Standards of Visualizing Historic Urban Sites on the Web

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1   INTRODUCTION

Historic Urban Sites (H.U.S.) are important components of the human inheritance. They are the eternal records, which keep the history of the nations, and they are the clear evidence upon the progress of the whole human civilizations over the time. Harmonized, integrated, and beneficial information regarding worldwide H.U.S. should be supplied to the people on a worldwide base, to maximize people's knowledge about these H.U.S… This is essential for these worldwide H.U.S. to be protected against dangers, and to be conserved over as long period of time as possible.

World Wide Web is a vital and effective component of the media and information technologies. Vitality and effectiveness of the web come at first from the highly advanced techniques, which are used in supplying information regarding wide range of different subjects. These techniques play influential role in attracting increasing number of people from all over the world to depend on the web to get the information regarding the subjects, which they are looking for.

Thus, the World Wide Web is supposed to be employed to supply to people the harmonized, integrated, and beneficial information regarding worldwide H.U.S., which is essential to maximize people's knowledge about them. Visualizing these H.U.S. on the web is one of the processes of supplying information to people, by using different types of visual materials of different techniques, i.e. still images, QuickTime panoramas, videos, computer graphics, etc. It is hypothesized that different types of visual materials of different techniques would be used in visualizing H.U.S. on the different web pages.

Typical standards should be applied in the process of visualizing H.U.S. to harmonize and integrate the information, which would be supplied to the people, and to maximize people's benefits from such information. Applying typical standards in the visualizing process would generate common and distinct features of the visual materials used for visualizing these H.U.S.

These common and distinct features could be clearly noticed in, for instance: types of the visual materials, combinations between different types of materials, number of the materials in one web page, file size of the materials, dimensions and resolutions of the materials, correlations between the materials, the visualized elements of the H.U.S.,...etc.

This study aims to distinguish any typical applied standards in the process of visualizing H.U.S. on the different web pages. To fulfill this aim, the visual materials and their features were surveyed. Thus, we searched the web, downloaded all the contents of the web pages, explored the visual materials and their common features, and then derived the results.

The results of the study indicated that the only type of visual materials used for visualizing H.U.S. on the web is still images of these sites. Moreover, we could find some indistinct features of limited commonness between the visual materials on the different web pages. These features could not lead us to distinguish any typical applied standards in the process of visualizing H.U.S. In addition, these features indicate, in some cases, definite deficiencies in the information supplied using those visual materials. Finally, it is concluded that there are no typical standards could be distinguished to be applied in the process of visualizing H.U.S. on the web.

2   PROCEDURES

2.1   Web pages:

We searched the web to find the web pages, which supply any kind of information regarding H.U.S., whatever the categories or the subjects of these web pages. To find these web pages, we searched the web using "GO express search engine" as a Meta search engine within which it contains multi search engines. It was found to be reliable and giving wide range of results for every search.

Different keywords were used in the search to get the best and the widest range of results. We used 40 different pairs of keywords, which were resulted from combining words from two different groups of words. The first group includes some alternative meanings of the word "historic", i.e. ancient, heritage, old, and past. The second group includes some alternative meanings of the word "site", i.e. architecture, area, building, city, district, place, site, and urban. The resultant pairs of keywords are "historic site", "historic architecture", "ancient site"…etc, which would be used for the search.

A list was prepared, including the URLs of the web pages, which resulted from the search and would be included in the study. Before including the URL of any resulted web page to the list, this web page was primarily checked, to be sure that it supplies information regarding H.U.S… At the end of the primary check of all the resulted web pages, the total number of web pages' URLs included in the list is 388 different URLs of different web pages.

2.2   Downloading the contents of the web pages

After searching the web, and saving the resultant URLs in the list, which is mentioned above, all the contents included within each web page should be downloaded as separate files. This is essential to explore the types of all the contents included in every web page, and to explore their features, as well.

Different software were found to be used to download the contents of web pages. We tried five of these software and the "Offline Explorer" was found to be the best of them, concerning reliability of downloading the entire contents of the web pages, speed of downloading, and ease of use.

On Tuesday, September 25th, 2001, all the 388 URLs were put in a "list enquires", to be downloaded using this software. The depth of downloading was set to zero, which means, "Download all the files within only the given URL". While downloading files from web pages, "Offline Explorer" creates a folder for each web page in which, files were downloaded. Every folder was identified by a folder name typical to the web page URL. This arrangement makes it easy to explore the files, which were downloaded from each web page separately.

2.3   Filling the data sheet

After downloading all the contents of all the 388 web pages, folders containing all these contents (files) should be explored. Types of all the files included in every web page, and their features are to be recorded in a data sheet, which was prepared as mentioned in Table-1.

Web Pages	Number	1		
	Subject	Academic		
	Link Yes/No	Yes		
Files Used in the Web Pages	Type	Html	Gif	Gif
	Sum	1	2	5
	Total Size	15	20	100
Visual Materials of H.U.S.	Yes/No	-	Yes	No
	Usage	-	Banners	-
	Content	-	Site	-
Correlated Visual Materials	Yes/No	-	No	-
	Correlation Type	-	-	-

Table-1 The typical data sheet

2.3.1   Explanations of the items of the data sheet

Web Pages:

- Number: is the serial number according to the list of the URLs resulted from the search.

- Subject: is the main subject or category of the web page.

- Link Yes/No: is the information about if a web page has, in its main body, links to other pages (Yes) or not (No).

Files Used in the Web Pages:

- Type: is the format of the files.

- Sum: is the total number of the files of the same type.

- Total Size: is the total size of the files of the same type.

Visual Materials of H.U.S.:

- Yes/No: is to inform whether the file is used for visualizing H.U.S. as visual material (Yes) or not (No).

- Usage: is the purpose of using the visual materials within the web pages.

- Content: is the information about the elements of the H.U.S., which were visualized in the visual materials.

Correlated Visual Materials:

- Yes/No: is the information about if the material was correlated with other materials (Yes) or not (No).

- Correlation Type: is the type of correlation connecting the elements of the H.U.S., which were visualized in the correlated visual materials.

2.3.2   Categorizing the items of the data sheet

Some items, which would be filled in the data sheet (Table-1.), were categorized as follows:

- Web Pages, Subject: was categorized into "Academic", "Commerce", "Conservation", "Information", and "Tourism".

- Visual Materials of H.U.S., Usage: was categorized to "Backgrounds", "Banners", "Headings", "Links", "Logos", and "Page Body".

- Correlation Type: was categorized to "Angle", "Detail", and "Projection".

2.3.3   Exploring the downloaded contents (files) and recording the Data

All the folders, which were created by the "Offline Explorer" software, containing all the files, which were downloaded from the listed web pages, should be explored. Types and features of all the downloaded files are to be recorded in the data sheet according to the categorizations mentioned above.

For every folder, we checked the downloaded files starting with the "html" ones, to check if the whole contents of the web page had been successfully downloaded or not. If any content was failed to be downloaded, a red "X" sign would appear instead of such content on the downloaded web page.

While checking, if this sign was found on any downloaded web page, the URL of such web page would be included in a list, to be downloaded again using the "Offline Explorer" software, until all the contents of all the downloaded web pages were successfully downloaded. To assure the success of downloading, such web pages were compared with the online web pages, to confirm that they are typical, and all their contents were successfully downloaded.

2.3.4   Repeating procedures for the web pages, which contain links to other pages

After completing exploring the folders, checking the downloaded files, and recording the data, 193 web pages were found containing links to other web pages. These web pages' URLs were listed again to download all the files used in all the linked web pages, using the "Offline Explorer" software. This time, the depth of downloading is set to one, which means, "Download all the files within the given URL and within all the linked web pages".

3   RESULTS

3.1   File types of all the visual contents

After exploring the folders, checking the downloaded files, and recording the data of all the original 388 web pages and the 193 linked web pages, as well as the data of all their contents, the following was noticed:

- Limited varieties of files were found in both the original web pages and the linked web pages.
- Types of files, which were used as visual contents, were found to be "Gif" and "Jpeg" files and some very few "Pdf" and "Bmp" files.

At the beginning of the study, we hypothesized that wide ranges of different types of visual materials of different techniques would be used in visualizing H.U.S. on the different web pages. However, the results indicate that the only types used for visual contents, in general, and specifically for visual materials of H.U.S. as well, are the still images of two file types, "jpeg" and "gif".

This result indicates a shortage in the use of the state of the art in visualizing techniques and materials to visualize the H.U.S. on the web. Moreover, it indicates a shortage in the use of the vitality and the effectiveness of the web in supplying information regarding H.U.S. to the people.

3.2   Web pages, which visualize H.U.S

For the following parts of the study, web pages that contain any visual material, which visualizes H.U.S. will be mentioned as "Visual Web Page", and abbreviated as "V.W.P.".

Web Page Subject	Academic	Commerce	Conservation	Information	Tourism	Total
V.W.P.	25	19	27	72	31	174
All Web Pages	81	31	51	177	48	388

Table-2 Total numbers of V.W.P. and total numbers of all web pages

Table-2 shows a comparison between the total numbers of V.W.P. of the different categories or subjects with the total number of all web pages. It is clearly noticed that the percentages of V.W.P. are low, and the highest percentage is in the case of tourism V.W.P., which is 64.58% of all the tourism web pages. The lowest percentage is in the case of academic V.W.P., which is 30.86% of all the academic web pages.

This result indicates that the tourism web pages tend to supply information of H.U.S. by using visual materials more than the other web pages do. Moreover, the academic web pages tend to supply information of H.U.S. by using visual materials less than the other web pages do.

3.3   Visual materials, which visualize H.U.S

All the Gif files and the Jpeg files, which are used as visual materials for visualizing H.U.S., will be mentioned as "Gif Visual Materials" and "Jpeg Visual Materials", respectively. They were abbreviated as "G.V.M." and "J.V.M" respectively.

3.3.1   Spreading of the visual materials on the V.W.P

Table-3 shows numbers of V.W.P. that only used G.V.M. to visualize H.U.S., numbers of V.W.P. that only used J.V.M. to visualize H.U.S., and numbers of V.W.P. that used both types together to visualize H.U.S., according to the categories or subjects of these web pages.

Web Page Subject / Visual Materials used	Academic	Commerce	Conservation	Information	Tourism	Total
G.V.M only	6	3	3	15	11	38
J.V.M only	17	13	23	52	18	123
G.V.M. + J.V.M.	2	3	1	5	2	13

Table-3 Numbers of V.W.P. according to type of visual materials used in them

It is clear from table-3 that the J.V.M. are more widespread on the V.W.P. than the G.V.M. are, this is true for all the V.W.P. of the different categories or subjects. The highest ratio between the spreading of J.V.M. and that of G.V.M. is 7.67:1, in conservation V.W.P., while the lowest ratio between them is about 1.63:1, in tourism V.W.P.

This result indicates that the conservation V.W.P. tend to use J.V.M. to visualize H.U.S. more than the other V.W.P. do. Moreover, the tourism V.W.P. tend to use G.V.M. to visualize H.U.S. more than the other V.W.P. do.

It is noticed that the percentages of V.W.P. that used both G.V.M. and J.V.M. are low; the highest percentage is in the case of commerce V.W.P., which is 15.79% of the total number of commerce V.W.P... The lowest percentage is in the case of conservation V.W.P., which is 3.7% of the total number of conservation V.W.P.

This means that the majority of the V.W.P. tend to use only one type of the visual materials, to visualize H.U.S.

3.3.2 Densities of visual materials

Web Page Subject / File Type	Academic	Commerce	Conservation	Information	Tourism	Total
G.V.M	71	7	30	30	30	168
All Gif Files	142	55	156	400	175	928
J.V.M	47	36	115	210	55	463
All Jpeg Files	85	89	218	398	140	930

Table-4 Total numbers of visual materials, all Gif files, and all Jpeg files

From Tables-3, and Table-4, academic and conservation V.W.P. have the highest densities of G.V.M.; they are about 8.9 and 7.5 materials/ V.W.P. respectively. For these V.W.P., densities in the case of J.V.M. are about 2.5 and 4.8 materials/ V.W.P., respectively. From the same tables, conservation and information V.W.P. have the highest densities of J.V.M.; they are about 4.8 and 3.7 materials/ V.W.P. respectively. For these V.W.P., densities in the case of G.V.M. are 7.5 and 1.5 materials/ V.W.P. respectively.

From these densities, it is concluded that conservation web pages densely use both the G.V.M. and J.V.M., while academic web pages densely use the G.V.M. only.
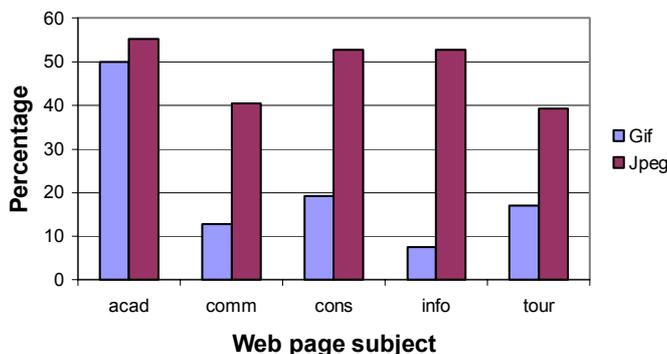

Figure-1 Percentages of numbers of G.V.M. and J.V.M. to all Gif files and all Jpeg files

Figure-1 shows the percentages of the numbers of G.V.M. and J.V.M. used in the downloaded V.W.P., to all the Gif and Jpeg files used in them, respectively. It is clearly noticed that there are big differences in percentage between the two cases in all the V.W.P. of the different categories or subjects, except the academic V.W.P… Figure-1 indicates that the total number of the Gif files contains small portion of G.V.M., while the total number of Jpeg files contains a big portion of J.V.M.

The reason is that the Gif files are densely used in the different V.W.P. as backgrounds, banners, headings, links, and logos, to visualize things other than H.U.S., while the Jpeg files are not densely used for all such usages.

Therefore, it is obvious that academic V.W.P. contain fewer backgrounds, banners, headings, links, or logos, which visualize things other than H.U.S...

3.3.3 Average sizes of visual materials

From Table-4, and Table-5, the total average G.V.M. size is about 33.5 kb/material, is bigger than that of other materials or file types. The biggest average G.V.M. sizes are 46.0 and 43.6 kb/material, in the case of the academic and the conservation V.W.P., respectively. The respective average sizes of the Gif files are 25.3 and 11.26 kb/file.

For the J.V.M., the biggest average sizes are 22.5 and 20.6 kb/material, in the case of the <u>academic</u> and the <u>commerce</u> V.W.P. respectively. The respective average sizes of the Jpeg files are about 20.6 and 15.8 kb/ file.

Web Page Subject File Type	Academic	Commerce	Conservation	Information	Tourism	Total
G.V.M	3263	99	1308	501	456	5627
All Gif Files	3593	638	1756	2555	1281	9823
J.V.M	1058	742	1734	3549	1116	8199
All Jpeg Files	1753	1407	2729	5739	1825	13453

Table-5 Total file sizes of the visual materials, all Gif file, and all Jpeg files

From the mentioned averages, it could be concluded that some V.W.P. use much more bigger sizes of G.V.M. than other V.W.P. do, because they may use wider dimensions and resolution ranges of the images, or they misuse the G.V.M. by visualizing full color or gray scale images. We checked these V.W.P. again to find out the reason. Few V.W.P. were found to use wider dimensions and resolution ranges of the images, others were found to misuse the G.V.M… That is why the average G.V.M. sizes differ much from all the other averages.

For the case of J.V.M., it is clear to conclude that all the V.W.P. use similar dimensions and resolution ranges of J.V.M. that is why all the average J.V.M. sizes are similar to each other.
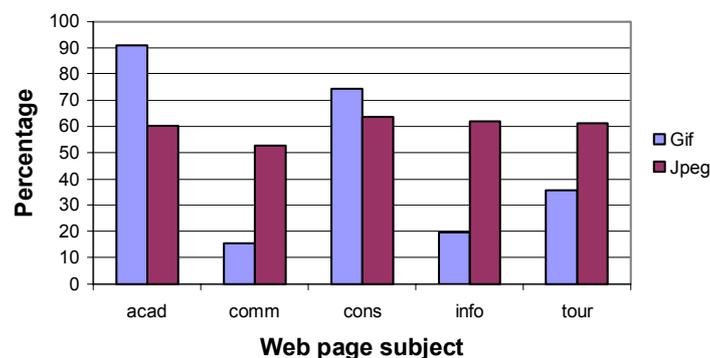

Figure-2 Percentages of total file sizes of G.V.M. and J.V.M. to total file sizes of all Gif files and all Jpeg files

This conclusion could also be declared from Figure-2. The big differences of percentages in the case of G.V.M. prove the big differences in G.V.M. sizes used in the different V.W.P. On the other hand, similarity of the percentages in the case of J.V.M. proves that the different V.W.P. use J.V.M. of similar sizes to each other.

3.3.4   Usages of visual materials

3.3.4.1   Usages, which do not include those of the "Page Body"

This part is about the usages of G.V.M. and J.V.M… Usages will be mentioned in this part do not include the usages of the "Page Body", which express the usage of the visual materials as main contents of the V.W.P. body.
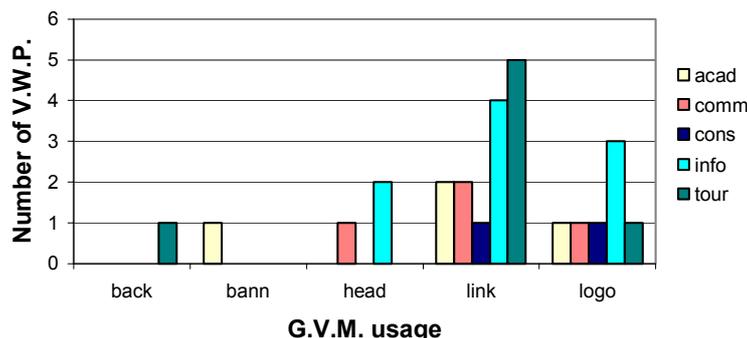

Figure-3 Number of V.W.P. according to G.V.M. usage

From Figure-3, and Table-3, it is clear that G.V.M. were not used regularly on V.W.P. to visualize H.U.S. as backgrounds, banners, headings, links, or logos. The highest percentages of V.W.P. found to use G.V.M. for these usages are 38.46% and 33.33% in the <u>tourism</u> and <u>commerce</u> V.W.P. respectively. These G.V.M. were used as links in both cases.

From Figure-4, and Table-3, the same result can be derived regarding J.V.M... The highest percentages of V.W.P. found to use J.V.M. for these usages are 25% and 24.56% in the <u>commerce</u> and <u>information</u> V.W.P. respectively. These J.V.M. were used as links.

From the two figures, both G.V.M. and J.V.M. are not used regularly for these usages. Moreover, V.W.P. tend to use G.V.M. more than to use J.V.M. to visualize historic urban sites for these usages, especially as links.
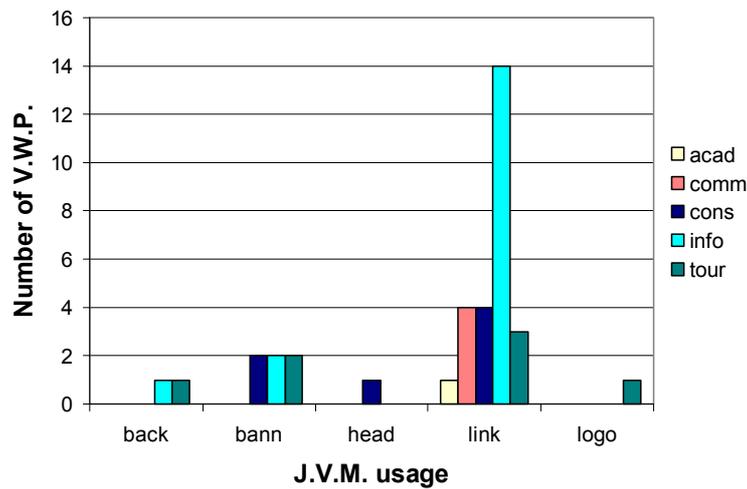
Figure-4 Number of V.W.P. according to J.V.M. usage

3.3.4.2 Usages of the "Page Body"

This part is about the usage of G.V.M. and J.V.M. as visual materials in the main body of the V.W.P... Figure-5 shows numbers of V.W.P. of all categories or subjects, which use G.V.M. and J.V.M. in their page body. From Figure-5, all V.W.P. tend to use J.V.M. more than to use G.V.M. to visualize H.U.S. in their page body. This result harmonizes with a previous result, which indicates that J.V.M. are more widespread than G.V.M. are.
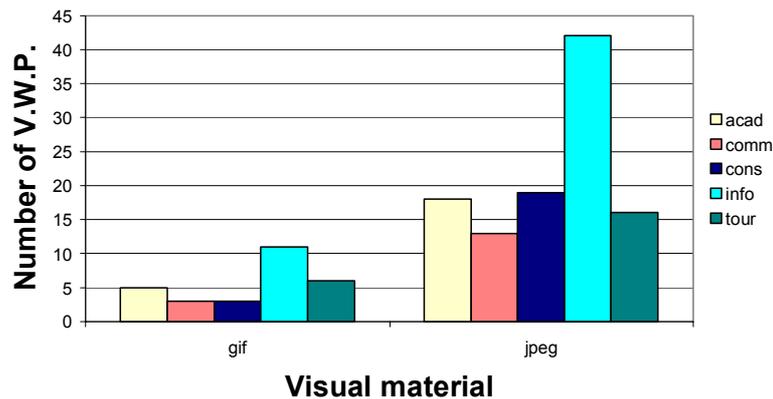

Figure-5 Number of V.W.P. according to the usage of visual materials in the "Page Body"

Table-6 shows the densities of G.V.M. and J.V.M. (material/ V.W.P.), and the ratios between these densities, which are used in the page body of the V.W.P. according to the categories or the subjects of these V.W.P.

Web Page Subject / File Type	Academic	Commerce	Conservation	Information	Tourism
G.V.M.	13	1	9.3	1.7	3.3
J.V.M.	2.5	1.8	5	2.2	2.75
G.V.M./ J.V.M.	5.20	0.56	1.86	0.77	1.20

Table-6 Densities of visual materials per one V.W.P. and the ratios between these densities

From Table-6, there are big differences between the densities of both the G.V.M and the J.V.M in all the different categories or subjects. Moreover, there are big differences in the ratios between these densities. To find out the reason, the main data sheet was checked again; some V.W.P. were found to use much bigger numbers of visual materials in their page body than other V.W.P. do, this fact is true for both G.V.M. and J.V.M.

Web Page Subject / File Type	Academic	Commerce	Conservation	Information	Tourism
G.V.M.	49.1	19.3	46	19.3	17.4
J.V.M.	22.8	25.7	15.3	29.9	20.9
G.V.M./ J.V.M.	2.15	0.75	3.01	0.65	0.83

Table-7 Average sizes of the visual materials (kb/ material) and the ratios between these sizes

Table-7 shows the average size of G.V.M. and J.V.M. used in the page body of the different categories or subject of V.W.P… From Table-7, there are big differences between average sizes of G.V.M. and J.V.M. and between those of G.V.M. themselves and of

J.V.M. themselves. Average sizes of G.V.M. could be classified into two groups; first group includes average sizes for both <u>academic</u> and <u>conservation</u> pages (49.1, 46.0 kb/material). Second group includes the remaining ones (17.4, 19.3, 19.3 kb/material). A gap in values was found between the two groups, and this gap and these differences were noticed to be because of the misuse of G.V.M. in some V.W.P. to visualize color or gray scale images.

The average sizes of J.V.M. could be classified into three groups, first group (15.3 kb/material), second group (29.9 kb/material), and third group (20.9, 22.8, 25.7 kb/material). Although the slight gaps between these groups, they seem to be harmonious. The reason behind these differences is the slight differences of the dimensions and resolutions used in every image.

3.3.5   Contents of visual materials

There are different elements of H.U.S. could be visualized in the visual materials. Figure-6 and Figure-7 show numbers of V.W.P. that use G.V.M. and J.V.M. respectively, which visualize the different elements of the H.U.S.
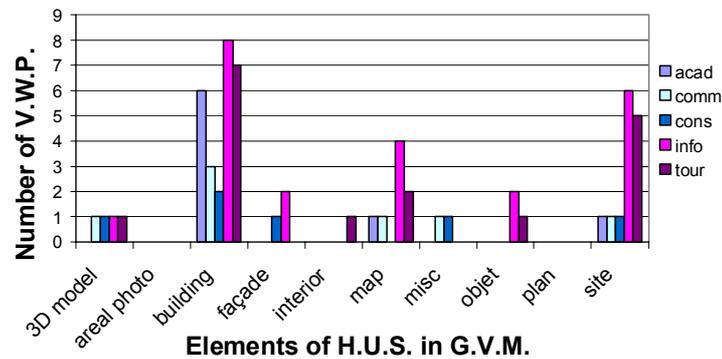

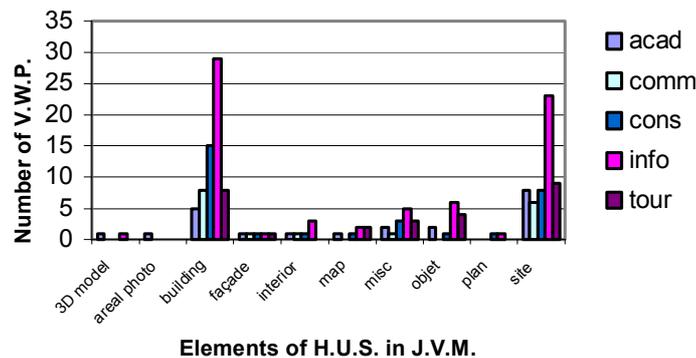Figure-6 Number of V.W.P according to the contents of H.U.S. in G.V.M.

Figure-7 Number of V.W.P according to the contents of H.U.S. in J.V.M.

From Figure-6 and Figure-7, the most visualized elements using both G.V.M. and J.V.M. are "building" (Single building) and "site" (urban site). These elements mostly visualized in the <u>information</u> and <u>tourism</u> V.W.P... Other elements were found to be seldom visualized on V.W.P. using the both types, G.V.M. and J.V.M... Buildings and sites were visualized as G.V.M. on few web pages; instead, J.V.M. is used to visualize them on the majority of V.W.P.
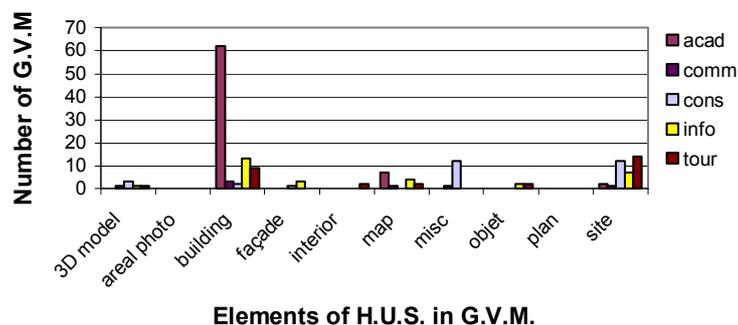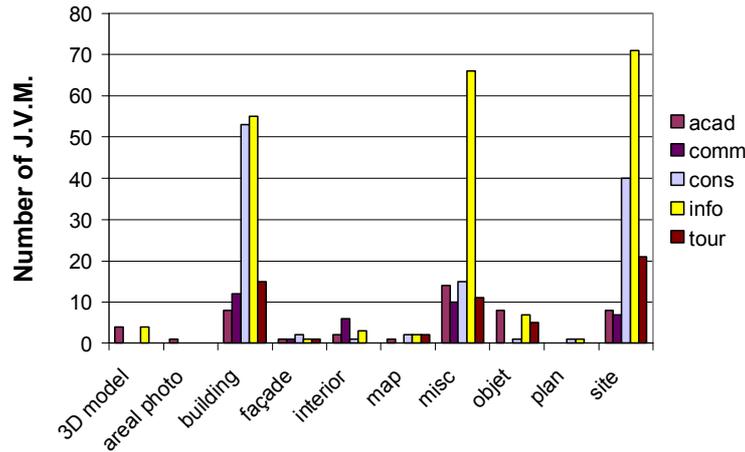

Figure-8 Number of G.V.M. according to the contents of H.U.S. in G.V.M.

Figure-8 and Figure-9 show the numbers of G.V.M. and J.V.M. respectively, which were used to visualize the different elements of H.U.S. on V.W.P. of the different categories or subjects. From Figure-8, it was found that <u>academic</u> V.W.P. tend to use G.V.M. to visualize "building" more than other elements, and more than other V.W.P. do.

From Figure-9, it was found that <u>conservation</u> and <u>information</u> V.W.P. tend to use J.V.M. to visualize "building" and "site" more than other elements, and more than other V.W.P. do.

Elements of H.U.S. in J.V.M.

Figure-9 Number of J.V.M. according to the contents of H.U.S. in J.V.M.

3.3.6   Correlation between visual materials

The following part concerns with the correlated visual materials on the same V.W.P., as well as the types of correlations connecting the visualized elements of the H.U.S., which were visualized in these correlated visual materials. Visualizing any element of H.U.S. using more than one visual material increases the ability of the people to understand and to get more information about these elements, through understanding these visual materials and the correlations between them. All the visual materials on every V.W.P. were compared with each other to find out the correlated ones, and the types of correlations between the visualized elements. Table-8 summarizes the results.

Web Page Subject			Academic	Commerce	Conservation	Information	Tourism
Visual	Correlation	Total Numbers of:					
G.V.M.	angle	V.W.P	1	1	0	1	1
		Visual Material	2	2	0	2	2
	detail	V.W.P	1	0	0	0	0
		Visual Material	7	0	0	0	0
	projection	V.W.P	0	0	0	0	0
		Visual Material	0	0	0	0	0
J.V.M.	angle	V.W.P	1	2	2	5	2
		Visual Material	5	9	16	15	4
	detail	V.W.P	0	0	0	0	0
		Visual Material	0	0	0	0	0
	projection	V W P	0	0	1	0	0
		Visual Material	0	0	4	0	0

Table-8 Numbers of V.W.P. and visual materials according to type of correlation between elements

From Table-8, V.W.P., which tend to use J.V.M. in correlations, are more than those, which tend to use G.V.M. in correlations. These V.W.P. use larger number of J.V.M. in one correlation than the number of G.V.M. in one correlation, which the other V.W.P. use. Moreover, the most used correlation to connect the visualized elements of H.U.S. was the "angle" correlation. It means that the correlated visual materials visualize the same element of the H.U.S. from different angles. In addition, it is obvious that all the visual materials in correlation, which were used in the conservation V.W.P. are J.V.M., no G.V.M. found in correlation in those V.W.P.

4   CONCLUSIONS

At the beginning, it was hypothesized that different types of visual materials of different techniques would be used in visualizing Historic Urban Sites (H.U.S.) on the different web pages on the World Wide Web. Nevertheless, the results declared that the only technique was found to be used for that is the still images of Jpeg and Gif file formats.

Moreover, we hypothesized that there would be typical applied standards in the visualizing process for using the visual materials to visualize the H.U.S. on the web pages of the different categories. Nevertheless, the results declared that we could found some indistinct features of limited commonness between the visual materials on the different web pages. These features could not lead us to distinguish any typical applied standards in the process of visualizing H.U.S. In addition, these features indicate, in some cases, definite deficiencies in the information supplied using those visual materials.

For instance, we could hardly find some weak threads connecting some of the features of the visual materials in some different web pages like in conservation web pages and in academic web pages. However, these features could not lead us to distinguish any typical applied standards.

Moreover, some conclusions could be stated as examples of the indistinct features of limited commonness, as follows:

- All the V.W.P. use similar dimensions and resolution ranges of J.V.M... That is why all the average J.V.M. sizes are similar to each other.

- Both G.V.M. and J.V.M. were not used regularly as backgrounds, banners, headings, links, or logos. Moreover, V.W.P. tend to use G.V.M. more than to use J.V.M. to visualize historic urban sites for these usages, especially as links.

- All V.W.P. tend to use J.V.M. more than to use G.V.M. to visualize H.U.S. in their page body. This result harmonizes with a previous result, which indicates that J.V.M. are more widespread than G.V.M. are.

- Buildings and sites were visualized as G.V.M. on few web pages; instead, J.V.M. is used to visualize them on the majority of V.W.P.

- The V.W.P. use larger number of J.V.M. in one correlation than the number of G.V.M. in one correlation. Moreover, the most used correlation to connect the visualized elements of H.U.S. was the "angle" correlation.

Depending on these results and conclusions, we can state here that the process of visualizing H.U.S. on the web, using visual materials of such indistinct features and limited commonness, has no typical applied standards. Thus, this process of visualizing H.U.S. on the web would have limited efficiencies in supplying sufficient information regarding these H.U.S. to the people.

Moreover, this insufficient information would be of limited benefits to the people in stepping them to the stage of having the sufficient knowledge regarding the worldwide H.U.S., which assure their participation in protecting and conserving them over as long period of time as possible.

5   DISCUSSIONS

The results of this study lead us to suggest establishing a non-profit organization(s) including web professionals and technicians, architecture conservationists, and artists, to: 1) improve the techniques used to visualize the Historic Urban Sites on the web. 2) Study, examine, and publish typical strategies and standard application methods on which any web page of any category wants to visualize any of the H.U.S. should depend and follow. 3) Observe the web to guide and help these web pages' publishers, who have not the sufficient qualities to apply such strategies and methods. 4) Insure sufficient integrities between the web pages visualizing H.U.S., by connecting them together and discussing all the technical matters in a collaborative manner.

6   NOTES

The downloading process, as well as the searching process were repeated on Wednesday, September 25th, 2002 and would be repeated annually to study the changes of the results over the time.

7   REFERENCES

BATTY, M.: Planning Support Systems, Models and Visualization Tools, Brail, R. K., Klosterman, R. E. (Eds.), Center for Urban Policy Research Press, Redland, 2001.
BENFORD, S., et al.: VR-VIBE: A Virtual Environment for Co-operative Information Retrieval, Proc. Eurographics'95, 1995.
BERALDIN, J., et al.: Establishing a Digital 3D Imaging Laboratory for Heritage Applications: First Trials, published in Proceedings of the Italy-Canada 2001 Workshop of on 3D Digital Imaging and Modeling Applications, Padova, Italy, April 3–4, 2001.
BURGE, E.: Learning in computer conferenced contexts: The learner's perspective, Journal of Distance Education, 9 (1), 19-43, 1994.
CAMPBELL, L., et al.: Standards for Imaging Projects, Electronic Imaging and the Visual Arts (EVA) Conference, The Museum of Modern Art, New York, May 21, 1999.
CHRIS, L.: Not just decoration: Quality graphics for the web, Fourth International World Wide Web Conference, Boston, 1995.
ERIC, G., et al.: Using Web Structure for Classifying and Describing Web Pages, International World Wide Web Conference, Honolulu, Hawaii, May 7-11, 2002
FEILDEN, B.: Conservation of Historic Buildings, Butter Worth, London, (1982)
INGRAM, R., et al.: Building Virtual Cities: applying urban planning principles to the design of virtual environments, VRST'96, 1996.
JEPSON, W., et al.: Virtual Modelling of Urban Environments, Presence, Tele-operators and Virtual Environments, Vol. 5, No. 1, MIT Press, 1996.
KRYGIER, J.: Public Participation Visualization, paper presented at the 1998 Association of American Geographers Meeting, Boston MA. (1998)
LEE, A. and Rajesh, V.: VRML for urban visualization, Winter Simulation Conference, 1454-1459, 1999.
MAIC, M. and Thomas, S.: Visualising Ancient Architecture using Animating Line Drawings, citeseer.nj.nec.com/424263.html, 1998.
MASUCH, M., et al.: Virtual Reconstruction of Medieval Architecture, Eurographics'99, Sept 1999.
MICHAEL, P.: Competitive strategy, Harvard Business School Press, 1986.
MICHAEL, P.: What is strategy?, Harvard Business Review Nov-Dec 1996.
MICHEL, R.: Strategy: Pure and Simple, McGraw-Hill, 1993.
MILDRED, F.: New Life for Old Buildings, McGraw Hill, New York, (1982)
SCAIFE, M. and Rogers, Y.: External cognition: How do graphical representations work?, International Journal of Human-Computer Studies 45, 185-213. 1996.
OGASAWARA, H.: What is Visual? Toward the Reconstruction of the Visual Literacy Concept. The Journal of Visual Literacy, 18 (1), 111-120, (1998).
PAIVIO, A., et al.: Why are pictures easier to recall than words?, Psychonomic Science, 11, 137-138, 1968.
REINHART, C.: Reflections on learning and teaching at a course at a distance: The America in the Sixties course, Journal of Asynchronous Learning Networks, 2 (1), 1998.
SCHODL, R. et al.: Video textures, In Proceedings of ACM SIGGRAPH 00, pages 489-498, 2000.
STEVE, B. and Lennart, E.: A Spatial Model of Interaction in Large Virtual Environments, http://citeseer.nj.nec.com/benford93spatial.html, 1993.
STEVE, L. and Lee, C.: Searching the World Wide Web, Science, vol. 280, no. 5360, 98-100, 1998
THALMANN, D., et al.: Virtual Human Life Simulation and Database: Why and How, DANTE'99, p 63-71, Tokyo, Japan, Nov 1999.
THOMAS, S., et al.: Visualizing Knowledge about Virtual Reconstructions, citeseer.nj.nec.com/515774.html
TOBIAS, I., et al.: 3D Illustrative Effects for Animating Line Drawings, citeseer.nj.nec.com/isenberg00illustrative.html, 2000.