

CmapTools, Web Pages & Websites

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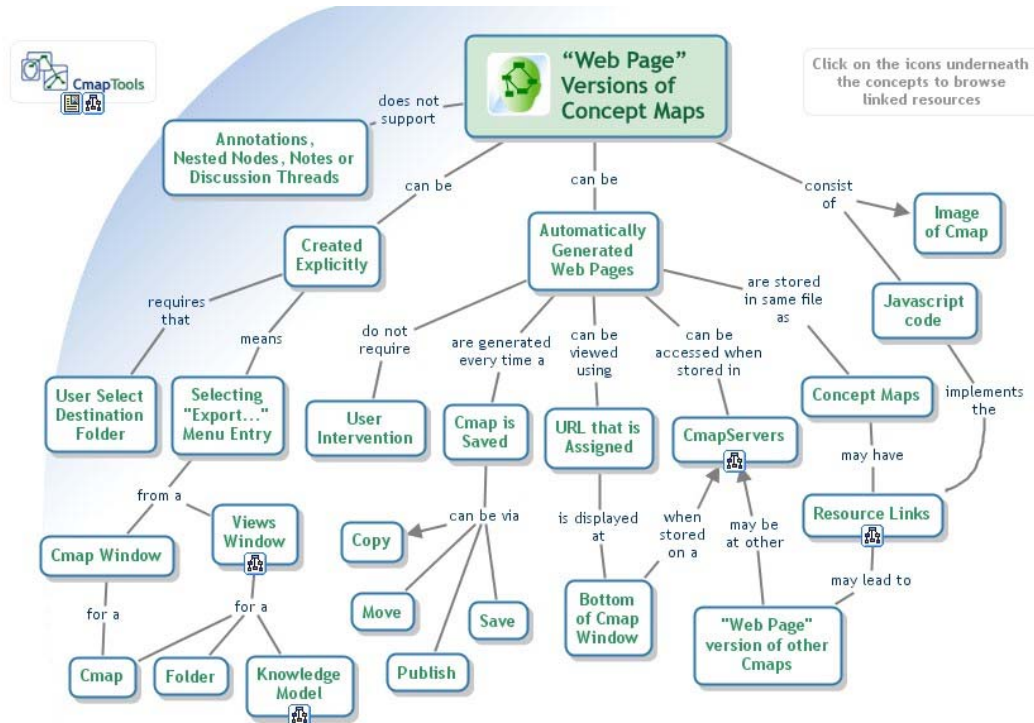


Figure 1: A Concept map about the Web Page versions of Cmaps (from the <http://cmap.ihmc.us> website).

Introduction

The *CmapTools* software suite was designed to support collaboration and sharing among users. Its client-server architecture allows users to copy or publish their *Knowledge Models* (Cañas, Hill, & Lott, 2003) to *CmapServers* making them readily available to users through the *CmapTools* client, or to construct the *Knowledge Models* directly on a server. However, it is clear that the World Wide Web (WWW) is the best way to make information available to the largest possible number of users. *CmapTools* facilitates sharing through the WWW by automatically converting Cmaps saved on *CmapServers* to HTML (web pages) that can be browsed immediately using an Internet Web browser (e.g. Internet Explorer, Safari, Netscape). The *CmapServer* includes a WWW Server that delivers HTML versions of the Cmaps it stores, and as such can support Cmap-based websites. Alternatively, the user can explicitly export a Cmap, a *Knowledge Model*, or the contents of a folder as web pages that can then be uploaded to a website for publication.

This document explains the features that *CmapTools* provides to support the creation and delivery of web pages and websites.

Cmaps as Web Pages on a *CmapServer*

When a Cmap is stored in My Cmaps, since it is saved on the user's computer, it cannot be accessed directly by other users through *CmapTools*. Any user that has the appropriate permissions (Cañas, Hill, Lott, & Suri, 2003), however, can access Cmaps stored on a *CmapServer*. (The default permissions on most *CmapServers* allow all users (Everyone) to open and browse through Cmaps.) Browsing through these shared Cmaps can be done using *CmapTools* or any Internet Web Browser such as Internet Explorer, Safari or Netscape. This is possible because at the same time that a Cmap is stored on a *CmapServer*, whether it is through a "Save" during the construction of the map, or via a "Copy", "Move" or "Publish" operation, a web page (HTML) version of the Cmap is automatically generated and stored together with the Cmap, in the same file. The Cmap window itself shows the URL (Web address) where the web page version of the Cmap can be located.

Figure 2 shows the window of a Cmap that has been saved in My Cmaps. Compare this image with that in Figure 3, which is the same Cmap after it has been saved on a *CmapServer*. At the bottom of the window in Figure 3, a URL (Internet address) for the web page that corresponds to

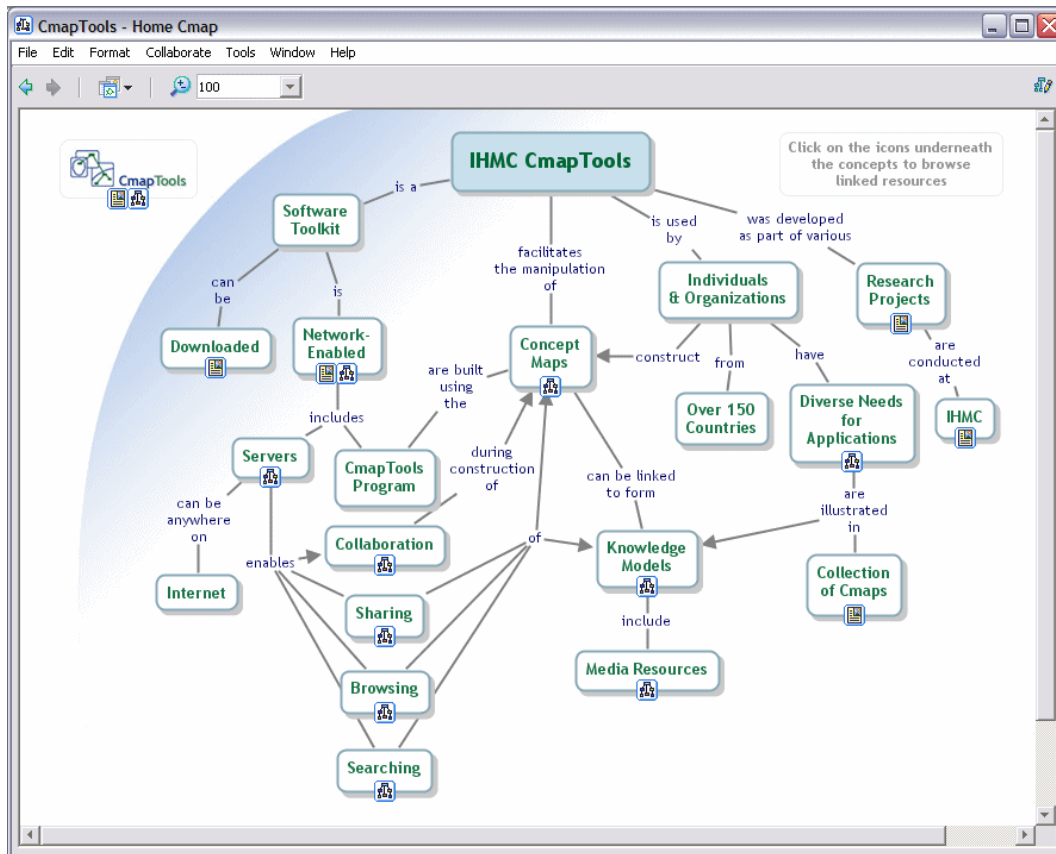


Figure 2: A Cmap that has been saved in My Cmaps. No URL information is displayed at the bottom of the window.

this Cmap is displayed (and is highlighted in red in this Figure). Clicking on the “View” button at the lower-right corner (also highlighted in red in this Figure) of the window will launch the default Web browser for the computer, displaying the web page that corresponds to the Cmap. This web page is shown in Figure 4. The URL in the window of Figure 4 can be copied and shared with other who may want to examine this map using a Web Browser program. Note that there is no need to explicitly “Export” the Cmap for the web page to be generated – any Cmap stored in a *CmapServer* automatically has a web page version stored with it, independent of whether it was generated as a “Save” operation during the construction of a Cmap, or copied, moved or published from My Cmaps or another location.

CmapTools provides the capability to link all types of resources to the nodes (concepts and linking phrases) of a Cmap. These resources can be displayed by selecting the icons underneath the nodes, and then selecting one of the entries displayed, allowing the user to navigate through collections of Cmaps and resources. The linked resources can be stored on the same *CmapServer*

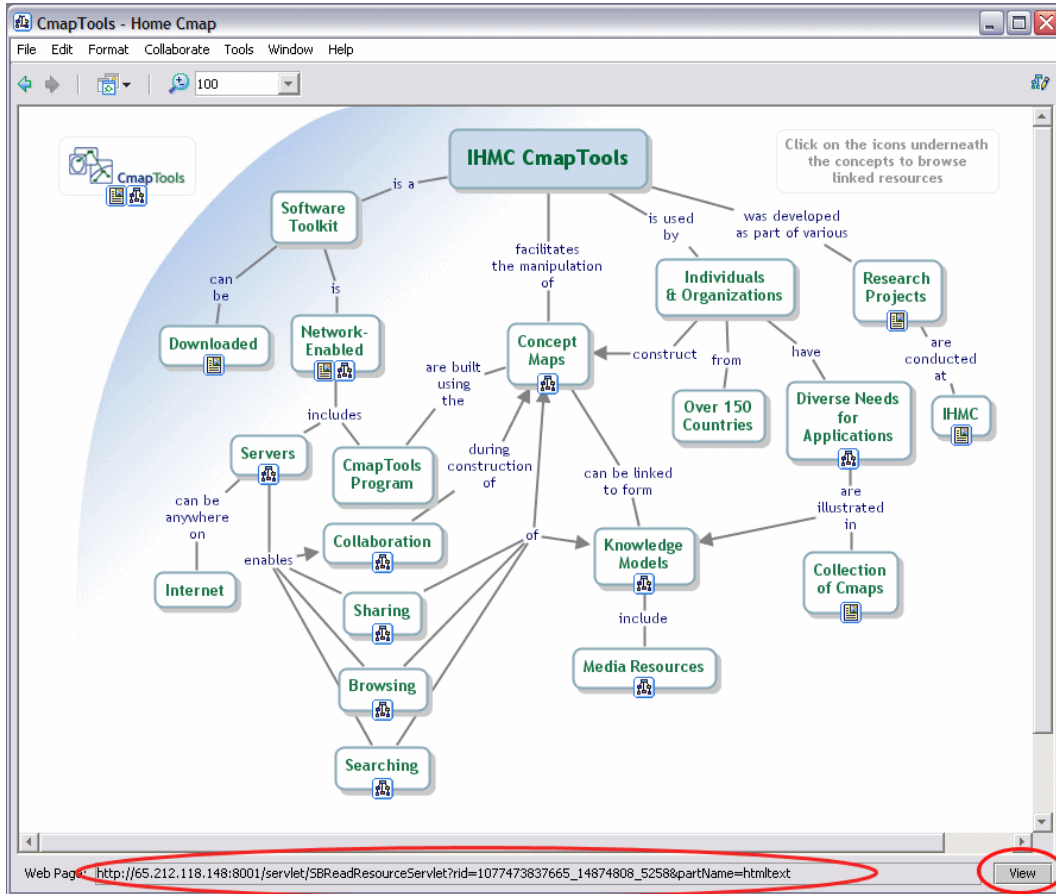


Figure 3: A Cmap that is stored on a CmapServer. The URL information for the corresponding Web Page is displayed at the bottom of the window.

or on another CmapServer – when selected the links are followed automatically and the resources opened. When the web page-version of a Cmap is opened, the links to resources are preserved and continue to be active. For example, selecting in the web page of a Cmap a link to another Cmap, whether on the same CmapServer or another, will automatically open the corresponding web page for the linked Cmap. Links to images, videos, text, web pages or any type of resources will be opened accordingly, using the viewer program for that particular type of resource that is default for the user’s computer.

The automatic generation of web pages together with the ability to follow links to resources from those web pages, makes storing Cmaps on a CmapServer an ideal mechanism to share information and knowledge, whether its the results of brainstorming meetings, project designs, or the work of elementary school children being shared with parents and/or other students.

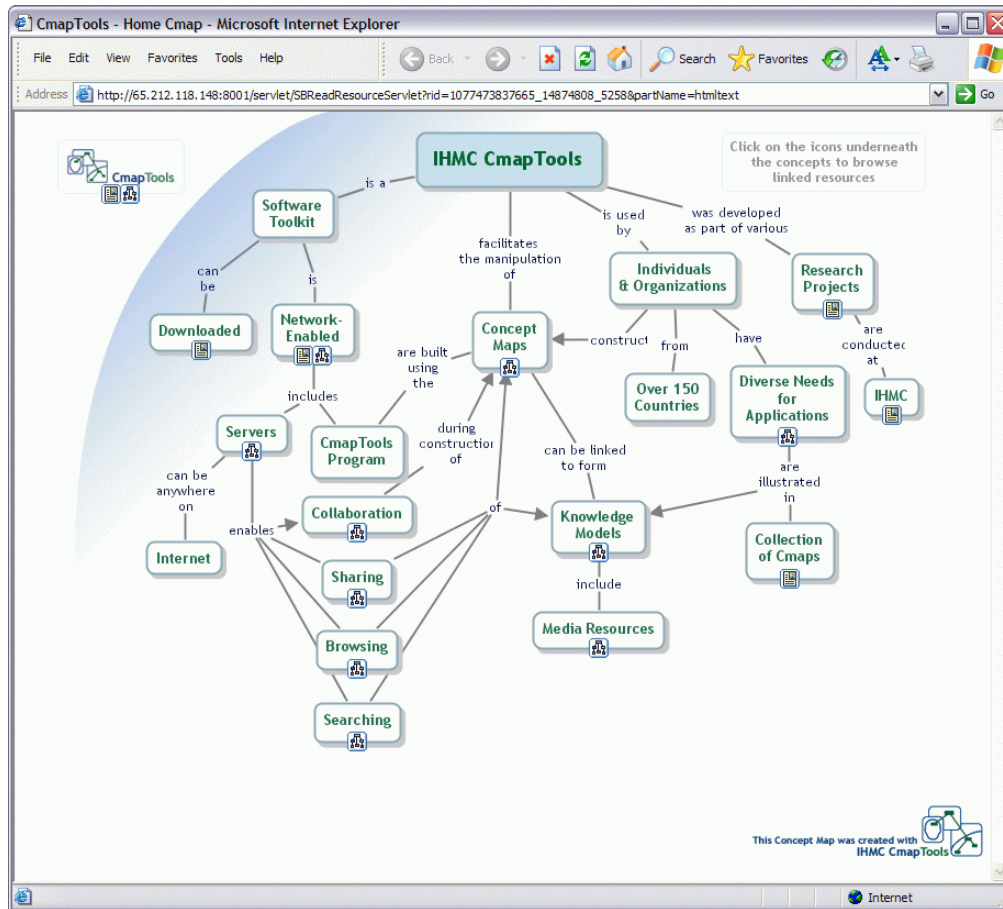


Figure 4: A Web Page displaying the Cmap in Figure 3.

Exporting Cmaps as Web Pages

The automatic generation of web pages for Cmaps stored in *CmapServers* makes it easy for users to share and publish their *Knowledge Models* on the Web. As discussed in a section below, this facilitates the construction of Websites organized using concept maps. However, the web pages generated at the *CmapServer* are not available for explicit manipulation by the users. For example, they cannot be taken and incorporated as part of another website.

CmapTools allows the user to explicitly export a Cmap, or the contents of a folder, as web pages. The "Export Cmap as...Web Page..." menu combination on an opened Cmap window generates a web page for that corresponding Cmap. A dialogue box allows the user to decide where in the user's computer file system to store that Page. This web page file can then be moved and manipulated by the user.

To export a set of Cmaps and their linked resources, the “Export” function is invoked on the folder at the Views window. Selecting the “Export Folder as Web Page...” menu entry on a selected folder will generate web pages for all Cmaps and resources contained in that folder. During the Export, the program automatically traverses subfolders and generates web pages for resources contained in them. For each Cmap, two files are generated: an image file that contains a “screen shot” of the Cmap, and an HTML file that contains javascript code to display the image file and enables the links to resources. For other types of resources (images, videos, etc.), the resource itself is copied to the destination folders selected by the user for the Export. All the generated files are stored in the same folder, and links among these resources are “relative”, meaning that the set of files can be “moved” as a group to other locations and the links among them will continue to work. This way, the generated files can be easily incorporated into a website.

It is important to note that exporting to web page a single Cmap will only generate the two files associated with that Cmap (image and HTML), even if the Cmap has links to other resources that are stored in the same folder in the Views. To generate the complete set of files, including resources, the “Export” operation needs to be performed on the appropriate folder that contains all the resources and the Cmaps that link the resources.

***CmapTools* and Websites**

The automatic generation of web page-versions of Cmaps, together with the features available in *CmapTools* to construct *Knowledge Models* (Cañas, Hill, & Lott, 2003) facilitate the construction of websites organized as Concept Maps. If the website consists of only concept maps, then the automatically generated web pages on the *CmapServer* may suffice. For users, the advantage is that editing and saving the Cmaps automatically updates the website, without the need of any technical intervention.

However, in some cases one wants to assign a particular URL to a Cmap that will be the “Home Page” of the website. There are several ways of dealing with this issue. First, redirecting the “Home Page”, so that the corresponding Cmap in the *CmapServer* is loaded whenever the “Home Page” is referenced. This way the Cmap can be modified and saved at will, and the website is automatically “updated”.

The second option is to perform an “Export Cmap as Web Page” operation from the opened “Home Page” Cmap. This will generate a web page that corresponds to the Cmap. However, there

are details to consider. If this “Home Page” Cmap has links to other Cmaps in the same folder, then the “Export Cmap as Web Page...” function will assume that the other Cmaps will also be exported eventually (or have been exported) and will not generate the correct links since they will be assumed to be relative links. That is, the links will not be absolute links that include the Internet address of the *CmapServer* where the other Cmaps are stored. (The “Export” works this way because it is assumed that a single file Export in a folder with other Cmaps may be part of a larger set of maps being exported). The solution to this problem is to use links to the web page version of the other Cmaps, instead of linking to the Cmaps themselves. That is, instead of making the links from this “Home Page” Cmap to the other Cmaps directly, make the links to the web page versions of those Cmaps. That is, open the target Cmaps, open their web page version, and use that URL as the link. Then, change the icons of the links to show the link as a Cmap reference, by right-clicking on the concept and selecting the “Add & Edit Links to Resources” menu entry. Select the link and click on the “Edit” button. The displayed dialogue box allows changing the icon). This second option was used for the Cmap in <http://cmap.ihmc.us>. The links to the various Cmaps in this (and only this) Cmap are hard-coded to be links to the web page version of the Cmaps. The rest of the Cmaps are all being served out of a *CmapServer*.

Restrictions and Limitations

The web page version of Cmaps don't implement fully the capabilities of using *CmapTools* to browse through the Cmaps. These include:

1. The web page version of Cmaps cannot be edited using a Web Browser.
2. The *Nested (Big) Nodes* are not implemented in the web page counterpart of Cmaps. There is now way to expand or close a *Nested Node*.
3. Links to images and videos in CmapTools have a description that is displayed as a caption underneath the resource. These captions are not displayed when using a Web Browser.
4. *Annotations* cannot be opened on the web page version of Cmaps.
5. The *Discussion Threads (DTs)* cannot be opened on the web page version of Cmaps.
6. There is no equivalent of the *Views* to browse through the *Places* and the collections of Cmaps.

7. When opening a link from a concept (or linking phrase) to an image, video, or sound clip that can be displayed with a CmapTools resource viewer, any other icons on that concept are displayed with the resources' window. This allows the user to continue viewing other resources associated with that concept without having to go back to the concept map. On the web page counterpart of the Cmap, these icons are not displayed with the resource's window.

Storage of Cmaps

To further explain how the automatic generation of web page version of Cmaps is managed in *CmapServers*, we examine the format in which Cmaps are stored in the computer's file system.

Within CmapTools, each Cmap is stored as a separate file, whether it is stored on My Cmaps (the user's computer) or on a *CmapServer*. This file can contain several components or parts, one of which is the Cmap itself (concepts, concepts, linking phrases, styles, links to resources, etc.). When the Cmap is stored in a *CmapServer*, two additional components are stored in the file: the

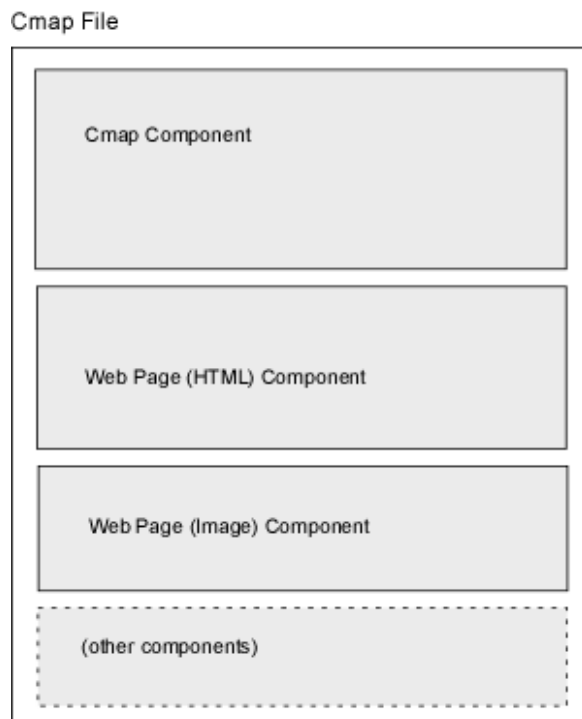


Figure 5: The file format of a Cmap file, showing its components.

HTML code and the image of the web page version of the Cmap, as shown in Figure 5¹. The *CmapServer* is able to “serve” any of its components when requested. That way, when a *CmapTools* client requests the Cmap, it serves that component, and when a Web Browser requests the web page version, the *CmapServer* can provide that too. When a Cmap is moved, or copied, the whole file with all its components is moved or copied – including the web page components (HTML and image). Each resource (including Cmaps) has a unique resource-id that identifies it. Moving the Cmap within a *CmapServer* preserves its resource-id and so links to it are resolved. The URL to the web page component of a Cmap includes that resource-id, which the *CmapServer* uses to identify the correct Cmap and serve the appropriate web page.

References

- Cañas, A. J., Hill, G., & Lott, J. (2003). *Support for Constructing Knowledge Models in CmapTools* (Technical Report IHMC CmapTools 2003-02). Pensacola: Institute for Human and Machine Cognition.
- Cañas, A. J., Hill, G., Lott, J., & Suri, N. (2003). *Permissions and Access Control in CmapTools* (Technical Report IHMC CmapTools 2003-03). Pensacola: Institute for Human and Machine Cognition.

¹ Other components include *Discussion Threads*, the *CmapTools Recorder*, the *CmapTools Presentation*, the *Soups*, and components from other *CmapTools* modules.