



## CULTURES OF CHANGE

## SOCIAL ATOMS AND ELECTRONIC LIVES

11<sup>th</sup> December, 2009 – 28<sup>th</sup> February, 2010

### **PRESS FILE**

A Production of

**Arts Santa Mònica**  
**Departament de Cultura i Mitjans de Comunicació**

In Collaboration with

A Topological Approach to Cultural Dynamics (NEST PathFinder dins el VIè programa marc de la Unió Europea), Goldsmiths - University of London, Media Studies - Universiteit van Amsterdam, Universitat de Barcelona, Advanced Hardware Architectures - Universitat Politècnica de Catalunya, Neàpolis, Universitat Oberta de Catalunya, BEEP.

**Arts Santa Mònica 2009**

# CULTURES OF CHANGE

## SOCIAL ATOMS AND ELECTRONIC LIVES

Usman Haque / Bestiario, Santiago Ortiz / Laurent Mignonneau, Christa Sommerer / José Manuel Berenguer / Sony Lab: Luc Steels, Michael Spranger, Martin Loetzsch / Raquel Paricio, Juan Manuel Moreno Aróstegui / Interaction Research Studio-Goldsmiths-University of London / Prospect and Innovation Studio-Goldsmiths-University of London: Mike Waller, Terry Rosenberg, Pete Rogers, Andrew Weatherhead, Duncan Fairfax / Digital Methods Initiative: Richard Rogers, Esther Weltevrede, Erik Borra, Marieke van Dijk / Govcom.org Foundation: Alexander Galloway, Erik Borra, Michael Stevenson, Marieke van Dijk

11<sup>th</sup> December 2009 – 28<sup>th</sup> February 2010

COLLECTIVE EXHIBITION

### **ARTS SANTA MÒNICA: ESPAI LABORATORI (PLANTA 02)**

*Cultures of change. Social Atoms and Electronic Lives* examines the social and cultural dynamics from a highly multidisciplinary perspective, from the hand of the complexity sciences and digital technologies.

The exhibition starts with the celebration of the international conference "Cultures of Change | Changing Cultures in Barcelona, funded by the European Union ([www.atacd.net](http://www.atacd.net)) where sociologists, philosophers, mathematicians, biologists, physicists, technologists and artists contributed their views on cultural dynamics in the contemporary world.

The project comes along with a specialised online database, a book, a series of workshops and a range of activities related to the exhibition.

## CULTURES OF CHANGE

### SOCIAL ATOMS AND ELECTRONIC LIVES

*Cultures of Change* is the first exhibition conceived by the Laboratory at Arts Santa Monica. The exhibition accommodates a number of experimental simulations of a practical, living imaginary in constant mutation. Projects and programs conceived in the Europe of thought and innovation. From our local universities we have included works of art and science and the Internet (UOC), robotics and artificial intelligence (UPC) and physics and scientific communication (UB). Coming from research centers and academia, these works produced jointly and equally by scientists, designers, artists and technologists find here, in the space of arts-science-communication, a crossroads between exercise and aesthetics, experience and enjoyment, anticipation and communication. In this way, in the shift from the industrial society to the society of readily available knowledge and information, the experiment takes on the value of shared collective social experience.

The exhibition has 10 different international projects. Two of them are local (POEtic cubes and Luci), two comes from Goldsmiths-University of London while other two from University of Amsterdam. The exhibition presents the first online project of Arts Santa Mònica designed and conducted by Bestiario. The exhibition project will be inaugurated during the celebration of the International Conference "Cultures of Change | Changing Cultures in Barcelona, inside the NEST PathFinder initiative A Topological Approach to Cultural Dynamics, as part of the European Commission's 6<sup>th</sup> Framework Programme.

*Cultures of change. Social Atoms and Electronic Lives* examines the social and cultural dynamics from a highly multidisciplinary perspective, from the hand of the complexity sciences and digital technologies.

Information and communication technologies have made possible to quantify and monitor, process and display aspects of our society and our culture unthinkable until recently. The so-called complex systems theory seeks to explain this phenomenology based on the hardest sciences through models that assume nonlinear properties, self-organization, emergence, feedback, heterogeneity and uncertainty. These theoretical abstractions contributions describe the social and cultural interactions maintaining the unique and the co-evolution with the environment as an essential element.

Both the whole and the singularities are particularly important, and robotics, artificial intelligence, electronic circuitry and new technological devices are getting closer to our human peculiarities. The exhibition seeks to experience in person all these ideas and artistic practices through experimental projects, and providing access to scholarly information on the subject in a friendly environment.

The exhibition project will be inaugurated during the celebration of the International Conference "Cultures of Change | Changing Cultures in Barcelona, inside the NEST PathFinder initiative A Topological Approach to Cultural Dynamics, as part of the European Commission's 6<sup>th</sup> Framework Programme (<http://www.atacd.net>) where sociologists, philosophers, mathematicians, biologists, physicists, technologists and artists contribute with their views on cultural dynamics in the contemporary world. The project has a series of workshops and a range of activities related to the exhibition.

## **PARTICIPANTS IN THE EXHIBITION:**

1. Usman Haque - Sky Ear & Open Burble
2. Bestiario - Canvi and Temps
3. Laurent Mignonneau & Christa Sommerer - Life Writer
4. Josep Manel Berenguer - Luci
5. Sony Lab: Luc Steels, Michael Spranger & Martin Loetzsch- Embodied Language Games
6. Raquel Paricio & Juan Manuel Moreno Aróstegui- POEtic-Cubes
7. Pi Studio Goldsmiths: Mike Waller, Terry Rosenberg, Pete Rogers, Andrew Weatherhead & Duncan Fairfax- News Telescope
8. Interaction Research Studio- The Drift Table
9. Digital Methods Initiative: Richard Rogers, Esther Weltevrede, Erik Borra & Marieke van Dijk- ppl of Iran #iranelection RT “
10. Govcom.org Foundation: Alexander Galloway, Erik Borra, Michael Stevenson & Marieke van Dijk- The Web starts here- the IP Browser

**International Conference. Changing Cultures: Cultures of Change. 10-12 December 2009.** Facultat de Filosofia, Universitat de Barcelona. Among 160 participants. **Plenary speakers** include: Rosi Braidotti, *University of Utrecht, The Netherlands* / Matthew Fuller, *Goldsmiths, University of London, UK* / Alex Galloway, *New York University, USA* / Penny Harvey, *University of Manchester, UK* / Dirk Helbing, *ETH Zurich, Switzerland* / Scott Lash, *Goldsmiths, University of London, UK* / Richard Rogers, *University of Amsterdam, The Netherlands* / Brian Rotman, *Ohio University* / Luc Steels, *SONY-France, France* / Sergi Valverde, *University Pompeu Fabra, Spain* / Eyal Weizmann, *Goldsmiths, University of London, UK* For more information: <http://www.atacd.net>

### **Related Activities:**

- December 10. Sala d'actes. 19:15h "Can robots create their own language?" Luc Steels SONY Lab Paris, Vrije Universiteit Brussel (AI Lab).
- December 12. Sala d'actes. 17:00h - 20:00h Conference: "Topologia, Innovació i Política Cultural" with the participation of Monika Fleischmann, Ronaldo Lemos, Ramón Sangüesa, José Luís de Vicente, designed and moderated by YProductions, in collaboration with Goldsmiths and Universitat de Barcelona
- December 13. Sala d'actes. 18:00h. "Complejidad/Interacción", Santiago Ortiz (Bestiario) and presenting the online project Canvi i Temps
- January 29 / February 11. Sala d'actes i Espai Laboratori.
- 18:00h Workshop: "Més enllà de la pell: robots sensitius? Experiència sensible i bioinspiració" Raquel Paricio Garcia i J.Manuel Moreno Aróstegui
- February 25. Sala d'actes. 19:00h "Interfacing Reality", Christa Sommerer, Interface Lab, Kunst Universität Linz

**Exhibition Book** Edited and published by ACTAR, 128 pages. Short Texts by the exhibitors and by 20 international experts: Alex Adriaansens, Usman Haque, Sergi Valverde, Santiago Ortiz, Albert Díaz-Guilera and Alex Arenas, Esteban Moro, Fabian Muniesa and Daniel Beunza, Jaume Masoliver, Laurent Mignonneau and Christa Sommerer, Eugene Stanley, José Maria Berenguer, Maxi Sanmiguel, Luc Steels, Michael Spranger and Laurent Mignonneu, Dirk Helbing, Raquel Paricio and Manuel Moreno Aróstegui, Philip Ball, Celia Lury, Pi Studio, Maximilian Schich and Albert-László Barabási, Interaction Research Studio, Mike Michael, Alexander Galloway, Erik Borra, Michael Stevenson, Marieke van Dijk, James Crutchfield, Richard Rogers, Tiziana Terranova, Matthew Fuller.

# Exhibition : Participants

## Usman Haque - Sky Ear & Open Burble

[www.haque.co.uk](http://www.haque.co.uk)

[www.haque.co.uk/skyear.php](http://www.haque.co.uk/skyear.php)



**"Open Burble" (2006 - 2007).** Open Burble was motivated by vary interests: to explore what I call the "granularities of participation." I created the Burble as a modular framework that could be assembled by non-specialist members of the public: the idea was to provide a kit-of-parts that people (who don't normally consider themselves designers) could come together to produce something so large that it could compete visually at an urban scale: even if just for one night, they could contribute to their urban context at the scale of a 15-storey building. The Burble is constructed from a set of 140 modular and configurable carbon-fibre units approx. 2m in diameter. Each unit is supported by 7 extra-large helium balloons (for a total of about 1000 individual pixels) which contain sensors, LEDs and microcontrollers (the same as in Sky Ear), enabling balloons and units to co-ordinate and create patterns of colour that ripple up towards the sky.

**"Sky Ear" (2003 - 2006).** The story of Sky Ear begins in my studio in Japan in 2000. I was wandering around trying to find good reception on my mobile phone. I started to imagine the undulating qualities of an invisible topography that surrounded me: the varying electromagnetic fields (EMF) that are present everywhere and that guided me to certain parts of the room in order to use my phone. With Sky Ear, I wanted to give form to this space, to make visible the invisible. I planned to create a large structure, of about 30m in diameter, that would float up into the sky sampling the electromagnetic environment as it moved, and changing colours as it encountered different qualities of space. I realised that by embedding mobile phones inside the cloud and then calling into them, one could actually change the local EMF to create different patterns of response.

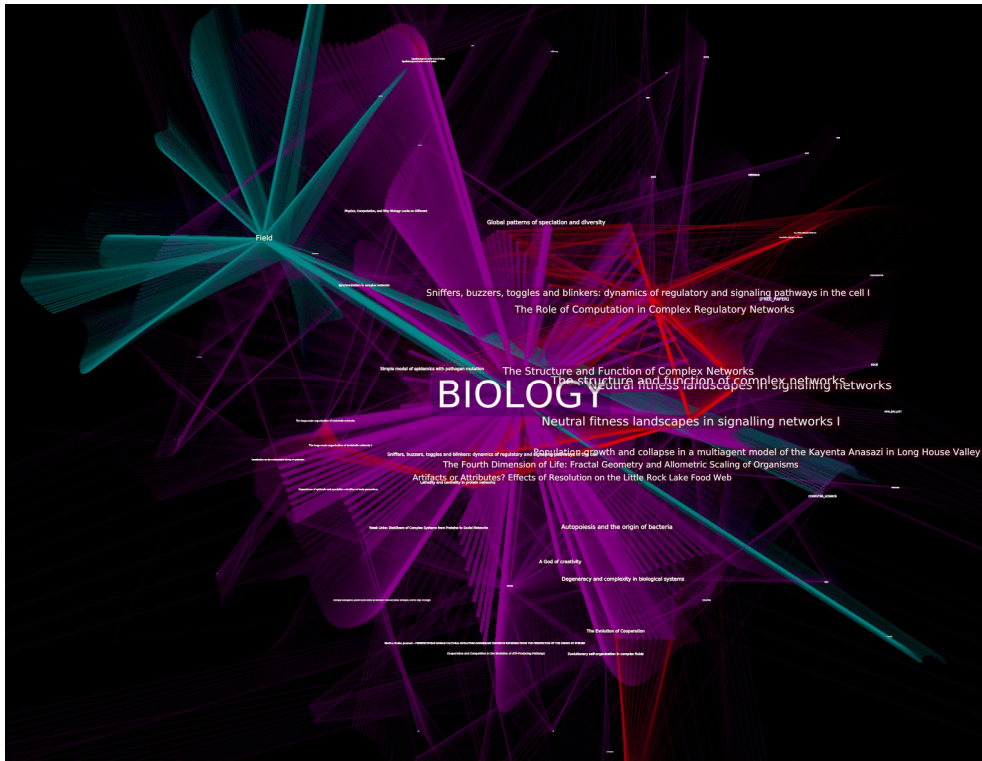
**Usman Haque**, director Haque Design + Research Ltd, founder of Pachube.com and CEO of Connected Environments Ltd has created responsive environments, interactive installations, digital interface devices and mass-participation performances. His skills include the design and engineering of both physical spaces and the software and systems that bring them to life. He has been an invited researcher at the Interaction Design Institute Ivrea, Italy, artist-in-residence at the International Academy of Media Arts and Sciences, Japan and has also worked in USA, UK and Malaysia. As well as directing the work of Haque Design + Research he was until 2005 a teacher in the Interactive Architecture Workshop at the Bartlett School of Architecture, London. He received the 2008 Design of the Year Award (interactive) from the Design Museum, UK, a 2009 World Technology Award (art), a Wellcome Trust Sciart Award, a grant from the Daniel Langlois Foundation for Art, Science and Technology, the Swiss Creation Prize, Belluard Bollwerk International, the Japan Media Arts Festival Excellence prize and the Asia Digital Art Award Grand Prize.

**Haque Design + Research** is specialized in the design and research of interactive architecture systems. Architecture is no longer considered something static and immutable; instead it is seen as dynamic, responsive and conversant. Our projects explore some of this territory.

## Bestiario- Canvi i Temps (Change and Time)

[www.bestiario.org](http://www.bestiario.org)

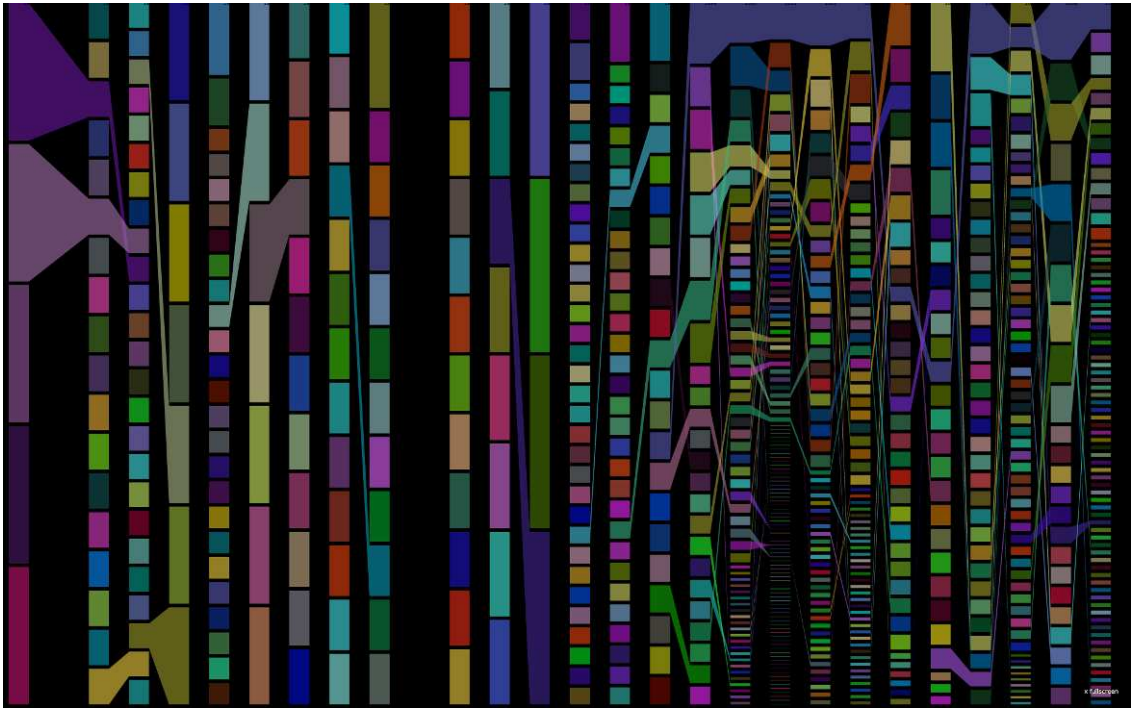
[www.culturesdelcanvi.com](http://www.culturesdelcanvi.com) (First on-line project in Arts Santa Mònica)



Canvi (change) and Temps (time) are two navigation spaces within a network composed of articles, web pages, people and links related to the field of complexity science. This research, which is both historic (papers as far back as 1927 are reviewed) and crosscutting (containing more than 30 categories from different fields and disciplines), offers a broad overview of the foci, strategies, tactics, research methodologies and topics of interest that make up the field of complexity science. Canvi and temps offers two distinct ways to explore the content and their relationships in this field.

The primary structure of the database is a bipartition made up of content and tags. Existing relationships between contents and tags suggest new relationships. The networks emerging point towards interesting relationships and possible new connections among the contents.

**Bestiario** is a Barcelona/Lisbon-based company founded two years ago. We are dedicated to data visualization and to the creation of spaces for the collective creation of knowledge. Our slogan is: *making the complex comprehensible*. We combine art and science to design and create interactive information spaces. We have developed a powerful framework based on graph theory, topological algorithms, physical models, and geometrical and geographical representations to provide the optimum solutions to our customers.



## Laurent Mignonneau & Christa Sommerer - Life Writer

<http://www.interface.ufg.ac.at/christa-laurent>



Life Writer is an old-fashioned typewriter that was transformed into a computer interface upon which users can interact using the normal functions of the machine. It stands on an old table with a projection from above oriented directly onto the paper. This creates the impression of the paper becoming the computer screen, since the movement of the typewriter's paper tray is seamlessly linked with the movement of the projected image. When a user writes text on this typewriter, the text transforms into artificial life forms that appear on the paper of the typewriter as if directly emerging from the machine.

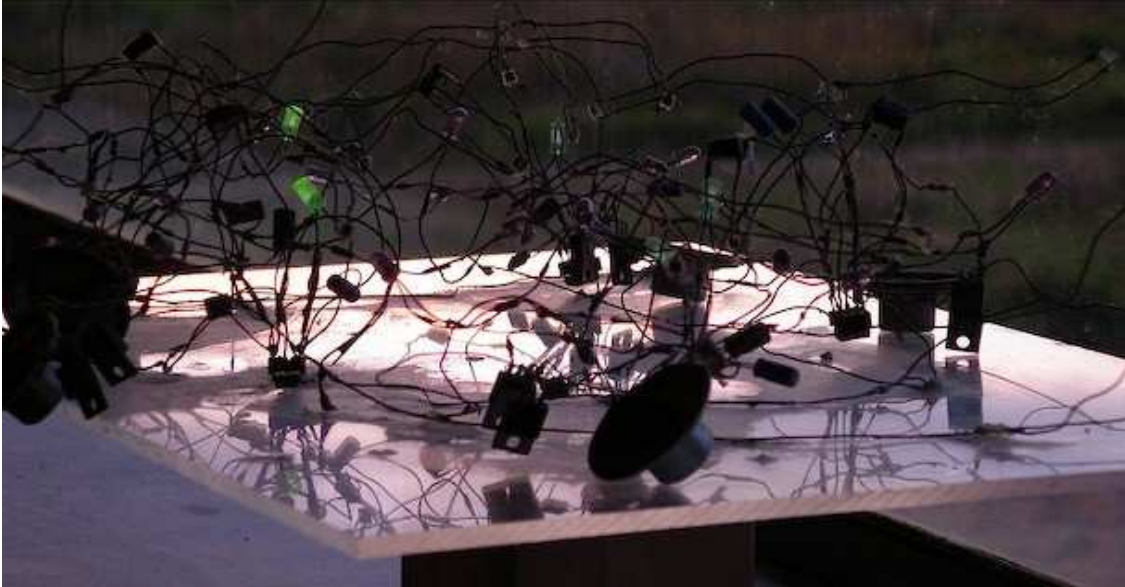
**Christa Sommerer and Laurent Mignonneau** are internationally renowned media artists and researchers, they have jointly created around 20 interactive artworks, which can be found at <http://www.interface.ufg.ac.at/christa-laurent>.

Mignonneau and Sommerer's interactive artworks have been called "epoch making" (Toshiharu Itoh, NTT-ICC museum Tokyo) for developing natural and intuitive interfaces and for often applying scientific principles such as artificial life, complexity and generative systems to their innovative interface designs. They have won mayor international media awards, among others the "Golden Nica" Prix Ars Electronica Award for Interactive Art 1994 (Linz, Austria).

Josep Manel Berenguer- Luci

[www.sonoscop.net/jmb](http://www.sonoscop.net/jmb)

[www.sonoscop.net/jmb/lucy](http://www.sonoscop.net/jmb/lucy)



I wanted to mimic the emergent behaviour of firefly colonies electronically in an installation. The first model I made, in 1994, had five electronic fireflies. The installation now has 21 electronic elements and 128 computational elements. When the ambient light is strong, each electronic object pulses independently in its own rhythm. When the time amount of light falls below a certain level, when the infrared signals can be picked received by the neighbouring receivers, the system tends to stabilize and large areas are created in which the objects gradually come to pulse in synchrony. The computational elements, which individually have no name or memory, mimic that behaviour and project it into the space occupied by the electronic elements

**Josep Manel Berenguer** is conductor of the Orquestra del Caos and Director of the 13 Music Festival, founder of Nau Còclea, member of the Academie Internationale de Musique Electroacoustique de Bourges and Honorary President of the International Conference of Electroacoustic Music of UNESCO's International Music Council.

Sony Lab: Luc Steels, Michael Spranger & Martin Loetzsch –  
Embodied Language Games

<https://arti.vub.ac.be/~steels>



The installation shows a series of experiments to see under what circumstances and by what mechanisms physical humanoid robots could selforganize a symbolic communication system without human intervention. This challenge raises tremendously difficult problems because we need to understand and artificially simulate visual perception, conceptualization of reality for language, interaction scripts, and language processing. We need to understand not only how robots can learn concepts and language from others but also how they can extend their existing language system with new words or constructions to express new concepts and talk about situations they have never encountered.

**Luc Steels** is professor of Computer Science at the Free University of Brussels (VUB) and director (from 1983) of the VUB Artificial Intelligence Laboratory <http://arti.vub.ac.be> . He is currently also director of the Sony Computer Science laboratory in Paris (<http://www.csl.sony.fr>). His scientific research interests cover the whole field of artificial intelligence, including natural language, vision, robot behavior, learning, cognitive architecture, and knowledge representation. At the moment his focus is on dialogs for humanoid robots and fundamental research into the origins of language and meaning.



POEtic-cubes is a physical installation, a sculptural group that is organized and takes form in relation to the stimuli coming from the environment. The installation consists of nine cubes or autonomous robots which have been provided with some of the properties of a cell, so that we also refer to them as "cells". They can thus develop certain characteristics of living things and create a sculpture that is adapted to its environment. Their behaviour is centred on detecting and surrounding any human being who enters the space. The robots always maintain a distance from one another and from the centre of gravity of the users.

**Raquel Paricio García** is graduated in Arts. She is a researcher and an artistic producer. She is interested on spaces, devices and interfaces that increase perception. She works with a bioinspired hardware in collaboration with Juan Manuel Moreno Arostegui (UPC) in artificial life installations.

**Juan Manuel Moreno Aróstegui** is Phd in Telecommunication Engineering of Telecommunication. He is Professor in UPC (Universitat Politècnica de Catalunya). He has been coordinator in the POETIC project. He is interested in bioinspired computation techniques, architectures of programmable devices, artificial neuronal nets models and microelectronic analogical and digital design.

Pi Studio: Terry Rosenberg, Mike Waller, Peter Rogers, Andrew Weatherhead & Duncan Fairfax- News Telescope

<http://mediatisedview.pbworks.com>



The "news telescope" draws on the fact that the visual is impregnated with non-visual data. Our "velo" of sight (veils of optical threads) is intersected by and may draw from matrices of information that lie "invisible" in the view (but are there nevertheless) into view. The "news telescope" is a located device which may be oriented and focused on different places and draw down different kinds of news from those places – setting them in contrast one to another. Thus, the demotic news of twitter feeds makes comment on traditional forms of news publication - organs of publication like newspapers. The "news telescope" places the news and asks the viewer to physically (and by extension in other ways to) relate their place in the world to the places and different constructions of news.

The **Prospect and Innovation Studio** is housed in the Design Department at Goldsmiths. It – as a group, in smaller groups or as individuals - produces research/work focused on what is 'to-come' ('a-venir' - futurity)). The Studio is intent on researching the 'possible' (the architecture of the possible) and also on building 'props' for the critique of possible future practices, objects and spaces. The studio also designs and produces future forms - as propositions - to speak back and critique past, present and emerging conditions and objects. The Studio (and its individual members) have worked with a range of clients and collaborators including: T-mobile, Kodak, Saatchi, Proboscis Research. And run workshops for a range of clients including: Nokia, Bagir, Fat Face, USAid and Senada (in Indonesia). The individuals working on the Leverhulme Mediating Place Project (that spawned the 'News Telescope') are: Terry Rosenberg, Mike Waller, Andrew Weatherhead, Pete Rogers and Duncan Fairfax.

## Interaction Research Studio- The Drift Table

[www.gold.ac.uk/interaction](http://www.gold.ac.uk/interaction)



The Drift Table allows people to float over the British landscape from the comfort of their own home. The weight of objects on the coffee table controls the slow scroll of high resolution photography displayed on a central view-port, giving detailed visual access to all of England and Wales. Adding weight causes the table both to accelerate and to descend towards the landscape below. But progress is always slow - traveling from London to Devon may take days. So what do you do with it? You do with it as you wish. The Drift Table is not designed to solve problems, but to provide a resource in the home. You might use it to take journeys, or to revisit favourite holiday destinations. You might explore particular questions about geography or town planning. You might even just lose yourself and watch the world go by.

The **Interaction Research Studio** explores the design of computational systems for everyday life. Our practice-based research integrates design-led research methods with work on embedded and ubiquitous technologies to produce prototype products embodying new concepts for interaction. As an integral part of our process, we lend our prototypes to people to try in their everyday lives, with their stories becoming part of the designs.

Govcom.org Foundation: Alex Galloway, Erik Borra, Michael Stevenson & Marieke van Dijk- The Web starts here- the IP Browser  
www.govcom.org



The IP Browser creates an alternative browsing experience that foregrounds the Web's machine habitat and returns the user back to the basics of orderly Web browsing. The IP Browser looks up your IP address, and allows you to browse the Websites in your IP neighborhood, one by one in the order in which they are given in the IP address space. The IP browser has a limited set of features: the user can either click to the next higher IP address or next lower one, using forward and backward buttons.

**Govcom.org** is an Amsterdam-based foundation dedicated to creating and hosting political tools on the Web. Much of the work involves mapping issue networks on the Web, using the Issue Crawler software, where one now may auto-request an account. Govcom.org is also a conceptual URL that indicates three major actor groups involved in debates on social issues: .gov's, .com's and .org's.

Methods initiative: Richard Rogers, Esther Weltevrede, Erik Borra & Marieke van Dijk- ppl of Iran #iranelection RT "  
<http://wiki.digitalmethods.net/>



The project, first, is a stored collection of all the tweets that have been tagged #iranelection from the first one on 10 June up to 30 June 2009, some 650,000 in all. The top three "retweeted" tweets (RTs) per day have been filtered and organized chronologically, as opposed to the reverse chronology that Twitter uses. The resulting output is a capsule account of the crisis, which also was subsequently edited, and made into sub-storylines, on arrests, violence, Neda, censorship as well as the Internet. "For the ppl of Iran - #iranelection RT" tells the story of the day-today unfolding of the Iran election crisis as seen through Twitter.

**Digital Methods Initiative** (DMI) is a collaboration of the New Media TEMPLab, University of Amsterdam and the Govcom.org Foundation, Amsterdam, with support from the Mondriaan Foundation's Interregeling and MACOSPOL, the EU project, led by Bruno Latour. The Digital Methods Initiative is directed by Richard Rogers. The project coordinators are Sabine Niederer and Esther Weltevrede. Current affiliates include Anat Ben-David, Erik Borra, Marieke van Dijk, Andrea Fiore, Anne Helmond, Noortje Marres, Koen Martens, Loes Sikkes, Michael Stevenson, Laura van der Vlies and Marijn de Vries Hoogerwerff.

## CONFERENCE

### Changing Cultures: Cultures of Change

**10-12 December 2009**

**University of Barcelona, Barcelona, Spain**

Across disciplines, intensive or topological approaches to the study of culture treat change as normal and immanent rather than exceptional and externally determined. Culture is understood in terms of possibility and topological approaches provide a set of tools to think about engaging different kinds of change - learning, transmission, innovation, adaptation, self-organisation and evolution. This conference asks: what is the potential of topological and other intensive approaches for thinking about change? It explores the value of thinking about culture as a privileged site or mechanism for change, but it also asks how and why the question of change is being posed in relation to culture today. This question is especially important at a time when calculation and complex technical systems have become ubiquitous elements in human life, in specialised sites of scientific enquiry and in everyday life. In contemporary society, numbers do not just describe but they construct and - in topological thinking - take on virtual properties, building abstract spaces of calculation and opening up the possibility of new perspectives on the questions of cultural predictability and innovation.

What are the tools, techniques and artifacts of thinking topologically about cultural change? What spaces do they make? How can the current development of material culture of topological thinking be taken into account, reflexively, as a research topic? What are the cultural implications of the growth of technical systems, quantitative calculation and ideas and procedures concerned with number, counting, and logic, the increase in lists and registers, and the rise of logistics, of innovations in thinking about linkages and technologies of address, and the combination and organisation of these operations into systems in everyday life? What kinds of engagement are adequate to the task of thinking and acting in response?

Finally, the conference will also address issues of method, and in particular examine the current interest in the use of quantitative methods to investigate and understand qualitative change. Can anything - or everything - be measured in numbers? What role do modeling, simulation and experimentation have in the study of culture? How can we understand cultures of qualification? What are the implications of studying culture for the uses and meanings of numbers?

**Plenary speakers** include:

Rosi Braidotti, University of Utrecht, The Netherlands

Matthew Fuller, Goldsmiths, University of London, UK

Alex Galloway, New York University, USA

Penny Harvey, University of Manchester, UK

Dirk Helbing, ETH Zurich, Switzerland

Scott Lash, Goldsmiths, University of London, UK

Richard Rogers, University of Amsterdam, The Netherlands

Brian Rotman, Ohio University

Luc Steels, SONY-France, France

Sergi Valverde, University Pompeu Fabra, Spain

Eyal Weizmann, Goldsmiths, University of London, UK

For more information: <http://www.atacd.net>

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# CULTURES OF CHANGE SOCIAL ATOMS AND ELECTRONIC LIVES



CULTURES OF CHANGE SOCIAL ATOMS AND ELECTRONIC LIVES



- Human Hague
- Richard Rogers Sebastian
- Albert Diaz-Guillera Juan Manuel Moreno Acosta
- Raquel Paricio Leo Steels Laurant Nijboorn
- Victorio Aizola Phillip Hill
- Orin Bozic Christa Sommer Albert Lázaro Barahona
- Michael Stevenson Santiago Ortiz Aiko Michael
- José Manuel Barandiarán the Digital Methods Initiative Alex Adriansong
- Maximilian Schlich Fabian Molina Merle van Diek
- Josep Parvilló H. Eugene Stanley Intentional Research Colla Lutz
- Jesus Nasoliz Ethel Walters Michael Boccia James P. Croteau
- Project and Innovation Studio the Geneva and Foundation
- Alex Galloni Tiziana Terrenova Birk Heibing
- Matthew Fuller Sergi Valverde



Generat de Catalunya  
Departament de Cultura  
i Espais de Convivència

<p><b>Illuminations in the night of the hyperworld</b> Vicenç Altaló 6</p>	<p><b>Social Atoms and Electronic Lives</b> Josep Perelló 9</p>	<p><b>Omnes et singularem: surviving singularities, totalities and complexities</b> Pau Alena 15</p>
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<p><b>History and Memory in the Digital Era</b> Alex Adriaens 20</p>	<p><b>Evolution of Technology Innovation Networks</b> Sergi Valverde 28</p>	<p><b>Extracts from a Skype conversation</b> Santiago Ortiz 34</p>
<p><b>Information Flow in an Organization through the Monitoring of Emails</b> Albert Diaz-Guilera &amp; Alex Arenas 36</p>	<p><b>Relationship mining</b> Esteban Moro 38</p>	<p><b>The Parliament of France</b> Fabian Mundesa &amp; Daniel Boumas 40</p>
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<p><b>Competition vs Cooperation in Complex Systems</b> Phillipe Ball 44</p>	<p><b>Econophysics</b> H. Eugene Stanley 50</p>	<p><b>Problems of Social Consensus: voting, language, culture...</b> Maxi Sanmiguel 58</p>
<p><b>Self-organization of social systems. The importance of local interactions for social cooperation</b> Dirk Helbing 64</p>	<p><b>Is Chance Unique? The debate between intrinsic and accidental randomness</b> Jaume Masoliver 72</p>	<p><b>Life/Writer</b> Laurent Mignonneau &amp; Christa Sommerer 46</p>
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<b>Humanisme</b>		
<p><b>From one to multiplicity</b> Cèlia Lury 78</p>	<p><b>Human activity - from the Renaissance to the 21st century</b> Maximilian Schlich &amp; Albert-László Barabási 84</p>	<p><b>Curious Homes</b> The Drift Table Interaction Research Studio, Goldsmiths, University of London. 86</p>
<p><b>The Hidden Fragility of Complex Systems: Consequences of Changing Consequences</b> James P. Crutchfield 92</p>	<p><b>Network topology: a tendency to differ</b> Tiziana Tarranova 110</p>	<p><b>POETIC-Cubes</b> Raquel Paricio &amp; Juan Manuel Moreno Ardastegui 68</p>
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<b>For the ppl of Iran: #iranelectionRT</b>		
<p>Richard Rogers, Esther Weitzel, Erik Borra, Mariëke van Dijk &amp; the Digital Methods Initiative, Amsterdam. 106</p>		

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## Social Atoms and Electronic Lives

Josep Perelló

How can pollen particles suspended in water remain in never-ending motion, in an agitation, an erratic displacement that '[arises] neither from currents in the Fluid, or from its gradual evaporation, but [belongs] to the particle itself'? This was the question the Scottish botanist Robert Brown, who was studying the mechanisms involved in the pollination of the flower *Clarkia pulchella*, asked himself in 1827.

What we know as Brownian motion is an engine that runs without fuel. It disperses particles: in botanical terms, it pollinates and germinates. It is the random movement that prevented Brown's pollen grains from settling at the bottom of the dish. In doing so it defies and overcomes the force of gravity, that great pillar of Newtonian physics, the interaction that supposedly governs our entire existence.

Brown replicated his experimental observation with pollen from other plant species and with other vegetable matter, but if he was at any point tempted to imagine he had found the pulse, the very essence of life, he avoided that temptation. Some years previously, in 1785, Jan Ingenhousz had described the same irregular movement in coal dust, an inanimate material, on the surface of liquid alcohol. More tantalizing still, back in the first century BC, the Roman philosopher Lucretius in *De Rerum Natura* had made a similar observation:

'Observe what happens when sunbeams are admitted into a building and shed light on its shadowy places. You will see a multitude of tiny particles mingling in a multitude of ways... their dancing is an actual indication of underlying movements of matter that are hidden from our sight... It originates with the atoms which move of themselves [i.e. spontaneously]. Then those small compound bodies that are least removed from the impetus of the atoms are set in motion by the impact of their invisible blows and in turn cannon against slightly larger bodies. So the movement mounts up from the atoms and gradually emerges to the level of our senses, so that those bodies are in motion that we see in sunbeams, moved by blows that remain invisible.'

The fact is that we can credit Brown, Ingenhousz and Lucretius, who did not have the powerful microscopes that allow us today to probe even the Nanoscale, with the first proofs of the existence of atoms — tiny 'fundamental' particles in continual collision with their neighbours. The sum of these collisions is a dance abounding in

irregularities, in which a virtually infinite number of individually insignificant entities are capable of countering the mighty force of gravity itself.

In 1905, Albert Einstein added his grain of sand by corroborating the atomic premise. The great physicist provided a mathematical account of Brownian motion in terms of probability and chance to calculate the trajectory of an individual particle. Statistical Mechanics thus builds the bridge between the micro and macro. Observations are merely statistical averages of the random variability of each atom, but taken overall, atoms conform to well-established certainties, with macroscopic observables such as temperature and pressure.

This whole disquisition on uncertainty at the atomic level continues to run comfortably on top of macroscopic determinism. We can see its validity in the case of systems in equilibrium: in other words, stable, homogeneous structures, without changes of temperature, with no heat flows between liquid and ambient air, with no exchange of matter or energy. Clearly, however, if we are dealing with living organisms, the hypotheses are far from being acceptable premises.

#### Out of balance and spontaneous order

Still within the realms of equilibrium and stability, the first person to expose the fragility of Newtonian determinism was Henri Poincaré, around 1900, with specific reference to the sun-earth-moon system, which interacts gravitationally. It is impossible to work out with exactitude in mathematical terms a system with even as many as three bodies. At the other extreme, in weather, probably the best-known chaotic system, we find millions of atoms of the most diverse natures interacting strongly outside of any kind of imaginable balance. In the famous butterfly effect associated with the name of Edward Lorenz the non-linearities of interacting particles are capable of causing dramatic changes in the weather, for example, as a result of almost imperceptible movements such as innocent beating of a butterfly's wings in the Amazon rain forest.

In the mid twentieth century, Lorenz tried to detect order in the chaos of meteorology in diagrammatic form, using maps representing both the position and the speed of the particles. This rendering translates the world to a larger space than the one we perceive in order to identify regularities that will make it intelligible. The necessary observation also call for a global perspective, because we cannot grasp these structures simply by carefully plotting the course of a particle.

For a classic instance of the aleatory creation of structures, consider the following mechanism. A particle moves from right to left at a random altitude, and if it encounters another particle on its way the two join up. This process is repeated countless times, and the resulting form is an agglomeration of branching particles which spread out in all directions like the veins and arteries of the circulatory system, the roots and branches of a tree, the cracks in a sheet of glass or a satellite picture of a river. Structures of this kind, known as fractals, are common to a great diversity of phenomena. They have the distinctive property of presenting the same form and appearance whether we are looking at a larger or smaller subdivision of their ramifications or the structure in its entirety.

Another model is a network of springs connected together in a mesh or lattice mode with a particle of a certain mass at each node. Each particle oscillates in response to the vibrating of the springs which in turn transmit the oscillations to adjacent objects. Think of a small number of connected particles and you will probably envisage a chaotic oscillatory dynamic. But now imagine hundreds, thousands or millions of vibrating particles and it becomes increasingly possible for all the particles to synchronize and beat in unison. From the microscopic stratum we find ourselves looking at the emergence of an orderly global dynamic. The idea is currently being applied to analyse the self-organization of a mass of heart cells that end up beating at the same rhythm, millions of neurons being activated at the same time and bringing on an attack of epilepsy, a community of fireflies in an American forest all flashing on and off at the same time or, in a more prosaic situation, the synchronization of the applause from a theatre audience. As I said, we are talking about living organisms. Biomedicine, which studies the growth and reproduction of cells, also observes that a limited number of very simple rules of development is sufficient to create highly sophisticated living systems at the macroscopic level.

#### Social atoms, complexity theory and electronic lives

All of these examples, metaphors, models and analogies invite us to look beyond specific individual disciplines of knowledge. Brownian motion was identified by a botanist, taken up by physicists and in fact also has applications in economics. In 1900, five years before Einstein tackled it, Louis Bachelier had already presented the mathematical model that set out to explain the erratic movement not of atoms but of share prices on the Paris stock exchange. For Bachelier, brokers were the liquid

medium and stocks were the grains of pollen, which receive impacts that cause their value to go up or down. The random path proposed by this theory resulted useful in economy and it is also currently applied in fields such as biology, chemistry, geology and sociology, among others. Now, let's take a step further. Benoît Mandelbrot first studied the fractal structures we mentioned above, not to study physical systems but to interpret variations in the price of cotton.

Can individuals and society be read in the same way as erratic grains of pollen suspended in a liquid? Does it make sense to speak of a channel through which ideas can circulate from one field of knowledge to another? Does this communication serve to enhance our understanding of the world? It would be risky to give an unconditional 'yes' to these questions, but it would be equally wrong to reject this transdisciplinary vision. The interactions may be of a different nature, but that matters little in the so-called theory of complexity. Analysis of complex systems (the word 'complex' comes from the Latin root *plexus* meaning to twist or plait) overwhelmingly places the emphasis on relationships: what is related to what. These relationships take on an abstract profile that is largely indifferent to their nature as such, be it gravitational, electrical or personal affinity. The theory of complexity gives rise to the visualization of complex networks of interaction and chaos maps, and also to the construction of dynamic models — with or without chance constraints — whose non-linear fractal properties enable them to accommodate the butterfly effect.

In addition, dialogue between disciplines and the adoption of a global perspective on certain problems are essential in the tumultuous world of today. This is most clearly the case in the fight against climate change, where the future of humanity itself is at stake. Combating the greenhouse effect involves a technological challenge, a profound rethinking of our economic and political models and a heightening of social awareness in which art, too, has a role to play alongside scientists of all kinds — climatologists, biologists, experts in new energy sources and others. None of these by themselves can resolve the problem, which requires the cooperation and collaboration of all.

### Cultures of change

The real change in the study of social dynamics in the broadest possible sense has come about thanks to the new information technologies. There are now digital records of almost everything, almost everywhere. For example, financial markets store all of the transactions and all of the price variations generated second by second, even

recording the names of the agents who handle the bids to buy and sell stocks and shares. What is monitored here is a world of social atoms in continuous interaction. The same is true of mobile phone networks, which keep permanent track of us and at the same time allow us to trace patterns of behaviour in human communication and the geography of people's daily movements. The social networks, in turn, seek to forge friendships, while offering the scientist an excellent database for studying the mechanisms that underlie personal affinities or the transmission of certain items of news suppressed by other, conventional channels. And all the time the powerful computers we have today are busy simulating and further evolving this world of springs, of sticky particles or any other model with a simple mechanics but an infinite number of iterations.

So, after all that, what do we see? What do we want to see thanks to this transfer of knowledge based on the physics of atoms? We want to see relationships, the dynamics rooted in microscopic behaviour that give rise to large-scale structures and patterns. Of course, it would be absurd to imagine that the communities we study are composed of identical atoms as in physics. Heterogeneity, diversity and the limitations of quantification of even our best science and technology are significant factors here. Nor should we believe that physics can do all this on its own. Further progress depends on the involvement of disciplines such as economics, psychology, anthropology and sociology. Similarly, it is surely symptomatic that so much of today's electronics — the truly new contemporary technology — is developing warm epithelial tissue and a breath that is more and more human.

The NEST PathFinder initiative A Topological Approach to Cultural Dynamics, part of the European Commission's 6<sup>th</sup> Framework Programme, illustrates all these confluences of thought, with all their strengths and all their weaknesses. Some of those involved have contributed to this book. Taken all together, this collection of texts gives us a snapshot, inevitably partial though it is, of this initiative. It outlines this cultural change. It describes the horizontal shifts more or less imposed on academic cultures by the hectic modern world. It shows how the toughest science and technology are moving closer to the culture of the arts and humanities.

Brown's mechanisms of pollination and germination are a metaphor and a gateway, an invitation to imagine a cross-fertilization between branches of knowledge capable of nurturing a renewed humanism.

## *Omnes et singulatim: surviving singularities, totalities and complexities*

### **Pau Alsina**

Never before have we had such so much information at our disposal. But having information is not necessarily the same as having knowledge. We know they are different things that often need one another. Nowadays, thanks to the information and communication technologies, we can access and store huge amounts of data and information of every kind from everywhere. But the challenge is not only quantitative, it is also qualitative, and so we try to obtain information that is both relevant and accurate. How do we establish quality and significance? The frameworks within which relevance and accuracy are constructed are central to the impulse to obtain, store and process data. How do we construct these frameworks? What do they help us look for? What are they?

Information and communication technologies, with their potential for processing, calculating, visualizing, monitoring, quantifying and distributing data, provide us with both a new vision of the world and new experiences to explore. The challenges consist precisely in knowing how to use all of this potential deriving from the appropriate frameworks, pointing in the right directions so as to generate helpful knowledge that seems likely to bring about changes for the better in our culture and the world. So-called Complex Systems Theory seeks to explain this whole phenomenon on a hard scientific basis in terms of models that assume properties such as non-linearity, self-organization, emergence, feedback, heterogeneity and uncertainty.

Living with this potential treatment of singularities that construct highly complex totalities represents a challenge that the so-called sciences of complexity have embraced since their inception. These complex systems are composed of interconnected parts which, taken as a whole, possess properties that are not found in the individual component parts. Deciphering these properties, these behaviours intrinsic to complex systems is a task that has come to include the mathematical sciences and also the natural and social sciences, and has helped to generate a series of interdisciplinary specializations, ranging from cybernetics to theories of complexity.

Knowledge thus generated has numerous and extremely diverse fields of application, and represents a highly significant contribution to society as a whole, a contribution that

many have sought to highlight by noting that it represents a change of paradigm in process, giving rise to ontological and above all epistemological shifts of the first magnitude. The present exhibition sets out to study, from a highly multidisciplinary perspective, the transformational impact that all of these conceptual and technological developments are having on cultural and social dynamics.

The aim was therefore to show, on the one hand, how sciences have progressed in their attempts to describe and explain complex phenomena and, on the other hand, how the technologies have given additional impetus to this knowledge both by shifting the boundaries of the questions addressed and by posing new questions by way of a wide range of applications, some of them experimental, others well established in our culture. To this end, along our route, we find documentary pieces reflecting the diversity of perspectives and opinions about these changes we are witnessing, and experimental pieces that are especially useful for an understanding of the magnitude of the associated ideas, and other pieces that are essentially poetic in their attempt to capture the significance of the cultural and human potential inherent in the new theorizations and ongoing applications.

The itinerary starts out from the purest abstraction — where mathematics makes it possible to represent this complexity with its formulas, detecting and revealing hidden patterns — and then moves on to the modelling of this complexity — producing simplified abstractions in which either computation or simulation or quantification or parameterization play a crucial role — and finally comes to the various applications of these complex systems in culture and society, which give rise to a whole new set of possibilities with a diversity of social, cultural and artistic facets to be explored.

The key element in these theoretical abstractions that describe social dynamics is their interaction and co-evolution with the environment. Atoms borrowed from physics take on here a manifestly social character, as robotics, electronic circuitry and the latest technological gadgets move ever closer to incorporating human particularities. The exhibition invites us to experience all these ideas at first hand while, at the same time, it provides specialist academic information about this topic in an environment that aims to make it accessible and readily understandable.

Today we can inquire into the characteristic patterns and mechanisms of the dynamics of complex phenomena, the illuminating potential of complexity by means of its adequate representation and the need for simplifying models or analogies and their

potential as explanatory metaphors. This exhibition aims to help making us more aware of the social and cultural significance of these advances, their potential and the way they change the image we have of the world, taking us from the change of cultures to cultures of change.

## RELATED ACTIVITIES

**Dijous 10 de desembre. Sala d'actes. Aforament Limitat. Sense servei de traducció simultània.**

**19:15h** Conferència inaugural: **“Can robots create their own language?”**  
Luc Steels SONY Lab Paris, Vrije Universiteit Brussel (AI Lab).

**Dissabte 12 de desembre. Sala d'actes. Amb servei de traducció simultània**

**De 17:00h a 20:00h** Conferència: **“Topologia, Innovació i Política Cultural”** amb la participació de Monika Fleischmann, Ronaldo Lemos, Ramón Sangüesa, José Luís de Vicente, dissenyat i moderat per YProductions, en col·laboració amb Goldsmiths i Universitat de Barcelona

**Diumenge 13 de desembre. Sala d'actes.**

**18:00h.** Conversa: **“Complejidad/Interacción”**, Santiago Ortiz (Bestiario) i presentació del projecte Canvi i Temps

**Dijous 29 de gener / Dijous 11 de febrer. Sala d'actes i Espai Laboratori. Grups reduïts**

**18:00h** Conferència i Taller: **“Més enllà de la pell: robots sensitius? Experiència sensible i bioinspiració”** Raquel Paricio Garcia i J.Manuel Moreno Aróstegui

**Dijous 25 de febrer. Sala d'actes. Amb servei de traducció simultània**

**19:00h** Conversa: **Interfacing Reality**, Christa Sommerer, Interface Lab, Kunst Universität Linz

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**CURATORS:** Josep Perelló and Pau Alsina with the assistance of Irma Vilà

**PRODUCTION:** Arts Santa Mònica - Departament de Cultura i Mitjans de Comunicació.

### **IN COLLABORATION WITH:**

A Topological Approach to Cultural Dynamics (NEST PathFinder of the European Union's 6<sup>th</sup> Framework Programme), Goldsmiths - University of London, Media Studies - Universiteit van Amsterdam, Universitat de Barcelona, Advanced Hardware Architectures - Universitat Politècnica de Catalunya, Neàpolis, Universitat Oberta de Catalunya, BEEP.

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From 11 December 2009 to 28 February 2010

## CULTURES OF CHANGE

## SOCIAL ATOMS AND ELECTRONIC LIVES

An exhibition curated by Josep Perelló and Pau Alsina with the assistance of Irma Vilà

COLLECTIVE EXHIBITION- ESPAI LABORATORI (PLANTA 02)

A Production of  
**Arts Santa Mònica**  
Departament de Cultura i Mitjans de Comunicació

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Coordination Arts Santa Mònica: **Fina Duran** and **Lourdes Ibarz**

Press Conference, 10 December 2009, 12H.

Opening, 10 December 2009, 20:00H.

Exhibition open from 11 December until 28 February 2010

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