EFFICIENCIES OF UNIVERSITY ONLINE SITE PLANS

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ABSTRACT

This paper describes the realization of a university online site plan (OSP), solely based on hypertext markup language (HTML), cascading style sheets (CSS), and Java Script (JS). In addition, all necessary software programs for this realization were freeware. The result is a simple, and efficient geographic information system (GIS), providing a better spatial orientation on the campus. The question is raised, whether this system is more efficient than other university OSP's.

1. INTRODUCTION

The background for the creation of this online site plan (OSP) is an undergraduate project at Bauhaus-Universität Weimar, Germany. This university provides maps with all important locations for students and visitors. However, the spatial orientation is sometimes difficult. This is because most university buildings are scattered throughout the city. Additionally, the numeration of lecture rooms is here and there quite complicated, owing to a complex layout of some buildings.

To get an impression on already existing solutions, a short survey of some university websites was undertaken. The chosen institutions were the ten biggest public universities in the USA and in Germany, by the number of enrolments in fall 2008. Most universities provide general maps in PDF format, many offer an additional dynamic map system, in the USA this is very often Google Maps. Some universities, especially in Germany, developed their own dynamic map system and do not rely on a big private company. Only two institutions offered a detailed spatial location of single rooms, one in the form of architectural drawings in PDF format, and the other, the TU Dresden in Germany, in a dynamic map system. Their system, called the Campus Navigator [1], is still in development. However, their approach is similar to the system, which is presented here, just on a more sophisticated level with dynamic maps and even with a routing function.

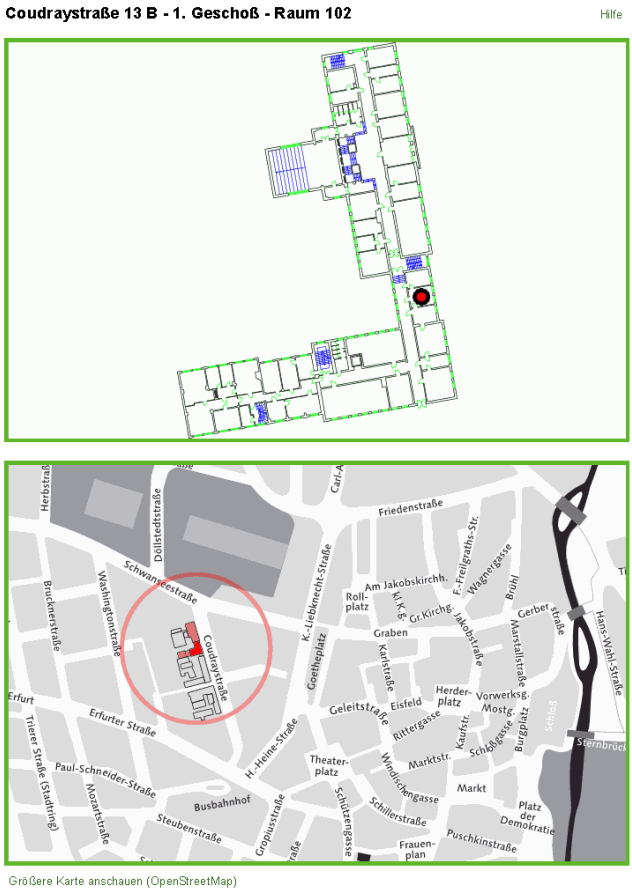

Fig. 1. Screenshot of the online site plan.

To evaluate the efficiency of a system, one has to determine its benefits and its costs. In the case of an OSP the benefit is foremost to get to know a location and how to get there. The costs come in many forms, development and maintenance, but also computational and bandwidth resources. Latter are usually not regarded with high interest, but their environmental impacts should not be underestimated, since they require large amounts of energy.

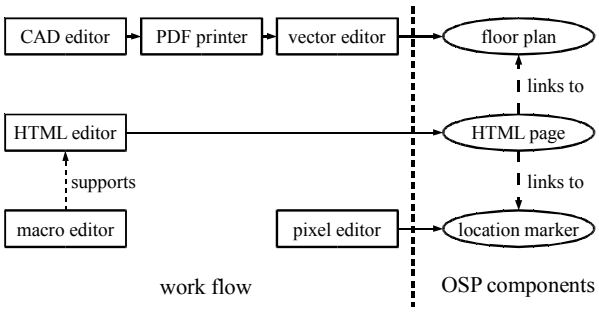

Fig. 2. Simplified model of the workflow and the resulting OSP.

Although some believe that the growing Internet use will finally reduce the gross electricity demand due to a higher economic efficiency [2]; others point out that the overall environmental impacts are not fully understood [3]. In any case, it would be wise not only to concentrate on the benefits of a system, but also on all its costs. The surveyed map systems helped all, more or less, to find a location. The big differences were in the development costs and the bandwidth demand. Former were not acquired, but it is to estimate that they were much higher than for the presented system. The bandwidth demand was evaluated with the transferred data for displaying one OSP site. It was never lower than for the presented OSP and reached few Megabytes for systems with maps only in PDF format.

2. LIMITATIONS AND REQUIREMENTS

The limitation of used techniques to HTML, CSS, and JS were due to the knowledge base of the project team and limited time. On the other side, the composition of the system should be easily comprehensible, so that change and further development by others is possible. The use of only these basic techniques supported this target, since they are quite easy to learn. All work processes in the creation of the OSP were done with freeware, as listed in Table 1. One could distinguish between free available and open source software [10], but for this project it was just important to eliminate costs for proprietary programs. For further development it was assumed that the used programs, or newly ones with similar functionality will still be available.

3. WORK FLOW AND SYSTEM DESCRIPTION

Current architectural drawings of each university building and some city maps are the geographical data base for the OSP. They were converted to compressed pixel graphics, which allow reasonable readability, but need little storage space, and therefore little bandwidth. The information about the locations of buildings and rooms are stored in JS

Table 1. Used programs for building the OSP.

Program type	Name	Source
CAD editor	Solid Edge Free 2D	Siemens [4]
PDF printer	Free PDF printer	Bullzip [5]
vector editor	Inkscape	Inkscape [6]
pixel editor	GIMP 2	GIMP [7]
HTML editor	phase 5	hdb [8]
macro editor	Makro	hintenaus [9]

embedded HTML pages. Each HTML page holds the locations of one building and all its rooms. This makes it possible to replace or improve the system, building by building, if necessary. The fact that all information is contained in one HTML page, allows everyone to understand the system and to use it as a template for other projects. Therefore it can be seen as a kind of an open source project, which could help to promote further development.

The user, who seeks a specific building or room, can use a search mask and is then led to a page where a city map and a floor plan are combined with graphical location markers (round circles and dots), as can be seen in Fig. 1. It is also possible to link a room directly from another site, for example, a professor could link his own office on his website. For the case, that the offered section of the city map is not satisfactory, a link to an open source map service is provided [11].

The workflow for the creation of the OSP has been outlined in Fig. 2. The conversion of the architectural drawings starts in the CAD editor, were all unnecessary drawing layers are turned off. The editing with the vector graphic editor was only possible after the conversion from CAD to PDF format. The location markers, in principle just small graphics which are put on top of the maps and floor plans, were made with a pixel graphic editor. In the HTML editor all the layout (HTML and CSS) of the OSP pages was written, as well as the JS code, which contains the locations of every room. The macro editor provided some useful keyboard macros to cope with shortcomings of the HTML editor. The room locations are simple x-y-coordinates of the floor plan graphics. They where taken with the image map tool of the HTML editor and then converted with the macro editor to fit into the JS code.

The decisions for this workflow and the necessary programs were not based on a wide research for the best possible options. It was more a quick look for things that work. Therefore the shown approach stands as an example for one working system, but probably not for the most efficient one.

4. OUTCOME

The OSP is not yet available for the entire campus and not introduced as a university wide service, therefore its overall usefulness is hard to estimate. However, till today the system represents eight buildings with 459 rooms, which uses only half a Megabyte of web space, including graphics. The working time to build the OSP was only around 20 hours, not including the time for establishing the working process. The data volume of one OSP page, as displayed in Fig. 1, averages around 40 Kilobyte. This is quite little compared to other websites dealing with spatial orientation in universities. However, many universities offer only maps with relevant campus buildings, in contrary this system shows the user the exact location of a single room within a whole city. This fact alone makes it difficult to compare the ratio between given information and used data.

To answer the question whether this system is more efficient than others, a more detailed analysis would be necessary. However, this system can be considered as a very efficient one, by comparing the amount of provided information with its development and operating costs.

5. CONCLUSION

With very limited resources, and only with the use of free software, it was possible to create a working online site plan. The realization of such a system could be done with more sophisticated techniques and then it could probably be more versatile and even more user friendly. But all this would have its price, higher development and maintenance costs, and very likely higher bandwidth demand. The question remains whether these costs would justify the benefits and additionally; how valuable would be these benefits for the user? The presented project stands as an example for a useful application with very modest computational requirements. It is an example against overloaded internet applications, which just look fancy but have no additional value, while wasting resources, which could be needed for better uses.

6. REFERENCES

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