Do (not) sketch into my sketch

A comparison of existing tools

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Various computer-aided sketch tools can be used to support architectural designing (Tang, Lee, Gero, 2010) either individually in early stage of the process or in communication. We focus on the second mentioned. The goal of this paper is to give an overview of possible applications and mention the platforms which are supported. We explore the advantages or disadvantages of the tools and compare it with our newly developed application called ColLab sketch. With this application we hope in increasing speed and ease of graphic communication on one hand and testing architects demands on the other hand. We develop multiple criteria for evaluating the tools, while believing this paper could be of use to give a hint how to improve remote as well as co-located collaborative designing by sketch. Architectural designing is a very sensitive topic when it comes to sketching. Finally, we would like to compare the newly developed tool to this list and suggest improvements or experiments that help its finalizing.

Keywords: *sketching, collaboration, electronic devices, sketch applications*

INTRODUCTION

Computer-aided sketch tools can be used to support collaborative architectural designing (Tang, Lee, Gero, 2010) and architectural communication by sketch. In this paper we would like to present an overview of few possible applications and mention the tested supported platforms. We explore the tools, which might be of a significant importance and compare it with our newly developed application called ColLab sketch. With this application we hope in increasing speed and ease of graphic communication. We also want to show the tool can be modified according to the constantly changing needs of architects. This paper also shows criteria for evaluating the tools. We believe the comparison could be of use to improve remote as well as co-located collaborative designing by sketch in architectural designing.

PREVIOUS RESEARCH

Architectural designing is a very sensitive topic when it comes to sketching. Previous research (Goldschmitt, Ullmann) showed that sketching plays an important role in the early stage of designing. It is also inevitable by architects cooperation and teaching (Cheng and Lane-Cumming, 2004) and last but not least it significantly supports communication.

Segers at al. says: "Although traditional tools continue to prove their usefulness in many architectural design processes, they are limited, as any tool, by their specific characteristics. Thus there is a constant search for new tools that may have certain new characteristics that may support particular aspects or components of architectural design process." (Segers, Achten and de Vries, 2000) Sketching is a traditional tool that has proved its value over centuries. The question is how to preserve its advantages such as speed and intuitiveness while incorporating it into computer-aided communicative and collaborative process among architects. The aim of this research paper is to bring an overview of possible existing tools that might be relevant and name their features. We target at list of characteristics that an ideal tool should have. Finally, we would like to compare the newly developed tool to this list and suggest improvements or experiments that helps its finalizing.

THE TOOLS

A large number of sketch supportive tools can be found on the internet. And there still might be a lack of the one appropriate for architects' sketch communication and teaching. We made a selection of multiple applications currently available on internet and an old one reported on in an article (Mynatt, Igarashi 1999) and we set several criteria in order to compare them. We also tested these tools in terms of sketch behavior (Figure 1) and tried to capture their strong points and weaknesses.

Our goal was to position our new developed application ColLab sketch among the existing tools. We chose following applications to compare:

1. DRAW.TO [1]
2. QUEEKY Multidraw [2]
3. Flockdraw[3]
4. Flatland
5. Adobe Connect [4]
6. GoToMeeting
7. Talkboard [5]
8. ColLab sketch [6]

DRAW.TO

One designer and one developer from Melbourne created the application called DRAW.TO in the beginning of the year 2010. It is a free on-line collaborative sketch sharing application with the possibility of publishing pictures on social networks like Facebook or Twitter. The possibility of editing others picture - forking is allowed. The size of the drawing area is devoted to rather small devices like Smartphones, iPhones and iPads. The size restrictions are rather strict, together with the fact, that finger is used for drawing. This causes this tool to be rather inprecise. Better conditions can be found on devices with a pen.

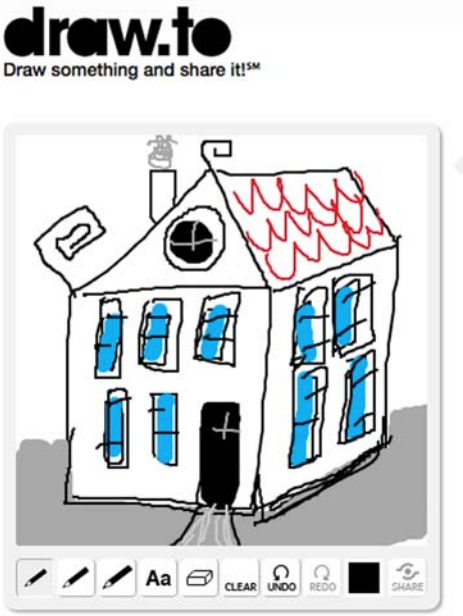

Figure 1
Example of test of sketch behavior, drawn on Mac OSX with Bamboo stylus: draw.to

QEEKY MULTIDRAW

On-line interactive tool Qeeky MultiDraw is a sketch collaborative application, where one or more participants can share the sheet and draw together. This web application is equipped by chat to communicate by word. It is not size restricted, which means it is of satisfactory dimensions on any device. The choice of filling in or leaving blank the password box when generating a new room offers the possibility of creating a closed group sketch or public artwork where anybody can participate. The participants can also record and replay their sketches. The disadvantage is a quite long and unclear registration process plus we came across some zooming problems causing imprecision. The tool gains up to one second delay when becoming complicated.

Figure 2
Example of test of sketch behavior, drawn on iPad with Bamboo stylus: Queeky multidraw

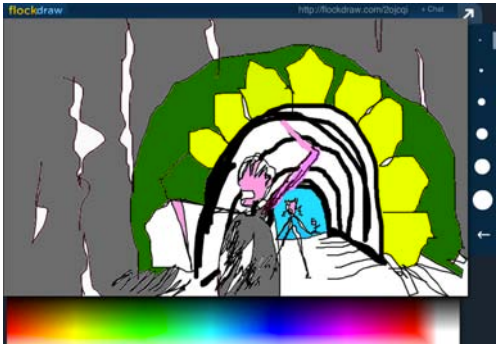

Figure 3
Example of test of sketch behavior, drawn on Mac Book Pro with Bamboo stylus: Flockdraw

FLOCKDRAW

This application was developed in 2009 and is proclaimed to be free. For Mac users, though, it is not free (2.99Dollars). We assume that special platforms like iPad do not support flash and need a special version of the program, which must be payed. When purchased it still has serious size problems on iPad like missing parts of the interface which are not shown: this stops the user from possibility of setting new sheet or generating new room. Also undo button is missing. To make it work we had to retype the web address into the other devices search tool. After that the tool acted satisfactory. The delay until lines could be seen on the users screen was less than 0,5s. Joining the same workplace by 2 people instantly was possible, the third was not accepted. The tool was equipped by a quick chat. If working like advertised, this application would have been of a good use for architects quick communication. The color choice bar would be great for multitouch implication, the users could fluently draw and change colour. Flockdraw is an application with features closest to ColLab sketch.

FLATLAND

Discussion about Flatland was found in an article on comparison of Computer aided tools for architectural design by N.M.Segers at al. 2000. The application was published in 1999 by E. Mynatt at al. and represents a type of collaborative tool that supports quick sketching. A big whiteboard can be edited by a special pen, but apart of a few specialities like scaling or double line no interactivity is provided. We mention this already older tool in the context of dimensions of the device, which is in the size of a blackboard and thus can be viewed by a collocated group of people. Also the fast development of collaborative tools can be tracked here. Flatland worked independently of internet and thus no remote collaboration was enabled. Finally, Flatland gave us a proof of importance of speed as a main criteria. It also emphasizes the size of the drawing.

ADOBE CONNECT

This program is focused on providing users - the team workers - a complex service from video and voice streaming to filesharing and sketch. The problem is the size of the windows. When the number of participants increases, the sketch surface remains quite small. Also the speed of transmission of the sketches is not satisfactory when tested on PQ Labs multitouch screen in Value Lab (Nováková, Achten 2012). Adobe connect is flash based raster application which might slow the drawing process. The application has special modes for all platforms, where it is incomparable with other on-line conferencing tool. The cumbersome primary setting and the price (55 dollars/month) of the application makes it impossible to use just occasionally with somebody who is not used to it like students. The advantage of this application is also the possibility of creating private new components, using the core of the application.

GoToMeeting

Cheaper version of Adobe Connect is GoToMeeting by Citrix application (49dollars/month). The application is focused on everything (teleconferencing, data sharing, etc.) but sketching, which is though possible in limited way. Multiple platforms are supported: you can work from Mac, PC, iPad, iPhone or Android tablet. For us this tool must be mentioned because one of GoToMeetings daughter applications specialized in drawing is Talkboard.

TalkBoard

Most interesting for the purposes of sketch collaboration is Talkboard by Citrix released in 2013. It is a free whiteboard application for work on iPad. Talkboard is configured only for iPad, so no multiplatfomality is offered. On the other hand drawing on iPad is most pleasant here, the tool is equipped with line smootling and pressure simulating. The thickness of the line is dependent on the speed of the stroke: the faster you draw, the thicker the line is. For making notes it is handy, for a sketch of a real scene the more precise the sketcher needs to be and the slower he drags, the less visible the line is. Exporting and saving of the picture is easy, it doesnt offer Facebook or Twitter though.

Figure 4
Example of test of sketch behavior, drawn on PG Labs multitouch screen with finger: Adobe Connect

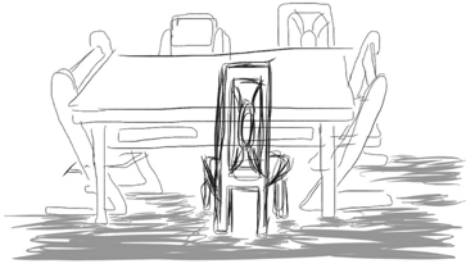

Figure 5
Example of test of sketch behavior, drawn on iPad with Bamboo stylus: Talkboard

Figure 6
Example of test of sketch collaboration, drawn on iPad with Bamboo stylus: Talkboard

ColLab sketch

The application we developed followed the principle of learning by doing. We started by preparing an empty interactive surface and added the functions the students desired until next meeting. After one year development focused on multitouch PQLabs device we changed from server based to web based principle and oriented towards multi-platform tool. ColLab sketch has simple login and instantly visible library, where sketch-storming takes place. It has no colours, but limitless variety of shades of grey. The reason is the function of magic wand used by admin to see different contributers in colour. Multitouch is supported on multitouch devices, which uses gestures in order to share or download sketches to work on them.

Figure 7
Example of test of sketch behavior, drawn on Cintique 24HD with stylus in communication with iPad: ColLab sketch

Figure 8
Example of test of sketch behavior, drawn on Cintique 24HD with pen in communication with Mac book Pro: ColLab sketch

CRITERIA

The quick set of criteria was derived from previous experiments and observation (Nováková, Achten 2012): architects need a fast and fluent sketch response. They need a shared workspace to edit it in real time and the possibility of fast save of the drawing. The color is not as important as the size of the stroke, where the purpose of pre-set number of stroke-types differ from fluent changing, which is made possible by multi-touch technology.

Replay of the drawing is a function usable for educative purposes, while background picture is required for architecture criticism. The easiness of log-in process plays also a significant role.

Since the architects are using many different types of devices the tool should be working on any possible platform from large PQLabs multitouch collaborative tables over Windows and MacOS desktops to iPads, Android and Linux mobile devices.

We also feel the importance of editable private library of each collaborative session, where pictures are saved for further purposes.

Functions like chat or videoconferencing services may be incorporated into the drawing application, where several disadvantages were described during the experiments (reference omitted) like capacity demands or small sketch surface.

The new programming language HTML5 was used to program web based drawing applications, which makes them platform independent. The desktop versions though are developed in various programs: flash, MySQL + C etc. This makes communication complicated.

We looked at other additional functions like chat or video streaming added to the applications. We assume if all windows must fit onto one screen, the size of the whiteboard becomes of importance.

The option of archiving comes important to us, where log-in allows multiple roles and users can edit their sketches. Visible library with the possibility of direct interaction within the drawing session seems to us as a significant factor of the speed of the collaboration.

One of the most important characteristics is online collaboration, where participants can draw into one file synchronously.

For architects, importing background picture into their sketch board is relevant due to the need of graphic reaction on existing or new designed works. In communication color is not as important as proper ratio of the background picture.

Last but not least price of the application influences the possibility of its use for non profit purposes.

tool	price	login	web/desktop	additional fcs	colour	platforms
DRAW.TO (2010)	0	no	web	no	yes	multi
QUEEKY (?)	0	yes	web	chat	yes	multi
Flockdraw (2009)	low	yes	iPad,desktop/ web	chat	yes	multi
Flatland (1999)	?	no	desktop	no	yes	Smartboard
Adobe Connect (?)	high	yes	web+client	video, voice, fileshare	yes	multi
Talkboard (2013)	0	yes	desktop	no	yes	iPad
[Our tool] (2013)	0	yes	web	no	no	multi

tool	archiv	stroke sizes	multi-touch	collaboration	zoom	background
DRAW.TO	no	3	no	Version-based	no	no
QUEEKY	yes	198	yes, optionally	Real-time	yes	no
Flockdraw	yes	any	no	Real-time	no	no
Flatland	no	6	no	no	no	no
Adobe Connect	yes	?	no	Real-time	no	no
Talkboard	yes	1	no	Real-time	no	no
[Our tool]	yes	many	yes	Real-time	no	yes

Table 1
Table of tools and criteria

Draw.To	Queeky multidraw	Flockdraw	Flatland	Adobe Connect	Talkboard	Our tool
Issues from tool testing						
Fluent workflow, no linesmoothing, 3 line thicknesses	Bad orientation on the interface, how to regulate the stroke	Bad orientation on the interface, impossible switch from pencil to brush	Not tested	Shows lines with delay, offers shapes,	Works only on iPad, stroke pressure simulated by speed, line smoothing	Fluent workflow, less than 1s delay when sharing sketch

Table 2
Issues from tool testing

IMPRESSION FROM BASIC TESTING (MACOS, IPAD, WINDOWS)

We introduced some of the possible tools for sketch sharing for architects with naming their advantages and contras. The list of the applications is not complete, we tried identifying representative selection of several types of the tools. First of all we divided them in web tools and downloaded desktop tools. Second criteria was free or paid app. This we could divide into three categories: the expensive monthly purchased teleconferencing applications with extra service, sketch share applications which could be bought for up to 3 Euro and free sketching interactive collaborative tools.

We found no specific free sketch sharing collaborative multiplatform application for architects. The teleconferencing tools like Adobe connect potentially fulfill their needs but they are cumbersome and not easy to use by students. The sketch transmission is not optimal as it works on raster based technology. Because of multiple windows there is less space for sketching on the whiteboard, which may be unpleasant when using small mobile device. Other cheap applications are more easy to use, but they struggle with multiple platforms, as they focus only on one or two types of devices. Also in some cases we found some important functionality missing, like "undo" button, "new sheet" or manipulating and posting of ready sketches. Free applications have rather good results: they are functional and able to share sketches even on-line, usually they are missing the background option. In case of Queeky and Flockdraw we noticed complicated registering system and lack functionality on diverse platforms. Libraries exist but usually with no control over the published sketches. Learning to use them may take several hours. Additionally, Flockdraw is not supported by Safari on MacOS, where it is impossible to start drawing. We were able to run it with help of Firefox.

We feel that our new developed tool with its functionality and multiple platforms operated can find its position among low-cost or free web sketch applications. The simple black and white background picture upload feature together with the role assignment within sketch tool is unique among the compared applications.

FUTURE WORK

Based on this comparison we look at the following future development. Log-in for example is an issue for

discussion. The access key for multiple users can be varied with private login. In the case of pedagogic purposes roles of teachers may be distinguished from students roles. Also the question of physical devices must be researched because it has crucial influence on usability of the tools. We can already suggest, that displays as small as smartphones or tables as big as PQ Labs Multitouch may not be suitable for architectural drawing and we might focus rather on devices in the size of a tablet from A5 to A3. Now we have a private independent application ColLab sketch, which can be used for future research on electronic sketching.

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