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Global Smart Spaces

Interaction Archetypes

(Flow plan and space organisation archetypes)

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All truly great thoughts are conceived by walking.

Frederich Nietzsche

Around 1840 it was briefly fashionable to take turtles for a walk in the arcades. The Flâneurs liked to have turtles set the pace for them. If they had their way, progress would have been obliged to accommodate itself to this pace. But this attitude did not prevail; Taylor, who popularized the watchword 'Down with dawdling!' carried the day.

Walter Benjamin

*Caminante, son tus huellas
el camino, y nada más;
caminante, no hay camino,
se hace camino al andar.
Al andar se hace camino,
y al volver la vista atrás;
se ve la senda que nunca
se ha de volver a pisar.
Caminante, no hay camino,
sino estelas en la mar.*

(Your footprints constitute the road and nothing more; there is no road—only the one you create as you go through life. Looking back, you can see the path you once tread but can never walk upon again—the road vanishes: like waves in the sea that disappear after a ship passes through).

Antonio Machado

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1 GENERAL INTRODUCTION TO THE DELIVERABLE

With this deliverable we want to show the diversity of our global environment, its inhabitants and the interactions which take place in it. We look towards the ability to both overlap information fields, public and private spaces and also to access tailored information in a seamless way. We will create and experiment with a set of artefacts that is intended to help people extend, mix and change their interactions in both a creative and supportive way.

By ‘creative and supportive’ we mean that the affordance of a place or an interaction will not only be decided from the expected *physical* affordance of the space or interaction. Rather, thanks to the tools we are proposing, there will also be the possibility of new, unexpected affordances being present in both spaces and interactions.

To make Globally Smart Spaces, it is necessary to have a flexible information infrastructure embedded into the fabric of the environment in which we live, move and act. It is a challenge to find how this can be executed in a seamless and non-intrusive way. Among informational issues, granularity and layering of information is important to bring out the information that is, for instance, to the wishes and profile of the user.

The global environment is like a living organism:- the spaces, the people and artefacts which inhabit it are, to a greater or lesser extent, in a state of constant change and flux. To be able to orchestrate technology which will reflect the diversity and complexity of individuals and their multifarious relationships with their respective environments we need to identify the core challenge of this project.

We have identified this challenge as the points of change which happen in the relationship between the environment, the user, and the interaction. Change in space from the perspective of both the physical and the human organism gives an idea of just how complex and layered this question truly is. Part of this process is a conceptual leap in dealing with the notion of change. It is important that the technology copes with the changes between interaction styles, places, events, behaviour, time, and information. To do this, we need to see change as a resource, not a challenge.

To be able to map the nodes of factors and influences the individual navigates in the course of their everyday life we have developed a methodology which utilises a new concept- that of *Interaction Archetypes*. In this approach we use these archetypes, to help us map two important things:

- where in the environment to embed technology,
- what type of information is needed in different situations.

When one generalizes behavior one looks for crystallized points in a sea of information noise. The goal is to summarize the important parts of the information *without losing the necessary granularity*.

A large part of this work is connected with architecture and the influences that the built environment has on the human organism. Architecture embeds sets of affordances that can be seen to colour the way places and spaces are used and interacted with. The layer of technology that we propose to be built into the fabric of the environment can help advance and afford *new experiences and affordances* in the same location.

Along with the structure of the built environment comes the use of our senses as information source, and how individuals and groups communicate. Further, the culture and sex of the individual can have a profound influence. Also, more abstract, ambient elements can have an influence; such as general gradients of sound, light, population density, etc. The matrix of influences which lie between architecture, human behavior and technology is central to our approach in building Globally Smart Spaces.

To start to identify the interaction archetypes we need to look at the different factors/elements that form any given archetype. We have identified three main groups of factors/elements: the action, the location, and the nature of the organism acting in space.

In the case of this work, we concentrate initially on outdoor space, and in particular that of the city. Results of this investigation will feed into work looking at indoor space.

1.1 OUTLINE OF THIS DOCUMENT

We will begin by looking at the various elements that constitute and affect our interaction with the spaces which we pass through in our everyday lives. This is a complex mix of elements and factors that either influence the individual, or to which the individual orients in his or her movement around the spaces of the city.

We will go on to outline the final interaction archetypes which have been created from reflection on this and work on modelling the city by the Transarchitecture Group at Starlab³. These have helped us to come up with some preliminary interaction archetypes which embody some scenarios of use.

We will end with an outline of three tools that will be used by the project to help evaluate and refine the archetypes we have put forward and feed forward to create Global Smart Spaces.

³ Starlab is at the moment in receivership. However, the personnel of the Transarchitecture Group have continued informally in the project as a gesture of goodwill until contractual questions have been resolved.

2 ELEMENTS OF INTERACTION WITH SPACE

We will now outline the various elements that shape our interactions with the physical world, such as the spaces in our cities. As said above, these elements/factors work together in a complex matrix rather than in isolation. It is, therefore, very difficult to give examples which bring out one factor in isolation. This is because most activities show the individual affected by, and orienting artfully to a number of different elements in the environment.

2.1 THE ORGANISM: THE MAKEUP OF THE USER OF THE SPACE

The sensory capabilities and abilities of the organism have a radical effect on both its use and perception of the space. Gibson, with this in mind, talks about the “mutuality of animal and environment” (1986). Of course, for this project we are exclusively interested in human beings. However the methodology could be applied to other possible populations, such as guide dogs. The breadth of the methodology could be highlighted by another example:- avian organisms such as birds have the ability to fly, to perch on different kinds of surface. Certain types of bird have visual acuity that is quite beyond that of a human being, such as the owl’s night vision. Birds therefore orient to their environment in a way that is totally different to an average human. This example helps us see that a human’s sensory abilities are specialised and of a certain, and variable range, albeit with significant individual differences.

This is neither a flippant or fatuous observation. We have to be very careful when thinking of the average human. It is too easy to fall into traps which, fail to take in the physical abilities of numerically large, and significant minorities who do not share these abilities, such as those who are blind and deaf or use wheelchairs.

We will go on to look at a number of elements and factors which help to make up the way that the human organism is able to act in, move through and experience the spaces of rooms, buildings, streets and cities. These range from basic sensory and physical abilities right through to cultural and semiotic influences. All of these can affect our experiences of, and use of, the spaces around us, and all come in useful to the concept of Interaction Archetypes. These elements are not often discrete- there is a constant interaction between these elements.

2.1.1 THE USER’S ABILITY TO MOVE THROUGH SPACE

The ability of the user of space to move in different ways may radically affect their use of the space, and thus the ways in which they interact with it. This will of course affect their particular requirements for smart spaces.

Adult humans are usually bi-pedal, with legs of a certain length, and visual equipment which is usually at a certain remove, roughly 4-5 feet from the ground. Thus they interact with tables and steps, door handles and signage in a certain way. Those givens are of course not true for all the human population. An individual’s experience is radically different if he or she is in a wheelchair, where steps which are unremarkable to the majority of the population are foregrounded as a major challenge and even barrier to someone with a wheelchair. The actions afforded by that landscape are radically different for that individual.

A user who is ambulant is able to interact with the city in a generally unproblematic way, given certain conditions, such as a reasonable surface, enough space to move, etc. Steps are no problem for a majority of the population. However, for older and very young people, and for people in wheelchairs, they may be more of a barrier.

Walking rather than riding on a bicycle or in a car gives a radically different experience of space. For example, the time in which humans are exposed to information in signage is much longer, as they move slower through space. Signage does not have to be put long in advance, such as is a car on a motorway. That is, the lengths between the first and second notices of an exit in, say, Schipol Airport (one well noted for its visual design) are much smaller by a magnitude than those giving the same information on a motorway in the UK (another example of good signage).

In essence, this reflects the *granularity* of the experience of the person moving through space. We will see later that this ability to walk in the human organism interacts with other variables, such as the activity in which the individual is engaged. We might rush from place to place, trying to get last-minute shopping, or wandering slowly, taking our 'turtle for a walk' in the terms of Benjamin and able to take in the full spectacle of our environment.

2.1.2 THE INDIVIDUALS' SENSES

The amount which a user can interact with their environment is of course dependent on their senses and abilities. We have mentioned, briefly, some of the broad ways in which senses and abilities affect a user's experience of the environment.

2.1.2.1 SIGHT AND SOCIAL FIELD OF VISION

Sight of course has a radical affect on the way in which we perceive our spaces. If an individual is blind, the visual properties of a street have little or no use, and instead properties of the street, which are overlooked by the majority of the population, are foregrounded. Properties like whether the environment echoes, how it reflects the sound of the stick tapping and the way that the sound is reflected on different surfaces, are highly important. As well as this, changes in ground properties such as steps, which help to suggest boundaries between roads and streets give a lot of information.

Public spaces are often appropriately dimensioned on a larger scale so their borders correspond to the limits of the social field of vision. In this way there is room for a wide range of activities, all within full view of everyone using the space. For example people can sit on monuments and squares or in street cafes, and see others passing by.

Social field vision is defined as the distance where one is aware of other humans. This varies with landscape and conditions. This might be different for those cultures who have vast spaces to cross with clear vision (e.g. desert/steppe cultures) than those whose field of vision is limited to a few yards at the most (forest/jungle cultures). In fact, there is a term used by North African desert cultures for that distance by which one can make out a person and recognise them, but which still precludes communication with them. Jungle cultures are often more attuned to hearing than vision, as vision is so severely circumscribed.

To achieve an appropriate dimension for public spaces, it has been thought wise to work with combinations of several social fields of vision at the same time, for example, the maximum distance for seeing events (70-100 meters) combined with the maximum distance for seeing facial expressions (20-25 meters). In his book '*Site Planning*',

(1962), Kevin Lynch gives spatial dimensions of around 25 meters as immediately comfortable and well dimensioned in terms of their social context. He also points out that spatial dimensions greater than 110 meters are seldom found in good city spaces.

As can be seen above in the desert example, possibilities for seeing involves a question of having unobstructed sight lines. In theaters and movie theaters, audience seating often is designed in an amphitheater form, and in lecture halls the speaker's platform is elevated so that they can be seen. Comparable principles can be used in a city spaces to give every person optimal conditions to see what is going on in the space.

Lighting is an important factor for seeing the environment. There may be different implications dependent on the possible purpose of the lighting. It is sometimes more important to light up objects than the street.

2.1.2.2 HEARING

In streets with heavy traffic it is generally very difficult for the individual to hear what is going on around themselves because of the traffic noise. Traffic-free streets, in comparison, generally allow the individual to be more aware of their ambient surroundings.

Noise is an important factor in general. When background noise exceeds approximately 60 decibels, which is usually the case in streets with mixed-in traffic, it is nearly impossible to have a normal conversation. To have a conversation under these circumstances, people must stand close together and speak at a distance of as little as 5-15 centimeters. Only when background noise drops under 60 decibels level is it possible to hold a conversation. Further, the level must be around 45 to 50 decibels for people to hear most other loud and soft sounds of voices, footsteps, songs, and so on, which are a part of a more complete social situation. The decibel (dB) is the unit of measurement of sound intensity to describe the ratio between two power levels on a logarithmic scale. A 3 dB increase is a doubling of power, a 20 dB increase is a power increase of 100 times.⁴

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Decibel levels can be outlined descriptively as follows:-

It is possible to distinguish three different categories of out door conversation (Gehl, 1996):

- *Conversation with people one accompanies:-* All over at any times, walking , sitting, standing
- *Conversation with acquaintances one meets:-* Conversation where they meet at all times, no movement
- *Conversation with strangers:-* If there is a reason, common activity or so. in ‘*The Social Life of Small Urban Spaces*’, William H Whyte (1980) uses the term ‘triangulation’ to describe this phenomenon, as, for example in the interrelationship between street performers and audience. Spectator A and B exchange smiles or begin to talk while enjoying the skills and talents of the street entertainer, C. A triangle has formed, and a tiny but very enjoyable process has begun to develop.

Good conversation landscapes are those that allow the opportunity to speak and orient to each other in ways which are appropriate. For example, a café is better designed for face to face conversation than a lecture hall or theatre, or aeroplane. The spatial configuration of the space at a micro level can have an important interaction with the ways in which we wish to communicate (c.f. Hillier, 1996).

2.1.2.3 SMELL

Smell can be important to give a whole series of cues as to the type of area one is in and the type of business which goes on there. Peter Acroyd (2000) talks about the different smells of the different areas of London, citing a wealth of historical sources and accounts. Haymarket in Edinburgh and the East End of Glasgow are noted both for

Decibel levels with description	
0 dB	Silence
2	Sparkling water
3	Venetian church
10	Quiet whisper
12	Heating water
20	Quiet garden
30	Clock ticking
40	Soft radio music
50	Conversation
60	Average music
70	Train with windows open
74	Corridor to toilet at a drum and base party
80	Noisy tube trains
90	Loud music
100	Pneumatic drills
110	Noisy airplane cabin

the smell of hops from the breweries which are based around there. It is also easy to tell if there is a fish, vegetable, or flower market nearby. Rotten smells and that of sewage can do much to tell the individual about the state of repair of that area of the city. The acuity of the human sense of smell is not as great as of the familiars, the cat or dog, but it is at least reasonable at a large level of granularity.

2.1.3 CONCLUSION

Interaction with the environment, we have seen, is dependent on the senses and acuities of the individual. It is important to understand the basic ways in which this may affect the human's interaction with the physical environment. Furthermore, the ways in which it may be appropriate to sense particular environments may well have an influence on the ways in which one interacts with information in that environment. Not all human societies, for example, look to the primacy of vision. Smart spaces, in other cultures, might well be auditory ones.

2.2 'HIGHER' ISSUES IN INTERACTION WITH SPACE

As well as the individual having certain senses, the individual is part of a culture which embodies certain 'higher' understandings and conventions about space, such as the appropriate ways in which to move around it. For example, one may well be able to see and move to a certain area, but to do this may well be taboo. Certain ceremonial spaces are like this in many different cultures. Also, spaces may be regarded as 'private' and others as 'open'. Such 'higher issues' may well be important in terms of the design of smart spaces, as they may well interact with the ways in which technology can understand what is 'going on'. Broadly, a case in point might be a technology's conventions for understanding that people are, for example, 'interacting'. If people in a particular culture have different ideas of an appropriate distance to stand near strangers, there may well be a mis-labelling of an activity as 'interaction' if a particular group tends to a much closer proximity than another.

As such, the individual interacts with space in a way that reflects such higher understandings, and this may be vital for the design of technology to support him or her.

2.2.1 SOCIAL UNDERSTANDINGS AND SEMIOTICS: MORE ADVANCED AFFORDANCES

This is intimately bound up with 'advanced' abilities in human societies, and with culture (below). Advanced affordances go beyond mankind in a 'state of nature' and offer a much more rich idea of the human in nuanced, symbolic world. A case in point is the post box, which "affords letter-mailing to a letter-writing human in a community with a postal system" (1986). That is, the ability to read and use symbols gives rise to a whole symbolic world which we can use in many different ways. For instance, we do not only read signs. We can look at them in terms of their *genre*: - are they a road sign, a shop sign, a piece of graffiti, a poster advertising a concert? Often, graphic designers manipulate this artfully, making CD cases look like packaging for a pharmaceutical. Our symbolic world is rich and nuanced, and is able to be interpreted with a great degree of sophistication.

In terms of physical spaces, we have a sophisticated and complex understanding of what is permitted to take place in different types of space, and at different times. Our behaviour in different types of public space can be very different from more intimate spaces, and different again from behaviour at theatres, cafes and the like (e.g. Goffman,

1974). It is important to remember that different patterns of behaviour are also expected and regarded as either the norm, or as ‘accountable’ breaches of normality in different situations (e.g. Garfinkel, 1967).

In terms of *social navigation*, (Dourish and Chalmers, 1994; Munro, Höök and Benyon, 1999) we can look at elements in the physical environment which give us a lot of information as to where people are going and where they have been. A good example of this kind of information is foot prints in the snow:- one can tell where a person is going from following a trail that they leave. Moreover, one can see *aggregates* of activity, that lots of people are using this particular path (by seeing that the ground is slushy and one cannot make out individual prints). One can thus tell well-used from little used spaces and paths, and, with further granularity, one can tell a level of use in different areas.

Spaces may also have specific meaning for different groups (Munro, 2000). Often, groups such as gang members and other specialised groupings may have particular readings of space which are much more intimate and specialised than the general population (e.g. Patrick, 1973; Armstrong, 1998). It might be that for a gang member, a normal shopping street is a major territorial boundary, such as a ‘border’ between different gangs’ territory. This may be actively patrolled and protected. But such ‘esoteric’ knowledge of the nature of the street might be beyond that of the ‘civillian’ population (Munro, *ibid*)

2.2.2 THE PERVASIVE INFLUENCE OF CULTURE

Culture is bound up with those ‘higher’ human developmental abilities. As Geertz (1993) says, “man is an animal suspended in webs of significance that he himself has spun”. The individuals of one culture may have particular tendencies and needs which are not replicated in another culture. A case in point in terms of spatial use is proxemics. There are certain established differences which have been found between cultures in terms of the physical space which humans seem to need before they exhibit signs of discomfort. There is a similar variation in the amount of touching which can be observed between individuals of a given culture. This may vary from zero incidents in one culture to hundreds in another. Further, there is of course a variation in permitted personal behaviour (e.g. Benedict, 1974; among many others) which of course includes often unquestioned culturally-varying assumptions about what is apposite and inapposite.

With particular relevance to the use of public spaces, it is important to note that proxemics inter-relates with other elements. We may well tolerate being very close to people in one situation, but find it very disturbing in another.

Even the sex of the individual may be an important element in the makeup of their use of, and attitude to certain configurations of space. In certain culture the public spaces have a history of being ‘gendered’. Charlotte Wolf’s criticism of Benjamin’s work on the Flâneur (Gregory, 1994) is on the basis that he fails to see that the public spaces he describes were originally created by Haussman to be largely bourgeois spaces. But they are also, she argues, very much male spaces. Woman in these spaces, she argues, are escorted and are the targets of looks rather than the looker, at least in terms of explicit looking. To go further into the anthropological literature, there is work on Islamic countries suggests the extreme gendering of certain spaces, both in the home and in the city. These might be kept for particular genders permanently, or may change over the daily cycle (Khatib-Chahidi, 1997; Wright, 1997).

The world of symbols (mentioned above) interacts profoundly with cultural meaning. In the West, signage of certain types of store has different typefaces and colour palettes. These often denote a different *genre* of store. Bright, eye-catching colours might be of a lower-class 'discount' type store. More upper-class stores use more restrained, 'classic' lettering. However, these are not hard and fast rules; these conventions are always being subverted and changed.

It is hoped that this section can give a brief idea of the kinds of ways in which culture may very well affect the activities and meanings supported by different spaces.

2.3 ACTIVITY

We will now talk about another element of our relationship to our physical environment: the activity we perform in it. As we have said above, the speed at which we move through space affects the granularity of what we see. In this way, activity can interact in a major way with what we sense and how we orient to our environment and to others.

2.3.1 EXAMPLES: *WALKING, STANDING, SITTING*

2.3.1.1 *WALKING*

The upper limit for an acceptable density in streets and on sidewalks with two-way pedestrian traffic appears to be around 10 to 15 pedestrians per minute per meter street width. This corresponds to a pedestrian flow of some hundred people per minute in a 10- meter wide pedestrian street. If the density is higher, there is a clear tendency to dividing the pedestrian traffic into two parallel opposite streams. This forces people to stay in their line and the possibility to meet disappears.

By these observations one knows what approximately the density and flow is in a pedestrian street of a certain street. If there is a special event going on in some part of the street the density tends to divide into two parallel opposite streams. Also time would play a big factor here. Saturday at noon you would expect the street to have a higher density than on a Thursday morning.

Pedestrian traffic is quite sensitive to such factors as paving material and street surface conditions. Cobble stones, sand and uneven surfaces are less easy to walk on. People avoid slippery wet surfaces, water, snow and slush whenever possible. The texture of a surface can make the individual very aware of where they are and are going. This can be used as a context and is in some countries, e.g. in Britain, where studded stones have been put around pedestrian crossings.

A frequent used example is how the Japanese people use different walking surfaces to make people pay attention to their environment. These are enhanced with the use of wooden shoes, which transfer the vibration in the shoe directly into the body, thus different material causes the shoes to create different vibrations with their contact.

In terms of an attitude to design which encompasses design for a specific activity, the Japanese tradition of tea house design is particularly interesting. Consideration is given to how people feel and how the mood of an individual should be when they are doing certain things. The tea-house is designed accordingly. Drinking tea is understood to be something which should be done while being relaxed and in harmony with nature. The entrance to a Japanese tea house is set as far away as possible from the street. To enter it, people have to take a long route around the house. This is understood to give the

individual time to leave other concerns behind and get in the spirit of tea drinking, a solemn and profound ceremony, which embodies much cultural nuance.

With these principles as rule of thumb one can anticipate which routes people would take in a city. 400 to 500 meters of walking has been shown in surveys as being an acceptable walking distances for most people in a normal daily situation. An important factor for this is not the physical distance, but the experienced distance. A stretch of 500 meters viewed in a straight and boring path is experienced as a very long distance, while the same length can be experienced as very short if the distance is perceived in stages, timeframes. Stimulation is an important element in this. Shops and other visual stimuli, modify the experience of distance (e.g. Gehl, 1996).

A walking network seems to be the most effective way of designing a route, a network of smaller and bigger streets connected with squares to break up the distance. Strøget in Copenhagen is a good example of this. It is broken up with squares all along. From Kongens Nytorv to Amager square to Gamel square to Rådhus pladsen. A similar connectedness between different elements is in the design of the New Town of Edinburgh, which connects smaller and larger streets, squares, gardens and parks and is regarded as a particularly harmonious and pleasurable town area.

Whenever people walk, they tend to prefer direct routes and shortcuts. Only obstacles like dangerous traffic, extensive barriers, and so on seem to make people chose a longer or slower route. To round a corner also falls under the term of 'shortcut'. There is a general tension in general between town planners who like right angled corners, and pedestrians, who generally like rounded corners. However, this is modified by the extent to which a city is known. If a city is not known by the individual, they tend to prefer to navigate by more major streets and obvious ways, and they avoid shortcuts, if they are at all ambiguous.

2.3.2 *STANDING*

We will go on to look at where people tend to stop and stand and the technologies and interventions which make them stay.

Popular zones for staying are found along the facades in a space or in transitional zones between one space and the next, where it is possible to view both spaces at the same time. At the edge of something or close to something, one is less exposed than if one is out in the middle of the space. An individual can thus keep watch over their personal territory. The most natural place to linger is the doorstep. Both physically and psychologically it is easier to remain standing than to move out in the space. One always can move farther out later on, if desired. In his book *A Pattern Language*, Christopher Alexander summarises the experiences regarding the edge effect and edge zones in public spaces: "If the edge fails, then the space never becomes lively". People tend to move from the edges into the space rather than the other way around.

People carefully select places to stand People carefully select places to stand. They chose places to stand after intention and context. Popular spots for standing are in recesses, on corners, in gateways, or near columns, trees, street lamps, or comparable physical supports. If spaces are desolate and empty, that is, without e.g. any street furniture such as benches, columns, plants, trees, and so forth, and if the facade is lacking interesting details, e.g. niches, holes, gateways, stairs, and so on, it can be very difficult to find places to stop. A city for staying in requires irregular facades and a variety of supports in their outdoor spaces.

It is an interesting question whether these values and properties can be added to a city through information rather than architecture. This question becomes very interesting in the light of Global Smart Spaces.

2.3.3 *SITTING*

Good opportunities for sitting give the environment its atmosphere and a bustling liveliness. This activity allows for a lot of different social interactions. One eats, talks, reads, discuss, watching other people sitting. Sitting is one of the main attractions in the public environment.

Interestingly for this project is the ability, once seated, of the individual to bring the majority of their attention away from the simple business of navigating the physical space of the city or room. Once still, the individual can focus more fully on other things, such as books, magazines, members of the opposite or same sex to which they might be attracted. They are also much more capable of utilising devices with interfaces which require reasonably full attention.

Seats add to the ability to be still by allowing sitting. Usually a well-designed seat will be comfortable for a significant amount of time.

These activities are so vital to quality of public spaces in a city residential area that the availability or lack of good sitting opportunities must be considered an all-important factor in evaluating the quality of the public environment in a given area. People prefer to sit with their backs against the wall. The most popular places to sit are with the back to something and a good view of the rest of the area.

Jan Gehl has distinguished three types of seating:-

Primary seating - benches and chairs, such as those in public parks and town squares.

Secondary seating - stairways, pedestals, steps, low walls, boxes, and so on. Steps are especially popular, because they serve as a good look-out point as well.

Sitting landscapes - multipurpose elements in the city spaces such as a grand stairway arrangements that doubles as a look-out point, a monument, a fountain with wide base, terrace base, or any other large spatial element designed to serve more than one purpose at the same time. This is also a great advantage if there in periods less people are using them for sitting, instead of the place feeling empty it just look like a space with a fountain and so on.

2.4 LOCATION/ENVIRONMENTAL FORM

2.4.1 *SPACE FORM ANALYSIS*

It is important to understand the difference between different cities. All are unique in their mix of location, topography, form, climate, culture and personal historical experience (as stated by the situationists). It is through the individual's memory of experiences that they truly occupy and interact in and with a city. Ungers, a leading architect/town planner argues that there is no longer a single utopia or direction to impose upon a large urban area. He implies that urban planning would be more successful if the area was divided into smaller varied zones such as low and high-density housing or public and private spaces. The use of varied elements brings life and increases the opportunity for interaction and communication between the inhabitants.

We suggest that a phenomenological method of inquiry would be a useful approach for the understanding of the global spaces and their affordances. This approach underlies post-modern attitudes towards site, place, landscape and building (in particular architectural tectonics). Phenomenology foregrounds the effect a work of architecture has on its user.

Visual, tactile, olfactory, and aural sensations are the human part of the reception of architecture, a medium distinguished by its three dimensional presence. However the phenomenologists do not look exclusively at the physical aspect of architecture. They also stress the importance of the poetics, language and information in the built environment. This suggests that the experience of architecture is not only about form, as in stone and mortar etc., but that architecture also is heavily linked to more subtle and ambient attributes.

We will briefly mention some phenomenological work that informs this position, in particular in terms of the relationship of man to the built environment.

Heidegger is concerned with modern man's inability to reflect on Being (or existence). This is crucial, in his eyes, because such reflection defines the human condition. His work, "Building Dwelling Thinking" (1971) is the most influential phenomenological work for architecture. In this he traces the ancient origins of the German word for building "bauen". He comes to the definition of it as "a staying with things", things (elements that gather the "fourhold":- of earth, sky, mortals and divinities). He maintains that language shapes thought and that thinking and poetry are required for dwelling.

Christian Norberg-Schulz (1976) interprets dwelling as being at peace in a protected place. This suggest that dwelling belongs in a familiar setting. He goes on to say:-

"The primary purpose of architecture is hence to make a world visible. it does this as a thing, and the world it brings into presence consists of what it gathers".

This is a concern to be an issue with the "concretisation of existential space". The tectonic aspect of architecture and particularly the concrete detail gives the architecture the character in a story being told by the architect.

Considering Norberg-Schulz's definition of a dwelling, and the aims of Gloss, we might come to the conclusion that flexible and new technology may allow 'dwelling' in a unfamiliar environment. By using embedded technology in the fabric of the built environment we believe that this can be achieved. This means that the *form* of space will be affected because the *identity of place* will be like a morphic field, changing attributes via context and user profile.

Phenomenology requires a close attention to how something is made. It recognises and celebrates the basic elements of architecture (wall, floor, ceiling, etc. and their role as horizon or boundary), and has lead to an interest in the sensuous qualities of materials, light, and colour, and in the symbolic, tactile significance of the joint.

Perez/Gomez (1990) argues that the apprehension of architecture as meaningful requires a "metaphysical dimension". This "reveals the presence of Being, the presence of the invisible within the world of the everyday." Architecture, then, is seen as a representation of our collective dreams, as a place full of inhabitation. Buildings and other static forms in the city can store memories and history to allow for a greater community and a richer experience in physical space.

2.4.2 WHAT ARE THE BUILDING BLOCKS OF FORM?

It is possible to analyse the elements of a city in a number of ways. The three dimensional physical world in which we live, move, rest and pause is observable. However, though we can observe attributes and interactions of geometric elements at basic levels, these are interpreted and used entirely differently according to who is involved in the interaction, as noted above. This suggests that archetypes of interactions are needed to identify the use of the space and to profile the properties of the tools we are developing in this project. We have identified location as one of the major elements that decides the interaction archetype. To do this we have to start to look at the different elements of built environments.

The basic elements of the architectural environment can be divided between form and space.

The *building blocks/elements of 3-dimensional form* can be defined as *point, line, plane, and volume*.

The *point* is a one dimensional element which, conceptually, has no length, width or depth. It is considered to be static, directionless and centralised. If you extend a point it then becomes a line, which conceptually has length but no width or depth. A line extended in any direction other than its intrinsic direction creates a plane, which is considered to have length and width but no depth. A plane extended in a direction other than that of its intrinsic direction becomes a volume, which, conceptually, has length, width and depth.

A *single point* has the function of marking a start point, an endpoint, the end of a line, an intersection of two lines, the intersection of lines at the corners of planes and volumes.

A *linear element* has the function of joining, linking, surrounding elements, defining edges, shaping planes and articulating their surfaces. If a line is extended out from a point it highlights this element.

A *planar element* has the function of defining the limits and boundaries of volumes of form and space through the use of size, shape, colour and texture.

A *volumetric element* functions as a mass or a void, which it may be used to contain or act as a barrier.

In summary, this section attempts to explain the very basic euclidean principles of space and form. It is necessarily reductivist. But an understanding of the very elementary basics will aid us in understanding complex forms in space.

2.4.3 FORM DEFINING SPACE- HOW FORMS ARE MADE UP

We will list some of the forms which help define a space. It is admittedly tedious and quite boring to read, but it is salutary for the reader to see the complexity of the built environment, and understand the multifarious and diverse nature of the elements which make it up. This taxonomy is from Francis D K Ching (1979).

Briefly, the *forms which help define a space* are: Horizontal elements, base plane, base plane elevated, base pane depressed, overhead plane, linear vertical elements, vertical plane, l-shaped plane, parallel planes, U-shaped planes.

Enclosures have properties also: dimensions, shape configuration, surface, edges, openings.

Qualities of space include: proportion, scale, form, definition, colour, texture, pattern, enclosure, light, view (i.e. a vista from a space or the transparency of an edge condition such as a wall or floor), openings in space, degree of enclosure, openings within planes, at corners, between planes.

Organisation of form and space can be done in a number of different ways. It can be: space within a space, interlocking spaces, adjacent spaces, spaces linked by a common space.

Visual properties of the space include: shape, size, colour, texture, position, orientation, visual inertia (i.e. if the object sits square in the space or if it has a 'dynamic' element, such as that it looks like it is going to fall, etc.).

Shape of form and space includes: primary shape, platonic solid, regular and irregular forms, transformation of form (dimension subtractive and additive), centralised forms, linear forms, radial forms, clustered form, grid forms, formal collisions of geometry, edges and corners, surface articulation (combination of texture, graphics, layering etc.).

2.4.4 NODES, PATHS, DISTRICTS: THE UNDERSTOOD FORM OF THE CITY

To put form into context we here explain the different shapes that form can take in a global environment. Architectural literature has looked at and discussed the nature of form in city spaces and their interaction with behaviour. In a similar way to the section above we will look at the basic elements which the literature suggests makes up a city environment.

Spaces and places, suggests Lynch (1962), are put together with *nodes*, *paths*, *edges*, *districts* and *landmarks*, interwoven to create diverse and interesting spaces.

Nodes : are points, the strategic spots in a city into which an observer can enter, and which are the intensive foci from and to which he is travelling they may be primarily junctions, places of a break in transportation, a crossing or convergence of paths, moments of shift from one structure to another. Or the nodes may be simply concentrations, which gain their importance from being the condensation of some use or physical character, as in a street-corner hangout or an enclosed square. Some of these concentration nodes are the focus and epitome of a district, over which their influence radiates and of which they stand as a symbol. They may be called cores. Many nodes of course, partake of the nature of both junctions and concentrations. The concept of node is related to the concept of path since junctions are typically the convergence of paths, events on journey. (Lynch, 1962).

Paths. Are the lines or channels along which the observer customarily, occasionally, or potentially moves through space. They may be streets, walkways, transit lines, canals, or railroads. These may be used to approach buildings directly or indirectly. The building approach may allow a distant view.

The form of a path may be linear, radial, spiral, grid, network or composite in nature. People observe the city *while moving in time* through it, and along these paths the other environmental elements are arranged and related. We move in and through a *sequence of spaces*. Path space relationships may be defined as passing by, passing through, starting or finishing in a space. The form of a circulation space should support the activity of people as they wander, pause, rest, or take in a view along its path. Circulation spaces may be enclosed, open on one side or both sides. The height and width of the circulation space should be proportionate to the type and amount of traffic it must handle. A

narrow enclosed space will encourage movement. A wide path will accommodate more traffic, but will also allow and promote pausing, resting and viewing.

Edges: are the linear elements not used or considered as paths by the observer. They are the boundary between two phases, linear breaks in continuity: shores, railroad cuts, edges of development, walls. Such edges may be barriers, more or less penetrable, which close off one region from another, or they may be seams, lines along which two regions are related and joined together. These edge elements, although not as dominant as paths, are for many people important organizing features, particularly in the role of holding together generalised areas, as in the outline of a city by water or wall.

We will now go on to some broader *gestalts*⁵ of these elements.

Districts: are the medium to large sections of the city, conceived of as having two dimensional extent, which the observer mentally enters "inside of", and which are recognizable as having some common identifying character. Always identifiable from the the inside, they are also used for external reference if visible from the outside. Most people structure their city to some extent in his way, with individual differences as to whether paths or districts are the dominant elements. It seems not only to depend upon the individual but also upon the given city.

Landmarks: are another type of point-referencing, but in this case the observer does not enter within them, they are external. They are usually a rather simply defined physical object: building, sign, store, or mountain. Their use involves the singling out of one element from a host of possibilities. Some landmarks are distant ones, typically seen from many angles and distances, over the tops of smaller elements, and used as radial references. They may be within the city or at such a distance that for all practical purposes they symbolize a constant direction. Examples are isolated towers, golden domes, great hills. Even a mobile point like the sun can be used, as its motion is sufficiently slow and uniform. Other landmarks are primarily local, being visible only in restricted localities and from certain approaches. These are the innumerable signs, store fronts, trees, doorknobs, and other urban detail, which fill in the image of most observers. They are frequently used clues for identity and structure, and seem to be increasingly relied upon as a journey becomes more and more familiar.

2.4.5 CONCLUSION

In this section, we have looked closely at the physical form of the space and its effects on the ways in which built space is formed and used. We have moved from some very basic work on how solids and spaces are built up, and gone on to look at the various ways in which these elements are assembled to form different types of urban space and perceived element, such as a *landmark* or a *node*.

This may seem at first remote from the design of smart spaces. However, it is important that we have a grasp of these basic and more advanced elements or *gestalts*, so that we can understand the flows and activities in urban spaces. Such an

⁵ For those unfamiliar with this term, a 'gestalt' is the combination of elements which form a 'whole'. It comes from Gestalt Psychology (e.g. Koffka, 1935), which took issue with reductivist ways of looking at perceptual phenomena. They argued that one should be very careful to only concentrate on edges and corners of objects. Rather, one should look at the object as a whole and the often emergent properties of the 'gestalt'.

understanding will, further, help us in understanding the transition from different indoor spaces as well.

2.5 TIME OF DAY

We will briefly mention that time of day is an important factor. There is a big difference in the interactions and movements during the night from the behaviour patterns then in the day. Thus time of day interacts with activity. There are great differences in most urban spaces between activities and flows at different hours in the day, between the day and night, and between week day and weekend.

2.6 PROSPECT

In this section we have offered a constrained view of context. We see the elements of the taxonomy presented above as exemplars, but by no means the final account of all the possible parts of the organism's interaction with space. We will build on this work in an Atelier which Gloss is organising in collaboration with a number of other projects.

3 INITIAL INTERACTION ARCHETYPES

3.1 INTRODUCTION

The domain of pervasive computing is in an embryonic stage. As such, there is much foundational work to be done in order for us to understand just what interactions are desirable between individual, activity, space and time. It is important to generate realistic and useful scenarios of use. To do this, we need to look at peoples' activity, and contrast that with scenarios of various degrees of sophistication. We need to look at activity in the context of architecture, other people, and social context.

From initial work, we have created a series of interaction archetypes. These will help us build a view of the context of some stereotypical interactions of the sort which we might wish to support if a digital overlay were put on the physical world. These archetypes are intended to be developed over the lifetime of the workpackage, so the ones discussed here are only *initial* ones. In terms of the development of the technology, they are a way of setting down and reflecting upon our assumptions about different elements of system and interaction.

Using the analysis of the various elements which make up our experience of the spaces around us, we have come up with a number of interaction archetypes. These are very much working prototypes, but have already proved useful in discussions and work in the consortium.

The interaction of archetypes in public spaces is both dependant on the user and the time of use and the affordance of the place. There are a number of elements that help define type of interactions that defines the use and the affordance of a space or a place. We are looking at four groups of variable:

1. User
2. Time
3. Expectation
4. Mode

3.2 BEHAVIOUR

We might ask: does the user act as a tourist or a commuter? This could possibly be defined in the way the user interacts with the space. Example: Grand Place in Brussels or in any busy square in any capital city one would probably expect to find 75% tourist behaviour and 24% commuter behaviour. A tourists use of the space might be more spread and unfocussed than a commuter that is on the way to his or her work , who would probably choose the shortest distance to cross the square.

3.3 TIME

Time is an interesting factor. As we have said above, there is a big difference in the interactions and movements during nights in places from the way the places are used during the day. You would probably also find great differences between the hours of the day, lunch, and if it is weekend or workday.

3.4 EXPECTATIONS

Examples of this variable would be shopping, travel, health, business, home, entertainment, education and so on. A scenario would be: When you come to a park you expect there to be trees for shade on a hot day, flower exploding with colours, paths for walking, green grass for playing football, benches and other park furniture. You might also expect that a park in an urban environment is different from a park situated in suburbia. All this is expectations humans has learned over a longer period of time as being the artefacts and affordances of a park. As there is another set of expectations if you would visit a museum, hospital or a train station. Each environment embodies its own set of expectations which have been built up through many instances of use.

3.5 MODE

For a long time there has been clear lines where the formal starts and when the informal takes over, the same with private and public. These modes are not static. Rather they are phases that we move in and out of very quickly every day. Further, it is conceivable that there will be times that the different modes overlap each other. An interesting case in point would be the mobile phone. With this technology we create our own private space wherever we are when we telephone: in a shop, in a formal meeting or in the street our notion over private, public, formal and informal seem to overlap.

3.6 INTERACTION WITH SPACE OR PLACE

As discussed above, Important things for the creation of archetypes might include:

- the layout and structure of the space,
- the cultural connotations and conventions with the use of space
- semiotics and social affordances of the space,
- the type of information and display.

Dealing with information and flexibility in places and objects requires a balance between change and stability. There are definitions to be made between information and “information noise” and how one characterises the space or the object and divines its affordances. These definitions are partly to be made by the people inhabiting or using the space or the object but also at a different granularity by architects, designers after extensive study. In a flexible world there has to be a balance between choice and guidance. This is of course an involved research question.

The guidance that architects, designers and researchers can supply is where and how information might be accessed. But more input will be required from the latter party. Close study of peoples’ behaviour patterns will help build the structure of the information and the physical place or object in which it might be embedded, and map out the relationship between virtual and real. Guidance is also needed in interface of the environment suited for this type of interaction and information access. The individual needs to be able to receive information based on scale, flexibility and relative to their activity. A context aware information environment might range from X-large fluid screens in communal information domains to private, secret, information displayed by e.g. a wearable.

3.7 INTERACTION ARCHETYPES

These are some initial archetypes of use which have been originated using a model of interaction with space originated by the Transarchitecture Group in Starlab. This has been combined with reflection on the literature (including ethnographic literature), and discussion of some initial observations.

These profiles of usage encompass projected scenarios of use of the city by the various individuals. We will detail these below. We are initially looking at the Archetypes from a number of different perspectives:

- Activity,
- Identity,
- Values,
- Information,
- Form.

3.7.1 DWELLER/FLÂNEUR

The Dweller/Flâneur has a range of long term to short time use of the city. A dweller's experience of a city can be tailored to his wishes and context. They can enjoy the sun or have time to sit in the shade, depending on preference. A dweller can be thought of being more receptive and able to spend time and linger in his/her environment, and able to have their plans changed by whatever happens there, and by what takes his/her interest.

The dweller is someone for whom time is not so important. He might well be the *Flâneur*⁶ that Benjamin and others discuss. What is more interesting is finding the new and strange in the city, the byways and places which commuters miss out.

Activity: visiting cafes, drinking -eating, socialize, poetry readings, special edition events, Flâneur-promenade, conversing, observing, working, using local transport.

Identity: he/she uses the city as an extension to his/her home, relaxed,. 'Finger on the pulse'. By reading/hearing the news when they are waiting changes the identity of place from train platform to becoming a newsroom.

Values: uses every opportunity to a richer experience of an activity. Open minded, tolerant and attentive to change.

⁶ A quote from Walter Benjamin's *The Arcades Project* gives some idea of the kind of feelings by which this urban character may walk the street:- "An intoxication comes over the man who walks long and aimlessly through the streets. With each step, the walk takes on greater momentum; ever weaker grow the temptations of shops, of bistros, of smiling women, ever more irresistible the magnetism of the next streetcorner [sic], of a distant mass of foliage, of a street name. Then comes hunger. Our man wants nothing to do with the myriad possibilities offered to sate his appetite. Like an ascetic animal, he flits through unknown districts- until, utterly exhausted, he stumbles into his room, which receives him coldly and wears a strange air." (Benjamin, 1999). Although here the flâneur is an essentially male vision, this is surely not so today in the west, which has a radically different societal form from that of Paris in the 19th century.

Information: attentive to short term messaging and small prints. Context aware use of the city - sun, shade, rain, wind. Interested in events, new and old. There is a close granularity in terms of the information in the city that he uses.

Form- physical use of the city: They look for places with overview, alternative seating and standing. Low places, high places, stairs, slopes, walls etc., interesting oddities and places for reminiscence.

Expectations: Meeting people - socialize with new and old acquaintances and friends. Learn new things, observe new narrative structures, new experiences - same stage different actors. Using the city to its limits.

3.7.2 *COMMUTER*

We think of the *commuter* as a user that uses the city as a transitional space between nodes of services. A commuter uses the city repetitively and has no intentions to brake his or hers behavior pattern.

Activity: walking, biking, driving car, sitting on bus, travelling with public transport, performing shopping services, running errands. Contact with family and friends on the go.

Identity: goal oriented, transitional, using nodes of service.

Values: efficiency, time and energy saving, intolerable for change.

Information: not very receptive to ambient info, only direct information.

Form: Shortest and quickest way from point A-B, transitions between nodes.

Expectations: Getting places and getting things done. Everyday rituals, preferably no surprises, time schedule.

3.7.3 *TOURIST*

We have identified a tourist as a short time user of the city. A tourist is interested in what is good and what is going on today. A tourist has no previous experience of the city and wants to experience as much as possible.

There is a split between tourists that are travelling on their own and people that are travelling with a charter tour – We've tried to identify archetypal tourist behavior.

Activity: Seeing, walking, visiting famous places, shopping, eating, drinking

Identity: Exploratory, adventure, using the city as a home away from home.

Values: Tolerant to change; released from value system from where one permanently lives, freedom, relaxed.

Information: short term, loud, i.e. translated pieces of information, visual and sounds, atmosphere, different from everyday life.

Form: Places with overview, uses the spaces and places as one would in ones home country, dweller might learn something new.

Expectations: To see and experience new things, meet new people, get inspired, change from everyday life.

4 BASIC TOOLS

We have used the archetypes to provide the foundation for a series of proposed tools which are intended to help the user in their day to day lives within different spaces in the city. The user will have a number of tools which they will use to interact in novel ways with the infrastructures provided in Global Smart spaces.

Building on the archetypes of interaction with physical spaces, we have made the first steps in going beyond these archetypes and looking at a range of basic conceptual tools which we will work on. These come in three types:- Radar, Hearsay, and Trails.

4.1 RADAR

This tool gives the user an overview beyond the immediate environment. With this tool you will be able to locate low and high densities, crowds and groups in a larger area. Radar, then, helps one see aggregates of human activity. This can help you find the special gap of freedom, the emptiness, one sometimes lacks in a public environment. This instrument can search the streets and spaces for one on a hunt for either noise or silence.

We can apply Radar to the Interaction archetypes above. Examples of information which the archetypes might need are:-

- Dweller/Flâneur: Density of people in space and places, cinemas, cafés, commune, cyber café. Atmosphere. Basketball, skateboard
- Commuter: traffic jams, public transport, shopping, post office, bank and other nodes of services parking
- Tourist: Silence/ noise, densities in restaurants, museum, attractions etc. Overview of the city

4.2 HEARSAY

Hearsay is an intimate, sensitive tool that will be there to allow the user to pick up small notes in the environment left for them. It will make sure that only that user will find the message left for them if the context is right. Some messages you will never find. We suggest a new form of “snail mail” that will give you the same experience the sender had when the message was composed. Posted or left in the global environment the message waits at the same place to be delivered at the right time for whom it’s left for. A mail where time is not an option but the context is.

We can apply Hearsay to the Interaction archetypes above. Examples of information which the archetypes might need are:-

- Dweller/Flâneur: friends, social, events, clubs, poetry readings, happenings, lectures
- Commuter: work, car, transport, family and friends, short term messaging. Perhaps family members travelling the same route but not at the same time. delays in the public transport
- Tourist: Recommendations, cafe, shopping, museums, clubs, bars and restaurants

4.3 TRAILS

This is an ancient way of finding your way around in an area, known or unknown. To find and navigate the way now you follow static landmarks and signs, if you lose the sight of the signs or find something “off “ trail interesting you lose your trail. We propose a Trail that is plastic, a trail that changes, grows and evolves with you. A morphic Trail that guides you in your daily life. This is also a tool to be shared with other people. Trails could be borrowed, given, bought or swapped.

We can apply Trails to the Interaction archetypes above. Examples of information which the archetypes might need are:-

- Dweller/Flâneur: Density of places and spaces, overview of the city, entertainment, education, social
- Commuter: shopping, work related places, change in routine - where is the nearest post office when visiting a client.
- Tourist: Sightseeing, attractions, views, eating, architecture

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APPENDIX 1

GLOSS SCENARIO : BOB GOES TO PARIS

Description produced by Starlab, UJF & TCD

February 19th 2001

EXPECTATION OF THE DAY

Bob lives in Brussels. He drives to the train station to take the train to Paris for a business lunch with his colleague Jane. While Bob is in Paris, he hopes to see a bit of the city since he has never been there before. In the afternoon, Bob will take the train back to Brussels.

LEAVING BRUSSELS

Bob gets directions to a free parking space outside the train station. The parking space is activated by his arrival and connects to Bob's PDA to request his parking requirements and profile. The PDA specifies parking for 10 hours with travel to Paris (the PDA has this information because the PDA acts as Bob's train ticket.)

The profile allows the parking space to debit Bob's bank account for payment of the parking and to obtain other information. Bob's PDA refuses to provide some of the requested information in order to protect his personnel privacy: The parking space does not need to know that he is travelling first class.

Once Bob has parked, he is informed that the train is on time, and will leave from platform B, and that he should use the red entrance and that he should follow the red pathway to get to his platform. Because BOB is not listening to the radio, the PDA decides to communicate this information by vocal command using the car stereo speakers. Other possible communication channels include a personal headset (sown into his jacket) and a heads-up display on his car window. The heads up display tends to make Bob ill, so he has instructed the PDA not to use it.

The red route is not busy this morning. As Bob is walking close to an active wall, he is presented a message relevant to his trip in Paris (e.g., weather forecast, strikes in the public transportation along with alternate trip recommendations). On the way, his PDA vibrates to tell him that he has received a message from his mother's automated house manager. The message tells him that his mother has left the stove on, that she forgot to put the alarm on when she went out and that she forgot take her PDA and her cell phone. The house has no way to contact her. For security reasons, the house informs Bob that it has been able to turn the oven off, but needs Bob's advice about the alarm system. Bob has privileged access to his mother's house and so he is able to turn the alarm on. Bob leaves a message for his mother saying that she should contact him when she comes back home. Further along the red route, Bob can see a large display actively communicating that the trains to London are cancelled due to the weather in the U.K. Bob is not directly concerned by this message but it does explain why there are so few people on the red route.

ARRIVING IN PARIS

Once in Paris, Bob tries to locate the public map that can tell him where he is. Being in Paris is a new experience for Bob. It is now only 10h00 and Bob has a couple of hours on his own before he meets Jane for lunch.

Bob thinks about what he would like to do with his morning. He is very interested in modern architecture and has always wanted to see the Pompidou Centre. There is a large green floor space close to the public map. It's an active area within which Bob's PDA can communicate with the public map and download the information that Bob is interested in. This includes very local maps, subway routes and schedules, travel recommendations, and travel delays. The PDA uses this information to estimate travel times to the station to the Pompidou center and from the Pompidou center to the lunch engagement.

TRAILS (ANYWHERE IN ASYNCHRONOUS TIME)

With art and architecture in mind, Bob logs on to the trail of his architect friend who lives in Paris. When Bob last spoke to him, he gave Bob access to his art and architecture profile in case that Bob ever has a chance to come to Paris. His friend has been building this trail over the years that he has been living in Paris. The trail now contains all the influences from the modernists. Bob is set for a busy day in Paris.

The trail starts with following the flat escalator that takes Bob to the correct exit. While travelling, Bob tries to contact his architect friend. Bob leaves a message for him.

HEARSAY (GEOGRAPHIC LOCATION IN ASYNCHRONOUS TIME)

Having the right direction Bob starts to move towards the Pompidou Centre. After Bob has walked a block he feels a vibration in his clothes. Bob's PDA tells him there is a café coming up around the corner that his friend in Denmark recommended last time he saw her. "L'Olympic, a café with the right Paris feel to it", were his exact words. Bob doesn't want to miss this, so he turns off the trail to the left at the next crossing. It's time for a coffee anyway and Bob sees that they have freshly baked croissants. When Bob sits down in the café, the active surface on the table informs him with of the local history of the café: Bob's profile knows that he is very much interested in being informed as much as possible about Paris. The piece of history Bob receives is that this was the hangout place for Le Corbusier when he was in Paris. There is a story about Maison Roche. This venue is something Bob adds to his agenda of the day. On the tabletop there are several trails being suggested to Bob by the local tourist office. Bob notes a trail that tells him a visual story about how a street crossing his trail looked before they built all the new buildings in that area. This is a part of a pooled service, accessible without wearable access, offered by the city.

Bob has coffee and is sitting, scribbling on the table. He accesses the picture bank of the café and sends a postcard to his Danish friend. He then receives a message from Jane. She is stuck in traffic and her PDA estimates that she is going to be an hour late for the meeting (the metro system is on strikes). Bob tells her that he has just done some sketches of some ideas for their city planning, she can have a look at them in the car before she comes to the meeting. Bob now has some extra time to look around. Excellent! His mother phones to say that everything is all right. She is having tea with her friend in the kitchen. Bob waves to Mrs Robertson over the videophone.

RADAR (REMOTE GEOGRAPHIC LOCATION IN SYNCHRONOUS TIME)

Out on the street again. With his radar tool, Bob is looking for a quiet place where he can prepare for the business meeting. Bob gets the information that there is a park nearby with several quiet areas. Bob gets directions to the park. When Bob get there he has time to go through the feedback Jane has sent. The space in front of Bob's bench is active and Bob can view his ideas on a larger scale. Bob appends some comments and sends it back to her.

After the park, Bob heads towards the Pompidou Centre. Bob doesn't want to be disturbed for an hour or two so he puts his receiver on a low mood that screens his calls so that only the really important ones come through.

Pompidou is a fantastic building with all the different pipes exposed on the outside. Outside is a large display with all the exhibitions in the centre. It gets activated when Bob enters a sculpture area within the interactive plaza, located outside the Centre. There is a Giacometti exhibition that Bob are interested in. He must make a decision on whether to see the exhibition or to continue on his friend's architectural trail (which, according to his PDA, is less crowded). His PDA reminds him that he does not have time for both. Bob chooses to stay on the trail so that he can visit the Institute Du Monde, the Arabic library and the Maison Roche.

After visiting these venues, Bob meets up with Jane. As he sits down, the menu appears on the tabletop. Jane recommends the fish. The table proposes a wine based on Bob's and Jane's profiles. As they are in hurry, they ask the table to order the meal. When they have eaten, they bring out the work that they had started earlier and continue to work on it. Bob and Jane use the objects on the table to illustrate their ideas for the layout of the site they are planning together. Bob names each object as he manipulates it. For example, the cup denotes a square, a spoon represents a street, lumps of sugar correspond to buildings. As he configures the physical objects, their virtual counterparts are configured in the shared electronic work-space displayed on the table.

Bob's PDA claims his attention. It is a message from his architect friend. He suggests meeting up for a drink at the Café de Paris before Bob takes the train back to Brussels. His plan was an earlier train but by changing his agenda, the PDA automatically reschedules the train. Bob accepts his invitation and adds the café to his agenda. His business lunch ends earlier than he had planned thanks to the exchange of ideas while Jane was stuck in traffic. Bob has time to catch the Giacometti exhibit before he meet s up with his architect friend. After being in the exhibition for a half an hour, Bob gets a communal message telling that the exhibition is closing in ten minutes.

This is a bit earlier than Bob anticipated. Bob uses his radar tool to look for a crowded area to mingle amongst the Parisians. While Bob is walking, he changes his accessibility profile on his PDA to fully accessible. His PDA notifies him when it is time to start walking to Cafe de Paris. To avoid arriving late, the PDA stops providing new suggestions of things to see or do.

BACK TO BRUSSELS

When Bob returns to Brussels, he notes that his parking authorisation has been automatically extended. His change in schedule also automatically reschedules the delivery of groceries. His family has been notified of his new arrival time. After dinner Bob displays a picture of Giacometti's sculptures on one of his interactive walls. The picture is one of the five that Bob downloaded at the Pompidou Centre.