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**C A S**

**Collaborative Artwork System**

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**Abstract:**

The subject of this final thesis work is to explore the possibilities of improving learning practices, in distance-learning communities of Art Education, through a Graphical User Interface (GUI) that promotes collaborative practices. This interface will enable the building of common visual identities as a ground to motivate communication and sharing.

Collaborative Artwork System (CAS) aims at providing a friendly, online environment for artistic communities, where members —only students, or tutor and students— will be able to strength group participation and collaborative activities, independently of the student's situation of time and place.

The work that conforms this project is focused in a specific user group in order to identify concrete needs and conceptualize a GUI design as problem solving. The user group is a community of students in Art Education at the virtual learning programme “virt@” in the University of Art and Design Helsinki.

**Keywords:** VLC (Virtual Learning Communities), GUI (Graphical User Interface), user studies, collaboration, motivation, virtual identities.



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## **I Scope of the project**

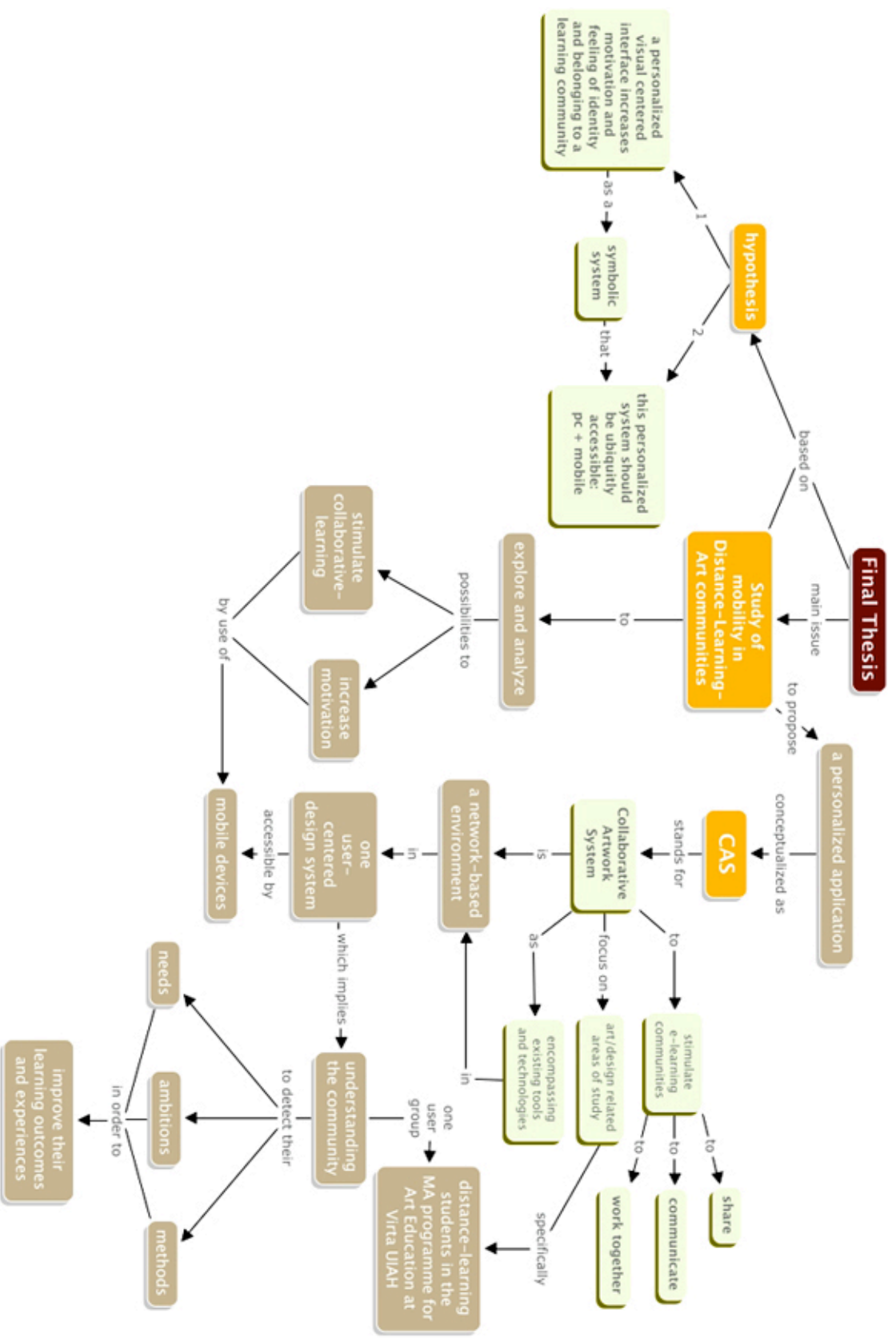
The scope of this work is research-oriented. It considers diverse theoretical sources within the literature of virtual learning communities and online and mobile media. It makes use of a needs analysis and a metaphoric approach to graphical user interface design.

A concept of Graphical User Interface (GUI) is proposed and designed during this project as a result of the needs study. The design process is described under a methodology structured specifically for the aims of this project but aims to be useful as a pattern for other design processes. The methodology consists in considering the specific needs of a community, studying existing tools in relation to those needs, and producing conceptual ideas to approach a design solution.

This work describes the evolution of the design process as a base for the implementation of a tool.

The concept map shown on Figure 1, was done in the first stages of the project to frame the focus points that comprise the whole design process.

[Figure 1] Next page. Concept Map considering the scope of the project.



## 2 Hypotheses

The next statements are general hypothesis in which the work is based. Some of them are analyzed in the end of the paper and some will be guiding the stage of development that is expected to be the continuity of the project.

- Background research and user studies will enable to determine relevant aspects for a design solution to be useful, effective, and competent. Design decisions, if they are proved successful to solve specific needs, can be generalized and applied into different user groups and for different purposes.
- A personalized interface, that considers art students under their specific context, will increase motivation to participate and improve their expected outcomes; thus mainly by enforcing identity and enhancing actions of collaboration and sharing.
- Cognitive practices will be encouraged when students interact through a virtual environment based on the social aspect of learning and the common building of visual identities.
- Designing a system that is based in metaphors will result in natural human-computer-human interaction. This will increase feasibility of understanding the tool, accepting it, and integrating it in a community's environment.
- A tool that is designed considering both station and mobile media will increase participation by diminishing limitations of time and place.

### **3 Motivation**

Learning communities of all kinds of fields are using online technology as part of their study methods to improve their outcomes and become more competent in a world of global information. Virtual Learning Communities are still far away in advantage from ordinary systems of education where face-to-face communication is core even though online systems are also present. The problem is greater when fields of study demand special frequent feedback and where visual communication is essential, as in art or design degrees. The motivation for this project is to explore possibilities to strength such aspects as collaboration, motivation, and identity within existing communities of art education that study mainly through virtual environments. The project considers the design of a GUI to approach those aspects.

The focus group is an existing community of virtual learning that already makes use of a virtual environment. In this sense, the basic idea of CAS is not to create new communities (although it may provide the elements for working as such), nor to replace any virtual environment; CAS aim is rather to improve social aspects and enhance motivation within existing communities. CAS should work in parallel to existing virtual learning environments or other communicational channels depending on the pedagogical methodology used in the educational programme.

The following lists of aims and goals are guiding the design process, which comprises a theoretical background, user studies, and metaphorical explorations, in order to elaborate a solid conceptual design that results useful and innovative.

### **3.1 Aims (or general purposes)**

- To design a solution that improves learning practices in artistic distance-learning programs (university level).
- To conceptualize an online tool that can be used efficiently through personal computer and mobile devices in order to provide tools for ubiquitous learning.
- To design a GUI that enhances student's participation and collaboration, approaching this with a process of sharing, associating, and communicating around artworks.
- To provide a system of visual representation that allows art students to store and organize their works under a nonlinear and spontaneous categorization; in other words, to give freedom to the users to organize hierarchies and nexus in a visual interface of their own.
- To propose a user-centered interface design that encompasses diverse motivational elements, so that students with different emotional characteristics can find means to participate naturally.
- To describe the interface design in a conceptual and structural level and provide the basis for the development of the design as a tool.

## 3.2 Goals (or expected outcomes)

The main goals are to:

- Identify the communicational elements that need to be strength the user group.
- Increase motivation to share and collaborate in virtual artistic communities.
- Stimulate active feedback around artworks.
- Stand for user-centered interface design and visual identity as a ground for improving virtual learning.

As part of the aims and goals of the project, the following phrases help to frame the work and to keep the expectations in mind during the design process. They are written from the point of view of the envisioning achievements so they lead the work towards a clear final purpose.

- The designer has conceptualized an interface that helps art students to improve their communication through pervasive media.
- The designer has shaped a tool that enables art students to share their processes and outcomes through a collaborative building of visual identity.
- The designer has proposed new means for art students to enhance motivation and participatory practices through visual aesthetics.
- The designer has given concrete ideas that promote ubiquitous learning in virtual communities of creative fields.

## 4 Introduction

### 4.1 Tools and online media

Human essential needs have guided the creation of all kinds of artifacts that surround societies through different times in history. Tools are artifacts that are designed to help accomplish tasks. They consist in putting elements together and shape them so that they adjust to certain situation as a solution of a need. Only the most efficient tools pertain over time and are not replaced but adapted to new societies and new places. In order for a tool to be efficient, in general terms, it ought to provide visible benefits to the users through a simple and self-explicit mechanism (Shneiderman, Hix). This applies to tools of all kind of technologies, both to physical (e.g. a pencil) and to digital (e.g. a word processor).

With the implementation of a diversity of digital tools in online media, every day's social, educational, and financial tasks can be performed through virtual interfaces. Nowadays, almost any task performed is benefited—or even dependable, on access to digital and online media. People with access to technology are replacing increasingly physical spaces to virtual ones, or at least adding some virtuality into their physical worlds. Digital online tools allow bringing those places that are physically separated from each other (shops, work, school, bank) to coexist in one personal digital device.

The constant development of tools and people's adopting and adapting those tools to their daily lives, make society dynamic: always changing environments through the new ways in which tasks are performed. When people use tools they transform with the impact of those tools in their lives, and so, they also modify those tools as an internal process of understanding (Krippendorff, 77).

In deed, innovative tools are core in the transformation of cultures. Today, digital online tools that provide means of communication in a global scale not only transform cultures that exist independently from each other; they propitiate nexus between communities that are almost anywhere and lead to a conceptualization of a global society, based on access to information through digital technologies. The global informational society (Castells) is transforming all the time around forthcoming technologies. The design of technological tools shapes very much this transformation; in the way that the tools provide elements that guide the way people interact with the available information. Diversity between members of communities—and between communities—that interact pervasively is very rich for positive transformations in the informational society.

With the emerging of digital technologies, communities around the world experienced a need to become dynamic: New tools change actively the way people use to perform tasks. That implies a need of continuous learning and adaptation. Society, in the age of digital information and communication, needs to constantly re-adapt and evolve upon technology, to innovate through collaborative processes and common aims, and to evolve on top of those innovations. Collaborative processes are more than ever taking the advantage of cultural and knowledge diversity, and are integrating developers and users of tools in a joint development, where the aim is to progress in a collaborative way towards a global sustainability (Himanen, 19).

Tools that influence social transformations become symbols of distinction and unity, they represent the users and their whole social, historical, and economical environment. As groups of people create, accept, adjust, and (sometimes) depend on innovations, efficient tools are innovative artifacts that determine the productivity and success of a community: coexistence, common understanding, and similar aims.

## 4.2 Virtual Communities

In most social systems, and for a very long period of time, the method of social organization has been structured under places of gathering, as a way to assure productivity, security, and unity. The concept of gathering is a pervasive social need, all over history people have been grouped and grouping together around similar needs or interests. In its general meaning, the term “gatherings” refers to a number of persons that come or are brought together for a definite purpose, as to perform a task<sup>1</sup>. Gatherings can be grounded under a principle of free choice, which are normally referred to as social gatherings; or they can also exist as communities formed under certain kind of obligations.

Communities are gatherings around a common aim and imply certain continuous following of activities by the participants in order to pursue that aim. People get together and form communities as a natural social activity; they share common objectives and set internal organizational rules. Gatherings are strictly connected to the understanding of society and community; both terms must be differentiated from each other.

The term community refers to a relatively small group of people who shares something, or have something in common: as a place of cohabitation (school, neighborhood), an interest (a sports community), or a belief (religion community). Communities are natural gatherings, found since very ancient times, and are not limited to human beings but are characteristic of every ecosystem; a community is a natural and, therefore, an iterative and dynamic way of organization (Tönnies).

Societies, in the other hand, are human creations. The term society is a modern invention that implies an artificial structure aiming at becoming public. A society is normally built or put together under a regime, an institution; it is a systematic method for the organization of masses: a mechanical aggregate, an artifact (Tönnies). Societies are normally created in terms of productivity and competence.

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<sup>1</sup> Definition reinterpreted from Thesaurus, Merriam-Webster, and Cambridge Advanced Learner's Dictionary.

A global digital society would imply, in that sense, gatherings that are or can be linked with each other and tend to produce innovations that can compete worldwide.

Online technology has produced a diversity of effects in society. The possibility of sharing information between distant people through online tools affects meaningfully how communities are formed nowadays, how people gather and how they communicate. People join new networks continuously through the advantages of online media. Virtual communities around different interests populate the online world and exist from the simple principle that everybody has something to share, something to say. These communities coexist in virtual environments, which are metaphors of the real: they re-present physical spaces with aims of improving and exceeding the possibilities of those spaces: “Virtuality functions as an extension of traditional modes of symbolic communication and exchange” (Drucker in Eskelinen, 91). Virtual places evolve from the tangible as a re-exploration of personal encounters, and as such, they need to hold on to the essence of the tangible in order to propitiate the right interaction to promote enriching and meaningful experiences.

Communication technologies influence the course of human relationships, production of knowledge, and social practices, leading to changes on individual and social needs. Virtual and physical communities nowadays spin about the fact that, no matter where people is located, they can still communicate almost without barriers. The way we nowadays process information and produce knowledge is definitely not the same as before digital and online media spread all over the world. The emergence and positioning of digital technologies have been in great part causes of the most important global changes through modern times, mainly with “the growth of new ways of communicating—and so learning” (Baynes, 7).

### 4.3 Virtual Learning Communities (VLC)

Since early Greek societies, where social entertainment rested upon literacy (Cubberley, 29), matters of education and learning have been very much related to the concept of gathering. From agora to modern schools and universities, places for gathering have been built in order to provide education and to produce and communicate knowledge. One of the most influential of these places of gathering, in terms of skill, behavior, and knowledge is the school.

As a place of gathering, the architectural planning of a school is determinant to the function of the pupils. The school is a place of gathering composed as well of several gatherings that enable arrangement under certain agreed classification. These sub-places are classrooms, they represent communities of knowledge, displayed by hierarchical models, where statements generally accepted as “truth”, convey from a respected character, accepted socially as an exemplary model, to a relatively docile and inexperienced audience. This respected figure who will be addressed as “educator” —commonly titled as professor, teacher or instructor— watches over the process of shaping the members of a system; and is, perhaps, the most important influence on society, after family members. Hierarchically placed and naturally stereotyped, the educator is naturally embedded with power due to its recognized superiority in experience and knowledge, which is in a way, its quality as a courier of information.

The role of the main character in a classroom that used to characterize educational systems before digital times, and the way this hierarchy is manifested, can be used to compare between two antagonistic models of society and thus, models of learning: the disciplinary and imposing, and the constructive one, in which the latest theories related to teaching and learning are based. A disciplinary system is commonly applied to big masses where little importance is given to the development of personal skills. In the contrary, constructive methods under its different perspectives and theories, basically aim for the individual grow and the promotion of personal thinking processes achieved through a basis of a shared culture. This of course is very much theory and the success can not be applied to

all cases where constructive bases have been used, nevertheless, the progress is believed to take societies further by applying innovative methodologies of learning with the advantages of state-of-the-art technologies.

Modern pedagogic theories make use of diverse tools to produce effective understanding and to help in personal learning processes as a ground for the establishment of competent societies. One example is the concept of learning objects, as the use of one or more tools to organize information in a way that it can be easily approached from different perspectives, depending on the needs and qualities of the student. This is something very much exploited after information technologies became a popular medium of communication and lead to more exploration of the possibilities of the media to improve learning outcomes.

Human beings are naturally social beings, and as such, learning implies always a human relationship, in a hierarchical or equal level structure: teacher-student, student-student, parents-children, parents-other parents, etc. Generally, schools work internally as social gatherings, in the sense that, even if the grouping is commonly an obligation, participants re-group freely inside those places to share particular interests. Social relations are built in between learning activities.

The aspect of social gathering, that is part of physical learning communities and that strengthens motivation in those communities, can be easily lost in the step from the physical to the virtual. Interfaces that mediate virtual models of learning must consider, besides the traditional tasks, the so important aspect of community building, of social networking: the motivational element of informal communication.

In the informational society, digital tools play an important role in today's learning practices and production of knowledge, by providing means to access and sharing information. Within online networks, people share information and interpret, create common understanding, and apply that understanding in particular cases: and those are the basis to create knowledge.

Knowledge building, a term which refers to the way societies learn in a world of information reachable through pervasive media (Scardamalia, 2), is a result of a selective gathering of data and its application into real situations where new understanding can solve important problems. Knowledge is created from social needs and therefore it results on the basis of social development. The process of creating knowledge is nowadays strictly related to digital media: the way communities emerge and evolve over systems of information and communication. Media represents a complex structure of iterative processes of linking (elements) and coding (information) that affects directly to the global evolution of learning processes and production of knowledge. More and more every day, fields of study relate one with each other, setting a tangle of connections between elements of information that convey in a wide general field of human knowledge.

Due to the possibilities of virtual environments, modern knowledge is undeniably community based (Capurro), virtual communities determine the hermeneutics of society as a collaborative process of selecting information and building meaning out of it, in relation to the diversity that comprises those communities.

In these times of living with (and even depending) on pervasive media, information is provided everywhere, and so, knowledge must be encouraged within all sectors of society, in every single place on Earth, equally. We are expected to participate in a “space of social collection” (Turkle, 3), through an endless expectation of unlimited exchange of information.

As technologies of communication are introduced to a wide range of levels of society all over the world, access to information is increasingly reachable and accessible, braking boundaries between producers of information and receivers, no one with access to online media is meant to remain passive. Access to almost unlimited information requires individuals to become selective and analytical (Wagner) through a participative attitude through virtual places.

## 4.4 Virtual identities and belonging

Natural gatherings emerge online due to the multiplicity of identities that encounter in virtual spaces and find infinite possibilities of “swarming” (Alexander). In virtual worlds, as well as in physical spaces, grouping together means strength, and can be either threatening or encouraging. Virtual environments and social networks enable swarming and give it a new presence. Communities are being formed through virtual spaces all the time, people with common interests can find each other and gather “freely”.

Gatherings under common identities are present with globalized and ubiquitous access to information and communication. These gatherings are most of them public and so they influence individuals and other communities in different parts of the world. The information is opened through numerous channels, where it seems to result pretty simple to communicate something worldwide. A huge diversity of interests shares the same medium, finding elements in common and emerging in new communities with new identities.

(Physical) Presence has been a basic requisite to belong in any community before digital times. In virtual environments the importance of presence and belonging remains preeminent but it happens in different levels than in physical environments. The way presence is manifested has changed together with the spaces where this aspect is required: Once it was a requisite, supervised and controlled, there was a need to “see” each other; with the emergence of virtual communities the aspect of being present became egocentric: Each member of the virtual community is free and responsible to participate and thus to affect the evolution of the community.

The gathering of individuals in virtual environments happens very naturally nowadays. Sharing common interests through online systems result in constantly emerging and fluctuating networks that fill the web with a bunch of identities entwining and branching together. Individuals identify within these groups by means of information that is presented visually. Belonging to a community implies understanding of a common identity. An identity, physical or virtual, comprises

common interests, common goals, and very much common aesthetics—limiting the term as the way individuals manifest their visual presence and the way they respond to visual elements. In virtual worlds, integrating to a community is very much a free choice, compared to physical communities, and in that sense, “identities are more belonging to us than we are belonging to them” (Jones, 16). Users of digital media take more advantage of a system, and are more motivated to use it, when they identify it as “their own”. Individuals join a virtual community and it starts to shape around them, each member contributes to the building of a network as a common place.

Being present in a virtual community is strictly related to the needs, interests, and habits of the participants. More than a social requirement it is an inexhaustible personal need for feeling of belonging, for living as part of a common identity. This is very much determined by the way people uses media and how they fulfill their needs of communication through that media. Presence in virtual communities is ephemeral but latent, people can come and go from time to time but at the same time, they are always present, always connected: “always online” (Turkle). Being part of a community gives comfort and certainty. Either active or not, participants know there is place for their thoughts, (rather virtually) a place where they belong.

The physical space is complemented, or even replaced, by the virtual space. In the virtual environments strong identities propitiate the building and spread of knowledge. Identities play a role of compounding: they make of the environment a solid field for gathering of thoughts that, after sharing and debating, must result in common understanding and emergence of new ideas.

In physical gatherings, identities are confined by certain behavioral characteristics, which are normally reflected in the members’ physical appearance. Visual identity is a strong element that keeps participants of a community together and active. In virtual environments this is not an exception, although the virtual interface (or the screen) can be for many people a barrier for visual expression.

Considering identities in the design of graphical interfaces for online systems of learning is very complicated when user groups vary widely. To solve that problem, this project approaches the needs through observation of a reduced group. In the end, that can lead to solutions applicable to a wider range of user groups and situations. The evolution of identities within a virtual community is a collective process of participatory behavior. Online communities shape throughout internal activities and the way in which members interact to perform those activities is very much influenced by the virtual environment, by its symbolic and its functional characteristics. The design of visual and interactive elements in a virtual interface determines the feasibility of participatory behavior.

## **4.5 Designing tools for VLC**

Communication processes happen through symbolic systems that cannot be separated from the cultural context in which they take place. Visual communication is always coded and those codes allow common understanding in society (Kress). The content of communication is pure information and information is represented through signs, those signs must have a precise meaning and a cultural connotation in order to produce understanding and evolve in cognitive actions (Barthes). Understanding means de-codifying and re-codifying existing information into personal mental representations. Through a process of association, new concepts integrate with assimilated ideas to construct new interpretations. This conforms a set of abstract and concrete mental objects that can be transformed into language—spoken, written, or graphic—through the use of universal conventions (signs). This is fundamental to consider in the design of interactive systems, where communication depends on the user's actions over a digital interface, which has to be understood, learnt, and identified by the user.

A visual interface works as an object of interaction that gathers information from a group of users (and sometimes from other sources) and (re)presents it in a codified way. An interface is something that acts “in between”: between people,

between individuals and information; and this aspect of being in between is at the same time path and barrier. Through its main characteristics of interactivity, dynamics, and autonomy, an interface in the context of computers and virtual environments tend to amplify users' mind (Krippendorff). In the case of learning environments, graphical user interfaces must act as a simplified symbolic system of information-communication where participation of the community is enhanced and with that, it opens more possibilities of achieving personal and common cognitive results. Learning practices on virtual communities can be improved by graphical interfaces that consider the importance of social identities for the cognitive development of individuals as part of a social system.

Most virtual learning environments nowadays, propitiate community participation based on text and the role of visual identity is very difficult to integrate. The social aspect of learning is also normally left apart and there is no advantage taken from the social nexus that online media facilitates and that have proved to be effective for virtual social activity. The idea from the pedagogic side that some other elements, besides the learning material, can be distractive or out of context, has limited the richness of virtual environments. These social elements can be part of the learning process and can be approached in a way that they result rather motivating. Propitiating a social environment, as well as a common building of identity, are very important aspects to consider in relation to motivate learning processes. CAS explores the possibility of bringing those elements together in one GUI in order to provide motivational elements that support virtual learning experiences.

With today's digital media, the possibilities of information nexus are huge. Nexus is the basis of collaboration, and therefore, social interaction and the way individuals behave through (and with) digital media, can be encouraged easily into collaborative practices. Communication happens through the same medium that supports sources and results of work and learning, making it possible to integrate cognitive processes with social activities. Communities for gaming, working, socializing, and learning, are sharing the same medium. Learning environments can take advantage of this aspect in order to enhance motivation.

An ideal virtual learning environment would provide an efficient mechanism for concrete information to be used in discussions, and analysis that result in creative and critical thinking as a basis for building knowledge. This is very difficult to reach with one virtual system, therefore the interest in designing a separate tool that supports the main Learning Environment. Normally, systems used by learning communities, tend to hold data and allow participants to organize it and structure it according to their goals. These systems, in spite of their efficiency in informational matters, very seldom take part of the evolution of the community. One huge motivational problem is that learning virtual environments remain the same, even though the learning community achieves progress, and graphical interfaces tend to be very lame in concern with the identity of the user group.

Very commonly, networks are designed visually by representing general aspects of stereotyped ideas on what defines a community. Few times, virtual networks are designed in order to let users explore visually their shared identities. Online applications like *SwarmSketch*, a tool for drawing collaboratively, are starting to consider aspects related to collaborative building of visual representations, and it is a matter that can be explored deeply in terms of virtual learning.

Graphical representations of the evolution of a learning community could be helpful and encouraging for a continuous knowledge building. An evolving system, which integrates itself to the activity of the community and responds to it, that is capable of adaptation to the continuous transformation of its users, could help the community to be aware of their communication process. An interface that follows the process and evolution of a learning community in a visual way supports its users in considering the state they are in terms of their goals.

Participants of a virtual learning community are meant to transform through the communicational experience around online media. They are, more than any other virtual community, needed to be encouraged to experience this transformation as a collaborative process of selection of information, discussion, and analysis. A virtual environment used by a learning community must be encouraging for the

participants to have an active sharing of ideas and to evolve in their thinking processes.

Learning groups are characterized by being always evolving, as cognition is always evolving, and this aspect must be represented in the systems and interfaces that are designed for them. This dynamic characteristic should be core in the design of active networks that work as support of learning processes.

Knowledge building results from meaningful collaborative learning processes and these processes become meaningful when they follow clear and concrete goals. There is an interesting field to explore through interface design on how to exploit media, experiment with tools, and create solutions for communities in order to aid them to reach their goals. The processes of acquiring meaningful information and being able to shape it according to specific interests cannot be considered nowadays in isolation, as knowledge building happens mostly through “social responsibility of the collective work” (Scardamalia, 6). Simplicity becomes a need for structures of information to take part in production of knowledge. A simple network helps the users to find fast and easy means of achieving their goals while deeper grounds of information keep their dynamic existence in a tacit way, this can be done considering elements of metadata within the interface design.

The use of visual interface design that enables layers of importance for information to appear is quite useful in virtual networks. It results normally very attractive and functional to keep the main part of the interface in a clear and meaningful visualization of just the most important elements of information, enabling metadata as an open door to other different levels of information. This can also work as a factor of motivation in the process of building knowledge as it facilitates the route to achieve it and avoids the feeling that (digital mediated) learning is a complex task.

With Engelbart’s research team publishing their innovations around the 60’s, the guidelines for free accessed systems of information and for future practices of collaborative education and development of software were established (Engelbart; Goldberg). In just a couple of decades, digital media became an embedded resource

of communication and information into everyday lives. Nowadays virtual environments have a strong presence in common people's lives; nevertheless, there are still many technological boundaries, even between people with same access to digital media. This is an important fact when designing interfaces, especially for learning communities, as participation should be enabled in the most equal possible way.

The participants of virtual learning communities are not experts in digital media and it is something that has to be considered carefully when designing interfaces for this user group. Normally people that studies through virtual environments have a very tight schedule. A single element that brings difficulty to use the system can be determinant to the failure of the design. When the objective of communicating through virtual environments is learning, distractive paths and complicate routes must be diminished but motivating elements should be strength.

Visual elements must not be over used, neither ignored, but always considered in terms of the way they enhance fast and clear interaction. Complex systems of interaction in virtual learning environments can affect participants by making it harder to identify focus areas and to concentrate in the aims of the group: "the more complex the item is judged to be, the more difficult it is to learn" (Walker, 60). When cognitive processes and development of skills are dependent on virtual interaction, the elements that conform a visual interface must be disposed in a simple and clear way and the process of accessing (log in or sign in) should be easy to follow and as short as possible.

Designing tools for virtual environments must be experimental rather than expectant: The user must have certain freedom of interaction and not be expected to act by the one and only way; an interface should provide the elements for the users to decide how to use them. Needs and motivations can always be surprising and designs have to be adaptable to this surprises, even if there is a background of intense user studies.

Designing successful tools for digital media can be approached as an iterative design process that makes use of explorative behavior. An iterative method of practical experimentation that allows, and even expects, continuous reshaping of the tool. The design of virtual tools can take advantage of experimenting with ideas that can be reshaped by the users or with the users' feedback. The presence of the user in the design process is now almost a requisite. Following and reinterpreting what Eskelinen and Korimaa describe as functional theory of media, conceptual designers do not need to consider how a medium works or what are its limitations, but rather how it is practically used and how it is integrated to people's emotions, body, and daily activities; something that is done by the individuals themselves, through real experiences with the technology.

Designing technologies, technological tools and applications, imply transforming thinking processes and behavior, which demand, as a result, new thinking and understanding of those technologies. When the user group is a learning community, participatory behavior is one of the main goals of designers. Detecting the kind of motivation to which the community responds, helps to select the adequate elements of interaction for a virtual environment. Observing and interviewing the user community is, in this sense, a key point.

## **4.6 Virtual communities and motivation**

Virtual social networks are systems for linking people based on online media and characterized by providing a set of elements of communication and sharing of information through graphical interfaces, serving as a direct channel of communication between users. A graphical user interface invites the user to conduct actions through a screen by showing what she/he can command, inducing her/him to command (at least once), and responding to the action achieved by the user.

Two main categories of motivation lead individuals towards actions. One is the extrinsic motivation, which involves certain reward or a specific objective that wants to be reached. The other one is that of autarkic or intrinsic motivation (intrinsic exploration in Berlynes theory), and refers to the action that implies a fulfillment on the people's own sake, normally there is a quality of pleasure or joy in performing that action. In Krippendorff's terms: "intrinsic motivations justify actions in their own terms" (Krippendorff, 136).

A network exists commonly with the base of motivation from the user side to participate in a virtual social environment. In this strict sense, participating in virtual networks is an example of intrinsic motivation due to the simple and natural pleasure of meeting people and socializing. This kind of motivation is characteristic of actions that are carried out with disinterest; the reason for performing is the performance of the task itself. In virtual networks, the basic motivation is intrinsic to the action of participating and belonging to a community itself, an action that does not offer any external rewarding. This quality of intrinsic motivation, that is characteristic of games and activities related to fun and pleasure, makes social networks an important focus in the field of learning.

To participate in a social network, the user must have determination to communicate with peers and has to have something to share—thoughts, projects, interests in general. Time is also an important factor, disposition of spending part of one's time on activities that does not show direct cognitive results. When this social networking happens through a virtual environment, familiarity with computer interfaces and the common symbolisms used in online communication is also a basic requirement, which can anyway, be learnt fast and easy if access to the appropriate media is provided—if the user has access to the appropriate media. The object, or interface itself must present also elements of motivation that are external to the simple action of participating, for example, possibilities for future business relationships or aid to overcome some personal troubling situation.

In digital systems designed for virtual and online learning, certain aspects have to be stimulated and facilitated, some of them are: motivation, participation, usability, time and place accessibility. It is not that members of social networks are always virtually present and active, but the consequences of those characteristics in learning communities affects to an important degree the evolution of the group and the achievement of learning outcomes. It is this difference between social virtual communities and learning virtual communities that determines the approach of user interface design; and it is also this what determines the need for simplicity and affectivity.

The aspect of identity and visual identity that was approached before is also a motivational factor. Members of a learning community that feel belonging to their virtual environment will most likely have frequent visits to it and participate more actively.

## **4.7 Design solutions through user studies**

To create virtual interaction that results in meaningful learning, design solutions must be created from detected needs in the learning community. From the point of view of the designer, studying the user group in terms of their needs can assure wise decisions when designing graphical interfaces and interactive systems. Having a clear idea of the objective as to give practical solutions to human needs is one of the expected focuses in this project. Observing a user group and analyzing their outcomes as a community who has certain goals, gives a start for designing solutions applicable in practical environments.

A lot has been written about the effectiveness of designing devices, tools, and services through studies of societies' needs. This approach of getting immersed into a group of people who will actually be affected by our input clearly characterizes nowadays-mediated worlds. An example of how private spheres have become

opened and public, is today's fashionable area of user studies, where researchers are meant to observe and annotate, analyze and communicate, inform, make "public" or semi-public the observed individual behavior. Designing through user studies is quite popular in software and state-of-the-art technologies. Studying human behavior and social actions are very effective in problem solving, and development of efficient tools. Collecting information about ordinary members of society has become very feasible; nevertheless, designers most consider the limitations and the ways this can affect directly to the people.

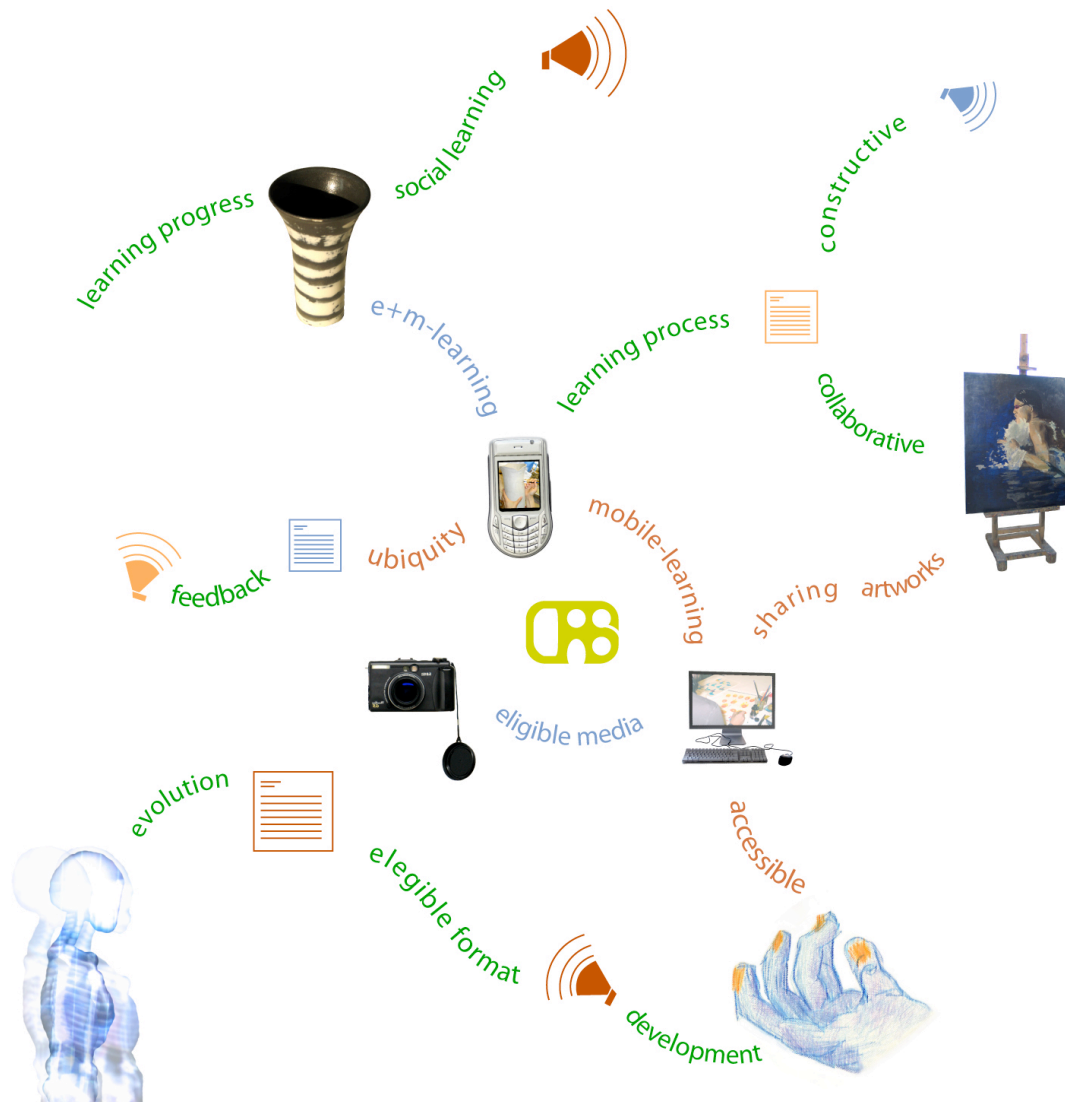
## 5 User Research

### 5.1 User group and needs analysis

Designing tools by having a specific user group in mind makes it possible to approach concrete needs. By studying the community that will be using the tool, it is expected to come up with a design solution that can be easily accepted by the users and incorporated to their daily practices. User-centered design consists in more than observing and interviewing the users (Hix, 30). User studies certainly require a complex of human resources to get a clear and precise set of information out of the user group.

Skills on cognitive science, anthropology, and ergonomics are very useful while studying a user group. Nevertheless, a close approach to the users' needs can be reached by observing closely the way they perform tasks and by analyzing their situation in relation to their expected outcomes. Interviews help to get to know their abilities, their demands, their characteristics on communicational practices, and other important factors related to their needs. Understanding user tasks, capabilities, and preferences (Preece, 109) are key to develop the right tools that an online community demands.

In the beginning of the project the ambition was to frame personal interests in regard to interface design and innovative digital applications. A list of research interests led to identify the user group before any concrete idea of what was going to be designed. The framing started by a general observation of the closest groups where the objectives could be analyzed (closest in the sense that they could be observed).



[Figure 2] By Fanny Vilmiä and the author.  
The illustration represents the key aspects from the first user approach in relation to the possible uses of media.

### 5.1.1 Identifying and determining the user group

The main interest that directed this project concerns the exploration of visual interface design as a way to influence social practices in learning environments. The work done deals with the question of how visualization affects the activity of a learning community when sharing objects of knowledge, mostly when that community interacts through a basis of digital-online media.

Certain needs and challenges were brought up in informal conversation with students from the department of art education at University of Art and Design Helsinki. Interesting possibilities of introducing new digital tools to this community were observed, in particular in the studies of the MA programme that is held through online media (*virt@*).

Art students and virtual communities appeared to be an interesting joint to focus for the first purposes of this project. The community of virtual groups of art education is characterized by being dependant on online media. In this community, the use of virtual environments and of visual communication are recurrent and one can find good possibilities of taking advantage of emerging applications for online communication, as well as for new practices with mobile devices. Three basic characteristics demonstrated that this group is suitable to explore, in terms of proposing solutions via GUI design. These characteristics, enlisted below, led to focus the project on one specific user group and guided the first approach to user analysis.

- Art education is a very important degree at the UIAH (the second largest community in the university<sup>2</sup>) and the pioneer inside the same institution for offering MA degree studies through virtual learning.
- “Art education” implies an interesting combination of theory and praxis; of self style development and intersubjective perspective; and as students are meant to be prepared for teaching in a modern society surrounded by new media, besides being a community dependant on a virtual environment to fulfill their learning processes, it also implies the combination of crafts skills and use of digital technology.
- Art students at *virt@* are generally studying and teaching at the same time, they have family and other occupations; in all, they are a suitable example of a community conformed by nomadic participants.

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<sup>2</sup> Information available on the Web Page of the University of Art and Design Helsinki: <http://www.uiah.fi/>

The objective of doing user studies within this community was to find out if their practices of learning through virtual environments can or need to be improved. And if so, to find out if a conceptual, graphic user interface design, could contribute to the improvement of the learning practices in the community.

### **5.1.2 Observing the community**

As a first process of observation, a voice interview was arranged with the head of the MA programme in Art Education, Professor Martti Raevaara. The most important concern detected in this interview was the need of an efficient tool that lead the students to show their works within the course, and so, be able to open a channel of feedback around those works.

The next approach was to the potential users of the tool, the students; this was done with voice interviews to two students of the field of Art Education who have been studying and also teaching in both, face to face and in virtual courses. These interviews were directed towards the activity of sharing artworks between art students, in order to get a clear idea of how much importance was actually given to the practices of sharing between the students and to detect if the use of digital media was already being used by the general Art Education community. This first approach determined the scope of the project in a general perspective of the demands of the user group.

A new interview to one student from the *virt@* community was held some time later. This interview was videotaped and comprised three main points: the emotive aspect of studying a hands-on field through digital media, the motivational aspect of interacting with the student community through an online software, and the technical aspect of the habitual use of digital media. This interview was more structured than the previous ones with the aim of getting the most objective and meaningful information possible.

The main characteristics of the study environment were detected through an analysis of the three stages of interviews to the community. The basic points have been extracted as guidelines for the continuity of the project<sup>3</sup>:

- The community is not used to share their visual material collaboratively and through most of their studies the learning process is very much independent and isolated.
- The community (teachers and students) is aware of the importance of keeping a constant active channel of information other than text based.
- The community feels in lack of a motivating environment that stimulates social learning practices as constant sharing of material, opinions, and ideas.
- This motivating environment should be part of them, identified by them as a place of belonging.

This first set of interviews (done during spring 2006) was useful to draw a general perspective of the basic possibilities of working with that community. Later on, a specific user group from the community of *virt@* was addressed for the purposes of this project. The user group was a course of 26 students in the final theses seminar: “*Mestarikurssi*”, taught by Jouko Pullinen, on an online base through a Virtual Learning Environment: *Moodle*.

A last interview was needed to get deeper details on the users personal characteristics and on their activities as a group. The interview (held in December 2006) was designed to be group based. It was structured in order to encourage discussion around the users’ experiences through their practices of virtual learning. The whole interview was taped and notes were taken as well from strategic points of the conversation. The aspects addressed then were their study methodologies, their actual sharing and collaborative practices, their expected learning outcomes, their degree as technology users, their means of motivation, and their particular expectations with technological tools.

Referential notes were taken during the interview from the following points:

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<sup>3</sup> From: Castro, Brenda. “CAS: First research paper”, March 2006 available in <http://mlab.uiah.fi/~bcastro/cas/whatis.htm>

- A general observation of the online learning environment that they use for their studies
- Group interviews, studies, observation, and analysis of the focus group: (students and teachers-tutors). These were done in order to determine the scopes and limitations of the project.
- Personal interviews.

The basic points discussed by the users that had to be considered in the design process are enlisted as a result of the interview:

- The students have normally several courses that take place in the same Virtual Learning Environment. In that sense they lack visual incentives to identify one course from the other and to pick the course in which they will work in a specific moment.
- Freedom is basic to them: they must feel in control of their time in regards to studies but at the same time, they do not want to be left behind in any of the courses.
- Quality of life: they agree that having the possibility of following the studies through different media is important for them to prioritize without leaving their studies behind.
- Having the freedom to decide if their participation is passive or active in different stages of their learning processes. Giving feedback to each other should be motivated and not obligated.
- Time is crucial for their daily activities and for their success at studies as well, they appreciate anything that makes interaction through virtual environments an easy and productive activity.
- They are normally more motivated to talk about their own work than commenting someone else's work.
- Having always to depend on the computer as a means for interaction makes them feel tired of the use of keyboard and mouse most of the time.

- As students in the field of art they all show interest on something new that makes the visual a relevant aspect of their interaction and that it is somehow something of their own, something that they “grow together”.
- They showed interest in something that helps on the process of selecting the information, due to the difficulties of fulfilling every expectation and learning goals in very limited time.

Besides the interviews held individually and in-group to the community, the activity of the group was followed through previous allowed access to their learning environment. It was possible to observe the practices of the user group and this was very useful for completing the understanding of the community. In this way the studies were closed with observations of the user’s activity through *Moodle*, the virtual learning environment that the community uses in this time for all or most of the courses:

- The activities are followed by most of the students, which are commonly based on discussions about their projects. Students post their participations and attach images of their works in progress but sometimes they are difficult to appreciate due to the big diversity of size and format between the students’ pictures.
- The students were very motivated by the way the course was taught and the medium was not a limitation for them to share experiences. This shows that a medium is just as efficient as the users make it.
- The studies, and work around the studies, were done independently. Participations were sometimes commented but mostly by the same people, the structure of the virtual environment provides the means to communicate through text and even if images are posted sometimes, the whole communication evolves around the written tasks. This shows that the tool works well for the theoretical-task purposes but the social and visual aspects of the community can still be strength and that could possibly lead to better communication and collaboration between the participants of the community.

### 5.1.3 User needs and possible solutions

A formulation of 5 main points to start a design process resulted from the analysis of the user studies:

- How to make CAS application a less time consuming and not an added need to the already busy schedule of students?
- How to approach interaction from the understanding that it is a complex problem in virtual learning (maybe as in classic learning) as levels of motivation, of knowledge, of skills etc. differ between students. A non-motivated student can spread apathy very easily the other student(s) if the interaction between them is not mediated in a positive way.
- How to make of CAS a tool to provide extra motivation to all kinds of students, creating more productive collaborative workflow.
- How to design CAS in order that it maintains the sensation of “freedom” but that it also provides active sharing of information.
- How (and why) to design digital tools that fight the feeling of frustration on having to access several environments that work technically different and have different elements that users must learn continuously.

An important aspect that needs to be brought up is that there is a general concern related to text-based environments being tedious for the field of Art Education<sup>4</sup>. Visual communication is a basic requirement that is not fulfilled by their current virtual tool. All the time, or most of it, the students have to communicate through e-mail, the works and participations are posted as text in the learning environment system and they are also commented through text input. With the basis of aiming on a motivational tool, where students can express themselves in more intuitive ways, new possibilities for communication must be considered in the development of the concept.

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<sup>4</sup> An extract from the last interview is copied as an example of this concern: “If I’m a professional artist I don’t have the time to waste to writing with doing nothing on art. Writing and writing for commenting while one wants to do art (...)” Translated from Finnish by Fanny Vilmilä.

It was found from the user studies, that introducing new practices with mobile devices, as has been the first aim of the project, was not very plausible and convenient. Before changing or adding media devices in the community's practices, it is a design concern to help solving the needs of the current problems on the use of media. The idea of ubiquity that was part of the inspiration for this project was not left apart with this conclusion, rather, it is taken through what seems to be a more feasible way: by approaching the design solution through online media, thinking on its accessibility through ubiquitous devices.



[Figure 3] The possibilities for mobile phone are considered during the design process.

It is convenient to explore the group behavior when interacting through an Internet based network as a re-exploration of the media they are familiar with, and to which they already have access<sup>5</sup>. A way to observe those aspects is by testing existing tools and analyzing the common behavior. The aspects to analyze within the use of an existing tool are: self/group motivation, self/group identity, as well as integration, participation, and building as part of a community. The tool to be used for testing is chosen according to the aims of the project.

<sup>5</sup> The introduction of mobile practices would require special technological features that most of the participants from the community were not having at least by the time of the user studies.

The interviews revealed the possibility of designing an application based on dynamic behavior of the interface<sup>6</sup>. The users showed motivation for the principles of interaction with a system that gives visual feedback on the progress of the community or on the progress of an individual. Providing a dynamic visualization could be encouraging for participatory practices, participants would be enthusiastic to visit frequently the virtual environment to see how it has changed. The interviewed users also showed a need of interactive elements that motivate students to give active feedback. A first way to approach this would be by using multimedia options (audio and/or video feedback) and taking advantage of mobile devices besides the personal computer.

CAS must be carefully designed so that is not interpreted as “an other” learning environment, but as an extra “simple and free-chosen” motivational resource. It also must be a user-centered interface designed: easy to learn and carefully not to create new technological boundaries.

## 5.2 Exploring tools

Part of the user studies were done through observing the community interacting with software that provides certain approach to the needs already identified.

In order to select the software in which to test, and also as a phase of research to find possible existing solutions, there was a process of exploring several examples of social networks and graphical user interfaces. This worked basically to frame the project in terms of the elements of interaction that the user group requires. Certain findings also worked as inspiration to the design approach.

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<sup>6</sup> The last interview was strong in this statements, in some parts of the interview the users started imagining ways in which the environment could show feedback, they mentioned small elements of change, as colors or patterns and even avatars, they came up with an association with a garden that changes everyday with the care of the owners: “Some visual way that requires interaction, it could be our own place that changes with the participations. Something really small would be already improvement. Something visual (as changing colors, flowers, but not ugly or cheap or badly design)” Translated from Finnish by Fanny Vilmilä.

Different tools for information visualization and social networks were observed. Those of information sharing and social networks are: *Flickr*, *Encompas*, *YouTube*, *Myspace* and mobile *Myspace*, and *Wikis*. Those of information visualization and organization: *kartoo*, *thinkmap*, several projects linked in [visualcomplexity.com](http://visualcomplexity.com), *PLwire*, the visual language at [plw.media.mit.edu](http://plw.media.mit.edu), *OpenStudio*, *kanshin*<sup>7</sup>, and *netvis*.

The main tools observed were in relation to sharing media objects and social networking. *Flickr* and *YouTube* were the first examples analyzed, as the most popular services for sharing media objects in visual and video formats. The main interest in observing these tools is the way they are used socially with a basis of intrinsic motivation (see page 26 in *Introduction*).

From the aspect of considering the use of different technologies to access a network, the tool observed was *Encompas*, a project being developed by Arki Research Group at MediaLab Helsinki. *Encompas* consists in sharing images that can be grouped together in the system as “baskets” and organized categorically. The principal aspect that motivated the study of this tool was its development under the possibilities of mobile communication. *Encompas* allows the users to upload pictures straight from mobile phone via Multimedia Messaging Service and to explore the objects in the system through the mobile as well. Observing this tool helped to frame the idea of CAS as how to provide extra elements for learning processes from a basis of online networks.

An interesting tool in terms of motivating artists or visual-oriented people in general is the project *OpenStudio* designed by The Physical Language Workshop at MIT MediaLab. This software consists in a basic drawing tool and a community interacting by drawing and trading with the drawings. The tool results motivating in terms of economy: people sell drawings and the rise on the price of their drawings inspires artists. The importance of this project in relation to CAS is the fact that a simple added value to the artwork (in this case the economical) can increase motivation to produce and share between participants of a community.

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<sup>7</sup> A prototype in <http://xml.kanshin.jp:8080/index.php?ID=278004&MODE=normal>

The tools observed were used as a comparison between user needs and software services. Most of the observations were also useful as inspiration for a new design solution.

The next chart summarizes the observations that were more useful for the design process, considering examples of the three main objectives of the observation, which are sharing, motivating, and communicating:

<b>Identified needs</b>	<b>Tools</b> , from the point of view of:		
	Sharing	Motivating	Communicating
	<i>Flickr and YouTube</i>	<i>OpenStudio</i>	<i>Encompas, Facebook</i>
Visual environment	Provides	Provides	Provides
Visual motivation	Only the implicit in some posted material	Provides	Only the implicit in some posted material
Promotion of visual identity	Only through the images themselves / individual	Only through the images themselves / individual	Only through the images themselves / individual but can be also group
Sharing	Provides	Provides	Provides
Motivation to use the tool	They can show their photos/videos to other people far away	They can acquire the images they like and can see if people likes their images too	They can share material and communicate with a group of contacts, and also meet new contacts
Stimulates feedback	Allows comments	Not directly	Allows comments, posts, interpersonal sharing
Social practices	Propitiates	Not directly	Propitiates
Work collaboratively	Does not propitiates	Does not propitiates	To some extent
Closed communities	Allows	Does not allow	Allows
Show dynamism	Through the recent uploaded images	Shows transactions, changes continuously	Shows the latest changes as rss feed

The observations represented in the chart are very summarized and some points need special attention. For example, the aspect of visual environments, even if the tools provide one, those environments are very complex to be used as a learning tool. A big amount of information is shown in the main screen, between images and

text, and most of it is not useful to the learning purposes. There are many elements that are not needed and therefore result distractive for a motivational-learning tool.

It is also important to indicate that the visual elements of the tools observed, as well as the dynamic aspect of the interfaces, are not related to the common building of a visual identity, that is one of the basic aspects identified as needs. The last from the most important points is that restricting a community is not necessarily isolating it from the distractions of the general community that conforms those environments. In the software that allows private groups, there are always announcements or extra information around, that does not promote focus on the group activities.

### **5.2.1 Observing through software**

The most important aspect in the aims of the project is to motivate practices sharing visual learning objects. In that sense, the tool selected to test the interaction of the community was basically a tool that enables sharing practices of visual and audiovisual material.

The tool selected for this testing was *Facebook*. This software is a Social Network for sharing information in different ways and formats. The principal reasons why this software was chosen was some of its features:

- The software enables sharing. This practices of sharing happen through communities that can be set as independent and private, therefore, the students feel freer to post personal works that can be also in process.
- Written communication can be done through different ways: Information about oneself: “personal profile”, greetings and daily news, and announcements or notes of events, news, etc.

- All information evolves as feeds [frequently updated content] which makes the network a very dynamic one where all changes are enlisted immediately when logging in.
- Share artwork: through a photo gallery that can be used to store visual portfolios with unlimited number of artworks. Each artwork can be named, described, and commented, as well as tagged, approached from an informational aspect through use of keywords that help also to search and categorize.
- Participants can share almost anything within online media: albums, pictures, Web Pages, videos (from *YouTube* or elsewhere) or even *Blogs* and news that can be imported to the software.
- One can create events, which can be used for collaborative practices and to share information on, cultural or art related events.
- Sharing through this network is enabled with login and also without doing so through sending the information to share (images) by e-mail or Multimedia Messaging Service.
- *Facebook* can also be accessed through mobile phone: it has an alternative design for mobile web, and uploading through Multimedia Messaging Service and Short Message Service are supported.

In short, this tool can be used to have a visual follow-up of the artworks that are created through a course and have also instant feedback around them in an informal and group-based environment.

To do the testing with the focus group it is important to clarify that the use of a network like this is an extra practices apart from their Virtual Learning Environment. This tool is not a “Learning Environment” but a network system, in that sense the expected results are not meant to replace the use of a Virtual Learning Environment but to explore the possibilities of alternative resources for motivation which may help to learn better and strength the relationships within

course mates. The tool allows participants to build a personal space that is directly affected by the other participants of the community providing the principles of belonging to a group identity. By using this network each participant can grow her own space and social practices can determine a collaborative grow.

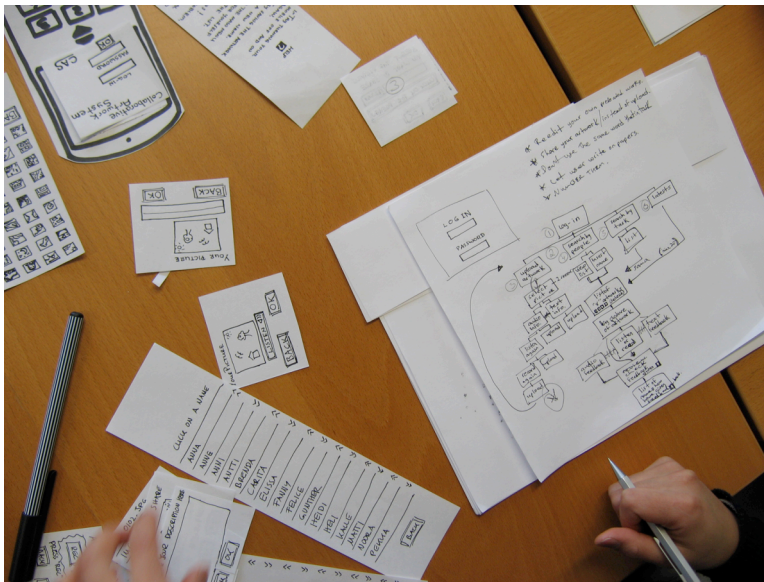
The testing of *Facebook* took place for two months with an open invitation to the whole user group of *MestariKurssi*. There was very little participation during the testing due to several aspects, the most common were that it seemed to take too much time to sign in and start to use the software, it seemed too difficult to learn for the little time that the users could spend on it. The software was too much text-based and it presented a lot more information than what they could use or even handle. The users did not find it very motivating and not very different from their Virtual Learning Environment as to use it as a second channel of communication. In general, there was clear that the users needed a tool presented immediately as a visual motivation and also a tool that does not imply much time for the users to start using it, to learn it, and to communicate through it meaningfully. The access should lead immediately to an interactive and easy to use interface that shows in dynamic way aspects of identity and collaboration representing the group.

Due to the very busy schedules of the users there was not enough time to test more than one tool and therefore the user studies concluded in this phase. The starting points were settled down already and there seemed to be possibility to propose a new tool after understanding the practices of the community and knowing the elements to consider in the new design.

## 6 CAS Design Process:

### Problem solving through Graphical User Interface

This chapter is dedicated to the process of designing the concept of a tool that responds to the established aims, the theoretical framework, and the user studies. The description that follows through this chapter considers the main stages of the process, from the first sketches and visual interpretations to the final concept, which is described in steps in order to provide the elements required for the practical development.



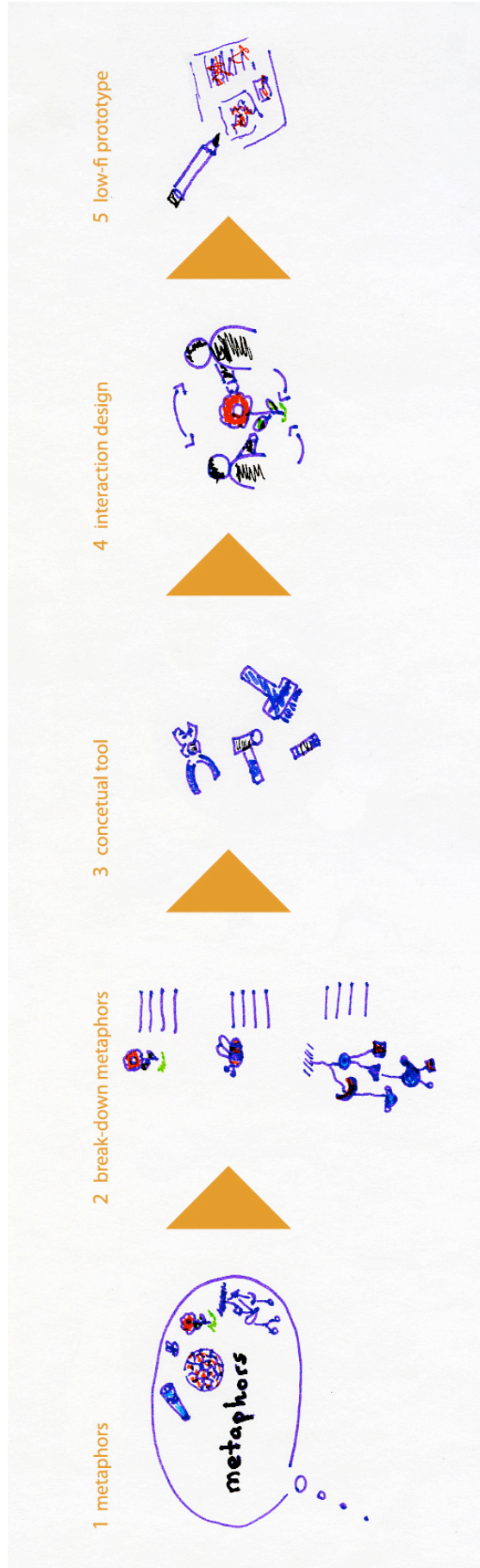
[Figure 4]

This picture illustrates the background of the project; which was the exploration of an interface design for a mobile application in which students could share their works easily and comment on them.

The design process consists in the following steps:

1. - Brainstorming, based on finding metaphors.
2. - Braking down the most relevant of those metaphors.
3. - Selecting from the described metaphors, the features that will be considered in the final design.
4. - Planning of the interaction user-user and system-user.
5. - Visualizing the tool and the functionalities through screen representations, scenario building, and concluding with the design of a low-fi prototype that allows testing certain specificities of the tool.

[Figure 5] Next page. Illustration of the methodology used through the design process



## 6.1 Metaphors

Together with synecdoche, hyperbole, and onomatopoeia (as the most commonly used figures in modern times and in visual communication), metaphor is one of the rhetoric figures brought from the oral and written tradition in order to represent ideas with the purpose of communication and persuasion. A metaphor is the figurative way of expression in which a thing is represented by something different than the thing itself: a “metaphor consists in giving the thing a name that belongs to something else” (Aristotle in Coyne, 254).

Synecdoche is a type of metaphor in which a part is used to represent the whole thing. The use of a flag in a Web Page or in an Operating System, as in the case when the flag of the British Empire stands for the English language, is an example of synecdoche. Metonyms are types of synecdoche in which the representation is done through a logic of continuity, for example, a steering wheel stands for driving, an action that is the result of a steering wheel.

The hyperbole is the use of exaggeration to represent something by emphasizing certain attribute. This rhetoric figure is very commonly used in online conversations, mails, or forums with *smileys*, which are icons that use an exaggerated physiognomy of expressions to communicate emotions.

Onomatopoeia is the representation of things by using sound, to imitate the thing represented. This figure is used in text-based communication, in informal conversations through chats and e-mails. It is used also a lot in publicity and other means where visual experience aims at recalling more senses.

Rhetoric originated with Greek philosophers as a skill to be used in the agora in order to persuade around political issues. Much after the times of *polis* and *agora*, that skill has been addressed through a diversity of studies related to communication, language, and representation. The study of rhetoric has been approached through the work of many theorists, from semiologists as Saussure and Pierce to new media theorists, due to its importance for understanding the way

communication influences actions. Rhetoric has its origins in oral communication (speech) and was applied much later on to visual communication. Now, a time in which digital mediation opens new forms of communication, rhetoric is reduced to metaphors as an approach to actions of human-computer-human interaction.

Rhetoric is the skill of strategically using signs to communicate and convince effectively an idea. Rhetoric is about language, and language's basic element is the sign. In Saussurean terms, a sign and its interpretation (the signified) compose meaningful ideas. The context of place and time has driven the use of signs through different stages in history. "Communication is always the use of signs which are entities characterized by signifying something external to themselves" (Tapia), while rhetoric is the deliberate use of those signs in order to persuade actions or induce a specific understanding.

In literature, basically in poetry, rhetoric figures have enriched the art of expression for thousands of years, creating representations out of signs and contextual meanings. With the use of rhetoric figures, communication has been enriched not just in the field of written language but in the field of speech and graphic communication as well. Nevertheless, in the age of digital media, communication transforms radically and so does rhetoric. The object of persuading is instead an intention of prompting, new rhetoric imply "validity" (Manovich, 77) and not ambiguity.

This new understanding of rhetoric consists in the use of metaphors as models. It implies the design of technologies with the purpose of guiding behavior through a symbolic representation of elements of interaction.

An approach of digital technologies through effective use of metaphors as models implies natural interaction between man and machine: "The use of visual metaphors (...) informs the design process as much as it enables users' understanding" (Krippendorff, 99). The role of rhetoric in designing digital media solutions is not anymore that of persuading as in Aristotelian times, neither that of illustrating in order to magnify the importance or the beauty of an idea; in digital media design,

rhetoric is about the use of appropriate tangible phenomena as a ground (as a model) to create understanding between users and technologies. By using situations, words, pictures, and metaphors that are natural and known to most users, a user's expectations about an interface are supported, and cognitive directness is increased (Hix, *et al*, 39). Thinking of metaphors in the field of mediated communication and interaction design helps to create a natural approach to human needs, thus, by generating an spontaneous association between the new artifact that is being designed and common places that are immediately identified by the users as human beings living in certain context.

Metaphors are very much related to artifacts, in the sense that natural phenomena has inspired technologies and served as a model in the designing of tools. Richard Coyne sees this inspiration as a two sides effect: "technologies are described biologically and biology is sometimes understood in terms of technologies" (Coyne, 280). It is a human nature to use signs as an understanding of phenomena, to explain something through examples and comparisons. The use of rhetoric in this sense, in the context of interface design, relates to the purpose of finding natural and ergonomic associations between the medium and the human action.

### **6.1.1 Use of metaphors as brainstorming for CAS**

Using metaphors in digital media helps to approach design solutions through contextualized environments. "Graphical user interfaces (...), based on visual metaphors (...), support users' inferences about how the computer system works" (Preece, 134). This section of the project covers the brainstorming that provided the metaphors for conceptualizing the design solution of CAS. A list of metaphorical elements are enlisted below, these elements have been brought up considering the observation of the user group and the analysis of existing tools for sharing, communicating, and visualizing/creating identities. The next step after this list is the description of four different approaches to the design solution based on the metaphors. Braking down these metaphors will result in a concrete concept design, which will be described thoroughly.

Metaphors reviewed are based on the intention of building an interface that works as a place of gathering for the user group, where participants join freely and auto-motivated, a place where learning takes place through an active exchange of artworks, thoughts, and meaningful experiences. The principal metaphors are classified in groups as follows:

### **Related to places and social gatherings:**

**Gallery** - a very obvious comparison to an architectural constrain where people meet socially around works of art.

**El jardín del arte** - (art park) a kind of gallery but taking place in open air and with a particular social activity.

**Orchestra** - as the holistic way of creating harmony: where each and every instrument is important in itself but the musical piece can only happen by the joint of all the musicians with their good work and effort in participation. The same musical piece played by different orchestras will never be identical; each orchestra has its own identity even if they share the same objectives.

**Puutarha** - (garden) as a place that starts as a dried, empty field and can be grown together in beauty and harmony.

### **Related to interaction:**

**Ecosystem** - systems in general consist in the addition of elements that together create a function in itself; reciprocity, feedback, phenomena that depends on the behavior of the elements that compose it, are characteristics of biological systems and can be translated to digital terms.

**Lego** - adding pieces that fit together in order to built a representation of something; building with Lego might result in interesting structures very different from the first plan or idea.

**Mobile** - (kinetic sculpture) the aspect of motion characterizes these visual (and sometimes also sound) structures; commonly conformed by very simple shapes, elements create together a three-dimensional composition that implies interactive behavior and commonly recreational activity (e.g. mobiles for small children).

**Related to the visual:**

**Honeycomb** - this natural phenomenon is characterized by the building of complex, double sided spaces for storing, through the disposition of hexagonal structures. The aspects of efficiency and continuity are what interest me in this association; a method of storing that allows infinite participations and connections through a method of nexus.

**Kaleidoscope** - a dynamic disposition of small independent elements that create a diversity of visual forms when arranged in several combinations.

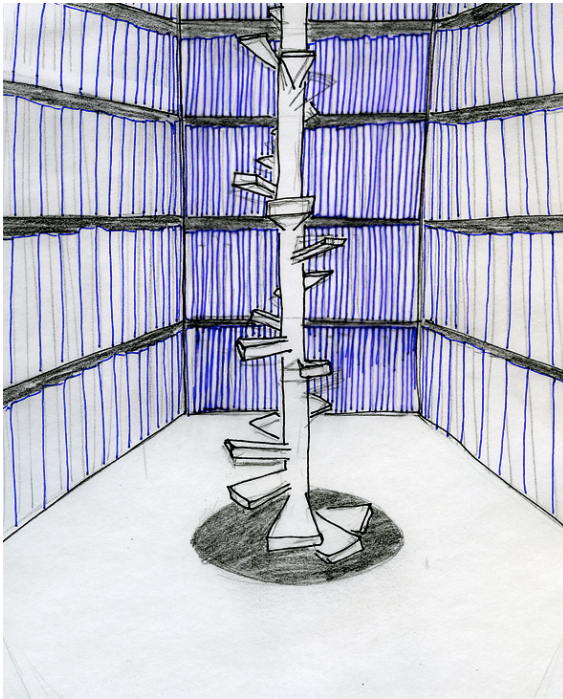
**Mosaic** - as the art of creating patterns out of numerous small elements of particular color and shape, which fixed together can generate a great diversity of models and designs.

**6.1.2 Breaking down metaphors**

Four different initial concepts are described as a breaking-down process of the metaphors enlisted before. The first one is an idea that refers basically to the visual metaphors, mainly from the model of the “honeycomb” but relating it to an architectural association with the novel *The Library of Babel* of Jorge Luis Borges, that describes under the placement of hexagonal structures an utopian complex library that comprises universal knowledge. The second breakdown is also based in a visual metaphor, that of the mobile as a kinetic sculpture. In this second idea the visual aspect is approached through a dynamic point of view, considering as well the possible behavior between the elements composing a mobile, what is translated to interactivity of the digital system. The third approach is based on the urban space *jardín del arte*, which comprises an interesting view of the social activity around artworks, opening room to aspects as collaboration and feedback. And finally the concept of *puutarha* is described thoroughly, as a common place for building a visual based environment that enables friendly and relaxing communication. This concept reutilizes some elements from the three previous ideas and is taken further as a complete design solution.

### 6.3.2.1 Honeycomb (art-comb)

This metaphor is inspired by Borges' description of the space that com The Library of Babel. An architectural constrain characterized by an immense (maybe even infinite) disposition of hexagonal rooms, following one after the other horizontally and vertically.



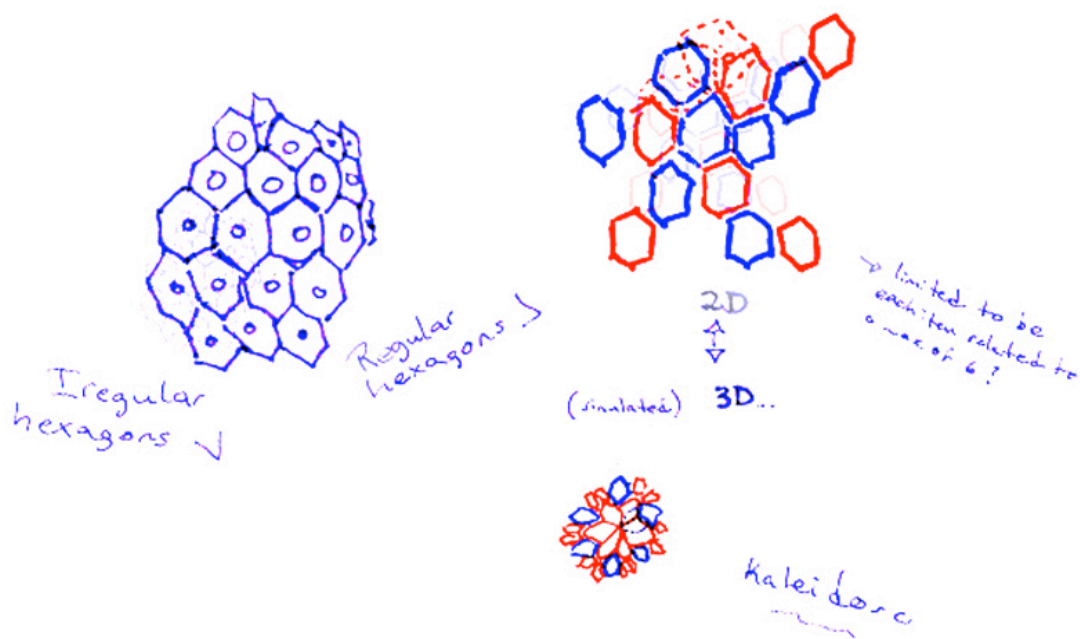
[Figure 6]  
Illustration by the author. Representation of Borges' The Library of Babel: "The universe (which others call the Library) is composed of an indefinite and perhaps infinite number of hexagonal galleries, with vast air shafts between, surrounded by very low railings..."<sup>8</sup>

The visual interface that comes out from this idea is represented as an "art-comb", from its similarity with a honeycomb. An art-comb is built through a process of adding hexagonal thumbnails of the artworks that share walls one after the other, just as Borges' library of Babel, and just as bees build their honeycombs. The building of an art-comb progresses according to the needs of the art students—as the honeycomb progresses after the needs of the bee.

In the honeycomb, each slot from the comb must be equal in proportions, resulting in an impressively precise composition. The disposition of regular two-sided shapes of walls and a floor determine functionality and effectiveness. A beehive results in an amazing natural design for storage, a design structure that has been admired and copied by humans in different places, situations and times.

<sup>8</sup> Borges, Jorge Luis. The Library of Babel in *Ficciones*. 1989.

Honeycombs are a good example of design in nature, one that provides important advantages to the species by the use of a very simple basis for the solutions to complex cases. An “art-comb” works in terms of the advantages that hexagonal shapes provide. Each artwork would be placed in the interface as a regular hexagonal shape auto-generated by the system (hexagonal thumbnail). This idea aims at allowing and inspiring progressive collaborative building of visual interfaces.

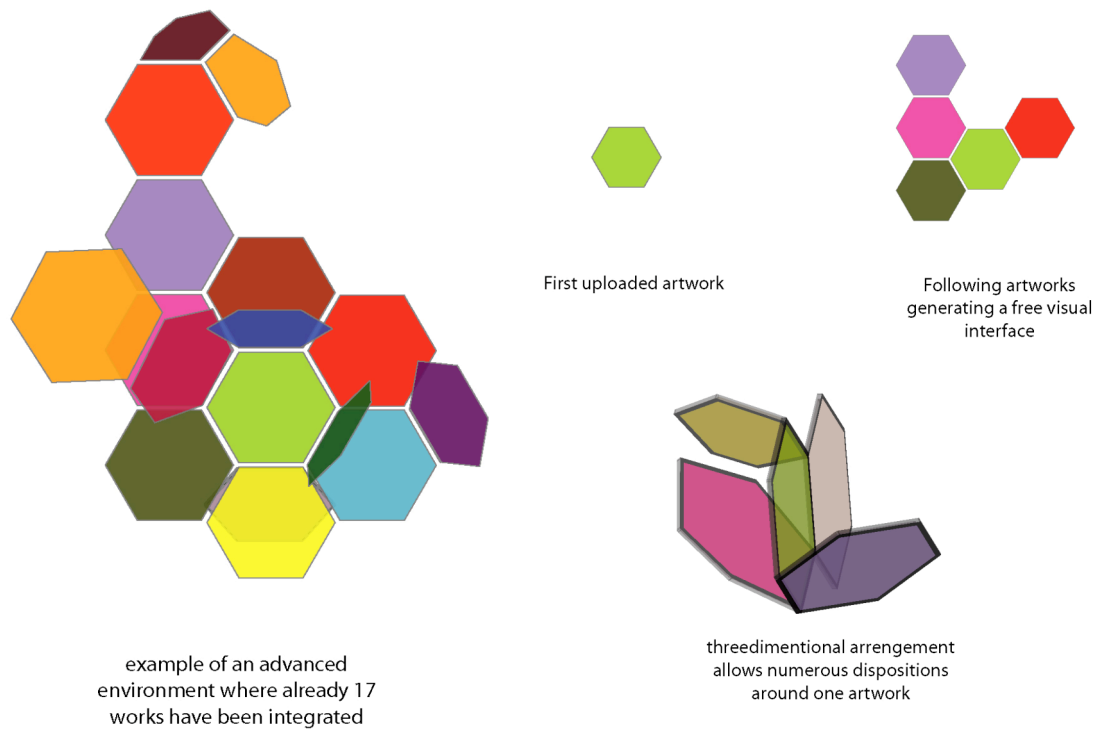


[Figure 7] First sketch of an art-comb.

The possibility to organize visual objects freely into a digital space generates opportunities for association and comparison, encouraging the creation of nexus through emotional and rational patterns. The arrangement of hexagonal thumbnails generates a visual effect of needing to fill in; wherever an object is placed it leaves a visual open space, enhancing continuous arrangement and rearrangement of artworks.

From the system’s functionality the concept works in the following way: The student selects an image file through the system’s interface. The moment an artwork is selected it gets stored into the art-comb to which the artist has joined previously (or picked if she/he has joined several art-combs). An hexagonal thumbnail is automatically generated and is disposed in a random isolated space in

the interface. The author or any other member of the group, then, arranges its disposition by placing the thumbnail in the desired area of the interface next to the work or works to which it wants to be linked to. In this way, the art-comb evolves dynamically with the collaborative features of the interface.



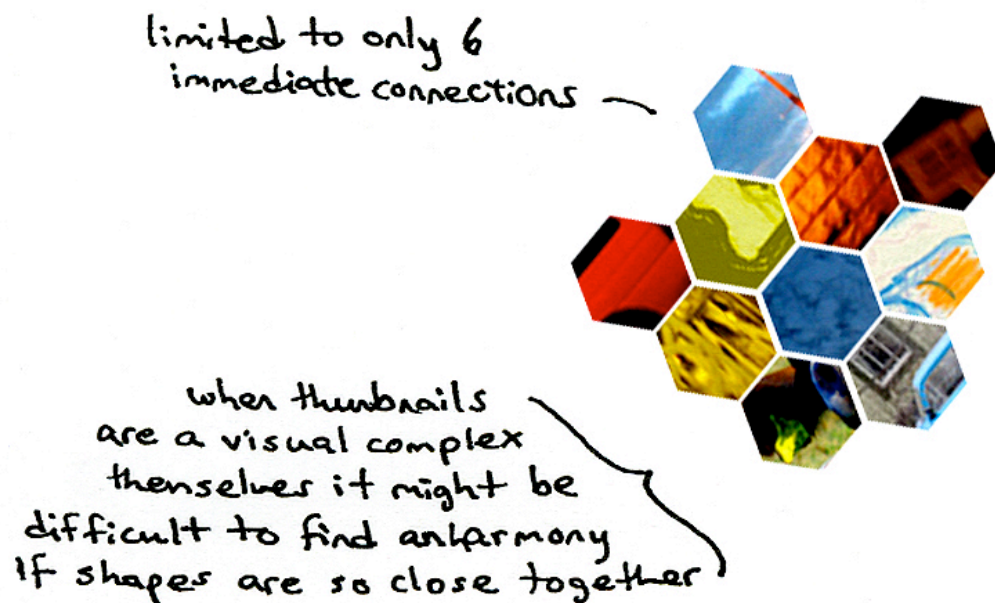
[Figure 8] Left: Each hexagon stands for an artwork, the color given to each one is to represent that each one is a different artwork. Right: Process of three steps on building an art-comb. The third sketch represents the three-dimensional possibilities.

The basic advantage of this concept is its infinite continuity: there will always be open walls to keep the structure in constant development. Artworks can be disposed in even very complex structures, maintaining the individuality of each art-comb as a common space of shared identity. In this kind of structure any member of the network is encouraged to take part on the community, as a collaborative building of the common space. The problem of isolated individuals in virtual environments is eliminated or at least very much diminished in this design as the main characteristic of hexagonal shapes is their puzzle-like aspect, making it easy

and attractive to “match” each other and gather. In this kind of interface design, leaving an isolated artwork is not determining its being apart from the group, as the other participants can attach their own works to it and smoothly integrate it into the collaborative development of the art-comb.

Objects are continuously placed in a process of association. Artworks are all surrounded by paths, which communicate directly with the neighbor hexagon but also generate visual paths that lead even very faraway to other artworks. The use of dimensional possibilities of the space is important to consider providing different possibilities of arrangement that clearly show evolutionary states. Being able to place artworks in different angles, several levels can take part of the visual environment determining important aspects concerning progress and evolution, this anyway, would require a complicated three-dimensional interface and the hexagons would need to be flexible from the corners in order to adapt to several dispositions. Thinking of a three-dimensional environment we get rid of hierarchical or self-centered input. The idea is that the group of images works as a navigable system, which can be zoomed in and out, as well as rotated, in order to appreciate the complete structure through its different perspectives. The structure would be easily observed from any point allowing the viewer to focus in a small area or even in just one piece, being always able to select to access a complete view of the work and the information constituting its independent profile.

The initial sketching of the concept shows interesting possibilities for visualization of identities, as either the two or the three-dimensional version enhances the continuous placing of shapes. The disposition of the hexagons, one artwork surrounded by other artworks directly after the “walls”, leads the eye from artwork to artwork encouraging the participants to have a thorough overview of the images that constitute the entire visualization. Nevertheless, the two dimensional environment would limit the direct level of connections of one artwork to only six other artworks, as shown in Figure 9, and the three-dimensional solution implies a very complex interface, both from the development side and from the user side as well. This is due to the difficulty of having a partial view of the visual environment without overlapping.



[Figure 9] Visualization of an art-comb with thumbnails of artworks. This sketch was used to represent the problematic aspects of this metaphor.

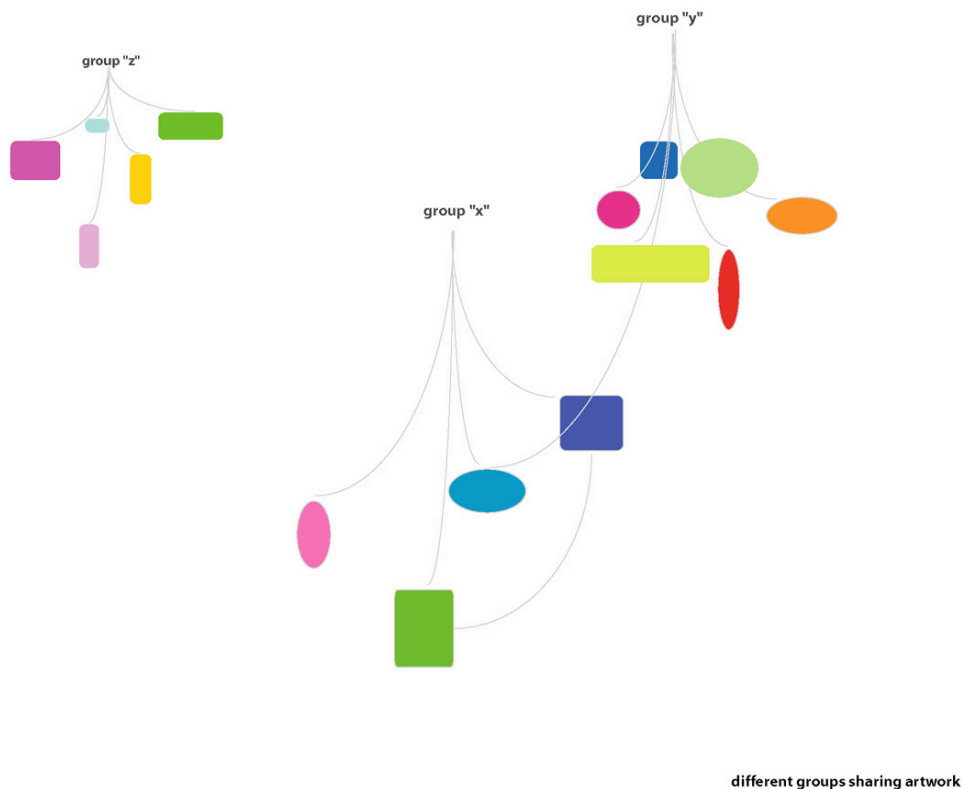
Another problem of this concept is that the disposition of too many visual elements very close to each other might distract the attention towards the content of one independent artwork, making it difficult to appreciate them independently from the nexus. In the three-dimensional solution, a work that is considered important by the users would generate an accumulation of works around it and the main work may be occluded, while the logic is that an important work needs to be easily appreciated. The last problem refers to aesthetics, and it concerns the hexagonal shapes being obliged to create second level nexus when a first level is disposed, meaning that taking one free space around one artwork can imply a place next to another one that the user does not consider “linkable”. This last point may also have repercussions in aesthetic problems.

### **6.1.2.2 Mobile (kinetic sculpture)**

Kinetic sculptures are commonly known as hanging mobiles. This second concept utilizes the metaphor of mobiles or kinetic sculptures as a ground. The tradition of mobiles as art pieces has its beginnings with constructivism in the 1930s. Influenced by the implications of an era taking place around man and machine, Naum Gabo is considered the pioneer of exploring movement as a principle for art pieces. The idea of dynamic structures explored by constructivists (and mainly Calder's works) inspired this concept. It consists in general of a dynamic environment conformed by independent elements that are freely disposed within a space and are moving constantly taking a different place in a natural way.

Although mobiles are just one kind from a huge diversity of kinetic objects of art, the characteristic of using basic physics to create harmonious dynamics is interesting in the comparison with interactive systems. Gravity plays an important role in the visualization of this idea: the accommodation of works has a relative hierarchy when displayed one over the other and when links are hanging downwards. The kinetic interface interprets the level of hierarchy in relation to nexus: the most linked artwork would occupy the upper level and the artworks would hang downwards in that same logic. Actions of linking are continuous and therefore the interface behaves in a dynamic way, moving up and down the artworks in relation to the activity of the users.

The visual disposition of the works in the kinetic interface gives interesting possibilities of relating groups, as represented in Figure 10. Artworks can be linked also to other public groups and a net of mobiles is disposed in the screen. Private groups need in any case to be considered, especially when the focus group is related to learning. In that case, invitations can be a key to make joints between private groups as well.

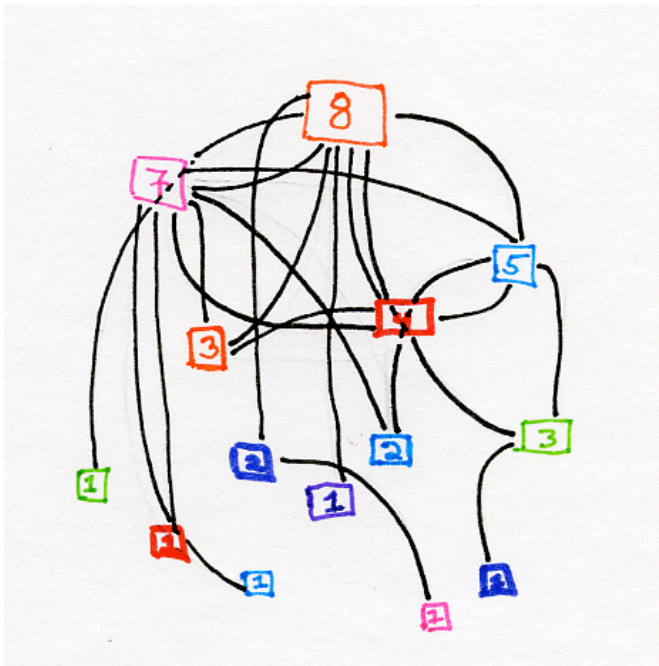


[Figure 10] Examples of visualization

This concept hinges upon the dynamic aspect of mobile as a recreational artifact, in the sense that the relationship between the visual elements and the space is harmonic and interactive. Out from the context of a museum, and rather as objects of small children's entertainment, mobiles have often been design with the use of contrasted colors and shapes that can help the kid to start recognition of objects. This aspect is related to the possibilities of dynamic objects to propitiate intrinsic motivational effects. The active elements considered in the interface to promote motivation are related to the common understanding of play, as the activity that gives feelings of freedom, control, fun, and excitement (Hy, 230). This recreational approach of the visual interface can provide motivation as a characteristic internal to the object, and in that way, attract the activity from participants in an emotional way.

Although this approach may seem very interest in a general view, certain difficulties must be considered. For example, the linking lines from a hierarchical (downward)

visualization become difficult to follow. This can lead the interface to a visual complexity causing disinterest in the users that want to follow the associations between works. This downward placement means also that a big amount of images uploaded to one group will create a large vertical screen. Either vertical or horizontal visualizations may cause limitations to view the interface as a whole. In spite of these problems, this approach has interesting features that can be anyhow considered in the final design solution.

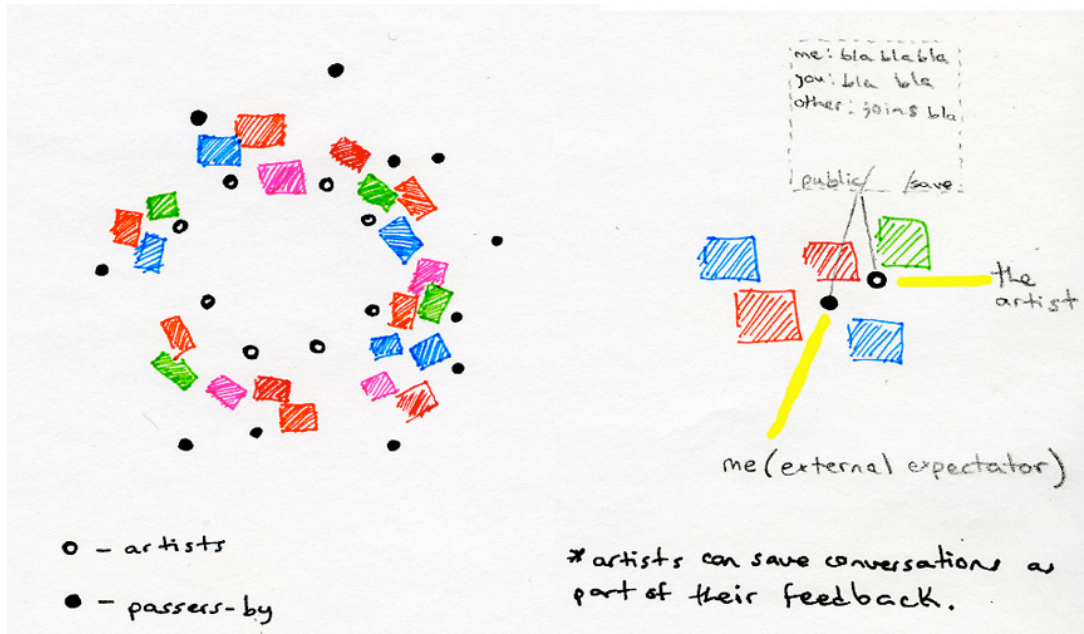


[Figure 11]  
The numbers inside the squares represent the amount of links from/to that artwork.

### 6.1.2.3 Jardín del arte (art park)

The art park, from the concept in Spanish *el jardín del arte*, is about a public, open-air gallery that takes place in free days (Saturdays normally) in specific squares of Mexico City. Like in a bazaar, the main characteristic of the art park is its energy: the movement of people around the objects exhibited, the chats between customers and vendors. Different artists from a diversity of backgrounds, age, social status, converge in these gardens where they exhibit their work at the same time that they draw, paint, or just socialize. One main aspect of the *jardín del arte* is that a community is established in the basis of diversity, of individualities merging

into one shared identity. Artists identify themselves in the aesthetics of the urban space and coexist in a friendly environment that motivates artist's productions. Hundreds of people visit the squares on those days and it becomes a place of gathering around sharing artistic experiences.



[Figure 12] Sketches for *jardin\_del\_arte* showing the social aspect of the interface. The colored squares represent artworks.

Gathering every weekend in their artistic park generates an ambition to generate and show more art pieces every week. This gathering is also a motivation for the artists to develop their skills further on to be still competitive in the exhibitions. The *jardin del arte* has two sides: the internal and the external; in the internal the artists coexist with each other, socialize, talk about their works and their lives as artists and also about their personal lives. The external side is the interaction with the public, the people walking in the street observing the artworks, people that might be or not artists, that might know a lot or nothing about art, but are there to observe and normally to share their likeness and emotions about the pieces exhibited.

As a public space, in an area with particular flow of passers-by, the artworks have a presence in the space; artworks and people share a place in the context. An

artwork needs to be harmonious with the environment, with the natural aspect of the garden as a green area and with the individuals around the area. People cannot be taken out from the context; the social interaction around the artworks is essential for the *jardín del arte* to exist.

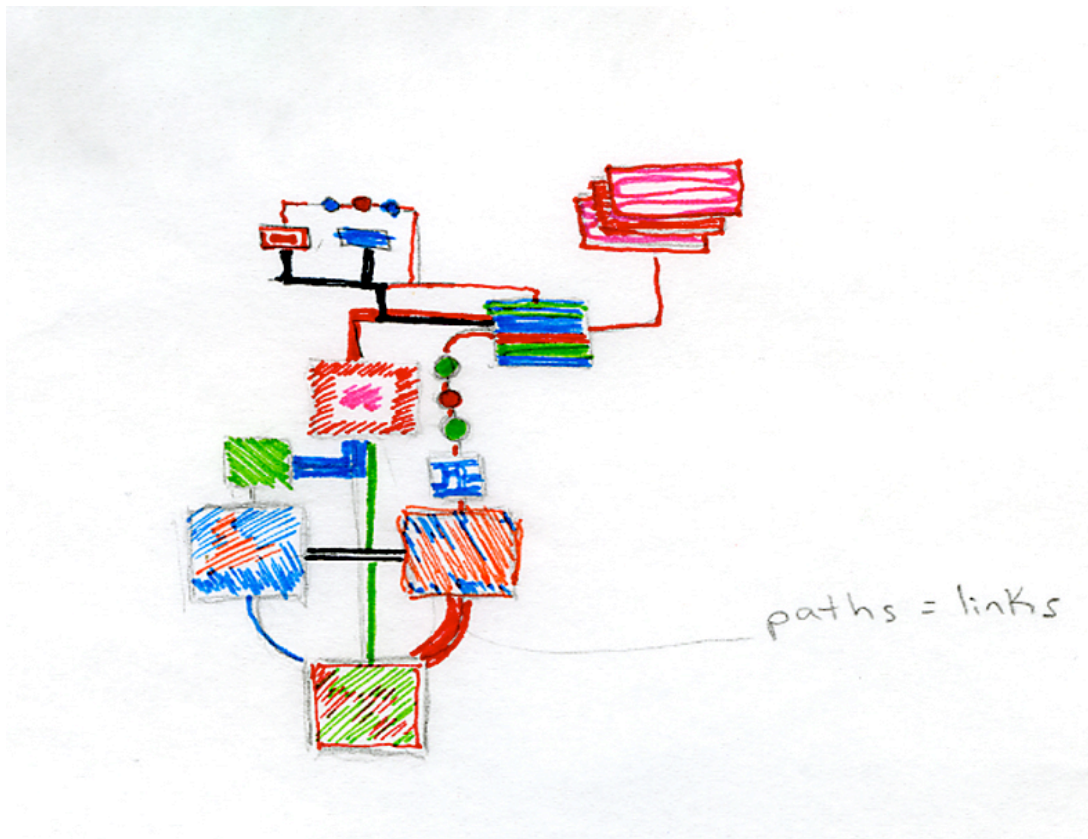
In the virtual system, by using this metaphor, the interface would be opened to the public to see and communicate around the artworks in a first layer of interaction, though a second layer would allow just private conversations and internal activity within only the art community. The disposition of the artworks happens around the artists, who have total freedom on arranging their own space. They all have the same limited area but can deal with other artists to share space, exchange artworks to arrange special exhibitions, and even influence each others personal space.

The social aspect is of great importance in the art park. Everyone, internal and external participants, can see if someone else is standing next to them looking at the same artwork. Conversation between close people is generated from an immersed service of instant messaging. Channels of instant communication may be opened immediately when people approaches people. These channels can be bipersonal or multipersonal and are generated after a work or set of works to inspire communication around the art pieces.

Even though this metaphor may seem promising at enhancing motivation from a social approach, generating a common visual identity can be difficult. The concept of art park brought into a digital interface can lead the artists to pay too much attention in their own exhibition spaces and dedicate very little time in viewing and commenting other people's works. This can be solved with limiting the possibilities of arrangement within the individual spaces and giving more importance to the complete view. Considering the three-dimensional possibilities of this kind of interface can make the space natural looking and more interesting to navigate. Nevertheless, this approach is still limited in achieving the general aims of the project regarding building a common identity.



coexistence or relaxation. This metaphor was brought up during one of the user interviews and developed further. It is grounded in the idea that each artwork is a very particular piece of creation, as a plant that even if it belongs to a specific category it will never have an exact replica. Plants are seed and need to be taken care of so they can grow nice and pretty. A plant little by little changes its form, and it contributes to the flourishing and transformation of the garden as a whole. As in a field owned by several experimental gardeners, they can always grow more or they can even cut, but with the understanding of sharing a common space that has to become a complex that exists independently of the beauty of a single element.



[Figure 15] Sketch for *puutarha*. Each square represents a different artwork, connected with paths of selected width and color.

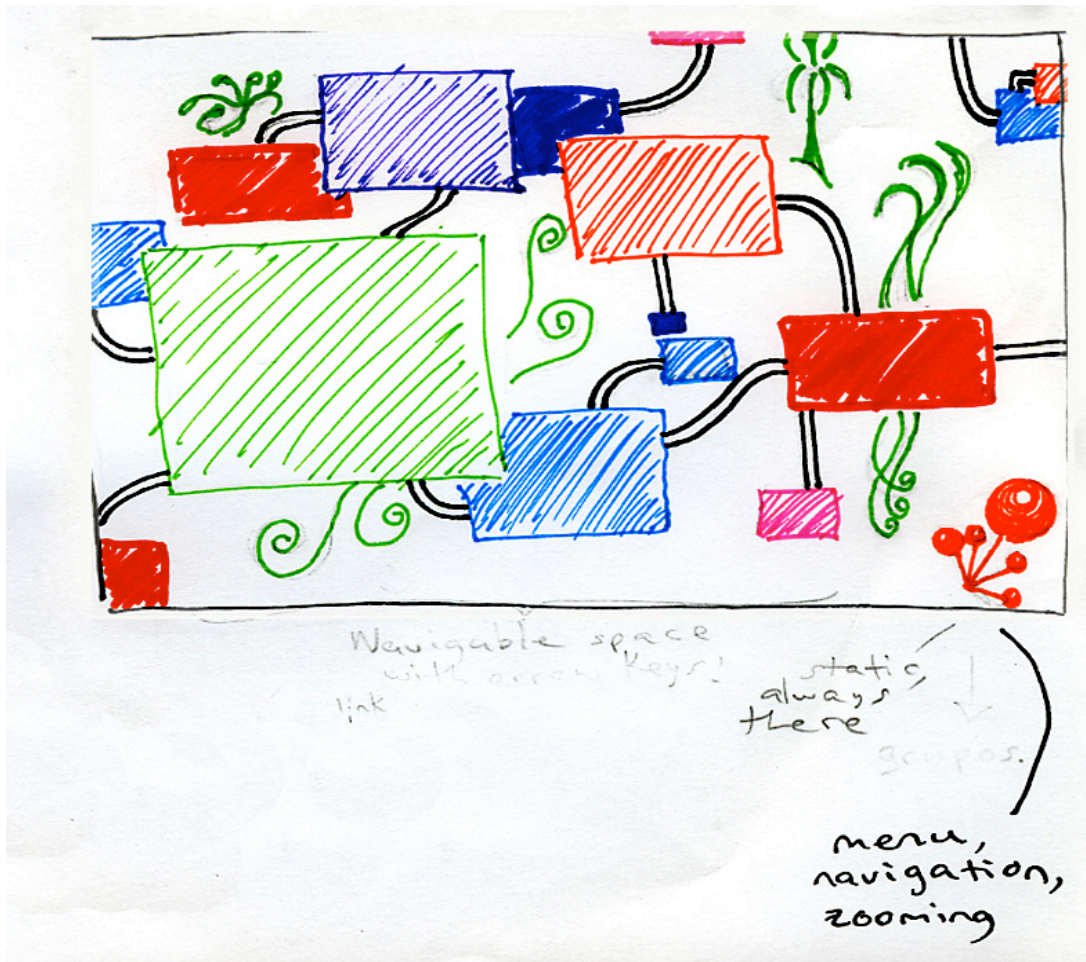
In general, this concept sets off from associating the interface with a botanic park or botanic museum where one can visit all the sections of natural diversity by walking through connecting paths (see sketch 1). In the garden interface, paths are followed depending on signs of identity and personal interests. Different paths can

be drawn from artwork to artwork depending on the causes of the link: For example, finding technical similarities between works will lead to open a blue path between them. Paths can be given different colors when the linking causes are for example emotional. This natural environment immersed in the urban space gives us certain feeling of relief as a small way out from rush and stress. The Virtual Art Garden works in a similar way, as a place for enjoyment after fulfilling the duties of studies. Due to its characteristic of intrinsic motivation, a place like this can be used for effectively stimulating learning activities in a social and relaxing way.

The main characteristic of the digital garden is that it enables the collaborative building of identities by a generative visual environment. Like in the architectural design of a botanic park, paths become essential. If one artwork is left alone without any path leading to it or way out from it, the artwork will be less visited, and therefore, less commented. On the contrary, a work that has many ways in and out will be more visited and thus, will receive constant feedback. Drawing paths become a two-sided advantage: from self-interest to a social interest. When one artwork has many accesses, the piece will most probably be considered as inspiring and will lead to a collaborative *gardening*; causing with this, both, individual (feeling of confidence about one's work) and group (feeling of belonging to a group identity) motivation. This aspect may also encourage an evolution on the quality of the works inspired by the intention of being in the center of the attention when connected through multiple paths.

The comparison with this open-air environment suggests the possibility of a continuous interface: A navigable space, a garden that goes beyond the limits of the screen. Gardeners are free to start new areas to grow and the field can become wider and wider with the participation of all. The art garden becomes a familiar place for the participants, a place where they go around freely and interact around a joint creativity.

This metaphor seems to be the most suitable to focus on. Following the description of its characteristics, the aspect of identity and collaboration through the idea of a common garden seems to be



[Figure 16] Second sketch: Squares represent different artworks, connected with paths.

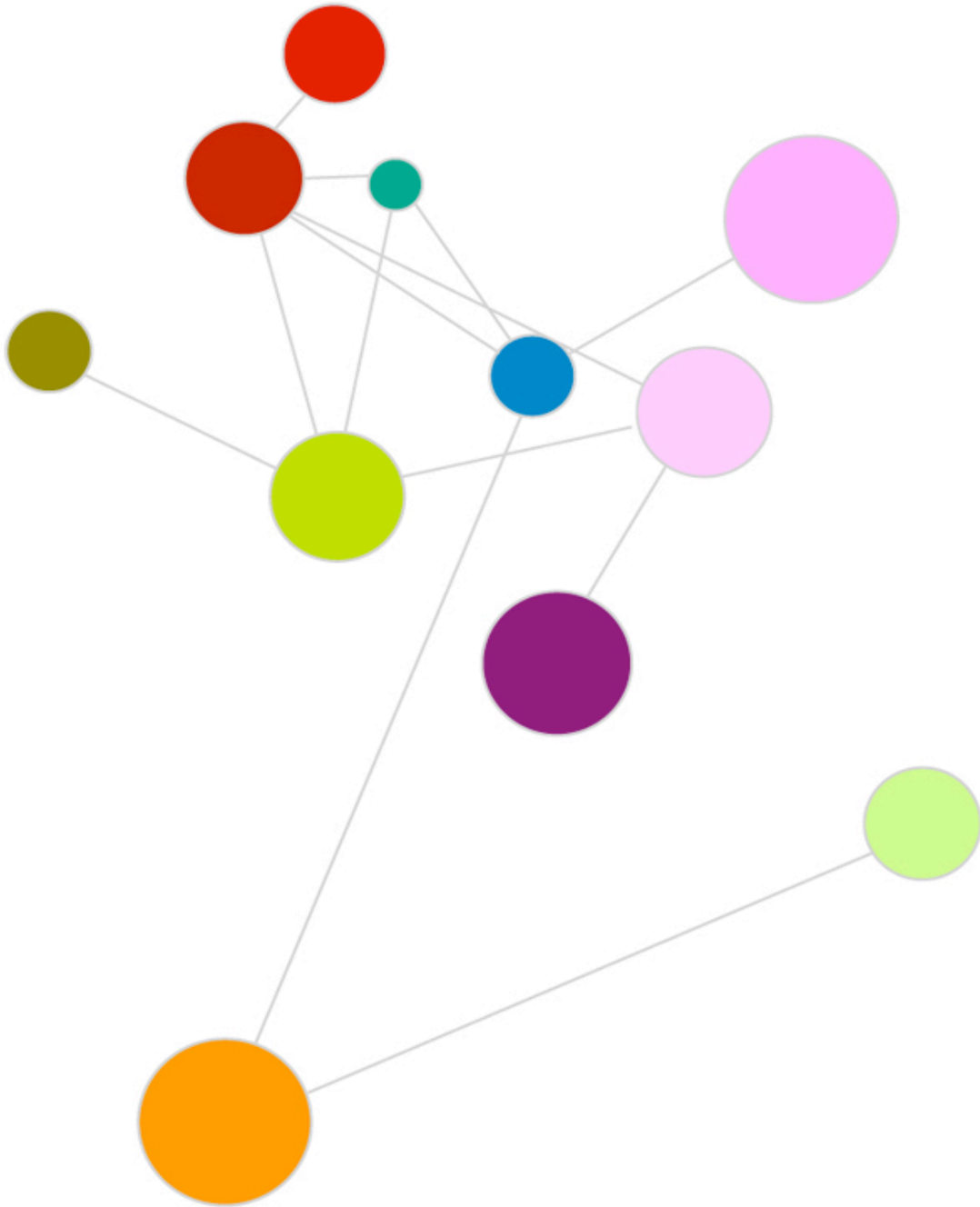
## 6.2 Design concept

The model of CAS is conceptualized as an online application, accessible through web browser from mobile device or personal computer that helps virtual learning communities though it is independent from any learning management system. CAS consists of an extra environment for virtual learners that sustain motivation. Its main characteristic is that it takes advantage of the aspects of social and amusing activities that can bring motivation to the group. The interface will provide the elements to build a visual identity where each participant is aware of the importance of her participation for the common results. The system must be designed based on simplicity of use, easy understanding of interaction, and fast to learn as a tool.

The interface will work as an online system, designed for access through personal computer and also through mobile phone. The importance given to mobile communication is based on the consideration of the aspect of time and place of the user group. The user group, in which this project is based, is most of the time busy with different activities, besides the studies, and sometimes they cannot access the learning system for long periods of time. Having a motivational/learning tool that can be accessed online not just from personal computer but also from a mobile device will be very useful for keeping track of some group activities and feel constantly in communication even if they stay away from the study duties for some time. The objective of considering the use of mobile phone in a tool like this is a long-term ambition, in the sense that this kind of practices might take some time to become daily and natural, at least in this specific user group.

The general idea consists in the conceptual design of a dynamic Graphical User Interface that behaves in a way that the visual aspect of the system represents a common identity, particular to each group using this system. Through a collaborative building of a visual identity the interface shall enhance communities of learning within creative fields to find motivation for communicating their artistic processes and final works through online media.

The main characteristic of the system is that it works as a visual network to show, share, and relate artworks that can be presented visually. The design of the interface shall maintain the following aims: to create motivation on virtual artistic communities for showing their creative productions, work collaboratively, generate and accept positive critique, and converse through their works.



[Figure 17] First approach to the interface design. Each circle symbolizes an artwork and the gray lines are the paths that represent links between the artworks.

In this visual interface users will interact with objects placed directly and freely by the individuals members of the community, creating through that their own visual identity, independent from the graphic design of the virtual environment. The information presented and shared in the interface is introduced visually by a unique map of works, disposed freely by the members of the group. This free disposition allows the community to build a place where they can feel as their own. Although

the concept is focusing in the visual interface as a first motivational element, in its deeper structure it is meant to work as an open channel for collaborative thinking. Besides the visual elements, information regarding learning processes will be encompassing the system. The meaningful learning practice will happen through information about each work and group discussion around them, the dynamic visualization will work basically as the motivational element (by dynamic in this project I mean modifiable, the data changes but it is not interpreted mathematically by the system in a visual way, it is, anyhow, modified by the users themselves. The users are in complete control of the visual modifications).

The visual interface resulting from the participation of the students will be an informational space, and as such, it is in the pieces that conform that space, plus the information interaction between them, where the learning takes place. The first level of the visual interface (the basis of the interaction design) is the integration and modification of elements in a general view. This level is the holistic aspect of the interface; which represents the common visual identity, collaborative processes of building this identity, and other aspects of group participation. The viewer can get a first general impression of the whole visual environment through this level, and presence the changes that participants produce. Each time the interface is viewed it should be a new experience after participation of the users. This level will act as the phase of intrinsic motivation.

The second level in the interface design refers to the way the users approach the visualization. The elements that conform this visualization —the works of art— are objects of information that have to be identifiable independently. Considering that the interface is composed by numerous participations so that it can be very extensive in space, users must be able to get immersed on a detailed tour through the disposition of the artworks. The interface, therefore, needs to be zoomable and navigable in order to provide the users with accessibility to the information. Hornbaek, *et al* mention two main aspects that characterize zoomable interfaces: one is that information objects are organized in space and scale, and the other one that the users interact directly with the information space (Hornbaek, 365). Both aspects apply to this user interface, in the sense that each artwork is an object of

information occupying a place in space and the users have access to this information by immediately interacting with the space and the objects in the space. In general terms of user interface design, navigability implies a search towards a specific goal; in the case of CAS' interface it implies an exploration to find new objects of information.

The third level refers to the works as independent from each other. As each work is an object of information itself, participants have their own personal places in the space through these objects. Participants show their personal styles, their individual identities, they express themselves independently from the community with each work they add to the interface. Each object of information can be studied independently but always starting from a holistic point of view, that is the essence of this visual interface. The information concerning each work of art will link back to the community by showing the works that have paths to it, through comments or discussions around the work, and through other features related to the collaborative aspect of this interface design.

When posting an artwork in the interface, the author of the work is expected to find a place for it considering elements of association. If one artwork shares certain aspects of artistic expression with some other work, the author most probably will identify her/his work with it and place it aside. Considering that this interface application is meant to be used by groups of art students, common elements must be easy to find from one work to the other and therefore, an associated placement is expected; nevertheless, isolated works can also be part of an interface.

From an analytical point of view, a participant (or even an indirect participant as a teacher or tutor) could observe and judge determining factors of the learning practices through the different dispositions of artworks in the interface, also through the history of who has placed what artwork where, and who has linked which to which. The common process of working collaboratively to build a visual map of their works can be very interesting aspects for analyzing different aspects of creative thinking.

### 6.3 Concept aesthetics

A visual element (as almost anything related to human perception) is perceived differently from one person to the other depending on individual mental associations and on the cultural context that the individual is immersed on. Aesthetic perception is an individual experience but seeks always a universal agreement (Kant). Aesthetic experiences, that ever since Plato have been discussed in relation to beauty and perception, refers to the emotional reaction that an individual has after an object or a representation of an object (in most philosophy of aesthetics it is always a representation). It is an interactive experience between the individual and the object, or more likely, the “interdependence among the elements of an object” (Moynihan in Day, 323).

From the motivational perspective the aspect of aesthetic plays an important role, as it is strictly related to human emotional activity; which is subjective but at the same time aims at being shared. From the way the virtual art garden works, a common building of a visual interface represents the aspect of motivation that is propitiated through aesthetics. Trying to avoid the cliché of design what represents beauty, the graphics are clean enough to let the user create their own aesthetics, or to experience their own idea of beauty, ugly, serious, funny, etc.

To motivate the community, the interface features a common visualization created from individual images as a result of collaborative work. Aesthetic experiences are individual but are determined socially; in this sense, participants of the Virtual Art Garden are expected to react emotionally to the visual interface that is generated within a context. Through these experiences, a visual interface influences the activity of the group members and this is understood in terms of social learning as a factor of motivation. The way CAS approaches aesthetics is then in the interaction of the users with the interface, or most likely, with the users themselves *through* the interface. This is comparable to the vision of aesthetics proposed by Krippendorff; which focuses in the aesthetic experience as an interaction of the user with the artifact (Krippendorff, 283-285) that is external to the expressive purposes of the designer.

User's activity in a visual interface is influenced by aesthetics, in higher or lower scale, but it is agreed that visualization is a motivational factor, besides being strictly related with usability and functionality: "Nothing succeeds like visual feedback, which in turn requires a good visual display" (Norman, 101). The garden interface behaves aesthetically from the basis of interaction.

The input that users give into the system affect immediately the visualization of the interface and therefore, it enables visual discussion and an aesthetic agreement between the participants. In an environment where individuals are affecting the aesthetics of that place themselves, the feeling of pertaining is strongly present. A visually adequate interface will provide benefits in the activity of the users. But the direct participation on the aspect of the environment will make it always more home-like, more easily accepted and integrated into their common activities.

Even though the user is given freedom to dispose the objects into the space, a graphic design is not just necessary but very important for the functionality of the interface. Like an architect that considers his clients in the designing of the place where they will live, the graphic interface designer considers the users so they will understand it and belong in it. The graphic design of the art garden interface must consider the role of the users to build their own aesthetics, which has to be done through a visual interface that establishes certain parameters.

The aesthetics of the interface are based in interaction and therefore, common agreement must be propitiated through a subtle and partial design. The elements of freedom for the users will be thoroughly determined; a total freedom in the manipulation of the visual interface would endanger the fulfillment of the aims, and would probably lead to chaos instead of agreement.

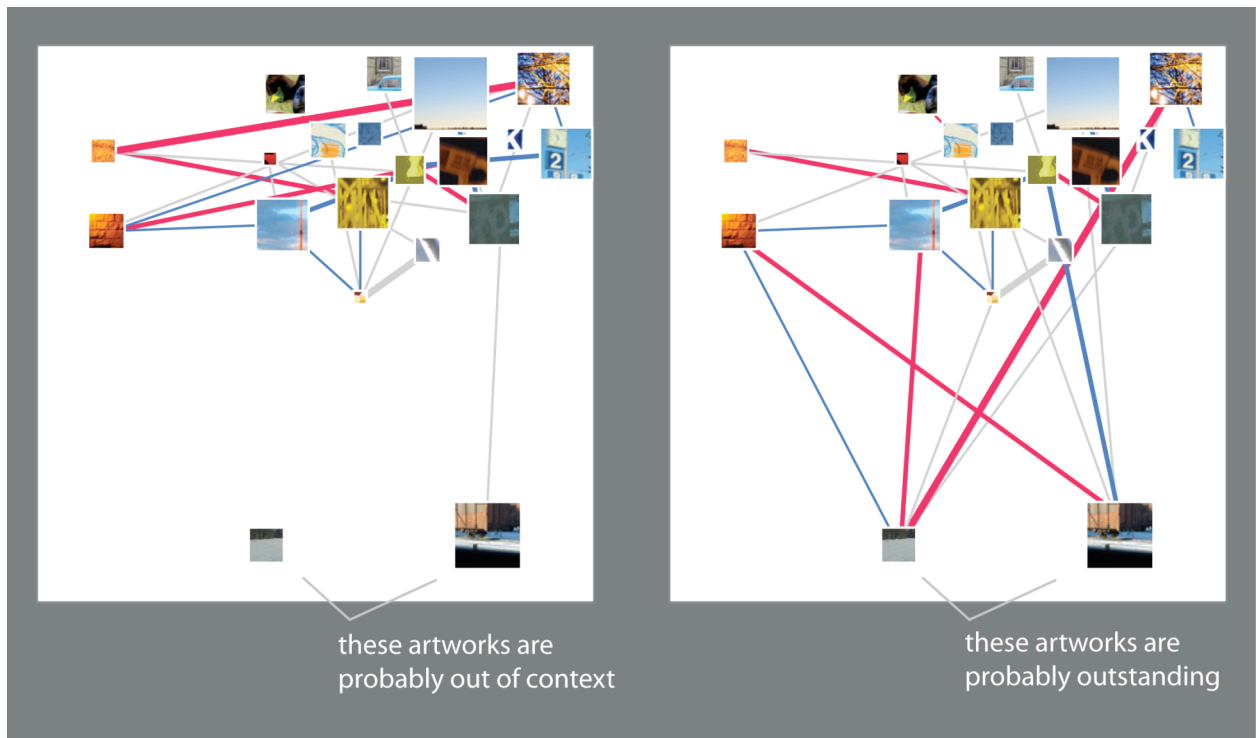
## 6.4 Designing the Interface of The Virtual Art Garden

The design of the interface follows the metaphor of the Virtual Art Garden, due to the possibilities shown in the description for intrinsic motivation and for enhancing collaborative building of identities. The interface of the VAG (Virtual Art Garden) is focused in user interaction through immediate perception. This is obtained by a simplification of the elements that compose the interface and by designing a navigation that is easy to use and fast to learn.

The sketches used in the metaphors work as a basis to conceptualize the space and explore its uses. After defining more clearly the general concept and the aspect of aesthetics, a new process of sketching is used to develop screen views on the visual interface design, which consider visuals, features, and interaction. A list of the basic elements to consider in the interface is the basis to start interpreting the GUI. The basic visual elements that compose the main screen of the interface are image thumbnails and paths. The simplicity of the interface can be achieved by using the visual elements as a threshold to more information constrained as metadata. From this principle, the sketch obtained is a simple and clean visualization that works as a ground for the rest of the elements to branch out, this first representation is shown in Figure 17.

There are two elements represented in the screen through the first level of the visual interface, these elements are: 1. - The artworks 2. - The paths. Artworks are incorporated into the system either from mobile phone (through web browser or by sending the image by multimedia messaging service) or from the personal computer. The artworks have been considered within the range of time and space:

- Time (when it was uploaded)
- Space (where it is placed)



[Figure 18] Representations of time and space.

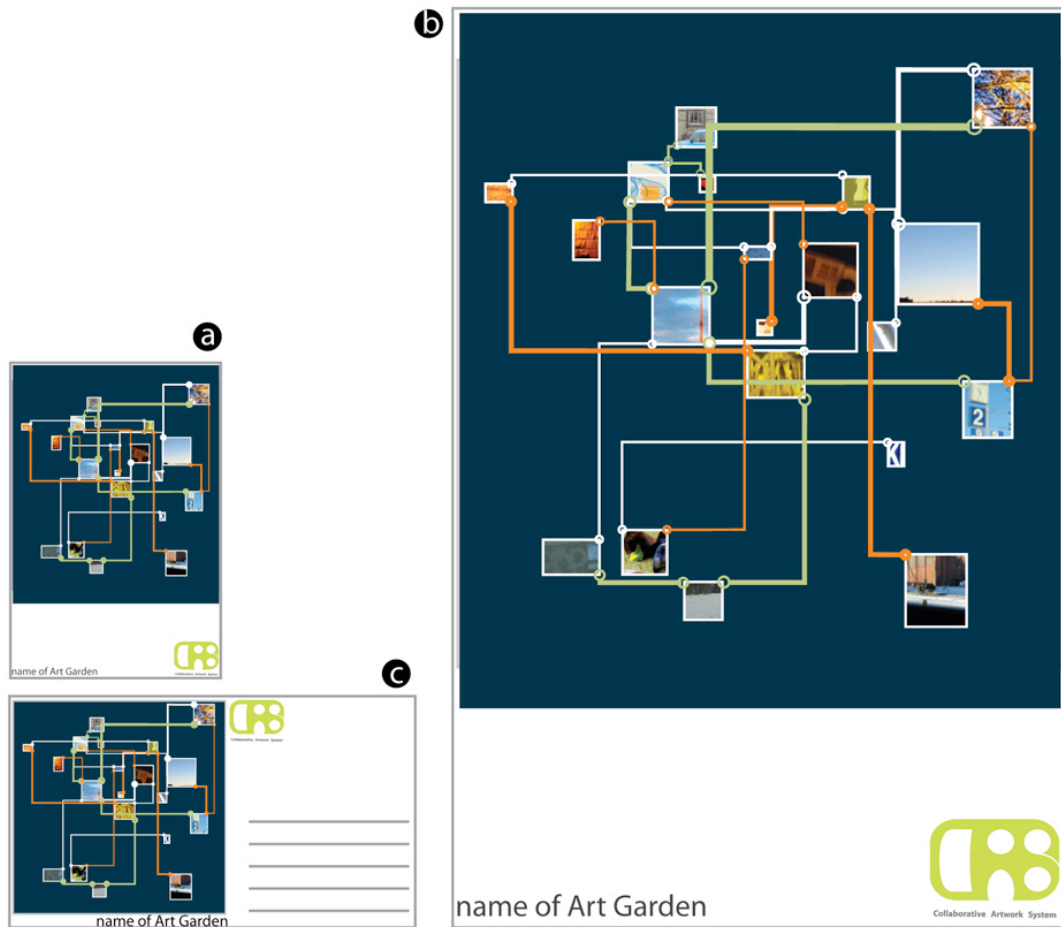
The aspect of time is represented by scale, which gives a notion of three-dimensional space. With the advantages of navigation and zooming, the images in the interface become informative, as they represent progress through time. Older images become slightly smaller as new artworks are integrated into the interface. Considering time allows the community to have a visual history of the interaction. As this project is conceptualized from the perspective of learning communities, this aspect is key, as students and teachers can analyze the evolution of the works by navigating the garden.

Space, in this case, is about the disposition of elements within a map. The possibility of dragging the artworks gives the users control over that space. What makes each garden a unique visualization is this principle of free positioning. Distance between artworks is arbitrary; it is dependant on subjectivities acting in the same ground. Any member of the community can do the placement of artworks any time, and the results can be interpreted in relation to particular characteristics of the user group. As shown in Figure 18, if most of the artworks, for example, are gathered in one place and few are left apart from the group, and this happens through a

process of common agreement, this kind of visual representation can help identify weaknesses and strengths in the ambition of the course.

The first screen that the user encounters is always the visualization of the garden. In the case of the mobile version, the interface can be navigated and zoomed through arrow keys and a menu will give the options of uploading an artwork and of editing the garden. In the case of the personal computer version, the interface will present a floating menu, which consists in four options: upload artwork, open a new path, edit garden, and create memory. The first option opens a top screen containing a form to upload an image stored in the computer. This form has several informational functions. It gets the image file and the contextual information about that image (title, author or collaborators, description of the work, and key words to relate the work with others). It also presents the functionality of linking through a check box list. In that way, the uploading of an artwork implies as well the principle of communication. When the artwork has been linked and given information details it is ready to open the functions of communication around it, which happens in the third level of user-interface interaction.

The option of “open new path” that appears in the floating menu of the personal computer version is an extra way to add paths directly from the main screen when no artwork is being uploaded. This option is useful when linking is spontaneous. The action of linking in this way is connected to aesthetic experiences in the sense that, when navigating through the visualization, certain object creates an emotional reaction that needs to be communicated (this communication can anyway happen from opening a path or also from adding a comment in an image profile).



[Figure 19] When the community decides to close an Art Garden they can get a printing version of it as (a) postcard (small) format or (c) poster (big) format. They can also send an electronic postcard (b).

By clicking on “garden” a top screen will appear where the user can modify the general visual aspect of the garden. The options in this section are: change field color (changes the background color), change emotive paths (changes the color of the emotional paths), change technical paths, change paths to right angles or to shortcuts (the option “right angle” forces straight horizontal and vertical lines while the option shortcuts generates diagonal paths), and change art-plants to round or square shapes (generates thumbnails in shapes of circles or squares). These simple options of visualization enable a huge possibility of diversity between gardens. It also promotes discussion and general agreement to a common understanding.

The last option from the floating menu is that of “create memory”. The way this works is that it gives an option to generate printing versions of the visualization. These options can be a medium format poster or a postcard version, which can be also digital to send via e-mail. Having a tangible object after the concluded period of gardening can be a way to enhance self-analysis over one’s participation through a collaborative work. This option is also a motivational object for learning groups to continue a process of communication even after the objectives of a course or studies have been accomplished.

Navigating in the visual interface will give place to the feedback process motivated through the system. Feedback is given through the artworks posted in the interface; each one of these artworks has a space for a “profile” where all the information concerning that artwork is gathered. Artworks are objects of information and this is the most relevant aspect to consider in the interface. The elements of information for each artwork are: image, tags, description, comments, awards received, about the author, other works from the same artist, linked works.

In the artwork’s screen the image occupies the mayor area and it links to a full screen view of it. The other elements that conform the informational space around the artwork are meant to encourage participants to have constant communication around the artworks:

- Tags are used basically to establish relations between works; they also give a hint to the participants visiting an artwork profile about the important aspects of that work.
- The description is needed in order to let the artist express herself and give details about the work that could be interesting to start conversing around.
- Conversation can happen through text messages or also through audio, the importance of audio is given from the characteristics of the user group, which find normally more motivation to give their opinions through other means than

writing due to the impersonal characteristics of this medium. It is also thought in terms of the use of mobile devices, where writing can be more complicated and slower than saying spontaneously what one is thinking.

- The element of “awarding” is a collective motivational task that consists in using symbols to express in a fast and easy way the likeness of an artwork.
- The information about the author is shown in a laconic way due to the fact that the user group is normally part of an already existing community, where other systems are used and user profiles are already present. The main objects of information in this system are the artworks themselves and not the artists; in other words, the way the artists are known is through their artworks.
- The last elements are displacements of the thumbnails of artworks related. These thumbnails are links to the work’s screen and they work as navigation objects, leading the user to travel through the net of related artworks that conform the interface.

The concept of the interface is based in two main ideas: Identity and motivation; which are used in terms of the hypothesis to improve learning practices that are virtual and community based. The elements of identity are mostly the artworks appearing in the interface as a map. The artworks alone are the objects of information; they carry feedback and other data. The placement of these artworks is also an object of information on itself, in the sense that they act as a pattern of recognition within the community. The placement in the map is visual information about the community, its identity and activity.

Users will be adding images and linking them with each other creating intentionally or no intentionally an object of their own. This is the main aspect within identity matters; the way the interface grows and evolves is through a process of participants’ recognition in which the users become represented as a community.

Motivation is the second basic purpose of the project. The interface itself should work as a motivational element by influencing the participants to get involved in the evolution of the visual as a whole. Other motivational factors are the possibilities of awarding. With this feature, participants can motivate each other by giving positive hints of feedback about the works. One can see how many awards the group has been giving to her own works and what kind of awards they are. An artwork can be awarded in terms of originality, aesthetics, capturing, skills, expressiveness, or a specific quality that participants can consider important to mention. Paths opened from artwork to artwork are also a mean of motivation. When one's work has been linked with different new objects the artist will feel positive about that work and that can influence the artist to post more works and to be more active in general with the interface.

[Figure 20] Next page. Representation of the Virtual Art Garden with thumbnails and features.

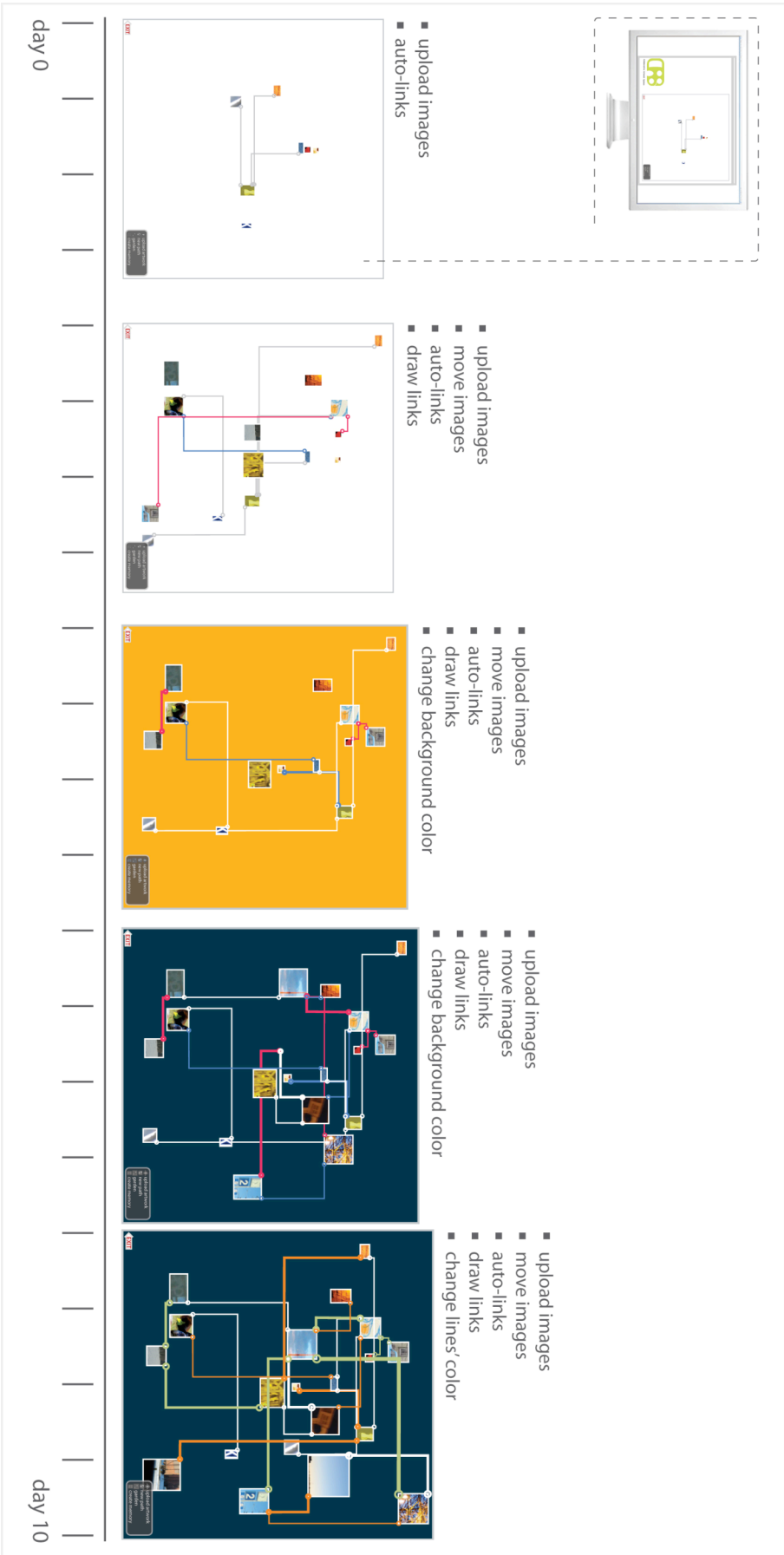


### 6.4.1 Design structure

This work concentrates in the design as a concept to be developed further on. In that sense, the structure focuses strictly in the features related to the aims of the project. It is based in group demanding, found in the user study, as it is meant to be a community system and enhance collaborative practices. The project in general is focused in group interaction from a holistic perspective of learning environments. All different sections of the interface must lead to collaborative thinking. The design structure will not consider personal data as an important informational element (possibly future developments could demand it); profiles are based on the works themselves and not from the artist's perspective. The system's architecture is designed with the purpose of enhancing sharing artworks.

As a community-based environment, just its members can access an art garden. The initial screen of the interface is considered as a very simple introduction to the system. A basic *log-in* is required from the user to access her garden. If the user is member of several art gardens, a top screen will provide the option of selecting which garden the user wants to enter, the user can also select an option to preview all the Art Gardens that she is member of. Following the basis of artworks as the main elements of the network, information about the participants has to be very summarized. The information elements regarding the users are reduced to: name, studies or background, and contact details. Deeper information about the participants is not necessary for the aims of this project and it is meant to be stored already in a Virtual Learning Environment, which the community is using as base of their studies.

[Figure 21] Next page. Schema of the possible progress of the visual interface with users' activity.



### 6.4.1.1 Interface elements

The principal elements in the visual interface are the following:

- Image thumbnails
- Linking paths
- Permanent floating menu (to perform essential tasks)

The secondary elements: these are those elements that are not seen immediately in the first screen:

- Artwork preview
- Artwork information view:
  - Comments view
  - Awards view
  - Other works from same artist
  - Works linked to this artwork
  - Tags assigned

### 6.4.1.2 Interface structure

**GROUP** (considering that it is community work, each community must have its own, private group)

- Name of group
- Group description

**USER** (in relation to the system)

- Name and last name (appear in authoring)
- User name
- Password
- E-mail (to retrieve password if forgotten)

**AUTHOR** (in relation to the participation)

- About author (summarized profile, straight forward and simple)
- Works
- Works linked to his works
- Comments made to his works
- Comments made by him

**ARTWORK**

- Image
- Thumbnail
- Title
- Author(s)
- Description
- Tag

**LINK color** (Relation based on)

- Blue (style)
- Red (emotion)
- Gray (other)

**LINK stroke**

- Thick
- Normal
- Thin

**AWARDS**

- Originality
- Aesthetics
- Capturing
- Skills
- Expressiveness
- Other

## COMMENTS

- Text
- Audio

### 6.4.1.3 User tasks

Those tasks that the user individually can perform are enlisted next. These are LOW (and also medium)-LEVEL TASKS.

From the contribution aspect:

- Integration (posting/placement) of visual and/or audiovisual work to the network.
- Filling work information by writing or recording—considering the use of mobile phone): work title / date of creation / technique / description / credits: other authors or collaborators.
- Linking artworks: by selecting from the other posted works the “recommended” or “related” or “inspirat-ed/ing” are linked through the work “page” which makes the linked works more possible to be seen and therefore commented.

From the observer aspect:

- Go through the posted works in the order of preference that the user decides (by being able to visualize the whole complex of posted works in one screen and easily jump from closest to farther from the mobile phone or arbitrarily from the computer).
- Get information of one work. Select one posted work and go to its “description” page (where the user can see a good resolution image of the work and the information about it).

- Comment one work (from mobile phone / from personal computer).
- Award a work adding a new qualification / selecting one established qualification.

The next list refers to the tasks that users, as a community, can perform. These are the HIGH-LEVEL TASKS:

- Communicate visually by showing / visiting the artworks produced related to the course(s).
- Discuss and reflect around each other's works.
- Give qualitative (commenting) and quantitative (through awarding or voting) feedback to motivate participation.
- Create a group identity and, at the same time, stand for their individual artistic qualities to be identified by the community.

## **6.4.2 Features and Interaction:**

### **6.4.2.1 Groups**

Different spaces of dynamic structures can be built by generating new groups similar to common social networks. A group is for example one course about "ceramics" but then almost the same people are taking "photography" as well. One user can be part of several groups: Different courses might be using the same tool but through separate groups, the diversity of students, the difference on how the course is taught, etc. are aspects that create an original environment in each group. Users can join a group when they are invited to do so or they can search for the gardens that are visible in the system and ask for direct permission to join.

Anyone can create a new group and then by that she/he can determine the openness or possibilities of being part of it. After a group has been created every new participant has the same rights over it than the creator, the group as a whole would be able to determine if participations are visible or private, and if it is possible to “register” or if invitation/acceptance is needed. When the user logs in she has a view of a list of the groups that she belongs to and can select from the list, the user can see all the groups she is belonging to and can “browse” through other “visible” ones from the main screen of the interface.

#### **6.4.2.2 Placing thumbnails**

Each image that is uploaded to the network is automatically set as a drag gable thumbnail, the author of the work is able to locate it in any free space on the interface, an overlapping of thumbnails would result as a negative action in a learning process and therefore should be considered as not possible from the system’s side. Each artwork is already part of the community as they become part of the visual interface and therefore anyone of the participants is free to rearrange it and play with the visual aspect of the community.

#### **6.4.2.3 Linking artworks**

Being objective, accessible, and positively critical are qualities that both artists and educators must develop in order to perform their work in a good way. Considering one’s work within a context and admitting the fact that this context affects directly and indirectly our self development is core to grow as a professional; the linking feature in this interface approaches this aspect and aims at generating participatory practices that will enrich the user’s job as teachers helping in the forming of societies.

#### **6.4.2.4 Time feature**

The first artwork loaded to the system takes a central position; recent uploads take upper level positions represented by slightly bigger shapes. The interface evolves in a three-dimensional view where nevertheless elder artworks are always visible and linkable with newest.

#### **6.4.2.5 Information**

Each thumbnail represents an artwork and is in itself an object of information. The pedagogic aspect of the interface is in fact supported by the information that each artwork carries with it. The drawn paths are communicating as well, and they are also important elements of information. The use of tags refers to this visual objects, they behave as automated links between artworks in the following way: Two lists of words are included in the system, one including the possible technical links and the other one including those determining the emotional, the words that are not included in neither of them will link as “other”. Most of the information included in the interface is structured as objects of metadata.

Another aspect of information is the log in process: that which concerns the system and the user as an individual who is given access to that system. This refers to the need of providing restrict access and introducing safely certain information.

### **6.5 Scenario**

A narration of a possible case explains more precisely the whole concept of the art garden, while the design of an envisoner scenario (MacLean, 192) provides a thorough description of a user interacting with the system that helps to detect design problems or weaknesses while it works as a pattern to follow in the future development process (Carroll, 4).

In this section the two narrations are considered. The first one is entitled “case scenario” and encompasses the ambitions of the design in regards to the social and pedagogical practices engaged in the project. The second one is entitled “envisioner scenario” and describes through the users’ point of view the interaction within the interface.

### **6.5.1 Case scenario**

Satu has opened her first personal exhibition as part of her study plan for her MA in Art Education. Because she studies through virtual learning modality (most of her classmates are in other places of Finland, and some even outside Finland) none of her classmates is able to attend. They all want to have a look at her works but being so busy and far away makes it very difficult. Satu, then, decides to start an “art garden” at CAS - VAG (Virtual Art Garden). She signs in and starts an art Garden that she calls: *mestari*, as the purpose is to show her work to her classmates on *mestarikurssi*.

At the opening of her exhibition, Satu takes some pictures of the main room gallery with her camera phone, later on her way back home, using her mobile browser, she logs in the VAG she just opened and selects her two favorite pictures to share with her course; as they are both related, she tags them as “exhibition” and plays a bit by changing the visual aspect of her new Art Garden while she waits for her bus stop.

When the other students from the course see the VAG that Satu created, some comment her work through the VAG, motivated on having a place of their own to converse, as it is a friendly environment and is not regulated by a teacher or tutor; some also start to share their own pictures and others even make big changes in the way the garden looks.

Soon, more students from the course open their own exhibition and want to share their experience through the same VAG. All the images from student's exhibitions are linked together, creating a very interesting visual atmosphere that the students themselves have made their own, have "personalized".

At the end of the course, the teacher, who have been invited also to comment their works through VAG, creates printable greeting cards, although she can make them electronically, she prefers to post them and handwrite to each of his students as it is a small group and they would appreciate it more after having most of the interaction through electronic means.

Some months later, Satu talks about her last exhibition while having a coffee with some new friends. She wishes to show some pictures about one of her exhibited works but has erased all from her mobile phone, so she goes to the course VAG and logs in to find her posted works. She notices that some classmates have still been adding pictures, linking, and commenting on their present projects and experiences. She is glad she got the postcard from her teacher as, although she felt exited for the new changes, she wanted a memory of how the VAG she created was looking at the end of the course. She showed the pictures she wanted to her friends and later on she kept checking mestaris's VAG every now and then. Enthusiastic about the experience of belonging to an Art Garden, she decides to keep using VAG through the different groups of artists she joins in her artistic life!

### **6.5.2 Envisoner scenario**

Background: The tutor in the art course communicates with the students through a Learning Management System where everyone has entered their profiles and contact information. Through out the course, the tutor is aware of the student's continuous production of artwork, but there is no much communication around those works so he decides to create a Virtual Art Garden and propose all the students of the group to participate on it.

The tutor has this idea while traveling in a train and so he enters the online application through his mobile phone. He sees the options to log in and also to create an art garden so he clicks in the button of “create art garden”. He then enters the name and year of the course in the field of the garden’s name. He writes also his e-mail address so the system recognizes the user (if the user is new it automatically sends log in information to that address).

He doesn’t have the list of e-mails of the students at hand so he just presses ok and quits the application. Latter from his personal computer he checks the e-mailed confirmation of the new Art Garden. The mail includes the tutor’s information stored in the Art Garden System and the name of the new Art Garden as a link to it. He clicks on it and enters his log in and password in the main screen. Then he copies the e-mail addresses of the participants into the field of “invite people” and selects from his gardens the one he just created. He presses “O.K.” and a confirmation window enlists all the e-mails to which the invitation will be sent and shows also the name of the garden that they will be invited to. He clicks on “accept” to confirm the invitation and posts an announcement in the L.M.S.’s page of the course to ask the students to check their e-mails for the invitation and he mentions in short as well the things they can do in the art garden.

One student checks her e-mail soon and reads the invitation. As she is new in the system she receives a provisional log in name and a password that she can change any time to something that she can remember easily. She clicks then in the link of the garden and goes to “change password”. In the same window where she changes the access information she also adds a short and informal presentation of herself, she clicks “O.K.” and in the next window she selects the name of the garden to enter. As she is the first participant there has been no image integrated yet. The system shows immediately a top screen entitled “upload artwork”. She remembers she has some pictures of her last exhibition in the desktop so she clicks the button “browse file” and selects her picture from the browsing window, then she presses “O.K.” and gets back in he “upload” window. She writes the name of her artwork shown in the picture; she writes also a small description about it in the specified text field and some words that express her aims and feelings towards that piece in

the field of “key words”. When she clicks “O.K.” she sees her artwork appearing as a small thumbnail on white background, a small menu in the bottom right corner and an exit button.

The next time she enters to the art garden she sees something completely different: her artwork is much smaller than before and is located in a new place with several paths connecting it to slightly bigger thumbnails. She drags some images from one place to another in an attempt to understand what the elements in the space represent and to interpret the new visual aspect of the art garden after her peers participated. She is curious of what is connected to her work and so she moves the cursor to one of them. A small rollover top-screen shows information about that artwork: it shows stars of different colors, a number 5 next to an icon that she interprets as messages, the title of the work, the name of the student that posted it, and small thumbnails of the pictures linked with this artwork where she recognizes her own. She then clicks on the thumbnail and a new screen opens displaying all the information about the artwork. She clicks in the image that appears bigger in that new screen and a new screen opens with the enlarged version of the image and she can now appreciate it better and wants to comment on it. She closes the window of the enlarged view to get back to the informational screen of the artwork. She clicks in the “comment” button and a new top window gives her the option of recording a voice message or writing the comment. She leaves her comment and presses “ok” to store it. Then she feels attracted by the small thumbnails in the bottom of the screen that are entitled linked works, so she clicks in the one she is more curious about. The screen changes to the informational view of the selected artwork.

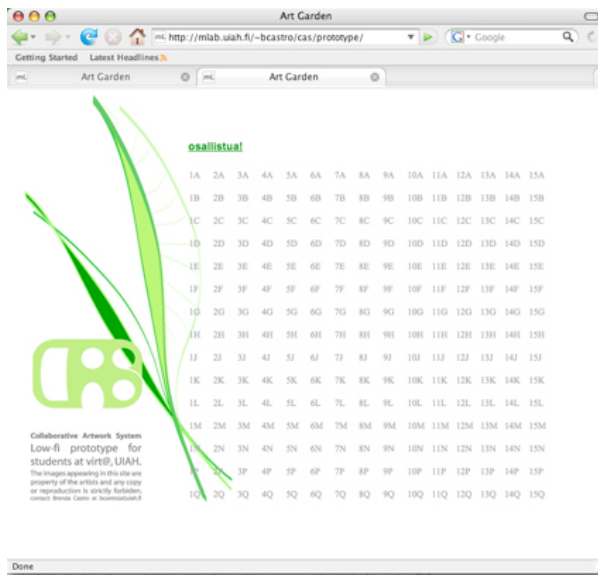
After navigating a while through the different artworks, commenting, linking, and awarding some of them, she goes back to the visualization by clicking on the thumbnail of the visual map that appears in every artwork’s screen. She notices that all the things she has done affected the way it looks so she drags some artworks again to reorganize in a way that let her appreciate better all the works and paths that conform the digital garden.

## 6.6 Designing a low-fi prototype

After determining the main structure and features of the interface, the next step is to create a low-fi prototype. The aim of creating a non-programmed version of the interface is to be able to test the concept idea with the real users. The design of a GUI comprises two aspects that are related to user-centered design: the conceptual and the functional. As it has been mentioned before, this paper work refers to the first, the concept design. The conceptual part of the project requires testing the users in a social environment: the way they communicate around the designed interface, the way they behave with the different motivational stimulus that were considered in the design process, and how they identify with the design (if the users identify and interact smoothly from the metaphor used). The other aspect related to user-centered design is the functionality, the so-called “usability” part of the interface, which is the way the system works when users interact with it. This will be approached during the phase of development that is the next stage of the project. In that stage a high-fi prototype will be completed and usability will be tested to improve the functionality of the interface in terms of learnability, efficiency, memorability, errors, and satisfaction (Nielsen, 26), before it is released.

This simulation of the GUI aims at trying out the metaphor chosen, and the basic elements of social interaction, of sharing practices and of collaborative building of visual identity. From testing the idea with this prototype, it will be possible to identify the users’ demands in regards to the system. The design of the low-fi prototype requires designing the initial state of the system’s architecture, which is an important step in making an idea tangible and feasible.

The low-fi prototype is designed as an html web page that presents the basics for the social interaction: it consists in a main screen that shows a square divided into sections as can be appreciated in Figure 20, each of them with a given code. The way it works is through e-mail and Multimedia Messaging Service communication: the users send their artworks and instructions and the designer implements them manually in the html version. The instructions are always visible through a link from the main screen.

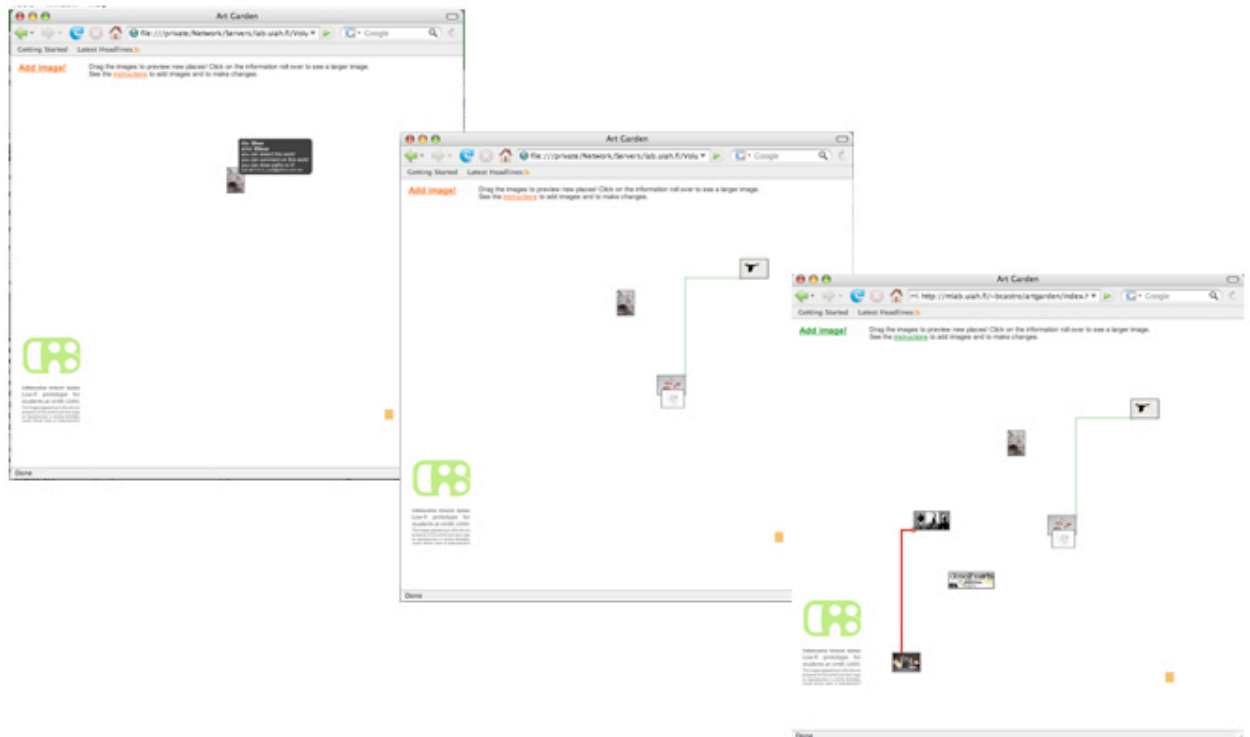


[Figure 22] Screenshot of Low-fi prototype before testing. The html introduction screen includes graphics and a logo that disappear when participations start to take place.

The tasks that users are asked to execute in the low-fi prototype are the following:

- Add an image to the system by sending the image file through Multimedia Messaging Service or through e-mail. The designer will manipulate the image in order to get a thumbnail that will be placed in the html file. The images received will be represented with a thumbnail of 35 x 35 px or a maximum size of 40 px if it is not regular. Each thumbnail will be linked to an information screen about that artwork; the information consists in tags, comments, and awards. The same screen includes a link to a full screen view of the artwork.
- Link thumbnails. Users can link the image they send at the same time they add it or they can do it later, they can link works of their own or any others from the community. The participants mention the related works and the kind of relation that exists within those works as well as the level of importance of the relation between them.
- Comment artworks; the participants can add comments, questions, etc. around any artwork by emailing them.
- Awards; Any artwork can be awarded at anytime within three main categories: originality\*, expression\*, artistry\*, or other added by the participants.

As other features, the participants can drag the thumbnails through the interface to preview visualizations. Each image has a roll over that shows the name of the artwork, the name of the artist, the awards it has received, the number of comments and the number of artworks it is linked with.



[Figure 23] Screenshots of the evolution of the interface through the user testing.

The test was held during a one-week period of time, from which the first four days were totally inactive. This was very stressing but the main problem was detected still on time. It was surprising that talking about artworks around the interface (in the instructions mostly) was inhibiting the interaction in the beginning and it took some time to overcome that problem. The users understood the term artwork in a very strict sense, probably as it is very closed to “art piece”. They were a bit afraid in the beginning to start sharing something that was not of good enough quality (even if it was explained that the prototype itself is just a resemblance with a concrete tool). It took sometime to get started but when finally the first work was posted, the interaction began to flow in terms of two to three artworks per day.

In the first stage, the phenomenon of solipsism was too strong; users' activity was restricted to posting images for two days. It was not till the third day that the social activity started with comments and links between different participants.

The test demonstrated that certain important aspects of social attitudes can be easily observed with this kind of virtual interaction. For example, students that tend to leave their works in the corner can be lacking confidence in their work and may need some encouragement from their pals or teacher, which can also be done through the art garden. Users seemed to be shy to move other participant's works to a new place, but still they add paths and those isolated works become really part of the visual environment.

The low-fi prototype testing resulted useful to determine certain elements of the graphic and interaction design. Very diverse behaviors were observed during the testing, this aspect influenced the slow start of activity but created an interesting environment. It was observed that, for most of the users, it took around two or three visits to the webpage till they got used to it and started adopting it. The process of identification with the interface was expected to be faster, nevertheless, the activity happened and it was very rewarding in the end to notice that the concept idea can definitely influence the activity of sharing and communicating.

In general, it was clear that this kind of test has to be done with more time, giving more space to the users to adjust and become an "art garden" community. The activity depends very much in the spare time of the users, who normally are very busy; that makes it difficult to detect the elements of the concept that are not promoting interaction.

## 7 Conclusions

The development of this project as a learning process was very challenging, due to the different areas of expertise the goals involved. Some elements were covered in a very low scale and some were even not considered in depth. This is true of those that refer to human factors and usability tests, which should be considered in later stages of the project in order to implement a successful tool.

One of the first aims was that of experimenting with the use of mobile technology. This part of the project resulted very difficult to handle due to the difficulties to meet frequently in person with the users to perform these practices and to the lack of a strongly motivational mobile tool that they could try in terms of learning activity without feeling that they were putting too much effort on the experiment.

The selected metaphor was introduced to the user community and it showed that the users felt attracted in the first place by the use of the name in the interface, but when using the elements of interaction, they did not seem to be guided by the metaphor anymore but more by the pure activity of “linking” and “uploading”, which is an already quite natural activity in online interfaces. The visualization in the end does not have to follow a straight representation of a “garden” and that is in a sense positive as it leads to certain freedom and spontaneity of the final visual results.

As a conceptual design, the idea proved to be attractive to the users who tried the social and emotional aspects of the concept in a low-fi prototype. The feedback gathered from students and teachers related to the arts field were positive and some saw even more possibilities of the tool besides the ones considered during the evolution of the design process; nevertheless, no success can be estimated yet before a high-fi prototype is tested. The concept needs to be developed further with more studies around the users and with a high-fi prototype to enable all the features approached in the design and thus, to observe if there are real changes in the learning communities.

The experience of a design process in close collaboration with the users was very enriching. The user group was very enthusiastic about the project; they expressed their needs and wanted to try new means of collaboration and motivation. The user analysis was fruitful and gave the starting points for the last concept idea. Nevertheless, for the whole project to progress in a good rhythm, more participation and commitment from the user group would be required.

The experience showed that working with a user group needs a lot of human resources and the user group cannot be taken as a free-contributing part. There is a need of giving some reward continuously so the participation is motivated constantly. This later was an important missing aspect during the last stages of the project and resulted in a slow progress towards the finalizing of this work.

The project proved to me that there is an open field for innovations in terms of interactive graphical user interfaces that can help communities to perform their tasks better and get more out of digital and online tools. The elements of interaction were designed to satisfy the needs and motivations of the user community and this aspect demonstrated the great need for social or informal communication in the scope of virtual learning environments.

As a result of this work, from the user-oriented perspective, I believe the concept was of interest in terms of the semiotic associations and patterns of interaction. The community tried and explored the idea and some participants even expressed interest to see further adaptations of the tool. Still, the design proposal resulting from this work needs a lot of work in terms of software engineering. The technical development of the design will need to be taken through an iterative process of adaptation where new solutions can replace features that are considered in this first approach to the concept.

The technical development, that is the next stage of the project, is collaboration with an experienced programmer. The aim is to make the Art Garden interface a

working online tool with the basis of collaborative software and open source. As a first approach to the technical development, the project will be tested with a prototype in the exhibition MoA 07. For this exhibition, the objective will be to try the activity of social building of a visual map and to observe the motivation and response from the visitors. The role of CAS will be that of a visual diary. The images to integrate the interface in that event will be from the visitors experience through the whole exhibition, they will be asked to take pictures of their visit to MoA and the interaction will be held around that theme.

## References

Alexander, Bryan. "Going Nomadic: Mobile Learning in Higher Education" in *Educause Review*, vol. 39, no. 5. 2004. Available online in: <http://www.educause.edu> (Last reviewed March 2007)

Bandura, Albert. *Human Agency in Social Cognitive Theory*. American Psychologist. Standfrod University Press. 1989.

Barrett, Edward (ed). *Sociomedia: Multimedia, Hypermedia, and the Social Construction of Knowledge*. MIT Press. 1992.

Barthes, Roland. *Retórica de la imagen*. Tiempo Contemporáneo, Buenos Aires. 1970.

Bar-Yam, Yaneer. *Dynamics of Complex Systems*. Addison-Wesley. Massachusetts. 1997. Available online in [necsi.org/education/programs/dyn-fulltext.html](http://necsi.org/education/programs/dyn-fulltext.html) (Last reviewed March 2007)

Baynes, Ken. "Design education: What's the point?" in *Design and Technology Education: An international journal*. G. S., Coventry. Vol.II Num.13. October 2006.

Carroll, John M. "The Scenario Perspective on System Development" in *Introduction of Scenario-Based Design: Envisioning Work and Technology in System Development*. John M. Carroll (editor). JW&S. USA. 1995.

Castells, Manuel. *The rise of the Network Society*. Blackwell. 2000.

Coyne Richard. *Designing Information Technology in the Postrmodern Age, from method to metaphor*. Leonardo books. MIT Press. England. 1995.

Cubberley, Ellwood P. *The History of Education*. Kessinger. 2004.

Engelbart, Douglas C. and K. William. "The NLS Demo" in *The New Media Reader*. Wardrip-Fruin and Montford (ed) 2002. MIT Press. Cambridge, London. 1968.

Eskelinen, Markku and Koskimaa, Raine (editors). "Introduction: Towards a Functional Theory of Media" in *CyberText: Yearbook 2001*. RCCC University of Jyväskylä. 2002. (p. 7 - 12)

Drucker, Johanna. "Ruskin's Horror of the Flesh: The ideology of the virtual" (p. 87 - 98)

Goldberg, Adele. *Collaborative Software Engineering*. ETH Zurich. 2002.

Day, Hy I. (editor). "Play, A Ludic Behavior" in *Advances in Intrinsic Motivation and Aesthetics*. 1981. (p. 225 - 250)

Moynihan, Christy and Mehrabian, Albert. "The Psychological Aesthetics of Narrative Forms" (p. 323 - 340)

Walker, EL. "The quest for the inverted U" (p. 39 - 70)

Himanen, Pekka. *Challenges of the global information society*. Committee for the Future Parliament of Finland. 2004.

Hix, Deborah and Hartson, H. Rex. *Developing User Interfaces: Ensuring usability through product and process*. 1993.

Hornbaek, Kasper, Bederson, Benjamin B., Plaisant, Catherine. *Navigation Patterns and Usability of Zoomable User Interfaces with and without an Overview*. *ACM Transactions on Computer-Human Interaction*, Vol. 9, No. 4, Dec. 2002.

Jones, Steven G. *Virtual Culture: Identity and Communication in Cybersociety*. Sage. 1997.

Kant, Immanuel. *Crítica del Juicio*. 1987.

Krippendorff, Klaus. *The Semantic Turn. A new foundation for design*. T&F. 2006.

Kress, Gunther and Leeuwen, Theo van. *Reading Images. The Grammar of Visual Desing*. 1998.

MacLean, Allen and Diane McKerlie. "Design Space Analysis and Use Representations" in *Scenario-Based Design: Envisioning Work and Technology in System Development*. John M. Carroll (editor). JW&S. USA. 1995.

Norman, Donald A. *The Psychology of everyday things*. Basic Books. 1988.

Preece, Jenny. *Online-communities: designing usability, supporting sociability*. Wiley. N.Y. 2000.

Salomon, Gavriel. *Interaction of media, cognition, and learning: An exploration of how symbolic forms cultivate mental skills and affect knowledge acquisition*. 1987.

Shneiderman, B. *Designing the User Interface: Strageties for Effective Human-Computer Interaction*. 1998.

Scardamalia, M., and Bereiter, C. *Knowledge Building*. In *Encyclopedia of Education*. 2nd ed. N.Y. Macmillan Reference, USA. 2003.

Tapia, Alejandro. "El diseño, del enunciado gramatical a la proposición lógica" in *Revista Encuadre: Memorias, 1er seminario de investigación en el Diseño Gráfico*. Asociación Mexicana de Escuelas de Diseño Gráfico. Mexico. 1990. *Free translation by the author*

Turkle, Sherry. *The Tethered Self*. MIT Press. 2006.

Tönnies, Ferdinand. *Community and Society*. P.Loomis (trans. ed.) 1957.

Wagner, Ellen D. *Enabling Mobile Learning* in *Educause Review*, vol. 40, no. 3. 2005.