



Third NeDiMAH Workshop on Space and Time in the Digital Humanities: "Networks over space and time: modelling, analyzing, and representing complex data in the digital humanities"

Convenors (NeDiMAH Space and Time Working Group)

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Location

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Abstract:

In the humanities, a close look at networks and relationships, whether formal or informal, personal or social, of information or of knowledge, of transportation or of communication, has always been an important subject of study and, at the same time, a powerful analytical process. In computer science, the study of networks and of methodologies for analysis and visualization of these relationships is nowadays an increasingly well understood and practiced area of knowledge. In both the humanities and computer science, researchers are well aware of the dynamic nature of data and knowledge when viewed through the lenses of space and time.

Networks can be studied in a purely spatial perspective, if the object of analysis is the distance between things or people. However, there are two other dimensions which render networks' study in a more complex and richer methodology. Either time or social relationships help to extend the focus of analysis from distance to connectivity, and this is an important concept for the Humanities.

When put together, time, spatial analysis, with its derivative, spatial network analysis, and social network analysis, can be a powerful way of thinking about the world (*theory*) and of explaining it (*methodology*). And at the present time, with the integration and plasticity of the digital, the rising awareness about geography and time through the Internet's social networks, and the growing usability of the Web 2.0, thinking and explaining networks can benefit from powerful *tools*, increasingly complex and accessible at the same time.

The aim of this workshop was to combine analytical perspectives in the study of networks, over space and time, in humanities disciplines and on various themes, to identify methodologies, discuss research results, and encourage interdisciplinary approaches. The main focus of the workshop was on the areas of modelling and representation, highlighting them more as methods of analysis and knowledge production than merely as tools.

Scientific Content

The workshop was organized into four sessions, each with two presentations and time for discussion about the methods and tools presented. The two morning sessions focused primarily on the presentation of case studies exploring how network analysis methods and tools can be applied to particular spatial and temporal sets of data in innovative ways.

The first session examined historical transportation networks, in Roman times (Pau de Soto) and in France during the nineteenth century (Thomas Thevenin and Christophe Mimeur). The second session explored social networks, through the case of the Portuguese Inquisition (Albertina Ferreira and Fernanda Olival) and complementary case studies involving subjects as diverse as witch-hunting in the seventeenth century, the credit market in the nineteenth century and intelligence cycle during the Cold War (Martin Stark).

During the afternoon sessions the focus shifted to more conceptual approaches, discussing theory, concepts and models, but also highlighting challenges in these particular approaches to space and time. Discussions exposed concepts of complexity, emergence and self-organization using data from Early Modern Portuguese communication and social networks (Joaquim de Carvalho), and on the need to evaluate and compare different network models and alternative approaches to classify and use distances in networks based on data from the Aegean Bronze Age (Tim Evans). The final session began with a general presentation identifying the challenges of introducing spatial and temporal data into network analysis and visualizations and presenting a variety of tools that can be utilised to address these challenges (Clement Levallois). The last presentation explored the gathering and visualization of temporal and spatial personal data, through the tension between artistic and scientific outcomes as it is explored by the "TimeMachine" app (Sofia Oliveira and Jared Hawkey).

Topics discussed on the transports and social networks sessions:

The morning sessions without pre-intention demonstrated a fascinating complementarity between transportation networks and social networks. The case studies showed that although similar tools are used in markedly different ways, the studies reached conclusions clearly identifying the socio-cultural aspects of transportation systems and the complementary logistical determinants informed the analysis of historical social networks.

At a surface level, the ability to both define and to use models of complex historical transportation and communication systems to answer questions of historical relevance - the increasing ability to raise hypothetical questions - to essentially gamify an approach to the study of these systems - has introduced a new dimension to spatial research practice. It demands attention towards standards for presentation and sharing of system mechanisms to allow for interrogation of not just the model assumptions and the academic rigour informing but also to facilitate the means to deploy and adapt them to use with 'own'/'external' datasets. The addition of this need to make available for external validation the underlying data, methods and assumptions employed also raises new demands on project resources and attention to appropriate digital project management practice that have heretofore been only informally acknowledged.

In the case studies presented during this session, the concepts of confidence around predictability, speed, cost and timing are called in clear relief as factors that can increasingly be addressed in these more complex systems.

Raster versus vectorised approaches to network modelling highlighted the use of a specific set of tools, allowing for different set of questions and significantly different modes of engagement, although visual outputs may in fact appear similar and emerge from similar practice.

There was a similar bifocal discussion about dealing with sparse datasets and the limitations on being able to produce statistically significant findings or to create appropriately rigorous models. A related aspect of this discussion raised a fascinating discussion surrounding determination of levels of abstraction in spatial modelling that allowed for generalisation and possible reuse of the model in other temporal or spatial contexts yet retaining enough particular relevance to allow for querying and examination in specific contexts. This discussion surrounding techniques to quantify fuzziness continues to permeate discussion. It is clearly a major challenges being routinely faced in this domain and appropriate methods to address it remain as yet elusive.

A very clear distinction emerged during the morning session in Lisbon highlighting the existence of two distinct approaches to spatial conceptualisation. The first, Social distances, attempts to model for many of the cultural factors that impinge on transportation and communication as demonstrated in the cases studies identified above. This is a unique and emerging perspective. This contrasts with the seemingly simpler concept of spatial distances, which in fact demonstrates similar modelling

complexities when looking at the added layers of geology and the nature of ways decisions that may in fact be informed by the same socio-political factors that are being identified in the emergent social spatial practice.

The question of tools, accessibility and providing access to supporting data used to generate visualisations as part of research product delivery is another recurring theme/challenge. As in past case studies at the previous two workshops, participants raised the issue of having to walk a fine line between being caught in closed proprietary platforms that allowed limited exposure of the underlying data and the resources involved in custom development using open source platforms that could allow for this ideal.

Topics discussed on the models and theory sessions:

During the second set of papers and cases studies presented the theme that seemed to organically be raised by the various uses of spatial tools and methods brought into sharp relief the rather varied ways in which distance can be both conceptualised and as a result measured. The simple concept of distance can clearly be applied to both space as well as time, and the addition of digital arts paper on how time is both personalised become a relative representation stretched all of the participants modes of thinking about alternative ways of measuring distance.

These divergent approaches to what at first seem to be less abstract notions - time and space - raised the need to instil into best practice the evaluation of different models, prior starting the analysis. Even a compilation of cases as presented during the morning and afternoon sessions suggest that numerous models are being conceptualised and put into practice today and that making examples of such available in a codified repository could solidly attempt to support this practice.

The afternoon sessions exposed concepts of complexity, emergence and self-organization within groups and within schools of practice and have spawned methods allowing for moving between micro and macro levels in networks when conducting analysis to expose such trends and patterns.

Networks visualizations are increasingly being employed in digital humanities practice as ways to deal with data issues and to raise new research questions. The challenges that are frequently emerging and seem to have gained even greater echo over the span of these three workshops deal with the demands inherent in working with network of greater dimension. The magnitude of emerging networks being modelled provides a constant stress not just on resources but on the scalability of the existing tools. A new practice seems to be emerging around exploring the means of modelling for temporal aspects within the networks and to allow for variation over time. Fluidity in spatial techniques has been a recurrent theme, but we are now seeing formal attempt to address this challenge and to reflect of its efficacy. In a similar fashion, there is a broadening in concepts being applied to network analysis that has also begun to draw spatial components out of non-inherently spatial defined networks and allowing for forms of spatial analysis carefully intertwined with the

network analysis itself. Especially in the presentation by Clement Levallois it was clear that Gephi is one of the more popular network visualisations tools in use in the digital humanities area, but there is no means yet available to effectively visualise dynamic networks and to provide for this layered spatio-temporal visualisation. All participants seemed to echo this appreciation of the need, but all the present available tools are unable as of yet to offer a possible solution.

General discussions / Future needs:

The theme of dynamism, change and fluidity was an important subject in several presentations and in the subsequent discussions. The response of the presenters in discussion with the participants highlighted a general agreement of a need for tools and methodologies to embrace data dynamics and also to capture and analyze the temporal variable in the network analysis methods. The construction of models undertaken by many of the presenters attempt to allow for this fluidity, but also exposes the increasing need amongst digital arts and humanities practitioners for means to deal with increased complexity with academic rigour as we deal with larger and more diverse datasets.

There was additional discussion on the role and limitations of GIS for this type of analysis. To date, it has been difficult to combine network analysis and spatial analysis with GIS, let alone marry this with emerging advanced data visualisation opportunities. Several issues were raised about the use of GIS in research projects in the Humanities, especially about the major financial and training effort that the use of such tools and methods pose to the researchers and the projects and the challenges that interdisciplinarity or lack thereof within traditional institutions presents to meeting this.

A further issue raised was that of the importance of Open Data. The importance of making data available along with the network analyses was stressed, to make sure that visualisations of networks can be tested by other researchers, especially as most historians are not expert statisticians. This discussion highlighted more questions than answers, and a major challenge was the additional cost of sharing data in terms of metadata, documentation, in addition to funding for the analytical work. We cannot speak about Open Data without taking account questions of copyright, past research efforts and future expectations about data exploration from the data producers/researchers, as well as issues of compatibility and interoperability of data, that when not accounted for can make the shared data unsuitable for other tasks. We must find a means to make Open Data a formal and identified common practice both to ensure the veracity of our research products but also to gain greater respect for digital practice from without the digital humanities domain.

The next topic discussed was the necessity of being able to connect visualisations and models in network analysis to the source data. This raised issues surrounding the need to test robustness of data, about the need to conduct research in a more iterative fashion, and overcome of the “black box” effect, frequently associated with

the beautiful visualisations that many of in our domain are producing to support spatio-temporal network analysis. The importance of connecting to the source data and making it both accessible for critical appreciation and for further application in unforeseen ways was also noted. This raised a subsequent reflection on the way in which the employment of increasingly complex and powerful modelling and visualisation tools are opening up new avenues of investigation yet, may be causing researchers to feel that they are being distanced from their objects of study - an early indicator of how our practice must reflect on changing human dimensions of DH practice.

Problems with data validation can be overcome by using rules and standards that already exist. However, their existence is not always widely known and their application has yet to permeate the pedagogy that is currently being practised. We need to find means of enforcing awareness and embedding into formal process - possibly through greater engagement with funding bodies and entrenchment as a condition for access to funds.

The user-friendliness of software and specific-domain instruction required to carry out even basic tasks when attempting to utilise network analysis was raised as a challenge to greater use in digital humanities scholarship.

The need to be aware of solutions from other disciplines was mentioned as a way to try to overcome problems that occur when researchers incorporate complex variables, as space and time, into an already complex method like network analysis.

A number of specific approaches, methods and tools were mentioned in the discussion, some pointed out during the presentations, others in the debates between them. The use of GIS software was frequently mentioned (ArcGIS; SQL-based OrbisGIS). Gephi was another tool used by several of the research projects and frequently recommended as the tool currently best suited to dealing with space and time. Several statistical and theoretical approaches to incorporate temporal and spatial data in network analysis were mentioned, such as simultaneous equation modelling (OLS, Koenker test, and GWR), clustering analysis and visualization, exploratory visualization of networks, theory-driven visualizations, and Principal component analysis.

One of the discussions inspired by the presentations considered the interplay between programming and humanities research, and the communication challenges between two fields (Computer Science and the Humanities) that have had a historic tendency to work independently of one another. This arises particularly as difficulties of communication among project members who come from different methodological backgrounds and terminology. A desire was expressed to realise multidisciplinary teams in order to build bridges between these different knowledge domains. Many of the projects demonstrate the potential of this and it is precisely this gap that the NeDiMAH network (and in our case the Space-Time Workgroup), is bridging, in the digital humanities community.

Tools mentioned, used or demonstrated during the workshop:

ArcGIS (<http://www.esri.com/software/arcgis>)

Cytoscape (<http://www.cytoscape.org/>)

D3 (<http://d3js.org/>)

Gephi (<https://gephi.org/>)

GEXF (<http://gexf.net/format/>)

GUESS (<http://graphexploration.cond.org/>)

igraph (<http://igraph.sourceforge.net/>)

Netdraw (<https://sites.google.com/site/netdrawsoftware/>)

nodeXL (<http://nodexl.codeplex.com/>)

Pajek (<http://pajek.imfm.si/doku.php?id=pajek>)

QuantumGIS (<http://www.qgis.org/en/site/>)

R Project (<http://www.r-project.org/>);

SeaDragon (<http://mith.umd.edu/tile/2010/09/07/the-open-source-seadragon/>)

TimeLink (<http://mhk.fl.uc.pt/>)

Ucinet (<https://sites.google.com/site/ucinetsoftware/>)

Visone (<http://visone.info/>)

VivaGraphJS (<https://github.com/anvaka/VivaGraphJS>)

VOSviewer (<http://www.vosviewer.com/>)

Annex 1 Programme

9:00 – 9:30 Reception/Introduction

9:30 – 10:15 Presentations #1

Pau de Soto Cañamares (Instituto de Arqueología de Mérida - Spain): *Costs & times of the Roman transport. Using network analysis to understand the Roman transportation system*

Thomas Thevenin (University of Burgundy - France), Robert S. Schwartz (Mount Holyoke College - USA) and Christophe Mimeur (University of Burgundy - France): *Measuring the link between space and network over time*

10:15 – 10:45 Discussing/Sharing/Practising

10:45 – 11:00 Coffee break

11:00 – 11:45 Presentations #2

Albertina Ferreira (Instituto Politécnico de Santarém - Portugal), Carlos Caldeira (Universidade de Évora - Portugal) and Fernanda Olival (Universidade de Évora - Portugal): *From low density networks to geo-temporal approach*

Martin Stark, (University of Hamburg - Germany): *Locating historical networks in time and space: current achievements and challenges*

11:45 – 12:15 Discussing/Sharing/Practising

12:15 – 12:30 Results/Conclusion

12:30 – 14:00 Lunch

14:00 – 14:45 Presentations #3

Tim Evans (Imperial College London - UK): *Spatial Network Models in Archaeology*

Joaquim de Carvalho (Universidade de Coimbra - Portugal): *Networks, self-organisation and historical research: uncovering hidden structures in historical data*

14:45 – 15:15 Discussing/Sharing/Practising

15:15 – 15:30 Coffee break

15:30 – 16:15 Presentations #4

Clement Levallois (Erasmus University Rotterdam - Netherlands): *Visualization of large and time-dependent networks: advances and limits*

Sofia Oliveira, Jared Hawkey and Nuno Correia (CADA and Universidade Nova de Lisboa - Portugal): *Finding and Representing Personal Time/Space Patterns*

16:15 – 16:45 Discussing/Sharing/Practising

16:45 – 17:30 Results/Conclusion

Annex 2

Presentations (abstracts)

Pau de Soto Cañamares (Instituto de Arqueología de Mérida - Spain): *Costs & times of the Roman transport. Using network analysis to understand the Roman transportation system*

Several methodological approaches are used to these days that also suggest how the Roman transport worked. This project is based on the operability of the Roman infrastructures as an indispensable way to know the benefits and shortcomings of the transportation system created in Roman times. A thorough analysis of each distribution models set (both temporary and costs) provides valuable information for understanding the mechanisms of the Roman economy and society. It is therefore obvious that the combination of all of the approaches (archaeological material, ancient sources, network simulation...) should allow us to obtain a more global perspective of the Roman economy, especially in matters of movement of goods.

The main geographical focus of this project is the NE of Hispania, but with the aim of use these methodology in a much broader geographic frame, the entire Iberian Peninsula, Italy and Britain were analyzed.

As would be seen during the presentation of this work, the knowledge of infrastructures is essential to obtain a more accurate knowledge of the freight transportation. This project has taken into account while analyzing the whole infrastructure of Roman roads which existed in Roman times, whether through land environment, river or sea. A set of constant values have been used to calculate the costs and transportation time needed for commerce. So, this model offers a simulation of possible costs and times needed to transport certain goods that had to be spent to travel from a particular spot of territory to another (and even the entire network).

Finally, the ability to see graphically and quantified those costs and time values which until now they could only be guessed, can open new perspectives and justifications to the speeches made on the work done until today. In fact, the comparison between these results and the analysis of archaeological and historical interpretations should not invalidate the final information but in many cases they should complement each other, clarifying and offering more elements for a global vision.

Thomas Thevenin (University of Burgundy - France), **Robert S. Schwartz** (Mount Holyoke College - USA) and **Christophe Mimeur** (University of Burgundy - France): *Measuring the link between space and network over time*

The railway growth seems to be essential to the economic dynamism of the north in France from 1830 to 1930. However, could we underline the same statement for the south of the country and for general consideration for the rural areas? On one hand,

the transportation economy the network effect is essential to develop economy, agriculture and demography. Many governments' policies are based on this mythic belief to justify the construction of important infrastructures. On the other hand, many others authors as historians and geographers criticized this position on the "network effect" (Pumain 1982). These works are usually based on aggregate scale or are focused on urban areas. The database presented in this article could be used to work at different scales to consider rural and urban regions or agrarian or industrial sectors on a long period of time. In this way, we need to explore the explicative power of econometric solutions. We will present the first encouraging results based on GWR indicators (Fotheringham, Brunson, and Charlton 2009). This measure will be essential to pass from a descriptive approach to an explicative scientific strategy.

Albertina Ferreira (Instituto Politécnico de Santarém - Portugal), **Carlos Caldeira** (Universidade de Évora - Portugal) and **Fernanda Olival** (Universidade de Évora - Portugal): *From low density networks to geo-temporal approach*

This study is based in 117000 prosopographic registers available in the SPARES database (Prosopographic System of Social Relations and Events Analysis). This database has being developed by the research project "Intermediate groups in the Portuguese dominions: the 'familiares' of the Holy Office (c. 1570 -1773)", at the University of Évora. The database collects information regarding biographic and relational events, from the sixteenth to the eighteenth century. All the data is geo referenced. When producing historical maps about the location of familiares and comissários of Inquisition (1575-1775), the research teams has realized the existence of large areas of low density distribution of these characters' networks. This study aims the creation of an analytic geo-temporal model which would allow historians to study these areas of low density distribution, in a comparative way. Departing from the dynamic networks analysis approach, this methodology tries to adapt it to the elaboration of new research parameters. In this sense, the team tried to coordinate the database with geographical information system software, the ArcGIS. Even if these trials will be constructed from the Inquisition historical data, these model can be applied to the other research themes involving time/space/networks.

Martin Stark, (University of Hamburg - Germany): *Locating historical networks in time and space: current achievements and challenges*

Given the nature of their sources, network analysis approaches in history often have a primary focus on social interactions. Well-known examples are letter exchanges between scholars, traders, covert resistance activists, credit markets, career advances or migrations. Many of the above mentioned network studies have however strong spatial components as well, which directly affect the creation of social ties, their maintenance and nature. Medieval trading for example depended largely on the capacity or failure to cover geographical distances, while the speed

and intensity of scholarly exchanges depended on the reliability and speed of postal systems. Research in rural credit markets has for example revealed strong cross-border ties between 19th century Germany, France and Luxembourg. At this stage it seems however that by and large the spatial dimension acts as a background against which historical social interactions are being studied. I will present a selection of case studies and their integration and exploration of the spatial dimension.

Historical sources not only allow us to reconstruct social interaction in detail but also offer clues with regard to temporal dimension in which they occurred: Serial sources such as church registers, trading contracts and letters are often very easy to date and relate to each other in time. Network analyses which are based on the hermeneutic analysis of texts and other objects typically need to deal with heterogeneous data: Some ties can be dated precisely to an hour, whereas in other cases scholars need to infer time stamps based on the context of other events or simply can not make any such statements at all. I will discuss the challenges posed by missing data and data collection methods as well as the challenges inherent in exploring temporal data using different visualisation techniques, some generic, some tailored to the needs of specific research questions.

Tim Evans (Imperial College London - UK): *Spatial Network Models in Archaeology*

I will look at the spatial network models that have been used in archaeology. I aim to show to what extent they are all part of large families of models which will highlight the similarities and the differences. I will then ask if one model is better than another and how we might answer that question. I will also look at the sort of questions that can be answered with such models.

Joaquim de Carvalho (Universidade de Coimbra - Portugal): *Networks, self-organisation and historical research: uncovering hidden structures in historical data*

The theme of self-organisation and the emergence of complex structures has been object of intense interdisciplinary interest since the beginning of the century. Historical research has been somewhat distant from these new approaches, certainly because of methodological and empirical difficulties in finding opportunities of applying such concepts to concrete historiographical problems supported by historical sources. We will demonstrate that it is possible to detect historical processes in which there is strong evidence of mechanisms of self-organization at work. We also show how common sources contain precious information that can be made visible by applying special network analysis tools. We will focus on two examples: the choice of godfathers as recorded in parish registers and the circulation of mail in the 18th century. The main conclusion from our examples is that historians should bring into their conceptual and methodological tools the findings of Complexity Science, namely the concepts of Emergence and Self-Organization, and the techniques of network reconstitution and analysis. By incorporating tools and

concepts such as these new insights can be gained into the fundamental questions of the persistence of structures and the interaction of structures and individual agency.

Clement Levallois (Erasmus University Rotterdam - Netherlands): *Visualization of large and time-dependent networks: advances and limits*

Network visualizations are helpful devices for the exploratory analysis of a dataset and are increasingly accepted as legitimate formats for the visual display of an argument in the social sciences and the humanities.

I will report on recent advances in software development (evolutions of the Gephi platform) which widen the scope of these visualizations: the acceptable size of datasets becomes larger, and datasets of such a large size and with a time dimension can be represented.

Experimenting with these new possibilities opens the question of the meaning of the visualization thus performed. Based on the visualization of a large dataset of transactional data, I will discuss how (still young!) conventions for the meanings attached to the visualization of dynamic networks are challenged by the scale and transactional nature of the dataset.

These advances are themselves anything but stabilized results, and the conclusion will discuss questions that are opened in the representation of large, time-dependent networks.

Sofia Oliveira, Jared Hawkey and Nuno Correia (CADA and Universidade Nova de Lisboa - Portugal): *Finding and Representing Personal Time/Space Patterns*

The talk describes the work carried out in a project, Time Machine, that aims to stimulate reflection about personal routine while engaging in a dialog regarding the daily uses of ubiquitous computing, and a more broad discussion regarding the methods and relations between art and science. TimeMachine was proposed as a collaborative project between CADA, a Lisbon-based art group that creates playful-experimental software mainly using mobile technologies, and the Interactive Multimedia Group of CITI/FCT/UNL, that works on different aspects of describing, processing and interacting with multimedia information. One of the main outcomes of TimeMachine is a mobile application that captures and processes location data and creates personal and intimate time and space maps that capture routine and activity. Visual representations exploit color, shape and proximity to show the network of meaningful places and how they are organized temporally. The visual representations rely on a carefully designed and rigorous processing framework that enables concrete representations of time and space but also supports the development of subtle and ambiguous representation forms. The work was developed in an iterative process where multiple processing and visualization prototypes were developed, tested and subject to critical reviews. The talk will

discuss the different methods that were employed to develop the project, the results obtained so far and open issues for further research. Particular attention is dedicated to the tension created by the different goals that the project had considering its desired artistic and scientific outcomes. <http://img.di.fct.unl.pt> <http://cada1.net>

Annex 3

Participants (general info)

#	Name	Gender	Position/Area of interest	Institution	Country
1	Ana Alcântara	Female	PhD Student	FCSH - UNL	Portugal
2	Tiago Alvarez	Male	Marketing Consultant	---	Portugal
3	Daniel Alves	Male	Historian	FCSH - UNL	Portugal
4	Francisca Alves Cardoso	Female	Post doc researcher	CRIA FCSH - UNL	Portugal
5	Carlos Caldeira	Male	Assistant Professor	University of Evora	Portugal
6	Joaquim de Carvalho	Male	Professor	University of Coimbra	Portugal
7	Guida Casella	Female	PhD Student	FCSH - UNL	Portugal
8	Rita CASTEL'BRANCO	Female	Teacher	ESE - Maria Ulrich	Portugal
9	MIMEUR Christophe	Male	PhD Student	University of Burgundy	France
10	Teresa Claudino das Neves	Female	Process technique	Renoldy, SA	Portugal
11	Nuno Correia	Male	Professor	FCT - UNL	Portugal
12	Stefani Crabtree	Female	PhD Student	Université de Franche Comté	France
13	Shawn Day	Male	Professor	University College Cork	Ireland
14	Maria Jose de Almeida	Female	Archeologist	Camara Municipal de Cascais	Portugal
15	Pau de Soto	Male	Archeologist	Instituto de Arqueología de Mérida	Spain
16	Lígia Duarte	Female	PhD Student	CIDEHUS - Universidade de Évora	Portugal
17	Øyvind Eide	Male	Senior Analyst	University of Oslo	Norway
18	Tim Evans	Male	Senior Lecturer in Theoretical Physics	Imperial College London	United Kingdom
19	Albertina Ferreira	Female	Teacher	Instituto Politécnico de Santarém	Portugal
20	Paulo Miguel Ferreira	Male	Program Manager	Via Verde Portugal	Portugal
21	Eduarda Ferreira	Female	Researcher	e-GEO, FCSH-UNL	Portugal
22	Gonçalo Ferreira	Male	Independente Consultant	Independente Consult	Portugal
23	David Ferreira	Male	Masters Student	FCSH - UNL	Portugal

24	Patrícia Fidalgo	Female	Researcher	UIED/FCT-UNL	Portugal
25	ALEXANDRA GAGO DA CÂMARA	Female	Professor	Universidade Aberta	Portugal
26	José Gomes	Male	Researcher	ICS/UL	Portugal
27	MARIANA GOMES	Female	PhD Student	CLUL / KCL	United Kingdom
28	Maria Cristina Guardado	Female	Professor	ESTGA-UA	Portugal
29	Dalia Guerreiro	Female	PhD Student	Universidade de Evora	Portugal
30	xinna han	Female	Translator	Freelance	Portugal
31	Heikki Hanka	Male	Professor	University of Jyväskylä, Finland	Finland
32	Jared Hawkey	Male	Artist	CADA, Art Group	Portugal
33	Anca Horvath	Female	Architect	UTCN	Romania
34	Leif Isaksen	Male	Lecturer in Digital Humanities	University of Southampton	United Kingdom
35	Pedro Jorge	Male	Sociology	FCSH - UNL	Portugal
36	Florian Kräutli	Male	PhD Student	Royal College of Art, London	United Kingdom
37	Clement Levallois	Male	Researcher	Erasmus University Rotterdam	Netherlands
38	Nuno Lima	Male	PhD Student	IHC, FCSH-UNL	Portugal
39	graça lopes	Female	Professor	FCSH - UNL	Portugal
40	Joana Lopes	Female	Landscape Architect	Faculdade de Arquitectura-UL	Portugal
41	Patrícia Lucas	Female	PhD Student	IHC, FCSH-UNL	Portugal
42	Eetu Mäkelä	Male	Researcher	Aalto University	Finland
43	CIOCANEA MARILENA DOINA	Female	Lecturer Architecture	Faculty of architecture, USH/BUCHAREST	Romania
44	ANTÓNIO MARTA	Male	Economic advisor	Freelance	Portugal
45	Alexandre Monteiro	Male	Archeologist	IAP/IHC, FCSH-UNL	Portugal
46	Helena Murteira	Female	Senior Researcher	CHAIA - Universidade de Évora	Portugal
47	Fernanda Olival	Female	Professor	Universidade de Évora; CIDEHUS	Portugal
48	Ana Oliveira	Female	Masters Student	FCSH - UNL	Portugal
49	Sofia Oliveira	Female	Sociologist	CADA, Art Group	Portugal

50	Yamê Paiva	Female	PhD Student	Universidade Nova de Lisboa	Portugal
51	Diogo Paiva	Male	PhD Student	CHAM, FCSH-UNL	Portugal
52	Fredrik Palm	Male	Research and development coordinator	Umeå University HUMLab	Sweden
53	Joana Paulino	Female	PhD Student	FCSH - UNL	Portugal
54	Patrícia Pires	Female	Masters Student	FCSH - UNL	Portugal
55	Teresa Prates	Female	Geographer	---	Portugal
56	Ana Queiroz	Female	Researcher	FCSH - UNL	Portugal
57	Antonio Rêgo	Male	Masters Student	Leiden University	Netherlands
58	Ana Ribeiro	Female	Professor	University of Coimbra	Portugal
59	Ana Ribeiro	Female	Post doc researcher	CIDEHUS - Évora University	Portugal
60	Miguel Ribeiro	Male	Executive director	Www.miguelribeiro.eu	Portugal
61	Delminda Rijo	Female	Researcher	Câmara Municipal de Lisboa	Portugal
62	Maria Alice Samara	Female	Researcher	IHC, FCSH-UNL	Portugal
63	alice santiago faria	Female	Post doc researcher	CHAM, FCSH-UNL	Portugal
64	Ana Santos Leitão	Female	PhD Student	University of Lisbon	Portugal
65	Marta Silva	Female	PhD Student	IHC, FCSH-UNL	Portugal
66	Martin Stark	Male	Researcher	University of Hamburg	Germany
67	Thomas Thevenin	Male	Geographer	University of Burgundy	France
68	COVADONGA VALDALISO	Female	Researcher	Universidade de Coimbra	Portugal

Annex 4
Participants (statistics)

Country	#	%
Portugal	50	73,5
United Kingdom	4	5,9
France	3	4,4
Finland	2	2,9
Netherlands	2	2,9
Romania	2	2,9
Germany	1	1,5
Ireland	1	1,5
Norway	1	1,5
Spain	1	1,5
Sweden	1	1,5
TOTAL	68	100,0
Position	#	%
Post doc researcher	3	4,4
PhD Student	15	22,1
Masters Student	4	5,9
Others	46	67,6
Gender	#	%
Female	38	55,9
Male	30	44,1