

# SPACE AS INTERFACE

- BRIDGING THE GAP WITH CAMERAS

PART II: PROJECT DIAGRAM

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# II PROJECT DIAGRAM

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The idea with this *project diagram* is to turn fragments into meaning. There are hundreds of ways of approaching the presented material, I am aware of that, but I tend to see this as a strength. When working, I constantly relate to, get inspired by, or build on already existing projects, ideas, and theories. By designing this *project diagram* I want to visualize this web of connections and relations that has emerged during the last couple of years. Both for my self and for You I find it important to see how different pieces of work are influencing each other over time and across types such as prototypes, concepts, methods, and papers.

Describing all different paths through my work would require an entire Ph.D.-project (or two) in itself and that is not the subject of this dissertation. However, by making this diagram I have been able to identify important relations between pieces of work that I had not thought of as related. Steve Jobs has in relation to his own career explained the following regarding making sense of his choices:

*“Again, you can’t connect the dots looking forward; you can only connect them looking backwards. So you have to trust that the dots will somehow connect in your future. You have to trust in something — your gut, destiny, life, karma, whatever. This approach has never let me down, and it has made all the difference in my life”.*  
(Steve Jobs)

This is not to say that I have been working blindly but rather that in looking back the pieces start making sense whereas they might be hard to grasp while being in the middle of it all.

Further, the project diagram basically describes the way I work – in different teams on simultaneous projects and reflects my opinion that to get into a complex field as interaction design it is hard to go through a narrow approach. I have chosen to approach the field through multiple impacts that in the beginning might only slightly relate. Over time my understanding of different concepts within interaction design and HCI has matured and I have been able to couple some of the impacts whether these are methods, concepts, prototypes or papers to get a broader understanding of the field and finally of the concept of space.

The diagram is also an alternative way of opening up and visualizing my design process. Not in detail but on a broad level showing that I am aware of the different “links” and inspirations between the works. It is not an attempt to claim that the work is not inspired by and related to other research projects. It would certainly have been valuable if even deeper layers of inspiration could be included, however, my main focus was to gain overview and understanding of my own work at first.

I find it necessary to mention that this is a piece of software that has not been tested thoroughly by others than myself, thus there might be small bugs and issues not addressed in the current version. I have had discussions with my advisors on the position of this diagram in relation to the classic written parts and its influence in the entire dissertation. Currently it is somewhat in the back and working as an “if you want to know more”-part. Nevertheless, through this diagram I hope to be addressing the form of Ph.D.-dissertations especially in new interdisciplinary research fields working with time-based and human centered interventions. I personally praise the openness for reflection and the visio-spatial presentation that in many respects is inspired by Gardner theories on multiple intelligences. Hopefully this will help to reach others than egg-heads!!

Finally before jumping to the manual I will encourage you to play with the diagram both regarding arranging projects in type and time but also by stepping through the substantial amount of content, and remember that it inscribes quite complex work over several years and is thus not quick and easy to grasp – so give a chance!

In the following sections I will describe how the project diagram is used in a step by step manual. I will also show how the fragment of camera spaces is distilled which should give an understanding for how other relations and perspectives could be extracted and elaborated further on.

## II.I MANUAL

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In the following section I will describe how to use the *project diagram* application. It is basically a manual that will be helpful both to configure the content but also to understand the different terms used.

First of all it is worth noting that the application is best run in a resolution of 1600 by 1200 pixels. I know that it is not every computer display that that is capable of running such a resolution but to present this kind of graphical content I really need the pixels. It is of course possible to run the application in a lower resolution but texts might render so small that they are not readable. I have implemented a number of scaling features to deal with these problems but I can not guarantee full readability in the entire application if not running 1600 by 1200 pixels.

### The Application

The *project diagram* is divided into a content layer and a representational layer. The content is organized in an xml file representing each project entry and its attributes. The application parsing and representing the xml content is written in flash and can run in a stand alone player or any browser if the flash plug-in is installed.

### The Tab Menu

In the bottom of the application the menu is located. It is designed as a tab menu that animates upwards as the cursor rolls over the different tabs. Each tab is labeled and present how the tab is configured e.g. the ID tab displays "ID# 6: Mixis", which indicates the name of the tab "ID" and the mapping id number and name of the current project in focus "#6: Mixis".

The menus are hidden on mouse rollout to maximize screen estate for the displayed project entries.



Figure 45: The interface tabs

### The Mapping ID Tab

The mapping ID tab is used to establish links between the *Part I: Thesis* and the *project diagram*. A mapping ID is to be considered as a type of reference in line with footnotes and references to literature. When coming across a mapping ID in the *project diagram* this ID can be typed into the input text field of the mapping ID tab. Mapping ID's appear in the right side of the page as shown here and can contain multiple ID's to projects related to the content in focus in the text.

[ mapping: 6 ]

When pressing the "GO!" button the project related to the specific mapping ID is put in focus and displayed in the center of the screen with related projects around it.



Figure 46: The mapping ID input tab

## The Appearance Tab

The appearance tab can be used to configure multiple aspects of how the projects appear. The first slider is a time crop tool useable for narrowing in the timeline to focus on certain periods. By pressing the mouse on one of the slider buttons and dragging projects will instantly disappear from the display. Depending whether any lock types (see the lock tab section below) are activated the projects will arrange on a timeline, in a grid, or in a circle. It is not possible to slide either of the two slider buttons across the project in focus.

The scale slider can be used to globally scale the displayed projects. By pressing the slider button and dragging along the slider all projects will instantly update their size. Depending whether any lock types (see the lock tab section below) are activated the projects will rearrange in a grid, in a circle, or just scale in their current position.

The alpha slider has influence on all projects that are not in focus, meaning either the actual project in focus or projects linking to that project in the specific relation perspective (see the relation tab section below). Thus sliding the alpha button can be used to hide or fade down projects that are not in focus. As there are quite a lot of projects in the *project diagram* it can remove a too cluttered interface by keeping the alpha values low. On the other hand sliding to 100% can give a total overview of projects. If the alpha is set to 0% and the user has activates the sortCenter lock the projects in focus will exploit the entire display area.

The last two buttons in the appearance tab are also related to projects not in focus. When "grayscale" is activated projects not in focus are rendered as grayscale and when pressing the "color" button the projects are rendered in color. This can again help to differentiate projects currently in and out of focus.

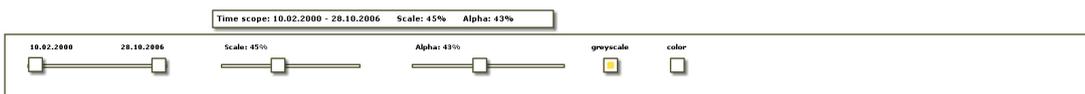


Figure 47: The appearance tab

## The Relation Tab

The relation tab handles how the different projects relate to each other. The objective with this tab is to provide multiple entries into understanding how the different projects relate depending on type and topic in focus.

The default relation is "links". This is my relational and inspirational way of sorting the different projects across time, type, and perspective. This means that the connections between projects can represent similarities even though the projects work with different technologies, application areas, or theory. If we look at figure 55 below, among others Mixis links to eMote and colorSpace. Mixis is not designed as a direct inspiration of these projects but all three projects resemble some of the same aspects of functioning within a three dimensional space and hence these connections exist. In the same figure 55 links between Mixis categorized as a prototype links to several papers because Mixis is discussed in the papers. The "links" relation is the only perspective where all projects are connected in some way.

The following eight relation buttons relate to certain aspects that the projects can be characterized as containing or addressing. In figure 48 below "links" is activated indicated both by the tab label and in the full yellow button beneath the "links" label. However, the "movement based" and "camera space" buttons appear as half yellow. This means that the project in focus (Mixis) addresses these aspects but they are not currently influencing the connections to other projects. By pressing and hereby activating the "movement based" relation the project in focus connects to a new set of projects as seen in figure 55. By choosing one of the other projects in focus will result in that all connection strings are drawn from the new project in focus to all the other projects categorized by "movement based".

With Mixis in focus choosing a button that is not either full yellow or half yellow will result in the project not relating to anything. In other words this means looking through a specific project with a perspective that is not related to the project and thus no other projects will relate and connect.

The last section in the relation tab is concerned with the type of project. All entries are categorized by a certain type; method, prototype, concept, and paper. This is of course a rough categorization but it is still useful to e.g. look at all papers without looking at other projects by sliding the alpha value to 0%; or to see how methods has influenced a concept which has led to a paper and so on. Several of the presented projects could be characterized as multiple types; I have, however, only chosen one type per entry to avoid too much chaos. An example of this is the HarborGame that is indexed as a prototype but in using the prototype presents a new method for involving users in a planning process.

[ mapping: 47 ]

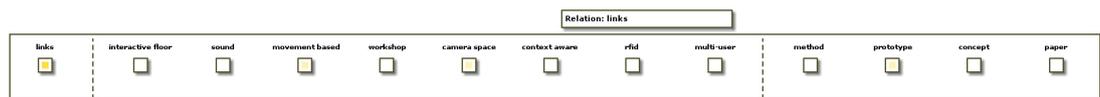


Figure 48: The relation tab

## The Content Tab

The content tab can globally change the displayed content of the projects. When changing content by pressing one of the five buttons all projects will instantly present the chosen content type. Depending on whether any lock types (see the lock tab section below) are activated the projects will rearrange in a grid, in a circle, or change content in their current position.

The image button loads a bitmap image related to the project into the project container.

The video button loads a video clip into the project container. Not all projects are associated with a video clip why they will display the text "no video available". As pressing this button will load a severe amount of videos it is recommended to have some patience, especially if your system is slow or if you are running the application over the internet. Alternatively I will recommend toggling to video content on the local project as described later as this will only load the videos you are interested in watching.

The appearance of the video will also be affected by the grayscale/color buttons in the appearance tab meaning that you can run videos in black and white if you wish. By rolling the mouse over a project a video panel for operating the local video appears. The loaded videos will not start automatically but must be started individually. Depending on the system that the application is running on (and connection speed if running via internet) multiple videos can run simultaneously. I see this as an important feature because it adds the possibility of comparing different projects beside each other.

The description button displays a descriptive text about the project in the project container. This text might depending on the scale set in the appearance tab be hard to read. To solve this scale the project containers. If the description requires more space than the initial text area two scrolling arrows will appear to navigate in the text.

The info button displays background information about the entry. Here you can see the ID number that refers to the specific project and that can be used as input number in the mapping ID tab. If the project contains other types of textual material that is not suitable for being displayed in the description text, e.g. an entire paper, a link to a pdf-file is available. Furthermore, all keywords that characterize the project are displayed. These keywords are the same as the perspectives defined in the relation tab, e.g. "movement based". It is also possible to see which projects the entry links to if the relation is set to "links". Lastly I have mentioned people that have been more or less involved in the project. Of course it is not clear who has done what; the important thing here is to credit all involved.

The last content type is contract that displays all projects as small textual containers presenting name, timestamp, and type. This can be a less cluttered way of over viewing the material.

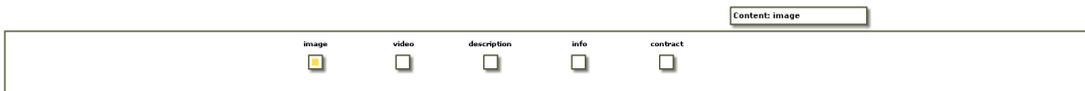


Figure 49: The content tab

## The Sorting Tab

This tab relates to sorting and arranging the displayed projects.

By pressing the shuffle button all projects will animate to a new random position within the screen estate. The functionality of this shuffling might be more fun than actual usefulness, however, in situation where a selection of projects are all cluttered up shuffling might help.

Sort in grid displays all projects in a grid view starting in the top left corner with the project in focus and its connected entries followed by the rest of the projects. The grid view avoids projects overlapping, however, depending on the scale set in the appearance tab many projects might be displayed outside the screen estate. The grid view is, however, a good way to look at a specific set of relations e.g. a listing of all method projects can be done by selecting "method" in the relation tab and then sorting in grid.

Sort by type sorts all projects along four segments on the y-axis depending on the type of project – method, concept, prototype, and paper. The four areas will be visualized by a fading text indicating which types are placed where.

Sort by time sorts all projects within the time scope set in the appearance tab along the x-axis. This enables the user to see how projects have developed and how they have influenced other entries over time. Coupled with sort by type both type and time of entries can be sorted in the same view.

The sort in center button animates the project in focus to the center of the screen with connected projects arranged in a circle around it. Outside this circle projects that do not relate to the focus project in the specific relation perspective are arranged in yet another circle. This view puts focus to the connections of the current project in focus regardless of type and time.

If the sortCenter or sortGrid lock (see next section) is activated while one of the sort buttons are pressed this will deactivate the locking.



Figure 50: The sorting tab

## The Lock Tab

The buttons in the lock tab offers three ways of locking the display of projects. This can be useful if you want to keep a certain order of projects without constantly having to use the buttons in the sorting tab. The buttons function as radio buttons meaning that activating one will automatically deactivate other active buttons. Pressing an active button will deactivate that current button. The default is that the lock type is "none".

If the "grid off" is activated the lock type will be set to sortGrid. This will invoke the sortGrid method described under the sorting tab section. Every time a new project is selected the interface will update by calling the sortGrid method. If the lock type is sortGrid changing the time scope, scale, or content type will also update the interface accordingly.

If the "center off" is activated the lock type will be set to sortCenter. This will invoke the sortCenter method described under the sorting tab section. Every time a new project is selected the interface will update by calling the sortCenter method. If the lock type is sortCenter changing the time scope, scale, or content type will also update the interface accordingly.

If the "unlocked" is activated the current project will be locked. This means that you can drag any project and toggle content both globally and locally but the project in focus will remain.



Figure 51: The lock tab

## The Credit Tab

The credit tab presents all people who have participated in one or more of the displayed projects. People are ordered alphabetically after first name. Apart from the importance of giving credit to the involved people the list shows that the projects have been carried out within a quite extensive network of people, and I tank them all!!

If you are running the application in a stand alone player and not through a browser you can quit the *project diagram* by pressing the "quit" in the lower right corner.



Figure 52: The credits menu

## The Container

Each project entry whether a method, concept, prototype, or paper is represented in the same graphical container. The container can present images, video, and text; and has basically two states, an expanded and a contracted. The five content types are described above under the content tab section, and are in summary image, video, description, info, and contract. Figure 53 shows iFloor used as an example presenting the five content types of the container.



Figure 53: The five different content types of a container; image, video, description, info, and contract

One way of interacting with the displayed projects is as described above through the tab menu interface. Changes in this part of the application will invoke global changes to displayed content which might not always be preferable. Thus there are different ways of interacting with the local containers.

Each container is draggable meaning that you can place it anywhere in the interface by pressing the mouse in a certain area of the container and drag it around. This area is shown in figure 54 a) and d) as the drag/selection rim. When pressing the mouse on this area the container can be freely moved and this will further select the container making it the project in focus. This will invoke changes in the displayed connections between projects according to the new project in focus, the time scope, and relation perspective (for more info on this see the menu sections above). Note that while the lock type is "locked" you can drag all containers around but you can not change the project in focus. When a project is in focus the circle in the upper center will be full colored opposed to no color.

The arrow button next to the circle in the upper center of the container can be used to toggle between content types in the local container. Pressing the arrow will take you through the five content types image, video, description, info, contract, and then loop back to image. By using this toggling button you can customize the interface and have some projects shown as an image while others are presented as text or running video. To return to a single content type use the content tab.

When video is displayed it will not start automatically. By rolling the mouse over the container a small video control panel will appear as in figure 54 b). Use the buttons to control play, pause, and volume of the video. When rolling out of the container with the mouse the panel will fade out.

The last active area of the container is shown in figure 54 d). If the text amount exceeds the text area two scroll buttons will appear to navigate the text.



Figure 54: Active areas on the container; drag/selection rim, video buttons, toggle local content, scroll text, and drag/selection rim.

## The Connections

When selecting a project by pressing the circle or rim of a project container the graphical string connections change according to the new project in focus. The application is always visualizing these connections in relation to the single project in focus, however, these vary depending on the relation perspective as described above in the relation tab section. In figure 55 the Mixis project is set in focus. The four images show how the project relate and connect differently depending on the relation perspective. The time scope is set to maximum meaning that all projects are present, and the projects are locked and sorted in the center. The first image shows "links" relations and the seven projects that relate to Mixis are rendered in the inner circle, and all other projects are arranged in the outer circle rendered with a lower alpha value. The second image shows how Mixis relate to projects through the "movement based" perspective. These include projects like iFloor, eMote, and storySurfer that in the first place would seem like very different projects, however, addressing some of the same issues

regarding movement based interaction. The third image displays the "camera space" relation which is the part that I go into depth with in the *Part I: Thesis*. Projects here include concept, papers, and prototypes and different as they might be they all exploit the use of camera spaces. The fourth image displays Mixis connected to all other working prototypes, why all methods, concepts, and papers are displayed in the outer circle.

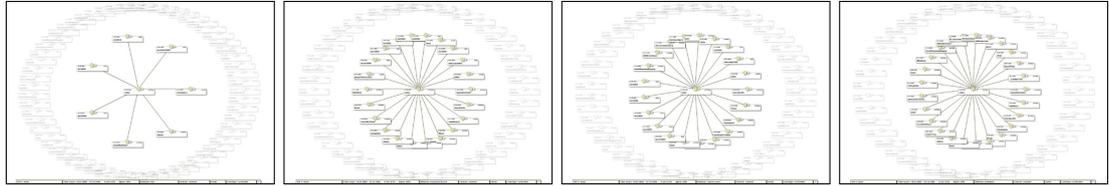


Figure 55: Four examples of connections with Mixis ID# 6 as projects in focus and content type "contract"; relation "links", relation "movement based", relation "camera space", and relation "prototype".

## Arranging Projects

Still looking at Mixis as the project in focus the content type is changed to "image" and the relation perspective is set to "links"; see figure 56. This displays the same view as the first image in figure 55 only with another content type. The second image shows the same selection arranged in a grid view. This gives another overview where projects are not overlapping, however, depending of scale they might go beyond the screen area. In the third image the grid view from image two is sorted by type. As can be seen the screen is divided into four areas labeled methods, prototypes, concepts, and papers. From this view we can see that Mixis links to two other prototypes, one concept, and four papers. In image four the view of image three is sorted by time. In this view it is possible to see when and which type of project is relating to Mixis.

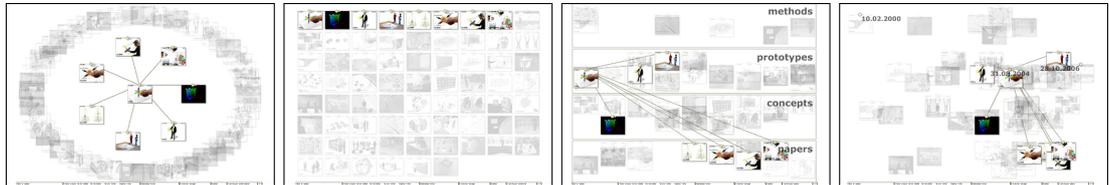


Figure 56: Mixis ID# 6 in focus; sorted in center, sorted in grid, sorted by type, and sorted by time.

To zoom into the projects in focus the time scope in the appearance tab can be used. Image 1 in figure 57 has Mixis in focus and all projects are sorted by type and by time. In image two the right time scope slider is dragged till the newest project in focus is the project most to the right on the screen. In image three the same is done with the left slider cutting all projects older than the oldest project in focus. By setting the alpha value to 0% all projects not in focus are hidden leaving only eight projects, Mixis and its seven related projects, arranged by type and by time exploiting the entire screen.

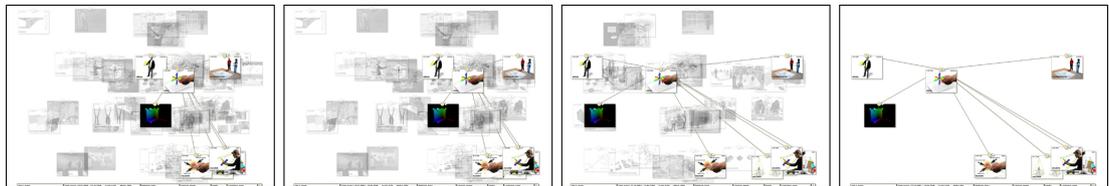


Figure 57: Using time scope; projects sorted by time and type in full time scope, time scope cuts all projects newer than the newest project in focus; time scope cuts all projects older than the oldest project in focus; alpha slider set to 0% shows the projects in focus within the set time scope.

## 11.2 DISTILLING THE CAMERA-SPACE FRAGMENT

I see the *project diagram* as useful in a couple of ways. First of all I have used it to get an overview of my work myself. Secondly it has helped me see relations between projects that I had not thought of beforehand. And thirdly it serves as an alternative way into my work than through this textual linear presentation you are reading just now.

Generally it acknowledges the multi-faceted nature of my work and does not try to “cover” it up and pretend to have followed a clear goal all the way. I will argue that the projects within the diagram all address aspects of space in the borderlands between physical and digital domains. As described above regarding the different relation perspectives there are many points of departure into the work, and clearly it would be possible to find numerous other perspectives that could guide other discussions across the material. I am, however, “just” using the *project diagram* to unfold the *broadness* of my work and from that distill a fragment on which I will go into *depth*. Thus it is not the objective to present all possible entries but to show its general ability to present work by the examples provided in the relation tab menu.

During my collaboration with Thomas Riisgaard and Eva Eriksson we have developed a conceptual framework for interactive projects using cameras. This framework is described in *paper 4* and is the main contribution of this dissertation. Applying this notion or perspective of “camera-space” to the content of the *project diagram* filters, inscribes, and visualizes a coherent fragment that go across the different work and project contexts that I have been part of, and across projects that are not initially connected. Figure 58 identifies the camera space fragment within the *project diagram*. Image 1 displays the entire project space sorted by time and type. The iFloor project is in focus and the relation perspective is set to “camera space”. What becomes clear from this view is that the work I have conducted regarding camera spaces falls within working prototypes and papers. Of course there lie concepts as a basis for the work but it has all ended up in a working system. Further, many of these systems have served as empirical test beds for several papers.

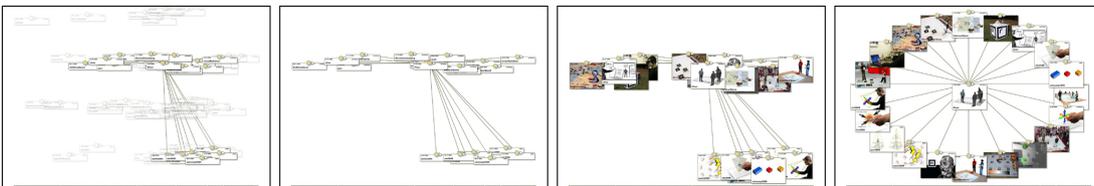


Figure 58: Camera space

Figure 59 presents all projects addressing the concept of camera spaces displayed in a grid view. As described while going through the tab menu interface different content types exist for each container. Use the tab interface or toggle the content on the local container to get an idea of the different prototypes and papers. Remember, however, that the entries in the *project diagram* serve to add further detail to camera spaces in conjunction with the three cases described in chapter 6 (*cases*) in *Part I: Thesis*. They are not described into depth but the videos, short descriptions, and for some entries links to pdf's will hopefully help to visualize and understand some of the potentials and limitations about interacting through camera spaces.



Figure 59: Camera space

By using the “camera space” relation perspective as well as all others except “links” the filtering of projects in focus is as mentioned in the relation menu tab section static. This means that camera projects relate to camera projects which might be a limiting way of looking at the content, thus I suggest applying multiple perspectives to investigate the complex relations that exist within my work. As an example to this I have in figure 60 kept iFloor as the project in focus and changed the relation to “links”. The time scope is framing the projects connected to iFloor and all projects are sorted by time and type. What this view reveals is that iFloor came about highly inspired by the virtual video prototype (Bardram et al., 2002) playful interaction.

[ mapping: 64 ]

Not because camera spaces are introduced there but because we imagined the floor as a social surface for interaction. Further, the view in figure 60 shows a relation between iFloor and two concepts.

[ mapping: 8, 61 ]

The skub school project applies a concept similar to iFloor to a scenario of a future school environment (see the pdf under the info content type); and the floorConcept is mainly inspired by the idea of the floor as interaction surface, the video, however, shows possibilities of extending the gestures and features recognized for interacting in camera spaces (features and gestures are discussed in chapter 7 (*interacting in camera spaces*)).

Also storySurfer and floorQuest has been directly influenced by iFloor mainly because of the reuse of tracking technique and of course as a consequence of the potentials we found in floor interaction while developing and deploying iFloor.

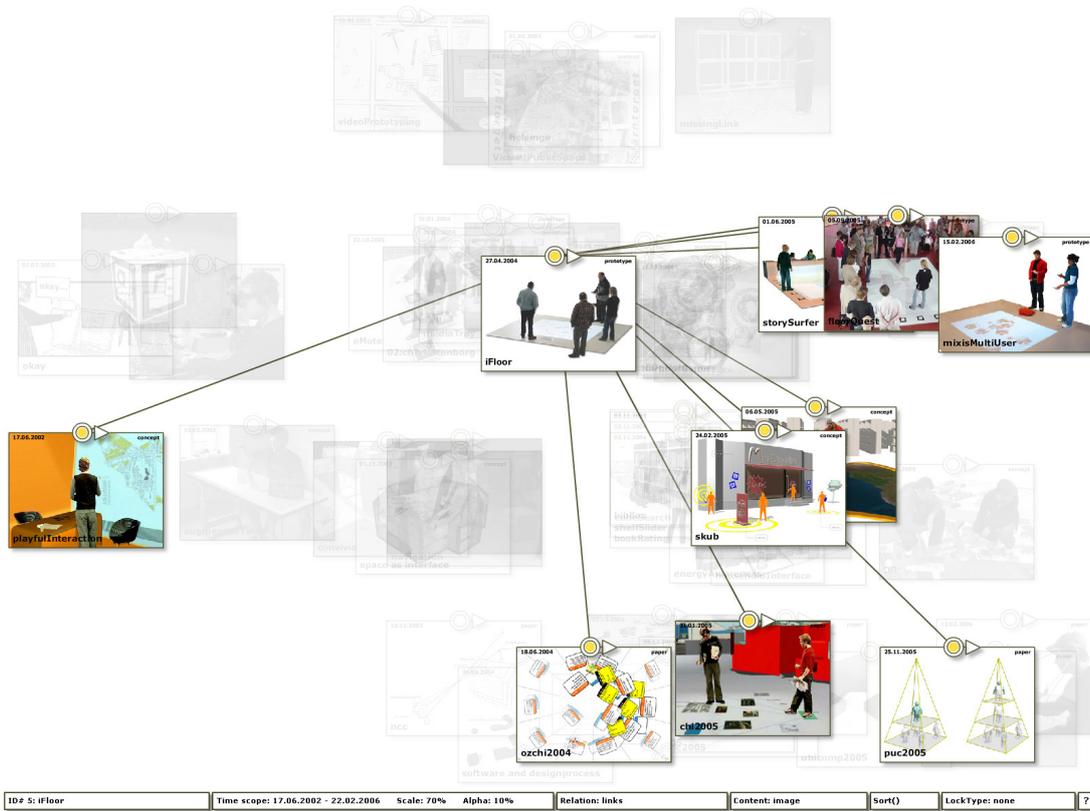


Figure 60: Inspirational links to iFloor

Hopefully the *project diagram* will function along with the *Part III: Papers* and the *Part I: Thesis* to create a consistent Ph.D.-dissertation. But I also see the *project diagram* as an instrument to invite others than the usual suspects into my work – namely the ones who are primarily directed towards the visual, spatial and non-linear; and who would not even bother to open the *Part III: Papers* and *Part I: Thesis* because of the weighting between text and images.

In the following *Part III: Papers* the five papers included in the dissertation are presented. For the additional papers I refer to the *project diagram* looking through the “paper” relation perspective.