

# Chapter 3

## Thinking with the Studies

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In this chapter we present worked through reports of the studies conducted this past year of some of the installations shown at ZKM and elsewhere. What we have tried to do is retain some of the flavour of the original reports presented at various times to the project team. However, there has also been some selection intended to bring out what we see as the more salient lessons for the eSCAPE project, many of which are incorporated in the systems reported on in the other Deliverables. The reports are not in any particular order, certainly not in an order which reflects when the studies were originally done.

What emerges from the studies is the importance of the notion of citizen and the distinction between a member of the general public and a user of these environments. This distinction was to us at least, somewhat surprising, and the main reason why much of the reportage focuses on *how* people learned to use the artefacts. While this process is of interest to the design of electronic landscapes in its own right – as we shall discuss – we take the view that the setting in which they were displayed, namely, in exhibitions, also has much to do with shaping the character of the interaction with the artefacts. From the point of view of users, engagement with any particular artwork took time to learn and ‘getting the idea’ of how it worked seemed to be sufficient for them. Few, in other words, seemed inclined to use the artefact further. ‘Getting to see how it worked’ was like a puzzle and, once solved, any further interaction typically ceased. There are, we suggest, a number of reasons for this. One is the non-intuitive nature of the artworks themselves which, in the case of Legible City, was more marked than we suspected. An equally important effect was the nature of the setting in which the general public encountered these artworks.

Visitors to exhibitions and museums tend to wander through seeing what is ‘on show’, trying out as many installations as possible in the time that they have available. The fact, too, that if the exhibition is crowded there is a pressure from other spectators who may wish to ‘have a go’ is an inhibiting factor in the amount of time any one user may feel inclined to use the artefact. Clearly, and if these surmises are on the right lines, then the nature of the setting has an important bearing on the design of electronic landscapes. We would argue that these studies

need to be seen in contrast to the development of other electronic environments such as those reported in Deliverables D4.1 and D4.2 that have been developed to meet a broader purpose than conveying an interactive experience.

In the rest of this chapter we briefly report on some of the studies of the developed artworks being used in a range of settings. These different settings vary from exhibitions within the ZKM multimedia museum to a range of demonstrations in more industrially oriented trade environments. In each of these studies a general issue to emerge was the means by which users engaged with each of the different art pieces and the public nature of this engagement.

## Engagement with the Mimetic Blob

### The Setting

The Mimetic Blob was exhibited at the *Information Society Technologies conference 1998 (IST 98)* in a large public auditorium at the Austria Centre, Vienna, between the 30<sup>th</sup> of November and 2<sup>nd</sup> of December. Over 130 stands displayed ‘leading-edge technologies and products’. Stands were grouped in discrete sections, the Mimetic Blob being exhibited in the ‘Future Technologies and Interfaces’ section.

The Blob was displayed within a closed space (due to the ‘noise’ it made and possible interference with other displays) measuring some three metres square. The outer ‘shell’ of its display space was unadorned, although posters announcing the site as a ‘virtual opera’, and showing a person interacting with the installation, were displayed on the inside of the display space. The installation was physically positioned adjacent to the Legible City and co-located with a ‘virtual piano’, thus affording visitors the opportunity to ‘make a concert together’ with virtual instruments should they desire to do so. Few visitors took up the opportunity, although many ‘experimented’ with both installations – moving from the Blob to the virtual piano or vice versa, as the flow of persons into the display space and engagement with the installations allowed.<sup>1</sup> The Blob essentially relied on people manipulating it through touching a large touch sensitive display (see figure 1 and the corresponding section of the CD ROM enclosed with these deliverables).

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<sup>1</sup> See Trevor *et al.* (1998) for issues concerning the ‘flow’ of persons through space as a feature of engagement with electronic landscapes and interactive installations



Figure 1: Engaging with the Mimetic Blob by dragging it around

To persons attending the conference, the Mimetic Blob was described by conference organisers in the official guide as:

‘ .. a virtual sculpture that is both a reflective and interactive “substance”. The blob tracks the finger placed on it in an organic and squid-like way. But the place and way it is touched affect it differently and can trigger a change in shape, visual appearance, colour and transparency. The blob is constructed from triangular shapes with 40 different textures inspired by the ocean and its life forms. The substance generates sounds and can project memory fragments that come from images of real world objects contained in the surface textures.’ (IST 98, *The Guide*: 129)

The Blob was described by the demonstrators, in the course of interaction with visitors, interchangeably as virtual art, a virtual sculpture, virtual opera, and a virtual instrument.

Three demonstrators – two male, one female - populated the site, moving between the two adjacent installations as contingencies required (lunch breaks, an influx of visitors, etc.). The primary demonstrator was female. She was a part of the development team and responsible for the artistic aspects of the Blob. Of the two male demonstrators, one was a member of the development team responsible for technical aspects (including doing ‘running repairs’ occasioned by the Blob being ‘dragged around too much’), and the other, a professional composer responsible for the virtual piano. All three demonstrators encouraged visitors to become users of the Blob.

At this point we come across one of the more important of the emergent findings from the studies, one connected to the usability guideline, but having poignancy in that though seemingly trivial has immense relevance for the design of electronic landscapes, namely, ‘getting to use the installation’.

Compared with a number of the other installations most people grasped intuitively that it has to be touched. As one demonstrator described the Mimetic Blob:

“People seem to immediately understand what’s going on with it .. at least in a sort of intuitive way . when you touch it reacts .. and er . some seem to understand also . sort of seen by the movement . seem to understand that it moves around by dragging it ... I tend to explain it anyway”

Attention to the demonstrators’ work of ‘explaining’ to visitors ‘what’s going on’ illuminates the natural practices whereby visitors came to engage with the Blob and with the other installations reported on here.

The purpose of attending to natural practices of engagement is not to assess the efficacy of the Blob in a real-world, real-time context as one might choose to evaluate a more orthodox system.<sup>1</sup> The intention is to explicate some of the social mechanisms, in detail, by which engagement with the Blob is facilitated as a social encounter. As we indicated, this is relevant to the kind of considerations relevant to someone becoming a user and, as such, of wider relevance than this particular artefact. The account that follows provides considerable detail.

## Public Use

As we pointed out previously, this installation was situated in an exhibition in which visitors would wander round the exhibits as they chose. There was no compulsion to try any particular artwork; this was a matter for the particular visitor. This meant that the demonstrators, should they be inclined, would normally have to extend an invitation for a potential user, that is, a person displaying a curiosity or interest in the installation, to ‘try the Blob’. If the invitation was accepted the visitor (or visitors since they often numbered two or three) was handed a pair of 3D glasses and taken to the installation. Orienting users to the Blob involved turning them to face to ‘the table’ on which it was displayed. The table measured approximately a metre square. Achieving an orientation to the table consisted of making hand gestures towards the object on the table and describing something about what the object (the Blob) was / is, such as ‘it’s a virtual artwork’, ‘a sculpture’, ‘it’s a virtual opera...an instrument’. But whatever the description this was always accompanied by some statement of the order – ‘you can interact with it’.

The user was then instructed to put the glasses on in order to interact with the Blob and told that ‘you need to touch it to make it interact’. At this point, and although some users touched the Blob immediately, the demonstrator would elaborate what was meant by ‘touch it’. The demonstrator started to drag the Blob around the table using the index finger and then proceeded to drag his or her finger across, up, down, backwards, and so on, over the surface of the table. In reaction to this the Blob would emit various sounds and follow the route traced

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<sup>1</sup> What measures for efficacy? That is, in what ways could the blob be considered efficacious? For what purposes? By whom? To what ends? Why? Could it not be considered otherwise?

by the finger. As the finger moved, the Blob morphed, changing shape and colour and texture. The harder and faster it was touched and dragged around, the louder it emitted the sounds and the more it morphed. As the demonstrator often described it: 'you see...you have a direct reaction'. Invariably, the user did see and started to emulate the demonstrator's actions.<sup>1</sup>

Electing to engage and emulate the demonstrator's actions while not requiring any great degree of skill, was not always an untroubled affair. On a number of occasions the demonstrator needed to go over the actions required to interact with the Blob: 'you need to press harder' being a common instruction, for example. Such instructions were often accompanied by further demonstrations, this time in concert with the user demonstrating-by-showing-and-doing just what degree of pressure to apply. The user would then try to reproduce the demonstrated actions until he or she 'got the knack' of it, often taking two or three attempts at it.

As the user proceeded with the engagement, the demonstrator would often provide further instructions or advice. For example, on occasion users would recognise that the Blob was not behaving like it did when the demonstrator used it. In which case the demonstrator would provide further guidance: 'it depends on where you touch it as well...it plays different music', or 'depending on how you touch it...it has different textures and colours'. Finding out just where touch and (thus) just how to use the artefact was a collaborative action accomplished through concerted demonstration which instructed users in the just where's and how's.

## Public use: learning use by watching

Some substantial numbers of users of the Blob became users not only through the demonstrators' personal instructions but by watching other users interact with the installation.

However, this was not always a simple matter of 'looking on' but often involved moving to a position to watch and making this known to other onlookers by gestures and other physical movement such as skirting round the crowd of other onlookers and looking over people's shoulders. The success of this kind of activity, if not exactly hit and miss, depended upon the responsiveness of other persons to accommodate to efforts to gain a better vantage point. On some occasions the efforts were not successful and the person 'tired' of the attempts and left the scene. On others, gaps were made by other onlookers and the person invited to take the place offered. In other words, the setting of the artefact, in particular what it allowed and what was expected of the viewers, played a part in shaping the opportunities to look, learn and be instructed in how to use the installation

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<sup>1</sup> Not all visitors were so include but preferred to watch others use the installation instead.

Trivial though these observations may seem, they are vital to understanding the various social dynamics which can be involved in ‘getting to learn’ about how to use an interactive installation in the setting of an exhibition. To engage with the artefact, a user is required to proceed from being in a position to observe interaction with the artefact, to engaging with the artefact on the basis of what is observed. What is learnt ‘in the watching’ - for example, that you wear glasses; that you touch the table; that you drag the object on the table around; that when you do so it makes sounds and changes colour and texture; that the faster and harder you touch it and drag it around the more sound it emits and the more it morphs; that the demonstrator will instruct you in use should troubles arise and so on - are like learning the ‘moves of the game’, so to speak. That is, the natural practices and competencies whereby interaction with the artefact is achieved and the technology made to work. Visibly for members at the fieldsite, the interaction is ‘read’ or, better, naturally understood, as practices instructing interaction. Seen and understood as such, potential users undertake engagement with the installation on the basis of, and in the same ways as, they have witnessed others engage with the installation.

However, to say that onlookers, as potential users, learn how to engage with the artefact by observing the activities of others and treating these as instructions, is not to say that these are simply ‘read off’ as instructions and the person proceeds from there. Much can be learned from watching others – how to engage with the artefact, what engagement looks like, what kind of actions to perform, and so on. However, insofar as the potential user is *observing* then there are ‘gaps’ – the “just hows” and the “just what’s” of actual engagement – which need to be filled in, and this can only be done through actual use. In other words, although users can learn a great deal from ‘watching others’, when engaging with the installation itself, practical ‘troubles’ are regularly occasioned, often requiring the assistance of the demonstrator.

## Some features of engagement

Observation of the public arrangement of the Mimetic Blob enable us to consider how users, first encountering the artefact, make the transition from trade show attendees to users of a novel future interface. This is important since such users are ‘general citizens’, so to speak: a vital consideration in the design of future interfaces intended to support the activities of the general, and non-expert, public. In what follows we set out more formally the ‘phases of activities’ which are likely to be involved in the transition referred to above

Engagement with the artefact typically begins with an *invitation* to try. This is followed by a general description of the installation and what it does. The potential user treats such descriptions ‘instructively’; that is, as ‘for now’ elaborating the character of the artefact and the kind of operations that may be performed. This general description is often accompanied, or followed in close order, by *showing* the use of the operational features. In the case of the Mimetic

Blob, the demonstrator instructs the user to ‘put the glasses on’ and then shows the physical actions that can be performed to make the artefact ‘do things’. Thus, the demonstrator instructs through the description and physical demonstration of engagement properties ‘*how to begin*’ engagement with the artefact.

Becoming a user witnessably relies upon the common-sense, natural and reflexive methods, or practices, of ‘*demonstration-by-showing-and-doing*’. This displays for neophyte users ‘how to go about’ using the ‘pointed out’ properties of the artefact. This is, in effect, a baseline of understanding, a resource that enables the neophyte user to begin using the artefact. By applying this understanding the user is then able to ‘fill in’ the irremediable and practical ‘gaps’ between instruction and action.<sup>1</sup> Instructions are always incomplete; an incompleteness which is experienced and manifested as ‘practical troubles’ – the ‘just how this or that is done?’ – and which is practically remedied by practise. It is this latter which marks the movement from the status of neophyte to ‘practised’, even ‘competent user’.

‘*Demonstration-by-showing-and-doing*’ is intendedly accompanied by the user as an emulating and embodied witnessable performer of ‘following the instructions’ and, as such, the bridge between a neophyte and practised user. This is a process which can and often does involve repeating the instructed actions to overcome the ‘normal, natural troubles’ experienced until the ‘knack’ is acquired and the user can become a more competent user of the artefact.

### The "process" of becoming a user

Widening the perspective a little, learning from what others do depends upon taking, or making, the opportunity to put oneself in a position to learn. In the settings in which the artefact studied was placed, physical access could, on occasions, be restricted by the number of onlookers. Typically, this involves the common-sense knowledge of how to conduct and position oneself in a crowd – in effect an audience – with a single focus in order to gain a suitable vantage point. If the possibility of engagement is of sufficient interest, then steps need to be taken to place oneself in a position to be selected as a ‘user’.

This point underscores the fact that becoming a user can be sequenced event which occurs over time and through familiar, routinely produced and reproduced practices of social encounters in public places. These can include the following:

- doing invitations.
- introducing the user to the installation and its features, and thereby beginning engagement, through the provision of general descriptions ‘pointing out’ engagement properties and operational features.
- verbally / descriptively instructing users in the use of engagement properties and engagement features.

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<sup>1</sup> See Garfinkel (1967; 1996) for a discussion and treatment of the irremediable incompleteness of instructions in practical circumstances of everyday life.

- showing users just how to engage through the method of demonstration-by-showing-and-doing (instructed action).
- engaging by emulating-demonstrated-showings-and-doings (following instructed actions)
- achieving position to observe practice
- observing practice and learning (some of) the moves of the game by watching on
- bridging practical gaps not filled through observation through the methods of demonstration-by-showing-and-doing and emulating-demonstrated-doings.

These practices constitute the interactional work of the site: work that is sequentially organised. It occurs for specific purposes and in the face of specific practical troubles at specific points in time, and it occurs *recurrently* in just these specific ways regardless of particular demonstrator or user. Such is the *social* organisation of this setting.<sup>1</sup>

## Public utility

The studies of the Mimetic Blob in use, suggest that the sequences of the social organisation of engagement and learning needs support; support which is sensitive to the ‘worksite specific practices’ as described above. In the case studied, among the specificities of the site was the presence of an expert demonstrator, which may not always be the case in other situations or settings. While almost trivial in its simplicity in the case of the Mimetic Blob, the ‘pointing out’ of engagement properties in, and as, the course of beginning engagement is, nevertheless, crucial to interaction with novel future interfaces.<sup>2</sup> This is to say that real-world, real-time studies of public use suggest that novel future interfaces fronting eSCAPEs should ‘point out’ (or ostensibly define) quite clearly the engagement properties of the space as a feature of beginning or undertaking engagement with the space. (See Trevor et al. 1998 for a discussion of some of the issues here, particularly the notion of an ‘annotated gateway’). As such, ‘pointing out’ of engagement properties – of technical requirements for, and features of, engagement – will be embedded in descriptions introducing the

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<sup>1</sup> Note that this is not to say that persons’ conduct is determined by the sequence but that the sequence is produced and reproduced through persons conduct which is the conduct *of the site*: of using, and thus becoming a user of, a novel future interface at an exhibition (in contrast to a usability lab) in this case. The conduct of the site consists in the resolution of endemic practical troubles - normal, natural troubles that are tied to the accomplishment of technological usage. If users are to become users then they can do no other than produce and reproduce the work of the site as it is through that work that they *become* users without exception. In more organised settings the conduct of the site would quite naturally be said to consist in differentiated ‘jobs’ of work. As any ‘job’ the practices of its performance, while subject to contingency, are routinely invoked, enacted and accounted for in and as the doing of the site’s work. The work of working the Blob is no different in this and becoming a user may rightfully be thought of, and treated, as a job of work to the extent that it involves a division of labour and achievement and coordination of routine activities manifest as sequential orders of work.

<sup>2</sup> Though we would not necessarily want to restrict the lesson here to future interfaces. Any interface which is novel to a user may well be in need of support.



user to the interface and eSCAPE alike, so instructing users in engagement and starting the process of moving from neophyte to practised user.<sup>1</sup>

The design of technical support for engagement would consist in the construction of ‘instructed actions’ (Lynch, 1993). That is, courses of technically embodied actions showing users, where and when necessary, ‘just how’ to accomplish engagement by pointing out engagement properties and operational features in a sequentially organised, unfolding order of actions that need to be done in order to engage with this artefact / environment. In a word, demonstration-by-showing-and-doing (providing for emulation by the user). Instructed actions make observable to the neophyte user ‘just what’ he or she has to do now in order to progress. It is, foreseeably, in supporting the ordinary practices of learning how to use an artefact, that users may be encouraged to become *users* and learn the interface and the environment alike.

Users quite clearly learn a great deal about engagement from observing practice. Observing practice requires that the user be in a position to observe. This seemingly trivial point has important implications for the design of eSCAPEs however. Insofar as eSCAPEs are ‘immersive’ distributed and populated environments, then learning how to ‘use’ them very much depends on being able to establish one’s presence ‘within’ that shared space. Establishing presence enables users to make their intentions to observe, for example, noticeable and, accordingly, allows for some response (such as recognition and reaction) from others in some ways engaged within the space. How presence is ‘registered’ so to speak is very much an open question. In ‘real world, real time’ spaces it is a question of ‘signalling’, through body language and gestures and of making physical reactions to those gestures, some further details of which will be explicated and addressed in the following studies of artworks in situated public use.

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<sup>1</sup> This is not to negate the notion of an annotated gateway, clearly such a notion is indispensable in connecting various and different eSCAPEs. Rather, it is to provide further support to the public user who has elected to ‘check out’ any particular space. Thus, the embedding of engagement properties in courses of instruction for beginning engagement would be an encountered feature *on entry* to any particular domain on having passed through the annotated gateway. The difference between the two is that annotated gateways ‘tell’ users *what* the technical requirements or features of any particular space are whereas engagement properties embedded in courses of initial instruction ‘tell’ users *how to* ‘go about’ employing said features. Such courses of instruction should, naturally, not be imposed but available on clearly marked, readily available command. (The implication here is that insofar as eSCAPEs and future interfaces are being designed for *public* use, then they should be designed in light of an ever-changing staff of ‘perpetual novices’ - Crabtree *et al.* [to appear]. A significant part of the job of design might be seen, then, as supporting the shift from novice to competent user. That is, in supporting the learnability of the interface and (thereby) the domain - see Hughes & O’Brien, 1998 for a discussion of learnability. The suggestion here is that insofar as the work of the site is, quite clearly, sequentially organised, then learnability may be supported through the ‘teaching’ of the sequence in details of its work. Of course, that means that engagement sequences have to be designed).

## Practically accomplishing engagement with the Legible City at IST '98

### The Setting

The Legible City was exhibited at the *Information Society Technologies conference 1998 (IST '98)* in a large public auditorium at the Austria Centre, Vienna, between the 30<sup>th</sup> of November and 2<sup>nd</sup> of December. The installation was displayed in an open space surrounded by posters announcing the installation as a member of the eSCAPE project. The installation was located adjacent to the Mimetic Blob also advertised on the posters. The Legible City was described by conference organisers in the official guide as follows:

'Created in 1989, the Legible City is generally considered to be the first computer-based interactive art installation ... The Esprit eSCAPE project has developed the installation from a single to a multi-user version that can show new possibilities of visual and vocal shared experiences in an artistic virtual environment ... At IST '98 a 21" monitor is mounted on a modified exercise bicycle ... The cyclist wears headphones and a microphone ... the installation is connected .. to two other remote locations (the 'surroGate' exhibition at the ZKM Media Museum, and the V2 gallery in Rotterdam). The cyclist can explore the Legible City's virtual text formed cities, meet cyclists from the other two installations and talk to them to imprint their own text architectures on the virtual environment.' (IST 98, *The Guide*: 130)

The Legible City was invariably described by the installation's sole demonstrator in the course of interaction with visitors as an 'artwork' which 'you can ride through', 'meet people' and 'to talk to'. The legible city consisted of an electronic environment that allowed users to cycle through a landscape consisting of letters laid out using the street plans of one of three real world cities. (See figure 2 and the corresponding video in the escape CD-Rom)

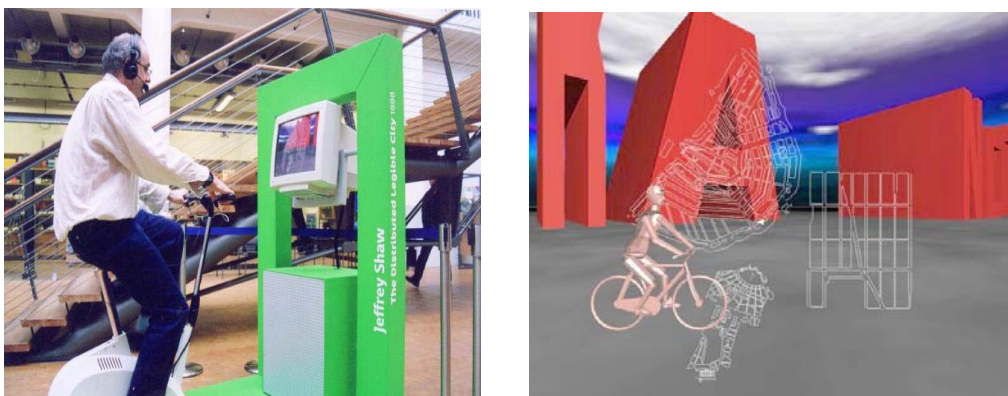


Figure 2: The legible city and the corresponding cyclist in the virtual environment.

The demonstrator was not always present and visitors were, at times, left to their own devices (see Murray (1998) for details). Insofar as the demonstrator

was present, then all visitors were encouraged to *become users* of the Legible City in the same *practised* manner. That is, through the same practical techniques of engagement we have discussed in connection with the Mimetic Blob. The ethnographic study below explicates the work – specifically, the natural practices – whereby visitors became users of the Legible City. Formal features of engagement are explicated in conclusion.

## Public Use

Potential users, that is, persons displaying a curiosity and interest in the installation, were typically invited to ‘try the bike’. On the visitor doing so, the demonstrator would provide a general description of the installation and its features. These were typically comments such as; ‘this is an artwork’ which ‘you can ride through’, ‘it’s connected to three installations’; ‘there’s a map which shows where you are and where other bikes are’; that the ‘little dot on the map is you’ and the others ‘are people riding the bikes’ at other installations. These were very often accompanied by specific instructions on how to operate the artefact: ‘you pull the map up by pressing this button’ on the handlebars, that ‘you can talk to others when you get near them’, and ‘explore the world together’, and so on.

The user would then be instructed to ‘experiment’ and ‘explore’ the virtual environment. Following this instruction, the demonstrator observed the user’s activities and furnished further, more specific, descriptions about the installation, its features and how to use them as events unfolded either in response to observed activities, or queries from the user. In this way, users found out that ‘you can only talk to each other if you’re close together’; that ‘you can always pull up the map to see where you are at any time’; that ‘you are in Manhattan’ (or Amsterdam or Karlsruhe) ‘right now’; that the others are in ‘Amsterdam’ (or Karlsruhe or Manhattan); that ‘you can see where you’re going’ by looking at the ‘little triangle’ on the map; that ‘you push either of the two buttons’ on the handlebars to ‘pull up’ the map; that ‘this’ is your location now and ‘you go in that direction’; that ‘you want to turn round to meet the other person’; that ‘you just go up that street’; that the other is ‘straight ahead’ and ‘just round the corner’; that ‘you don’t have to keep the map up all the time’; that ‘you can pull the map up to check where you are’; that ‘you can see if there’s somebody on the bike’ by ‘talking to them’.

## Indexing troubles

The furnishing of the ‘further instructions’ described above are examples of the way in which instructions can index the practical problems encountered by neophyte users of, in this case, Legible City. This indexing had an ‘unfolding’ quality to it in that finding a solution to one problem usually meant that the user, although making progress, went on to find other ‘troubles’. An example of this is connecting with other users of the installation, itself a task that involved not a

few problems. Having made contact with other connected users, a period of ‘playing around’ would typically ensue as they would first follow one and then another, taking turns, and generally exploring the possibilities. A further typical trouble occurred in the attempt to co-ordinate a face-to-face (avatar-to-avatar) encounter. This was no easy task. Users would cycle towards each other, decreasing their speed but, with few exceptions, this would result in overshooting one another. This meant a period of reorientation and circling around in order to resume a semblance of a face-to-face approach. Circling around was not easy due to the very wide ‘turning circle’ of the bikes which required not only physical effort but considerable perceptual adjustment. Many users gave up at this point. Those who persevered and achieved realignment – often after much assistance from the demonstrator – would engage in small talk for a moment or two and then dismount, and so on to the next user...

## Some features of engagement

Much of the pattern of instruction discussed in connection with the Mimetic Blob was witnessed in the case of Legible City. Here we will concentrate on other formal features that emerged. One of the major differences between the two artefacts is that Legible City is intended as a cooperative virtual environment (CVE) rather than a single user installation. Again, we are interested in how non-experts move from being neophyte users to practised users insofar as this is relevant to the design of virtual environments for the general public.

As described previously, engagement with the installation follows the pattern of the demonstrator providing general instructing descriptions of the artefact and what it does. From this very brief and general description, the user is then shown operational features and their use described. In the case of the Legible City, for example, the demonstrator ‘pulls up’, and at the same time points out the operation for ‘pulling up’, the installation map. Having ‘pulled up’ the map, the demonstrator describes the map’s features: where the connected others on the map, where the rider is on the map, and which others the rider may interact with. Again, the user treats such descriptions instructively. That is, as a set of instructions providing for engagement with the CVE and its contents. Thus, and again for example, the user learns that the map may be pulled up by pressing *this* button, and that it displays the position ‘within’ the CVE of him or herself and connected others with whom he or she may interact.

Such introductory descriptions serve to prepare users for engagement with the CVE through familiarising them with the CVE and its basic operations. Introductory descriptions provide users with just enough practical instruction to begin engagement. ‘Just enough’ is the operative characterisation here since, typically, users seek to know ‘just enough’ to ‘get on with it’. They do not seek to find anything like a complete set of instructions for use because, in a strong sense, they do not know what else by way of instructions they will require. It is likely that they will realise that more will be needed, but at this stage they have

no experience to determine what this might be. They need to know sufficient to start the engagement with the artefact and leave the rest dependent on how 'things unfold'.

The course of 'becoming a user' consists in the use of sufficient instruction to move to the next point, a process of dealing with troubles 'here and now', as they are encountered. Thus, and for example, following introductory descriptions and instruction to initiate engagement, the user of the Legible City starts pedalling the bike and shortly encounters a practical problem: the user can not see where s/he's going. That is, s/he can not see the way to the connected other(s). The demonstrator instructs the user to pull up the map and describes both the user's and connected other's location. This description 'pin-points' the two positions 'precisely' and traces the route from the rider to the connected other. At a formal level, the description is a *specific in-action instruction* (in this case, as to the map's features and their uses). The description, treated instructively by the user, provides for the next action necessary to successful engagement from *this* point. Thus, in the above case, the description reads as an instruction to pull up the map to see where you are going, that you are just here and the connected other just there, and the that the way to go in order to meet the connected other is along this route from here to there (which means, in this case, that the rider must 'turn around').

In and as of the natural course of engagement, the user proceeds to follow the specific in-action instructions provided. Should the user currently – at any point in time – be engaging with the CVE 'incorrectly' (misusing operational features), further descriptions instructing the user in alternate modes of engagement are furnished. Similarly, should the user currently be experiencing problems then descriptions furnishing instructions to achieve a solution are provided.

The furnishing of further instructions is tied to the temporally unfolding, situationally relevant, courses of action and the 'troubles' encountered. In the case studied, this unfolding very often was directed at achieving connection with other users in the virtual space. As we have seen, instructions tend to become specifically and relevantly directed to achieving this particular task as it emerged.

### The "process" of building a user

Analysis of the situated action and talk produced by parties (demonstrator and rider) in, and indeed *as*, the course of practically accomplishing engagement with the Legible City, displays members' worksite-specific practices providing for that achievement. Of central importance is the temporally sequenced production of descriptions, which are treated by production cohorts *as instructions for engagement and interaction* with the virtual environment and its content (and, thus, of achieving the site's work). In the sequenced production of descriptions, users transform them into instructions providing, over an unfolding course of time, for:

- an introduction to the CVE which renders the space intelligible in terms of its general engagement properties: what kind of ‘place’ the CVE is, and what can be done ‘here’.
- the practical orientation of users to engagement with the CVE: what the user needs to know now in order to engage with the CVE.
- preparatory engagement: in light of the previous action, what specific activities can be engaged in here
- beginning engagement: pointing out what actions need to be taken to commence engagement
- specific in-action instructions providing for the next action necessary to the accomplishment of successful engagement from this point, wherever that may be.
- different modes of engagement in the course of engagement itself
- using the installation’s features effectively in the course of engagement
- situationally relevant assistance in the accomplishment of the site’s work.

Insofar as users – without exception - treat descriptions as instructions for engagement, then the granularity and situational relevance of descriptions is of paramount importance. Detailed instruction in operational features and use only become relevant at certain temporal points, notably later and discretely, in the sequence where the next action, whatever it is, requires such instruction now for its achievement. The challenge to developing CVEs for use by the general public is, then, to provide naturally intelligible, temporally organised engagement sequences for cooperative CVEs. Engagement sequences that describe, in lay terms (ordinary, not professional, talk), the particular environment and which, in doing so, furnish situationally relevant instructions for action and the achievement of the site’s work.

## Engagement with the Web Planetarium in EVE

### The Setting.

The Centre for Art and Media Technology (ZKM) in Karlsruhe, Germany, has developed an assemblage of apparatus known as the Extended Virtual Environment (EVE). This apparatus was conceived as ‘a new form of interactive immersive visualisation environment and virtual-reality apparatus’ (Duguet *et al.*, 1997). As part of the collaboration between the Swedish Institute for Computer Science (SICS) and ZKM in the eSCAPE Project, the demonstration and exhibition of the Web Planetarium device in the EVE apparatus was considered an appropriate and effective combination for experimentation and display. The

Surrogate exhibition (1<sup>st</sup> November to the 6<sup>th</sup> of December 1998) provided the opportunity to make the installation available to public use

The exhibit was housed in an annex at ZKM within an inflatable dome (the shell of the Extended Virtual Environment) measuring approximately some ten metres across and 5 metres high, inside of which a projector mounted on a tripod in the centre of the dome projected the dynamic image of the Web Planetarium. (See figure 3 and the corresponding clip in the eSCAPE year two CD-ROM)

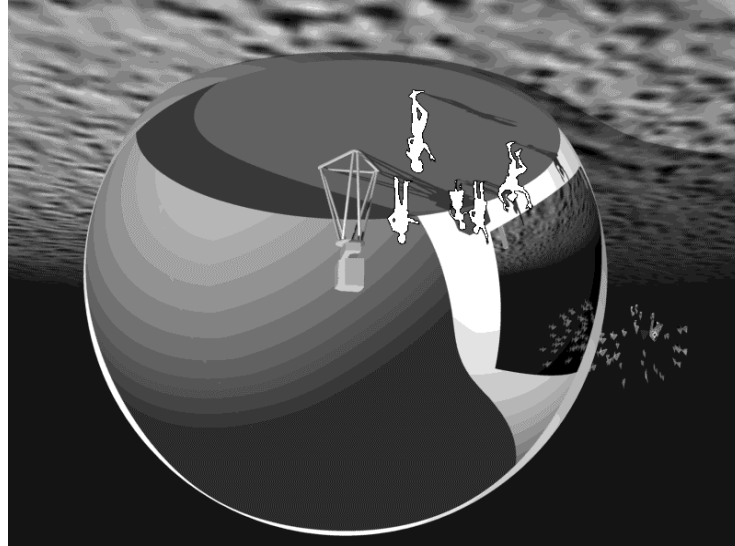


Figure 3: The EVE dome showing it immersed inside a virtual world

Members of the public-cum-audience members were to view the scene using polarised spectacles, which would allow them to see the scene in 3D. Users were to view the scene through similar glasses, although these were fitted with an infrared light pointer that controlled the movement of the scene projected onto the interior of the dome. A joystick allowed the user to control forward and backward movement within the virtual scene. An initial period of study took place during the Surrogate exhibition (2<sup>nd</sup> to the 5<sup>th</sup> of December) and again shortly afterwards (20<sup>th</sup> to the 25<sup>th</sup> of January 1999). The study took place during hourly guided tours of the exhibit. These tours made it possible to conduct an empirical investigation of the exhibit in details of public use.

## Public Use

Members of the public entered the EVE environment through a small revolving door in single file and in doing so invariably found themselves plunged into darkness. It took several moments for their vision to adjust, to organise their positions within the dark space, and to notice that displayed on a portion of the dome was a blurred 'constellation' of images that resembled 'planets'. The tour guide explained what the constellation of images represented - links on the Internet. He would then turn the lights on in the dome and instruct the present assembly to retrieve, and wear, a pair of 3D glasses from the container next to the

revolving door. Glasses retrieved, the lights were switched off and one of the assembly was invited to assume control of the user glasses and joystick. Not every member asked accepted the invitation and so it was remade, often with the invocation of the device being ‘fun’, until one of the assembly accepted. On occasions, no-one accepted the invitation and the tour guide would assume the position of user, which after demonstration often prompted subsequent use by members of the current assembly.

In demonstrating the device, or once having enlisted a user, the tour guide issues a description of the device, explaining to the user and / or assembled ‘audience’ what the exhibit consists of and how it may be engaged with. For example, that you may navigate the ‘planets’ by moving ‘towards’ and going ‘through’ them. Notably, the sense of movement this course of instruction engendered was initially conveyed through moving the control glasses around by hand to demonstrate simultaneous movement of the screen and, similarly, by manipulation of the joystick. Thus an initial sense of use and engagement was conveyed by instruction and demonstration of device features.

The sense of use and engagement is further elaborated in the course of use as the tour guide ‘tells’ the user to ‘move’ to various arbitrary locations and at the same time physically guides the user, directing his or her hand and visual attention to the arbitrary places specified. In going through this exercise, the assembly or user learns to move not simply the head in moving the image but to align the body with the head in moving around the Web Planetarium.

On occasions and for various reasons, be they technical (breakdowns or moving too fast for the equipment) or distractions (noticeable ‘noises’ oriented to outside or among the audience), the projected image does not follow the user’s head movements. The movement and image are ‘uncoupled’ and use breaks-down. Such contingencies require ‘repair’. Users adopt two visible strategies for repair: moving back to the point where they last saw the image, thus seeking to re-establish the connection, or by asking the guide for assistance. In response, the guide directs the user in ‘picking up’ the image again. Insofar as the uncoupling is not due to moving too fast, then the guide must ‘fix’ the equipment (not uncommonly, and often successfully insofar as the projector unit’s movement has ‘frozen’ yet again, by ‘whacking’ the projector unit with a wrench).

In the course of engagement, members of the audience begin to ask the guide questions about the exhibit, clarifying the things she has said and seeking explanations for what they see. As the user manipulates the joystick, the projected constellation of images moves around the dome and ‘towards’ and / or ‘away’ from the assembly as directed by the use of the joystick. Initially, members of the audience remain rooted to the spot, twisting torso and turning head to maintain visual contact with the Web Planetarium. The user, however, begins to turn and walk around, particularly when his or her view is blocked by audience members or the projector tripod. Members of the audience subsequently orient to the user’s movement and begin, themselves, to move around the space in sequence with the movement of the images as directed by the user.



As the workings of the device start to become apparent to the assembly, members of audience try to guide the user in his or her activity, pointing to 'planets' and issuing directions and instructions for movement. At this stage, the user often undertakes to 'pass on' the control glasses and joystick. The transference of the peripheral devices (control glasses and joystick) played a key role in the nomination of new users. Taking off the glasses, the user would offer them to the some member of the audience. As when the tour guide invited use on entering EVE, the user's offer was not always accepted. On such occasions, the guide would often intervene, again prompting use through the invocation of 'fun'. Alternately, on seeing the users offer, audience members would nominate themselves by reaching out for the peripherals. Notably, very few audience members made direct requests of the user for control.

Instances of peripheral exchange were also occasioned by success, failure or difficulty. For instance: having reached a planet; having difficulty in finding the constellation; the screen going blank; the occurrence of uncoupling between the viewer's head movements and the projection camera. All these instances, and more, occasioned users to 'give up' the peripherals. Now 'previous' users would often become members of the audience and, standing close to the new user, would often begin to 'point out' details of use, thereby instructing the new user in and as the course of use. Thus, as a new user assumes control, the work of the site continues. That is, the work of making sense of the device, becoming a user, learning the controls, repairing breakdowns and / or passing on control is produced and reproduced yet again and by every new assembly entering EVE.

## Some features of engagement

Observation of the public arrangement and use of the Web Planetarium in EVE allows us to consider how users first encountering the installation make the transition from 'visitors to a museum' to 'users of an eSCAPE', so to speak. Again, our focus here is on non-expert users in order to better understand some of the practicalities of public use and their design implications

As with the previous studies, engagement of the neophyte user is one which requires instruction in the properties of the artefact and how it can be operated. This stage is followed by an invitation to some member of the audience to 'try it out'. Very often the attempt was made to encourage participation by saying that it 'is fun'. However, on numerous occasions this failed to convince or overcome the 'natural reticence' of strangers suddenly invited to enter the limelight using a technology of which they have only just become aware. In which case, it was not uncommon for the demonstrator to do a 'walk through' which was often sufficient to encourage a member of the audience to come forward and 'try it out'.

There were occasions, however, when a member of the audience volunteered to accept the invitation. Following this the demonstrator gave a general description of the controls, and demonstrating operational features. This was

often supplemented by guiding the body movements of the user and showing how this produced the results on the projected image. In the course of being guided in use, it begins to become apparent to individual users and the audience alike that head movement is coupled directly to the projection camera ‘point-of-view’. That is, that the control glasses are connected in some way to the projected image. Thus, when the head moves, the image moves. When the user turns his or her head around, the image moves around the dome. As such, it emerges that use of the device, and ‘exploration’ of the Web Planetarium, relies on the coordination of hand, head and body movement. The coordination of hand, head and body is, in the first instance, an instructed coordination of actions. The tour guide ‘tells’ the user to ‘move’ to various arbitrary locations and at the same time physically guides the user, directing his or her hand and visual attention to the arbitrary places specified. In going through this exercise, the user learns to move not simply the head but to align the body with the head in moving around, thus accomplishing proficient use.

A notable re-occurrence in the course of use was that of dealing with contingencies – specifically, breakdowns. Although the installation is but an experimental one, bugs, glitches, and all sorts of unanticipated anomalies are to be expected in the course of use of developed eSCAPEs. How such things are to be ‘dealt with’ is an open issue, which at some point must inevitably be addressed. The present studies offer no solutions: users re-trace their steps and, failing success in that, seek assistance. Thus, the current studies simply draw attention to the contingent breakdown issue.

In the course of use, audience members come to learn practices of use from observing interaction between the tour guide and user, and from the user’s subsequent interaction with environment and its features. There is, in many respects, a concerted character to the course of becoming a user and, to use a phrase, the ‘transmission’ of competence adequate for engagement. Not only do the user and the audience alike learn the ‘just what’ and ‘just how’ of engagement from observing interaction between the tour guide and the user. Eventually, in the course of the user’s ‘solo’ activities, the audience themselves become active participants in developing, first a sense of movement through manipulation of control devices as produced by the user, and then, through attempts to direct the user’s activities. As the user’s sense of, and ability to, manipulate the controls grows, so does that of the audience members. Thus, audience members instruct the user to go to places, to move around, and the rest.

The attunement of audience members to the workings of the environment and its features, as manifest in the issuing of directions and instructions, prompts, as a matter of routine, the ‘passing on’ of the controls to some unspecified member of the audience.<sup>1</sup> In assuming control, the work of the site is contingently

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<sup>1</sup> Conduct in some sense unique to the categorically ‘fun’ nature of the device – that is, to activities in which the ‘seriousness’ of social life and commensurate ‘respectful’ demeanor is temporarily suspended and the *occasioned* participation of present members is, not without the prospective possibility of mis-reading, correction or sanction, tacitly invited.

reproduced. Thus, the new user may find him or herself engaging in a course of ostensive definition, guidance and / or the instructed coordination of actions. This time however, there is every possibility of that work being undertaken and accomplished in concert with a previous user.

### The "process" of becoming a user

Once again, analysis of the situated action and talk produced by the demonstrator, users, and members of the audience, in accomplishing engagement with the Web demonstrates the worksite specific practices which accomplish that achievement. By worksite specific we mean essentially the practices necessary to work with *this* technology in *these* circumstances in the company of *these* persons. The explication of the worksite specific practices makes visible a number of endogenous activities which constitute the "just what's" of becoming engaged with the Web Planetarium. These consist of:

- Instruction in engagement properties: 'pointing out' technical requirements of use.
- Walk-throughs: encouraging use through demonstration.
- Ostensive definition of operational features (controls): 'pointing out' controls and their use through manipulation of them.
- Guidance in use of ostensively defined features: instructing users in the 'hands-on' manipulation of controls
- Instructed coordination of actions: practical exercises in coordination of controls and achievement of activities.

These findings suggest that attention to and support of such practices provides for the possibility of encouraging the adoption and use of future eSCAPE technologies by members of the public as it is in and through these practices that users visibly become users.

## Engagement with Nuzzle Afar

### The Setting.

The Nuzzle Afar installation was available to public use during the Surrogate exhibition (November 1st - December 6th, 1998) at ZKM, Karlsruhe. The installation was located within the exhibition area, on the 2<sup>nd</sup> floor of the museum.

Nuzzle Afar consists of an enclosed room, with left and right side entrances. Within the room are two podiums, in front of which are two projection screens. Trackballs embedded on top of the podiums allow users to control movement through the computer-generated environment displayed on the projection screens, and microphones similarly located allow distributed users to communicate. As

users move through the electronic environment, a string-like trace is left upon the virtual landscape, which may be locked onto and followed by another user. The enclosed space of the virtual world consists of four walls, ground and sky plane. Upon the walls are images of a 'sense' organs (e.g. a hand, an eye, an ear, etc.). In addition to spherical 'avatars' of unique colour, a sphere and a cylinder are placed within the virtual room. These latter objects are the means by which users can enter or depart a series of three rooms.

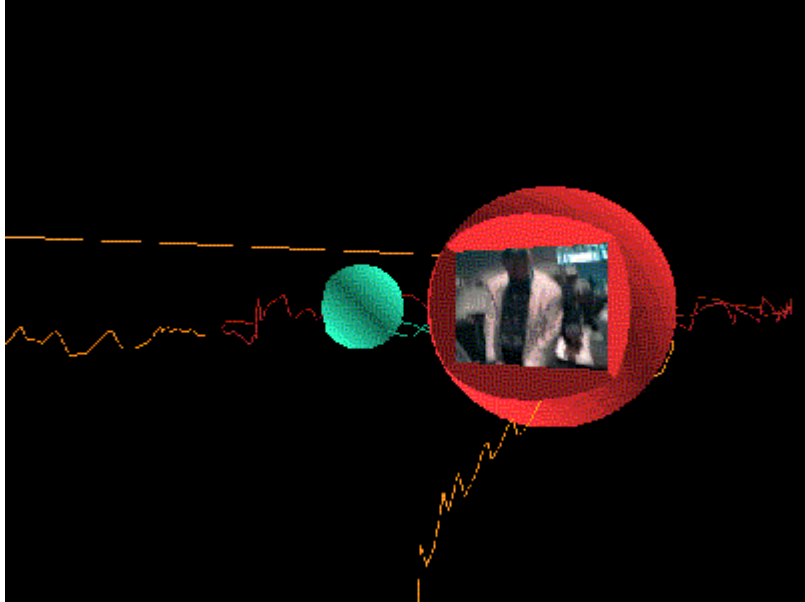


Figure 4: A user avatar in Nuzzle Afar with a video image of their use at ZKM

Within each of the spaces in Nuzzle Afar navigation needs to be learnt anew: effort, space and travel have different relationships within each. When two or more users are in close approximation 'within' any of the spaces, they are able to see a video image of one another mapped and wrapped, visor-like, around the middle of the sphere. This allows for recognition of the others' identity. In meeting each other, any two users are able to enter a new virtual space which encompasses them, while locking out the previous environment and any other inhabitants. This new space is, however, visible to other users as a spherical object inside of which the colours of the two users 'inside' merge. Once inside this new space, users are represented via their video images on a 2D square. When one or both of the users leave this space, a video still of the two users remains, along with details of the time and physical locations of the encounter (Blunck & Fujihata 1999).

## Public Use

On entering the display space potential users have to determine how the artefact is to be controlled. To be successful, even at a minimum level, this has to be done collaboratively. Typical comments heard during the fieldwork were: 'we move around with the track balls?'; 'we're in the same environment aren't we?'; 'can

you hear me [through the mic.]?' It is in and through 'experimenting' collaboratively with the artefact that users find out how to use it and what it does. Thus, users move the track ball around and observe movements on the screens, interpret, in moving around and seeing 'the same things', that they are 'within' the same environment and, even though they are co-located, learn that they can communicate by talking into the microphone.

This initial process of trial and error gradually eases into more serious attempts to use the installation. However, very often this is still a matter of exploring the artefact and, principally, trying to establish a 'convergence of views'. That is, establishing a basis for collaboration by establishing a common viewpoint. For example, one of the first things users typically try to establish is their current position 'within' the space. This consists of assessing the objects displayed on their respective screens and cross-checking them against the other's.

**Nuzzle Afar: transcript extract #1.**

[7] A: So looking at this [the screen in front], I can see those hands [on partners screen] to my left. Oh, no yours has changed, oh mine's changed now. There's a delay in the visuals as well isn't there? That's obviously, the hands up here now...

[8] B: Yes

[9] A: You're looking directly at that wall, it's slightly to one side, and I was wondering if we could get the same point of view of things, if I'd get to see that round thing in a second. It is...

[10] B: It is the same scene from different perspectives.

[11] A: Well that's what I was wondering, but I can't see your circle that's over there.

[12] B: No. [walks over towards partner] It's the same roof, that's a view of a roof. The brown bit is the top of a house.

[13] A: Ah. There's the circle, so we are in the same...

In seeking to establish current location, the different perspectives offered by each screen are compared by users to orient each of them to securing a similar point-of-view. That is, establish a mutual sense of coordinate position in the space. In and through accomplishing this, users compare the general topography of each screen, then identify finer detail (such as the blue circle) to further confirm common virtual positions in a shared environment.

Once coordinate position has been established, the participants begin to look for an object which might in some sense 'represent' them as virtual embodiments. There is, then, a natural presupposition as to representation: something must be here that's 'us', and more precisely, that's 'yours' and that's 'mine'. What though? Finding out 'just what' is the practical problem to hand:

**Nuzzle Afar: transcript extract #2.**

[25] A: I can't see that yellow thing on yours [B's screen]. I wonder if they're us? Do you see that blue ball there?

[26] B: Yes.

[27] A: You've got a red ball there. I wonder if they represent us?

[28] B: Well I've got a blue ball as well behind the red one.

[29] A: Right, there that green one. Do you see the green one you've got there?

[30] B: Yes.

[31] A: Do you see the red thing coming out of it? That's there isn't it?

[32] B: Well, that's like a golf ball thing isn't it.

[33] A: Well I can see that, but I can't see you're yellow stream.

[34] B: No, well I can't see your red stream.

[35] A: But there's red there.

[36] B: I can see the red. There's the yellow.

[37] A: Oh, there's the yellow, yeah. So that must be you.  
 [38] B: So I must be yellow.  
 [39] A: So can you look for the red one, because I must be red.  
 [40] B: There's the red [stream]  
 [41] A: Can you find the red ball though, because then you'd be looking at me. You look like you're coming towards me, if that's you.  
 [42] B: There's the red ball.  
 [43] A: Right. I think that red's me looking at you, and there's you looking at me, the yellow one.  
 [44] B: Right [laughs]  
 [45] A: I'll try and come towards you and see whether... Yeah, the red one looks like it's coming towards...  
 [46] B: It's coming towards me.  
 [47] A: So that's me, and this one's you.  
 [48] B: I'm yellow, you're red.

The above dialogue again makes visible the effort to achieve a mutual, situated understanding of virtual arrangements through an attention to, and coordinate manipulation of, visible object(s). Notably, coordinate manipulation consists not only of seeing the same things but on the categorisation and re-categorisation of shared objects. Thus, users identify representations that are 'us', and 'yours' and 'mine' in particular, through orienting in the first instance to the same objects – the 'yellow thing', the 'blue ball', the 'red ball there', the 'green one you've got', etc. Orienting to the same objects is achieved in and through categorising what is seen, thereby instructing one another in what is seen. Instructed objects become candidate categories of solution – 'I wonder if they represent us?'; 'that must be you'; 'if that's you'; etc. Thus, the 'blue' and the 'red' balls become candidate representations of 'us', and 'you' and 'me' in particular. Mutual consideration of the objects and their features, however, prompts re-categorisation whereby new candidates of solution are formulated. Thus, in mutually orienting to 'the green one you've got there', the 'red thing coming out of it', and in not seeing 'you're yellow stream' but seeing 'the red' one, the 'yellow' ball becomes 'you' and the 'I' must be 'the red'. The status of these reformulated categories of candidate solution is established by coordinating the manipulation of the candidate objects: 'I'll try and come towards you and see whether ... Yeah, the red one looks like it's coming towards ...', 'It's coming towards me.' 'So that's me, and this one's you.' 'I'm yellow, you're red.' Thus it is established that participant A is 'represented' by the 'red' ball and participant B by the 'yellow' ball, and thus 'these' objects (the yellow and red balls) are 'us' and (the red) 'yours' and (the yellow) 'mine' in particular.

Having established the meaning of artefacts (what they are and what they do), coordinate position (where 'we' are), and the presupposed virtual proxies (*that* is 'you' and *this* 'me'), users proceed – insofar as they do proceed; many give up the effort of engagement at or before this point – to 'experiment' with their virtual proxies and to 'explore' the space:

**Nuzzle Afar: transcript extract #3.**

[60] B: We flipped into another little world.  
 [61] A: Well, we flipped out again, haven't we? So maybe, we've got to find each other again. Have we changed, because that looks like you there doesn't it? Weren't you yellow, wasn't you?

[62] B: Yes. [scene changes back into sphere environment] When we get to a critical size we flip into this jigsaw puzzle.  
 [63] A: If I hit you again I think we go out into the world [moves towards partner, the scene changes back to outside, accompanied by a 'Zing' sound]  
 [64] B: Oh I see. You zapped me.  
 [65] A: Those are outside now. So we've got four of them outside.  
 [66] B: Right.  
 [67] A: So we started of as being a yellow and red ball, and we've gone into each other twice, and there are now two sets of things there aren't there?  
 [68] B: Erm.  
 [69] A: We've been in twice, we've got two sets now.  
 [70] B: We've now got one out in the other world?  
 [71] A: Well each time we've gone in another two have come out. If we go in again another two will probably come out. You come towards me now. [B moves his virtual position towards A. The scene changes back into the sphere, accompanied by an electronic sound]. Right.  
 [72] B: Right.

In the course of experimenting with, and exploring the space, users chanced upon 'terrain' facilities. Users came to learn the installation and its features serendipitously. Thus, some users discovered that achieving the 'face-to-face' positioning of avatars allowed communication by microphones and that avatars in the immediate virtual area could also witness their dialogue. Others discovered that when two avatars come closer together, an alternative virtual space is created around them, visible within the departed 'world' as a spherical object made up of the colours of the conversing avatars, and that when one or both of the avatars leave this newly created space, it vanishes, leaving behind a two-dimensional video still composed of the two actual users.

### Some features of use

Observations of Nuzzle Afar in public use reiterate endemic practical problems or troubles encountered and addressed by users of artworks at ZKM.<sup>1</sup> Given that these aspects of use have already been treated, they are but summarily restated here. When encountering electronic environments, users must establish what the artefacts they are confronted on entering the space are and how they may be used. This occasions collaboration between users - or in other cases demonstrators - in interpreting and making sense of the artefacts. Insofar as artefacts are natural objects in common use, such as microphones, they 'speak for themselves' to some large extent. Insofar as they are not common objects, experimentation more often than not serves to elucidate their meaning and use. Thus, and for example, rolling the track ball and watching the screen serves to establish that track ball is an artefact affording navigation 'within' the space. As noted, the achievement of sense is a *collaborative achievement* and, as such, users constantly ask and inform one another as to the sense of the artefacts 'around' them.

Learning how to use the artefact is a graded process involving much trial and error as well as using what one has already 'found out' thus far. This is perhaps

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<sup>1</sup> See Büscher, *et al.* (1998).

not surprising given the less intuitive appearance of the artefact compared, for example, with *The Legible City*.

Finally, with little exception (except instructed use) users ‘learn’ the environment serendipitously. Thus, users ‘stumble’ upon features of the environment by chance. Insofar as public use *of artworks* is concerned, this is not seen to be a problem (Blunk - eSCAPE Plenary Session, ZKM, Germany, December 1998). Insofar as public installations for public use are concerned, then this approach to design is, as the studies reported here serve to illuminate, more problematic. Simply put, and as the study of *Nuzzle Afar* points out, in such circumstance users frequently abandon their efforts *to become* users. Serendipity, while fine for the curious, does little to encourage public use.

## The construction of public setting

In exploring and reviewing the studies of the four different artworks in these previous sections we have focused on the relationship between the virtual environment and the general public. A particular issue of focus has been the notion of engagement. We have seen how across all of these different environments the process of engaging with the environment has been central to allowing the everyday citizen to migrate from being a member of the general public to a user of the virtual environment and objects making up these artworks.

However, this is far from the only issue to be drawn from these studies of the use of the artworks. In this section of the Deliverable we consider the social organisational aspects of real-world and virtual public space. Here we explore the extent to which a natural sense of space and spatial arrangements underpins interaction ‘within’ real and virtual environments in considering background expectancies involved in ‘setting up’ the *Legible City* for public display and embodied orientations to *Legible City*’s physical structure. This exploration allows us to consider the way in which these environments draw upon the nature of the place within which they are situated and the extent to which these places can themselves be constructed.<sup>1</sup>

One of the first requirements of an ethnographic study is to describe the setting or, to put it loosely, the context in which the activities take place in order to give, we might say, a sense of place. It is not to treat the setting as if it were a container, an arena or a stage, (though some settings might have just this quality), but to acknowledge that real-time, real-world activities occur in a particular place, and that this might influence the character of the interaction which takes place. There are conceptual subtleties to this notion of setting (many of which are discussed by Hughes & O’Brien, 1998; Crabtree *et al.*, 1999). This need not detain us for immediate purposes except to say that as we use the idea it is intended to convey that the character of the setting and the activities which take

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<sup>1</sup> Interested readers are referred to Harrison, S. and Dourish, P. (1996) for a more extensive discussion of the nature of space and place within the CSCW community.



place within it are reciprocally connected. In other words, we want to bring out the idea of setting as involving much more than the materialities of rooms, buildings, artefacts, props, and so on, though these are by no means irrelevant. What we seek to capture are the ways in which a setting has a meaning for the people who live and work within it and this encompasses more than a setting's materiality.

The issue of the real-world setting of the artwork, and the virtual settings the artwork situates members actions 'within', is relevant to eSCAPES insofar as one of its longer term objectives is to explore IT spaces which are not rooted to the desktop. IT spaces may be located almost anywhere including various kinds of public spaces, which may be important given how it is envisaged that the virtual space is used. This clearly, but in complex ways, impinges on the issues of private versus public worlds.

## Real-world settings

The real-world setting for most works of art is a gallery, museum or exhibition although this is not their sole method of display. Others include carnivals and festivals as well as works of art which are intended to be displayed in public places such as streets or adjacent to buildings, for example. However, here we concentrate on museums and exhibitions since all the works of art studied were placed in such places. Such settings have key features that are important to note.

Firstly, although there are often attempts made by the organisers of the museum or the exhibition to direct an audience through the exhibits, on the whole members of the audience can more or less please themselves when and how they view what is on show. Secondly, and closely related to the first point, members of the audience can choose with whom they view the exhibits. They can view them as a solitary activity or as part of a group, both of these being situations which could well have a bearing upon how the exhibit is experienced. Thirdly, museums and exhibitions have what we can describe as their own 'aura'. By this we mean that as settings in our culture a 'respectful demeanour' is expected on the part of the audience. What they convey is a certain authority, more than a hint that what will be found there is worth taking seriously, worth looking at, worth spending time here. At the risk of exaggerating the point, what we are trying to point to is the ways in which different demeanours are appropriate to various settings. Museums and exhibitions are not market places, they are not bars, nor carnivals, nor airport lounges, etc. They are places where a certain respect is due to the exhibits and where exuberant behaviour is to be avoided.

There is, perhaps, a danger of making too much of the last point, not least because there is nothing sacrosanct about artistic productions being displayed in this way. Indeed, as many artists themselves point out, art should not be confined, or consigned, to museums and galleries. And as we have already pointed out, there are very many instances of art pieces being sited in churches and other buildings, in market squares, by road sides, on hills, in forests, in dining halls,

and more.<sup>1</sup> However, the fact remains that the art installations reported on here were situated in exhibitions and museums (which will be described shortly).

There is one issue, however, which may arise, one that is relevant to system design, namely, the seeming asymmetry between the location of the artefacts studied and the potential location of the systems developed. In studies of work settings there is already a strong connection between the setting-of-inquiry and the setting-of-use. In this case, however, and even though the settings-of-use for the systems being developed are only vaguely envisaged, we cannot, with very much confidence, assume there is a similar parallel between the respective settings. There is little we can do about this except to note it as a possible limitation bearing in mind, too, nor should we necessarily see the discrepancy as a serious obstacle. These are matters that need to be weighed. However, and as we shall see, important lessons were learned for the design of electronic landscapes from the observation of people using, and trying to use, the artworks.

ZKM can by no stretch of the imagination be described as a sombre museum. It was designed as a very different kind of institution bringing art and technology together in new ways; ways which encouraged exploration within an environment which was supportive rather than overly serious. As an ex-armament factory it has available very large spaces some reaching up to three stories high and extending to the full width of the building itself. The Media Museum – there are three museums in the institution itself – houses exhibits of interactive media art by national and international artists. The entrance hall is large and spacious and, shorn of exhibits and posters, would look like what it is, an empty factory space, utilitarian and unadorned. To one side is a shop and, on the other, a café bar. Metal stairways provide access to three floors that provide extensive space for exhibits.

At the time of when much of the fieldwork was done, the main exhibition, *Surrogate*, consisted of a series of works exploring, conceptually and experientially, the properties of multimedia environments. The majority of the works were interactive installations projecting images onto screens of various kinds. This meant that in order to ensure the quality of the projections many of the installations were housed in and surrounded by purpose built rooms. Thus, while being located in the public space of the museum, the visitor is required to enter a succession of darkened enclosures to view the artworks. As one of the designers pointed out in respect of a previous exhibition held at the museum, the exteriors of the small rooms housing the exhibits were given a ‘mediamatic’ quality to convey the idea that the visitor is passing through a ‘string of events within the architectonic space of the existing building’ (quoted in Trevor *et al.*, 1998). Importantly, through the design of the ‘outer shells’ of the rooms, some first clues about what was ‘inside’ were conveyed. Visitors used these clues as a

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<sup>1</sup> The practicalities of types of artistic production is clearly relevant here. Compared to sculpture, which tends to use resilient materials, paintings are much more vulnerable. The relatively delicate nature of many of the electronic components used in the installations studied here places a constraint on where they may be exhibited.

resource in their movement through the exhibition. That is, the use of ‘shell’ designs as a resource in moving around the general space of the museum was / is a practiced use. Most effective were designs that allowed people to get a ‘glimpse’ of the installation from the outside.

In the above respects, practices for the use of the outer shells are understood by visitors against a ‘seen but unnoticed’ background of expectancies providing a distinct ‘scheme of interpretation’ (Garfinkel, 1967)\* which enables visitors to *formulate* some initial impression about what is inside. It is against the background expectancies tied to the setting that visitors conduct their affairs (hang around for a while, engage with the installation, move onto another, etc.). In practical detail, formulating an impression ‘about what is inside a room’ consists of: 1) ‘noticing’ (and being able to notice) that someone else’s

1) ‘noticing’ (and being able to notice) that someone else’s curiosity has been sufficiently piqued to motivate them to stay and watch for a while; that there is

something 'within' that might be interesting as indicated by other peoples



2) A window, a gap in the wall, or other structural arrangements, allows people not only to ‘glimpse’ the content of an installation, but also establish a sense of its popularity, and the general character of the experience it provides;

3) Moreover, such permeable structures afford the visitor an at-a-glance

3) Moreover, such permeable structures afford the visitor an at-a-glance availability of the ‘queue’ inside the installation. The queuing system that regulates access to the installation is displayed to the passer-by through the position and orientation of people in and around the installation. Visitors can watch events in the installation as the ‘next in line’, they can be ‘spectators’, or

they can be ‘floaters’ – ‘peeping in’, in order to decide whether they want to stay,





This queuing system, displaying to visitors the ‘flow’ of people through the exhibition space, furnishes part of the information visitors rely on, and look out for, in making decisions over where to go and what to do and in conjunction with points 1) and 2). The queue is an endogenous background expectancy at work in the self-organising ‘movement of human traffic’ through exhibition space; ‘movement’ which is irredeemably tied *in and through practice* to the very spatial arrangements constituting the space itself.

Developing an appreciation of the background expectancies underpinning inter-action ‘within’ public spaces (such as the exhibition space) has been of some not insignificant use in the design process to date; informing, specifically, the development of annotated gateways (Trevor *et al.*, 1998). While it is not always immediately obvious or apparent in ‘just what’ ways such understandings may be brought to bear on design, it is, nevertheless, towards some significant background features at work in the organisation of public spaces that we now turn our attention in considering the ‘setting up’ of an artwork at a public exhibition.

### Setting up the Legible City (a ‘happening’ account)

The study reported here was conducted in Essen, Germany at the launch of the Fifth Framework Programme in February, 1999. An evolved version of the installation was displayed on the 25<sup>th</sup> and 26<sup>th</sup> of February 1999. This part of the report describes the set up of the installation on the 24<sup>th</sup> of February. Essentially our interest here is the means by which the virtual environment and the physical interface to it are made to fit into the new place within which they are placed. Given the importance of the physical setting discussed in the previous section developing an understanding of how these environments are configured and set up allows us to develop some understanding of the importance of the fit between the real and the virtual environments. It also offers the potential to allow us to reflect on the issues of configuration involved in using these environments in real world settings.

The following description is called a ‘happening’ account for the simple reason that the people who set the installation up conducted their activities in the German language – a language the ethnographer who conducted the study did not speak. That he did not understand German does not mean that he did not understand what it was that the people who were assembling the installation were doing. Nor that, insofar as those people were proficient in English, he could not ask them to clarify what they were doing. This is a ‘happening’ account, then, in that (through points #1-15 below) it ‘tells’ what happened in setting the installation up. Given the circumstances of its production no claims to rigour are made - many practices whereby the assembling of the installation was achieved are missing from the account. It nevertheless serves to illuminate the rich texture of the work – specifically, the parties, practical details, problems, and solutions - involved in setting up an eSCAPE. Importantly, in this respect the study brings to

light a number of background expectancies essential to the organisation of public spaces; background expectancies that impinge upon design in subtle ways.

One issue is of particular relevance here, namely, maintaining the artefacts. One of the main ways in which artists display their works is by showing them in a number of museums or galleries. Although it is common for major galleries to have their own permanent exhibitions, usually of artists of the past, it is becoming increasingly common for artworks to be transported around various exhibitions. This places a special premium on many interactive artworks that the technological infrastructure be available to support the display and the operation of the artwork itself. We include a report of some of the problems involved here in the next chapter. There is, however, a more general issue arising from this to do with the fact that although electronic landscapes are virtual spaces, the interfaces to such technologies will be located in real-world, real-time space which will need to provide the affordances and the support for the effective use of escapes.

#1. A party of three from ZKM arrive at the exhibition hall and go to find their display spot. On locating the spot, they discover that the allocated space is too small for the installation, measuring some three metres square. They need twice that amount of space to demonstrate this version of the Legible City. 'This' version consists of two bikes co-located 'within' the same space and separated by a 'wall'. The set up team go to find someone who can help them resolve the problem, returning with the exhibition's chief organiser and a fitter shortly afterwards.<sup>1</sup> The organiser, fitter and team members talk over how best to extend the display space. Extending it backwards should double the space and cause the least problems. The fitter leaves the scene and the team decide to start unloading the installation's parts from the van and bring them into the exhibition hall. While the team is unloading the parts, the fitter returns with a 'mate' and instructs him in the changes to be made. The two then leave the scene.

#2. Two different fitters arrive on the scene and, following one the team's instruction, remove a computer provided by the exhibition, 'noting' the move on the list. It takes about twenty minutes to unload the van. Now they need to assemble the installation. No changes have been made to the space as yet however. They decide to erect the 'wall' that goes between the two bikes while waiting for the fitter. The 'wall' is a hollow metal frame about two feet thick to which covering boards will be attached. It is intended to put a concrete 'boundary' between the two bikes and their riders.

#3. The changes to the space have not been made by the time the wall frame has been erected. The team decide to go and sort out registration for the conference. On returning some twenty minutes or so later, two fitters are extending the display space. An exhibitor from the stand next to this one approaches the team. She is not happy about the changes, which reduce her wall space. She tells the team that she was 'promised' that wall space for displaying her posters on. As this is happening, another exhibition organiser arrives on the scene. He asks the team if it is possible to put the bikes side-by-side. The team says no – the technology requires this layout as pointed to the exhibition's chief organiser. This organiser accepts their account. The new layout stays.

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<sup>1</sup> The chief organiser was contacted through making enquiries at an on-site booth signed 'Exhibition Organisers' and a large team of fitters are present in the exhibition hall assembling display booths, putting in electric's, lights, computers, and the rest of the things that go to 'make up' the physical structure of the exhibition space within which particular items are displayed.

#4. The fitters finish changing the space and the team start unpacking the installation parts. Many of the parts are in boxes or wrappings which are labelled to show their particular contents. The team start unpacking the bike stands and organising the assembly space. The rear stand and the wall frame are placed in the display area and the team start to position them. They are discussing where to locate things. The discussion involves positioning and repositioning the stand and the wall, and their relation to one another. First they place the stand and wall at varying angles from left to right within the space. They stand back and appraise the potential layout. Then they rearrange the stand and wall frame, placing them in straight line. Again the layout is appraised. The stand is removed from its position and one of the team gets a spirit level from the toolbox. The layout is settled and the team make adjustments to the wall frame until it stands level in its position.

#5. The team now start to assemble the wall casing, at which point a light fitter arrives on the scene: where do the team want lights placing? The team consider and point out where it would be best to position lights. The fitter then leaves the scene. The team carry on attaching the casings to the wall frame, working in concert to place the casings correctly, lining them up with screw holes, and screwing the casings into place. The two front casings are attached and one of the team members unpacks and places a computer inside the wall cavity. He then starts placing and assembling the rest of the technical bits within the wall. Meanwhile, the light fitter returns and starts putting the lights in the requested positions. One of the other team members assembles a strut. The 'strut' contains the 'polyhemus' – the VR headset's receiver and tracker. Once assembled, the strut is attached to the wall. (One will be attached to the other side of the wall, hence not being able to locate the bikes side-by-side).

#6. The team member who assembled the 'bits' inside the wall now gets one of the VR headsets and attaches it to the computer and bike which has been placed adjacent to the attached strut. The other member, who assembled the strut, now assembles the bike stand, and the bike is then placed on the stand. The third member of the team is attending to aesthetic details, taping up the joints between the wall casings and screw holes to give the wall a 'solid', one-piece, look. (From here-on in he almost exclusively attends to aesthetic details – the other two members deal with the 'technical' assemblies).

#7. At this point in time no technology is 'running'. One of the two boots the computer and then they start unpacking the external computers. There is one computer for each bike, each of which are 'housed' in coloured shells to be located between the bike and the wall. Before the external computers are put in place, the back wall casings, and one of the side wall casings, are unpacked and attached. Again, the three members work in concert positioning and attaching the casings. The back strut and the top part of the remaining casing are put in place – the lower part of the side casing slots into place allowing easy access to the 'workings' inside the wall at anytime - and the third member of the team starts taping up the casing joints and corners.

#8. The other two members start connecting the bike up to 'run'. They put one of the external computers in position and connect the polyhemus, headset, and audio mixer on the bike at the front of the display. They 'power up' the computer – all lights are on although nothing is 'configured' yet. One of the two puts the headset on to see if it's powered up. It looks 'OK'. The back cover is placed on the external computer shell, then the second bike is connected up in the same way. The third member of the team is now painting the taped joints white to blend with the wall.

#9. Having installed the computers, the external monitors are then unpacked by one of the two members dealing with technical assemblies. The two then configure the external computers – the audio mixer is set to zero, they check that the headset is powered up and that cable is the right length (the cable is extended). The headset on the front bike hasn't 'booted'.

One of the two gets the keyboard inside the wall and ‘reboots’ it – ‘sometimes you have to boot it twice’ he explains. This time it boots – the other member checks that the map ‘pulls up’ and that the pedals work. The front cover is then placed on the computer shell.

#10. At this point there is a phone call on the third member’s mobile – it’s the team’s ‘boss’. The team member explains the contingencies encountered and the layout of the installation – its OK, you can see the green bike and when you walk round, you can see the red. They talk about the size of the space and the positioning of posters.

#11. The other two members carry on configuring the bikes – each assumes position at a bike and puts a headset on. They are talking into the microphone on the headsets. The sound is not working. They don’t know where the problem is and are going to ‘shut down’ the audio mixers on the external computers and configure the sound manually. One of the two starts working on the computer inside the wall and then starts running diagnostic ‘checks’ on the audio controller. The other has a headset on – ‘no .. no .. no .. no’. The diagnosis is not going well – ‘I don’t think it’s the electronics because it worked yesterday; I think it’s a plug or cable’ explains the member running the checks. The same member a few moments later: ‘Oh f\*\*k! There are two parallel ports. I think I’ve plugged it into the wrong one!’ The other member changes the connections round and both put headsets back on. Both start talking through the mics. They take the headsets off – the sound is working now.

#12. Everything is working now: the headsets are working, the audio is working, the bikes are working. Now the rest of the installation can be assembled. The ‘frames’ that hold the external monitors are put in place; strut ends are taped up and painted, posters are unpacked, external monitors are installed in their mounts, connected and powered up, on-screen functions are checked, bike functions are checked – everything is up and running. The external monitors are then shut down, everything is okay technically but the installation is not finished yet. Posters, like the wall casings, are put up in concert: one member positions the posters, the other checks positioning and instructs on repositioning, the third attaches the posters to the wall. Attention to detail runs to picking the ‘right’ screws for hanging the posters – brass ones rather than chrome, of a certain size, shape and length. The bikes are secured to their stands (wooden blocks are screwed to the stands to stop the bikes moving around). ‘That’s it’, the last screw is in; all that remains is to tidy up.

#13. Having tidied up, one of the technicians gets on a bike and tries it out while the other watches on. There’s a problem. The ‘birds’ aren’t working properly, one of them is out of position. The other technician checks the other bike out – there’s ‘a polygon mistake’ too (an aesthetic blip for want of a better description). The side wall cover is removed and the keyboard retrieved. There is a ‘known bug’. It was fixed but some of the line code was left in. This code is assumed to be causing the bird problem. The member now acting as ‘programmer’ explains that the code was deleted from the other bike but not this one. He now deletes the code and the bike is rebooted. The rider tests it again and the programmer goes to check the other bike.

#14. As he is about to mount the other bike, the other team member passes him the mobile phone on which he has been talking for the last couple of minutes. Again, it is the ‘boss’. The programmer appraises him of the problems encountered. Meanwhile, the other member starts checking the bike. The two riders check the bikes together. Everything is OK now (which is relayed directly to the boss), except for known problems: the map only shows one arrow (indicating only the rider’s position) and it is not coloured according to the bikes placement on the installation (red or green); and there is the polygon mistake (all details which are relayed to the boss). Following the phone call, the programmer tells the others that the boss wants the team to sort out the map problem (the polygon mistake can’t be fixed now). This version of the map was only installed five days before – the weekend, packing and transport

mean that time has not lent itself to resolving the problem. The team feel that it is risky to start making changes now. The installation is up and running – it may well not be so if they undertake changes. Although they have a *CD-ROM* with another version of the map from an earlier incarnation of the Legible City to-hand, they decide to leave the installation as it is: making changes is too much potential trouble. They might do it tomorrow night – right now they have a running installation and they would like to keep it that way given that ‘showtime’ is but a few hours away. The seat heights on the bikes are set, floors cleaned, cables placed in their proper positions, tools placed in their boxes, boxes carried out in concert and placed on a pallet. Coats are gathered, bags are packed. The installation is ‘set up’ and, some five and a half hours after arriving, the job is done.

#15. The following morning: the programmer assesses the possibility of sorting out the map problem. He has discovered that he can’t change the code and (thus) can’t run the other version of the map. The code is not his (but Manchester’s) and incompatible with the old map code. The current set up stays for the exhibition (see Appendix for details of the use).

### Background expectancies in setting up the city

Observing how the installation was ‘set up’ serves, on the one hand, to sensitise developers to some generic socially organised features of public space, and on the other, to identify some generic technical issues involved in making electronic spaces available to public use.

In previous Deliverables we have discussed some of the generic features of the social organisation of public places. In simple terms, the social organisation of public spaces is about the management of access and territoriality within a populated environment. In the case of an exhibition while there is typically some central direction the organisation of the space, it is rarely the case that this works ‘first time round’ for all the parties who have to use the space for the duration of the event. For example, on arriving at the venue, the installation team finds that changes need to be made to the display space. They cannot just do this themselves, but must obtain permission. Obtaining permission requires some ‘negotiation’ with the relevant authority (the chief organiser in this case). Authorisation to change the space involves further collaboration on the part of the relevant authority with parties who are to make the changes. Changes are instructable changes, ‘pointed out’ by production cohorts in specific detail within a context of situational potentials and constraints. In the first instance, then, the social organisation of space consists in a taken for granted orientation to public space by members, and number of pervasive common sense procedures for producing and managing alterations in the fabric of this type of public space. More formally:

- Members orient to public spaces as places subject to access and control – members cannot do, and do not expect to do, just what they want to the organisational fabric of public spaces *ad libitum*.
- A category of activities that might be described as ‘ordinary exceptions’ (such as alterations to the fabric of space) within public spaces require

warrants for their passing – members expect, as a matter of course, to have to obtain permission to alter the organisational fabric of public spaces.

- Members wishing to make alterations to the organisational fabric of public spaces expect that warrants for ordinary exceptions will have to be ‘negotiated’ with parties controlling any particular space for their unhindered passing.<sup>1</sup>
- Negotiations are to be conducted with persons with the capacity to authorise ordinary exceptions.<sup>2</sup>
- The passing of ordinary exceptions – the actual instantiation of changes - requires collaboration with parties responsible for the ‘ground level’ management of the space.
- Collaborations with ‘ground level’ staff consist of the formulation of instructed actions to be taken in altering the space.

In the second instance, whether alterations in the fabric of public space are to occur or not, members doing displays of a public character show an abiding concern with organisational aspects of ‘their’ space. That is, with the part of space within which they are physically and interactionally situated. Of paramount importance is the ‘layout’ of the physical and interactional space. Insofar as planned arrangements are everywhere subject to situational contingencies (Suchman, 1987), then they are subject to a finite number of physical realisations of just what they will ‘look like’ and the affordances those ‘looks’ provide for.<sup>3</sup> Members must ‘work out’ which on-location ‘looks’ best to satisfy required affordances. Thus, the organisation of particular ‘pieces’ of public display spaces consists of the positioning *and* repositioning of display features to achieve a concrete sense of just what the display space will look like really, and just what looks best satisfy required affordances.

Decisions as to the layout of the display space are the concerted achievement of parties to the setting’s organising work. Decision-making consists of such interwoven things as cooperating in placing and re-placing display features; in assessing different physical viewpoints; in appraising placements; in formulating concerns of ‘affordance’ in arriving at situationally reasoned judgements of ‘what will do’. Cooperation between members continues in the assembly of display features and consists in the coordination of discrete tasks; of putting particular features in place; of putting together the parts of particular assemblages; of checking the working order of particular assemblages; of diagnosing faults in particular working assemblages; of correcting faults in particular working

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<sup>1</sup> This is not to say that warranted ordinary exceptions will pass without trouble. But rather, that their passing is a sanctioned passing, with the circumstantial features warranting the sanction providing grounds for appeal in cases of trouble. Parties may object to the change (as in #3. above) but the ‘reasonable grounds’ warranting the change go towards (but with no guarantee of success) countering the objection and upholding the change.

<sup>2</sup> Which assumes that means to find them are available. In the exhibition hall at Essen, a booth signed as ‘Exhibition Organisers’ was clearly visible.

<sup>3</sup> A concern with affordances consist of a concern with such things as aesthetic presentation, viewing potential, access, flow of persons, safety, compliance with other regulations, and the rest.

assemblages; of addressing aesthetic details; of preparing the space for public viewing.

## Making electronic spaces available to public use

One of the main design lessons to be taken from the study of the setting up of the legible city is the amount of work and design needed to allow this to take place. Often this is considered "invisible" work and is seldom seen as a key aspect of the design and development of software systems. However, it appears to be crucial in determining how this public set up work and is central to setting the character of the electronic environment and the way in which it is used by the general public. This raises a number of key questions in terms of the currently accepted boundaries of the development of virtual environments.

1. Where does the design of public virtual environment stop? In current considerations of the development of virtual environments and electronic landscapes this has tended to be a highly insular process with little concern to the world outside the virtual environment. However, the studies of the ZKM and the setting up within the Legible city highlight the amount of work involved in building the physical aspects of these settings.
2. When does the design of public virtual environments stop? A traditional view of software applications is that they are designed, developed and then delivered and subsequently maintained. This view has already been challenged by a number of considerations in CSCW and interactive systems that suggest an on-going process of customisation is critical. In the case of these public virtual environments we see a process of continual modification and a merging between design and maintenance as existing environments are made to fit the demands of the expected public users.
3. How do we support the process of putting public spaces in place? What is clear from the study is the highly contextualised and situated nature of the placement of public interactive devices and public electronic spaces. This suggests a need for us to consider how we provide support for the process of putting electronic landscapes in public spaces and the need to consider the development of guidelines and approaches to the placement of citizen based public access devices in public spaces.

These issues cannot be divorced from the social organisational issues with which they are interwoven. They cannot be divorced in that they are themselves social through and through and intimately tied to the social organisation of public space, specifically in terms of affordances. When assembling particular spaces, members have a concern with the aesthetic organisation of technical features: such things as lights, computers, posters, and other physical artefacts are arranged so as to add and / or blend in with the 'overall' organisation of the

space.<sup>1</sup> The ordering of technical things must not prevent the satisfaction of affordances.

The reverse also, and at the same time, holds however, affordances must provide for the ordering of technical things. The ordering of the space must provide for access not just to the space but to the technology of the space. Of particular concern here is the ability to configure the technology, to run checks, diagnostics, and repairs. All activities which require collaboration between parties for their accomplishment and which tend to be considered as development issues with little support provided for everyday users.

## Making sense of 'space' in action

Background expectancies are not limited to the organisation of spatial arrangements in the real-world and we here consider one omni-prevalent social organisational feature of physical space integral to interaction 'within' the Legible City. That is, integral to interaction 'within' virtual environments drawing on real-world arrangements of space such as 'cityscape' or urban arrangements.

The Legible City, although consisting of urban arrangements of space represented in a textual form which may be cycled through, was nevertheless oriented to by persons in the course of use as real-world urban arrangements of space are naturally oriented to. That the Legible City consisted of buildings represented by textual forms that could be traversed in novel ways was of no relevance to persons undertaking action 'within' the virtual space. Instead, users acted as they would in real-time by cycling 'down' the Legible City's 'streets' and 'around' its 'buildings' regardless of the fact that the space was constituted by textual representations rather than facsimiles of real-world structures. This mode of conduct displays a natural attitude towards engagement with particular spaces. As such, the Legible City's textual forms were treated as if they were solid structures, and the spaces between them as highways and by-ways. Users cycled down and around the city streets, trying to avoid colliding with, what for them were ostensibly, text-form *buildings*. It was in the course of trying to avoid collisions (not always a straightforward matter due to the turning parameters of the exercise bikes) that users found out that the text-forms were not solid structures. This made little difference to their course of action however (beyond causing some surprise and even confusion) and users, more often than not (though not without the occasional exception) sought to resume a natural, real-world mode of navigating and traversing a cityscape.

Users embodied orientation to the Legible City makes it apparent that when undertaking inter-action 'within' electronic environments resembling real-world spaces, they employ a natural sense of the ordering of the virtual space they are engaging with. It is on the basis of an ordinary, everyday sensibility of particular

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<sup>1</sup> Although it should be noted that 'overall' space is elaborated by nothing more than the arrangement of its constituent parts.



spaces and their physical arrangements that persons undertake inter-action 'within' virtual spaces of facsimile character. The point is a subtle one of immense complexity and (potential) import to the design physical e-scapes. It draws attention not only to gross observables (such as an orientation to streets and buildings when encountering cityscapes) but to much finer features such as the use of signs and signals, not to mention the internal arrangements of different kinds of building. By 'different kinds of building' we are drawing attention to the fact that buildings 'house' different activities. Hospitals, offices, libraries, schools, shops, and factories, to name but a few all 'house' different activities – activities which cannot be divorced from the particular spaces and spatial arrangements they might be said to be embedded 'within'. Just as the activities that occur in these, and all other, categorically distinct buildings are unique, then so too are the spatial arrangements at work. And, as noted above, just as spatial arrangements cannot be divorced from the activities that take place 'within' museums and exhibition halls, spatial arrangements at work in hospitals, offices, libraries, schools, shops, and factories, etc., cannot be divorced from the unique activities occurring 'within' them. Particular spaces, activities and spatial arrangements are tied together in and through particular practices and it is persons common-sense understandings of such matters that constitutes the background expectancies against which they make sense of activities and order their spatially situated affairs in conduct. As noted, this is a particularly complex issue and one to which we shall return in the following chapter.

## Conclusions

In this chapter we have reviewed some of the studies of the art works undertaken during this year of the eSCAPE project. The review of these studies has considered the more generic lessons of the use of radical forms of interaction and the exposure of electronic environments to the general public. We have considered a number of distinct art pieces

The Blob: an interactive virtual object that allows users to manipulate it by touch causing a range of different reactions within the object.

The Legible City: a virtual cityscape environment that allows a number of users to cycle through it and meet other cyclists accessing the shared virtual environment from different physical locations.

The Web planetarium in EVE: a presentation of the world wide web inside a shared dome that allows a collection of co-located users to simultaneously experience access to a virtual environment made up of on-line web sites.

Nuzzle Afar: an abstract electronic landscape that allows a number of users to meet and record their meeting within a series of shared spaces.

In presenting these studies we highlighted, as a common interactive feature, the means by which users engage with these different environments and the commonality of the engagement process. A common aspect of this engagement

was the way in which scripted descriptions of the nature of these technologies and public demonstrations from guides were used as a set of instructions and familiarisations by use.

We complement our consideration of the use of these environments by the general citizen by considering how these environments were placed in front of these users and the work involved in developing the public settings in which these environments are installed. This configuration and maintenance work appears to be essential to the eventual success of these environments and is an important aspect of design and developing successful environments. In the following chapter we present some broader reflections on the lessons to be gained from these artistic experiences for future developers of virtual environments.