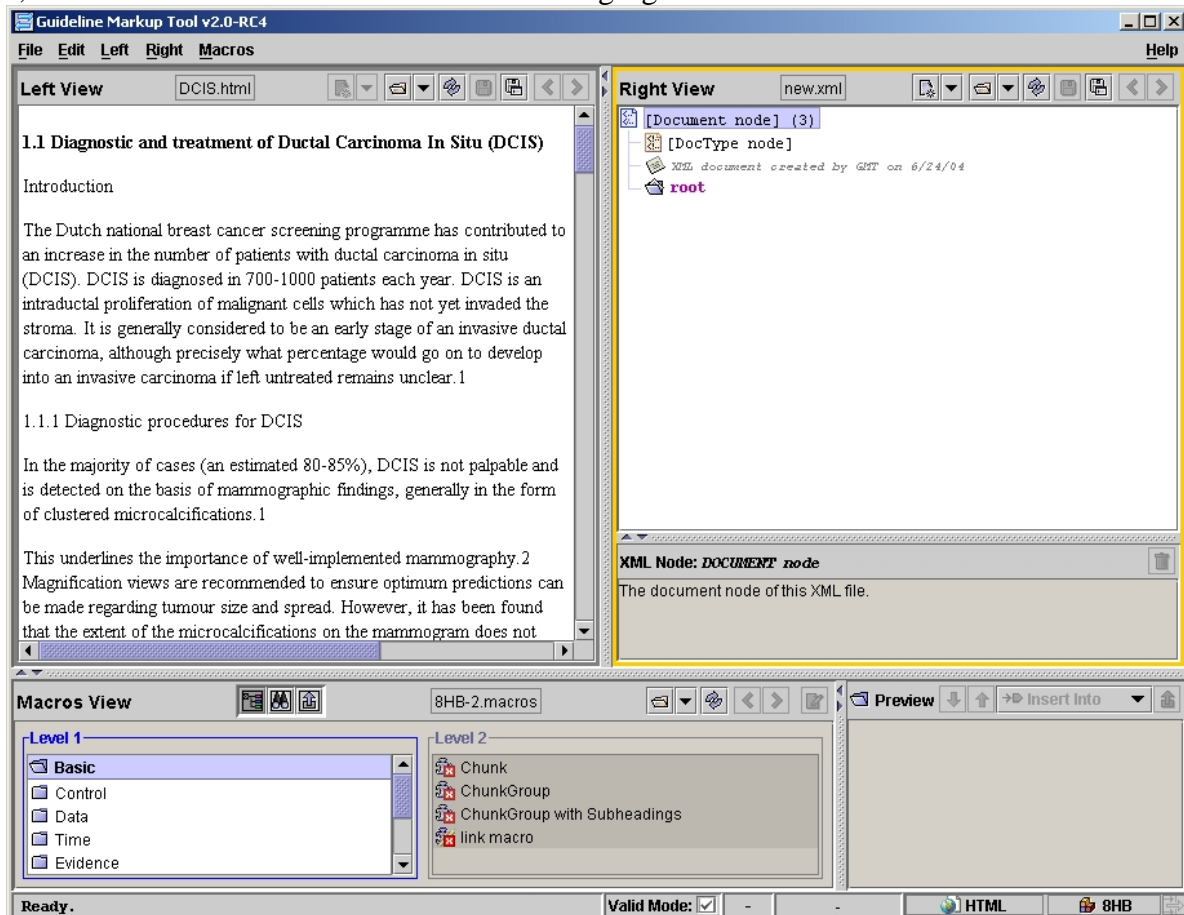


3.3 Open Macros file


Click on the  button in the macros toolbar and choose the 8HB macros file in the file dialog.

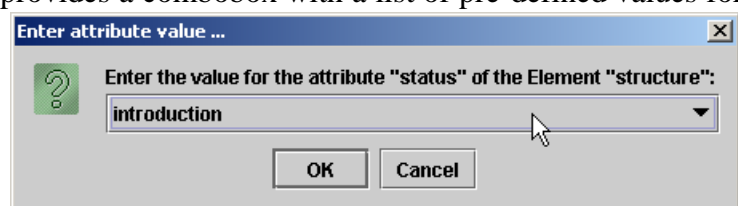


Now, the GMT should look like as in the following figure:



3.4 Insert Macros

First, we need a chunk-group in our new 8HB XML file. Thus, select the root element in the XML view and then select the *ChunkGroup* macro in the macros structure view. Optionally, select a text in the HTML view, which will be taken as value for the *title* attribute of the new *chunk-group* element. Finally, click on the  insert macro button. Then insert a *Chunk* macro inside the *chunk-group* element. The attribute input dialog provides a combobox with a list of pre-defined values for the *status* attribute of *structure* element that has been inserted together with the *chunk* element.



3.5 Create and use Links

Links can also be inserted without using macros. To do so select a text in the HTML view that should become the one link endpoint and then select an XML element where the other link endpoint should be inserted. Finally, invoke "Create new GMT Link" from either the left or the right context menu.

4 Evaluation

The Guideline Markup Tool has been tested within the scope of this task (T2.3a) by the task partner and by two other project partners. Furthermore, it is being used by other project partners for their work in successive tasks. The feedback that we will receive from the other project partners will then be used to determine the usability of the GMT and moreover, depending on the importance of the particular remarks and on our time schedule to further improve it.

Aside from that it should be noted that there have been four papers written about the GMT that have been accepted by international conferences (MedInfo-2004 and CGP-2004).

Appendix A: Keyboard Shortcuts

It has been tried to define keyboard shortcuts for all features, so it should be possible to work almost without the mouse (except from activating links and selecting text in the HTML view).

- **I/O - Actions** (only available when XML-Tree or HTML-View has focus):
 - Open XML- / HTML – File ... **<Ctrl-O>**
 - Reload current file ... **<Ctrl-Shift-R>**
 - Save current XML- / HTML – File ... **<Ctrl-S>**
 - Save current XML- / HTML – File under new name... **<Ctrl-Shift-S>**
 - Create new empty XML document of current XML-Language... **<Ctrl-N>**
- **XML-Editor actions** (Actions available when XML-Tree has focus):
 - Remove current Node ... ****
 - Duplicate current Node ... **<Ctrl-D>**
 - Change value of Comment/Text-Node ... **<F2>**
 - (Re-)Validate current XML-Document ... **<F4>**
 - Show "Insertable Nodes" dialog ... **<Ctrl-I>**
 - Show "All Elements" dialog ... **<Ctrl-A>**
 - Show all Elements dialog ... **<Ctrl-A>**
 - Show/Hide XPath-Bar ... **<Ctrl-Shift-X>**
 - Show/Hide Treepath-Bar ... **<Ctrl-Shift-T>**
 - **Clipboard:**
 - Cut current XML-Node ... **<Ctrl-X>**
 - Copy current XML-Node ... **<Ctrl-C>**
 - Paste "XML-Clipboard" content into current element ... **<Ctrl-V>**
 - Paste "XML-Clipboard" content before current node ... **<Ctrl-Shift-V>**
 - Paste "XML-Clipboard" content after current node ... **<Ctrl-Alt-V>**
 - Replace current node with "XML-Clipboard" content ... **<Shift-Alt-V>**
 - **Folding:**
 - Expand all descendants ... **<Ctrl-Alt-E>**
 - Collapse all descendants ... **<Ctrl-Alt-C>**
- **Navigation in any XML-Tree** (also Macro-Preview-Tree):
 - Go to node above ... **<Down>**, Go to node below ... **<Up>**
 - Scroll one page up and select topmost node ... **<PageUp>**
 - Scroll one page down and select bottommost node ... **<PageDown>**
 - Scroll to and select first node ... **<Home>**, Scroll to and select last node ... **<End>**
 - Select next node starting with specific character ... **<Any-character-key>**
 - Go to parent node and collapse ... **<Left>**
 - Go to next node (first child or next sibling) ... **<Right>**
 - Toggle folding ... **<Space>**
 - Go to parent element ... **<Alt-Up>**
 - Go to next sibling ... **<Ctrl-Down>**, Go to preceding sibling ... **<Ctrl-Up>**
 - Go to first sibling ... **<Ctrl-Home>**, Go to last sibling ... **<Ctrl-End>**
 - Go Back ... **<Ctrl-Alt-Left>** (only main XML view)
 - Go forward ... **<Ctrl-Alt-Right>** (only main XML view)

- **Navigation in any List-Box** (*Macros Structure View* and *Insertable Elements Dialog*):
 - Go to list entry above ... **<Down>**, Go to list entry below ... **<Up>**
 - Scroll one page up and select topmost list entry ... **<PageUp>**
 - Scroll one page down and select bottommost list entry ... **<PageDown>**
 - Scroll to and select first list entry ... **<Home>**, Scroll to and select last list entry ... **<End>**
 - Select next list entry starting with specific character ... **<Any-character-key>**
- **Macros Structure View List-Boxes:**
 - Insert current macro / Activate current group-link ... **<Enter>**
 - Go to left list-box ... **<Left>**, Go to right list-box ... **<Right>**
- **Change View actions:**
 - Switch to XML/HTML view ... **<F5>**
 - Switch to syntax-highlighted source view ... **<F6>**
 - Switch to plain-text source view ... **<F7>**
 - Available only for XML files with DocType entry:
 - Switch to DTD report view ... **<F8>**
 - Switch to syntax-highlighted DTD source view ... **<F9>**
 - Switch to plain-text DTD source view ... **<F10>**
 - Maximize (one step) current XML/HTML view ... **<F11>**
 - Minimize (one step) current XML/HTML view ... **<F12>**
 - Move divider of any split-pane:
 - activate ... **<Ctrl-F2>**
 - move ... cursor keys / **<Home>** / **<End>**
 - Activate and change focus to other side ... **<Tab>**
 - Change focus between XML-Tree and Attributes-Table ... **<Ctrl-Tab>**
- **Global shortcuts:**
 - Undo last action ... **<Ctrl-Z>**, Redo last action ... **<Ctrl-Shift-Z>**
 - Insert current macro in current XML-document according to insert mode ... **<Ctrl-M>**
 - Change macro insert-mode:
 - Switch to "Insert As Child" – mode ... **<Ctrl-Shift-M>**
 - Switch to "Insert Before" – mode ... **<Ctrl-Alt-M>**
 - Switch to "Insert After" – mode ... **<Alt-Shift-M>**
 - Switch to "Replace" – mode ... **<Ctrl-Alt-Shift-M>**
 - Save-All ... **<Ctrl-Shift-A>**
 - **Project:**
 - New-Project ... **<Ctrl-Shift-N>**
 - Open-Project ... **<Ctrl-Shift-O>**
 - Project-Properties ... **<Ctrl-P>**
 - Show XML-Language Definitions – Dialog ... **<Ctrl-L>**
 - Show Preferences – Dialog ... **<Ctrl-Shift-P>**
 - Quit GMT ... **<Ctrl-Q>**
 - Show Help ... **<F1>**
 - Refresh display (should solve display problems) ... **<Ctrl-Alt-R>**

Appendix B: Preferences

The GMT has been designed to be fully configurable. Using the Preferences dialog (shown by the menu item of the same name in the File menu or using Ctrl-Shift-P) the user can adjust the behavior and appearance. The preferences will be maintained in `gmt.preferences`, a simple key-value text-file, in the GMT main directory. There are five different categories of preferences: general preferences (see Fig. 17), preferences regarding HTML (see Fig. 18), preferences regarding XML (see Fig. 19), preferences regarding macros (see Fig. 20) and preferences that affect the appearance of the GMT (see Fig. 21).

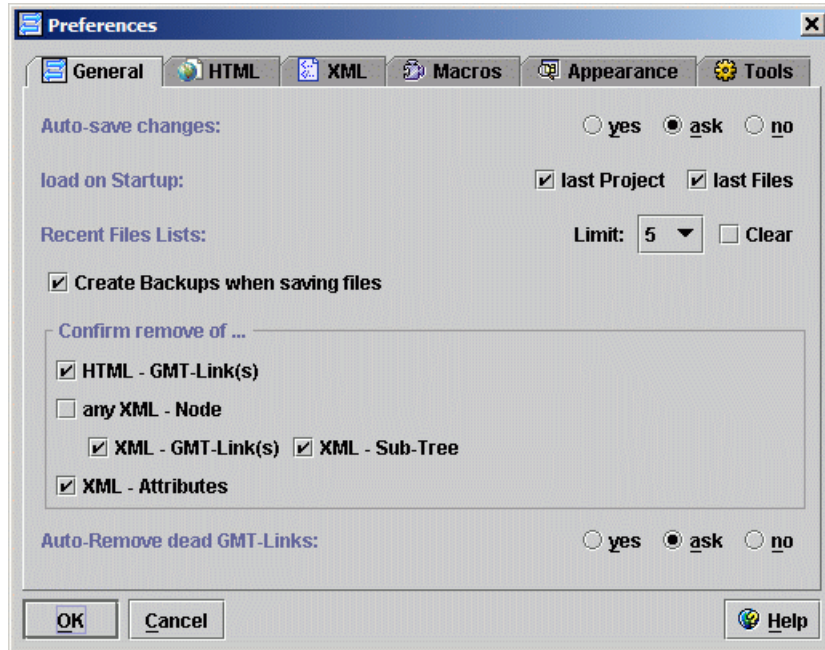


Fig. 17: Preferences Dialog – General Tab

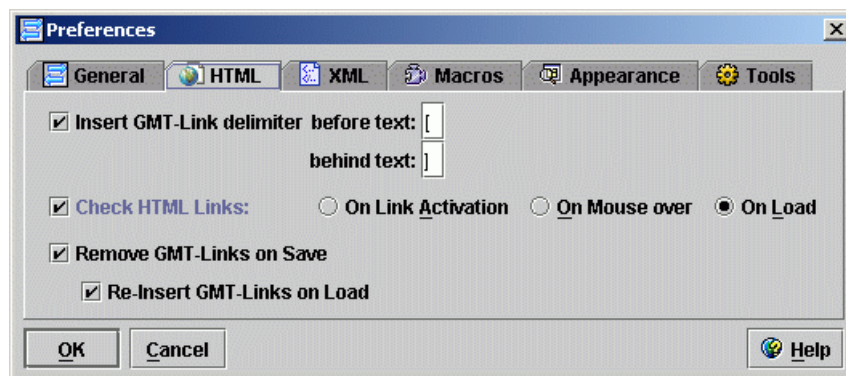


Fig. 18: Preferences Dialog – HTML Tab

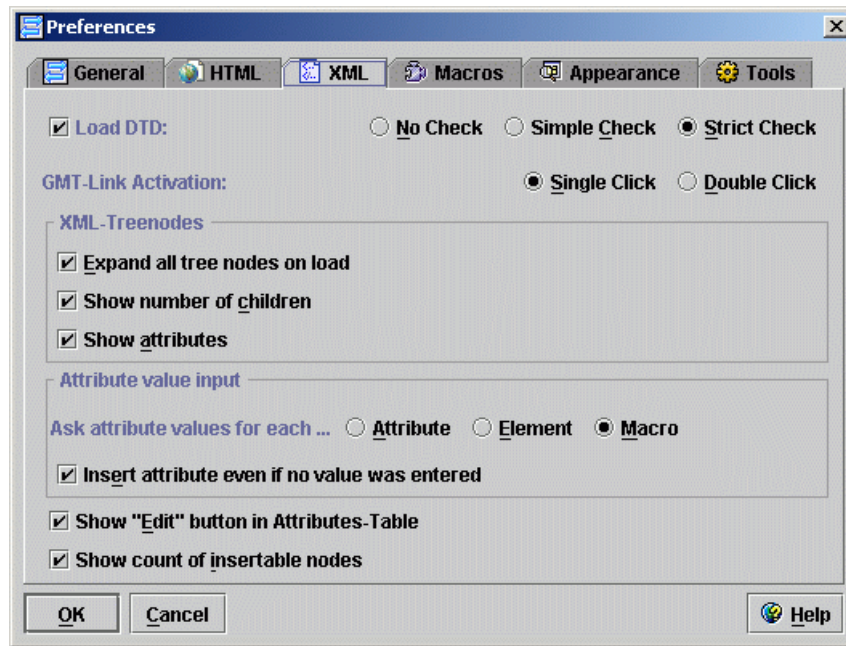


Fig. 19: Preferences Dialog - XML Tab

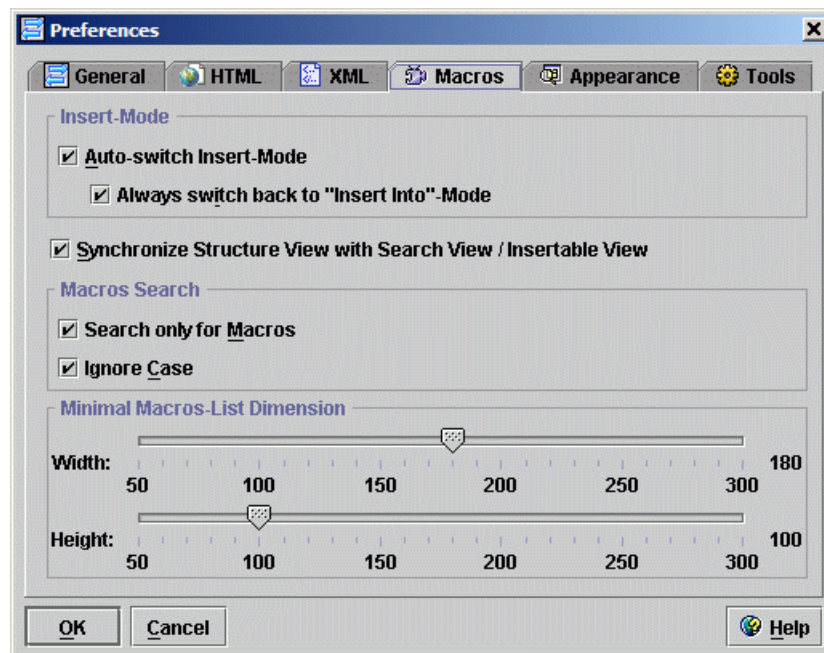


Fig. 20: Preferences Dialog - Macros Tab

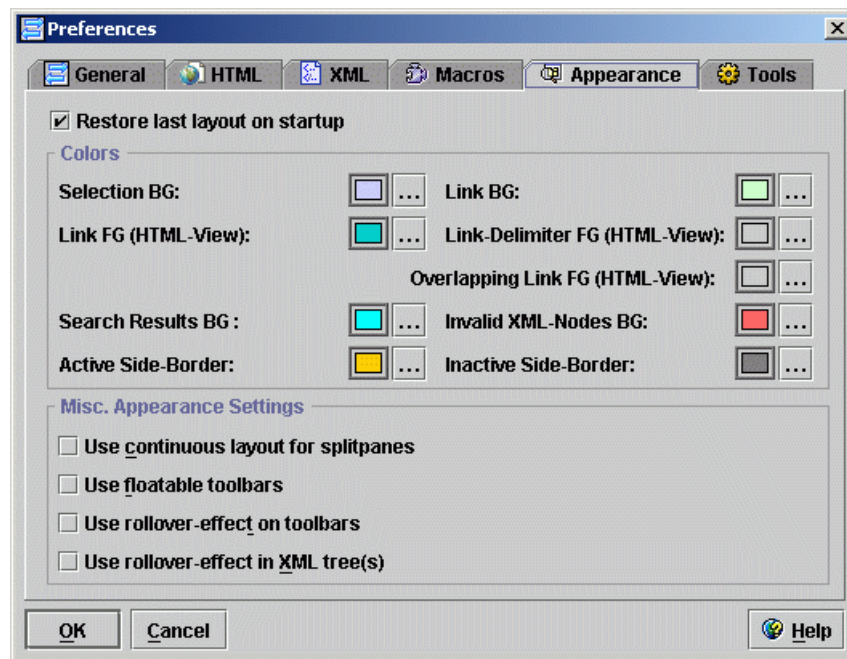


Fig. 21: Preferences Dialog - Appearance Tab

Appendix C: Menu Bar

Since all features of the GMT are available via the menu bar or the context menus, this section gives a good overview of all available features. Note that features, which appear multiple times – in menu bar, context menu or toolbar –, have always the same icon.

• File Menu:

File	Edit	Left	Right	Macros
Save all...				Ctrl-A
Project				
XML Language Definitions...				Ctrl-L
Preferences...				Ctrl+Shift-P
Exit				Ctrl-Q

→ Save all changed files.

→ Project submenu

→ Show the XML-Language dialog (see sect. 2.8.3).

→ Show the Preferences dialog (see section 2.8.3).

→ Quit the Guideline Markup Tool.

▪ File / Project Submenu:

New...	Ctrl+Shift-N	→ Create a new project using currently opened files.
Open...	Ctrl+Shift-O	→ Show the project file Open-dialog.
Reopen		→ Show a list of previously opened project files.
Open in		→ Show a list of previously used directories.
Close Project		→ Close the current project and all project files.
Project Properties...	Ctrl-P	→ Show the project properties dialog (see sect. 2.8.2).

- **Edit Menu:**

Edit	Left	Right	Macros
Undo			Ctrl-Z
Redo			Ctrl+Shift-Z
Cut			Ctrl-X
Copy			Ctrl-C
Paste			
Show Insertable Nodes			Ctrl-I
Show all Elements			Ctrl-A

- Undo last action.
- Redo last undone action (= undoes last Undo-action).
- Cut current XML node to internal clipboard.
- Copy current XML node to internal clipboard.
- Submenu providing 4 paste actions (see below).
- Show "Insertable Nodes" dialog.
- Show "All Elements" dialog.

- **Edit / Paste Submenu:**

Paste Into	Ctrl-V
Paste Before	Ctrl+Shift-V
Paste After	Ctrl+Alt-V
Replace	Alt+Shift-V

- Paste last copied node as last child into current element.
- Paste last copied node before current node.
- Paste last copied node after current node.
- Replace current node with last copied node.

- **Left / Right Menu:**

Left	Right	Macros
New empty XML-File...		Ctrl-N
Templates		
Open		Ctrl-O
Reopen		
Open in		
Reload		Ctrl+Shift-R
Revert		
Close		
Save		Ctrl-S
Save As...		Ctrl+Shift-S
XML Language		
View		
Create new GMT link		
Synchronize GMT link(s)		
Activate Links		
XML		
Remove Node		Delete
Duplicate Node		Ctrl-D
Change Text Value		F2
Validate		F4
HTML		
Remove GMT link(s)		

- Creates a new empty XML file (*ToolBar*).
- Creates a new XML file based on a template (*TB*).
- Shows the Open File-dialog (*TB*).
- Shows a list of previously opened files (*TB*).
- Shows a list of previously used directories.
- Reloads the current file (*TB*).
- Loads the last backup of the current file.
- Closes the current file.
- Saves the current XML file (*TB*).
- Saves the current XML file under a new name (*TB*).
- Shows a list of available XML languages.
- XML / View submenu (see below).
- Creates a new GMT link.
- Synchronize this link with link in other side.
- Activate all "selected" links.
- Remove the currently selected XML node.
- Duplicate the currently selected XML node.
- Change the text value of the current Comment / Text node.
- Validates the current element and its descendants.
- Remove the currently selected GMT link(s).

■ View Submenu:

Change View	→ Change View sub-menu (see below).
XML	
Highlight	→ Highlight sub-menu (see below).
Folding	→ Folding sub-menu (see below).
Filter	→ Filter sub-menu (see below).
Info-Extraction	→ Info-Extraction sub-menu (see below).
Icon-Sets	→ Icons sub-menu (see below).
GMT-Links Visualization	→ Links Visualization sub-menu (see below).
<input type="checkbox"/> Show XPath-Bar <small>Ctrl+Shift-X</small>	→ Show/Hide XPath-Bar.
<input type="checkbox"/> Show TreePath-Bar <small>Ctrl+Shift-T</small>	→ Show/Hide Treepath-Bar.

— View / Change View Sub-menu:

Tree View <small>F5</small>	→ Switch to Tree View (default).
<input type="radio"/> "HTML" Source <small>F6</small>	→ Switch to syntax-highlighted Source View.
<input type="radio"/> Plain Source <small>F7</small>	→ Switch to plain-text Source View.
XML	
<input type="radio"/> DTD - HTML Report <small>F8</small>	→ Switch to DTD HTML report.
<input type="radio"/> DTD - HTML Source <small>F9</small>	→ Switch to syntax-highlighted DTD Source View.
<input type="radio"/> DTD - Plain Source <small>F10</small>	→ Switch to plain-text DTD Source View.
Maximize View Size <small>F11</small>	→ Maximize current view stepwise.
Restore View Size <small>F12</small>	→ Minimize current view stepwise to default.

— View / Highlight Sub-menu:

Highlight all Links	→ Highlight all links in current XML/HTML file.
Highlight same Links	→ Highlight all links with same link id as current link.
Highlight result of XPath...	→ Highlight result of XPath expression.
XML-Language pre-defined	→ Show list of pre-defined Highlight-definitions.

— View / Folding Sub-menu:

Expand All	→ Expand all nodes.
Collapse All	→ Collapse all nodes.
Expand All descendants <small>Ctrl+Alt-E</small>	→ Expand all descendants of current node.
Collapse All descendants <small>Ctrl+Alt-C</small>	→ Collapse all descendants of current node.
Expand only result of XPath ...	→ Expand only result of XPath expression.
Collapse result of XPath ...	→ Collapse only result of XPath expression.
XML-Language pre-defined	→ Show list of pre-defined Folding-definitions.

— View / Filter Sub-menu:

<input checked="" type="checkbox"/> Show document node	→ Show/Hide document node (= root node).
<input checked="" type="checkbox"/> Show comment nodes	→ Show/Hide comment nodes.
<input checked="" type="checkbox"/> Show Text nodes	→ Show/Hide text nodes.
<input checked="" type="checkbox"/> Show CDATA nodes	→ Show/Hide CDATA nodes.
<input checked="" type="checkbox"/> Show PI nodes	→ Show/Hide processing-instruction nodes.
Show only result of XPath ...	→ Show only those nodes that are matched by XPath-expr.
Hide result of XPath ...	→ Hide those nodes that are matched by XPath-expr.
Show all tree nodes ...	→ Cancel any previously set filter.
XML-Language pre-defined	→ Show list of pre-defined filters.

– View / Info-Extraction Sub-menu:

- | | |
|---------------------------------|--|
| Apply XSL-File ... | → Apply XSL file with information extraction instructions. |
| Unload XSL-File | → Unload previously applied XSL file. |
| XML-Language pre-defined | → Show list of pre-defined XSL files. |

– View / Icon-Sets Sub-menu:

- | | |
|----------------------|---|
| Base Icon-Set | → Switch back to default tree node icons. |
| 1 icons1 | → Use icons from directory "icons1". |

– View / GMT-Links Visualization Sub-menu:

- | | |
|---|---|
| <input type="checkbox"/> ↓ GMT-Links and descendants | → Highlight all links and all descendants of their parents. |
| <input type="checkbox"/> ↑ GMT-Links and ancestors | → Highlight all links and all ancestors of their parents. |

• Macros Menu:

- | | |
|--|---|
| Macros | |
| Open... Ctrl+Shift-O | → Show the Macros file Open-dialog (<i>TB</i>). |
| Reopen | → Show a list of previously opened Macro files (<i>TB</i>). |
| Open in | → Show a list of previously used directories. |
| Reload | → Reload the current Macro file (<i>TB</i>). |
| Close | → Close the current Macro file. |
| View | → Macros / View submenu (see below). |
| Insert Macro Ctrl-M | → Insert the currently selected macro (<i>TB</i>). |
| Macro Insert Mode | → Change macro insert mode (<i>TB</i>). |

▪ Macros / View submenu:

- | | |
|------------------------|---------------------------------------|
| Macro Preview | → Macro Preview submenu (see below). |
| Structure View | → Switch to Structure View (default). |
| Search View | → Switch to Macros Search View. |
| Insertable View | → Switch to Macros Insertable View. |

– Macros / View / Preview submenu:

- | | |
|----------------------|---|
| Tree View | → Switch to tree pre-view (default). |
| "HTML" Source | → Switch to syntax-highlighted source pre-view. |
| Plain Source | → Switch to plain-text source pre-view. |

• Help Menu:

- | | |
|---|---|
| Help | |
| Help F1 | → Show the internal GMT help. |
| WWW Resources | → Help / WWW submenu (see below). |
| Check for new Version | → Check if a new version is available online. |
| Refresh GUI Ctrl+Alt-R | → Re-Initialize all components to solve graphic problems. |
| Reset Layout Ctrl+Alt+Shift-R | → Reset the layout to the default. |
| About | → Show the About dialog. |

▪ Help / WWW submenu:

- | | |
|--------------------------|---|
| GMT Web-Site | → Open the system-default browser with the GMT main site. |
| GMT Online Manual | → Open the system-default browser with the GMT help site. |
| Asgaard site | → Open the system-default browser with the Asgaard site. |

Appendix D: The Macro Language

This section gives only a short overview about the macro language. If you want to write your own macro file, have a look at the macro page¹ of the GMT website.

D.1 The Document Type Definition (DTD)

```
<!-- gmt-macros is the root element - it must have exactly 2 children: macros-
def and structure-def (=the top level group) -->
<!ELEMENT gmt-macros (macros-def, structure-def)>
<!-- This attribute is not used in the current release. It is intended to
specify the XML-Language. -->
<!ATTLIST gmt-macros lang-id CDATA #IMPLIED>
<!-- This attribute is not used in the current release. It can be used to
specify a description of this macros file. -->
<!ATTLIST gmt-macros description CDATA #IMPLIED>

<!-- Macro definition part: -->
<!-- the macros-def element contains all macro definitions: at least one
macro-group or one macro -->
<!ELEMENT macros-def ((macros-group | macro)+)>

<!-- with the macros-group element macros - which belongs together - can be
combined; macros-group's are currently not shown in the macros view of the GMT
- they are only useful when editing a macros file in a XML editor -->
<!ELEMENT macros-group ((macros-group | macro)+)>
<!-- name of the macros-group -->
<!ATTLIST macros-group name CDATA #IMPLIED>
<!-- description of the macros-group -->
<!ATTLIST macros-group description CDATA #IMPLIED>

<!-- the macro element defines a macro (i.e. a structure of XML elements
which belongs together); a macro may contain one or more references
to elements, other macros or to the special link-def "macro" -->
<!ELEMENT macro (constant-def*, (element-ref | text-node | comment-node |
macro-include | GMT-LINK | GMT-LINK_EXT)+)>
<!-- the name of this macro -->
<!ATTLIST macro name ID #REQUIRED>
<!-- an optional description for this macro - it will appear in the GMT as
a tooltip when the mouse is over the list element in the structure view -->
<!ATTLIST macro description CDATA #IMPLIED>
<!-- indicates if the XML document stays valid after this macro is inserted
(true) or if further macros/elements have to be inserted to this macro (false)
-->
<!ATTLIST macro standalone (true | false) "true">

<!-- with the element-ref element you can define an element which
may have attributes and can contains other elements; in the current version
the GMT will not check if this is an valid element -->
<!ELEMENT element-ref (attribute-ref | element-ref | text-node | comment-node
| macro-include | GMT-LINK | GMT-LINK_EXT)*>
<!-- the name of the referenced element -->
<!ATTLIST element-ref name NMTOKEN #REQUIRED>

<!-- with the attribute-ref element you can define an attribute for the
element which is defined with the surrounding element-ref element; the GMT
will not check if the name and the value of this attribute is valid for the
element -->
<!ELEMENT attribute-ref EMPTY>
<!-- the name of this attribute -->
<!ATTLIST attribute-ref name NMTOKEN #REQUIRED>
<!-- the value of this attribute - currently there are special "text-macros"
for attributes (and text-/comment-nodes) interpreted by the GMT:
    %INPUT% - the user is asked for a value - if the user cancels the input,
              the attribute won't be inserted;
    %TEXT% - if text in the other side is selected the selected text will be
```

¹ <http://www.asgaard.tuwien.ac.at/~peter/GMT/macros/>

```

        used as the value, otherwise the attribute won't be inserted,
        %DATE% - will be replaced with the current date,
        %TIME% - will be replaced with the current time,
        %USER% - will be replaced with the current user (is not fully supported
yet),
        %LINK-ID% - will be replaced with the (next) link id, which will also be
        used in the HTML link in the HTML view - is used in link-def
        $CONST_NAME$ - will be replaced with the text-value of string constant
CONST_NAME; the first time a constant is accessed user input is required; if
its is in upper case characters it is a global constant, otherwise it is local
(only valid in current macro)
        #COUNTERNAME# - will be replaced with "#COUNTERNAME{successive number}",
e.g. #A-000# = #A-001, #A-002, #A-003; ## = #1, #2, #3
        {XPath-Expression} - will be replaced by the result of the XPath
expression applied to the selected element in the current file
        [XPath-Expression] - will be replaced by the result of the XPath
expression applied to the selected element in the other file -->
<!ATTLIST attribute-ref value CDATA #REQUIRED>
<!-- defines a default value - makes only sense if used together with
'%INPUT%' as value -->
<!ATTLIST attribute-ref default-value CDATA #IMPLIED>

<!-- creates a text-node (PCDATA) -->
<!ELEMENT text-node EMPTY>
<!-- the value of this text-node; see attribute-ref for special values -->
<!ATTLIST text-node value CDATA #REQUIRED>
<!-- defines a default value - makes only sense if used together with
'%INPUT%' as value -->
<!ATTLIST text-node default-value CDATA #IMPLIED>

<!-- creates a comment-node -->
<!ELEMENT comment-node EMPTY>
<!-- the value of this comment-node; see attribute-ref for special values -->
<!ATTLIST comment-node value CDATA #REQUIRED>
<!-- defines a default value - makes only sense if used together with
'%INPUT%' as value -->
<!ATTLIST comment-node default-value CDATA #IMPLIED>

<!-- defines a string constant which can be used inside the value-attribute of
attribute-ref, text-node and comment-node elements using $CONST_NAME$ or
$const_name$ -->
<!ELEMENT constant-def EMPTY>
<!-- name of the constant to be defined -->
<!ATTLIST constant-def name CDATA #REQUIRED>
<!-- value of the constant; see attribute-ref for special values -->
<!ATTLIST constant-def value CDATA #REQUIRED>

<!-- copies the content of the referred macro into the current macro -->
<!ELEMENT macro-include EMPTY>
<!-- name of the referred macro -->
<!ATTLIST macro-include name IDREF #REQUIRED>

<!-- will be replaced by <gmt-link link-id="%LINK-ID%"/> -->
<!ELEMENT GMT-LINK EMPTY>
<!-- will be replaced by <gmt-link link-id="%LINK-ID%" comment="%INPUT%
%TEXT%" created-at="%DATE%", %TIME%" created-by="%USER%"/> -->
<!ELEMENT GMT-LINK_EXT EMPTY>

<!-- Structure definition part: -->
<!-- structure-def contains the root-group of the macros structure as shown in
GMT's structure view -->
<!ELEMENT structure-def (group | group-include | group-link | macro-ref |
single-element-ref | separator | label)+>
<!-- a group contains one or more sub-groups, group-refs, macro-refs or
single-element-refs -->
<!ELEMENT group (group | group-include | group-link | macro-ref | single-
element-ref | separator | label | macros-group-include)*>
<!-- the name of this group -->
<!ATTLIST group name CDATA #REQUIRED>
<!-- an optional description for this element - will appear in the GMT as a
tooltip when the mouse is over the list element in the structure view -->

```

```

<!ATTLIST group description CDATA #IMPLIED>

<!-- with macro-ref you can refer to an existing macro; if a macro-ref element
is used in a macro definition(i.e. in a macro or element-ref element), the
macro-ref element will be replaced with the contents of the referred macro -->
<!ELEMENT macro-ref EMPTY>
<!-- the name of an existing macro -->
<!ATTLIST macro-ref name IDREF #REQUIRED>
<!-- the optional label attribute can be used to define a different label
(instead of the name) for the list-item in the structure view of the GMT -->
<!ATTLIST macro-ref label CDATA #IMPLIED>

<!-- with group-include you can include an existing group (i.e. defined
somewhere else in the structure definition part); in the GMT it looks the same
as the referred group (it seems that the referred group is defined twice) -->
<!ELEMENT group-include EMPTY>
<!-- the name of an existing group -->
<!ATTLIST group-include name CDATA #REQUIRED>
<!-- the optional label attribute can be used to define a different label
(instead of name) for the list-element in the structure view of the GMT -->
<!ATTLIST group-include label CDATA #IMPLIED>

<!-- inserts a new group with containing the macros of referenced macros-
group; convenient way to quick add new macros -->
<!ELEMENT macros-group-include EMPTY>
<!-- name of macros-group to be included -->
<!ATTLIST macros-group-include name CDATA #REQUIRED>

<!-- represents a link to a group -->
<!ELEMENT group-link EMPTY>
<!-- the name of an existing group -->
<!ATTLIST group-link name CDATA #REQUIRED>
<!-- the optional label attribute can be used to define a different label
(instead of name) for the list-element in the structure view of the GMT -->
<!ATTLIST group-link label CDATA #IMPLIED>
<!-- description for this group-link - will be shown as tooltip -->
<!ATTLIST group-link description CDATA #IMPLIED>

<!-- unlike element-ref a single-element-ref is used to define only a single
element it's the same as a macro-ref referring to a macro with only a single
element-ref; if you want to define attributes with to single element, you have
to use macro-ref/macro -->
<!ELEMENT single-element-ref EMPTY>
<!-- the name of the element -->
<!ATTLIST single-element-ref name NMTOKEN #REQUIRED>
<!-- an optional description for this element - will appear in the GMT as a
tooltip when the mouse is over the list element in the structure view -->
<!ATTLIST single-element-ref description CDATA #IMPLIED>
<!-- indicates if the XML document stays valid after this element is inserted
(true) or if further macros/elements have to be appended to this element
(false) -->
<!ATTLIST single-element-ref standalone (true | false) "true">

<!-- inserts a separator (line) - use this to group macros/elements which
belong together -->
<!ELEMENT separator EMPTY>

<!-- inserts a label - useful together with separator to describe a part of a
group -->
<!ELEMENT label EMPTY>
<!-- the text of the label -->
<!ATTLIST label text CDATA #REQUIRED>
<!-- description for this label - will be shown as tooltip -->
<!ATTLIST label description CDATA #IMPLIED>

```

D.2 Sample Macros

Some samples taken from the 8HB macro file:

Macros Source	Result (in 8HB)
<pre><macro name="ChunkGroup"> <element-ref name="chunk-group"> <attribute-ref name="title" value="%TEXT%" /> </element-ref> </macro></pre>	<pre><chunk-group title="..." /></pre>
Note: %TEXT% will be replaced with the currently selected text in the other side.	
<pre><macro name="Chunk"> <element-ref name="chunk"> <attribute-ref name="chunk-id" value="#CHUNK-00000#" /> <macro-include name="Structure" /> </element-ref> </macro></pre>	<pre><chunk chunk-id="#CHUNK-..."> <structure status="..." /> </chunk></pre>
Note: #CHUNK-00000# will be replaced with #CHUNK-00001, #CHUNK-00002, #CHUNK-00003#, ...	
<pre><macro name="Structure"> <element-ref name="structure"> <attribute-ref name="status" value="%INPUT%narrative" /> </element-ref> </macro></pre>	<pre><structure status="..." /></pre>
Note: %INPUT%narrative will be replaced with a user-entered value; defaults to narrative.	
<pre><macro name="definition"> <element-ref name="definition"> <attribute-ref name="name" value="%INPUT%" /> <attribute-ref name="description" value="%TEXT%" /> <GMT-LINK /> </element-ref> </macro></pre>	<pre><definition name="..." description="..."> <gmt-link link-id="..." /> </definition></pre>
Note: <GMT-LINK /> will be replaced with the GMT link element.	

Publications

- [1] Votruba, P.; Miksch, S.; Kosara, R.: "Facilitating Knowledge Maintenance of Clinical Guidelines and Protocols", in *11th World Congress of Medical Informatics (MedInfo-2004)*.
- [2] Votruba, P.; Miksch, S.; Seyfang, A.; Kosara, R.: "Tracing the Formalization Steps of Textual Guidelines", Vienna University of Technology, Institute of Software Technology and Interactive Systems, Vienna, 2004.
In Kaiser, K.; Miksch, S.; Tu, S.W. (eds.): *Computer-based Support for Clinical Guidelines and Protocols. Proceedings of the Symposium on Computerized Guidelines and Protocols (CGP-2004)* organized in the framework of the International Joint Meeting EuroMISE 2004 in Prague, IOS Press, Amsterdam, 2004.