IST BASIC RESEARCH PROJECT
SHARED COST RTD PROJECT
THEME: FET DISAPPEARING COMPUTER
COMMISSION OF THE EUROPEAN COMMUNITIES
DIRECTORATE GENERAL INFSO
PROJECT OFFICER: JAKUB WEJCHERT

Global Smart Spaces

D 5.0 Design Guidelines for Integrated spaces

1 SEPTEMBER 2002

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IST Project Number	IST-2000-26070	**Acronym**	GLOSS
Full title	Global Smart Spaces		
EU Project officer	Jakub Wejchert		

Deliverable	**Number**	D 5	**Name**	Architectural Design guidelines for Integrated Spaces		
Task	**Number**	T	**Name**	(N/A)		
Work Package	**Number**	WP 3	**Name**	Interaction Archetypes		
Date of delivery	**Contractual**		PM 18	**Actual**	1September 2002	
Code name				**Version** 1,0 draft ✍ final ✍		
Nature	Prototype ✍ Report ✍ Specification ✍ Tool ✍ Other:					
Distribution Type	Public ✍ Restricted ✍ to: all partners, reviewers, project officer					
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Abstract (for dissemination)	The document outlines architectural guidelines and tools by which we might study them for the Gloss project. It provides an initial platform for developing design guidelines for integrated spaces for the research in GLOSS. To be able to introduce and to implement ambient technologies and artifacts in the fabric of the urban environment we have been looking for a common language for interdisciplinary teamwork. In GLOSS this has been taken as a special interest since we are using a multidisciplinary approach to our project. In this deliverable we wish to outline a possible basis to non- technical design guidelines for integrated spaces. We have developed an analytic tool in the form of a model. This is a model that will help different disciplines, from soft to harder sciences, to come to a common understanding towards the design of smart spaces and artifacts. The model can be seen as a tool for the support of ad-hoc conversation. The model also works as a tool for understanding the contexts, needs and expectations of the user. To use a model in this process, gives an overview of the challenge and offers the opportunity to see and answer the diversity in the urban landscape. This, hopefully, can be used to create an interesting, useful and subjective information environment at both a microscopic and macroscopic level.						
Keywords	Design guidelines, smart spaces					

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1 PURPOSE OF THIS DOCUMENT

The purpose of this document is to provide a platform for developing Design guidelines for integrated spaces for our research in GLOSS. The establishment of Design guidelines is not to be seen as a goal *per se*, nor as a normative framework for the research and outputs to be developed, setting unchangeable and non-negotiable rules. The Design guidelines has developed during the life of the project. Genesis of the idea is initially from an architecture and design disciplines and not from a technical design perspective. This document should be read both as a tool orienting the research and as a first step towards the development of a language common to different disciplines and work groups who is working with integrated spaces and objects. It is written to state intuitions more clearly and as a first step to turn these into workable terms and concepts.

1.1 ABOUT THIS DOCUMENT

The document is to be seen as a whole where we are explaining the use of non-technical design guidelines for integrated spaces. We start of with some of the inspirational sources we have used to reach the model. Then we go on looking at the Design guidelines. We have come up with some questions that we find are important to the design process and then we follow up with a set of analytical tools we are using to answer these questions. We go on explaining the analytical tools in more detail of how they work together and separately explained through the use of scenarios. In this deliverable we are advancing the concept of Interaction Archetypes and the TRH tools to be a coherent part of the Design guidelines. We have also looked at the delivery of information, as we believe this to be a vital component in smart spaces.

2 INTRODUCTION

This deliverable is a reflection on design methodology for integrated spaces and the context in which it is currently evolving. It is an attempt to discover what it takes to produce a living urban environment for the future. A GLObal Smart Space. This text is organized around a strategic model we have developed. The model is an opening, a tool for different disciplines, technical and non–technical, to come to a common understanding of integrated spaces.

We have not dealt with the design guidelines for each discipline per se, but developed guidelines of how to work with a common analysis tool developed for global smart spaces. We mean that we have built a platform for the design process and the team work, by using a universal model, a tool for asking the “right” questions and to focus in the same direction.

The goal in this text is to produce a methodology for an environment of collaboration between disciplines in the development of integrated spaces, a laboratory environment where a holistic view of the complexity of designing integrated spaces can be pursued. The model itself is applied to the real world where it can be used as a analysis tool to observe emerging phenomena in a visible manner. The model also works as a tool to understand the contexts, needs and expectations of the user. There will be an opportunity to design and plan the process accordingly to the pattern of interaction or to implement change. The model can be in constant flux. This allows for a flexible infrastructure to be built around the project.

The model is an analysis tool for multidisciplinary collaborations for interpreting the world and the urban landscape as it is, in constant change.

3 GLOSS RESEARCH INITIATIVE

The objective in the research is not only to develop smart spaces, but culture. The world is an information center and it's inhabitants already have a lot to deal with. If we are going to be successful in our suggestions of a smart global environment and not only add to the information noise in the city we need to have a good idea of a humans behavior in space and time.

Part of our research is to develop an instrument that can orchestrate a complex environment to cope with the behavior of the user. In the development of the infrastructure of the project, humans will interact with their own logical presence, informing it (explicitly or through user modeling) of certain key information. This information will allow the system to predict, in a highly controlled manner, what interactions may be expected with other individual, organizations and physical context, based upon the physical location of all relevant entities.

We attempt to look beyond the age of the ubiquitous computer to the age of a global computational and information network. We address a scenario where global connectivity and computation are available within a seamless network. In the context of the disappearing computer initiative we specifically address the issue of consistency of experience over time and location. [1]

4 COMPLEXITY OF INTEGRATED SPACE

Interactions in normal space are understood to be complex in nature. The complexity of a system can be defined in relation to it's tractability – the number of operations required to solve a problem. Therefore, we conclude that the understanding of integrated space and it's associated interactions will only extend the tractability, i.e. greater complexity. Initially we stress the term complexity intuitively but we have reason to believe that the project and our proposed model has a much deeper connection to this terminology. Looking closer at the urban landscape it is evident that the

complexity in the city arises from an array of factors, we have concentrated on humans interaction in space and time: "complexity is the study of the behavior of macroscopic collections of such units that are endowed with the potential to evolve over time" [2]

> **" Man as a behaving system is quite simple.**
> **The apparent complexity of his behaviour over time**
> **is largely a reflection of the complexity of**
> **the environment in which he finds himself."**
>
> Herbert Simon, Sciences of the Artificial, 1981

We see an immediate match with the central biological complex cell organism – the user. There are clearly stated cases for complexity arising from these already. One of the questions we have been working with is: can/should we build evolution process into the elements of a seamlessly connected system? The answer appears obvious to us; if one wishes to build complexity into the system then it is essential that the elements and layers must have the ability to evolve/change. If we do so we can predict that the foundation of a complex system has been built and therefore, complexity will arise.

Further to the previous statements, we are also aware, that, for complexity to emerge, there are two elements which are necessary. An irreversible medium in which things can happen: time. Second, an essential characteristic: non-linearity. Nonlinear systems do not obey the simple rules of addition. They cause small changes at one level of organization to produce large effects at the same or different levels. In general, non-linearity produces complex and frequently unexpected results. But matter has an innate tendency to self-organize and generate complexity. We can see this within a rich environment, when the development of life adapts or optimizes it's ability to survive. Therefore, we can project that the users and the system through their interaction will learn to adapt and optimize.[1]

The implication of understanding complexity inside a system is immense. It allows the system to anticipate the arrival of previously unseen future events. The implication of this understanding is that the system becomes aware and can deliver contextual information accordingly to the event.

We have looked to the area of complexity for inspiration in the development of our methodology to attempt to build a sustainable model that can be used for large challenges. Conventional scientific approaches to problems have been traditionally reductionist in nature. Nobel laureate Murray Gell-Mann [3] argues for the movement against the idea that serious work is restricted to "beating to death a well-defined problem in a narrow discipline, while broadly integrative thinking is relegated to

[1] We can see this from technologies such as the mobile phone, computer and e-mails. People have needed time to get used to them and to learn how to use these artefacts, seamlessly and as effective as possible in the daily life. The interactions have been optimised over time.

cocktail parties. In academic life, in bureaucracies, and else where, we find the lack of respect for the task of integration"

In this deliverable, we put forward the idea of integration and the whole as a complex system instead of only small separate entities. This is what we try to demonstrate with the use of the contextual analysis model.

5 DESIGN GUIDELINES

In this section we are looking at the design guidelines we have suggested. We start by looking at the notion of local vs. global since this is a central part to the Gloss project. Then we go on to some questions which we found to be important for the design of smart spaces. After that we go on looking at the analytic tools we have suggested to answer the questions, where we explain how these tools work together and separately.

The Gloss project is primarily interested in the global level of seamless interactions within and between integrated space and users at various local levels. The concept of local, is relative to the current positioning of a cell within a hierarchical global scale. This global scale has been defined, as the following:

1. country
2. region
3. city
4. district
5. street
6. building
7. room
8. element

Through the use of the above list we can see that clusters of interacting cells will occur under each layer. For example, Malmo Library can been defined at a macroscopic level as a level 6 entity, which can be shown through level 7 to be a multi-celled organism consisting of rooms A,B,C,D…….

When we apply the concepts of the tools we have developed initially for GLOSS (TRAILS, HEARSAY and RADAR alias CONTINUITY, COMMUNICATION and CONNECTIVITY) between the various cells and layers, we have a very interesting challenge, which can be described as the complexity of integrated space.

When developing the design guidelines[2] we are suggesting a flexible landscape of questions that connect to each other to optimize the intention of the space. We give a free hand on how to use it, but provide pointers of why these questions are relevant to the design of global smart spaces. Concerning the technology, we suggest an evolutionary system that may learn, self-replicate and support emerging technology. From this we build our definition of a Smart Space: **A Smart Space can influence the paradigms of, identity of place, form of space, activity, value, information and Interaction Archetype through the use of technology.**

To give an overview of the creation of global smart spaces we propose the following questions to consider:

- ?? Who is going to use the space?
- ?? What expectations does the user have on the activity, identity of place, values, information and form of space and how does these elements effect each other?
- ?? What is the task, to discover or create information?
- ?? How will the information be delivered?
- ?? What type of message is being delivered?
- ?? What type of media in the availability of proximity fits the message type being delivered?

We work with these questions in a non linear fashion, where all information is linked in a dynamic structure. The questions are to be revisited continuously during the process. It is a liquid process that stays flexible all the way. A smart space will always keep on learning and changing to fit the profiles of the different users and their interactions.

We use two analysis tools to answer the questions above; these can be used separately and together, but as we mentioned above they all link together in a non-linear fashion, where they are all being used to support the user. The following part of the

[2] *We have been searching around for other proposals of design guidelines for integrated spaces. We found much, but most guidelines we found where of local nature. We have found guidelines developed by governmental institutes (4) about how to design ergonomically to local graphic design (5) teams proposing design guidelines for the web. The web might seem global but how much can you really interact with a web site that is in North Korean if you are not from North Korea, or possibly Asian. Some of the guidelines we have seen are more rules of how the maintain a design from logos to landscaping. We are trying to develop guidelines from a global perspective which can allow interaction from North Korea to take effect in Los Angeles in the U.S. if this is the intention.*

deliverable will explain the analysis tools first separately and then working together, the tools are:

?? Contextual analysis model – Interaction Archetype, State, Values, Information, Identity of place and Form of space

?? Concept management tools – Trails (continuity), Hearsay (communication) and Radar (connectivity)

5.1 CONTEXTUAL ANALYSIS MODEL

The contextual analysis model we suggest as a large part of the design guidelines is a model which can be described mathematically, but we will leave this for further investigation. The model's central core is from the users perspective with relation to the environment around us and other users (models). We use it in an analytical manner to come to questions and conclusions. It is a tool to shine clarification on the complex system of an urban landscape. Bill Hillier describes this process as - "Analytic knowledge, or scientific knowledge is knowledge where we learn the abstract principles through which spatio-temporal phenomena are related – we might say the 'configurationality' – consciously. We are aware of the principles both when we acquire and when we use the knowledge. As a result, through the intermediary of the abstract, we grasp the concrete." This describes an " idea-to-think-with", [6]

The model is part of the whole process of developing smart spaces. The contextual analysis model is a guideline to answer about what expectations the Interaction Archetype have on the state, identity of place, values, information and form of space and how do these elements effect each other? The model becomes an actor in the interactive process as its begins to evoke new, more specific meanings at, for instance structural and spatial levels. The structure of the model and its paradigms is developed to support the mobile, often immaterial, shaping forces of the contemporary city. This involves an assumption that the classical models of pure, static, essentialised, timeless form and structure are no longer adequate to describe the contemporary city and the activities its supports. We believe that a contextual analysis model that supports the dealing with changing information gives us a new medium in which we can reconceptualise old problems in new ways.

We illustrate how the Contextual Analysis model and how the different paradigms work together in the following diagram (1.1).

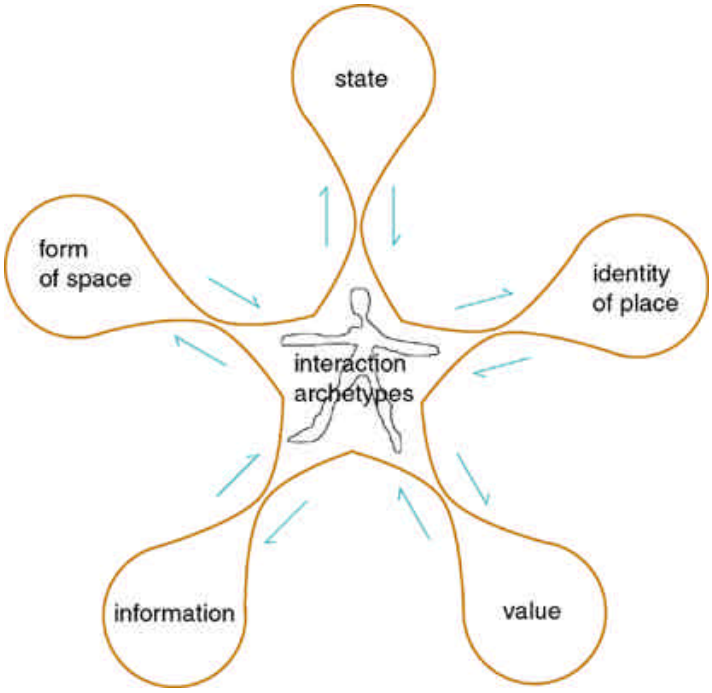

Diagram 1:1 Contextual Analysis model

The core question that drives our guideliens is why would/does the system change? Environmental issues aside, in the case of the city and other public and global spaces, we look to the dynamic relationship between context-tool and archetype (and delivery of information). We conjecture that the system may change due to one or more of six paradigms coming into a state of imbalance – this leads to constant development of intention to keep the balance between the elements.

We believe that the paradigms of Form of Space, Identity of Place, Information, Values, State, and Interaction Archetype, are the strategic building blocks of such a model and we define these terms as follows:

?? **Interaction Archetypes:**

Mode (educational, shopping, social, work, etc)
Time (night time , day time, lunch, weekend, etc)
User
Expectation
Design , Anthropology

?? **Form of Space** –

Shape (configuration of surfaces and edges)
Size(length width and depth dimensions)
Texture (characteristic of surface effecting light-reflecting and tactile qualities)
Position (relative to environment or visual field)
Orientation (relative to ground plane, compass points, and individuals position)
Visual Inertia (degree of concentration and stability dependant on the geometry, orientation relative to ground plane and line of sight)
Other users (Our spatial relation and density of other users)
Architecture and Design

?? **Identity of Place** –

Meta (metropolis, city, town, village, building)
Macro (factory, theatre, library, house and elements of infrastructure)
Micro (town square, street, restaurant, table, toilet etc)
Architecture, Anthropology

?? **Information–**

Audible (oral, instrumental)Visual (one, two, three, four-dimensional)
Smell(Olfactory)
Taste (sweet, bitter, sour and salty)
Touch (pain, thermal detection, texture)
Design, HCI, Anthropology.

?? **Values –**

Social (family, friends, community, species etc)
Culture
Spatial
Design ,Anthropology

?? **State –**

Mental (sensory perception, Mental imagery, Inner speech, Conceptual thought) Remembering,
Emotional Feeling, Volition, Self-awareness, Dreaming, Lucid Dreaming)
Physical (Playing, Creating, Sex, Sleeping, Walking, etc.)
HCI, Anthropology

5.2 THE PARADIGMS AND USE OF MODEL

The diagram depicts how tensile forces converge upon the individual and challenge their expectations. As we make changes to one of the elements we exert forces upon the others. To make a change upon an Interaction Archetype's expectation we can make use of information which will change the expectations of the individual and apply a force to the Identity of Place. The system represents a competitive dynamic, which is constantly trying to be in balance. If the system is not in balance and cannot be supported by a change in the elements then this will be supplemented through the expenditure of

mental and physical well being. The goal is to reach a point of balance between the individual's expectations and the delivery of information.

The model's purpose is to change or reinforce the paradigms of the system. You start by defining one of the paradigms that you wish to change or reinforce and you try to optimize the chosen by exploring the forces of the other elements. You have a choice to make the optimization brittle or flexible depending on what you are looking for. Brittle can be good if you are looking for total control, flexible optimization is what we have been exploring in this deliverable.

5.2.1 INTERACTION ARCHETYPE

In deliverable 4, [7] Interaction Archetype, we developed a concept for clustering user's state. Clustered into archetypes of behavior in the context of architecture, other people and social context. For example, dweller, tourist or commuter. We suggested a methodology for defining what interactions are desirable between individual, activity, space and time. In terms of technology, the interaction archetypes are a way of setting down and reflecting upon our assumptions about different elements of system and interaction.

As the interaction archetypes has already proven themselves useful in discussion and work in the consortium, we project the model in this deliverable to be another tool for collaboration.

In the Interaction Archetype analysis we work with four groups of variables; user, time, expectation and mode. In the Contextual analysis model we are working with six; activity, identity of place, values, information, form of space and Interaction Archetypes. Where Interaction Archetype has a given role as the user. Depending on what archetype one defines, it will have different expectations on the information and environment. Close studies of people's behavior patterns (D6) will also help build the structure of the information infrastructure and the physical place or object in which it might be embedded. Subsequently, we will use the model as a lens to look at the observational data.

5.2.2 FORM OF SPACE

Form of space is the physical elements of the city or buildings like, street, square and stairs, hall, rooms, people and objects. Also the geographical location has to be taken in as an element, east, west, hilly, flat, etc. As described in Space Form Analysis 2.4 in D4 Interaction Archetype: The basic elements of architectural elements can be divided between form and space. The building blocks of three dimensional form can defined as point, line, plane and volume whilst spaces and places as suggested of Lynch [8] are put together with nodes, paths, edges, district and landmarks.

To change form is usually the least economic way to change a space. Building new structures is expensive . But there is less energy demanding ways to change the form. One example is changing a space with sliding walls and doors, mobile units that are context aware. For example, if there is a crowd building up in an enclosed area. They have all come to watch a play. The space is filling up and the boundaries around the stage changes the space into a performing place, a theatre. When the play is over and the crowd is leaving several more gates has opened to the enclosed area and the crowd can go out in different directions, large queues are avoided. This is something that is done already but with a context aware system it happens automatically depending on

context: density, archetype of people, weather, time of day etc. Closing and opening of streets to divert the traffic is another example. Form of space is essential to smart spaces, since the forms are the building blocks for the technology and the interactions of the user.

5.2.3 IDENTITY OF PLACE

'Liminal spaces': they are border crossings, places where the different worlds of the inhabitants of the urban field touch each other [9]. If you add embedded technology into these liminal spaces you will have the attributes of a smart space. Inhabitants share the same place but might use it differently. Example is a park where kids are playing games, families are having picnics, people work and study and others are on a date. The different activities will give different identities to the space, play ground, workspace etc

Wherever you go you see the imprint of the local culture and identity. You see it in the way people dress, what language they are speaking and their social behavior. This is not necessarily connected to a geographical location.[3]

An example of future scenario would be that people can participate in a demonstration on the other side of the geographical world and by their participation the can influence the form or identity of place. If it was a small town square that the demonstration was held in the information that there was millions of people participating would change the identity of a small square into a global arena. This might in its turn change the governmental value system in the country the demonstration is being held.

In *Social Logic of Space* [10], the writers suggest two concepts, *description and synchrony*, to describe the problem of finding a way to say how two identical spaces with different named functions might be formally different from each other. The answer proposed was that the spaces have identical synchrony - they have the same shape- but different descriptions – that is, the identical spaces are embedded in quite different syntactic context. This leads to the different uses of the space , one being a military parade ground and the other being a marketplace. Form decides type, Identity decide name for differentiation in single type.

5.2.4 INFORMATION

Information is the most flexible system we are working with to design smart spaces. Information is basically everything we experience around us and come in all the forms that our body has senses to cope with. We believe strongly that information can be used as an architectural building block. In O-design [11], a book about designers in the Oresund region we, explain how immaterial architecture can change a community hall in Copenhagen into a concert hall. How the space regulates itself to the density of people and the music. The building blocks we, as Lava design studio, used were the information sources light and visuals. By applying light relative to the density of people

[3] *You find for example China town and Little Italy in several bigger cities. You have big integrated areas in all cities with people from all over the world. It is interesting that most countries has people, some countries a lot, living in other countries that the one they where born. That in it self is global space.*

and activity we slowly made the hall bigger to fit more and more people. The perception was that the hall was growing, changing form of space. By applying the visuals and the sound we changed the community hall into being a concert hall, change of identity of place.

Text is one of the more common perceptions of information and its applied all around us. Users expect text to be part of the urban landscape. Pictures, moving images and films are information and used effectively visualization can provide insight and allow valuable data to be collected and used for quick decision making. Our goal is spaces that support the information the user needs at the time, whether it's a public or a private message to avoid information overload. That is why it is important to have the paradigm of Information in our model.

5.2.5 VALUE

When exploring values we quickly realize it's importance. The value system can be a range of limits which delineate the acceptable behavior for the other components of the model. The users value system changes constantly, in flux. Moving in and out of different roles/interaction archetypes, the worker, the mum, the dad, the son, the lover , the tourist etc., our envelope of values is contextually altered, too. From an architectural perspective, the built environment can attempt to embody and support these value systems. Scale of elements would be one such example. The Palais d'Justis in Brussels, Belgium is an excellent example. The enormous scale of the front portal and external staircase have been used to reinforce the idea of state versus the individual. The accused is under no mistake of the hierarchical imbalance which is in play, even before entering the building. The state and its legal system comes first here. The size threatens to compete even with the existential spiritual scale of the local cathedrals. Value helps us select from a larger set of "forms", different social, cultural and spatial forms. The list of social, cultural and spatial values needs to be explored further, and we accept our limits in this area.

5.2.6 STATE

At first, the activity is a seemingly simple area. The physical aspect of activity is, after all readily observable. The physical is supportable through ergonomic means. But, we have not stopped at the physical, as we have divided this section into both physical and mental. It is the inclusion of mental activity which adds the complexity to the equation. The user may be performing a physical task but the internalized mental activity, which occurs in parallel to this, may alter the definition drastically. The area of the cognitive is still relatively unexplored even by those who's area of expertise lie in this domain. The cognitive remains relatively unobservable, yet it's existence cannot be ignored as it has large implications in the system.

5.2.7 SCENARIO

To explain further the use of the model we have tied the different paradigms to the Café Scenario that is part of the GLOSS scenarios:

The café scenario was developed earlier in the process of this project in an annex to D4. Within this scenario, Bob, whilst visiting Paris, received a hearsay message from a Danish friend. The message recommends that he should visit this particular café. Upon

doing so, Bob decides to send a digital postcard, to this friend, from one of the interactive table surfaces.

UJF have developed a tool to support this scenario. The original scenario has been expanded to include a public wall (displaying a selection of postcards) and a laser pointer (for selection purposes). The overall concept was received well by the group, with particular interest being shown towards the inclusion of the laser pointer interaction with the public wall. The inclusion of the public wall, though popular, brought around an interesting question of optimization from a technological stance– was the wall necessary, as this information could be displayed on the semi-public table surfaces? For the answer we can look toward the model. Firstly, we look towards the contextual model of a café from an architectural perspective:

?? Identity of place – a café

?? Form of space – a container with vertical and horizontal components, which affords good visual connections internally and to the external world, i.e. large windows.

?? Values – Acceptable range of limits, i.e. high level of visibility, low level of drunkenness.

?? Activities – observing, displaying, sitting, eating, drinking, reading, writing, flirting.

?? Information – menus, magazines, postcards.

As can be seen the system is generative. The openness of the container is supportive to the activities of observing and displaying etc.. Conversely, it can also be seen to be restrictive in it's openness, and high levels of public visibility, which is not conducive to higher levels of drunkenness. Taking these into consideration, we now require to look at the environmental requirements of the system from a technological perspective:

?? Identity of place – not applicable

?? Form of space – requires good visual connections internally, a vertical surface for projection

?? Values – stable mid-range of lighting level, high level of dexterity for controlling the pointer interaction.

?? Activities – not applicable

?? Information - postcards, pointer marks and table numbers.

Although only two perspectives are consider here for illustration, we can see that there is a high degree of correlation between the two analytical listings. The addition of the public wall and the pointer system can be considered as conducive, if not enhancing, to the café environment. The publicly visible interaction of the user with the system

would be beneficial. The limited effect of alcohol on the users also conserved their dexterity skills. The paradigms which where not applicable in this scenario might very well be applicable in another. It could be projected that this system would not be so appropriate for a bar environment, where a whole different matrix is under operation.

5.3 DISCOVER AND CREATE INFORMATION - TRH

Trails, Hearsay and Radar are the initial core concepts for the creation and operation of integrated spaces. To create and operate integrated spaces we have suggested the central core concepts of CONTINUITY, CONNECTIVITY and COMMUNICATION, represented as TRAILS, RADAR, and HEARSAY. These concepts are used to bind together the various cells/layers/users to support interaction in integrated spaces. The combination gives us a system that allows the user and system to record, observe and build feedback into integrated spaces at both global and local levels.

They are all tool concepts that either discover or create information. They work together, separately, or in a matrix. Trails are histories and stand for continuity. Trail is divided into three segments, **Observational, Intentional and Archetypal**. An observational trail creates paths, capturing individual or group movements through space. From Observational trails, Intentional and Archetypal trails are derived. Intentional trails are discovering trails that following a specific order. For example, when you go to Paris you want to look at the architecture in an historical order – you there follow this **intentional** trail. Archetypal trails are discovery trails that are more open than Intentional trails but still follow a specific archetypal subject or nodes of interest. For example, art, shopping, tourist attractions, café's etc. Depending on which archetypal group you belong to, which ties back to the Contextual model - dweller, tourist or commuter, and your individual profile the system tailors a Trail that answers to your needs and wishes.

Hearsay works as a feedback loop and stands for communication. Hearsay is to create or to discover a message of some type, text, sound, visual in the environment. The hearsay has to match the profile and context of the receiver with the profile and context of the created hearsay to be delivered. Hearsay is linked geographical to a specific location which means that if you never discover the location you miss out on your message. Hearsay as a conceptual tool is meant to be qualitative, not quantitative.

Radar is a direct observational tool and stands for connectivity. It is a discovery tool that can pick out fields of activity or service. For example, densities of people, groups of friends, noises, empty spaces around in the urban field. This gives an overview of the activity in the city further than your direct location. More broadly it extends the sensorial range of the user beyond the immediate horizon.

The idea is that it is possible to flip in and out of the different tools. Let's say you are walking on a trail and you find hearsay that takes you off the original trail and on to something you find is more interesting. Or, perhaps, you get tired of the trail and you radar for some peace and quite. The point is to discover and to filter out the information from the information noise that fits your profile. To create friction (used positively) and interest in the place and people you meet. [4]

[4] To make the concepts user friendly we have used the common business model of new technology and old behaviour, or old technology and new behaviour (new technology

5.4 TOOLS WORKING TOGETHER

As mentioned above two analysis tools influence each other. In the Contextual model we are working with six paradigms; activity, identity of place, values, information, form of space and Interaction Archetype. THR is translated to Continuity, Communication and Connectivity and are linked with the Contextual model implicitly. The Contextual model is a slice of the narrative structure that the trails provide. Hearsay can be used to change the direction of the trail or the activity one is doing, being directly linked to the Information paradigm. Radar is linked to the model as a tool for discovery of other people's "models" in the physical landscape.

The analysis tools are also closely connected to the contextual delivery of information in the following section. Depending on the Interaction Archetype's intention for discovering or creating information, they will select an appropriate tool (Trails, Radar or Hearsay). The selected tool feeds the profile remotely into the smart embedded system to enable the retrieval of a result. The requested information from the system will be answered from the paradigms of the model with the archetype of the user as a central hub supported by the chosen TRH parameters.

6 DELIVERY OF INFORMATION

In our approach to smart spaces as hybrid information landscapes it is as vital to consider how information is being delivered as it is to consider what type of information and what type of media is used to deliver the information. We must consider the spectrum from communal static grand scale screen delivery to personal mobile mini screen delivery. We must also consider the types of messages, whether they are public or private, global or local etc. The media type, can then be considered to reflect the aspects of context and messaged type.

As we mentioned the overall structure of relationships ties together in a linked model and cannot be dealt with linearly. The system is built to influence other parts of the contextual system. For example, consider the first two questions, How and What type of information? We can phrase and analyse these questions through the contextual model.

How to deliver information? If we look at some of the paradigms of the model starting with Form of space we instantly look at the space we are working with and have to consider how and if the architecture supports large scale or small scale delivery, on what surface is this feasible (a table or a wall), and other such relevant physical characteristics of the space.

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and new behaviour is more difficult to be successful). Because this project is mostly about new technologies we have been concentrating on the formula new technology and old behaviour. Trails being an ancient way of travelling and to orally tell people where to go. Hearsay being messages left in the physical environment such as in the old days gypsies leaving marks for other gypsies and the tags used in graffiti today. Radar used in navigation of ships and aeroplanes to see obstacles further than its immediate geographical location.

Identity of place? Is the space a public space like a library or a personnel space such as a house? Which Interaction Archetype is the user at that time and what is his or hers interaction with the space (sitting, standing, walking or driving)? Moreover, how does the state of the user effect the position of display?

Type of message gives us another set of questions although interconnected with the Archetype, contextual model and the *how* of information delivery. Is it a private or a public message, implicit or explicit, organized or unorganized? How does the form of space, identity of place, state and value support a message, is there a lot of people or is the user alone? Is it necessary that the message gets delivered at that time in that particular space?

The two questions above give direction to the third question; What media type is best to use for this message in this context to fulfill the purpose of the information? Of course that depends on how the message is delivered and what type of message is. The context of the environment is once more extremely important, if it is a loud environment text might be better than sound, and vice versa. Choosing the type of media also has to do with what types of media are available in proximity to the user. The questions and the answers throughout the analysis from the contextual model and the management tools implicitly or explicitly connect, overlap and influence each other to support the notion of right information at the right time and for the right user and consequently continuity of interaction of time and location.

7 CONCLUSION

In this deliverable we have identified the physical environment as a complex problem. This observation has given us the opportunity to look at the physical environment as whole and not exclusively as smaller individual entities. On these grounds we have developed a contextual analysis model as part of our Design Guidelines for integrated spaces. One of the major differences between designing a "non-smart" space and a smart space is that it requires expertise and input from a large number of disciplines, from harder to softer sciences. This has given us direction for the use and creation of the model. We have outlined a possible basis for non-technical design guidelines for integrated spaces as a model to support ad-hoc conversation in multi-disciplinary teams, such as the GLOSS consortium and a contextual analysis model for understanding the contexts, needs and expectations of the user.

Along with the Contextual Analysis model we have merged the Concept Management tools TRH, (that are the initial conceptual tools in Gloss),to be a coherent part of the design guidelines. Together the tools define the use of environment and information from the users perspective, which we argue is the driving force in developing new technology. The two tools must be understood together and orchestrated as a whole in order to achieve effective results, such as the right information at the right time and place.

There are areas in this deliverable, which we would like to be more defined. For instance, the importance of values and the process of the use. At this point we need more practical input although, so far, using the model as a common platform has been giving positive results. These are points which will be followed up and evaluated in the coming period of research and will be revisited in the making of the final scenarios deliverable (D9). We also see a natural user study of this design process being part of

the living document (D23). Moreover, we need to tightly integrate the ontology aspects (D7) in to the design parlance. The technology aspects of proximity groups, coordination, contextors model, network model, programming language and context extraction are all informed by this model. These core technical developments will be brought together with the design guidelines in the design and construction of the second smart space (D11).

What we have achieved in this deliverable is a model that gives an overview of the challenge of designing smart spaces and offers the opportunity to see and answer the diversity in the physical landscape. This, hopefully, can be used to create an interesting, useful and subjective information environment at both a microscopic and macroscopic level.

7.1 ACKNOWLEDGEMENTS

Initial motivations for this document came out of conversations with W. Van de Velda early in the project. Alan Munro commented on early versions of the report. The ideas benefited greatly from the detailed discussion in Grenoble with James Crowley, Nick Bradley, Graham Kirby, Siobhan Clarke and other members of the GLOSS consortium.

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