

Urban environments and New Media:
Redefining a Fitness Facility
through a Technologically Mediated Space



FEUP

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Abstract

This dissertation summarizes a year of research guided by the question: “Can a mediated space be created in the context of a gym, and does it positively change the way that this urban environment is experienced?” It starts with an introduction to the revolution that occurred with the advent of digital technologies.

The ideas of different people that explore different theories of space and greatly influenced urbanism in the last century constitute the first Chapter. A guide on how to distinguish the different types of space: tangible, intangible, and mediated space is presented and the implications of it in our urban lives.

The second chapter relates New Media and the city, and explains different characteristics and cultural phenomena linked to augmented space. The concept of touch points or interfaces where the man and machine communication occurs is introduced.

Examples of projects that integrate media in different types of contexts, from a small installation to an Olympic monument, are presented in the third chapter. Once the theoretical frame is set, the following sections guide the reader through the process of redefinition of a fitness facility.

The methodology focused in understanding the user’s view and learning from what they expect as well as their different ideas and motivations. The design process proposes to interfere setting a communication platform for the already merging of digital technologies at the Gym, but taking it to a different level of impact. An emphasis on the production of activity engagement and community meaning is pursued.

Finally, a perspective of opportunity areas of evolution of mediated space in the fitness facility typology is proposed.

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Contents

1. Introduction: About Space and New Media	pg.06
2. State of the Art	pg.09
2.1 Spacialties	pg.09
2.1.1 What is space? A perspective from Architecture and Urban Theories	
2.1.2 Physical, Non-Physical and Mediated Space	
2.2 New Media and the City	pg.23
2.2.1 New Media in localized Urban Environments	
2.3 Projects	pg.31
3. New Media in a Fitness Facility	pg.46
3.1 Objectives	pg.49
3.2 Method	pg.52
3.3 Results	pg.54
4. Discussion	pg.74
5. Conclusions	pg.87
6. Sources	pg.89
List of Figures	pg.92
List of Tables	pg.93
List of Annexes	pg.93

1. Introduction: About space and new media

*“The contemporary city is a media-architecture complex resulting from the proliferation of spatialized media platforms and the production of hybrid spatial ensembles. While this process has been underway at least since the development of technological images in the context of urban ‘modernization’ in the mid-19th century, its full implications are only coming to the fore with the extension of digital networks.” (McQuire, *The Media City: Media, Architecture and Urban Space* 2008).*

In the past decades there has been a boom of explorative work of artists, designers, musicians, scientists, geographers, architects, urban planners, engineers and professionals from different backgrounds in the field of mediated environments. Two basic concepts pop out: spatiality and digital technologies. The term spatiality involves not only the physical component of what we can define as space but also a non-physical component related to perception. Digital technologies in the form of New media constitute the tool or the key that opens up the possibility of a networked non-physical common space. Virtual worlds have existed for years in painting, storytelling, music, or other forms of expression. It is through digital technology that the space is not only shared for perception, but also for real-time distant interaction. This means, a given person can change something in that virtual world, while another person can immediately be aware of the change without the physical restraint of presence. If someone changes something in a painting, that someone has to be near enough the painting to intervene in it and the receptive part has to be there as well. With digital and communication technologies, a given person can change something in the painting in Japan and be perceived by many in Mexico. The intervention and change can occur entirely in this virtual space (e.g. in a digital painting).

The big interest and concern about the big changes that digital and communication technologies have made in the shaping of our urban life guides this work.

“In the augmented city, ‘virtual’ and ‘physical’ spaces are no longer two separate dimensions, but just parts of a continuum, of a whole. The physical and the digital environment have come to define each other and concepts such as public space and “third place”, identity and knowledge, citizenship and

public participation are all inevitably affected by the shaping of the re-configured, augmented urban space". (Cindio 2008)

Digital Media interventions in the built environment are fully customizable to the users. "The only limit on infinity is that its means of expression are limited only by its creator."

As Serajul Bhuiyan(2005) analyzes while thinking on the impact of New Media in our society: "We humans build better machines, which function and carry out whatever tasks they are designed to perform, ultimately making our lives easier. For all the hard work technology does for us, we give back to it upgrades." (Bhuiyan 2005). This statement describes a two way process, in which the new technologies make certain jobs easier for people but at the same time create new jobs, and work like a continuous circle of progress.

The rise of digital networks and the implications of technology in our urban lives are essential components of the relatively recent transformation in the way we experience people and places where we live. We have embraced digital technologies at home, in urban localized places, and in extended locations thanks to the proliferation of mobile media. As Scott McQuire reflects, "the spaces and rhythms of contemporary cities are radically different to those described in classic theories of urbanism; ...as much as the city has changed, so has media" (McQuire 2008). We make friends online, buy entrance tickets or even schedule train trips and flights on our mobile, send/receive invitations to attend events or not, share our music tastes, our online music play lists (which can be accessible from any computer or technologically enabled device that is connected to the Internet), we text messages, change our wallpapers, download ring-tones, gather together in online communities, generate our own contents, publish our own pictures, mix our contents, give opinions on them, transform, share and interact in social networks. We are living a converged media world and we are "No longer a captive, mass media audience; today's media consumer is unique, demanding, and engaged." (Bhuiyan 2005).

Fifteen years ago, many of the services that connected me with different important social rings, like my family and friends back home, and even ex-coworkers, were not commonly used. Nowadays, I can stay connected through digital social networks; have instant information about the latest happenings in distant localities (e.g. by reading newspapers online), continue to collaborate with professional colleagues that

live in a different time zone (work), pay my taxes, check my transactions, administer my resources (finances), and even listen to the voice and see the faces of people that are thousands of kilometers away over the internet in real time.

The implications of interactivity and digital systems in our everyday life environments **is** a theme that Architects should think in the context of today. The so-called virtual world, which merged with the physical one can be described as a hybrid space or mediated one, gives rise to new urban specialties that are increasingly and inevitably worth exploring. The difference between virtual reality, and mediated space is explained and discussed later in this document.

After analyzing different public spaces and deciding whether New Media has been incorporated into the day a day through focused designed systems, it was found out that Fitness Facilities are lived roughly like twenty years ago. Digital technologies are manifest only through the television, music system, a database containing the users' accounts and payments, or the individual feedback that each workout machine gives after doing an exercise. Some gyms have opened up WebPages; blogs or online social media groups in an attempt to stay connected and have a presence on the net. However, compared to e-libraries or online universities, this very important area related with health and well-being is a bit behind. Perhaps one of the main reasons is the complexity of the data that has to be managed in such a facility. At a school you can determine that a certain course will have specific contents and whoever completes successfully a determined number of exercises and examination processes will obtain an amount of credits. At the Gym, there is no such thing as a predetermined routine, since too many individual characteristics are taken into account before "prescribing" the activity.

Thus, the objective of this work is to answer the question "*Can a new layer of space be created in the context of a fitness facility, and does it positively change the way that this urban environment is experienced?*"

This document presents an analysis of the typology of the fitness facility. The expected result of this analysis is the design of an experience within this context powered by New Media. Only a small amount of technical specifications is presented since the main focus of the work was to study the users, their preferences, and the type of activities that they perform at the fitness center as well as the implications of the proposed environment.

2. State of the Art

2.1 Spatialities

“There is no space without event...no architecture without programme... Architecture becomes the discourse of events as much as the discourse of spaces.” -Tchumi (Holt-Damant 2010)

Traditionally, physical space is conceived in three dimensions, but after the work of Albert Einstein on relativity modern physicists consider it to be part of a four-dimensional continuum known as space-time. Many theorists and philosophers have written about these themes, but there is no fixed definition. They can't agree between an objective definition or a subjective one. For French philosopher, Descartes, space is an “absolute and objective experience”(Holt-Damant 2010). Rationalist Gottfried Leibniz, back in the 17th century, thought that space was a bunch of relations between objects, and that it could be measured by the distance and direction from each other. In contrast, for the eighteenth century German philosopher, Emmanuel Kant, space and time are elements of a systematic framework that humans use to structure their experience, what he described as “subjective and ideal”(Janiak 2009). Since Kant's theory of space is not so clear, it is difficult to explain. But he defends that the perception of space is due partly to external things and partly to our own way of perceiving things. In conclusion, thinkers and philosophers disagree about whether it is itself “an entity, a relationship between entities, or part of a conceptual framework.”(Dictionary30 2010). Later in the twentieth century, Albert Einstein reinforced Kant's notion making the subject part of the notion. He suggested that things do not exist as absolutes but as relative relationships.

Trying to build a personal definition, I can state that space is the capacity inherent in a physical or nonphysical dimension to hold or fit something, the container where something may exist. Space has boundaries: physical and psychological boundaries. Physical space can have larger or smaller limits; however, our perception might be affected by the presence of certain factors. Space is merely capacity, it can be full, partly taken, or empty. Space has dimensions, tiny, small, big or infinite. Space has materiality or lack of it. How do humans perceive space? It happens through what our senses experience. In my experience, they include:

- Temperature
- Proportions. (Human scale, huge scale, small-scale, tiny, invisible scale... etc.)
- Limits
- Gravity
- Sound reach (ears...) can you perceive or not the sounds in an extension of space.
- Eye vision. You can see the empty or full space, or part of it if you are immerse.
- Immersion. You can experience it from inside the space or outside from it.
- Boundaries: physical / psychological boundaries. Physical space can have larger or smaller limits but at the end we can perceive it differently when certain factors are present. Fear, happiness, emotions in general can change the way we experience space. Think of vertigo, claustrophobia, and other psychological phenomena of perception of space.
- Tactility. Are you able to touch your surroundings?
- Visually, hearing sensibility, distance, smell, luminosity,
- If you are at a concert, you are at that space when you can hear it without losing its sound properties.
- If you are at the cinema, you are at the movie room if you can listen and watch the movie.
- Space can be contained into space. Many small spaces can build up a general space.

Despite traditional physics, the subject of time will constantly appear related to the theories of space, since space can't be experienced in a frozen image of the place. In this research I found that there are sociologists, like Max Webber, that explain the transformation of the city following economic forces, or models such as capitalism. I prefer to analyze the changes focusing more in the social forces involved in the change. I am particularly interested in Henri Lefebvre's theory that explains how new social interactions demand new type of spaces. He explains that every society produces its own space. For the purposes of this work, it is not the subject of matter to define if space is absolute or an abstraction concerning a relationship between bodies in the plenum. It will focus in the capacity of and characteristics with which it holds people's interactions and everyday life in the city, and more specifically in a fitness facility. In other words, this exploration is not

much about what causes are involved but about the outcome, the human experience of that space.

2.1.1 What is space? A perspective from Architecture and Urban Theories

The 20th century was probably the time in history when a notorious amount of big and fast changes occurred. This was true for all areas of science and humanism. It even gave birth to many new areas of study. Kathi Holt-Dammant, architect and writer for the MEM Magazine, explains how the themes of space and time acquired special interest.

“Since World War I and World War II, the unparalleled scale and intensity of urban destruction and demolition have remarkably changed the spaces of cities over brief, condensed periods of time. This, together with developments in science, mathematics, philosophy and art, has meant that architecture has had to confront space and time in new, untraditional and unprecedented ways.” (Kathi, 2008).

In this section a few important ideas about space are presented, focusing on ideas about the experience of space. The promenade starts with the ideas of the Situationist International group, who analyze experiences of life and their context. The second stop is Henri Lefebvre, who defines a layering of space and conceives it as a social product. Next, the idea of Bernard Tchumi about the complexity of space is explained taking his own metaphor *The Pyramid* and *The Labyrinth*. Another concept that reflects the ideas of sociologist Manuel Castells who explains his *Space of Flows* is presented. Finally, the ideas of Christopher Alexander and his definition for a good city, one which occurs in a more natural way and that follows not a tree structure of relations or interconnections between its parts but a lattice one, follows.

Situationist International

In 1957, a restricted group of people from international backgrounds, all of them revolutionaries, founded “The Situationist International”. They root their ideas in Marxism and 20th century avant-gardes, and they made a point about experiences of life being alternative to those that the capital order established. They explored ideas such as “the fulfillment of human primitive desires” and the “pursuing of a superior

passional quality.” (“Situationist International” 2011). They suggested the *construction of situations*. With the term they referred to the construction of environments that will address those desires. They developed different themes to study such as *unitary urbanism* and *psychogeography* (“Situationist International” 2011).

Unitary urbanism was one of the earliest Situationist concerns. It rotates around two main ideas: “the rejection of the standard almost wholly functional approach to urban architectural design, and the rejection of the compartmentalized way in which art is typically detached from its surroundings” (“Unitary Urbanism”, 2011). In the Unitary Urbanism utopia ideal the structural and the artistic elements of the metropolitan surroundings of a person are so mixed up into the whole, that it is impossible to identify where the “function ends and the play begins.” (“Unitary Urbanism”, 2011). So there is a resulting society, that while worrying to solve its fundamental needs, is also being part of an environment that is suitable for exploration, leisure and stimulating ambience. These ideas are interesting in the context of this redefinition of a fitness facility because they imply that there is an incorporation of the arts and new technologies in the urban whole.

Psychogeography is defined by the self-proclaimed leader of the Situationist International Guy-Ernest Debord in the following words: “the study of the precise laws and specific effects of the geographical environment, consciously organized or not, on the emotions and behavior of individuals” (Debord 1955). He defended that different combinations of ambiances give rise to feelings in individuals that no other form of spectacle can evoke. “The slightest demystified investigation reveals that the qualitatively or quantitatively different influences of diverse urban decors cannot be determined solely on the basis of the era or architectural style, much less on the basis of housing conditions” (Debord 1955).

In “Formulary for a New Urbanism, Ivan Chtcheglov(1953) reflected how the Situationists found architecture in their time restrictive. He explained how the cities have special “fixed points” and “vortexes” which influence the way we enter or exit certain areas. But there is a passage in his essay that deserves attention:

Architecture is the simplest means of articulating time and space, of modulating reality, of engendering dreams. It is a matter not only of plastic articulation and

modulation expressing an ephemeral beauty, but of a modulation producing influences in accordance with the eternal spectrum of human desires and the progress in realizing them.

The architecture of tomorrow will be a means of modifying present conceptions of time and space. It will be a means of knowledge and a means of action.

The architectural complex will be modifiable. Its aspect will change totally or partially in accordance with the will of its inhabitants.... (Chtcheglov 1953)

I find Chtcheglov's writings very easy to relate to digital technologies. Say 'web navigation'. If the fixed points and vortexes are thought of as links that let you enter or exit certain areas of the webpage then this could be like small places or virtual cities.

Architecture is the simplest means of articulating time and space, of modulating reality, of engendering dreams.

Moving, when you walk or run or crawl, is the way you articulate time and space. The same movement in the context of ubiquitous technologies can be used to modulate the reality of the environment. You enter a room with movement sensors and the light turns on automatically. When you stop moving or go out of the room the light turns off.

The architecture of tomorrow will be a means of modifying present conceptions of time and space.

If in your movement you could also weave a virtual world in it, you would be in fact, mediating between 2 types of space. Your movement or actions would reflect in this new space or both spaces.

Time + physical space + virtual space = Mediated Space

Equation 1 Mediated Space Experience

It will be a means of knowledge and a means of action.

Tracking your life in the physical environment and using this information later for new actions constitutes a new possibility in the way we live our built environments.

The architectural complex will be modifiable. Its aspect will change totally or partially in accordance with the will of its inhabitants.... (Chtcheglov 1953)

This idea is one of many that are part of a period marked by the rise of Urban Utopia. Urban planners dreamt with the possibilities of new technologies that emerged after the World War II. Ideas such as 1964 Archigram's Walking city explored possibilities such as mobile architecture. Another example is that of the metabolists' Clusters in the Air Project (1962). Perhaps these theoretical urban planning ideas were not truly objective, focusing on mechanical ways to transform the city, such as movement. But physical displacement is not the only way to achieve movement. Concepts such as connectivity, dynamism and flexibility can be present in a transformation without having to be as physical as moving pieces of the city. Perhaps having spaces where the use can be easily transformed, or connecting them in a digital whole in forms like telepresence are more interesting solutions.

In the image below various clusters of the walking components of the city are pictured. These could be moved according to the need. Clustered and uncluttered (Archigram, 1966).



Figure 1 Archigram's visualization of A Walking City, 1966.
 (http://www.archigram.net/projects_pages/walking_city_5.html Accessed July 15, 2011)

However, even though digital worlds open up new spatial possibilities and break up linear exploration and movement in time, other similar restrictions like Chtcheglov's fixed points and vortexes can occur. Netherlands based new media applications company, Mediamatic, is concerned with the fact that certain social networking sites result in that Webpages become like islands and people move within those sites but there is not a real connection between them and other social networking sites. They describe these as walled gardens, "islands that force their users to rediscover their friends and re-explain who they are." (Worrel n.d.)

Henri Lefebvre

Henri Lefebvre is famous for his work on *The Production of Space*. "Lefebvre has been credited by geographer and social theorist David Harvey, among others, with re-inventing urbanism. His various works in this field, notably *The Production of Space* (1979, 1994) influenced an entire generation of architects and social geographers in Europe, Latin America, the US and Britain (Aronowitz 2007). He establishes that space is not pre-given, but "a social production of people" (Aronowitz 2007), which is influenced by the capitalist development. Not surprising, he is widely recognized as an important Marxist thinker. He was concerned with the transformation of the city into an urban condition, which made it some sort of omnipresent space-entity. He described three layers of space: the Perceived, the Conceived and the Experienced.

Below is a critique Lefebvre made to soviet constructivists, reinforcing his idea of the relation of space and the relations between people that it holds:

"Change life! Change Society! These ideas lose completely their meaning without producing an appropriate space. A lesson to be learned from soviet constructivists from the 1920s and 30s, and of their failure, is that new social relations demand a new space, and vice-versa" (Commons 2011).

Making a direct connection to New Media, the following statement can be made: Our social relations are now having place in an in-between space or a mediated space. We should conceive those new spaces while thinking of those social changes.

Bernard Tchumi

Bernard Tchumi is a very influential contemporary architectural thinker. He has a lot of work that talks about space and time. His theory has inspired and he has collaborated with Deconstructivists such as Jacques Derrida and Peter Eisenman. The ideas behind his work were born around 1968, when there was a worldwide concern with the need for "an architecture that might change society"(Kathi, 2008). Before this period critics and historians focused mainly on the formal or physical aspects of buildings and cities, and not in the events or happenings that took place in them.

"Over the next decade I kept exploring the implications of what had first been intuitions: that there is no cause-and-effect relationship between the concept of space and the experience of space, or between buildings and their uses, or space and the movement of bodies within it" (Kathi, 2008).

Tchumi is influenced by Lefebvre's categories of space. In 1974 he publishes a text, "Questions of Space: the Pyramid and the Labyrinth". In it, he proposes a metaphor to understand the idea of what he calls the conceived space, the Pyramid, and the perceived space, the Labyrinth. If in a Pyramid, you will feel that there is a very rational physical model of how to move within the space, whereas in the Labyrinth you are submerged in an experience and rational ideas such as inside or outside lose value. He proposes that the objective and the subjective characteristics can't stand alone, and thus space is a complex experience built of the two of them.

Later in his theoretical work he proposes his own categories of Space: Space, Movement and Event. "There is no space without event...and no architecture without program. Time is inherent in both " -Tchumi (Holt-Damant 2010). He applies concepts from film directors to explain his design intentions. He uses the terms: frame, sequence and shock. With them, he makes references to architectural space conceived from the manipulation of time and movement. It is true that we cannot

explore a place without the component of time. This is probably the biggest fact of why cinema had such a huge influence on modern theories of architecture. Andong Lu, publishes in a Special Issue of Jianzhush (The Architect, this journal is the most important and influential periodicals in China):

“Architecture is frozen cinema!” In his opinion, Cinema supersedes music as the art that is most similar to contemporary architecture. His arguments: “Both are public arts and articulate lived space; cinematic expression follows inherent architecture, while architectural experience has cinematic essence” (Lu 2008). In fact, Architecture existed long before cinema.

Based on Tchumi’s idea of the Pyramid and the Labyrinth, one can state that the experience of space is composed of both quantitative and qualitative characteristics and thus during the design process both of them should be considered.

Manuel Castells

He describes a cultural abstraction of the relationship between space, time and the new technological paradigm as *Space of Flows*. He describes space as a static component, and time as the dynamic one. But space cannot be experienced without the dynamic part, so the space of flows is an organization of social practices that involve time-sharing and work through flows. The space of flows is "the material organization of time-sharing social practices that work through flows". Those flows of information or time sharing through digital technologies are different from the “global village” because the physical places or positions of these people are not as important as their positions in time, which is the dynamic component of the space-time cultural abstraction. I find this theory very inspiring for the typology of a fitness center, since the project will explore the way in which personal and social activities will be organized in the gym and they involve time-sharing and work through flows. The real-time events and the distant-presence events will be important in the idea of connecting the Fitness Center to other points in the day and thus freeing it from its space-time position.

Christopher Alexander

In his published article, "A city is not a tree", he uses the metaphor of a tree in contrast to a semi lattice, Christopher Alexander describes the nature of the city. Both structural models give an order to the elements that form the set or work as a whole. However in a semi lattice the society is mucho more open and connections do not occur in a closed order fashion, shown by the overlapping of the friendships in Figure 2. He classifies cities as natural, or artificial, which are the ones that are not projected by designers and planners. He defends that "natural cities work better." (Alexander 1966)

He also describes how many of the interactions between the people in the city, do not have a physical counterpart:

"Each unit in each tree that I have described is the fixed, unchanging residue of some system in the living city. A house, for instance, is the physical residue of the interactions between the members of a family, their emotions and their belongings. A freeway is the residue of movement and commercial exchange. But a tree contains only very few such units - so that in a tree-like city only a few of its systems can have a physical counterpart. Thousands of important systems have no physical counterpart. In the worst trees, the units which do appear fail to correspond to any living reality; and those real systems, whose existence actually makes the city live, have been provided with no physical receptacle." (Alexander 1966).

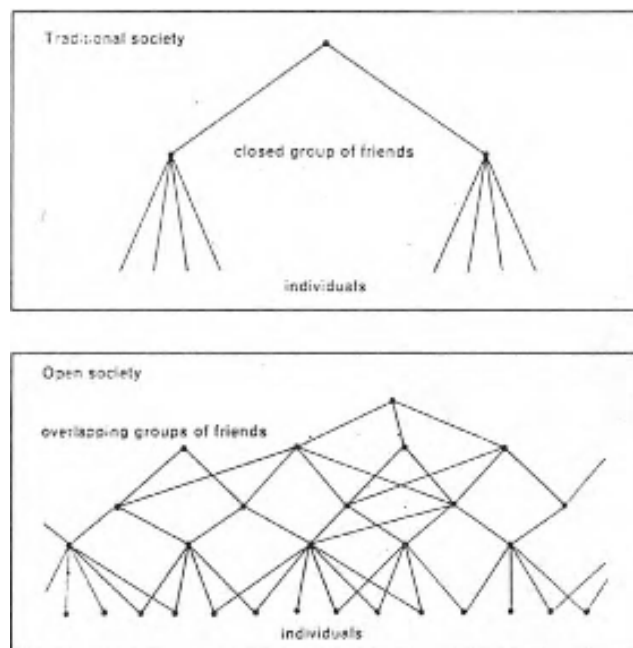


Figure 2 Friend Lattice (Alexander, 1966)

His ideas were very controversial at the time, because even though he was an Architect, he was denying in a way the work of the Architect by saying that “natural cities work better” (Alexander 1966). However from the structural conception, where his studies in Mathematics are probably reflected, his idea is interesting and acquires special importance in a time when global networks have revolutionized the way we live. In a gym it would be very positive to connect or bring closer other fitness facilities between them in a more dynamic way and not just rely on the connection of the chain or owner. The same way universities can collaborate between them or companies form private initiatives on joint projects, perhaps gyms could benefit from connecting into a larger network, and construct an open social lattice.

2.1.2 Physical, Non-Physical and Mediated Space

By definition space that cannot hold anything physical has to take place in the imagination or abstract world. Some authors agreed to the term *virtual space*, because even though it is in the imagination, it can be perceived in a similar way from person to person. In this section, definitions are presented explaining the differences between physical, *non-physical*, and the *in between* or *mediated space*.

Rem Koolhaas is right when he expresses that “*The representation of the contemporary city is thus no longer determined by a ceremonial opening of gates, by a ritual of processions and parades, nor by a succession of streets and avenues. From now on, urban architecture must deal with the advent of a ‘technological space-time’* (Koolhaas, Mau, et al. 1998). The intervention of digital media in our urban reality results in a totally different spatial experience than without it.

However, he continues with

“The access protocol of telematics replaces that of the doorway. The revolving door is succeeded by “data banks”, by new rites of passage of a technical culture masked by the immateriality of its components: its networks, highway systems, and diverse reticulations whose threads are no longer woven into the space of a constructed fabric, but into the sequences of an imperceptible planning of time in which the interface man/machine replaces the facades of buildings and the surfaces of ground on which they stand.” (Koolhaas, Mau, et al. 1998)

I find this metaphor very interesting, because there is an understanding and an indirect reference to the possibility of separation of public and private space. This is truth for all types of architectural space, being *physical*, *non-physical*, or *mediated*.

If we described liquid architecture as a symphony in space, this description should still fall short of the promise. A symphony, though it varies within its duration, is still a fixed object and can be repeated. At its fullest expression a liquid architecture is more than that. It is a symphony of space, but a symphony that never repeats and continues to develop. If architecture is an extension of our bodies, shelter and actor for the fragile self, a liquid architecture is that self in the act of becoming its own changing shelter. Like us, it has an identity; but this identity is only revealed fully during the course of its lifetime. (Novak 1992)

Nonphysical space existed before the advent of digital technologies. It has long existed in paintings, as Arch. Or Ettliger, Researcher and Professor of the Faculty of Architecture at the University of Ljubljana, explains. He published a book in which he describes "The Virtual Space Theory". He proposes a very interesting approach to conceiving what is virtual space setting an example of a 2d virtual space:

-*The window metaphor.* The Renaissance artist, architect, and theorist Leon Battista Alberti described a painting as a window through which we can look at the visible world. Several decades later, Leonardo da Vinci said that "perspective is nothing else than seeing a place behind a pane of glass, quite transparent, on the surface of which the objects behind the glass are to be drawn." (Ettliger 2010) *The Virtual Space Theory* proposes that this metaphor holds also when speaking in terms of making virtual places, except that they are not limited to the technique of perspective alone. Whatever the way by which a possible visible world is made, it would be a virtual place located in virtual space.

Another term referencing the sense of hearing for a virtual or abstract space is denoted in the following definition for Cyberspace:

Cyberspace, for those who haven't hooked in yet (it is neither in a here nor a there but is a continual articulation relentlessly boring through us), is, according to the slogan, "Where you are when you are talking on the telephone." In more precise terms, it is where your attention is within a promiscuous, multidimensional electromagnetic matrix, even when your body (for which there seems to be, yet again, no limit of protestant-capitalist contempt) is homelessly fixed in viscous Euclidean "real" space. (Koolhaas, Rem Koolhaas-OMA | 2006)

Other definitions depict different implications:

This definition considers intelligent products and environments in real space, powered by the information technology scope.

``Cyberspace is a completely spatialized visualization of all information in global information processing systems, along pathways provided by present and future users, allowing input and output from and to the full human

sensorium, permitting simulations of real and virtual realities, remote data collection and control through telepresence, and total integration and intercommunication with a full range of intelligent products and environments in real space.” (Novak 1992)

The following definition places *Cyberspace* in terms of space, and a sort of synonym of *World Wide Web* or *virtual reality*.

“A term coined by science-fiction writer William Gibson to describe his fictional computer-generated virtual reality in which the information wealth of a future corporate society is represented as an abstract space. Pre-dating the internet as a popular phenomenon, Gibson’s cyberspace has been widely interpreted as prophetic (though he says he got the idea from watching children playing videogames). The word is also used in very general terms to cover any sense of digitally generated ‘space’, from the World Wide Web to virtual reality.”(Lister, et al. 2009)

Cyberspace is “A graphic representation of data abstracted from the banks of every computer in the human system. Unthinkable complexity. Lines of light ranged in the nonspace of the mind, clusters and constellations of data. Like city lights, receding...” (Koolhaas, Mau, et al. 1998)

People confuse the terms virtual reality and ubiquitous computing. They think that if it has to do with computers, it is immediately something `virtual`. But it isn't. “Ubiquitous computing is virtual reality’s opposite number. In virtual reality, the computer interface is erased, and all we see is what the computer places before our eyes. Ubiquitous computing, on the other hand, turns our whole world into a computer interface. So, while virtual reality refashions the immersive qualities of Hollywood film, ubiquitous computing appeals to us as a kind of interactive television that monitors and rearranges our physical world.” (Joy, 2002). There is another term also related with these two: ‘telepresence system’. This type of technological tool uses video signals and computer graphics to place you in a remote place where something has to be done. For instance, they have to fix something in a nuclear plant after an accident, so they send a robot that will pick up live video and the worker, by this telepresence system, can inspect the area. As Joy explains, “In this case, the images are not computer generated, as they are in the architectural walk-through, but are instead provided from the world of light through digital video.” (Joy, 2002)

A *mediated architectural space* is a type of space that emerges from the fusion of physical and non-physical space, through the use of New Media.

	ARCHITECTURAL SPACE	MEDIATED ARCHITECTURAL SPACE
BOUNDARIES	PHYSICAL (DIMENSIONS)	PHYSICAL + DIGITAL (DIMENSION + CAPACITY?)
CONNECTIONS	LINEAR	NON LINEAR
MOVEMENT	ONE POINT TO THE NEXT	CAN JUMP FROM ONE POINT TO ANOTHER
LIMITS	LIMITED SPACE	LIMITED SPACE
MATERIALITY	YES	NO
TYPE OF INTERACTION	PHYSICAL	PHYSICAL AND DIGITAL (TELEPRESENCE)
NAVIGATION	YES	YES
DIMENSIONS	3 PLUS TIME	DEPENDS ON THE MEDIUM, 2 OR 3 + TIME
INFORMATION GATHERING ON FUTURE EVENTS	LIMITED TO PRINTED INFO OR DIRECT COMMUNICATION	REAL-TIME INFO ACCESSIBLE AT ANY GIVEN TIME
PRESENCE	ON-SITE	ON-SITE AND OFF-SITE

Table 1 ARCHITECTURAL SPACE AND MEDIASPACE

As seen in Table 1, a mediated architectural space offers the advantages of physical presence plus distant or non-physical one.

2.2. New Media and the City

New Media comes to change the way we perceive and live the city, the way we move in the city, the way we relate with other people in and out of the city and even the old boundaries of privacy. Terms like “augmented urban space”, “third space” or “mediated space” all refer to the different characteristics that digital technologies through New Media redefine and reshape our cities.

As Scott McQuire notes in his book, the “Media City”, the fact that media and technologies have acquired the capacity of reconfiguring perception and experience through new spatial and temporal parameters, and people being able to hear, see or even act ‘at-a-distance’, completely destroys previous conceptions of space. “The ability to span space and compress time through different generations of media from telegraph to satellite television and the internet has not only exerted a powerful fascination over modern imagination, but has fundamentally shaped the economic and social relations of modernity.” (McQuire 2008)

New Media technologies have erased in a way the limits of our embodied perception. McQuire describes it as “a crisis of boundary, reference and dimension. “Events happening in one place have instantaneous effects in another, or in a multiplicity of others, potentially impacting on sites distributed across the entire globe.” (McQuire 2008)

An interesting phenomenon about digital media is that it can play with the masses and the individual at the same time. It can be very personal, and can manifest for instance in your mobile phone, but it can also become very social to the limit making it public to whoever can receive the message through the internet, like a blog. It also plays with scale. Erkki Huhtamo (2009) refers to the phenomenon of the enlarging and shrinking of media “the gulliverisation of media”. The concept “refers to a two-directional optical-cultural ‘mechanism’ that worked against the idea of a common anthropomorphic scale. The size of the human observer kept on shrinking between gigantic (in relation to the carte-de-visite postcards or trade cards) and Lilliputhian (in front of large billboards or below advertising spectacles in the sky). “The main attention will be on the monumentalisation of displays, but it will also be pointed out

that this issue cannot be separated from the simultaneous miniaturization and proliferation of reproduced imagery and media gadgetry.” (Huhtamo 2009) Something similar happened to the field of media: ‘Immersion’ into enormous circular panorama or diorama painting (and later, the cinema screen) found in counterpart in the act of peeking at three-dimensional photographs with the ubiquitous hand-held stereoscope.” (Huhtamo 2009)

Huhtamo also explains how ‘gulliverisation’ operates between the private and the public. He pictures the skyscraper as the ultimate manifestation of the de-humanization of the built scale, opposite to the anthropomorphic one of a house. This term also encloses the issue of things being near or distant, tangible or intangible (unreachable). A billboard is distant, and less personal, the message being for more than one person. In contrast, you can hold a postcard in your hands and receive or send a personal message in it.

Cultural transformations like globalization cannot be separated from New Media, thus learning to understand the city in this “Global Digital Age” acquires relevance. Saskia Sassen points out that “Understanding a city through its built topography is increasingly inadequate when global and digital forces are part of the urban condition. This dominant accounts evict place and materiality, even though both globalization and digitalization are deeply imbricated with the material and the local, and hence, with that topographic moment.” (Sassen et al, 2009)

Are we really living locally? It is really hard to deny the fact that we are no longer relating with people within a physical boundary. Generalizing however is dangerous, since there are people who just do not use the internet, do not use mobile devices or any other kind of media, and do live restricted to their locality. Saskia’s affirmation, in which she conditions the global part of the experience to the presence in the network, is fair: “Much of what we experience as the “local” actually is something I would rather think of as a micro-environment with global span” in so far as it is deeply internetworked.” (Sassen 2009). Another fact is that “Much of what is liquefied and circulates in digital networks and is marked by hypermobility remains physical in some of its components.” (Sassen 2009). We can do electronic banking, but there is a physical bank in the city where I can go and do the same transactions. Merging new technologies has not erased old possibilities, but in some cases just gone beyond.

Have we really transformed into a “the networked society”? “What may appear as segregated sectors of a city may well have increasingly strong interconnections through particular networks of individuals and organizations with shared interests. Any large city today is traversed by these invisible circuits.” (Sassen 2009) Do we have the ability to choose those connections? There is a concept called *relational space*, that Scott McQuire defines using two premises:

*First, it pertains to a social context in which social relations are no longer ‘given’, are no longer adopted ‘naturally’ on the basis of tradition and habitus, but instead have to be actively constructed in the absence of what Bauman calls ‘pre-allocated reference groups’.¹ Second, the conduct of social relationships increasingly occurs across radically heterogeneous spatio-temporal dimensions and speeds. Face-to face encounters in relatively localized sites such as workplaces and neighbourhoods are routinely punctuated by ongoing interactions sustained by complex, technological systems, such as transport networks and communication media. (McQuire, *Mobility, Cosmopolitanism and Public Space in the Media City* 2009)*

What he describes in these premises brings different outcomes. One is that since the place itself is not enough to restrain us enough to relate, since we can escape to a virtual world (for instance students in a classroom that, even though present physically, can escape on their laptop computers to another relating-place and instead of talking with each other can chat with people in distant locations). Another possibility is that a person who would otherwise not be able to strengthen a social relationship physically, for example a young student doing military service can communicate and continue relating with the people he or she values online. Probably the best possibility is when the new communications technology allows the people to strengthen their relations in-site and off-site, physically and at-a-distance.

What remains clear is that new urban spatiality enables different configurations and can allow multiple possibilities that did not have a place a century ago. And that is probably why, we are still dreaming about and trying to delimit the full range of applications of New Media in our real space. The dream of completely joining virtual

¹ He refers here to Bauman Zygmund and his book “Liquid Modernity,” published by Polity Press in Cambridge, MA 2000.

and real space was probably the dream of the last decades, what some authors describe as *liquid architecture*. (e. g. Marcus Novak, Kas Oosterhuis, Rem Koolhaas)

2.2.1 New Media in localized Urban Environments

New Media in the form of Installations, permanent or mobile Interfaces or intelligent rooms or buildings modify localized ambiances. In their paper “Ambient Displays: Turning Architectural Space into an Interface between People and Digital Information”, the group of authors from the “Tangible Media Group” of the MIT Media Laboratory envisioned already in 1998 that the architectural space that we are living would be a new form of interface between humans and online digital information. Their approach is so valuable, for it describes characteristics of human behavior and space that are not constrained with time, as most of the previous ideas presented in this document have. In their Introduction they borrow two definitions from the Oxford and Webster’s Dictionary, respectively.

Ambient a. Surrounding, encircling, encompassing, and environing. -Oxford English Dictionary

Display n. An opening or unfolding; exhibition; manifestation. -Webster’s Revised Unabridged Dictionary (1913)

They mention the importance of expressive ambient displays that help our senses get engaged with our environment, like those present in nature. “The sounds of rain and the feeling of warm wind on our cheeks help us understand and enjoy the weather even as we engage in other activities.” (Craig Wisneski 1998) In a similar way, they point out, we can be aware of the activity of other people through passing sounds and shadows at the periphery of our attention. “Cues like an open door or lights in an office help us subconsciously understand the activities of other people and communicate our own activity and availability.”(Craig Wisneski 1998)

Fortunately, nowadays interactions between people and digital information have liberated themselves from the conventional Graphical User Interface, comprised of a keyboard monitor and mouse. Information is now moved off the screen into the physical environment, manifesting itself as subtle changes in form, movement, sound, color, smell, temperature, or light.

They explain how ambient displays can aid the connection that satisfies the need of people to feel connected to others, especially loved ones. Other spaces that could be suited in their opinion are highly specialized ones where many streams of information need to be constantly monitored, like an aviation cockpit, an atomic power plant control room, or a car. "Media is stretching out towards everyday life, being incorporated into people's workplaces, and into future visions of wearable computers people might have on their bodies."(Craig Wisneski 1998)

That monitoring of which they think about and the output after a cognition process of the system constitute an *interactive system*. (Bongers 2000)

Gwarth Pain defends in his article, "Interactivity, where to from now?" how physical exhibition space, the technology used to make the work interactive and the human movement and behavior patterns are critical in the development of interactive, responsive environment installations. He explains it:

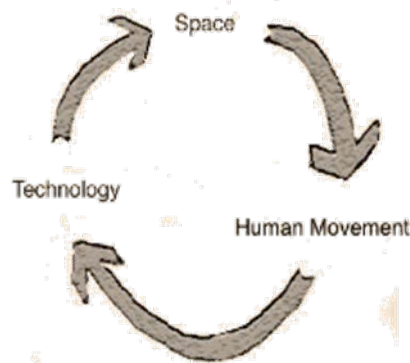


Figure 3 Causal closed loop. (Pain 2002)

"Within an interactive, responsive environment installation, human movement and behaviour patterns act upon the technology, the sensing system collects information about the nature of the human movement, the weight of the gesture, the speed and direction of movement, and feeds the data to audio and video algorithms that respond in whatever fashion the artist has designed. The response of the system is presented in the physical space, and takes the form of changing sound patterns and variations in video or animation projections. In this way the technology acts upon the space, altering the architectural and energetic nature of the exhibition space, and these changes in the physical space cause an alteration of behaviour by those that inhabit the exhibition. " (Pain 2002)

This view while illustrative is a bit restrictive to the idea of an installation, and limited outputs like video or animation projections. It does not establish the difference between an interactive and a responsive environment.

Bert Bongers, illustrates in the diagram below, how he understands the human-machine interaction. He defines the human as a circle, and the machine in a squared shape.

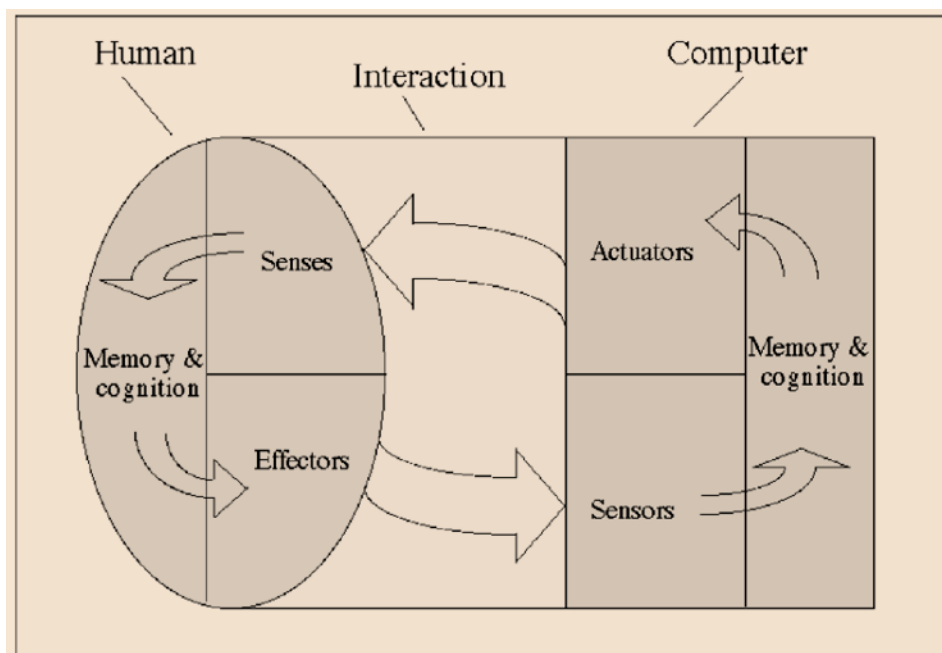


Figure 4 Human-Computer Interaction (Bongers 2000)

“The system, or ‘machine’ in the diagram, is defined very wide. It can consist of several linked elements or devices.... An interaction-‘loop’ may start when the user wants to activate the system. The system is controlled by a user through its inputs; it processes the information, and displays a result. For instance, when the user presses a key on a computer keyboard, a character is displayed on the screen. Or, in the case of an electronic musical instrument, a sound is displayed through the loudspeakers after a key is pressed. The human perceives the information from the system processes it and controls again. Note that in some cases only parts of the loop can occur, for instance when the cognition is left out on one side or the other this part rather reacts than interacts.” (Bongers 2000)

He warns us about the mistake of considering a reaction system the same than an interaction one. An example of a reaction system is a doorbell. We humans press a button(input) and it causes the bell to ring(output). But there is no cognition involved and the doorbell does not to name a possibility, open the door. An interactive doorbell would work in such a way that when you ring the door, one of its components can recognize your identity and let the door open, or deny you access if you are not allowed to pass that door. “Ideally”, he explains, an “interaction between a human and a system should be mutually influential.” (Bongers 2000)

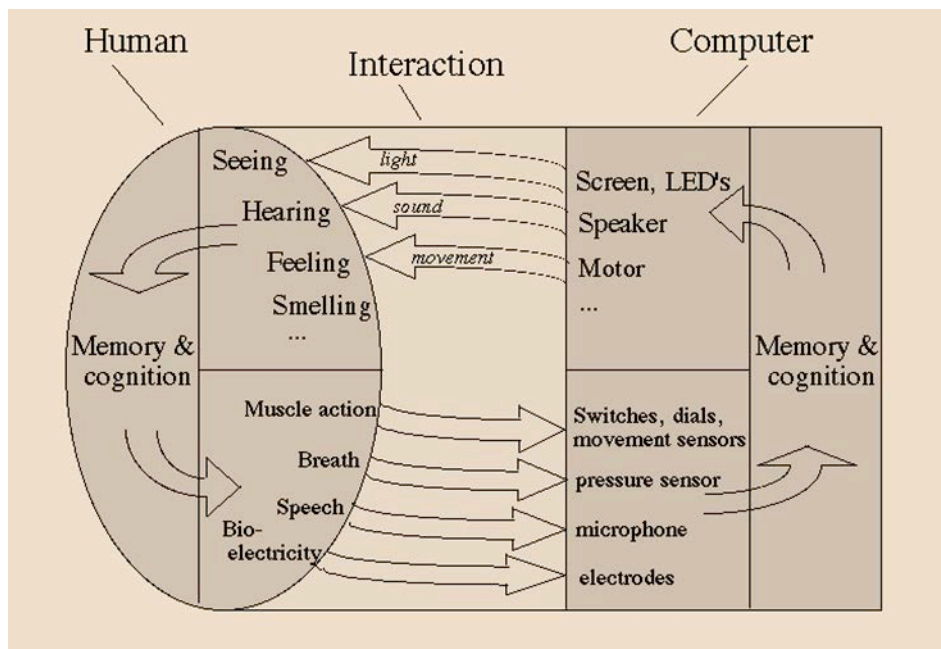


Figure 5 The Interaction between Audience and the Installation(Bongers 2000)

“The systems communicates with its environment through transducers, devices that transduce (translate) real-world signals into machine-world signals (sensors) and vice versa (actuators). Sensors are the sense organs of a machine. Through its sensing inputs, a machine can communicate with its environment and therefore be controlled. A sensor converts any physical energy (from the outside world) into electricity (into the machine world). There are sensors available for all things perceivable by human beings, and more. Machine output takes place through actuators. Actuators are the opposite of sensors, i.e., they convert electrical energy from the machine world into other energy forms for instance those perceivable by human beings. The interaction usually takes place by means of an interface (instrument). Following the definitions of the diagram, the interface is part of the system or machine and consists of the sensors and actuators.” (Bongers 2000)

An interesting way of understanding interactivity, from the perspective of Christopher Alexander (Architect and Mathematician):

“For example, in Berkeley at the corner of Hearst and Euclid, there is a drugstore, and outside the drugstore a traffic light. In the entrance to the drugstore there is a newsrack where the day's papers are displayed. When the light is red, people who are waiting to cross the street stand idly by the light; and since they have nothing to do, they look at the papers displayed on the newsrack which they can see from where they stand. Some of them just read the headlines, others actually buy a paper while they wait.

This effect makes the newsrack and the traffic light interactive; the newsrack, the newspapers on it, the money going from people's pockets to the dime slot,

the people who stop at the light and read papers, the traffic light, the electric impulses which make the lights change, and the sidewalk which the people stand on form a system - they all work together.” (Alexander 1966)

This idea, while simple, reunites all of the components Bert Bongger’s proposes for an Interactive System. The traffic light will give a green light for walking people if they press the button telling the machine that they are there and want to cross. The traffic light will then program the walkers-cross interval. However the part about the free time, the news rack and the money to the dime slot, includes more than a human-machine interaction system. It encloses a social phenomenon of behavior.

Intelligent environments are different than normal environments because they have the ability to pick up information (sensors), process it (cognition) and act upon it (actuators). “Sometimes everyware is just there: an ambient, environmental, enveloping field of information. At other times, it’s far more instrumental, something that a user might consciously take up and turn to an end.” (Greensfield 2006).

Above I introduced some concepts on Interactivity and the relation of New Media in the city. This is important to the present work since I will be designing a mediated environment in an urban localized space, a fitness facility. The interfaces will be the touchpoints of the system that will be part of the facility.

2.3 Projects

In an attempt to illustrate recent works that incorporate media into architectural and urban spaces, a selection of projects was made. Design is so difficult to define, that perhaps a view of the ideas and factors involved in each project can give a broader image of what we are talking about. According to Bill Moggridge, design problems should be all solved in a similar fashion, since the only big difference is scale. The following table published in his book “Interaction Design” shows the constraints and the human factors involved in a user centered design depending on the level of complexity of the problem.

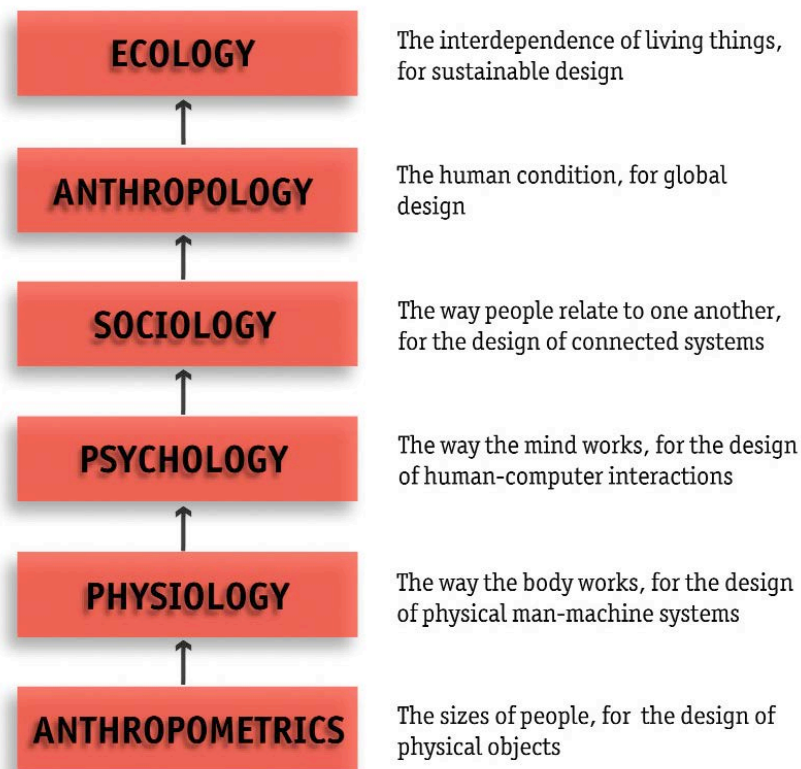


Figure 6 Design Hierarchy (Moggridge 2007)

User Centered Design Scale of the Problem “*This hierarchy shows the increasing complexity of the relevant constraints, if you consider each type of design problem from the point of view of the user. The hierarchy is based on the type of human factors that is relevant to the design context in each level of complexity, starting with the simplest at the bottom.*” (Moggridge 2007)

The selections of projects are presented in an ascendant order of scale and complexity, reaching with *The Cloud* the upper level of group of factors where

sustainable design is a concern. They were all selected thinking on a possible application within a fitness facility.

Stand MOBI.E / ADENE @ Rock in Rio

Dancing produces energy ("A Energia que nos Move".) 21-05-2010

On 2010, the Adene stand designed for the Rock in Rio in Lisbon consisted in a system of plates with sensors that would feed a power-meter in real time to associate the movement of the people with a digital count of Power shown in watts and energy produced shown in joules.

Changing environments

-The displays are constantly changing.

Engagement

-There is extra motivation for jumping or dancing.



Figure 7 Adene Stand

<http://www.adene.pt/ADENE/Canais/Noticias/ADENE+no+Rock+in+Rio.htm> (accessed several times between July 1 and July 15 2011)

This type of sensors or platforms could be installed in the Dancing, or general exercise studios to give real-time information on the activity that the group is doing. The people could compare results between class and class, and also within activities. People could even post and publish that they were present at this class and that they achieved a certain “energy level”.

ADA / The Intelligent room

Swiss National Exhibition Expo 2002

Ada is the name of the tactile luminous floor cladding that was used in an exhibition at the Swiss National Expo 2002. It allowed visitors to use this skin as a playful interactive space. It consisted of 360 hexagonal tiles that measured 66cms of longitude and that covered a total area of 136m². Each of the tiles was equipped with tactile load sensors and dimmable neon red, green and blue lamps.

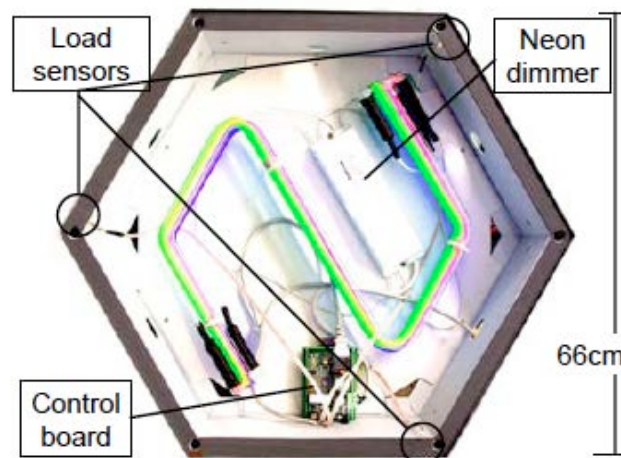


Figure 8 Inner structure of a tile (Tobi Delbrück 2007)

A factory automation bus was used to detect the present of the people and control the activation of the light in each tile. Their idea is very interesting, because they combined luminous floors that were already been used mainly in the entertainment realm for use in discotheques, television studios and stage shows with tactile floors. These second type of floors were developed more for musical instrument input or dance recording. In Figure 8, the functional components of the tile are shown:

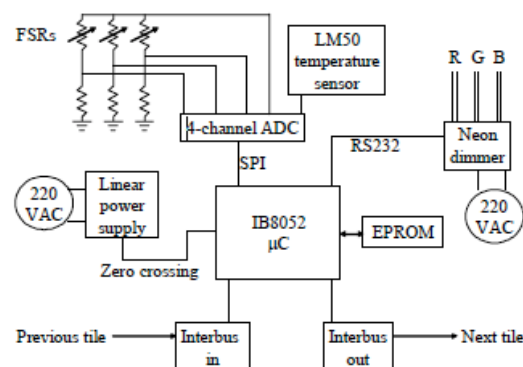


Figure 9 Functional Components of Tile (Tobi Delbrück 2007)

“It interacts with its visitors using touch, audition, sound, and vision. We think of Ada as a robot turned inside out, with its world being its visitors.” (Tobi Delbrück 2007)

According to their published data, it operated for 12 hours per day during a period of five months. It is estimated to have had 550,000 visitors, which means about almost 300 per hour. After experimenting with video tracking and video projection the design team decided that loading it with pressure sensors was the best option for achieving reliable and effective interaction.

The following figure shows a complex interaction:

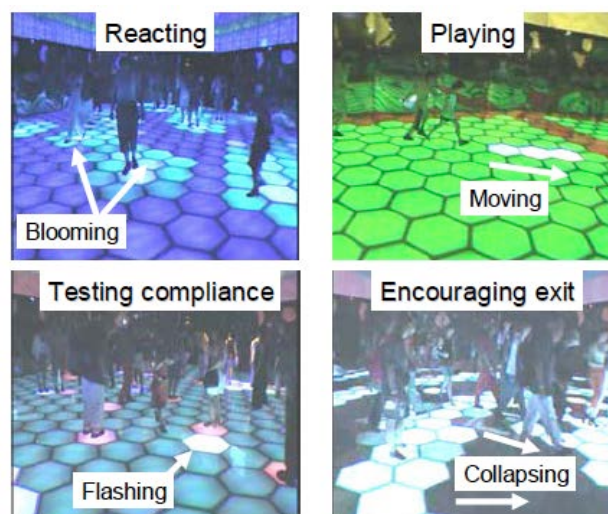


Figure 10 Ada's floor in Operation. Clockwise from top left: flowers bloom around newly loaded tiles, children chase a virtual ball, people are encouraged to leave, a visitor's compliance is tested.

The following characteristics were found in this project:

Changing environments

- The displays are constantly changing.

Engagement

- There is extra motivation for moving.
- The system recognizes the compliance and gives more attention to those who are participating rather than those who are just walking by.

Playful environments

-The tile program is capable of testing compliance and taking decisions upon it.

PRADA / KOOLHAS

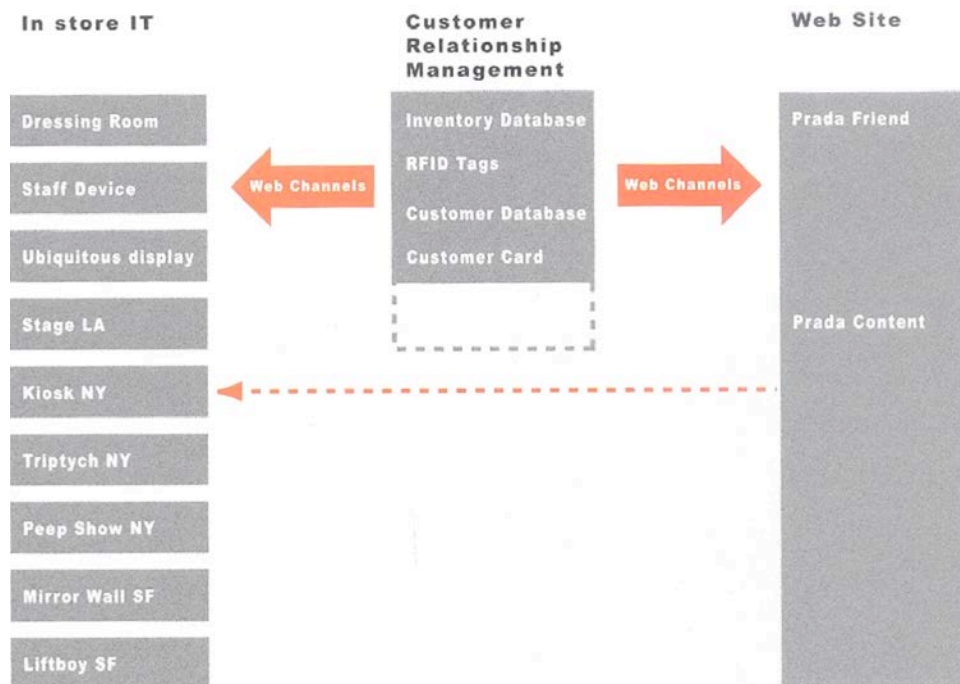


Figure 11 Prada Flow (Koolhas 2006)

In this project one can identify different characteristics:

There is a sense of public and private space, both on the physical and the media space.

- Content available only to a specific client, in their web closet, dressing room, etc.
- Content available exclusively to employees, about sales, info on specific customers ... etc.
- Public displays available the same for everyone: peep show, ubiquitous displays, wallpaper, etc.
- Level of intimacy can vary according to the different screen sizes

A record or history of customer visits

- Items they tried
- Items they bought
- Prada's staff suggestion of items they could take based on their previous choices

Administration tools

- Use of different databases to separate the personnel of the store, the brand or corporate as a whole, services, products and the customers
- Person ID linked to a profile



Figure 12 Service (Koolhaas 2006)

- Staff can connect the Sales associate and the store server. It scans items of the collection and customer cards, controls the ubiquitous screens and dressing rooms and exchanges information with the cashier about sales.
- Real-time information of their inventory, displaying items on stock at a given time



Figure 13 ID Reader and Product Scanner (Koolhaas 2006)

Interactive screens/ surfaces

- Touch points for registering their presence in the dressing rooms and the garments they are trying
- Touch screens displaying real time information about what items are brought into the dressing room and allow clients to request more specific information on the clothes or browse through other garments of the collection
- 'Magic mirrors' Plasma screen built into the large mirror surface that allows customers to see themselves both from the front and the back at the same time. Additionally, an integrated time delay can even capture and replay movements.

Observation: In this case the fact that you can see yourself from front and back at the same time is not so relevant, since the use of technology seems to be of little improvement and big investment, if you consider traditional triptych reflection with the use of angled mirror is effective enough. However the integrated video with time delay adds a different dimension and makes it very interesting.



Figure 14 Dressing Room (Koolhaas 2006)

Changing environments

- The doors, being made of Privalite glass allow customers to control the privacy of the dressing rooms by switching them from transparent to translucent or vice versa.
- Screens can be used in different modes of operation: Service and Aura. In the first one staff can 'publish' service content directly to the screen and make it accessible to customers, while in Aura mode screens are showing content on a previously programmed or random way.

Ubiquitous technology

- Dressing rooms using RFID antennas can register the items brought into that space and display an inventory of icons on a touch screen without the need of the customer requesting it or scanning every piece, it is just automatic

- Screens are located like physical store displays, billboards, mannequins or also in the garments, with a huge emphasis on flexibility and ubiquity. They can display different types of content fed from the store content server.

Mediated space. Person-to-computer interactions

- Web-site that enables a virtual visit to the closet or 'web-closet', where he/she can find the history of all the pieces tried on, keep track of their selection of likes, the things he tried but didn't buy, etc.
- Screen content can be updated from distant locations such as the central in Milan
- Ep show in a booth displaying real-time content giving an idea over a specific topic and/or random content from the service content database

Person-to-person real time interaction


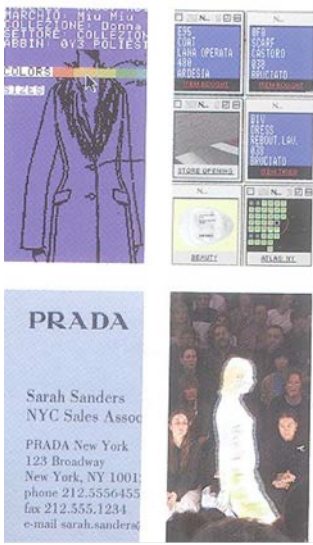
- Ubiquitous screens serve as a tool for the sales agents to communicate with the client in the dressing room allowing showing recommendations on what other pieces match the piece just selected or real-time information about what is available in the store stock.

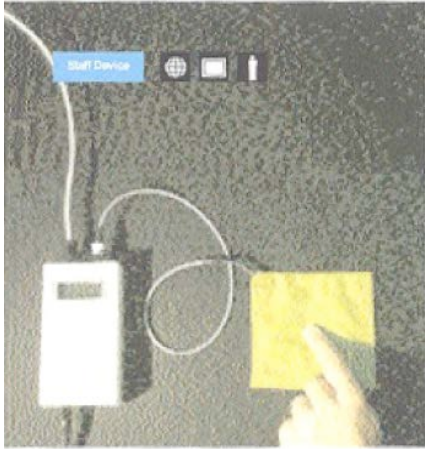
Immersive experience


- Media booth-triptych with a 3 screen vertical display showing features and curated content

Ambient media displays

- Wallpaper

 <p>Figure 15 Dressing Room 2 (Koolhas 2006)</p>	 <p>Figure 16 Product Info (Koolhas 2006)</p>
<p>Dressing Room touch screen (service)</p> <ul style="list-style-type: none"> - Inventory Database - Customer Database 	

<p>- Ubiquitous Screen Content</p>	
 <p>Figure 17 Staff Device (Koolhas 2006)</p>	<p>STAFF DEVICE- service</p> <ul style="list-style-type: none"> - Inventory Database - Customer Database - Search - Cashier - Appliance control

 <p>Figure 18 Ubiquitous displays (Koolhas 2006)</p>	<p>Ubiquitous screen (service)</p> <ul style="list-style-type: none"> - Inventory database - Item-Specific inventory information - Non item-specific inventory information
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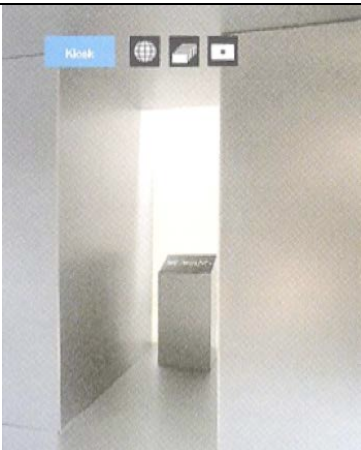
 <p>Figure 19 Service Kiosk (Koolhas 2006)</p>	<p>Service Kiosk</p> <ul style="list-style-type: none"> - Shopping - Prada Colors - Stores - Display - Prada is Content - Fashion show - Billboard
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Figure 20 Triptych 1
(Koolhas 2006)



Figure 21 Triptych 2
(Koolhas 2006)

Triptych
- *Features*

THE CLOUD / broadcasting the climate of humanity

OLYMPIC STRUCTURE

This project is a structure designed for the Olympic Games that will take place in London 2012. As described in the webpage dedicated to this project "...the proposal is a structure which gives real time expression of visitors to their virtual space (web-page) from all around the globe. It considers a live information system transmitting data and imagery from around the city and the world." (Raise the cloud n.d.)

Characteristics:

There is a strong sense of public space, both on the physical and the media space.

- Content-generated displays available for everyone to see
- Public virtual interface (website) and physical (sensors at the on-site structure)
- There is no sense of intimacy or privacy (no private space)

"The structure gives real time expression of visitors to their virtual space (web-page) and also physical data collected from all around the globe" (Raise the cloud n.d.).

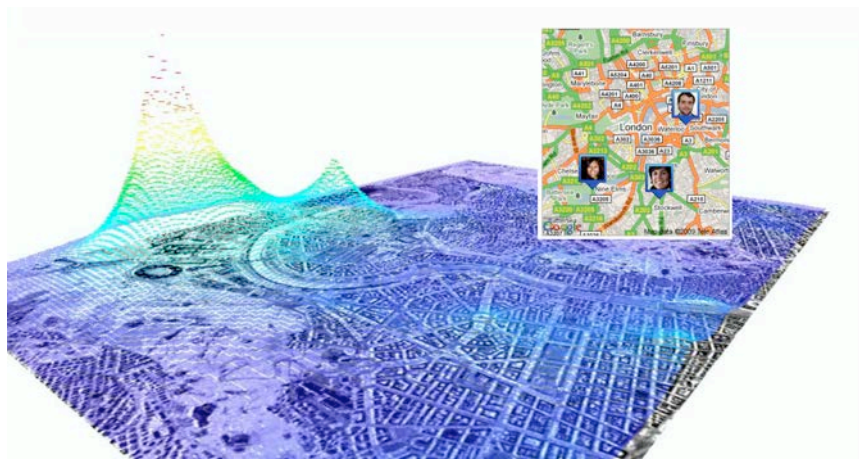


Figure 22 People's flows through the city (Raise the cloud n.d.)

Historical reference

- There is a justification that during the industrial revolution architecture in Olympics was made with glass and iron. In the past years Herzog and de Meuron made the “nest” which reflects meta-modernism. Now “the cloud” projects a networked society.

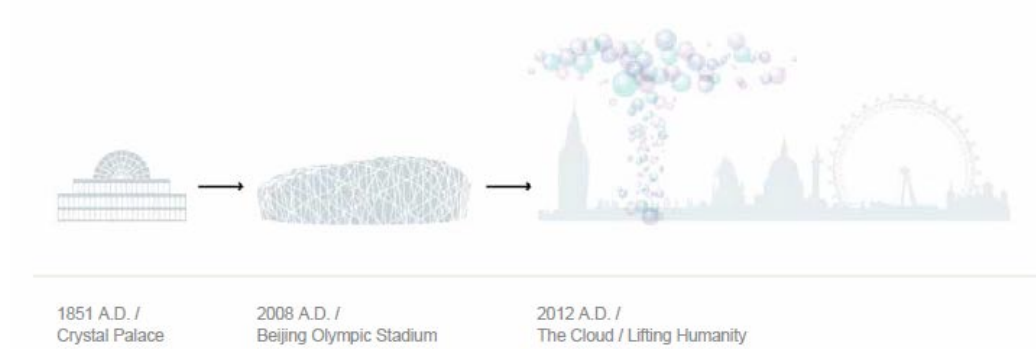


Figure 23 Buildings in time (Raise the cloud n.d.)

A record or history of visitors and their actions online

- Google searches on specific topics like weather, global warming, etc.
- Number of people

Interactive screens/ surfaces

- Display system that considers a screen and some sort of barometer. It shows patterns in its “animated skins” serving as a meter for particular events, such as transport patterns, weather forecasts, timetables and footage from deferent moments in history.
- It implements a non-Cartesian method of spatial display that consists of a suspended field of distributed LEDS. This enables people to see the display from any angle. As it is published in their webpage, “it destroys the antique divide between audience and spectacle; the people become the project and projection, watching and learning from themselves, transmuted into light.”

Administration tools

- Use of different databases to archive videos for the displays, number of visitors, searches on the search engines, data and imagery from around the city and the world.

Changing environments

- The displays are constantly changing

Ubiquitous technology

- There are hidden sensors in the structure and you are practically unaware that you are generating energy while climbing up if not told and generating content.

Mediated space

- Online world community interactions. Immersive experience

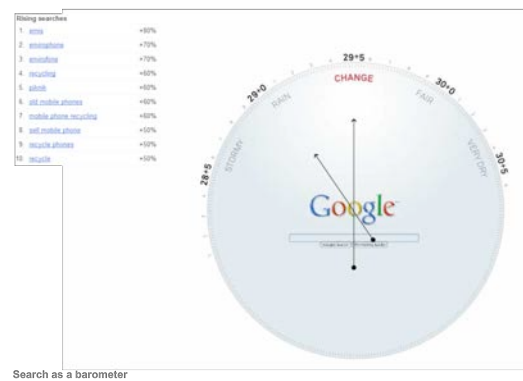


Figure 24 Weather barometer city (Raise the cloud n.d.)

Person-system real time interaction

- Its movements can reveal the movement of people below, or even within its structure, detected by hidden sensors/ a space alive to touch, an aerial ecology.

Devices and or technology

- Screens, sounds LEDs

Software

- Open source

Sustainability/ Ecology

- Use of photovoltaic cells for energy supply, pneumatic structure that uses cables, air pump, piezometric membrane (used to measure pressure).

The fact that the proposed complex structure gives real time expression of visitors to their virtual space, or webpage, from all around the world is great. It is some sort of abstraction of a telepresence system. It plays with scale; it serves as an information source of particular events, transport patterns, weather forecasts, timetables and footage which can be taken from any moment in the past timeline until the given moment. It is truly interactive.

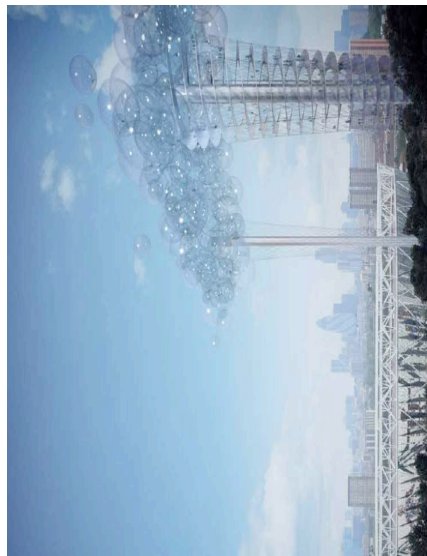


Figure 25 The cloud

(Raise the cloud n.d.)

After reviewing different projects a variety of ideas on the type of situations and interactions that can take in a localized urban environment were analyzed. Projects such as Cardio Trainer (<http://www.worksmartlabs.com/cardiotrainer/about.php>) were considered but not included since it is the case of a mobile application and thus such a type of project could be used within the built space but is not directly a type of utility or interface that pertains to the building.

3. New Media in a Fitness Facility

"Design for user-centered innovation is the activity of conceiving and developing a plan for a new or significantly improved product, service or system that ensures the best interface with user needs, aspirations and abilities, and that allows for aspects of economic, social and environmental sustainability to be taken into account." (European Commission)

In the previous sections a series of ideas from the domain of Urban Space, New Media and a few projects that can be directly related to the scope of this dissertation were presented. This design project aims to study the characteristics of space that results when using new media within a fitness facility setting. Since a mediated architectural space is in direct relationship with the use of it, identifying users' needs, preferences and behaviors was considered crucial in the design process.

Why would an Architect be interested in analyzing New Media in the built environment? When new possibilities in the physical world have arisen in history, architects and engineers have explored those to give rise to new typologies and buildings with different characteristics that at the same time offer new possibilities. The value is both present in the tangible and the intangible. In the gothic period new building techniques gave rise to impressive cathedrals, after the industrial revolution, we got skyscrapers. How is the digital revolution manifesting in architecture?

"You employ stone, wood, and concrete, and with these materials you build houses and palaces: that is construction. Ingenuity is at work. But suddenly you touch my heart, you do me good. I am happy and I say: This is beautiful. That is Architecture". (Le Corbusier)

This statement made by one of the architects that most influenced the discipline in the last 100 years, reflects a very important idea about our built environment. Taking Tschumi's idea of the experience of the space, a well-designed space has to involve not only quantitative properties but also qualitative. Ever since Vitruvius, the author of the earliest archived work that defines Architecture, there was the idea that a good building should show three principles: firmitas, utilitas, and venustas (Rome 100BC). It is something like Solidity, Utility or Function and Beauty. When he referred to beauty he did not mean only the physical one, but the aesthetic properties of the building.

Our society identifies these properties and values them as very important in the way we perceive our built environment. According to a study performed in the UK by the Mori Social Research Institute (Mori, 2002), 81% of 1,018 respondents affirmed to be interested in how the built environment looks and feels.

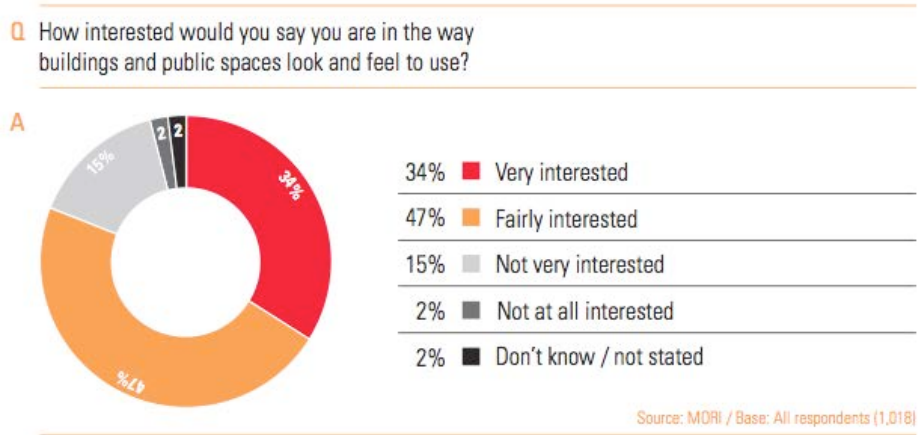


Figure 26 Survey about people's interest in the way buildings and public spaces look and feel to use. Mori, 2002.

<http://webarchive.nationalarchives.gov.uk/20110118095356/http://www.cabe.org.uk/files/streets-of-shame.pdf>
(accessed on June 27, 2011)

People are interested in quality of life, and more than 4 out of 5 answered that they believe that better quality buildings and public spaces improves it. They even affirm that the quality of their built environment directly changes the way they feel.

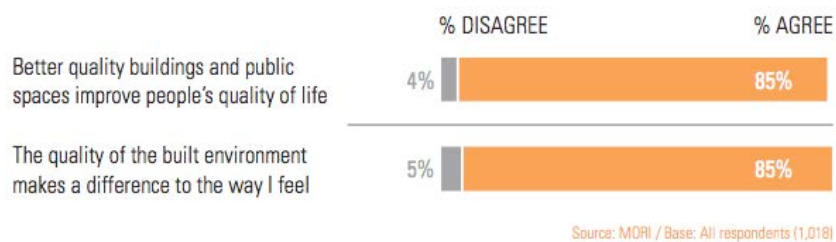


Figure 27 Survey about quality buildings, public spaces and the way people feel. Mori, 2002.
<http://webarchive.nationalarchives.gov.uk/20110118095356/http://www.cabe.org.uk/files/streets-of-shame.pdf>
(accessed on June 27, 2011)

Feeling and experiencing are not that far. Experience is directly linked with symbols and meaning. Ogden and Richards published in 1923, "The Meaning of Meaning" a diagram also known as the "triangle of meaning". It is based on the 1810 idea by

Bernard Bolzano about the relations between the matter, the symbolism applied and the mind of the receptor.

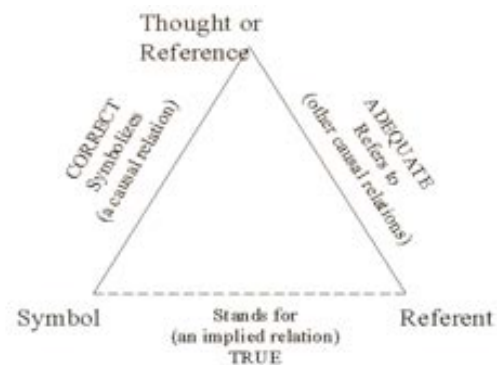


Figure 28 Ogden-Richard's Triangle

Wikipedia. PNG, http://en.wikipedia.org/wiki/File:Ogden_semiotic_triangle.png (accessed July 01, 2011)

Both thought or reference and symbol contain the meaning or symbolize. The difference is that thought concerns the things about which we think and speak, when symbol concerns the medium by which we think or speak. Thoughts are involved in how we process information. We are capable of thinking in different languages, graphic, sign language, Morse code, music, etc. Following this logic, symbol, then, depends on the media within the created world that people use to communicate (both with themselves and with others).

Thoughts, Symbols and References or using the subcategories: Space People and Meaning are intrinsically bonded. A space is empty when it can hold no meaning. People can't think of something without giving that something a mental symbol or representation of the thought. Following this, a gym is nothing without its people, and the meaning of the place is created through actions. It represents something. The building acquires a meaning in direct relationship with the needs it satisfies or activities that it holds.

Following this line about experience, New Media is a different symbol within the proposed fitness mediated space. Since the challenge of the project is to use these information technology tools not to quantify and process data to give a useful output but to contribute to a meaningful human experience, it is not suitable to treat of New media as something separate from the city, " -the medium which 'represents' urban phenomena by turning it into an image – ". As Scott McQuire argues "the spatial

experience of modern social life emerges through a complex process of co-constitution between architectural structures and urban territories, social practices and media feedback. The contemporary city is a *media-architecture complex* resulting from the proliferation of spatialized media platforms and the production of hybrid spatial ensembles.”

Interaction design is be the field of New Media that studies the way in which the people relate to it. Bill Moggridge proposes in his book, *Designing Interactions* the following interrogates: “How can we make computers become invisible? How can we interact with environments? How can we see them simply operate in space?” (Moggridge 2007) “People do not want to interact with computers; they want to get things done. The fact that there is a computer involved in that interaction is instrumental. It is not the purpose. It is the way to get things done.” (Moggridge 2007) His approach is indeed interesting however the statement is also very radical. It reminds me of the big discussion around Louis Sullivan’s famous statement: “Form follows function” that in much pictures the values of the Industrial Revolution.

New media in the built environment should not only be useful but should contribute to a meaningful and aesthetic experience of the place. Therefore, the focus of the design process involves both the quantitative and qualitative qualities. To get an idea of the way people feel about the different components that build the mediated environment, extensive interviews with people were performed. Let us review the question that is the focus of study of this work: *Can a new layer of space be created in the context of a fitness facility, and does it positively change the way that this urban environment is experienced?*

3.1 Objectives

The following objectives are stated:

- Explore and propose social and spatial interactions that new technologies can make possible at fitness facilities (while thinking of the *Situationists* and the idea that the environment matters and induces behaviors, of the idea of solving the fundamental needs of users but provide an environment suitable for exploration, leisure, and such a stimulating ambience that they are willing to engage more to the institution and to follow their activities).

- Merge an intangible space within the built one.
- Identify the actors and their different needs.
- Make relevant information and contents available.
- Define the way in which mediated space affects the way users experience the public space defined as gym or fitness facility
- Design is socially responsible ²
- The design considers international persona

Idea| start point

Introducing digital technologies to a gym involves a world of possibilities. The first step is to recognize what is already present in the typology. The following equipment was identified:

Workout Machines

Computers for administration staff

Id readers

Temperature Controls

Light controls

Video cameras

Screens

Music Device

Security Alarm

Fire Alarm

² Consider different persons and abilities, design for a broad range of users. The design of a building will determine whether the personas have access or are able to use the product or service at all. Following the European Commission guideline for universal design, under the "Design as a driver of user-centered innovation" document (Brussels, 2009), three important characteristics have to be present to meet this requirement: the design of products and services are suitable for most potential users without modifications, they are easily adaptable to different users, and have standardized interfaces, capable of being seamlessly connected by assistive devices.

Telephone

Printer

The second step is to review the nature of digital technologies. A recent post by Lev Manovich reads the following:

Thinking more about it, I realized that we can't have a single good term to describe what we do with digital media for a reason.

In the 1960s-1970s digital media pioneers like Alan Kay systematically simulated most existing mediums in a computer. Computers, and various computing devices which followed (such as "smart" phones) came to support reading, viewing, participating, playing, remixing, collaborating.. and also many new functions.

This is why 20th century terms- reader, viewer, participant, publisher, player, user - all apply. This multiplicity of media experiences is one of the defining characteristics of digital media - or, as Alan Kay called it, "the computer metamedium." (<http://manovich.net/> July 18, 2011 accessed on July 23, 2011)

In any case, the definition involves some action. The following are actions that digital technologies introduce in the environment for two type of characters, people who are clients and people who work at the facility:

Users will have real time information about activities, events and happenings @ the local gym, schedule classes and sessions online (for ex. Spinning, lockers, etc.), administer their routines, get graphic statistics of their performance, get online specialized information on their routine, diet, health etc., make new friends with similar interests, administer accounts, build a focused social network, build user-gym engagement, receive bonus/discounts according to their interest and performance.

Gym employees can be aid in accounting, making automatic statistics, target market services, administering accounts, and automatically calculate their financial statement.

Hypothesis

1. A new layer of space can be created in the context of a fitness facility using media technologies, and it positively changes the way this urban environment is experienced.
2. Users are affected in a positive way such that they develop local identity and increase engagement to the fitness facility.

3.2 Method

In order to come up with a good design solution, it was mandatory to understand the nature of the problem. If the focus is to create an experience for the user, then the user is in fact the main objective. It is important to understand the psychological phenomena involved. The motivation of modern societies to exercise was important. Another important aspect is to analyze different situations, and the implications of social contact. What questions or needs does the gym answer? Why and how does this space make sense in the city?

The following guideline was developed:

1. Definition of the type of activities that the users perform and the means to do it. Define the services proposed and the benefits.
 - 1.1 Interview people to understand their priorities about the activities that digital technologies enable in the facility
 - 1.2 IDEO Method cards by Bill Moggridge which is coherent with the User-Centered Methodology proposed by Donald Norman³

³ User Centered Methodology

Donald Norman is the author of 1988 book "The design of everyday things". He is an academic in the field of cognitive science, design and usability. Search for a search explaining system. His principles for interaction design include: use both knowledge in the world and knowledge in the head, make things visible: bridge the gulfs of Execution and Evaluation, Get the mappings right, Exploit the power of constraints, both natural and artificial. /Don Norman: The Design of Future Things (<http://www.youtube.com/watch?v=wQmWEjL6K1U> accessed several times between April 15 and July 20th 2011) Norman proposes the use of case studies, and hypothetical users, to draw useful information and gain different perspectives when designing interactions. He defines them as *scenarios* and *personas*. Scenarios are usually specified at too high a level to be of much value in the design of specific interface elements. Task-flow diagrams are important when analyzing them.

Flow analysis / Case study

Flow analysis II. Number of the people who visited the gym in a given day.

1.3 A day in the life



Figure 29 Ideo Method Cards (Moggridge 2002)

2. Analysis of the current space at a sample gym to understand the different areas and how do they work: as a system or a single organism.
 - 2.1 Interview to gym instructor Luís Bruno
 - 2.2 Spatial analysis of the projected facilities. Interview to Jose Mergulhão
 - 2.3 Analysis of an excerpt of the American College of Sports Medicine Guidelines for Gym/Fitness Facilities
 3. Definition of the media aids that articulate this environment and actions enabled. Description of the proposal and characteristics.
 - 3.1 Card Sort (Annex 4)
 - 3.2 Location of media touch points (Annex 5)
 4. Opinion of the fitness community whether the Gym, conceived in this new way would positively change their experience in this urban environment and if they expect to feel more engaged.
 - 4.1 Survey
-

The methodology is clear, divided into 4 phases to understand the user, understand the physical space of the gym, define the proposed mediated environment and assess if the people feel it can improve their experience and contribute to their engagement to the facility. Due to the big scope of people that live the gym, during the process it was decided to focus on the group of people that want to lose weight. This is what I refer to as the “users”.

To reach a concrete proposal one existent gym was selected. The new gym at the Faculty of Engineering of the University of Porto was chosen. Instead of trying to remediate an existent Gym, the proposal is to build a unique experience with the privilege of an empty canvas as a context. Rem Koolhaas said: “Where there is nothing, everything is possible.” (Koolhaas 2006)

Different methods were used in order to understand the user and design the experience. Due to the qualitative character of the project the opinion of people was highly esteemed. Interviews were oriented to gym users from different backgrounds and nationalities. Interview to 100 people from different nationalities, age groups, and backgrounds to understand what possibilities were interesting to them. Another series of interviews were conducted to specialists in different areas (Gym coach, Sports Education Professionals, Technology and media specialists, and to Architects) to get additional ideas and draw conclusions about the creation of this application to mediate the gym space.

3.3 Results

(1.1) Interview to gym users

The first approach to gather information about my persona was an interview applied to 100 people of different nationalities and backgrounds. The following table shows the age and gender of the individuals. The first column contains the age, second column for females and the last column for the male count. Not all of the people answered all of the questions, so the people count might not be the same in every question.

IDADE	FEMENINO	MASCULINO
19	1	
20	1	
21	3	3
22	4	2
23	3	5
24	3	4
25	5	3
26	8	7
27	7	18
28	1	3
29	3	2
31	1	1
32		3
33	1	1
35		1
52	1	
53		
54		
55		
56	1	
57		
58		
59		
60	1	
	44	53
	SUBTOTAL	97
	NO ANSWER	3
	TOTAL	100

Figure 30 People Interviewed Gender and Age

They were asked about how they would like to connect with the system. There was no bigger preference.

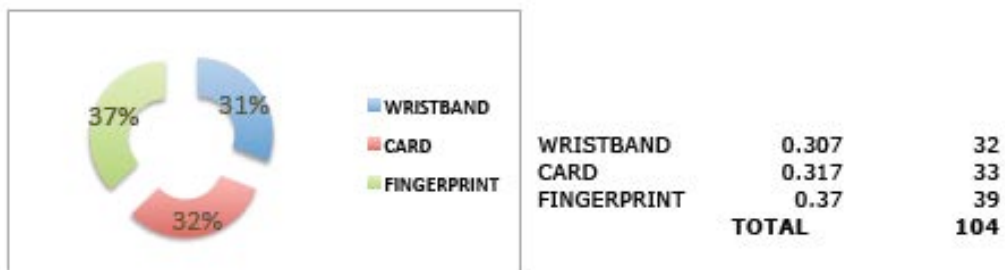


Figure 31 Id method preferences

They were confronted with the following list of features that this new service could provide them with and were asked to rate them from no feeling to very appealing.

	Very appealing	Appealing	Not so much	No answer/ I don't know	# Answers
Get real time information about activities, events and happenings in and out of your local gym.	31,1% (28)	47,8% (43)	20,0% (18)	1,1% (1)	90
Schedule classes and sessions online (for ex. spinning, locker rental, etc.)	56,0% (51)	30,8% (28)	11,0% (10)	2,2% (2)	91
Administer your routines.	43,3% (39)	46,7% (42)	7,8% (7)	1,6%	90
Get graphic statistics of your weekly and monthly performance.	55,1% (49)	34,8% (31)	9,0% (8)	1,1% (1)	89
Receive personalized feedback from your instructor online.	36,0% (32)	44,9% (40)	16,9% (15)	1,8%	89
Access and receive updates with specialized information on your diet, health, tips, etc.	40,7% (37)	46,2% (42)	9,9% (9)	3,3% (3)	91
Make new friends online with similar interests.	14,6% (13)	20,2% (18)	57,3% (51)	7,9% (7)	89
Have a mobile version of the gym assistant for your ipod or phone.	28,1% (25)	29,2% (26)	34,8% (31)	7,9% (7)	89
Administer your account, pay your membership online, sign up or eliminate services online like locker rental or new classes.	37,8% (34)	45,6% (41)	13,3% (12)	3,3% (3)	90
Be connected to people with similar interests through a focused social network.	12,4% (11)	31,5% (28)	51,7% (46)	4,5% (4)	89
Have a private space to compare your pictures on a timeline to see how your body changed.	23,3% (21)	33,3% (30)	36,7% (33)	6,7% (6)	90
Have a space to express yourself and propose activities to other members of the gym.	7,9% (7)	46,1% (41)	39,3% (35)	6,7% (6)	89
Receive bonus/ discounts according to your interests and performance.	48,9% (43)	38,6% (34)	9,1% (8)	3,4% (3)	88
Change the music in the room according to the music taste of people that are currently on the gym.	56,2% (50)	23,6% (21)	15,7% (14)	4,5% (4)	89

Figure 32 List of features

At the end of the questionnaire, people were asked to propose ideas on what they would like to have or see or do at the fitness facility. Contributions can be found in Annex 4.

Due to the nature of the information involved in the new possibilities and in an attempt to classify them, the suggestions were divided into two categories: personal and public information. Personal for information that has to fit somewhere in a more private informational space related to the user, and public to information that can be for example displayed in a bulletin board. From suggestion number 5 found in the Annex 4 an idea emerges: offer gym users videos where they can learn to do certain

sports or physical activities. They could form groups organize themselves within the gym space, and maybe the Gym administrators after evaluating the demand they could hire an instructor for them or open some group session, even charge them an extra service for it.

	Private	Public
Online profile with your health info	X	
Real time information about activities, events and happenings in and out of your local gym		X
Get graphic statistics of your weekly and monthly performance	X	
Receive personalized feedback from your instructor online	X	
Access and receive updates with specialized information on your diet, health, tips, etc.	X	X
Make new friends online with similar interests	X	X
Gym assistant for your Ipad or phone	X	
Administer your account, pay your membership online, sign up or eliminate services online like locker rental or new classes	X	
Connect with people with similar interests through this focused social network	X	X
Have a private space to compare your pictures on a timeline to see how your body changed	X	
Have a space to express yourself and propose activities to other members of the gym		X
Receive bonus/discounts according to your interests and performance	X	X
Change the music in the room according to the music taste of people that are currently on the gym		X
Digital signage/ Alerts for users to the risks involved in their use of certain area of the facility		X
Operational policies and rules signage videos. Those areas of the facility such as the pool, whirlpool, sauna, steam room, free-weight area, exercise classroom, cardiovascular area, resistance-training area, racquet sports courts, and gymnasium could have associated videos to communicate the general policies and rules that govern that area. In case of emergency people should be able to ask for medical help or call immediately to the security guards.		X
Reminder of regular inspections of the plant as part of an overall risk-management program	X	
Gym parties or other social gathering announcements.		X
Discounts	X	X
Communication with trainers about my progress	X	
Wrist band identification	X	
Changes to opening schedules, holidays, extended hour services, change of hour system (daylight savings, etc.) and how it will be reflected in the operation.		X
Providing workout alternatives in case one machine is being used, and enabling routines that are better suited for any particular individual.	X	
Gym employees ratings and comments.	X	X
Real time updates regarding gym relevant issues, such as if a class has been cancelled or a machine is not functional.		X
Monitor the amount of energy that is generated in the room by the exercising of people.		X
Monitor the amount of people at the gym now.		X
Update my profile with info such as my weight and body composition.	X	
Organize a sports adventure trip.		X

Most of the people visit the bathrooms but there are very few exceptions of people who do not. People do have the same agenda, and while some would just arrive to the space to attend a certain class, like aerobics, others just concentrate in the cardio or weight lifting area. A good majority combine both cardio exercises and weight lifting.

(1.2b) Flow analysis II/ How many people entered the gym in the typical day? (Observe)

Gym location: Bom Suceso Health Club **Address:** Praça Bom Sucesso 61,3º 4150-146 PORTO

Data collected: 15 June 2011. The following table shows the number of people that accessed the services hourly. The total of people that entered the gym in this day was 568.

TIME INTERVAL	# PEOPLE	TIME INTERVAL	# PEOPLE
7:00AM	17	16:00PM	40
8:00AM	15	17:00PM	25
9:00AM	50	18:00PM	98
10:00AM	30	19:00PM	55
11:00AM	48	20:00PM	43
12:00PM	56	21:00PM	28
13:00PM	10	22:00PM	10
14:00PM	15	23:00PM	3
15:00PM	25		
		TOTAL	568

Table 3 Flow analysis 2. Number of people that entered Bom Sucesso in a time interval.

As observed in the following chart, the biggest flow of people in the Gym occurs around 6 PM where the peak occurs and then drops dramatically towards the closing time. The lowest in-flow occurs around lunch time, reaching a minimum of 10 people at the location.

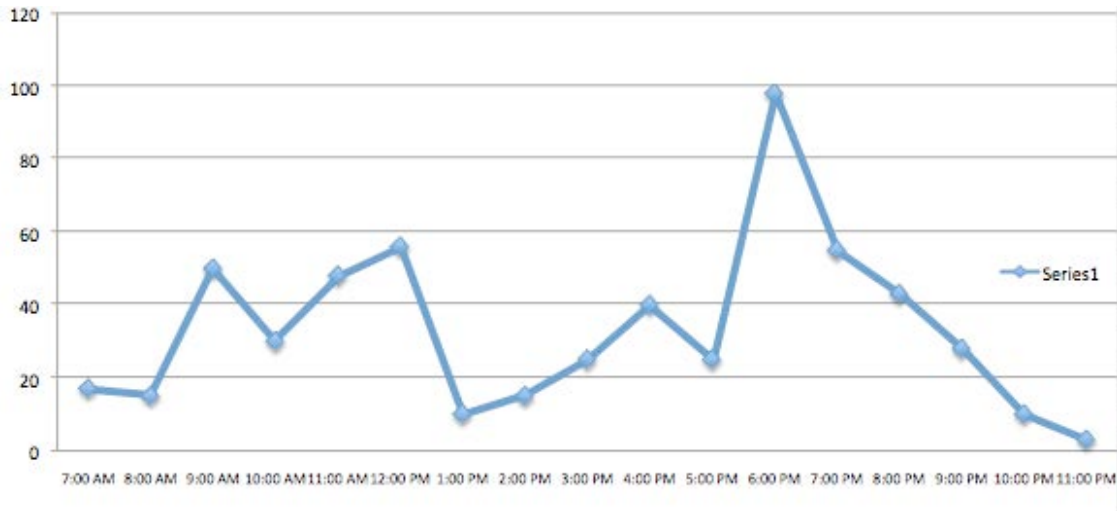


Figure 34 Graph of the user's flow through the day

A majority of 65% of the people selected fitness as the reason they are attending the gym, and only 35% mentioned body build up.

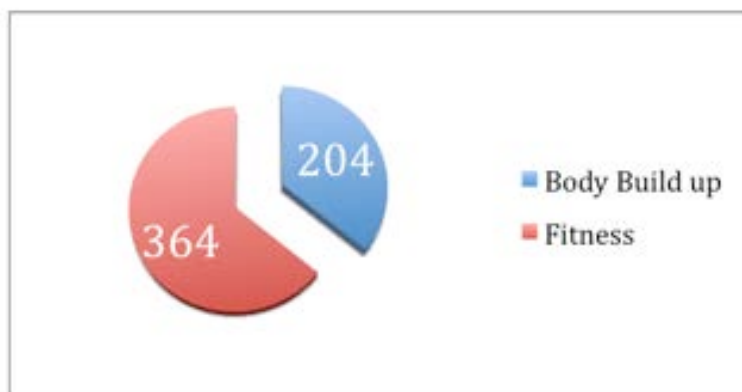


Figure 35 Bom Sucesso members choice for attending the Gym

People attend the gym mostly at the end of their day, perhaps after their mandatory activities and responsibilities (school, work, etc.). Since it was important to limit the scope of this project, based on these results the system will focus in the people interested in FITNESS. Further studies should consider the rest of the population attending the Gym to meet the design objective of being socially responsible.

(1.3) A day in the life

The objective was to observe and catalog the activities that many different users did in one entire session at the gym. Their profiles were extensively analyzed (see Annex 3) with the aid of different gym instructors and special attention was given to complex cases. This was intended to reveal unanticipated issues inherent in the routines and circumstances people experience daily and to consider their unique physical conditionings.

Example:

Person 1.

Profile:

João		56 yrs old	88 kgs	1.72 mts
START DATE	26-03-2009	INSTRUCTOR	Bruno Luís	
MEDICAL ANALYSIS (ANAMNESE)	Heath problems, hypertension and medicated. Diabetes type II. Stopped smoking 4 years ago.			
OTHER COMMENTS	Objective: lose weight, improve physical condition.			
BODY MEASUREMENT		BODY COMPOSITION		
ABDOMEN	102	THORAX	102	% FAT
RIGHT ARM	32	LEFT ARM	32	CHEST
RIGHT COXA	57	LEFT COXA	57	ABDOMEN
RIGHT LEG	37,5	LEFT LEG	37,5	LEG (COXA
WAIST		BUTTOCKS		
SHOULDERS				
BODY COMPOSITION		TESTS		
MCM		DOBRAS		TAS
TRICEPS		SUPRA		TAD
COXA		CHEST	15	FC. REP
COXA		ABDOMEN	19,2	FC. MAX
		UPPER MEMBERS		
		FLEXIBILITY ABDOMINAL		17,5
		MAX. VO2		9,7
				82

Table 4 User's profile card

Routine

MACHINE	ACTIVITY	# SERIES	# REP.
	Cardio Crosswalk 20-30	1	
	Bicycle 15		
	Prone Leg Curl	3	20
	Inclined Press	3	20
20	Pulldown (25 kg)	2	15
12	Pectoral fly	2	15
HALT	Rotary Torso	2	15
18	Lower Back	2	15

Table 5 User's routine card

People with different health conditions should be differentiated from people who need no special considerations regarding for example hearth problems. This could allow the gym couch to immediately take in count those conditions and not just give a regular suggestion. A language of different wristband colors could be established, such as the Manchester Code at hospital, to give an instant feedback on the type of activity that people may be following (Lose weight, build muscle, etc.) and if there is any special consideration (hearth problems, injured leg, etc.)

A second conclusion is that it would be convenient to have a reminder of when to check their physical composition and routine again in relation with their assistance and progress. A person who visits the gym everyday will need to update his/her information with a higher frequency than someone who visits it twice a week.

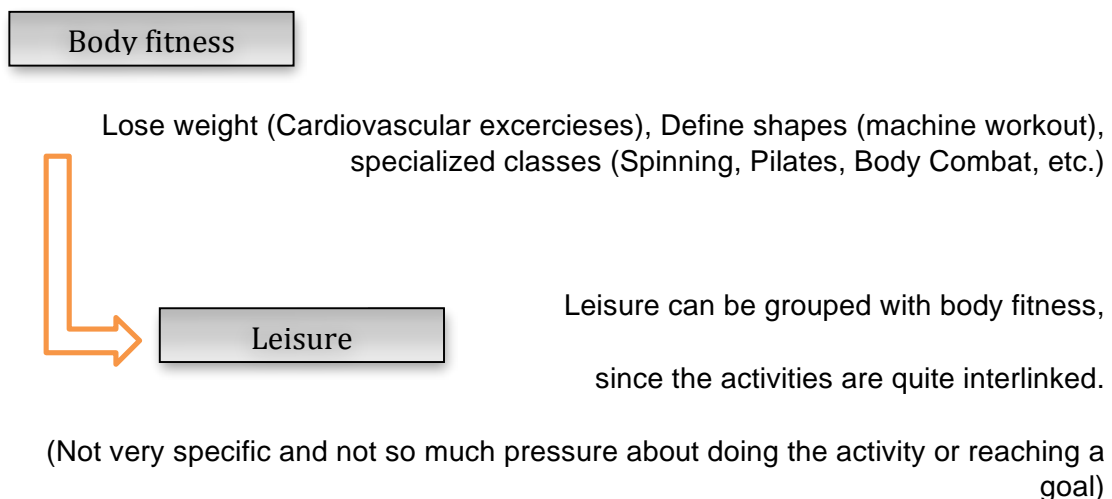
Analysis of the current space at a sample gym to understand the different areas and how they work: as a system or a single organism.

(2.1) Interview to gym instructor Luís Bruno

Interview by Denisse Iglesias on 15-june-2011 to Luís Bruno, Gym Instructor and Physical Education Professional

Description of the activities at the gym space, according to Luis Bruno, Instructor with three years of experience at the Bom Sucesso Health club.

Luís Bruno along with different interviews helped in establishing different reasons people are attending Bom Sucesso Health Club. He divides them into three main interests: losing weight, muscle build-up and preparing the body for special tasks.



Muscle Build-up

Abs (upper, lower, etc.), arms (biceps, triceps, etc.) Legs (thigh, abductor, etc.)

(Not very specific and not so much pressure about doing the activity or reaching a goal)

Body tests

10k marathon, 5k, Police-department admissions, bike tournaments, surf tournaments, etc. (Very specific and more pressure about doing the activity or reaching a goal)

The largest of these groups is integrated by the people who want to lose weight and define shapes.

(2.2)Spatial analysis of the projected facilities/ Interview:

Description of Filipe Jose Menezes Mergulhão about the planning of the gym space.

/Interview by Denisse Iglesias on

According to Filipe Mergulhão, planner of Feup's sports facilities, the infrastructure was thought of to work similar to a health club. However, due to the lack of money and space, other collective sports were not considered in the Project. Another limitation was a spinning studio or bigger bathrooms. The facility is intended to hold two to three visits per week per user, to be able to host more users. If there were no economic limits, what could have been done? Better sound isolation and better machine equipment. The only automatic processes considered for the gym are temperature, lights and access.

(2.3) Analysis of an excerpt of the American College of Sports Medicine Guidelines for Gym/Fitness Facilities

In this section I present guidelines that are related or could be explored when mediating the facility.

One of the worries is plant safety, an area in which proper signage is very important:

“The facility should provide properly designed, produced, and erected signage indicating entries. A facility must post appropriate signage alerting users to the risks involved in their use of those areas of a facility that present potential increased risks. A facility should include operational policies and rules signage. Areas of the facility such as the pool, whirlpool, sauna, steam room, free-weight area, exercise classroom, cardiovascular area, resistance-training area, racquet sports courts, and gymnasium should have sign age posted that communicates the general policies and rules that govern that area. A facility should provide appropriate signage and user instructions for all equipment. This signage should include the following for each piece of equipment: A full description of the equipment's mechanical function (each manufacturer should be asked to provide this information). Instructions on how to use the equipment. Posted warnings for any relevant risks that may be associated with use of the equipment.” (American College of Sports Medicine , 2000)

Videos could be available communicating these general policies and they would probably explain better the risks than just posters.

“A facility should provide message boards or bulletin boards for the communication or dissemination of facility and user information. These boards should be located Inappropriate areas, such as the lounge, locker rooms, fitness areas, aerobics studio, physical activity areas.” (American College of Sports Medicine , 2000)

Interactive screen-board for messages could work as their bulletin board for communication and user information.

“A facility should have signage that identifies its staff and their relevant credentials.” (American College of Sports Medicine , 2000)

Staff could wear a different color of wristband to be identified.

“Signs should be of colors consistent with expectations within the culture. For example, in Western culture red connotes blood or fire and, by extension, danger. Therefore the color red should be used in emergency or danger-related warning signs (e.g.: signs designating the location of the fire extinguisher). Furthermore, in Western culture signs that involve some element of caution should be yellow, and so forth. The factors that affect an

individual's perception of colors should be considered when a sign is being designed. The three primary factors are the lighting conditions under which the colors are seen, the sources of light for the sign, and the colors that surround the sign. The location of each sign and the visibility afforded by that location should be carefully considered. As a general rule, signs on a wall within a facility should be affixed five to seven feet above the floor. To help create a cohesive appearance within a facility, signs should be mounted at a uniform height throughout, with due consideration given to the visibility or placement needs of the specific individuals using a particular area of the facility (e.g., children, the disabled). Signs should have a substantial amount of open space surrounding them: For example, as a general rule, no more than 5.0 percent of the wall space in an information area (zone) should be occupied by signage.” (American College of Sports Medicine , 2000)

The location of the interface touch points should be carefully considered, have a cohesive appearance between them, and when designing the graphic interfaces special attention to colors and cultural meanings should be taken into consideration.

In areas in which users are exposed to a high level of thermal stress (e.g., sauna, steam room, whirlpool), a facility should have control mechanisms that will automatically shut off the equipment in predetermined (i.e., potentially dangerous) situations. A facility should also have an ongoing monitoring system that ensures that the temperature in each area is properly controlled. Finally, facilities should avoid placing steel or other heat-conducting materials in areas of high temperature or humidity (e.g., no metal handles on the doors to the sauna or the steam room).

“A working telephone or another mode of emergency calling system, such as a public address system, should be available within or adjacent to all physical activity areas. For example, emergency contact numbers should be displayed at all phones within the facility. These numbers should include those for EMS, police, and fire departments, according to local availability.” (American College of Sports Medicine , 2000)

In case of emergency people should be able to ask for medical help or call immediately to the security guards through the system. Regular inspections of the plant as part of an overall risk-management program are another concern. The system could remind the staff when the next inspection should be performed.

This was a very useful way to understand the type of concerns that an institute, such as the American College of Sports Medicine, could have regarding the facility standards for a gym.

3. Definition of the media aids that articulate this environment and actions enabled. Description of the proposal and characteristics.

3.1 Card sort (Annex 1)

A list of possible features that might be included in the different interface touchpoints was a result of the previous studies interviews and surveys. On separate cards, those possible features of the new application were listed and people had to organize them in ways that made sense to them. This helped to group the functions and know in what type of interface the information should be displayed.

Five types of interface are proposed:

INTERACTIVE BOARD. Interactive screens that can be placed in the environment to have a public touch point of the gym helper.

BODY METER. The character of the body meter is a cabin where people can enter and get a complex analysis of their body composition and measurable aspects of their body.

ENERGY METER. This is a special floor cladding with special sensors that can measure the amount of energy produced by the person or people moving on it.

WEB. Web based user interface or WUI is a subclass of GUIs that accepts input and provide output by generating web pages which are transmitted via the internet.

PORTABLE DEVICE. Small and portable devices that can have internet access such as mobile phones, tablets or music players.

According to the preference of the 20 individuals interviewed (SEE ANNEX 4), the following main functions were defined for the interface touch points in the gym:

INTERACTIVE BOARD

Analyzing this table with the results of the type of functions would like to use through the interactive board, the following list results:

	Private	Public	#
Real time information about activities, events and happenings in and out of your local gym		X	20
Make new friends online with similar interests	X	X	11
Have a space to express yourself and propose activities to other members of the gym		X	20
Change the music in the room according to the music taste of people that are currently on the gym		X	17
Digital Signage/ Alerts for users to the risks involved in their use of certain area of the facility		X	20

Operational policies and rules signage videos. Ability to ask for medical help or call immediately to the security guards in the case of an emergency.		X	20
Reminder of regular inspections of the plant as part of an overall risk-management program	X		14
Gym parties or other social gathering announcements.		X	20
Wrist band identification	X		20
Changes to opening schedules, holidays, extended hour services, change of hour system (daylight savings, etc.) and how it will be reflected in the operation.		X	20
Providing workout alternatives in case one machine is being used, and enabling routines that are better suited for any particular individual.	X		13
Gym employees ratings and comments.	X	X	20
Real time updates regarding gym relevant issues, such as if a class has been cancelled or a machine is not functional.		X	20
Monitor the amount of people at the gym now.		X	17
Organize a sports adventure trip.		X	14
Watch videos on how to do my stretching exercises.	X	X	20
Play against my friends' abs record.	X	X	12

Table 6 Interactive Board functionality analysis

People want to have not only public information, different as what could be imagined, but also private one. Some of the functions could work both as private and as public, with five of them overlapping. From the rest, three are strictly private and nine of them strictly public. They selected the option of identifying with a wristband, which could make the bridge between the public and the private information. That would be the division that separates both.

They can arrive to the interactive board, and see the public info and only after identifying be able to for example confirm their assistance to a special event organized by some other member of the community. This is very relevant because without the digital technologies it would be impossible to access both public and more personal information on the same display system without protecting the private info. What they have in front of them can be conceived as 2 tools, one personal and one private in the same device.

BODY METER

	Private	Public	#
Online profile with your body and health info	X		7
Have a private space to compare your pictures on a timeline to see how your body changed	X		9
Wrist band identification	X		20
Update my profile with info such as my weight and body composition.	X		20

Table 7 Body Meter Functionality analysis

The character of the body meter is a cabin where people can enter and get a complex analysis of their body composition and measurable aspects of their body. People were not very familiar with the idea of a “body meter cabin”. They made more questions about this interface than the rest. It was reflected in their answers to the survey. It was clear for them that in order to personalize the info of whatever they measured in this cabin about their body it was important to identify, with 20 out of 20 selections. The same happened with the feature of updating their profile with body info. When it came to the rest of the list, less than half proposed to connect this cabin with their online profile to display or modify their body health info. Almost half wanted their pictures displayed in a timeline to see their evolution in time. Interesting suggestions were received like to give special discounts whenever the body meter measured that they reached a certain weight loss goal. Two of them suggested connecting the body meter with their portable device.

ENERGY METER

This is a special floor cladding with pressure sensors that can detect movement and calculate the amount of energy produced by the person or people moving on it.

	Private	Public	#
Wrist band identification.	X		20
Monitor the amount of energy that is generated in the room by the exercising of people.		X	20

Table 8 Energy Meter Functionality Analysis

In this case they selected to identify with the wrist band which is very interesting because in this study it was preconceived as merely public. This might reflect their will to share or “remember” that they were at the session using the energy meter. In the context of the Energy Meter it would make sense to have the option to publish if they assisted or not to a special class. Say the entire class broke a record in the Energy Meter level, and they want to let their friends know that they were part of the challenge. In that case, identifying to communicate their presence makes sense.

WEB

	Private	Public	#
Online profile with your health info	X		20
Real time information about activities, events and happenings in and out of your local gym		X	20
Get graphic statistics of your weekly and monthly performance	X		20
Receive personalized feedback from your instructor online	X		20
Access and receive updates with specialized information on your diet, health, tips, etc.	X	X	20
Make new friends online with similar interests	X	X	20
Gym assistant for your Ipad or phone	X		20
Administer your account, pay your membership online, sign up or eliminate services online like locker rental or new classes	X		20
Connect with people with similar interests through this focused social network	X	X	20
Have a private space to compare your pictures on a timeline to see how your body changed	X		14
Have a space to express yourself and propose activities to other members of the gym		X	20
Receive bonus/discounts according to your interests and performance	X	X	18
Reminder of regular inspections of the plant as part of an overall risk-management program	X		8
Gym parties or other social gathering announcements.		X	20
Discounts	X	X	20
Communication with trainers about my progress	X		20
Changes to opening schedules, holidays, extended hour services, change of hour system (daylight savings, etc.) and how it will be reflected in the operation.		X	20
Gym employees' ratings and comments.	X	X	13
Real time updates regarding gym relevant issues, such as if a class has been cancelled or a machine is not functional.		X	20
Monitor the amount of people at the gym now.		X	18
Update my profile with info such as my weight and body composition.	X		9
Organize a sports adventure trip.		X	20
Watch videos on how to do my stretching exercises.	X	X	20
Watch videos on how to do my weight lifting exercises.	X	X	20

Table 9 Web Page Functionality Analysis

The type of functions that people chose to have accessible online on a web application reflects their will to engage and come back virtually to their gym session at home or wherever they connect to the internet. They marked functions such as “watch videos on how to do my stretching exercises” or “communicate with trainers about my progress”. The fact of the interviewed people marking all of these features can be related to a consumer-based thinking, however, the idea of making all of this information available opens possibilities and provides them with a medium of higher engagement.

PORTABLE DEVICE

Small and portable devices that can have internet access such as mobile phones or tablets.

	Private	Public	#
Online profile with your health info	X		20
Real time information about activities, events and happenings in and out of your local gym		X	18
Get graphic statistics of your weekly and monthly performance	X		19
Receive personalized feedback from your instructor online	X		20
Access and receive updates with specialized information on your diet, health, tips, etc.	X	X	20
Make new friends online with similar interests	X	X	16
Gym assistant for your ipod or phone	X		20
Administer your account, pay your membership online, sign up or eliminate services online like locker rental or new classes	X		20
Connect with people with similar interests through this focused social network	X	X	20
Have a space to express yourself and propose activities to other members of the gym		X	12
Receive bonus/discounts according to your interests and performance	X	X	13
Change the music in the room according to the music taste of people that are currently on the gym		X	20
Digital signage/ Alerts for users to the risks involved in their use of certain area of the facility		X	12
Operational policies and rules signage videos. Those areas of the facility such as the pool, whirlpool, sauna, steam room, free-weight area, exercise classroom, cardiovascular area, resistance-training area, racquet sports courts, and gymnasium could have associated videos to communicate the general policies and rules that govern that area. In case of emergency people should be able to ask for medical help or call immediately to the security guards.		X	20
Reminder of regular inspections of the plant as part of an overall risk-management program	X		15
Gym parties or other social gathering announcements.		X	18
Discounts	X	X	20
Communication with trainers about my progress	X		20
Changes to opening schedules, holidays, extended hour services, change of hour system (daylight savings, etc.) and how it will be reflected in the operation.		X	20
Providing workout alternatives in case one machine is being used, and enabling routines that are better suited for any particular individual.	X		20
Gym employees ratings and comments.	X	X	20
Real time updates regarding gym relevant issues, such as if a class has been cancelled or a machine is not functional.		X	20
Monitor the amount of people at the gym now.		X	20
Update my profile with info such as my weight and body composition.	X		14
Organize a sports adventure trip.		X	20
Watch videos on how to do my stretching exercises.		X	20
Watch videos on how to do my weight lifting exercises.		X	20
Play against my best running record.	X	X	20
Play against my friends' abs record.	X	X	20

Table 10 Portable Device Functionality Analysis

The long list that resulted reflects the interest of people of keeping contents close to them, and an attachment to those devices. They want to see most of the features they see in the web in their portable devices.

(3.2) Location of Media touch points

‘The technology question is inseparable from the question of *where* technology occurs.’ (Virilio 1995)

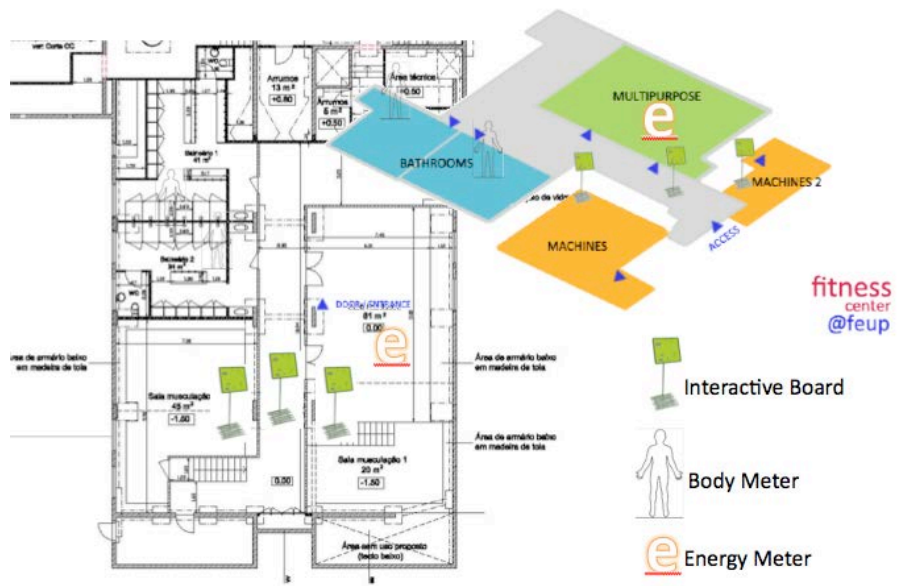


Figure 36 Location of Media touch points

According to an interview performed to different potential users of this space and the analysis of their preferences and ideas this location map is proposed (see Annex 5). The Body Meter should be placed in the place of a shower cabin, in both of the bathroom facilities. Due to technical installations it will be probably placed in one end of the shower cabins so that it doesn't interfere with the water channel.

Screens should be located in the different rooms, and one at the entrance which serves also as the exit. In this way people can keep up to date on what is going on there and access them in their activity areas.

The Energy Meter makes sense to be placed in the multipurpose room where different classes such as aerobics, dancing, and body pump occur. There will be a graphic display to know how much energy the people are generating in a given moment.

4. Opinion of the fitness community whether the Gym, conceived in this new way would positively change their experience in this urban environment and if they expect to feel more engaged.

4.1 Survey

Based on the description of the gym powered by Zione Fitness, would you say your experience at the fitness center will undergo a...?

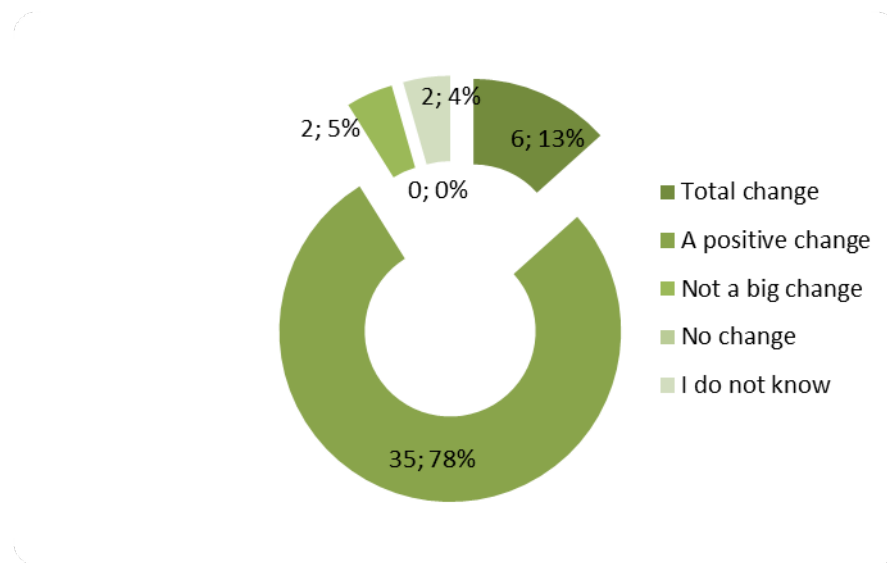


Table 11 Result of survey to 45 Gym users

A vast majority of the people (91%) would agree that their experience would change positively, and only less than 5% would say their experience would not change, or that they do not know if it would change positively.

Western society recognizes Sports and leisure facilities as items that would say are important in making somewhere a good place to live. A recent study (2005) made to 2,017 Great Britain residents gave them the opportunity to choose up to 5 of the options listed in the chart below, and 14% chose Sports and leisure facilities. This is about the same importance they give to Low level of pollution, low levels of traffic congestion and access to culture.

What makes Somewhere a Good Place to Live: Change over Time

Q Thinking generally, which of the items on this list would you say are most important in making somewhere a good place to live? You can choose up to five.

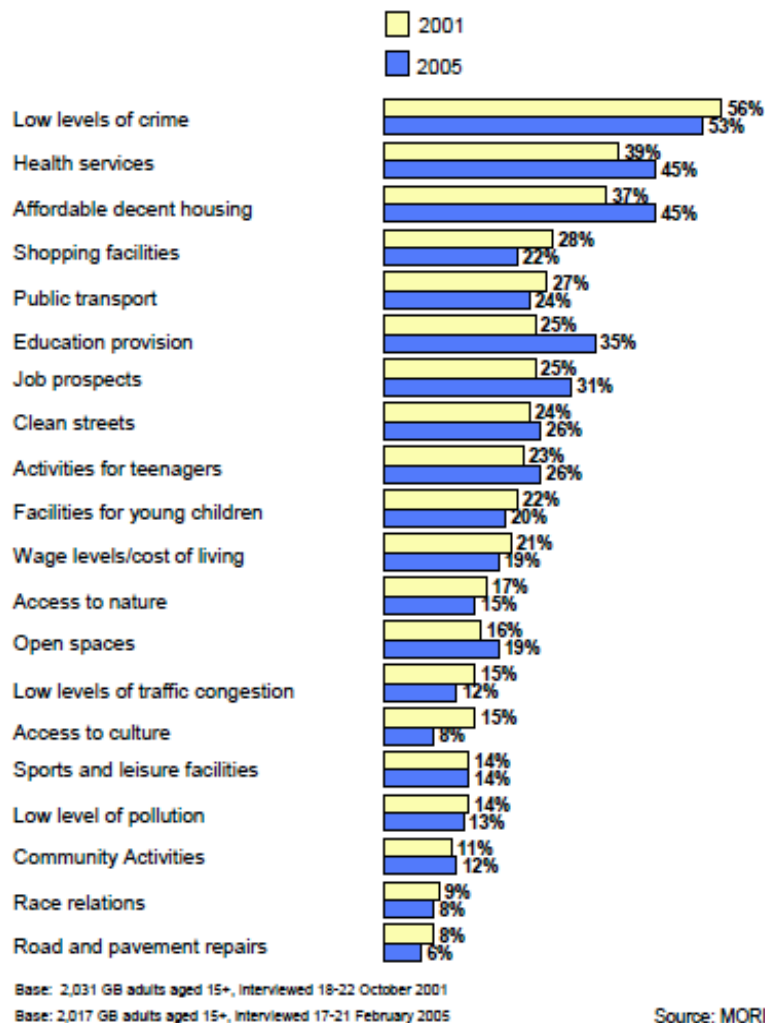


Figure 37 Mori 2005

...I have come to understand the close relationship between architecture and civilization. I have learned that architecture must stem from the sustaining and driving forces of civilization and that it can be, at its best, an expression of the innermost structure of its time. (Koolhaas, Mau, et al. 1998)

If we have transformed the way we live our schools, accessing courses online, our libraries, turning them digital, we use online banking, why are we living sports and fitness centers roughly like 30 years ago when communication technologies were not broadly used?

4. Discussion

“...Everyware finally isn’t so much a particular kind of hardware, philosophy of software design, or set of interface conventions as it is a situation—a set of circumstances.”(Greensfield 2006)

People organize within space depending on the activities they need to do, and the available means to do them. If people have to eat, and there is only one food source, they will probably start lining up in order to get the food. The diagram below is taken from William Mitchell’s idea, as described in a conference at the MIT titled Designing a Campus for the Twenty-First Century (Mitchell 2007):

CLUSTER ORGANIZATION OF PEOPLE LOOKING FOR INFORMATION AT THE SCHOOL CAMPUS

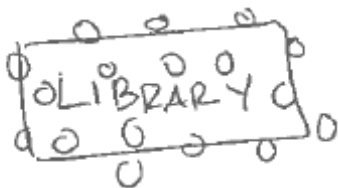


Figure 38 PHYSICAL DISTRIBUTION RESTRICTED TO BUILDING AREA



Figure 39 PHYSICAL DISTRIBUTION RESTRICTED TO LAN SOCKET ACCESS POINTS

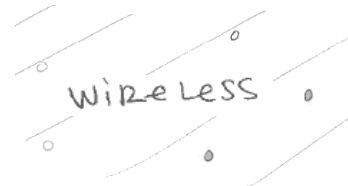


Figure 40 RESTRICTED TO WIRELESS (INVISIBLE) COVERAGE

He analyzed how the simple activity of information seeking, organized people around the only source in campus (library) 25 years ago. In the 1990s, when Internet was available at the campus, the clusters of people reorganized not anymore only at the library, but also very visible around the LAN sockets (Internet access points). Nowadays, people are clustered differently and more disperse in the campus due to the availability of the wireless internet coverage.

What if the people at the gym, have their routine, and instead of following it in a linear order they can just mark up what they did already and be reminded what is next. The 4d map versus the 3d list (considering time as a dimension involved). There are situations in which order doesn’t alter the end result, like doing Leg Abduction before

Leg Adduction, or vice versa. This is already happening naturally, but perhaps it could be better shaped.

An idea of a game in their portable devices was analyzed. It is based on the concept of making life a game:

Gamification of life (A different reason to go to the gym)

Since the biggest group of people attend the gym with the specific purpose of gaining body fitness, this category was chosen. How many of them think of those activities as a game? Can we generate more engagement through a fitness game? Can we take the gym out from the physical building into their everyday? Establish the In's and Out's. (Ubiquity) How could they do a gym session at home or at work in a day they could not be present? How can I meet other people with whom I share similar interests to do things outside the gym? How can the system motivate these types of fortuities of interaction?

Goals:

- Classify the different exercise and activities that aid in body fitness
- Define the point system
- Define the bonus and prizes. Justification of the procedure according to a recognized game design method
- Describe the social component.

The idea was to classify different exercises under the body fitness category. Under those different areas of the body were identified as goals. Under the different goal-oriented division the type of exercise or machine was listed. Breaking up into these end-purposes, it was easier to analyze their results.

Since it would be fair to group a non-experienced gym user with an athlete in the same classification, different levels were designed. Different rules, point system, and type of social interaction possibility apply to the different levels and exercise type. The aim should be to provide a new digital social experience. Rules can be designed according to age, gender and limitations of the user (medical conditions, etc.)

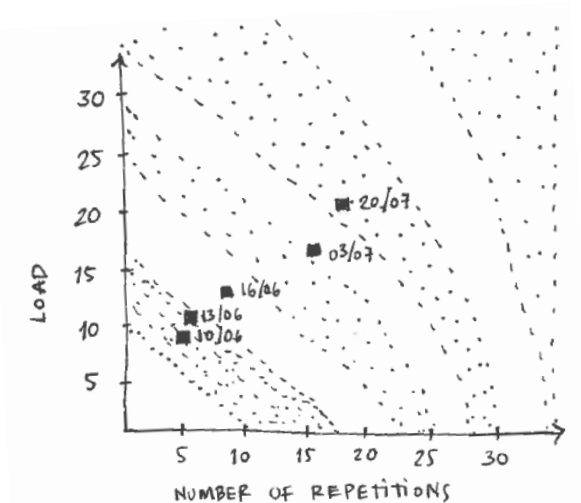


Figure 41 Example of graph of sessions and the amount of load and # of repetitions done in different sessions

Every session a new point could be generated stating the amount of load the person did the number of repetitions in that exercise, and the date. This way over time there would be a resulting graph. Different zones could be established and would indicate the different levels. Once the person reached a new level he or she could be notified (E.g. "You reached Level 4, after doing 25 repetitions with an average load of 20 kgs on the Leg Abduction machine")

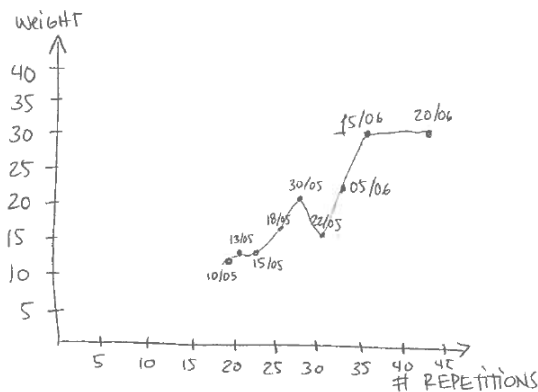


Figure 42 Example of graph of performance over time in a specific exercise

This shows a simple way in which graphics statistics of a single routine could be generated for the user, in the context of a game, or just as a graphical tracking of their performance. A specialized team could take care of this component of the project.

After using different methods to study the users, understand their frameworks, and organize and test the ideas, a new story about the gym experience is to be told. The following chart explains how to apply the design principles to solve a problem published by the Silicon Valley Product Management Association.

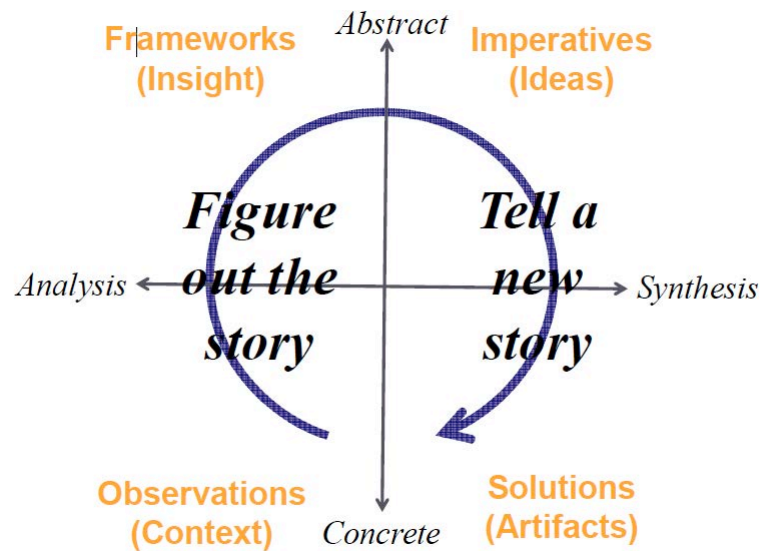


Figure 43. Design Principles to solve a problem (Beckman, 2009).

The narrative is important in the context of urban environments:

“With the pervasiveness of technologies weaving their way into everything from clothes tags to toilet seats, artistic projects that explore the subjective, personal domains of mind and body already adjusting to accommodate such phenomena are vitally relevant. In the context of urban environments – interfaces in their own right- their presence offers a medium of human investigation that is not hermetic, fixed or semiotic, but mutable and narrative based, giving technology an almost human and embodied presence. Many projects offer social commentary, and add a haptic layer to the environment that reads what is happening there, some more provocatively than others.” (Bullivant 2006)

The current story is as follows:

A new member of the Gym arrives, takes a tour. He will generally get a free session to see if they enjoyed the experience. If the potential user decides to enroll, payment has to be done and it usually happens over the counter. He is then assigned an instructor and is tested for stretching performance, and exercise resistance, and different characteristics of his body composition and measures are taken. In many gyms nowadays the user will get a card, which includes an RFID identification to check in every session. Every user has a unique id, a name, an address and a contact number. All of these data is compulsory.

Every user is assigned with a professor, responsible for his programmed activities and body work. This professor has a unique id, a name, address, contact, schedule and salary. At the gym the different machines have a unique name, type (cardio, workout, etc.), and model. Workout plans are composed by a series of exercises and repetitions in different models of machine. In a single workout plan there is a parameter of time and type of load and or speed. There exercises can also be measured by number of repetitions.

Stretching exercises have also a unique name and there is a correct way of doing them. Posters are usually posted in the stretching area to understand graphically the correct way to follow the exercises. Professors assign a plan that includes start date of the plan, end date, and objectives. They also indicate the number of times per week that the user has to follow that plan, and in many cases, they give more than one plan to work different muscle groups in different sessions. The Gym Instructor will fill in the user's card and store it in the common place area, usually by alphabetical order. Whenever the gym user comes to the gym again they have to look for their card and follow the prescribed routine. If the card is lost or physically destroyed (wet, etc.), a new card has to be formulated for him.

If the Gym staff wants to publish an event or a special happening they will very likely post a print in the entrance of the facility. If they are members of an online social media group then they can also post it to their blog or page. However there is no registry of calendar, there is no direct way for a user of the fitness facility to propose an activity but through pasting an announcement upon authorization or writing on the blog or wall of the facility, if there is one.

They do not have the opportunity to track their performance at the gym once they leave the facility, since they will be moving away from their card. The only way to remember it would be to ask for a photocopy of the routine and of their results of the body assessment. The user is responsible of remembering when to make their next assessment. The user is responsible of reminding the instructor if they have a health problem.

What is the new story that this work proposes? What are the characteristics that define this fitness space?

There is a sense of public and private space, both on the physical and the media space.

- Content available only to specific users, in their body meter results, their own record of evolution, etc.
- Content available exclusively to instructors, about the improvement of the gym users, about their own schedule and changes in it, ... etc.
- Public displays available the same for everyone: events, new activities, energy meter, interactive board etc.
- Level of intimacy can vary according to logging in or not, to the type of media touch point, etc.

A record or history of user's performance

- Routines they are following
- Attendance to the center
- Statistics about their performance in time
- Goals and schedule to achieve them
- Graphics, pictures and challenges achieved
- Body Meter device where they can perform easy body composition and measures check and updates their profile in real time

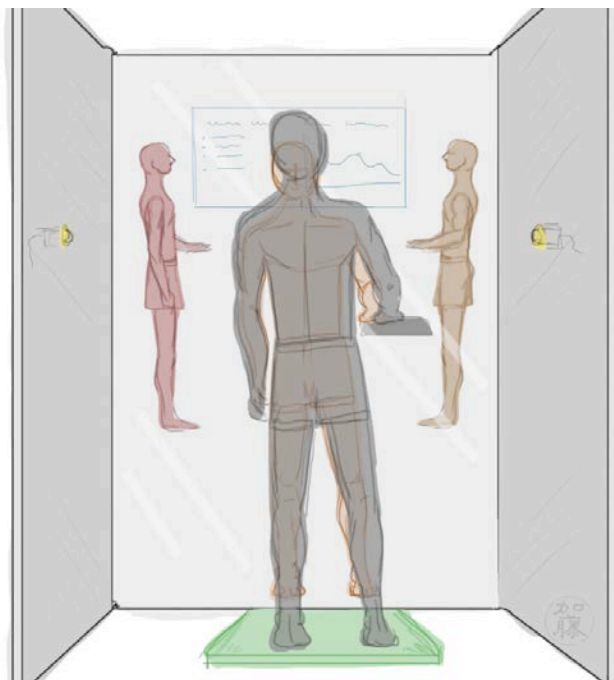


Figure 43 Body Meter. Illustration by Enrique Kato, 2011.

Administration tools

- Use of different databases to separate the fitness centre's employees and instructors, services, products and the users
- Person ID linked to a profile, to an assigned instructor, to the services and products
- Users can ask for lockers, sign up for classes or activities, and make payments online.
- Users can communicate with their instructor and ask for written feedback in addition to the verbal that they can get at the gym.
- Real-time information of activities, classes cancelled, changes to schedules, etc.
- Real-time statistics about how many people are at the gym, what are the main activities that they are engaging in, etc.

Interactive screens/ Interactive board

The interface in real time now dominates the interval of real space: the surface has become an "interactive depth." (Koolhaas, Mau, et al. 1998)

- Different types of content can be displayed in the Interactive Boards
- Touch screens displaying real time information about what is going on in the gym, new classes, new activities, evaluation of the Instructors, if they did not bring a portable device they can sign in and check their personal info, etc.

Changing environments and Immersive experience

- Through the integration of Energy Meter in the multipurpose room, the class can become more fun and active and have a direct feedback both from the changing colors in the floor and by the visualization of how much energy they are producing
- There is a tactile communication from with the environment and it can encourage bigger engagement in the activity, be part of a record-beating challenge, the instructor could propose to beat the best record, etc.



Figure 44 Multipurpose room equipped with Energy Meter, Illustration by Enrique Kato 2011.

Mediated space

- The presence and activities of users and gym staff can be recorded
- The environment is modified with interface touch points such as Body Meter, Energy Meter, Interactive Boards, and Portable devices
- Web site enables virtual visits to their profiles, connect with other members, watch their own statistics, compare them, play
- Screen content can be updated from distant locations , like a member of the gym who wants to organize a trip can post at home or from his mobile phone and it will appear in real time in the Interactive Board

Person-to-person real time interaction

- Imagine that the user could not attend the gym but is on holidays and has access to a park. He could ask for real-time advice to his instructor on his mobile phone about the type of exercises or what amount of time to run, at what speed, etc.

Gamification of life

- People can socially engage in games on their portable devices, exchange their performance information, establish records at the Energy Meter room, and have a new way of thinking of their activities at the Fitness Facility.

Evaluation

Using the EMMI LAB guidelines (Lugmayr, 2010) to evaluate Ambient Media on their Innovativeness, a few questions are answered.

How do currently existing media products fit into the phases of the innovation processes? At least locally, there is nothing similar. This would be the first ubiquitous environment at the University of Porto.

How did the ideas for currently existing ambient media products emerge? I had the idea for this service while speaking with Carlos Ureta, Founder of Zione (www.zione.com.mx) a Mexican company that focuses on online applications for sports organizations. His services include Zione Sports Web Applications, Zione Mobile Tech, and Zione C X C, which are all directed to administering sports leagues and groups. He is currently expanding into new business areas, like Zione Sport and Zione Streaming which envision services like sports clothes and online broadcasting of minor leagues sports games. I have been collaborating with him in one of the projects (Zione Streaming) and Zione is willing to take the initiative further developing the technology for what I call Zione Fit. This service is not already a marketable one, since it is still in a design stage. It would take about two years to make it into a real service, since the company has a tight agenda due to its size.

The following table proposed by the EMMI LAB guidelines (Lugmayr, 2010) was used to make a reflection about the type of service that this intervention in the facility would mean. It proposes evaluation criteria on the product innovativeness of ambient media services and products.

Type	Criteria
V1 Innovation process [7]	Invention, innovation, imitation
V2 Degree of novelty [2]	Radical, adaptive, imitation
V3 Innovation form [7]	Product innovation, market innovation, process innovation, social innovation, method
V4 Innovation management [8]	Organization, efficiency, relationships, market, structure
V5 Media characteristics [5] [6]	Single creation, continuous creation, processes
V6 Impact on ambient and ubiquitous environments	low, medium, high

Figure 45 Evaluation Criteria on the product innovativeness of ambient media services and products proposed by the Emmi Media Lab (Lugmayr, 2010)

Evaluating my project using the criteria listed in the above table, the following conclusions were drawn:

The type of innovation process used was not an invention of the technology, but an innovation in the way it is used. Rfid is only used for accessing buildings or for security alarm systems in fitness facilities but not for registering gym routines. The degree of novelty is of adaptive nature. The type of innovation form is reflected in the following areas:

-Product Innovation and Market Innovation

There is nothing similar in the market. While there are mobile applications, like Cardio Fit or Adidas those are mobile applications and not local for a specific community or site, like a fitness center.

-Process innovation and Social innovation

The process of how to pay, administer and use the gym services changes completely and there is social innovation in the idea of a stronger network, a new communication channel to organize their activities, a playful way of interacting and promoting fitness through games and statistics, a way to evaluate their instructors to motivate them to make a great job, etc.

-Method

The implementation of an ubiquitous environment is a different method.

As described, there is innovation management that impacts on the Organization, the efficiency of their work and their employees, it strengthens and establishes new relationships and connections, and changes the structure by having an invisible backbone or ubiquitous presence.

The project has the following business benefit: The market is big, people were willing to pay an extra fee for having this extra experience. The following data was collected from an interview to different gym users:

5. HOW MUCH WOULD YOU PAY FOR THIS SERVICE?

	18,4%	
0.50 to 1.00 euro /month		16
	34,5%	
1.00 euro to 2 euro /month		30
	37,9%	
2.00 to 5.00 euros/month		33
	12,6%	
more than 5 euros/month		11

FORMATO

The expectation was that the majority of them would answer between 1.00 to 2.00 euros per month, but surprisingly almost 38% of them would be willing to pay between 2.00 to 5.00 euros per month to have this additional experience. For a Gym like Bom Sucesso, with more than 2,000 active users, this is translated to a monthly amount of more than 5,000 euros if the fee would be included in the monthly fee. A guess is that implementing such an environment in a fitness facility could work and translate to a business benefit of distinguishing from other fitness facilities and getting an extra revenue.

4. WHICH OF THE FOLLOWING BEST DESCRIBES YOUR NEED FOR THIS SERVICE?

I really need this product because nothing else can solve this problem.	11,5%	10
I don't really need it but it would like to have it.	74,7%	65
This is a minor improvement over what I currently use.	4,6%	4
It looks okay but is about the same as what I'm doing now.	4,6%	4
My current solution would serve me better.	0,0%	0
You've got to be kidding. Why would I need this?	4,6%	4

Table 12 Do people really need this service at the gym?

As seen in the above table, most people agrees in that they do not really need this environment but that they would like to have it. The service improves the way in which its users live the gym. Small contributions to everyday moments have proven to change the lifestyle of humans in the big scale. This media service/design is an on-going process. As history has proven, our society and media are always evolving. Happily we are trapped in this life-circle of evolution, with an ever improving ambient design.

Questions that should be analyzed and solved when developing the technology to power this design are:

What happens if internet shuts down? What may happen if memory is not enough to record everything? What happens if a person leaves the gym, is his profile erased permanently? What happens with the information in case a person dies? How can this system feed or help keep up a medical record? Starting from the idea that “Life is always on the move”, how can we tell the user if he/she should put more effort while they are working? Give them tips about their diet at the time of eating? Take the Gym out of the physical facilities? Say the person couldn’t attend the gym session, what can they do at home? How to create an experience to engage the user to use the system all the time? Would it be valid to take pictures to remind the person what he or she was doing at the session? Can you expand the areas where activity is and compress the ones where nothing happens? Can you give visual feedback to show if the person is in the right hearth beat area? What can stimulate the heartbeat, etc.? How can we make the experience more pleasant?

Future views

The Fitness Centre of FEUP could consider building a network with the rest of the fitness centers in the University. This way they would stop being islands and benefit from the possibility of doing joint initiatives, allow members to visit the different gyms with the same membership, and organize activities out of the facility together like sports and adventure trips. Having a broader network and weaving the digital and physical worlds would immediately expand their actual space and strengthen their identity. Cultural differences within the population of the University would be another

important area to study, to focus the offer of activities carefully and considering for example, their growing population of minority groups (like FEUP that has a big community of Persian people).

Taking the following lines as an inspiration, in which Every ware is truly ubiquitous, “In every ware, the garment, the room and the street become sites of processing and mediation Household objects from shower stalls to coffee pots are re-imagined as places where facts about the world can be gathered, considered, and acted upon. And all the familiar rituals of daily life—things as fundamental as the way we wake up in the morning, get to work, or shop for our groceries-- are remade as an intricate dance of information about ourselves, the state of the external world, and the options available to us at any given moment.”(Greensfield 2006). Wearables could offer a broader range of possibilities for the users of a fitness center. An example could be a wearable tracking device to better the posture of the person while doing exercise, since doing exercise with a wrong posture is a big risk. They are already using special clothes for doing sports; anyway, so buying a garment that would be part of their experience would not be a significant trouble. The trick would rely on the real benefits that it might open for them.

Another path of study would be in the subject of Sustainability. Since we have all of these people moving in the space, can we transform their exercise into energy that can be used in the facility? Taking the reference of the London’s Olympic structure for 2012, they successfully designed a complex system that conceives the use of photovoltaic cells for energy supply, and a pneumatic structure that uses cables, air pump, a piezometric membrane (used to measure pressure), and is fed by users climbing this structure. Can we take away the image of the fitness center of being a banal consumer product away to more of a responsible practice, where the values would spin around well-being and environmental care?

Integrating the current information technologies in the form of New Media in a Fitness Space can support and be part of this new digital layer of the city, redefining and keeping up to date in this growing infrastructure. Interactivity and participation help create local identity and engagement - the benefit is there. Instead of having a non-organized layer crashing with the lack of planning and fragmented by whatever the users are already merging in (blogs, facebook pages, mobile applications), it makes

sense to recognize the social and technological change and provide a strong platform for this to occur in a more natural and useful way.

5. Conclusions

“... the convergence of media which is increasingly mobile, instantaneous and pervasive with urban space has become a constitutive frame for a distinctive mode of social experience.” (McQuire, 2009)

New Technologies have proven not to dehumanize societies' activity but on the contrary to strengthen the bonds that unite communities. Pervasive Technologies are here for us to use their advantages and provide more possibilities in our human-human interactions. They indeed modify the time-space framework of human experience. We should positively recognize and integrate these tools intelligently into the city. It is happening however and the best is to give them a good and productive use.

Back to McQuire's publication, he unfolds the argument that “the convergence of media which is increasingly mobile, instantaneous and pervasive with urban space has become a constitutive frame for a distinctive mode of social experience.” (McQuire, *The Media City: Media, Architecture and Urban Space* 2008). He explains how media is not something separated from the city, and it is not just a medium which represents some images that stand for urban happenings or phenomena, but that “the spatial experience of modern social life emerges through a complex process of co-constitution between architectural structures and urban territories, social practices and media feedback.” (McQuire, *The Media City: Media, Architecture and Urban Space* 2008). Digital technologies have touched many corners of our cities and our everyday experiences. It is very important to consider these changes when designing new architectural spaces, which don't necessarily have to be only physical or only virtual.

If we recognize that different elements can help us have a healthy and happy life, and that we should include physical well-being in that list of elements; then we are also recognizing that the spaces to promote our fitness are important containers, being either open or closed spaces.

In an idealized image, the way we decorate and organize our room, our house, the articulation of the space, if we give more importance to the kitchen, to the television room, to the studio, reflects our need, our beliefs and our priorities. By studying the History of Architecture it is possible to state many examples.

I was surprised to find in the Institution's webpage that FEUP's mission mentions *well-being* in the statement of its vision:

"FEUP intends to use its quality, inspiring well-being, pro-activity and ambition to do more and better, in the pursuit of mission objectives, production and transfer of knowledge to the society." (Feup, www.fe.up.pt accessed on 24 July, 2011)

We students, engineers, architects, urban planners, designers, sociologists, scientists, writers, teachers, should integrate the knowledge created in our projects to better our every day's lives. If we can move more and more towards applied research practice then we are more and more closing circles, providing solutions and implementing them. I am very happy to see FEUP's radio student group controlling the program of what is playing now on their laptops, in an informal session at the student's union café. I am happy to see the "canteen line tracker" online, for the use of FEUP's Community. A big challenge in the life of an Academic Institution is to be coherent with its values and the everyday effort of every member, and land the knowledge to the next step which is our "now". By doing this our community can construct new meanings of personal and group significance.

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List of Figures

FIGURE 1 ARCHIGRAM'S VISUALIZATION OF A WALKING CITY, 1966. (HTTP://WWW.ARCHIGRAM.NET/PROJECTS_PAGES/WALKING_CITY_5.HTML ACCESSED JULY 15, 2011)	15
FIGURE 2 FRIEND LATTICE (ALEXANDER, 1966)	18
FIGURE 3 CAUSAL CLOSED LOOP. (PAIN 2002)	27
FIGURE 4 HUMAN-COMPUTER INTERACTION (BONGERS 2000)	28
FIGURE 5 THE INTERACTION BETWEEN AUDIENCE AND THE INSTALLATION(BONGERS 2000)	29
FIGURE 6 DESIGN HIERARCHY (MOGGRIDGE 2007)	31
FIGURE 7 ADENE STAND	32
FIGURE 8 INNER STRUCTURE OF A TILE (TOBI DELBRÜCK 2007)	33
FIGURE 9 FUNCTIONAL COMPONENTS OF TILE (TOBI DELBRÜCK 2007)	33
FIGURE 10 ADA'S FLOOR IN OPERATION. CLOCKWISE FROM TOP LEFT: FLOWERS BLOOM AROUND NEWLY LOADED TILES, CHILDREN CHASE A VIRTUAL BALL, PEOPLE ARE ENCOURAGED TO LEAVE, A VISITOR'S COMPLIANCE IS TESTED.	34
FIGURE 11 PRADA FLOW (KOOLHAS 2006)	36
FIGURE 12 SERVICE (KOOLHAS 2006)	37
FIGURE 13 ID READER AND PRODUCT SCANNER (KOOLHAS 2006)	37
FIGURE 14 DRESSING ROOM (KOOLHAS 2006)	38
FIGURE 15 DRESSING ROOM 2	39
FIGURE 16 PRODUCT INFO	39
FIGURE 17 STAFF DEVICE	40
FIGURE 18 UBIQUITOUS DISPLAYS (KOOLHAS 2006)	40
FIGURE 19 SERVICE KIOSK (KOOLHAS 2006)	40
FIGURE 20 TRIPTYCH 1	41
FIGURE 21 TRIPTYCH 2	41
FIGURE 22 PEOPLE'S FLOWS THROUGH THE CITY (RAISE THE CLOUD N.D.)	42
FIGURE 23 BUILDINGS IN TIME (RAISE THE CLOUD N.D.)	43
FIGURE 24 WEATHER BAROMETER CITY (RAISE THE CLOUD N.D.)	44
FIGURE 25 THE CLOUD	45
FIGURE 26 SURVEY ABOUT PEOPLE'S INTEREST IN THE WAY BUILDINGS AND PUBLIC SPACES LOOK AND FEEL TO USE. MORI, 2002. HTTP://WEBARCHIVE.NATIONALARCHIVES.GOV.UK/20110118095356/HTTP://WWW .CABE.ORG.UK/FILES/STREETS-OF-SHAME.PDF (ACCESSED ON JUNE 27, 2011)	47
FIGURE 27 SURVEY ABOUT QUALITY BUILDINGS, PUBLIC SPACES AND THE WAY PEOPLE FEEL. MORI, 2002. HTTP://WEBARCHIVE.NATIONALARCHIVES.GOV.UK/20110118095356/HTTP://WWW .CABE.ORG.UK/FILES/STREETS-OF-SHAME.PDF (ACCESSED ON JUNE 27, 2011)	47
FIGURE 28 OGDEN-RICHARD'S TRIANGLE	48
FIGURE 29 IDEO METHOD CARDS (MOGGRIDGE 2002)	53
FIGURE 30 PEOPLE INTERVIEWED GENDER AND AGE	55
FIGURE 31 ID METHOD PREFERENCES	55
FIGURE 32 LIST OF FEATURES	56
FIGURE 33 FLOW ANALYSIS	58
FIGURE 34 GRAPH OF THE USER'S FLOW THROUGH THE DAY	60
FIGURE 35 BOM SUCESSO MEMBERS CHOICE FOR ATTENDING THE GYM	60
FIGURE 36 LOCATION OF MEDIA TOUCH POINTS	71
FIGURE 37 MORI 2005	73
FIGURE 38 PHYSICAL DISTRIBUTION RESTRICTED TO BUILDING AREA	74
FIGURE 40 RESTRICTED TO WIRELESS (INVISIBLE) COVERAGE	74
FIGURE 39 PHYSICAL DISTRIBUTION RESTRICTED TO LAN SOCKET ACCESS POINTS	74
FIGURE 42 EXAMPLE OF GRAPH OF PERFORMANCE OVER TIME IN A SPECIFIC EXERCISE	76

FIGURE 41 EXAMPLE OF GRAPH OF SESSIONS AND THE AMOUNT OF LOAD AND # OF	76
FIGURE 43 BODY METER. ILLUSTRATION BY ENRIQUE KATO, 2011.	79
FIGURE 44 MULTIPURPOSE ROOM EQUIPPED WITH ENERGY METER, ILLUSTRATION BY ENRIQUE KATO 2011.	81
FIGURE 45 EVALUATION CRITERIA ON THE PRODUCT INNOVATIVENESS OF AMBIENT MEDIA SERVICES AND PRODUCTS PROPOSED BY THE EMMI MEDIA LAB (LUGMAYR, 2010)	83

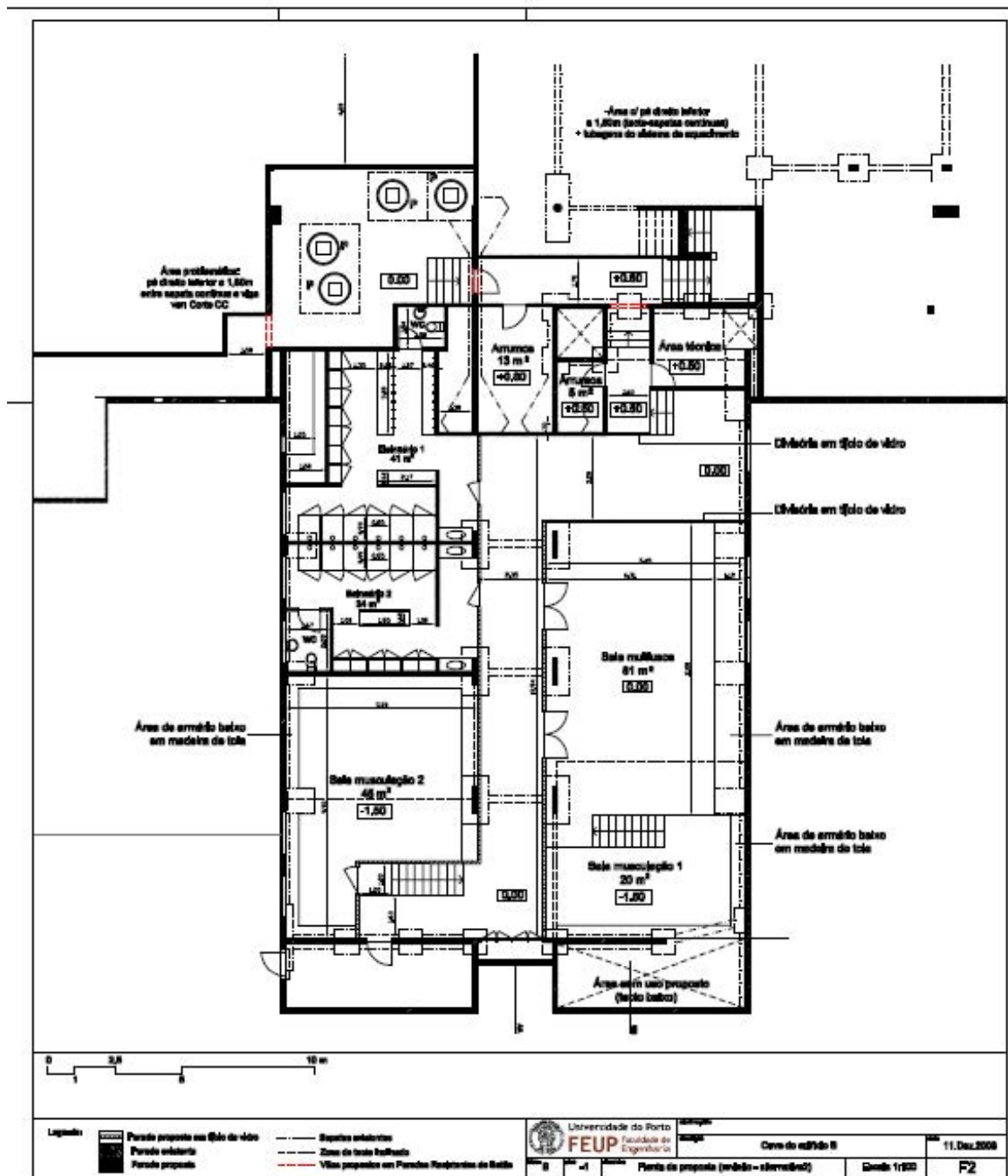
List of tables

TABLE 1 ARCHITECTURAL SPACE AND MEDIASPACE.....	22
TABLE 2 NATURE: PUBLIC OR PRIVATE	58
TABLE 3 FLOW ANALYSIS 2. NUMBER OF PEOPLE THAT ENTERED BOM SUCESSO IN A TIME INTERVAL.....	59
TABLE 4 USER'S PROFILE CARD.....	61
TABLE 5 USER'S ROUTINE CARD.....	61
TABLE 6 INTERACTIVE BOARD FUNCTIONALITY ANALYSIS	67
TABLE 7 BODY METER FUNCTIONALITY ANALYSIS.....	67
TABLE 8 ENERGY METER FUNCTIONALITY ANALYSIS	68
TABLE 9 WEB PAGE FUNCTIONALITY ANALYSIS.....	69
TABLE 10 PORTABLE DEVICE FUNCTIONALITY ANALYSIS	71
TABLE 11 RESULT OF SURVEY TO 45 GYM USERS.....	72
TABLE 12 DO PEOPLE REALLY NEED THIS SERVICE AT THE GYM?.....	85

List of Annexes

ANNEX 1 FEUP'S GYM PLAN.....	94
ANNEX 2 FLOW ANALYSIS.....	95
ANNEX 3 A DAY IN THE LIFE.....	98
ANNEX 4 CARD SORT RESULTS.....	103
ANNEX 5 LOCALISATION OF MEDIA TOUCHPOINTS.....	104

Annex 1. FEUP'S GYM PLAN



Annex 2. FLOW ANALYSIS

Flow analysis / Case study (Analyze)

Represent the flow of activity of our personas through all phases and places of the system or process (scenarios). In this case, their activity at the fitness center.

Why?

This is useful to understanding what people do at the gym and in what order. It can also help identify bottlenecks and opportunities for functional activities and suggesting new patterns of flow.

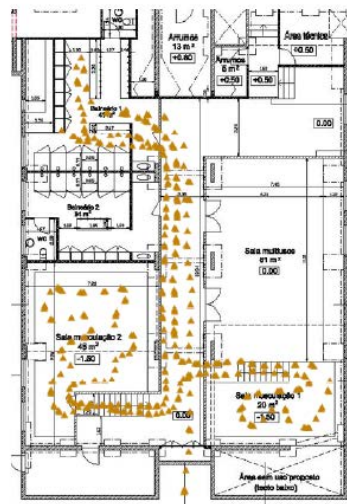
Persona 1.

Male 20 yrs old

Main objective: Body build up

Security guard

1. Check in
2. Bathroom/ Lockers
3. Weight balance
4. Stretching exercises
5. Heating up/ running
6. Muscle build up
7. Take a shower
8. Check out



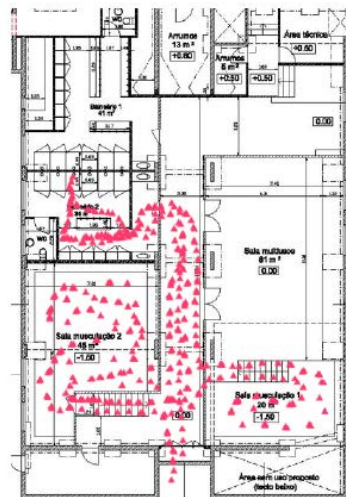
Persona 2.

Male 28 yrs old

Main objective: Body build up

Architect

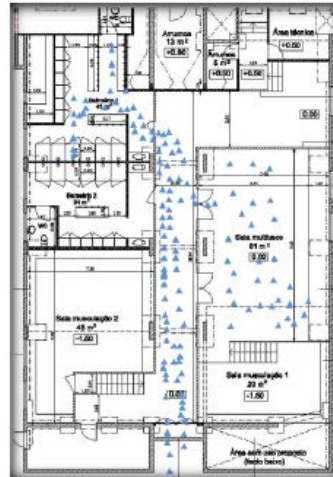
1. Check in
2. Bathroom/ Lockers
3. Weight balance
4. Stretching exercises
5. Heating up/ running
6. Muscle build up
7. Take a shower
8. Check out



Persona 3.

Female <20 yrs old

1. Check in
2. Beauty saloon discount of the day
3. Bathroom/ Lockers
4. Dancing class
5. Sauna
6. Shower
7. Check out



Persona 4.

42 year old male, Respiratory problems, Heart problems, Articulations, Column, Diabetic, Medicated.

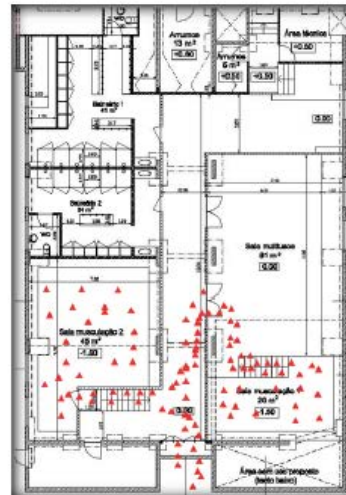
1. Check in
2. Bathroom/ Lockers
3. Cardio Room
4. Weight check
5. Muscle Room
6. Pilates or Localized class
7. Abs 3 times per week (not always)
8. Bathroom
9. Check out



Persona 5.

26 year old male. Good general health.

1. Check in
2. Cardio Room
3. Muscle Room
4. Check out



Persona 6.

Female, 21 years old. Allergies, Using medication for jointures, Allergies. Scoliosis in backbone. Wants to loose weight.

1. Check in
2. Bathroom
3. Weight check
4. Cardio
5. Machine workout
6. Ab workout (machine-free)
7. Cardio 170-180 BPM per hour
8. Bathroom/shower
9. Check out



Annex 3. A Day in the Life

Person 1.

Profile:

João		56 yrs old		88 kgs		1.72 mts	
START DATE		26-03-2009		INSTRUCTOR		Bruno Luís	
MEDICAL ANALYSIS (ANAMNESE)		Hearth problems, hypertension and medicated. Diabetes type II. Stopped smoking 4 years ago.					
OTHER COMMENTS		Objective: lose weight, improve physical condition.					
BODY MEASUREMENT				BODY COMPOSITION			
ABDOMEN	102	THORAX	102	% FAT			
RIGHT ARM	32	LEFT ARM	32	CHEST			
RIGHT COXA	57	LEFT COXA	57	ABDOMEN			
RIGHT LEG	37,5	LEFT LEG	37,5	LEG (COXA			
WAIST		BUTTOCKS					
SHOULDERS							
BODY COMPOSITION				TESTS			
MCM		DOBRAS		FLEXIBILITY		TAS	17,5
TRICEPS		SUPRA		ABDOMINAL		TAD	9,7
COXA		CHEST	15	UPPER		FC. REP	82
COXA		ABDOMEN	19,2	MAX. VO2		FC. MAX	

Routine

MACHINE	ACTIVITY	# SERIES	# REP.
	Cardio Crosswalk 20-30	1	
	Bicycle 15		
	Prone Leg Curl	3	20
	Inclined Press	3	20
20	Pulldown (25 kg)	2	15
12	Pectoral fly	2	15
HALT	Rotary Torso	2	15
18	Lower Back	2	15

Person 2.

Profile:

Carla Isabel		21 yrs old		42,5 kgs	1,54 mts
START DATE		INSTRUCTOR			
MEDICAL ANALYSIS (ANAMNESE)					
OTHER COMMENTS		Gain weight			
BODY MEASUREMENT			BODY COMPOSITION		
ABDOMEN	70	THORAX	78,5	% FAT	
RIGHT ARM	22	LEFT ARM	22	CHEST	
RIGHT LEG	48	LEFT LEG	48	ABDOMEN	
RIGHT LEG	32,5	LEFT LEG	32,5	LEG (COXA	
WAIST		BUTTOCKS			
SHOULDERS					
BODY COMPOSITION			TESTS		
MCM		DOBRAS		FLEXIBILITY	TAS 17,5
TRICEPS		SUPRA		ABS	TAD 9,7
LEG		CHEST	15	UPPER MEMBERS	FC. REP 82
LEG		ABDOMEN	19,2	MAX. VO2	FC. MAX

Routine

MACHINE	ACTIVITY	# SERIES	# REP.
	Cardio elliptical 8' + Crosswalk 8' @ 70km/hr	1	
	Solo	2	20
	Inclined press	3	20
4	Straight press	3	15
12	Pectoral Fly	2	15
Class	Pilates	1	1
Aulas	Dancing	1	1
	Abs 3 * per week	3	

MACHINE	ACTIVITY	# SERIES	# REP.
	Cardio Elliptical 8' + Crosswalk 8' @ 70km/hr	1	
7	Flexion	3	15
	Leg Press	2	15
	Adductor	3	15
	Abductor	3	15
	Rowing	2	15
	Bicycle 10	2	15
	Stretching exercises		

Person 3.

Profile:

Ahmed		42 yrs old		kgs	1,65 mts
START DATE	31/05/2011	INSTRUCTOR	Bruno Luis		
MEDICAL ANALYSIS (ANAMNESE)	Respiratory problems, Hearth problems, Articulations, Column, Diabetic, , Medicated.				
OTHER COMMENTS					
BODY MEASUREMENT			BODY COMPOSITION		
ABDOMEN	78	THORAX	89	% FAT	15,9 %
RIGHT ARM	30	LEFT ARM	30	CHEST	
RIGHT LEG	44	LEFT LEG	44	ABDOMEN	
RIGHT LEG	32	LEFT LEG	32	LEG (COXA	
WAIST	82	BUTTOCKS			
SHOULDERS	110				
BODY COMPOSITION			TESTS		
MCM		DOBRAS		FLEXIBILITY	TAS 17,5
TRICEPS		SUPRA		ABDOMINAL	TAD 9,7
LEG		CHEST	18	UPPER MEMBERS	FC. REP 82
LEG		ABDOMEN	17	MAX. VO2	FC. MAX

Routine

MACHINE	ACTIVITY	# SERIES	# REP.
	Cardio Elliptical 8' + Crosswalk 8' @ 70km/hr	1	
	Solo	2	20
	Inclined press	3	20
4	Horizontal Press	3	15
12	Pectoral Fly	2	15
Class	Pilates	1	1
Aulas	Dancing	1	1
	Abs 3 * per week	3	

Person 4

Profile:

Jonathan		26 yrs old	78 kgs	1,93 mts	
START DATE	27/05/2011	INSTRUCTOR	Bruno Luis		
MEDICAL ANALYSIS (ANAMNESE)	General health.				
OTHER COMMENTS					
BODY MEASUREMENT			BODY COMPOSITION		
ABDOMEN	85	THORAX	92	% FAT	3,8 %
RIGHT ARM	30	LEFT ARM	30	CHEST	1
RIGHT LEG	55	LEFT LEG	55	ABDOMEN	7
RIGHT LEG	40,5	LEFT LEG	40,5	LEG (COXA)	7
WAIST	73	BUTTOCKS	97		
SHOULDERS	113				
BODY COMPOSITION			TESTS		
MCM		DOBRAS		FLEXIBILITY	
TRICEPS		SUPRA		ABDOMINAL	
LEG		CHEST		UPPER MEMBERS	
LEG		ABDOMEN		MAX. VO2	
				TAS	
				TAD	
				FC. REP	
				FC. MAX	

Routine 1

MACHINE	ACTIVITY	# SERIES	# REP.
	Cardio 5'	1	
23	Lateral Dorsal Press	3	10
20	Running	3	10
22	Rowing	3	10
12	Vertical Chest	4	10
26	Shoulder press	4	10
18	Tricep press	4	10
-	Biceps	4	10
	Cardio 10'	1	

Routine 2

MACHINE	ACTIVITY	# SERIES	# REP.
	Cardio 5'	1	
5	Press	4	10
6	Leg extension	4	10
7	Leg curd	4	10
	Abs type 1	3	20
	Abs type 3	3	20
3	Pulldown 45°	3	20
	Cardio 10'	1	

Person 5.

Adelino		43 yrs old		92 kgs		1,74 mts	
START DATE		01/02/2011		INSTRUCTOR		Mario Leitão	
MEDICAL ANALYSIS (ANAMNESE)		Left knee hurts. Problem in the column. Hypertension.					
OTHER COMMENTS							
BODY MEASUREMENT				BODY COMPOSITION			
ABDOMEN	108	THORAX	115	% FAT			
RIGHT ARM	34	LEFT ARM	33	CHEST		25,4	
RIGHT LEG	59	LEFT LEG	58	ABDOMEN		36,4	
RIGHT LEG	40,5	LEFT LEG	41	LEG (COXA)		32,6	
WAIST	102	BUTTOCKS	105				
SHOULDERS	123						
BODY COMPOSITION				TESTS			
MCM		DOBRAS		FLEXIBILITY	9cm	TAS	128
TRICEPS		SUPRA		ABDOMINAL	52	TAD	88
LEG		CHEST		UPPER MEMBERS	11	FC. REP	73
LEG		ABDOMEN		MAX. VO2	14'42	FC. MAX	

Routine

MACHINE	ACTIVITY	# SERIES	# REP.
	Cardio 20' Crosswalk / Eliptica	1	
	Leg Curl	3	15
	Lower Back	3	15
	Inverse	3	15

Routine 2

MACHINE	ACTIVITY	# SERIES	# REP.
	Cardio 20' Bike/ Rowing	1	
12	Pectoral fly	2	20
6	Leg extension	2	20
20	Pulldown (25 kg)	2	20
8	Flexion	2	20
18	Lower back	2	20
13	Pectoral Fly 2	2	20
29	Triceps	2	20
	Biceps with rotation	2	20

Person 6.

Aná		21 yrs old	74,5 kgs
START DATE	16/11/2010	INSTRUCTOR	Vasco Pereira
MEDICAL ANALYSIS (ANAMNESE)	Allergies. Medication for jointures.		
OTHER COMMENTS	Spine cord problems. Escoliose Loose weight.		
BODY MEASUREMENT		BODY COMPOSITION	
ABDOMEN	96	THORAX	101
RIGHT ARM	33	LEFT ARM	33
RIGHT LEG	66	LEFT LEG	66
RIGHT LEG	40	LEFT LEG	40
WAIST	84	BUTTOCKS	113
SHOULDERS	107		
BODY COMPOSITION		TESTS	
MCM		DOBRAS	
		FLEXIBILITY	19
		TAS	11,4
TRICEPS		SUPRA	
LEG		CHEST	
LEG		ABDOMEN	
		ABDOMINAL	20
		UPPER	12
		MEMBERS	
		MAX. VO2	
		FC. REP	94
		FC. MAX	

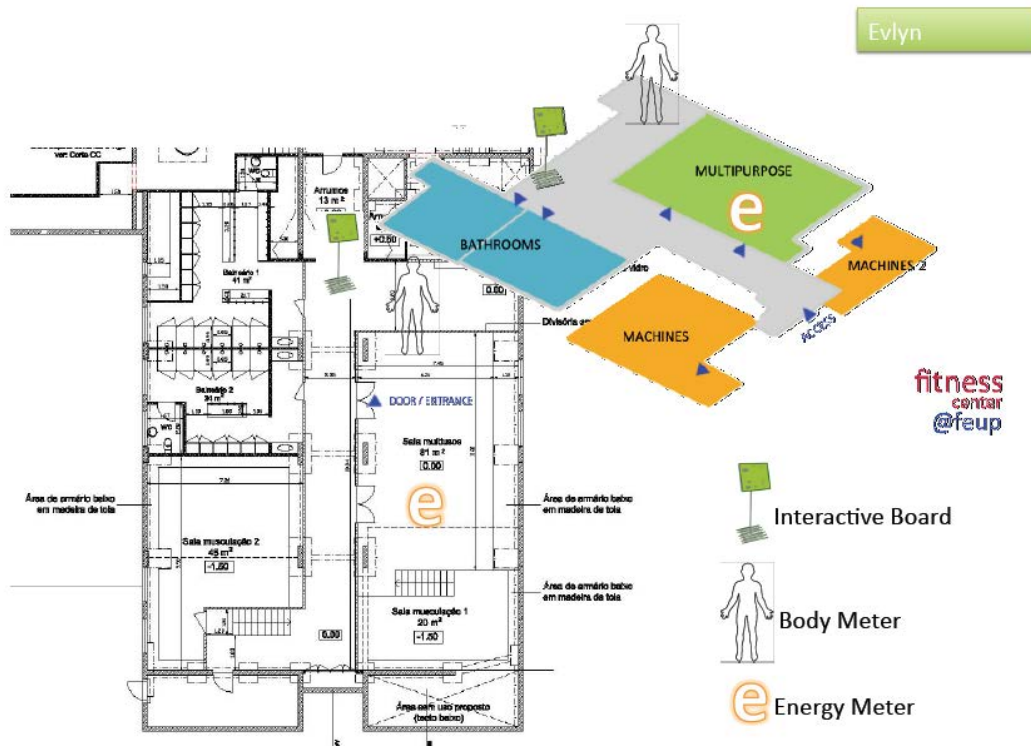
Routine

MACHINE	ACTIVITY	# SERIES	# REP.
	Cardio 5' to 10' Crosswalk / Elliptical	1	
4	Leg expansion	4	20
8	Leg Curl sitting down	4	20
10	Adductor	4	20
11	Abduction	4	20
9	Buttocks	4	20
	Abs type 1	4	20
	Abs type 2	4	20
	Abs type 3	4	20
3	45	4	20
	Cardio 170-180 BPM per hour		

Annex 4. CARD SORT RESULTS

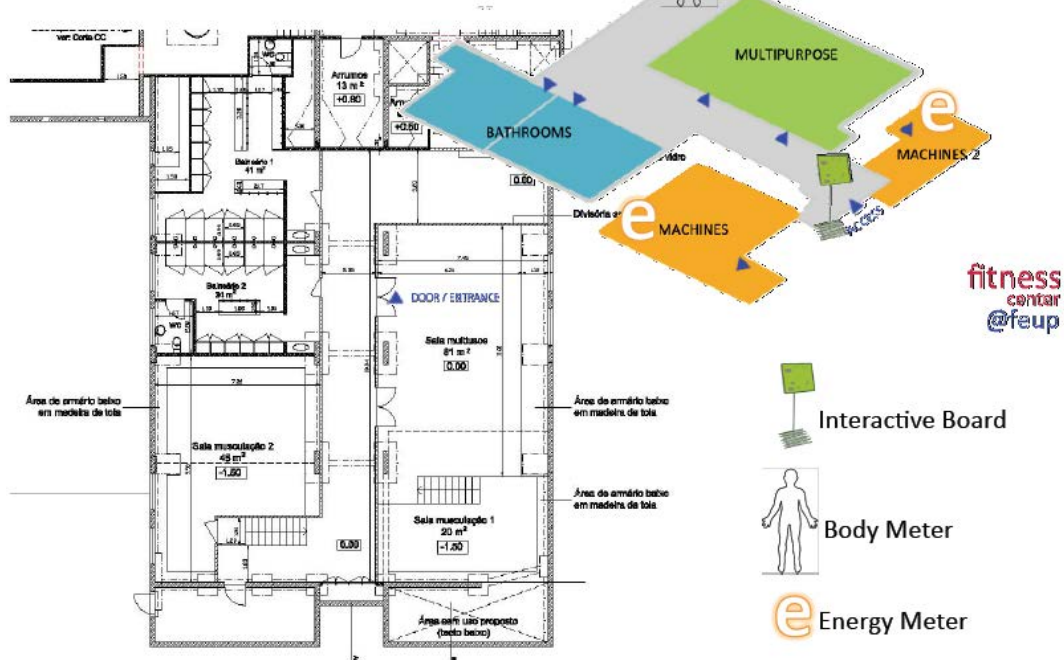
	INTERACTIVE BOARD	BODY METER	ENERGY METER	WEB	PORTABLE
Online profile with your body and health info	5	7	1	20	20
Real time info about activities, events and happenings in and out of your local gym	20			20	18
Get graphic statistics of your weekly and monthly performance	3			20	19
Receive personalized feedback from your instructor online				20	20
Access and receive updates with specialized information on your diet, health, tips, etc.	3			20	20
Make new friends online with similar interests	11			20	16
Gym assistant for your Ipad or phone	2	2		20	20
Administer your account, pay your membership online, sign up or eliminate services online like locker rental or new classes				20	20
Connect with people with similar interests through this focused social network	3			20	20
Have a private space to compare your pictures on a timeline to see how your body changed	6	9		14	5
Have a space to express yourself and propose activities to other members of the gym	20			20	12
Receive bonus/discounts according to your interests and performance	3	2	1	18	13
Change the music in the room according to the music taste of people that are currently on the gym	17				20
Digital signage/ Alerts for users to the risks involved in their use of certain area of the facility	20		3	1	12
In case of emergency ability to ask for medical help or call immediately to the security guards.	20	1			20
Reminder of regular inspections of the plant as part of an overall risk-management program.	14			8	15
Gym parties or other social gathering announcements.	20		2	20	18
Discounts	2	3	5	20	20
Communication with trainers about my progress	3			20	20
Wrist band identification	20	20	20		
Changes to opening schedules, holidays, extended hour services, change of hour system (daylight savings, etc.) and how it will be reflected in the operation.	20			20	20
Providing workout alternatives in case one machine is being used, and enabling routines that are better suited for any particular individual.	13				20
Gym employees ratings and comments.	20			13	20
Real time updates regarding gym relevant issues, such as if a class has been cancelled or a machine is not functional.	20		5	20	20
Monitor the amount of energy that is generated in the room by the exercising of people.	6		20	4	1
Monitor the amount of people at the gym now.	17			18	20
Update my profile with info such as my weight and body composition.	4	20		9	14
Organize a sports adventure trip.	14		1	20	20
Watch videos on how to do my stretching exercises.	20		1	20	20
Watch videos on how to do my weight lifting exercises.	20		1	20	20
Play against my best running record.	2		3	6	20
Play against my friends' abs record.	12			6	20

Annex 5. LOCALIZATION OF MEDIA TOUCHPOINTS

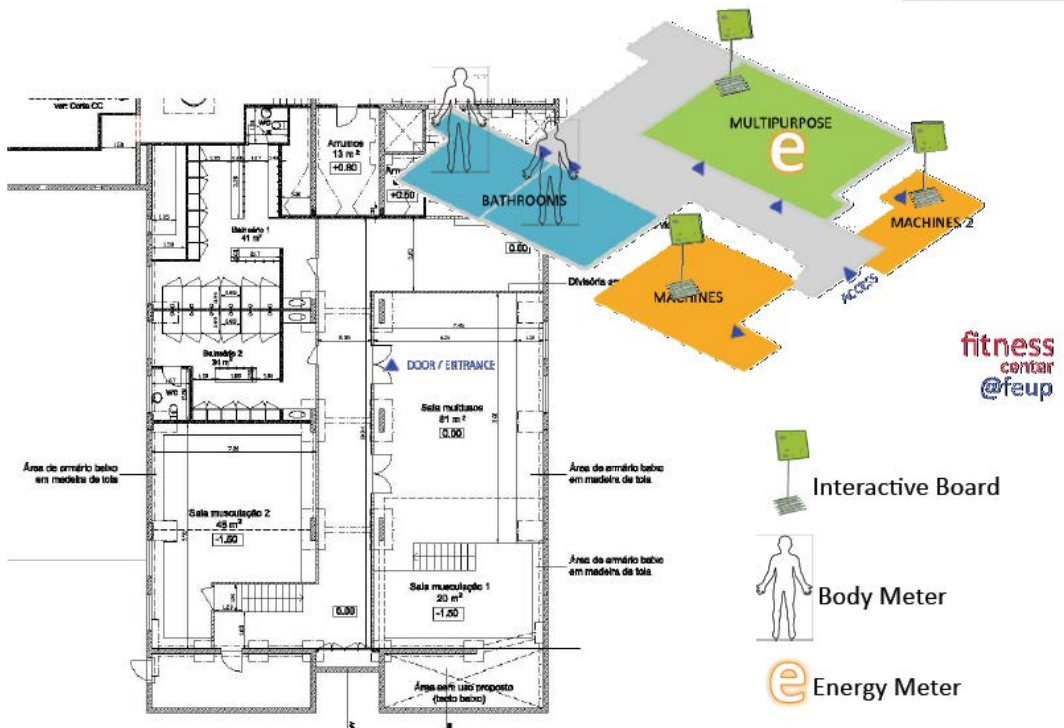


Vasco

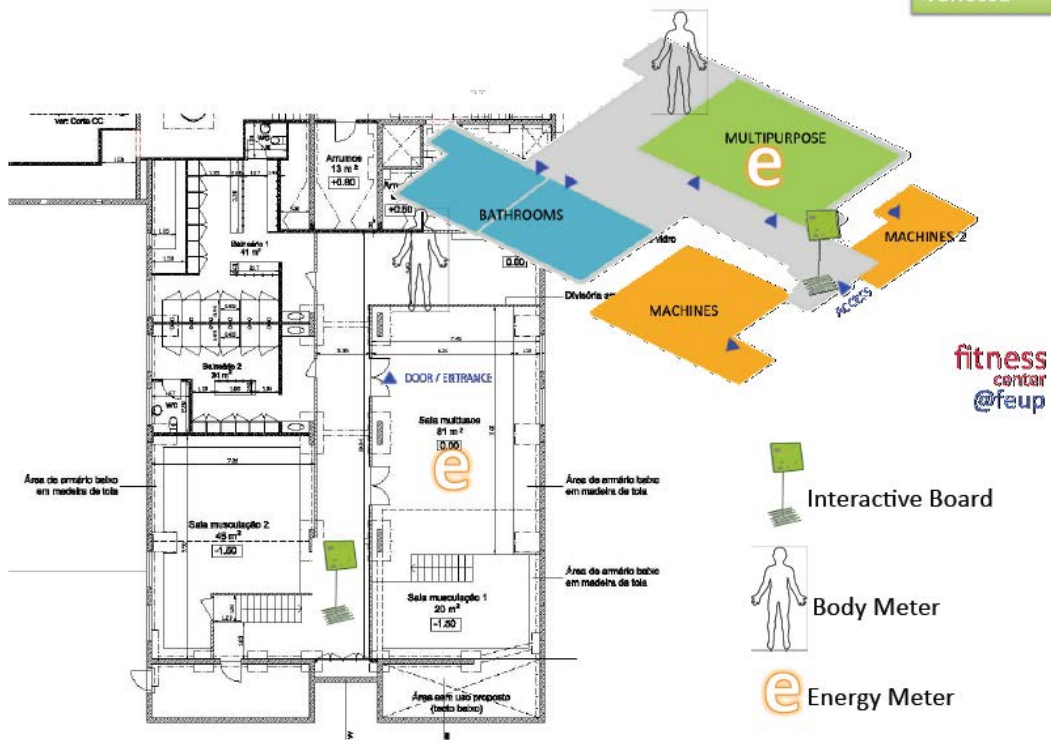
This person proposed to link different gyms at the different UP Faculties and make tournaments. Link them together.



Julia



Vanessa



Mario

