

# EMDL European Mobile Dome Lab for Artistic Research.

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## Abstract

This paper comprises the E/M/D/L [European Mobile Dome Lab] panel presentations which the activities and outcomes of the artistic research carried out during the international collaboration funded by the European Culture Programme (Strand 1.3.5). E/M/D/L built an international network for the exchange of artistic and technological expertise, with the goal of researching and documenting a language and grammar unique to the fulldome medium. Bringing together four European and three Canadian institutions and cultural partners, all leaders in the fulldome field, the project aimed to share and expand skills, methodologies, strategies and content under this creative and highly productive umbrella. Between February 2014 and September 2015, the participants took part in eight residencies and public presentations offered in five countries, clustered around domed architectural structures equipped with cutting-edge technologies. This culminated a series of works presented at the world's most sophisticated virtual theatre, the *Satosphere* in Montreal, Canada.

## Keywords

Fulldome, media art, artistic research, cultural exchange, immersive, interactive, transdisciplinary, performance, mobile labs.

## Introduction

E/M/D/L was coordinated by and under the project Direction of Martin Kusch and Ruth Schnell of the Digital Art Department, University of Applied Arts Vienna [Austria] the international network of partners and collaborators included i-DAT, Plymouth University [England], TransMedia-Akademie Hellerau, CYNERTART festival, Dresden [Germany], Laboratory of New Technologies in Communication, Education and the Mass Media (UoA NTLab), National and Kapodistrian University of Athens [Greece], Society for Arts and Technology [SAT] Montréal [Canada], *kondition pluriel* Montréal [Canada] and LANTISS University of Laval, Quebec City [Canada]. This partnership brought together, through a series of commissions, an international transdisciplinary group of artists to develop an international network for exchange of artistic and technological competencies, with the goal of developing and documenting new artistic languages and grammars and to explore modes of expression for the fulldome medium.

The European Mobile Dome Lab supported an interdisciplinary collaborative process, which foregrounds embodied immersive experiences. The project lies within the research and development area of new digital applications for 360° dome shaped projections and aims to generate a

diversity of artistic dramaturgies for this media. E/M/D/L was tailored around the process of collaboratively creating immersive artworks and experiences for a dome environment. These immersive mediated environments involved real-time visualization (and sonification) software, ubiquitous computing, sensor networks, tracking technologies, pre-rendered material, mobile or locative technologies.

The community itself drew on practices from artists, scientists and theoreticians from Canada and EU who are active in creating media art or pursuing innovative interdisciplinary research and wish to collaborate in order to create (interactive) fulldome media artworks. This included members of the performance, software art, VJ, installation, video, audio and computing communities.



Figure 1. EMDL, *Liminal Spaces* at *Satosphere* © Sebastien Roy.

## On Fulldomes

The word “fulldome” refers to immersive dome-based projection environments. The dome, horizontal or tilted, is filled with real-time (interactive) or pre-rendered (linear) computer animation, live captured images, or composited environments. Although the current technology emerged in the early-to-mid 1990s, fulldome environments have evolved from numerous influences, including immersive art and storytelling, with technological roots in domed architecture, planetariums, multi-projector film environments, flight simulation, and virtual reality.

The fulldome experience is one of the most immersive and engaging ways of supporting the interactive (or passive) synchronous presentation of 3D graphical environmental representations to relatively large groups of people, with a limitless scope of applications, including education, arts, games and wellness.

E/M/D/L took as a premise that in the context of an immersive dome environment, the impact of immersion can be described as a physical, sensorial and emotional experience, through which the participants experience the very vivid illusion of playing an integral part in the image. The project researched the phenomenon of perception in an immersive 360° environment, exploring vision without being objected to one singular focal point of view, directed in generating multi-sensory and kinaesthetic feedback for the spectators. One of the specificities of this medium is to offer an environment in which the spectator's senses are engaged in manifold ways.

From this perspective, E/M/D/L built on the exploration of the narrative and dramaturgical possibilities and the aesthetic potential, to attempt to define certain rules and guidelines for creating such an audio-visual and multi-sensory full-dome artistic experience.



Figure 2. EMDL, Liminal Spaces at Satosphere © Jean Ranger.

### Liberating the Full-dome

The power of the full-dome environment has been successfully exploited by the scientific community for decades, however, digital projection technologies are liberating immersive full-dome experiences from cosmological visualization and enabling the evolution of a broad range of disciplinary content to be presented in the context of this medium. Transdisciplinary collaborations between media artists and scientific disciplines have produced rich immersive media content to support the public understanding of science and can be seen as influencing huge audiences around the globe through the rapid expansion of science centres equipped with 'planetariums'.

However, the rapid evolution of the full-dome as a 'form' of artistic expression has been contained by the formalities of these edutainment/infotainment models and the 'planetarium' style shows. Equally the evolution of the digital technologies underpinning the full-dome platform have been contained by the scale and repeatability required for the 'planetarium' format. Technological platforms emerging through parallel creative media communities, such as VJ and projection mapping practitioners, offer greater flexibility, accessibility and economical routes to production.

E/M/D/L explored the protocols and artistic potential offered by an immersive situation, a kinaesthetic, poly-sensorial and emotional experience in which the spectators are plunged. For this purpose, E/M/D/L provided a number of selected European and Canadian media artists, coming from different cultural, technical and artistic backgrounds, with the opportunity to collaborate with other European and Canadian artists in order to explore and create immersive projection-based artworks, through a process that allowed for intercultural and interdisciplinary dialogue. The extensive list of collaborators can be found on the [www.emdl.eu](http://www.emdl.eu) website.

The project produced, via the creation of a series of immersive media artworks, new aesthetics and technological paradigms. In particular three highly interactive and experimental productions screened/performed at the Society for Arts and Technology [SAT] in May and June 2015 (<http://sat.qc.ca/fr/emdl>):

Liminal Spaces explored the dome as an intermediary membrane between inside and outside, sheltering human performance, interactivity, image, sound and text layers; Murmuration fostered public interaction with digital particle swarms and real-time manipulation of virtual/physical audio-visual objects; and



Figure 3. EMDL, Murmuration at Satosphere © Sebastien Roy.

Dream Collider highlighted the place of the user as a living actor of a multi-perspective narrative, unfolding between physical and virtual spaces.

### Dome Workshops

The backbone of E/M/D/L project were the series of research and production residencies in each of the partner institutions. These workshops explored technical and aesthetic considerations through a collaborative and highly

participatory creative practical process. At each of the workshops, members of the E/M/D/L project were joined by local artists, to explore specific aspects of the research process.

#### **Workshop #1: Society for Arts and Technology [SAT] in Montreal, Canada, February 2014**

This first residency at SAT aimed to unify and standardize the initial knowledge, expertise and vocabulary of the full-dome medium. Participants from several different fields of artistic research took part in master classes and workshop sessions that focused on spherical imagery production, real-time generated immersive visual content and 3D spatial sound. The residency further elaborated the global intentions for the project and defined the participants' vision for the collaboration over the following year. This first gathering encouraged the discovery of each other's practice, expertise and interests. The workshop introduced the exemplary work of SAT, providing key insights into its unique fulldome, sound system and game-engine based systems, and provided a catalyst for the subsequent innovations.

#### **Workshop #2: NTLab, Athens, Greece, April 2014.**

The NTLab E/M/D/L workshop provided a platform to exploring the early phases of the research process, being more exploratory in nature and comprised of 5 days of brainstorming and design sessions. The analysis of the research performed in the Athens residency, resulted in the identification of themes which informed subsequent residencies as malleable concepts and points of reference. Many of the ideas manifest in the final productions can be traced back to these early brainstorming processes, whilst others emerged in the gaps between themes.

The workshop also included a public open-studio at the National Museum of Contemporary Art (EMST), consisting of an inflatable mobile fulldome and peripheral technologies, for the real-time testing of creative ideas. In addition a symposium, "Artistic creation in immersive environments, using large-scale display technologies" (April 15, 2014) was held, organized by UoA NTLab and the National Museum of Contemporary Art (EMST) in cooperation with the University Research Institute of Applied Communication.

#### **Workshop #3: i-DAT, Plymouth, UK, July 2014.**

The Plymouth workshop, following on from the design workshops in Athens, was oriented around rapid prototyping processes. The Plymouth workshops took advantage of i-DAT's Digital Studios (including the IBM Smarter Planet Lab). The Immersive Vision Theatre (IVT) was also used for audio production and performances and provided a 'micro-Satosphere' for the presentation of the various media artefacts together.

The E/M/D/L team, working with local artist/researchers, collaborated on the development of a range of technologies to support the fulldome research agenda. These included explorations of: generative audio audio

compositions (incorporating the weird acoustics of the IVT solid plaster 'whispering gallery' dome); dynamic data feeds and navigation techniques for Unity 3D environments, including swarm behaviour, mobile app feeds using smart phone sensors; wearables, iBeacon proximity sensing and camera/kinect tracking; scaling and recursive spatial experiments. The products of these endeavours were demonstrated and critiqued, culminating in a rubric and prototypes which were carried forward to the August Montreal session.

#### **Workshop #4 and #5 : Society for Arts and Technology [SAT], Montreal, Canada, August 2014.**

This fourth residency at SAT was a longer mid-project endeavour, marking the end of the exploration phase and leading to a more elaborate definition of the research/creation project. The workshop was structured to maintain a highly experimental approach through a critical practice and prototyping of concepts. Iterative brainstorming sessions refined and validated the continuity of the creative research process. Combined with specific project developments, the workshop led to workflow pairings and to the identification of integrated solutions. This culminated in the participants defining processes for expanding the medium's language of expression, and identified the need for more structured experiments on perception and for converging the different research interests towards united creation, laying the foundation for the Dresden residency.

#### **Workshop #5: CYNETART festival in the Festspielhaus Hellerau, Dresden, Germany, November 2014.**

An important part of CYNETART festival 2014 was dedicated to the support of the E/M/D/L project. A bespoke fulldome was constructed for the experimental productions and public interactions conceived of in Montreal.



Figure 4. EMDL at CYNETART © David Pinzer.

The goal of the Dresden workshop was to conduct artistic research, exploring interactive parameters with live movement (performer and public) in the fulldome environment. After the preliminary workshops conducting basic interactivity tests, the research explored the impact of live-movement that is mapped in real-time to different interac-

tive media parameters, inside of a circular full-dome reactive media space. The Workshop consisted of day time research and production work generating artistic prototypes that were then played out to groups of the public over four evenings. The experience gained from the public prototyping at the CYNERTART festival, was nurtured by working groups leading up to the Vienna workshop. The mission was to scrutinize the different research strands, refine the existing artistic concepts and to form working production groups that would continue developing issues and concepts as well as practical solutions to the realisation of themes, such as body architecture, multi narration, etc. as part of an artistic syntax for 360 degree environments.

#### **Workshop #6: Digital Art Department, University of Applied Arts, Vienna, Austria February 2015.**

The Vienna workshop also marked the inauguration of the new digital full-dome lab at the Department for Digital Arts. During the Vienna residency the 20 participants were able to conduct specific tests and artistic experiments in the new domed architecture of the Department of Digital Art.



Figure 5. Full-dome-lab at Digital Art Dept. © Mike Phillips.

This immersive projection environment (diameter: 5.75 meters, height 3.70 meters) is equipped with state-of-the-art hardware and software thus offering a wide range of possible applications. The workshop consolidated artistic research undertaken to date. These reflections and the outcome of the practical working sessions led to a more coherent definition of the formats and the dramaturgical mise-en-scène for the final Montreal workshop, a process that was continued until the final showcase. At the end of the residency some of the artistic experiments were shown to invited experts during a presentation.

#### **Workshop #6: Society for Arts and Technology [SAT], Montreal, Canada, May 2015.**

The final workshop consisted of a frenzy of production, bringing a broad range of research experiments into a form that could be shown to a public. The research was articulated through the full-dome environment as an instrument to explore transdisciplinary forms of artistic expression. These experiments oscillate between performance, interactive installation and immersive event. Many research experiments were not included in these productions for practical

reasons and decisions were made to pragmatically address the performative aspects of the final productions.

#### **Public Presentations**

The project culminated with a series of ten evening presentations of three experimental artistic dome-works, showed in the Satosphere Society for Arts and Technology (SAT), in Montreal, Canada: *Liminal Spaces* explored the dome as a intermediary membrane between inside and outside, sheltering human performance, interactivity, image, sound and text layers; *Murmuration* fostered public interaction with digital particle swarms and real-time manipulation of virtual/physical audio-visual objects; and *Dream Collider* highlighted the place of the user as a living actor of a multi-perspective narrative, unfolding between physical and virtual spaces.

#### **Liminal Spaces**

We are made up of layers: the physical ones of skin and tissues, but also the intangible ones of history, tradition, images, and words. In the strata of sensations and accumulations of meanings, what strategies can be used to subjectivate such heterogeneous materials and find coherence among them? Where should borders be porous and where should they be strengthened? How can we let them breathe and allow them to change their contours? How to inhabit the threshold between two states, conditions, or regions – the transitory, the indeterminate?

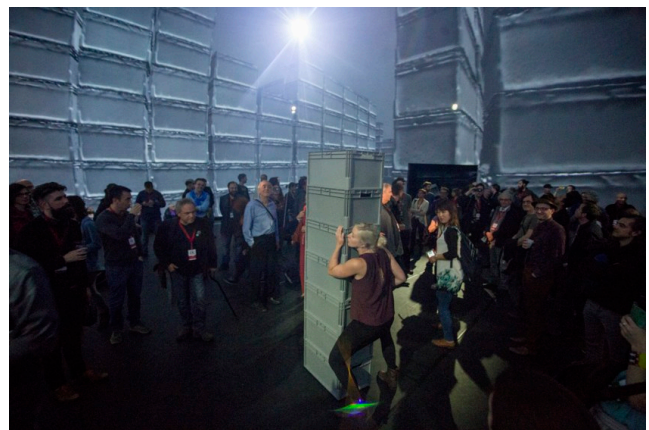


Figure 6. EMDL, *Liminal Spaces* at Satosphere © Sebastien Roy.

Sheltering layers of performance, interactivity and image, sound and text, the dome becomes the intermediary membrane between inside and outside, as it is explored and pierced through at the limit of palpable space.

#### **Dream Collider**

Through an interactive journey in the narrated dreamland of crystallized daily scenes, *Dream Collider* questions the intertwined states of diverging oneiric ideas, the rise and collapse of these subconscious mind constructions, and the iterative processes leading the exploration of self-generated worlds. Initially created with the intent of expressing

grammatical results issued from artistic research in the field of immersion, this dome installation highlights the relation and cohesion of physical and virtual spaces, and the place of the user as a living presence in between the layers of this multi-perspective narrative.



Figure 7. EMDL, Dream Collider at Satosphere © Sebastien Roy.

Abstract collisions, premonitory visions or interneuronal recovery fluctuations; dreams have always been intriguing and are haunting our nights' and days' perceptions.

### Murmuration

Murmuration [muttering of low, indistinct, whispers / abnormal heart sounds / mass cloud like flocking] is a series of trans-scalar and recursive transitions from the imaginary to infinity:  $i\infty$ . Constructed from bio-imaging technologies and modeled fractured architectures, the low-poly-aesthetic of murmuration navigates its audience through playful interaction with particle swarms of digital detritus and real-time manipulation of virtual/physical audio-visual objects and the environmental experiences afforded by their continuously transforming arrangement. Algorithms of repulsion and attraction maintain the cohesion of nano / molecular landscapes harvested by atomic force. Bio-forms, like artificial organs, and boney architectures, temporarily seem

to come to life, create cavities and cavernous voids, conjuring uncanny atmospheres of elation, intrigue and awe.



Figure 8. EMDL, Murmuration at Satosphere © Sebastien Roy

### Dome-Technic

The overall E/M/D/L fulldome research benefitted from the sharing and development of the latest tools for capturing, synthesizing, and re-visioning the world by the imaging and sonification methods of sampling, IR analysis, MRI, Atomic Force Microscopy, 3-D scanning, photogrammetry and point cloud visualization. These works capture the multiple, heterogeneous forms of presences generated by a digital culture but also critique the intrinsic homogeneity that emerge through processes of surveillance and control. This transdisciplinary research interrogates the language of the new creative environment of the fulldome, creating the possibility of a rich experience of audience participation: a world of multi-user interactions, navigating through trans-scalar, recursive imaginary territories, harnessing both physical and synthetic worlds.

### European Mobile Dome Lab for Artistic Research

E/M/D/L filled the empty infinite space of the fulldome with a creative nucleosynthesis - the closest we came to talking about astronomy was the reflection on the artistic nuclear fusion that drove the collaboration. The highly transdisciplinary approach, productions, technical innovations and artistic research methodologies will be articulated in a forthcoming publication.

On reflection, one way of defining artistic research would be to regard it as being composed of highly specific and singular projects that require multiple competencies and within which different individual investigations might combine for shorter or longer periods of time. The nature of such prospect is that the form of presentation, just like the research methodology, must be invented. The rules of such activity always come afterwards, they do not precede practice, and they cannot be formulated as a system or a "methodology" (and in this particular feature, Jean Francois Lyotard, among others, has seen an essential similarity between artistic and philosophical activity, which he posits

as the opposite of “normal scientific” practice, whose rules of validity and forms are regarded as self-evident). Artistic research as a “disruption” to scientific research. The methodology of artistic research has to be continually invented, something dynamic and unfixable. The rules of such activity always come afterwards, they do not precede practice!



Figure 9. EMDL, Liminal Spaces at Satosphere © Sebastien Roy

## Notes:

**Liminal Spaces:** Organizations: Digital Art Department, Vienna, Austria / kondition pluriel, Montreal, Canada / Trans-Media Akademie, Dresden, Germany  
Participants/Collaborators: David Campbell, Carla Chan, Matthias Härtig, Johannes Hucek, Martin Kusch, Marilou Lépine, Armando Menicacci, Marie-Claude Poulin, Audrey Rochette, Ruth Schnell, Alexandre St-Onge, Nikola Tasic

**Dream Collider:** Organizations: Society for Arts and Technology [SAT], Montreal, Canada.  
Participants/Collaborators: Derek deBlois, Bruno Colpron, Sébastien Gravel, Jean Ranger, Olivier Rhéaume, Dominic St-Amant, Louis-Philippe St-Arnault

**Murmuration:** Organizations: Laboratory of New Technologies in Communication, Education and the Mass Media (UoA NTLab), Athens, Greece / i-DAT (Institute of Digital Art and Technology), Plymouth, U.K.  
Participants/Collaborators: Dimitris Charitos, Luke Christison, Phil Mayer, Cameron Micallef, Lee Nutbean, Alexandre St-Onge, Mike Phillips, Olivier Rhéaume, Haris Rizopoulos, Ben Stern, Iouliani Theona, Penny Papageorgoulou

## Authors Biographies

Dimitris Charitos is an Associate Professor in the Department of Communication and Media Studies at the National and Kapodistrian University of Athens, where he teaches human-machine communication, interactive design, digital art and visual communication. He studied Architecture at

the National Technical University of Athens, and C.A.A.D. in the Department of Architecture, University of Strathclyde (Glasgow). He holds a PhD in interactive and virtual environments design. His artistic practice includes electronic music, audiovisual and interactive installations and virtual environments. He has participated in exhibitions in Greece, the UK and Cyprus. As a researcher or coordinator, he has participated in research projects (funded by Greek and European programs) on the subjects of virtual reality, locative media, digital art and multimedia.  
<http://www.media.uoa.gr/~charitos>

Martin Kusch studied art history, philosophy and painting in Berlin, and media arts with Peter Weibel at the University of Applied Arts in Vienna, where he has also been teaching since 1997. Founder and artistic co-director of the Media performance group kondition pluriel, he is particularly interested in the transformation processes of the electronic media inside performative contexts, and on how digital technologies influence our perception of the body and space. His works have been presented at numerous festivals and institutions, such as: Ars Electronica (Linz), ISEA, ZKM (Karlsruhe), Transmediale (Berlin), CYNETart (Dresden), EMPAC (Troy), Le Centre des arts d'Enghien les bains (Enghien), the Mois Multi (Quebec City) and the Museumsquartier Wien (Vienna).  
<http://www.konditionpluriel.org/>

Mike Phillips, is Professor of Interdisciplinary Arts at Plymouth University, the Director of Research at i-DAT.org and a Principal Supervisor for the Planetary Collegium. His R&D orbits a portfolio of projects that explore the ubiquity of data ‘harvested’ from an instrumentalised world and its potential as a material for revealing things that lie outside our normal frames of reference - things so far away, so close, so massive, so small and so ad infinitum. He manages the Fulldome Immersive Vision Theatre, a transdisciplinary instrument for manifesting (im)material and imaginary worlds and is co-editor of Ubiquity, The Journal of Pervasive Media.  
<http://i-dat.org/mike-phillips/>

Marie-Claude Poulin is trained in dance and kinanthropology at the Université du Québec à Montréal and holds an MA in Choreography at the Inter-University Center for Dance in Berlin. Between 1985 and 2000, she has taught in the field of somatic education and has worked as a performer, notably with choreographers Benoît Lachambre and Meg Stuart. In 2000, she co-founded the digital performance group kondition pluriel. Her works have been presented at numerous festivals and institutions, such as: ISEA, ZKM (Karlsruhe), Transmediale (Berlin), CYNETart (Dresden), EMPAC (Troy), Le Centre des arts d'Enghien les bains (Enghien), the Mois Multi (Quebec City) and the Museumsquartier Wien (Vienna). Since 2013, she is a lecturer at the University of Applied Arts in Vienna.  
<http://www.konditionpluriel.org/>

Ruth Schnell lives in Vienna. Her corpus of work, which includes video installations, interactive video environments, and light installations, explores the nature of human perception and the relationship between human perception and the human body. Ruth Schnell has been teaching at the University of Applied Arts Vienna since 1987; since 2010 she has been head of Digital Arts Department. Solo and group exhibitions include: Fourth Moscow Biennale of

Contemporary Art (2011), Bienal Internacional de Arte Contemporáneo de Sevilla/Biacs 3 (2009), ZKM/Center for Art and Media Karlsruhe (2010 and 2008), Akademie der Künste Berlin (2004/05), California Science Center, Los Angeles (2004), Kunsthaus Bregenz (2002), mumok – museum moderner kunst stiftung Ludwig wien (2000), 46. Biennale di Venezia / Austrian Pavillon (1995).  
<http://digitalekunst.ac.at>