

E-Voting and the architecture of virtual space

Anthoula Maidou, Hariton M. Polatoglou

Department of Architecture
Aristotle University of Thessaloniki
Gr 54124 Thessaloniki, GREECE
anthoula_maidou@yahoo.gr

Physics Department
Aristotle University of Thessaloniki
Gr 54124 Thessaloniki, GREECE
hariton@auth.gr

Abstract: One of the basic principles of architecture is that of the relation between function and form. It is a common fact that in most cases form reveals or refers to function. Thus by observing the form of a building one can envisage its function. Although the forms are different in different periods of history for reasons like the use of certain building materials and building methods, the specific socioeconomic conditions and the type of governance, one can find very few exceptions to the rule. The prevailing type of governance today is democracy and we are in a stage of dramatic change in the way people interact, get information and decide what to do concerning governance. This is mainly due to the revolutionary change in the communication, processing, representation and availability of information brought by the tremendous progress in the field of informatics. The representation is not restricted to some material form but it can take also an electronic form, existing in virtual space. Therefore there is great need for an architecture of the virtual space and even more important to establish a relation between form and function in the new environment. In this work we propose some principles and present some virtual space representations appropriate for e-democracy and e-voting.

1 Introduction

Since the early days of social organization, people had arranged various social functions in space and time and represented them by different forms. Houses had always different forms, than the places for public gatherings, for worship, for transportation, and for governance. This specialization is the result of the effort to represent function by form, since a building is much more than just a shelter - it is a bearer of ideas and symbols, reflecting the society that built it at the specific time. Of course, such form-function relation was constrained by the building materials, methods of construction, the external environment, and the social conscience, but Architecture had always expressed in built form the cosmological knowledge of each historical period [No96], at least until the nineteenth century. As the progress was slow historically, we could find only a small number of different representations of functions through form.

In the nineteenth century architecture could not express the edge of knowledge any longer. This was due to the invention of non-Euclidean geometry on the one hand, which could not be reproduced in built using the available building materials and techniques, and on the other hand was the reproducibility and ubiquity of books, which were much more powerful means of propagation of knowledge than architecture.

Presently we experience a revolution in the way we can communicate, process, access and represent information. This is due to the new information technologies. Storage devices enable the storing of huge amounts of data, accessible from everywhere around the globe. Digital representations, using virtual reality techniques, have led to the digitalization of architecture, offering a new experimentation field, free from materials, where new space-time reference systems can be applied. Marcos Novak, virtual architect and artist, introduced the word “transArchitecture” to describe current architecture, which has a twofold character: within cyberspace it exists as liquid architecture that is transmitted across the global information networks, while within physical space it exists as an invisible electronic double superimposed on our material world [No96]. Architecture has become transmissible, and thus is placed on a virtual shelf, available to be put to use on demand. Furthermore, form and function can be differently interrelated in virtual space. By changing the relation between form and function and decoupling reality from actuality, “we can vectorized significance into series of independent dimensions. We assemble what we need by picking and choosing among endless arrays of options” [Nov96]. transArchitecture establishes the lost connection between knowledge and architectonic exploration. “It brings knowledge ... back into the realm of poetic experience” [No96].

Furthermore, the public places have lost their initial character as places for the exchange of ideas and communication [Mi95], while the internet and its easy accessibility, has given to everyone the ability to communicate his/her ideas with everyone else on the globe. The new communication technologies affect also the way political decisions are taken. E-voting is a new way of voting and is currently understood as a way to use computers at poll stations, to enable a correct and immediate election/poll result, or is considered as a novel way of voting remotely using the internet. Among the two types of e-voting the most promising and interesting seems the second one, although there are many problems to be solved concerning security issues, etc. E-voting through the internet is the most democratic way to let everyone take part at the decisions [KS03, SM03, TG03, WC02], since even older, ill or disabled people could take frequent and active part in the decision process. Although this is innovative, e-voting can and should offer much more than an opportunity to remote voting. It should offer information on the event, an agenda, on what is programmed to be tackled in the future, and direct democracy, where everyone can take part in the discussion and the decision. How and why this should be done will be analyzed in more detail below.

2 Method

In this work we have in mind e-voting with the use of the internet, when referring to this term.

2.1. e-voting environment: theoretical background

Current technological achievements enable the storing of enormous amounts of information and the access to it from everywhere on the globe. Nonetheless, it can cost endless hours to go through some of the available information, find the relevant topics and filter the information of interest to each subject. E-voting sites should be in action a sufficient time before the voting date, offering complete and detailed information on the subject in question. Furthermore, since information should be as representative as possible, everyone, citizen or organizations should have the opportunity to add his/her/their opinion on the subject at this site, and everyone should have access to all information, which should be stored in all possible formats, as texts, sound, picture, video format. It is reminiscent of the Ancient Agora, the market place of ancient Greek cities, but in addition the place for the exchange of views. Furthermore, everybody has to be able to be informed on all available opinions, either reading them or hearing them. Such a dynamic environment, where someone can also add an opinion could attract young voters. This is important in order to use the abilities new technology offers, namely direct democracy.

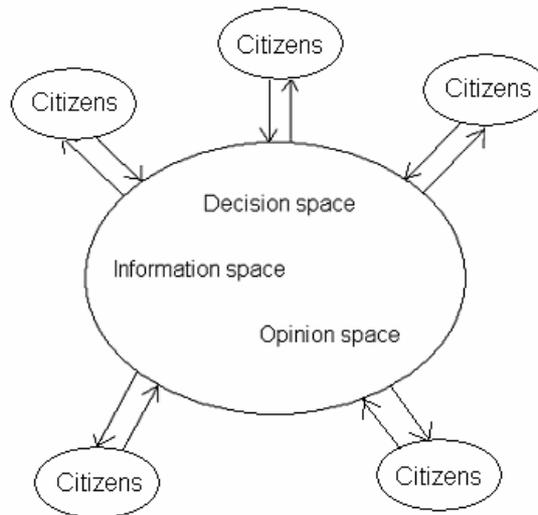


Figure 3: A many to many interaction of citizens with the decision process

In this way the scheme of the spaces/functions an e-voting site has to include can schematically be depicted in Figure 1. The information space is the place, where information can be gained. The opinion space is very important in order to obtain a democratic voting. Although it seems at a first glance that the “opinion space” could become too large to be useful, this is not the case, since on a specific subject only certain

distinguishable ideas can be expressed – if for example opinion A hasn't covered some matters, someone could add an opinion B to cover them, and so on. Finally, at the voting day, the voting place will also be accessible for the e-voting process, completing in this way the process of gathering information, exchanging information, and voting.

Furthermore, the authorities, that organize voting processes, should put on the web an agenda, where citizens can be informed on subjects to be discussed in the near future and be able to contribute to it.

2.3 Virtual space

The space we produce though the computer is virtual, it exist only as a digital representation, as a standing-reserve. It is immaterial. Furthermore, it doesn't obey physical laws, unless it is programmed to do. Neither do the restrictions we have as human beings, such as our dimensions and abilities apply necessarily to virtual space - we can “see” a large building from any height, walk through walls, jump from one place to another. Humankind has constructed a new kind of space.

The experience of a new kind of space isn't something novel. Since the implementation of the telegraph and later on the telephone and television, humankind is experiencing a new kind of perception, the “perception at a distance”, or telesthesia [Mc94]. This experience is perceived as real, like the real world experience - it differs only in the fact that things are not bounded by the rules of proximity. Virtual space is also experienced as a real space - we use virtual space to get information on any subject, read the news, buy, visit libraries, museums, listen to music, etc. [Mi96]. Furthermore, the terms we use to refer to virtual space has a close analogy to the physical world: we talk about “virtual communities”, “homepages” or “sites” that have “addresses”, etc.

Virtual geographers study the geographies of the virtual space [DK01] using geographical metaphors. Additionally, we talk about the law of virtual space, protection of privacy, etc. Virtual space is perceived as a notional mechanism beyond the real world. Spatiality takes a new dimension; it can be electronically constructed and experienced. Through our memory we transform these experiences into possibly experienced realities. Virtual space is an extension of real space and can thus be analyzed in spatial terms.

2.2 E-voting interfaces

The main question we wanted to examine is how a successful human computer interface should be built, in order to attract people of various age groups, with a wide range of skills and abilities, and different degrees of voting experience, to take part at an election, or referendum. On the one hand we have special groups that are not familiar with the use of computers, and on the other we have the younger ages, which are familiar with computers, but show a minor interest in politics.

The question remains on how to communicate information, and how this information is correctly understood, in order for everyone to know what the voting is about, and also to give the impression of the importance this voting has. Originally, computers were designed by engineers for engineers – and little attention had to be paid to the interface. Later on, the use of computers by a broader, non-specialized user group necessitated the use of interfaces to enable them ease of use, correct understanding and interaction with the computer. The most important aspect in the Human Computer Interface design is to find efficient ways to design understandable electronic messages [No88, Sh98]. At this point we could take advantage of the achievements of virtual architecture.

In order to overcome these problems we propose that the appearance of the site should not be unique. As in electronic games, the visitors/citizens should be able to change the interface, choosing among various interfaces, in order to build their own environment, according to their taste. In this way people get familiarized with the voting environment.

A first step towards this direction should be the construction of more environments with various complexity and ease of use, which should be available to the visitor of the site, ranging from simple text sites, which should also be the default version of the site, to more complicate 3D graphics sites, to sites containing video and sound, or even navigable environments. At a second stage objects will be introduced, in a form similar to that of the avatars used in computer games, in order to invoke the feeling of their electronically projected self in this electronic environment, where interactions among the avatars (other visitors) could be possible. For example in the “Information Space” the various opinions could appear as avatars expressing their thoughts. A discussion group could also be organized as a place for the exchange of opinions. This could, in the future get the form of discussions among avatars. Such environments would specially invite the younger ages to take a look at the site, organize the interface according to their taste, get familiar with the structure of the site, and most important with the issue in question. In this way they will form an opinion, and probably take part at the e-voting process.

2.4 Virtual space

As to the interfaces and the navigation techniques, we used:

- 1.) A simple text and buttons interface in all spaces. Framed text displays the information, and links to the opinions, and the voting options. This is also the default interface.
- 2.) A 2d, or 3d graphics interface, which is used as a background. The actual interface remains about the same as in the first case.
- 3.) Video and interactive 3d graphics.
- 4.) Interactive navigable interfaces using VRML versions of the interfaces and graphical links.

3 Results

3.1 Presentation of some interfaces

Below we will give some examples. Because of the restricted space we will present only three interfaces. Of course, the acceptance of a virtual environment is not necessary – someone can also interact with the e-voting site using a default textual environment.

3.1.1 First example:

A scene reminding an ancient city market place serves as our first example. Picture 1 presents a part of it. In the center is a round temple, the tholos, with its altar formed as a multi-screen information place. It serves as the place, where information can be gained and also as the place for the exchange of opinions. Picture 2 shows a closer look at the information and opinion place. The upper section of the cylinder of the multi-screen contains the information space, while at the sides the opinions are displayed.



Picture 1: The first example displays an ancient marked (agora) interface. Here we present the part showing the “vouleftirion”(parliament) and the “tholos”(round temple).



Picture 2: The altar in the “Tholos” is a multiscreen projector. The altar plays the role of the information and opinion space.

Finally, at the voting date, the information and opinion space transforms into a voting-box, as presented in picture3.



Picture 3: At the e-voting day the altar transforms into a “kalpi” – a ballot-box.

3.1.2 Second example: a meeting room

A large meeting table refers to discussion. The various opinions may be displayed as sheets of paper on the table, or as the human figures. Picture 4 presents such a room.

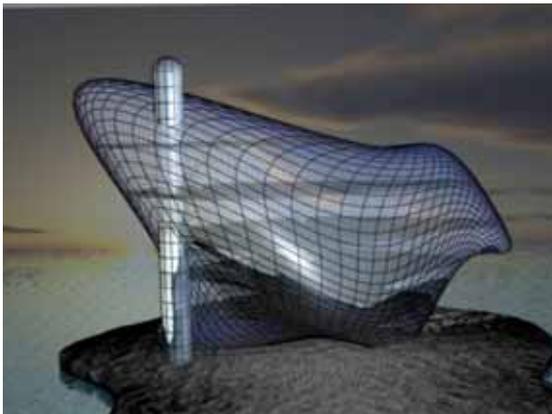


Picture 4: Second interface example, where the interface is a meeting room.

When it comes to voting the table transforms to a voting screen.

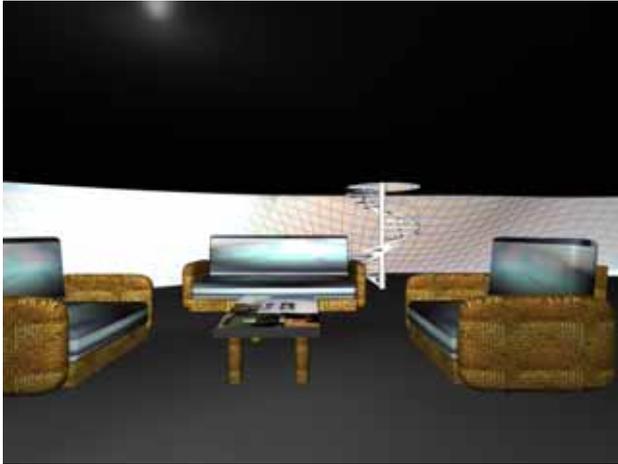
3.1.3 Third example:

Here the interface becomes an imaginary building, which refers to future environments.



Picture 5: The table of picture 1 transforms into an e-voting screen.

Someone enters the building and navigates in this VRML environment to gather information and express, read, or discuss opinions. An instance of how this could look is presented in picture 6.



Picture 6: An instance of the navigation in the information and opinion space

3.2 Testing results

We tested the interfaces on 16 persons, 9 women and 7 men, of various age groups¹. With the help of a questionnaire, which was completed after the testing of the different interfaces, we found that both sexes and all age groups had no difficulty, at least after a short time they spend to get familiar with the interfaces. Some women and men of middle age group and all higher age groups participants preferred the simple text environment (about 35%) or the text and graphics interfaces (about 30%) and the video and graphics environment (about 35%), while the younger age groups were more attracted by the video and 3d graphics interface and the VRML navigate-able interface (about 50% for each).

In addition, more men (about 70%) were willing to spend more time reading different opinions, while a larger part of the women (about 65%) would prefer discussion groups.

Our findings showed that it is necessary to allow people to get familiar with the e-voting process through an earlier activation of the voting-site in the form of an information and opinion space.

¹ From the 9 women: 4 were under 30, 3 were between 30 and 55, and 2 over 55, while from the men 4 were under 30, 2 between 30 and 55, and 1 over 55.

Furthermore, about 60% of the younger age group admitted that they are in general not interested in politics and in community issues, but they would like to take part at e-voting processes, provided they could find objective information on the subject in question.

4 Conclusions

Current technological evolutions have changed the way we live, interact, communicate, learn, play get information, etc. Virtual reality techniques offer a new ground to architecture to take up expressing current knowledge and visualize data and information. The technological evolutions in accordance with the virtual reality techniques can be applied by governance in order to access the ideal of direct democracy. E-voting is the best way to allow citizens to express their opinion on major decisions of the political life of a community. Our findings showed that it is possible to attract younger voters, and encourage groups unfamiliar in the use of computers to participate.

References

- [DK01] Dodge, M.; Kitchin R.: An Atlas of Cyberspace, Addison Wesley, 2001.
- [KS03] Kampen, J.K.; Snijkers, K. : E-democracy - A critical evaluation of the ultimate e-dream. Social Science Computer Review. 21 (4): 491-496, 2003.
- [Mc94] McKenzie, W.: Virtual Geography, Indiana University Press, 1994.
- [Mi95] Mitchell, D.: The end of public space- Peoples Park, Definitions of the Public and Democracy, Annals of the Assosiation of American Geographers 85 (1): 108-133, 1995.
- [Mi96] Mitchell, W.: City of Bits. MIT Press, 1996.
- [No96] Novak M.: transArchitecture. 1996 http://www.mat.ucsb.edu/~marcos/Centrifuge_Site/MainFrameSet.html, as retrieved on 19.02.2004.
- [No88] Norman, D.: The design of everyday things. New York: Doubleday, 1988.
- [Sh98] Shneiderman, B.: Designing the user interface: Strategies for effective human-computer interaction (3rd ed.). Addison-Wesley Publishing, Reading, 1998.
- [SM03] Smith, E.,; Macintosh, A.: E-voting: Powerful symbol of E-democracy. Electronic Government, Proceedings Lecture Notes in Computer Science, 2003, 2739: 240-245.
- [TG03] Tambouris, E.,; Gorilas, S.: Evaluation of an e-democracy platform for European cities. Electronic Government, Proceedings Lecture Notes in Computer Science, 2003, 2739: 43-48.
- [WC02] Watson, A.,; Cordonnier, V.: Voting in the new millennium: eVoting holds the prondse to expand citizen choice, Electronic Government, Proceedings Lecture Notes in Computer Science, 2002, 2456: 234-239.