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Phillips, Mike

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Investigating the artistic potential of the fulldome as a creative medium: the case of the E/M/D/L project

Katerina Kontini¹, Iouliani Theona², Dimitris Charitos¹, Mike Phillips³

1 – Faculty of Communication and Media Studies, University of Athens, Greece

2 – School of Architecture, National Technical University of Athens, Greece

3 – School of Art and Media, Plymouth University, UK

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Introduction

The term “fulldome” refers to a hemispherical immersive environment, which incorporates 360° video projections, surround-sound and affords user interaction with the audiovisual representation projected on its surface. The fulldome has been in the spotlight of scientific research for some years now. Fulldomes have mostly been used for creating simulations for planetariums and cultural heritage applications as well as large scale projections of cinematic content, mostly viewed by audience in a passive mode.

In recent years the artistic community has started to realise the immense potential of the fulldome as a creative medium. However, still only a small percentage of the total production of new media artworks utilize such systems, and there is scarce research on the nature of the fulldome as a creative and communicative medium. The E/M/D/L project responds to this need exactly.

European Mobile Dome Lab for Artistic Research

The European Mobile Dome Lab for Artistic Research (E/M/D/L)¹ is a project dedicated to exploring the potential of the fulldome environment as a medium for innovative artistic experimentation. To this end, the E/M/D/L project’s primary objective is to initiate an international network of artists and researchers and foster collaboration, sharing of experience and exchange of skills, in order to promote knowledge production and capacity building. Ultimate goal of this effort is to articulate a novel framework and to propose an artistic language and syntax, pertinent to the fulldome, as a foundation to support unique and origi-

nal artistic expression, in accordance with the medium’s intrinsic potential.

Overview of the Project

The E/M/D/L project is a joint endeavour of four European, along with two Canadian institutions and cultural partners. The project is coordinated by the Digital Art Department of the University of Applied Arts, Vienna and partners include i-DAT (Institute of Digital Art and Technology) Plymouth University, Trans-Media_Akademie Hellerau, CYNETART Festival, Dresden, Society for Arts and Technology (SAT), Montreal, *kondition pluriel*, Montreal, LANTISS, University of Laval, Quebec City and the Laboratory of New Technologies in Communication, Education and the Mass Media of the Faculty of Communication and Media Studies of the National and Kapodistrian University of Athens (UoA NTLab).

Artistic experimentation and research during the project is structured to take place through seven residencies and public presentations in five countries, which lasted from February 2014 till May 2015 and which are concluded with a series of presentations and shows at the Satosphere, in Montreal, Canada. For this purpose, more than twenty artists, scientists and experts in the field from Europe and Canada, are brought together to collaborate as a step towards investigating the fulldome as a medium for artistic expression..

This paper aims to present the work in progress of the E/M/D/L project and in particular, the research conducted, during the second residency, held in Athens.

The E/M/D/L Athens Residency

The second residency of the project took place in Athens, in April 2014 and was organised by UoA NTLab in cooperation with the University Research Institute of Applied Communication (URIAC) and the support of the National Museum of Contemporary Art (EMST) of Athens. Since the workshop took place at the beginning of the project, the research conducted was more exploratory in nature and comprised of 5 days of brainstorming sessions. Additional-

¹ More information regarding the E/M/D/L project is available on the website: <http://www.emdl.eu/>

ly, an inflatable, mobile dome was also available for the real-time testing of creative ideas².

For the needs of this workshop, a group of twenty-one participants with diverse backgrounds, worked together: Carla Chan Ho-Choi, Assist.Prof. Dimitris Charitos, Dimitris Delinikolas, Matthias Härtig, Katerina Kontini, Martin Kusch, Philip Mayer, Armando Menicacci, Prof. Mike Phillips, Marie-Claude Poulin, Antonis Psaltis, Jean Ranger, Olivier Rhéaume, Marko Ritter, Charalampos Rizopoulos, Conrad Schneider, Prof. Ruth Schnell, Dominic St-Amant, Louis-Philippe St-Arnault, Ben Stern and Iouliani Theona³.

The process of collaboration alternated between fast brainstorming sessions within the whole group and more focused and in depth working sessions, within smaller teams. In particular, at the beginning, all the participants involved were prompted to contribute to a preliminary analysis of the communicative impact of the fulldome and the experimental application of this new technological apparatus in the context of digital, media and performing arts. The concepts that emerged, traced the possibility of taking advantage of the audiovisual content, the development of representational action and interaction with the user in the dome environment and outlined directions in need of further investigation via artistic experimentation.

These initial, crude ideas resonated each participant's specific expertise and interests, as well as their aspirations for creative work in this project. Nevertheless, the process continued with forming seven teams and allocating the themes to be discussed, deliberately in a random manner. Every team was responsible for presenting a more comprehensible theoretical assessment of their assignments, as well as suggesting more concrete experiments to be put to test. The rest of the paper is dedicated to documenting in detail and analysing the content that was produced during the Athens residency.

Research methodology

For the needs of this paper, the aforementioned endeavour assumed by the seven teams of artists and researchers during the Athens residency, was further examined by using a qualitative method of content analysis, called thematic analysis. As described by Braun & Clarke this inquiry is "*a method for identifying, analysing and reporting patterns (themes) within data*" [1]. Each theme represents an important aspect of the data in relation to the research questions, which, in this case, correlate with the various approaches as outlined by the teams.

Thematic analysis can be either inductive or deductive. This research employs the inductive approach, which

² The inflatable dome was transported courtesy of the University of Plymouth and was installed in the Project Room of EMST.

³ All names are listed in alphabetical order.

means that the themes that are observed are strongly linked to the data themselves [2]. The inductive analysis is a coding process that does not attempt to fit the data to an existing coding frame or to the preconceptions of the researcher. "*In this sense, this form of thematic analysis is data-driven.*" [1]

Braun & Clarke suggest that thematic analysis comprises of six phases [1]. Firstly, the researcher needs to familiarise with the data by transcribing them – if necessary, reading them repeatedly and noting the initial concepts and ideas. Secondly, primary codes emerge by addressing interesting features of the data in a systematic fashion and collating accordingly the relevant data to each one of them. Then the researcher seeks to identify prevailing themes through orderly arranging codes and their respective data sets. At the next stage, the themes are reviewed in relation to the coded extracts and then in relation to the entire data available (level 2), and a thematic 'map', or in other words a graphical representation of the analysis is developed. Next, the themes are defined and named, as the analysis continues in order to refine the specifics of each theme, their interrelationships and their structure. Finally, the report of the analysis is produced.

The thematic analysis of the content which was produced by the participants for the final presentation of the E/M/D/L residency in Athens followed all six phases of inquiry, as described above. It should be noted though, that the methodology proposed by Braun & Clarke was treated in a recurring manner and in the process, many of the identified steps were either repeated or combined. For example, new codes emerged while searching for themes, whereas while reviewing the themes some codes and subcodes were revised. In the next section of this paper, a detailed account of the findings of this process will be presented and discussed.

Thematic analysis

Content analysis of the research performed by the seven teams in the Athens residency, resulted in the identification of six main themes, around which all other issues and concepts raised and discussed by workshop participants, regarding the creation of a fulldome artistic experience, can be categorized. These are:

- Navigation and Content Manipulation
- Modes of Interacting and Viewing the Content and the Context in the Fulldome (Physical and Projected Space)
- Embodied Interaction and Performative Mediation of the User Experience (UX)
- Multiplicity of Spatial Representations (Physical and Projected Space)
- Arranging Narratives in the Audiovisual Physical or Represented Environments

- Manipulating the Spatial Experience within the Physical and Represented Space

These themes are depicted in the schematic map of the analysis (figure 1), along with their distinctive features (subthemes). This representation helps improve our understanding of the multiplicity and the structure of the relationships among the various aspects that should be taken into account when creating an artwork for the fulldome. As is also portrayed, the themes are not mutually exclusive, rather they overlap and bear certain strong associations with one another.

However, it is understood that this is merely a systematic analysis of the data produced by a series of brainstorming sessions and therefore should rather be regarded as a work in progress to be further refined, as an initial step towards articulating a language pertinent to this specific medium, as the E/M/D/L project ultimately aims to achieve.

Additionally, it should be noted that this thematic analysis makes use of the specific words and terms coined during the Athens residency, which make sense in the context of the working process but may not all be easy to generalize. Unavoidably, sometimes these words convey initial ideas about specific artworks and as such carry with them contexts and specificities stemming from these particular ideas. This is rather visible in the articulation of the subthemes and at times undermines the effort for a more general conceptualization.

Description of the Themes

The thematic analysis will proceed with a more in depth presentation of the identified themes and subthemes, so as to offer further insights into the manner in which the EMDL workshop participants conceptualized of the process of artistic experimentation, during the Athens residency. The themes will not be addressed in a particular order, as there is not a specific, established hierarchy, but in a manner that enables the display of their interrelations.

Navigation and Content Manipulation

The first theme refers to the different possibilities of navigation within the fulldome and the subsequent manipulation of the projected content. There are three major trends defined:

- a single user leads the navigation, influencing to a degree the content projection on the dome surface -i.e. its position, its perspective or the pace of the narrative- determining thus the experience afforded to the rest of the audience,
- multi-user navigation is afforded, as more than one members of the audience interact simultaneously with a different aspect of the representation
- in the case of an interactive performance, the performers may be in charge of the navigation, guid-

ing the audience through the most desirable/ suitable pathway of experiencing the artwork, reserving thus for the spectators a more passive role in exploration

The theme of navigation is closely linked both to the “modes of interacting and viewing the content in the full-dome”, as well as to the “embodied interaction and performative mediation of the UX”.

Modes of Interacting and Viewing the Content and the Context in the Fulldome (Physical and Projected Space)

This theme explores the unique qualities of the fulldome and the potential of taking into account both the physical setting and the projected spatial representation, within the dome, in order to create novel artistic experiences. It regards this medium as a radically different interface whose shape affords arranging multiple frames of content on various areas of the dome’s surface, that can present multiple perspectives simultaneously, thus undermining the represented Cartesian space and furthermore challenging traditional forms of spectatorship.

Other subthemes that emerged focused on elaborating further on the technological aspects that would support this prospect. Tracking the movement of users and/or performers in order to activate multiple projections, or employing gestures to control the representation –i.e. number of different frames within the dome, their positions etc,- and interacting with the projected space, sought to exploit the entire circumference of the dome.

A final line of inquiry within this theme’s context, investigated various set ups of the fulldome’s physical space. Proposals varied from attempts to destabilise the internal structure of the dome by introducing inclined planes, to placing objects as obstacles or constructions like risers, to enable users to climb on them and explore the area.

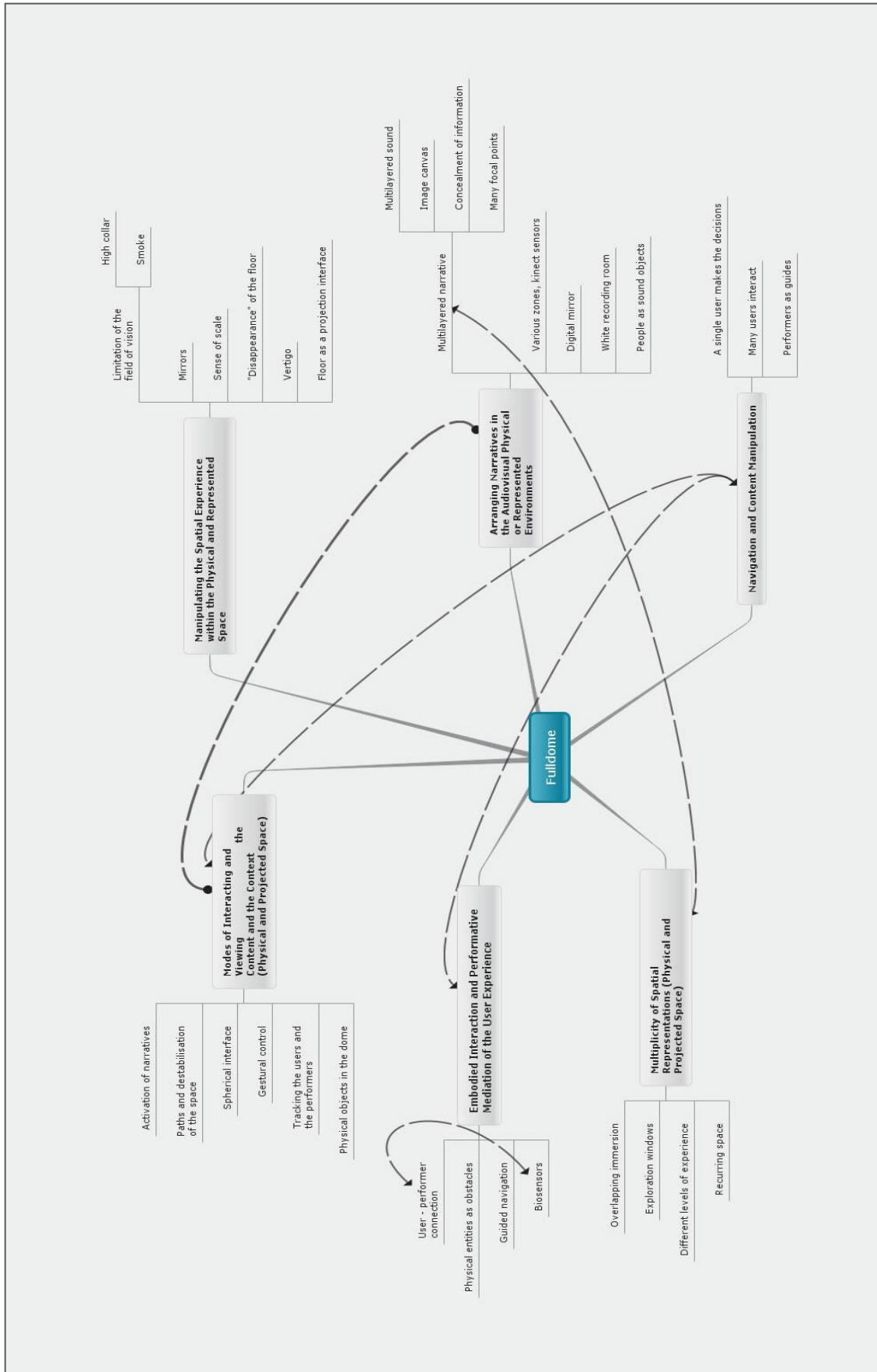
Embodied Interaction and Performative Mediation of the user experience (UX)

The third theme refers to physical interaction. In artworks that include performer participation, it is possible to create a connection between the performers and the users. For example, a “stress station”, which is equipped with biosensors and kinect sensors, can be placed inside the dome. In this case, skin conductance is seen as an additional parameter that determines how interaction may occur between the users, the performers and the fulldome. The “stress station” is visualised and displayed on the surface of the dome. Biosensors could also be used independently as means of navigation –the sensor readings could direct the navigation of the user. Moreover, the performers may act as “alive mobile objects”, constituting a set of objects which partly determine the user navigation. While on the contrary, they could also assume the role of the guide, actively leading the users to specific parts of the dome space.

Multiplicity of Spatial Representations (Physical and Projected Space)

The fourth theme examines the possibility of introducing the use of complementary media inside the fulldome as a means of creating overlapping immersions that afford a

multilayered experience of the artwork to the user.



For example, a user can wear a head mounted display (HDM), such as the Oculus Rift through which she navigates an environment potentially different from the one projected on the surface of the dome. Her moves and her choices within the virtual world visible to her, bear an effect upon the projection on the fulldome, determining thus the audience's experience of the artwork.

Another experimentation towards the theme's general direction was addressed as the "exploration window". This essentially refers to introducing mobile devices as instruments to reveal hidden elements of the artwork. Pointing a tablet towards the dome can unveil content relevant to the projection but visible only at the screen of the mobile medium. Portable devices can also double as controllers. Swivelling a smartphone in space, or sliding one's fingers on a touchscreen may dynamically influence the audiovisual environment in the dome.

Eventually, a thread in this section focused solely on projected environments and explored notions such as recurring space, or suggested the simultaneous display of spaces with varying qualities and characteristics, in search of the experiential impact afforded to the audience.

Arranging Narratives in the Audiovisual Physical or Represented Environments

Multilayer experience (fourth theme) is also associated with a subtheme of the narrative (the fifth theme), the multilayered narrative. This subtheme refers to the use of sounds and images on many levels. Different sounds can be triggered in specific parts of the dome and transmitted either through headphones or directional speakers, while the speakers can be embedded into objects placed in the space. The sounds may be associated with a specific type of image, or with certain colors.

Furthermore, the action in an artwork can appear in various parts of the surface of the dome, creating in this way many focal points. These images of action could also form a canvas, consisting for example of film excerpts that show people talking. The images of these people can be projected on the dome, but the sound mix that is being heard is determined by the participant, thus supporting a form of navigation through the content. But apart from the simultaneous presentation of multiple layers of information, an aspect of the multilayered narrative is associated with the concealment of certain information. For example, the user may hear the voices of two people involved in a three-person conversation, and the hidden information could be only revealed to a certain place in the dome.

Another aspect of the narrative theme is the combination of the performance in the dome with the creation of different zones. For example, there could be three zones inside the dome and a kinect sensor is placed in each one of them in a different angle. So, each sensor records different parts of the performers' bodies as they move in each area. This

video material is displayed on the dome and the movement of the performer alters the projection surface. A similar setting can be used in creating a digital mirror. The dome is again divided into zones and the kinect sensors are used in order to record the users movements when they enter in each space. The recorded material is either displayed in real time on the surface of the dome or it is played back, while the images could overlay or get altered.

The fourth subtheme of the narrative refers to a white recording room inside the dome. Tape mapping is combined with artistic performance in a white room, filled with ropes, lines of black tape on the walls, cameras and microphones. Whatever happens in this room is an extension of the projection on the surface of the dome, or it is connected in some other way with that projection. The fifth subtheme explores the use of people as sound objects. The spatial sound is used for narrative purposes. Specifically, each individual user or group of users is associated with a specific sound and his/their movements are being tracked and they affect the space surrounding him/them.

Manipulating the Spatial Experience within the Physical and Represented Space

The last theme seeks to identify potential techniques as tools to affect the perception of space and accordingly, the spatial experience within the fulldome. Limiting the spectators' field or depth of vision is one of them, either for instance through the use of smoke inside the dome, or by employing wearable props such as high collars that restrict the view along particular directions.

A second set of suggestions outline an opposite approach and attempt to expand projected and perceived space. This can be achieved in various ways. The floor inside the dome can be used as a projection surface, it can disappear, covered in dry ice, or in mirrors that additionally double the dome's volume to that of a sphere.

The transformation of the spatial perception can also be achieved through experiments associated with the sense of scale. Creating interactive 3D graphical objects and spaces helps in this direction, as there are no points of reference regarding scale. In realistic worlds it is interesting to examine the different ways of presenting the human scale, challenging the user's limits. In some cases, causing dizziness and vertigo may be an end in itself.

Conclusions

The above analysis and the themes that emerged describe in a certain extent the way artists approach the fulldome environment, and also highlight the potential of this medium, for creating immersive audiovisual experiences. The fulldome can be a platform for creative innovation. They describe the different kinds of relationships that a user can develop -under the guidance of the artist- with the environment of the dome, the artwork, the performers and the other users. They also redefine the relationship between the

user and the fulldome, as they reveal new ways of interaction. However, the analysis presented in this paper is only a first step towards the identification of the basic aspects of artistic approach of the fulldome and more research in this direction is necessary, in order to discover new practices and to recognise the role of this new medium in the digital arts.

Acknowledgements

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