Science meeting report - Visual Tools and Methods in Digital Humanities: Representing, Reading, and Thinking about Knowledge Creation

Hamburg 21th of July 2012
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Summary

Exploring the shifting intersection between more descriptive and analytical uses of visual components in digital environments and interpretative research tools - we will theorize 'new' readings and question shifts in representation within the digital sphere. In the workshop we gathered expertise from different research areas, each one of which uses various form of visualization to support existing research and to anticipate new research.

The workshop's general aim was to define critical reading principles both for research itself but also for the awareness of both usage and design aspects of digital tools for different paradigms within the research process. The workshop was the second NEDIMAH infoviz workshop.

Participants shared problems and solutions encountered throughout the different stages in the research process such as:

data collection/modeling,

representation/visualization and

interpretation/perception.

Multiple perspectives were voiced. As a result the workshop managed to articulate a better understanding of both the risks and benefits involved while considering the different stages of visualizing research as well as considering the different audiences for the visual outputs of research.

The workshop was organized by giving participants responsibilities for sharing their views on how to address/reflect upon the objectives of the workshop. The participants expressed a keen interest in the theme of the workshop, but more importantly there was a strong collaborative atmosphere of shared research and experience where everyone felt their perspective mattered.

In the closing session, all participants gave their summary of the workshop by putting their most important issues/questions on white-boards.

The workshop gathered 14 participants predominantly composed of the NEDIMAH working group. There were also guests from other working groups of NEDIMAH as well as other invited expert participants. In the workshop we shared a variety of perspectives on how to

use, and how to reflect upon the use of visualization in the humanities. The participants shared presentations and had prepared themselves by reading selected contributions and also by preparing comments and questions. This framework facilitated an active and participatory engagement from the beginning, as each person had read and thought about the others' work prior to the meeting. This critical engagement was invaluable as it allowed participants to move beyond a surface description of their research and method, into comparative analyses from which shared points of concern and interest emerged.

Workshop results

Apart from general discussions about how to read and think in relation to information visualization we also shared several examples and related them to the key topic.

In the workshop various topics were covered:

graph-visualization for a variety of purposes, and in turn its relationship to research methods,

spatiotemporal models and representation,

3D modeling in cities, and

3D-capturing of Culture heritage.

From one map to the other: the risky, yet heuristic, parallel between Web graph and digital cartography

This presentation showed the heuristic opportunities arising from comparing two visualization tools used for online research: network graphs and geographic maps. This comparison can potentially bring a reflexive perspective on the graph as a representation of research in the age of big data. The presentation by Jean-Christophe Plantin identified 5 key challenges as well possible solutions:

The steps of creation

Temporal development

Subjectivity and black-boxes

Beyond hyperlink map

Image status

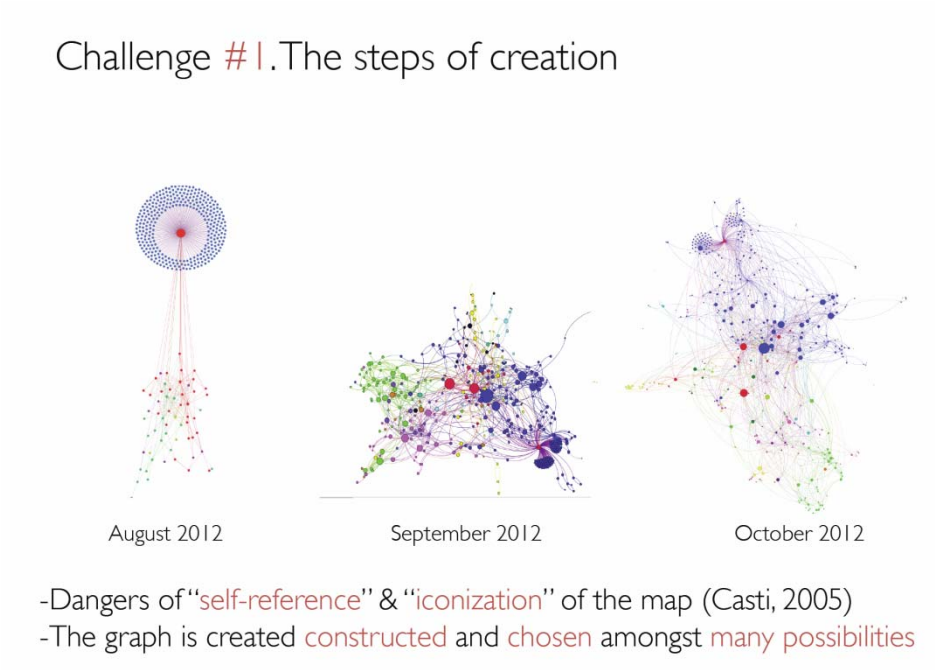


Image from presentation by Jean-Christophe Plantin showing some challenges in the steps of creation.

Plantin compared tools, low and high tech, to 'map' or represent the 460 nodes of the data. The resulting 'spaghetti monsters' are shown in the graphic above. As the slide suggests the danger of this type of representation is that this new network map becomes a geography in itself. Plantin suggests that solutions could include showing the various steps of the analysis, thus exposing the algorithm in a dynamic version of the graph.

In the second challenge, regarding temporal development, Plantin evokes Girard (2012) remarking that a website graph is outdated as soon as it is made, and Farinelli (2009) "violence of mapping" eg. artificially "freezing" a process in motion. Setting up a crawler that performs iterative crawl might be a solution to these issue".

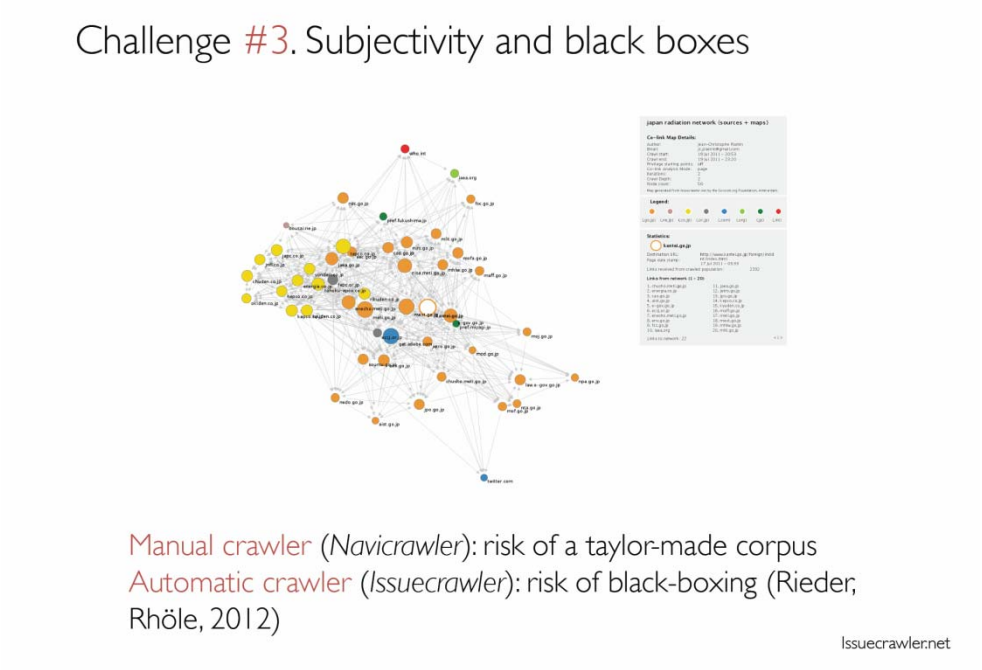


Image from presentation by Jean-Christophe Plantin creating awareness of the subjectivity and need for transparency in the data processing.

The solution proposed for the third challenge is to use only open source software, and to double check all aspects, including asking participants whether the graph is representative. Difficulties arise with the use of automatic crawlers, as they categorise the nodes, and set the colour, online and at the push of a button.

The fourth challenge – to move beyond the hyperlink map, also queried how to map non hyperlinked related forms of online cooperation. Plantin suggested a range of solutions, particularly 'participatory research' where various methods are employed to 'ground' the graph (Rogers, 2009) such as interviews, and documenting the cases.

The final challenge is the status of the image – here he uses the work of Boyd and Crawford (2011) moving "beyond the assumption of objectivity". He remarks that the graph is an exploratory tool, and not an end in itself.

An excellent discussion ensued – where Christoph Kudella remarked that there is currently no way to integrate context into the map. The question of the algorithm was a focus for many participants – querying the steps of creation, and why an individual would choose a particular visualization. Can an individual get information back into the map using a low tech online tool such as navicrawler. Questions arose too regarding the issue of exhaustivity, preferential attachment theory and the technique of interviewing actors/participants. Further questions focused on the issue of objectivity. A compelling visualization is not always truthful! Influence mapping is VERY difficult.

Data gathering and the visual representation of relational patterns and network structures. The case of illegal support networks for persecuted Jews during the ‚Third Reich'

„There is a tendency when using graphs to become smitten with one's own data. (…) Graphs have a tendency of making a data set look sophisticated and important, without having solved the problem of enlightening the viewer."

Ben Fry, Visualizing data, Sebastopol 2007, S.240.

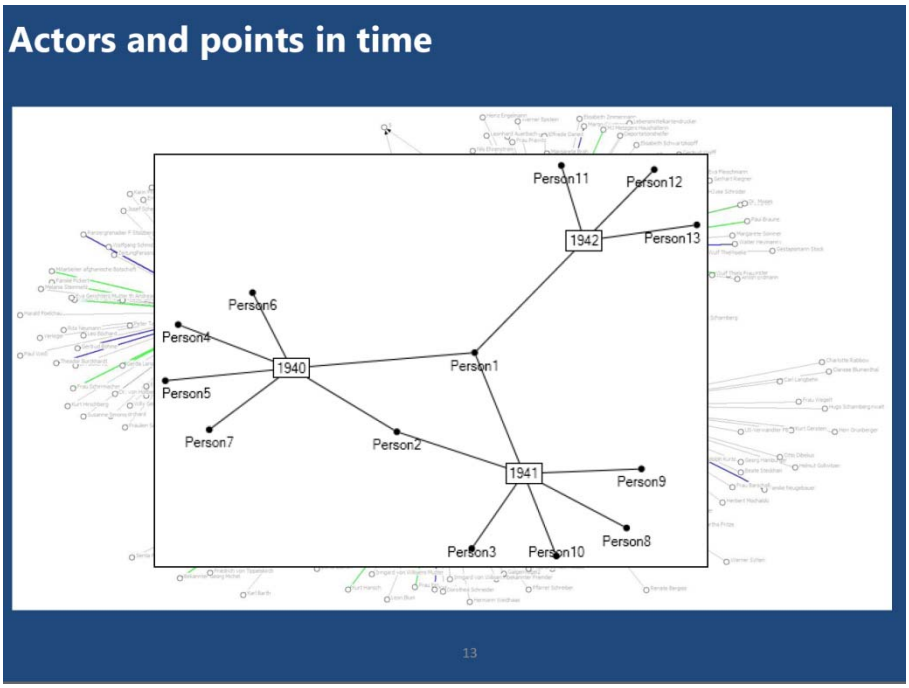


Image from presentation of Marten Düring, showing graph output as part of knowledge process but sometimes a limited set of information makes more sense than the whole complex graph.

In relation to the different challenges related to modeling and representations there was in the workshop an increased awareness of that Data visualizations do not "speak for themselves." The meaning of a given visualization is jointly produced and shaped by creators, software, social practices, and the recipients. That awareness is crucial for the more mature and meaningful usage of data visualization. Marten Düring summarized that in some guiding rules that need attention.

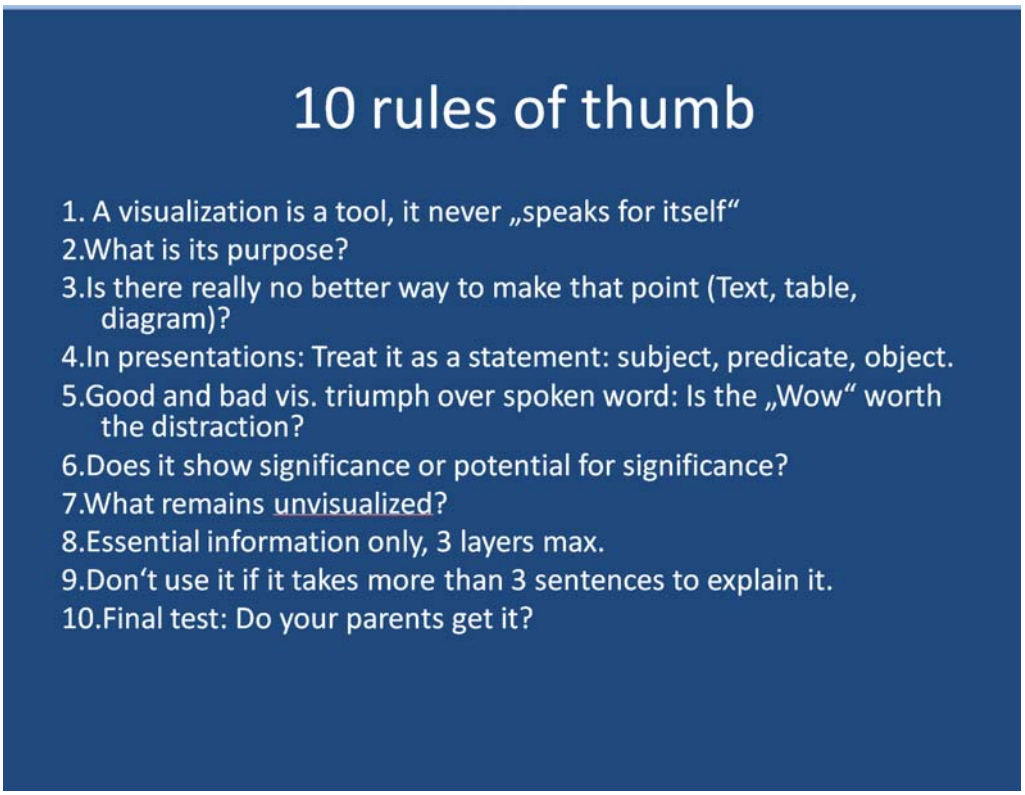


Image from presentation of Marten Düring showing some concluding highlights.

PELAGIOS Visualizing aggregated data: approaches and challenges

This presentation discussed how the Pelagios framework is beginning to bring together an enormous diversity of online data—such as books that reference places, and archaeological finds discovered there—which a user can search through, combine and visualize in various ways depending on their needs. The Pelagios Explorer , a prototype Web application that supports a number of common types of query using visually-oriented interaction metaphors (“which places are referenced in these datasets?”, “what is the geographical footprint of these datasets?”, “which datasets reference a particular place”) and displays results using a graph-based representation.

In the workshop there was interesting discussion how important it is that the framework should be flexible for different research approaches. Pelagios is about Linked Open Data – and there was an excellent exposition on visualizing aggregated data – their approaches and challenges surrounding:

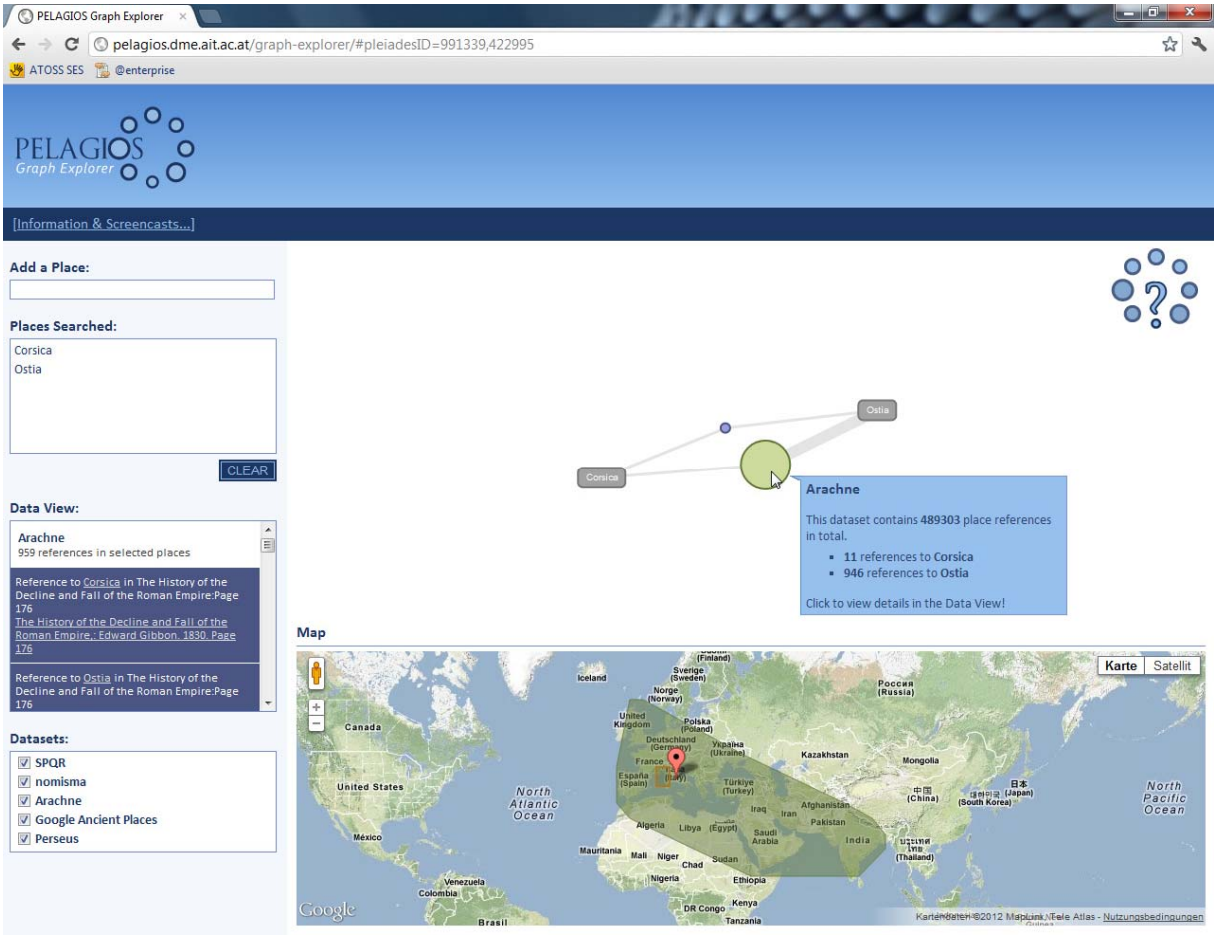
Getting the research out there

Reuse is sustainability

`Pelagios is not a service – is not hosting in any way

They annotate their data – they are using Pleiades and Hestia networks. There was much hard core manual work in the hand encoding of spatial categories. They are interrogating space and relationships and considering mapping as interrogation. There is an outsourcing of the

methodologies, querying directionality, senses of clustering and relationships. There is a movement towards a more dynamic visualization, but also they are confined to print in terms of publication. This theme was repeated throughout, in that screens and pages need to advance to readily allow the transmission of the visualizations being created to transmit research.



Pelagios explorer was presented by Elton Barker.

Use of digital tools in order to reveal Urban Landscape History

The scope of the research study was to identify through historic research this *Lost Gardens of Bucharest* (archives and literature research) and to virtually re-create them (2D and 3D), considering that visualization of past places and spaces is one method to disseminate the information, and raise the public awareness in unscientific environments. We consider that this method can constitute also the starting point in order to realise a local (or European) database of virtually re- constructed urban landscapes.

Main problems confronted within the elaboration of the research study (that we intend to discuss and present in the workshop) were related on how this scientific research can be delivered to public based on visualisation (digital) techniques in order to disseminate the cultural value of this lost places,

and also their atmosphere, history and specificity. The presentation will be focused on how research methods and data have been used through digital tools to overlap specific domains and amenities (humanities, information and visualisation).

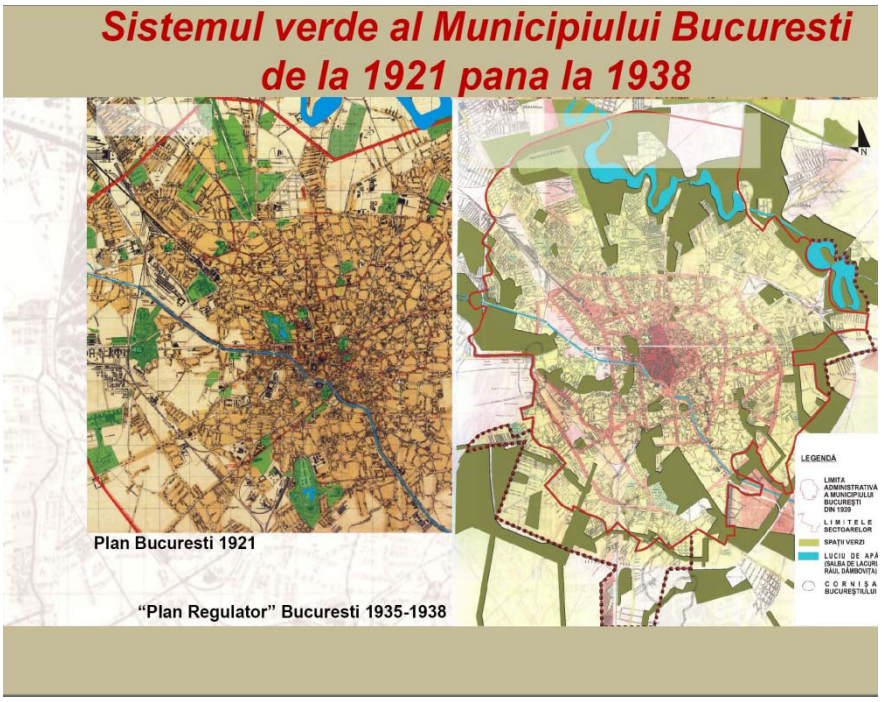


Image from presentation by Alexandru Calcatinge*, showing the mapping of the lost gardens in Bucharest*

In the workshop there was helpful discussion on how to improve the method of modeling as well representing the sometime uncertain data about park-landscape. A flexible approach was suggested where narrative text, images and sometimes also 3D and 2D could be used. All depending on what data was available.

This project posited the possibility of the gardens of Bucharest being reestablished in a virtual manner. The only future for these gardens is virtual. As iconic and symbolic urban spaces the proposed project has to contend with problematic data, based on a map from 1770 where some of the original gardens are located. At present few green spaces remain, in successive maps 1791, 1852, 1920 the diminishing green environment in the city was shown. The project proposes to construct a virtual image of each garden using old books, narrative descriptions and maps.

Participants suggested an OMEKA / Neatline mix as a solution – with possible social media mapping and integration for tourism.

How to choose pictures based on their narrative potential and how to interpret texts based on their visual capacity? - Guidelines for an urban history project.

The first aim of the presentation is to analyze an often observed dual need: a) to interpret pictures by means of narration; and b) to interpret texts by means of visualizations. It is suggested that recent technological advances can be explained with references to older hermeneutical theories by notably Paul Ricoeur, and Mikhail Bakhtin.

Having analyzed the symbiotic relationships between pictures and texts, the secondary purpose of the presentation was to study some practical problems of collaborative research. For example, by exploring these links between pictures and texts, how can we improve work that otherwise tends to focus on either visual or narrative analysis?

Rolf Hugoson works within the context of an urban history project, where working rules for the collection, analysis and presentation of pictures and other visual data are established.

The narrative behind the picture reveals more about the urban history than the picture itself does at first sight. Simultaneously the narrative contained in the image is also itself enriched by the historical context surrounding the image.

Image from presentation by Rolf Hugoson, where the contextual situation shows a less formal, but still important part of the urban planning process.

New light on old knowledge: Digitising the forms and structures of England's place-names

This paper described the Digital Exposure of English Place-names (DEEP) project, a JISC-funded project to digitise and make available some eight million place name forms documented in the Survey of English Place-Names. The resource currently being produced traces the etymological and linguistic histories of the all England's place-names from the 1086 Domesday Book to the present day. Place-names are not static. They change and evolve over time, in response to the development of language, wars and conquests, shifting administrative boundaries, or simply the vagaries of spelling in the days before dictionaries and atlases. They have complex etymologies derived from different languages including Anglo-Saxon, the Celtic dialects, and Norman, Scandinavian and Germanic languages. Toponyms also mean different things to different communities. Therefore, historical documents and archives, ephemera and sources, contain different spellings (forms) of place-names, depending on their date and context. However – and despite the fact that we now take for granted the ability to search geographic data using web services such as Google Maps and GeoNames.org – there is no gazetteer documenting these historic name forms. Therefore, there is no means of linking or cross-searching the geographic references they contain. In summary, a search using a modern place-name will not currently return results for that name in all its many variant forms. This has resulted in a major underutilisation of electronic resources.

In summary, the DEEP project, through a process of digitisation and manual and automated information processing, will make available a mass of place-name data which has never before been made available digitally. This raises important questions for how digital media can be used to approach the reconstruction of ideas about location, as expressed in the names of those locations. This paper will present explore those questions, with special reference to the Counties which will be available in digital form by the time of the workshop. These will include Cheshire, Leicestershire, Shropshire, and Cumberland and Westmoreland).

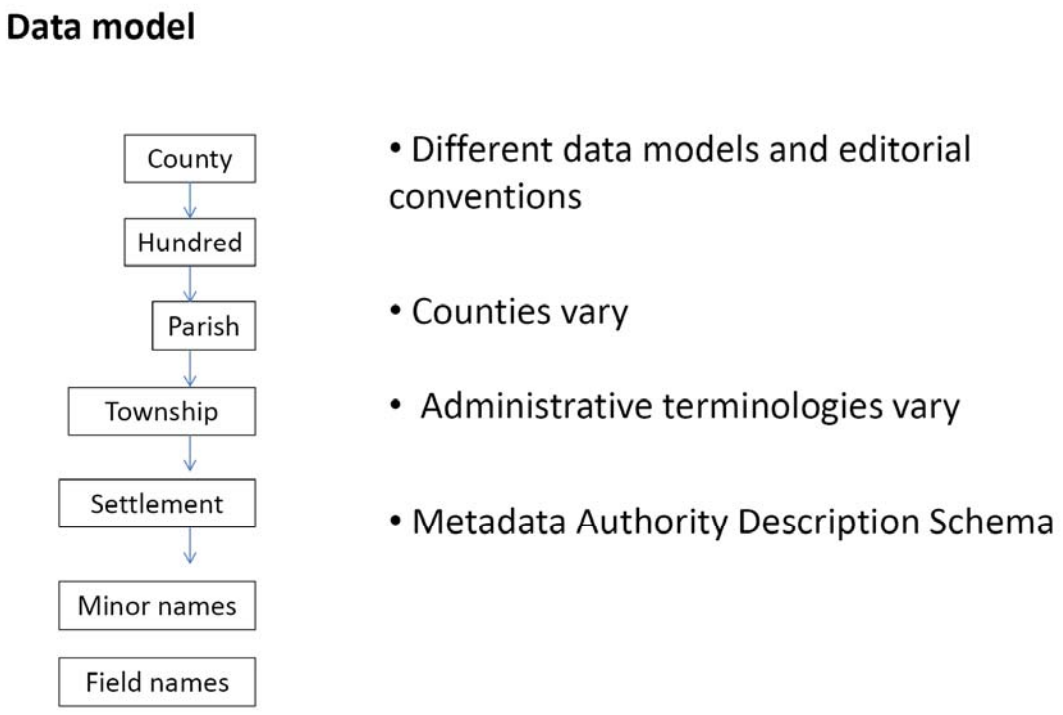


Image from presentation by Stuart Dunn, showing the complexity and needed consideration when digitalizing place-name resources

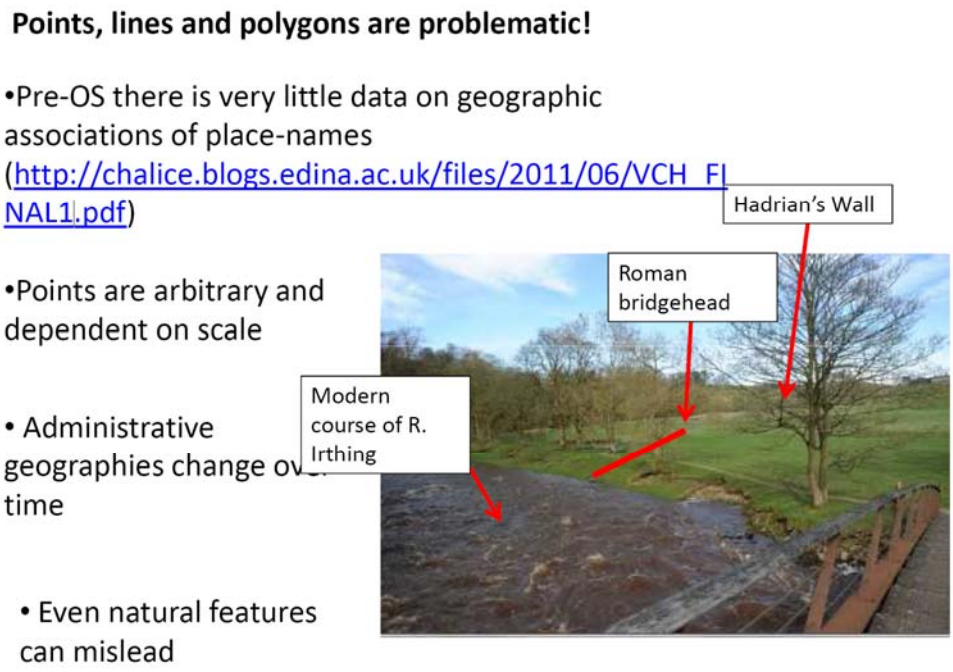


Image from presentation of by Stuart Dunn, showing the complexity of handling points, lines and polygons.

Dunn relates that place names are dynamic, attested, contested and researched. He also reinforces through examples above, some previous speakers' contentions that maps can be misleading over time. Critically Dunn queried concepts such as:

- Text
- Time
- Place

as being fluid concepts, and critically states that GIS is a tool, rather than an end in itself.

"Think with dataviz" - Towards Connected Concept Analysis (about *Textometrica*)

Research processes and the digital tools being used were further compared analysed using an aesthetic approach. This was done by sharing preliminary results of studying connections between the research method "Connected concept analysis" and the tool Textometrica.

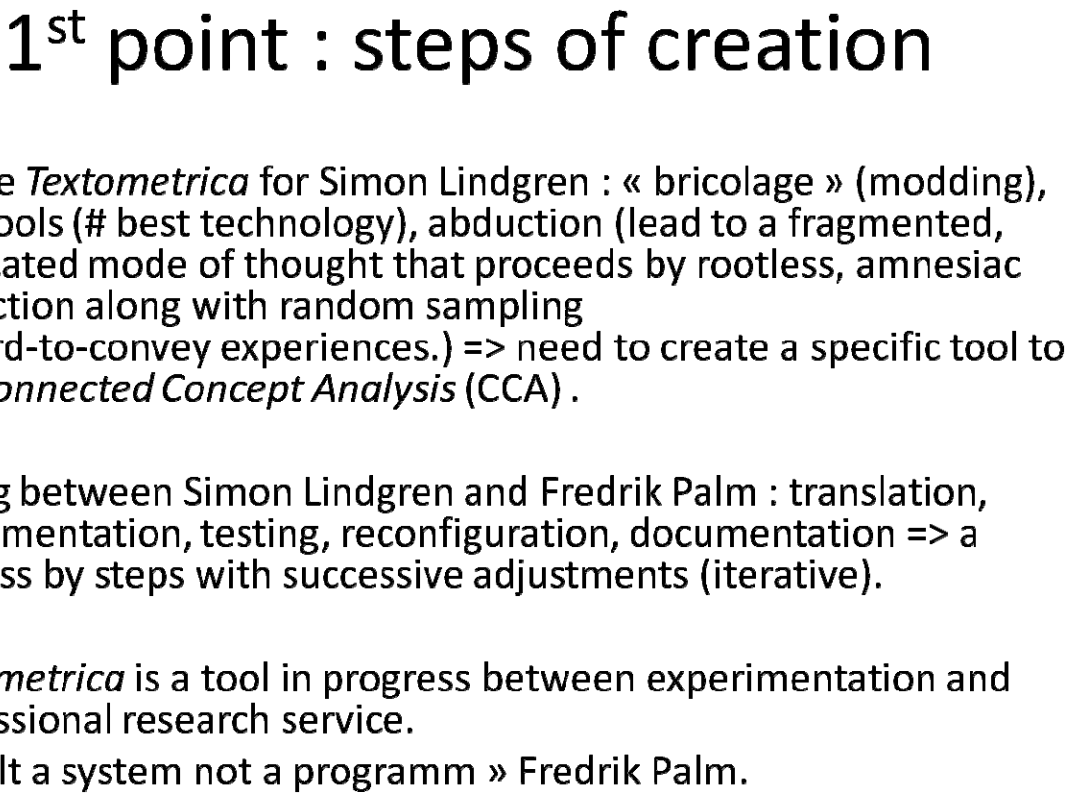
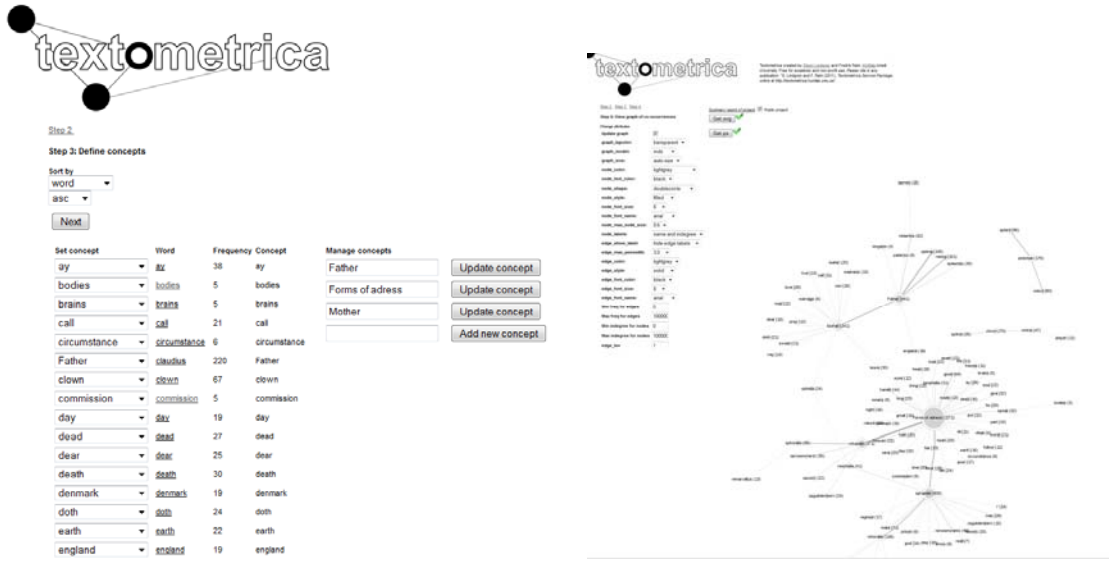


Image from presentation by Nicolas Thély and Fredrik Palm, showing the translation process between method and design of tool.

The aesthetic study looked into the different steps involved on a detailed level showing the need for the transparency of the tool and how it is being connected to the method.



Word to concept mapping and co-occurrence representation in Textometrica

2nd point : Application use (tools) /analysis (method)

- Step 1 : Upload file / Atomize discourse filtering steps.
- Step 2 : Select words / Atomize discourse filtering steps. (« *Textometrica* will perform the atomization and filtering steps as one single opération, presenting the researcher with a full word frequency list .» S.L.)

- Step 3 : Define concept / Conceptualization (« The process iteratively alters between creating, revising, deleting, spliting and merging categories, thus gradually refinning the image of « what is going on. » S.L.)

Image from presentation by Nicolas Thély and Fredrik Palm, sharing an example of the correlation and translation process between method and tool.

Thély began with a YouTube clip from Simon Lundgren – and proposed that within the context of the digital deluge an understanding of the context is vital as well as tools to explore, categorise and represent content. Our initial question is what is going on? What is the context?

Palm finds tools to help answer research questions, and Thély maintains that as an academic Simon had a vision, a research question and it was specific as he (Simon) was computer literate, therefore as they were both speaking the same language it was relatively easy for Palm to build Textometrica.

Visualizing Global News

"Visualizing Global News" studies how excerpts from large collections of political speech videos with historically significant personages are remixed into even larger collections of news broadcasts. It applies new techniques in search and visualization to aid both humanities researchers and the greater public interested in exploring the visual details, aesthetic features, and narrative context of source footage that is reused in news broadcasts.

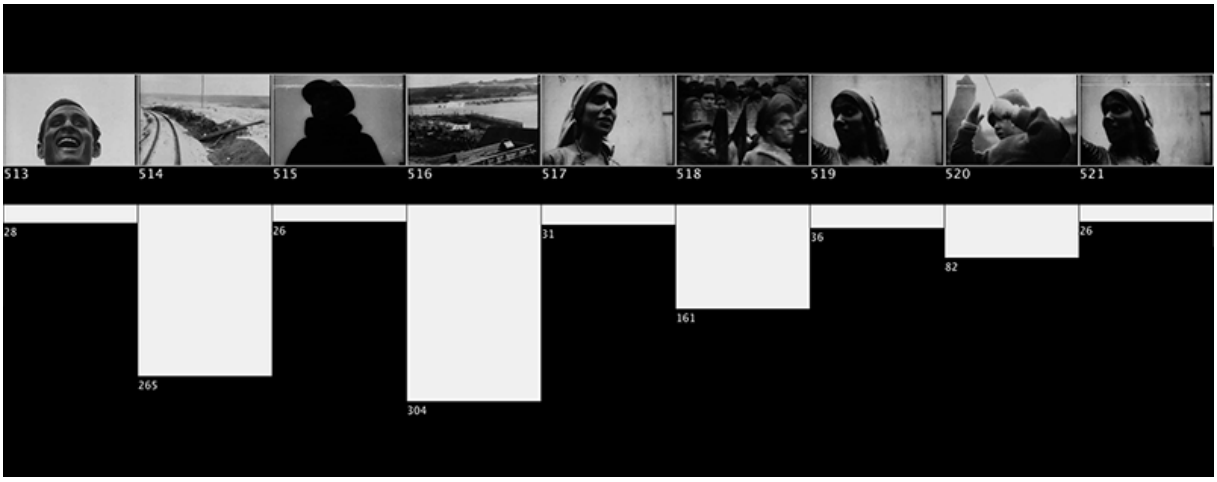


Image from presentation of Elizabeth Losh showing shot detection as approach to locate key elements in speech videos.

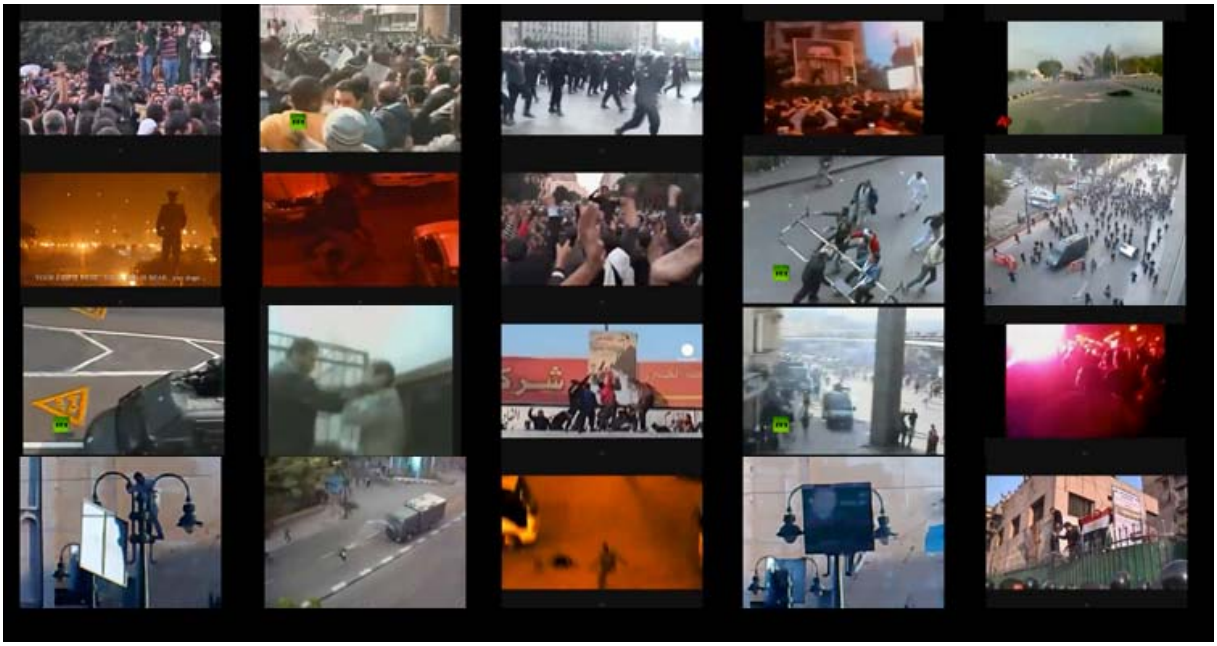


Image from presentation of Elizabeth Losh showing remix of source footage (with sometimes unidentified sources) with music of Michael Jackson.

From Creator to Viewer

Via Data to Meaning

When representing damaged Cultural Heritage -artefacts to a wide range of end-users /audiences there is a need to understand the context for the production of the model - the transformative and creative process behind the final representation. This is true for 3D-capturing, processing, analyzing and interpreting historical monuments, and inscriptions. It is necessary to document the researcher's choices at each stage, making their reasoning explicit – removing the process from the 'black box'. This enables future researchers to further understand and analyse the work. It is also clear that each aspect of the process involves much subjectivity, and that objectivity in terms of colour, light and shininess parameters is a loose term. There is an inherent subjectivity in attempting to represent acts of interpretation, even when those acts are measured and digitized. Key concepts emerge in terms of the fluidity of context, person, place, and time; colour and light; and even choices of what will be scanned all impact on the model. Murphy attempts to map the process, and proposes a community led methodology and taxonomy for the Hiberno-Romanesque.

Damaged high cross 10C CE Toureen Peacaun, Co. Tipperary, Ireland.

Image from presentation by Orla Murphy.

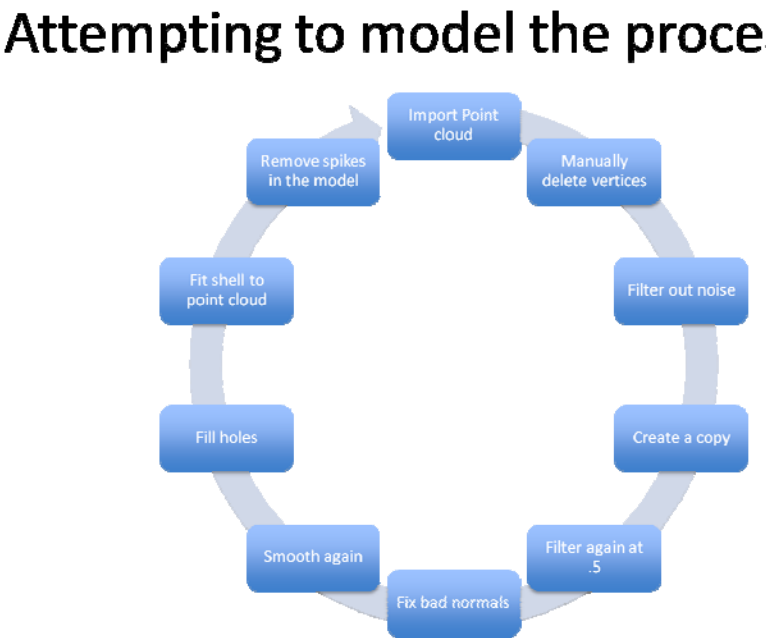


Image from presentation by Orla Murphy.

Conclusion, future work and activities

There was an excellent concluding debate, where many participants agreed that certain key issues pertained across the variety of research areas, and types of information visualization.

Reduction

The issue of reduction was a central one – how does one make sense of the output? How do **you** the researcher read it in the first place (before considering anyone else) and then, does it make sense to you, only at this point can one begin to consider other viewers, and how they might read the visualisation.

Process

There was a clear understanding that the use of visualization was as part of a process, and most were using it to make the data better, to flag issues, to understand key concepts, and to make critical issues understood more clearly.

Interface

The interface was also an issue outlined, user case studies were proposed, with iterative testing, feeding responses back into the models. A good example was the use of taglines in the representation to allow a naive user 'in' to the context of the visualization – java script for an annotated browsing experience is being used by Isaw at NYU numismo, it gives an intuitive legibility and may be worth exploring. Heatmaps and annotations density were also discussed in the context of the interface as being more obvious ways for the user to engage with the network graph.

Interdisciplinarity | Transdisciplinarity | Collaboration

Interdisciplinarity was also discussed as a necessary focus for future endeavour, teamwork was a feature of the projects presented, and the research undertaken, even when work is undertake by a lone scholar the work is often transdisciplinary in nature, crossing over the borders of traditional research – this is particularly evident for younger scholars, say in history, where the use of the network graph to display research results is by no means accepted by all.

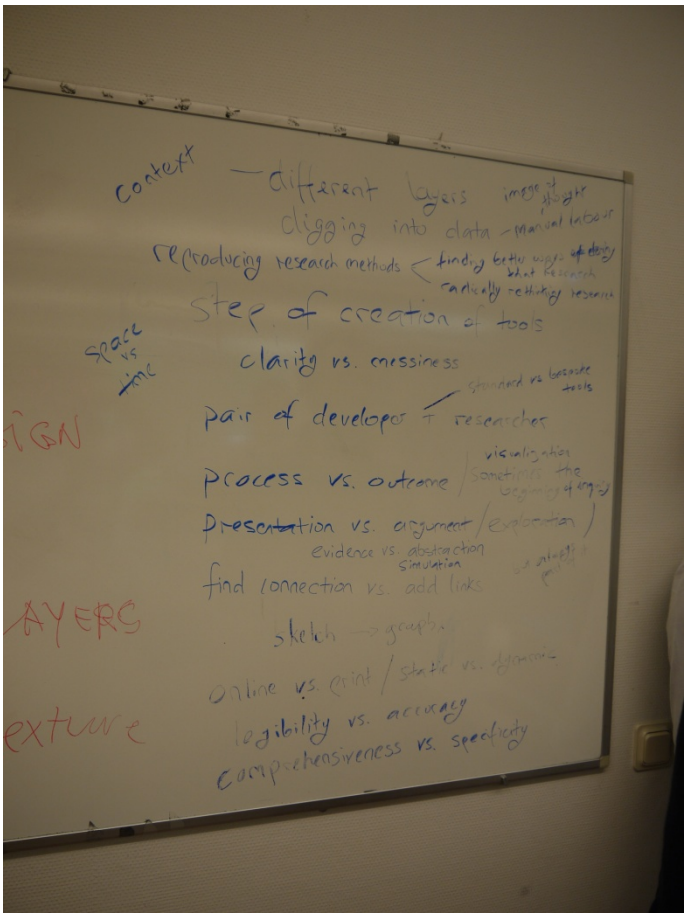
Audiences | Pedagogy

These aspects were also discussed – perhaps the pedagogy could form part of the user testing?

Meaning

Layers, interpretation, depth, chronology, context, how do we treat metadata associated with visualisations… all of these emerged as heuristic issues, that merge across topics and reemerged in the discussions at the end, to use Thely's terms, we are engaged in a putting together and a taking apart, bricolage and analysis.

In the concluding session groups of 2-3 persons tried to summarize the most relevant finding of the workshops. These were all written collaborative on 4 panels on two whiteboards. Each group having one color each.



Theme 1: digital vs. analogue/print

- There are various questions relating to what digital visualization brings to scholarship. Is it simply reproducing the research that is already being done? Or is it a case of finding better ways of doing or representing that research? Or might it even lead to radically rethinking the kinds of research questions that are asked?

- Some other questions: to what extent can visualizations be automated or is manual labour always an essential part of representing, and understanding, data? What degree of technical expertise is needed for visualizing data, and is that something that most humanists would be capable/willing to learn? And to what extent can visualization tools be made generic or is it always best to have bespoke tools to represent the particular dataset being studied?

- One aspect in which digital visualization would appear to change the rules of the game is in being able to depict more easily the differing *layers* of research, allowing them to be peeled away in order to bring to light different ways of thinking about the subject at hand.

- The digital medium, then, offers a dynamic visualization of the data in contrast to more conventional analogue/print static representations. This gives the user a great deal more input in managing and manipulating the data to explore different perspectives.

▪ Thinking about visualizations more dynamically takes emphasis away from presenting a final product to embedding them as part of a *process*.

▪ In turn, digital visualizations may be better thought of or better utilized as part of an argument or investigation than as the final outcome of research.

▪ A danger here though is that audiences remain seduced by visualization, by virtue of it being by nature visually arresting and by convention the manner in which results are conveyed. Attention will have to be paid to educating audiences not to view visualizations as finished products but as partial attempts to think about the data, which need explanation and interpretation as much as non-visual forms of argumentation. Visualizations are, as representations, always simulations… (cf. Derrida).

▪ On this note, it is worth considering that visualizations have limited power for explaining or making sense of nuance in the data, and will always need text to help unpack their visual semantics.

Theme 2: clarity vs. messiness

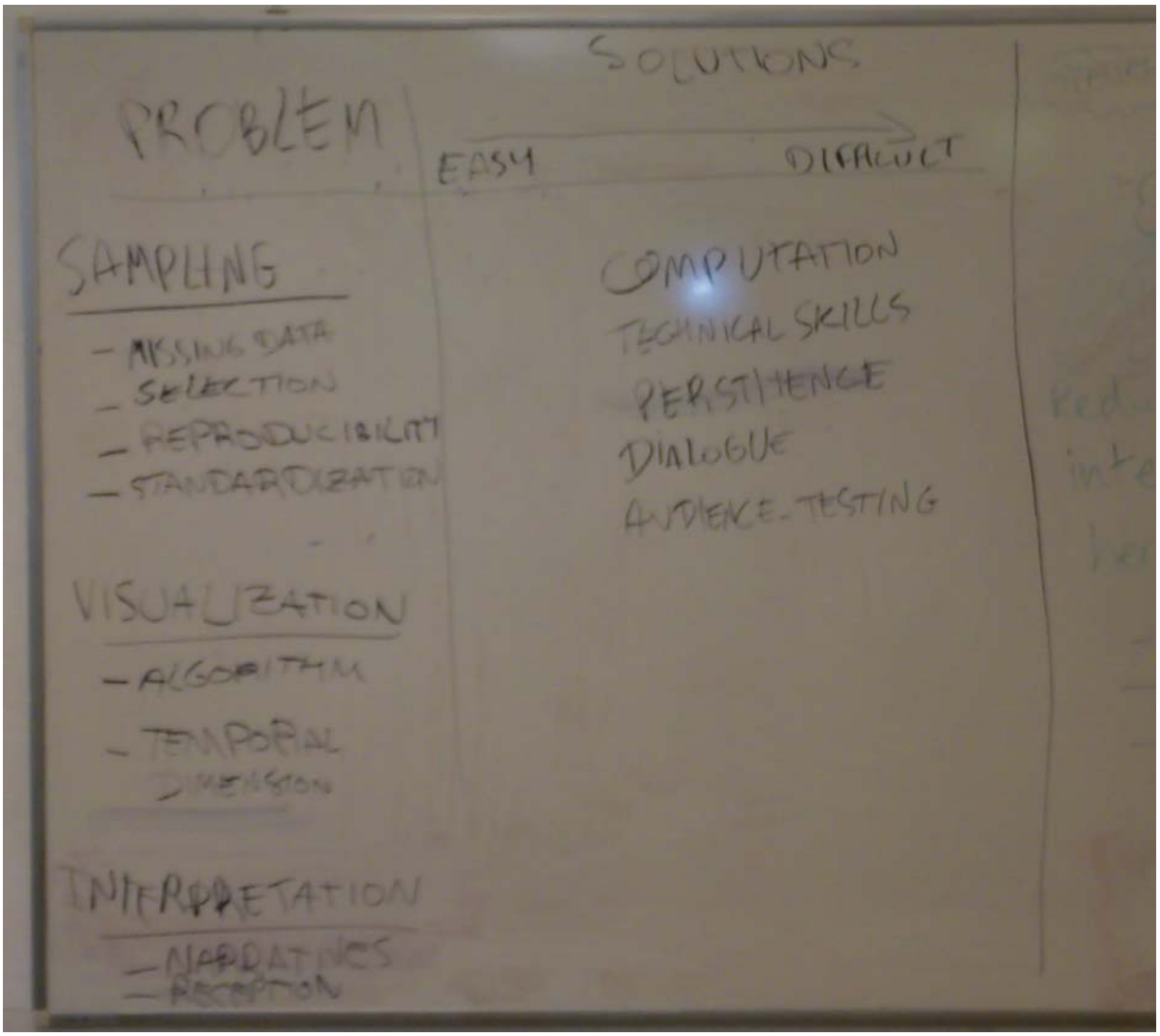
▪ There are many questions relating to the design of visualizations. Do they by nature simplify data or are there ways of allowing them to represent messiness? (And, if so, how?) Is there an inherent tension between legibility (being able to read data easily) and accuracy (depicting those data precisely and exactly)? And how does the tension play out between trying to present a comprehensive picture while at the same time aiming at specificity?

▪ Granularity is important, and in particular the ability to move between different levels of granularity.

▪ Is there a case for simplifying the visualization for a non-specialist audience, in order to communicate a basic argument, and then being able to build complexity into the visualization for the specialist? (e.g. The Stanford Orbis maps are visually arresting, but to what extent are they representing the data accurately?) And, if so, how does one go from one to the other? At the very least it seems important that the researcher is able to dig into the data for themselves.

▪ How much attention should be paid to communicating information vs. creating an attractive or arresting image? Where does power lie? (cf. Foucault).

▪ Finally, what gets lots in visualization?



This board aims to highlight some problems and solutions that researchers face while using network analysis method. First, the **problems**:

1. **Sampling**: the act of extracting and selecting the entities that will constitute the analyzed corpus brings various issues:
   - **Missing data**: some topics or fieldwork does not come with a full set of data, and some entities or set of entities might be missing; How can we adequately deal with these misrepresentations? Can seemingly perfect network vis be used even if we know they contain faults? Where do we draw the line between "tolerably faulty" and "intolerably faulty"?
   - **Selection**: which criteria are to be applied in order to operate this selection of entities?
   - **Reproductibility**: creating a corpus might be contingent in terms of space (access to sources) or time (during a certain period of time), which might make the corpus singular, and not reproducible; The goal must be to work with reproduceable vis, this is what makes them a credible academic medium of information. How can we make reproducability easier without simply giving away the precious data we collected?
   - **Standardization?** Similar to missing data: How do we need to account for consciously losing/neglecting information? Arguably, dealing with ambiguous and contradicting

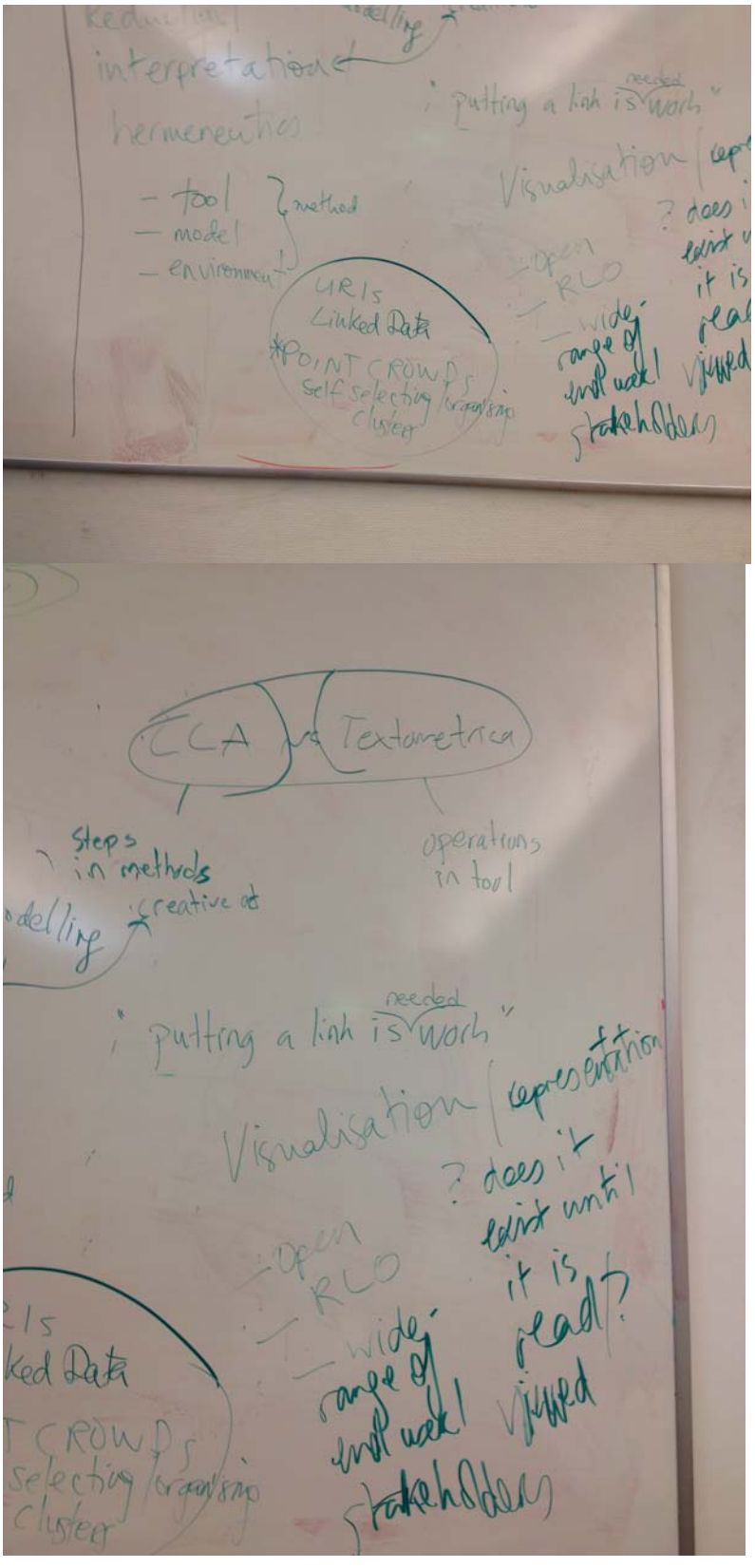
information is one of the strengths of the humanities. How can we use standardized categories without oversimplifiying/distorting our objects of study?

2. The way the corpus is visualized also brings several questions:
   - **Algorithm**: delegating the analysis of the corpus to an algorithm might bring some opacity to the analysis, especially with non-open licence tools; beyond that, the question is not to find the "right" algorithm, but rather to multiply the algorithm used during the analysis; and to understand what it does and how we are culturally determined to read text/vis/
   - **Temporality**: chronological development for a corpus is hard to visualize, as it requires to record how the dataset changes in time, which in turn brings the question of automating the corpus collection;
   - **Dimension** – dimensionality was also highlighted as a topic as the movement from representation in two dimensions, into three, and possible more also needs attention from scholars, we need to push this, as at present what is possible to represent in terms of dimensions is being limited by pages, and screens…

3. Finally, interpreting a network bears two issues:
   - **Narratives**: what is the status of the network in the analysis: is it an exploratory step closely linked to the analysis? Is it a final result that stands on its own? The multiples position that a network can have in a research can be confusing for the researchers and the audience; … and they are usually not distinguished as such
   - **Reception**: showing a network for scientific validation (article or communication) always has to deal with the reduction that the final graph brings: people might easily assume that it is a result on its own. It is then important for the researchers to also show what the final graph conceals, eg. steps of creation, rejected entities, software used: this precaution is not always easy to do, as it takes time and brings the risk to diminishes the point the researcher want to make.

In face of these multiple problems, researchers can choose amongst various **solutions**: each of them can apply to various problems.

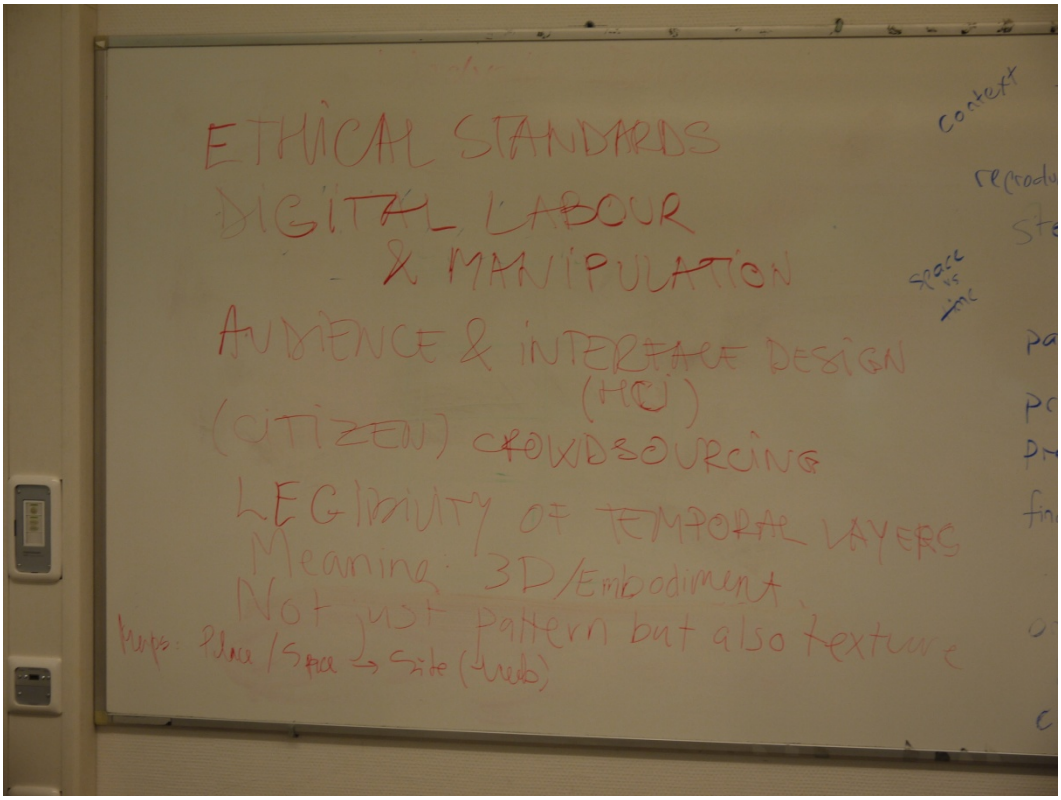
1. **Computation**: some type of entities or large set of entities might require or are facilitated by using automated means (eg. a websites corpus, big data);
2. **Technical skills**: network analysis takes time in order to get familiar with both the underlying theories of this rich field, and the tools to create and analyse a graph. If researching is a matter of test-failure with various theories and methods, it is more efficient if the researcher already knows if using network analysis will be worth it for his work;
3. **Persistence**: the various steps of network analysis (collecting entities, visualizing them, analysing them) take time, and it frequently requires back-and-forth movements between the various steps: persistence helps.
4. **Dialogue**: presenting and discussing a network analysis is fruitful during work in progress (as in the Nedimah workshop!), as it highlights the multiple issues that come with it; also while presenting the final results - a network graph never comes on its own and needs contextualization;
5. **Audience-testing**: "do your parents get it?" cf. Marten Düring presentation.



On this board there was an acknowledgement of the importance of the semantic web and linked data – the emerging Internet of Things, where leaving behind the web of documents the potential for new ways of representing research is great. Also, moving beyond traditional modes of scholarly publication and envisaging a wide range of end users or audiences or

stakeholders who participate in an active rather than a passive way – no longer simply the objects of research. This board is wary of the effect of reduction, and conscious of the multiple contexts for interpretative activity, both on the side of the creator and the viewer. Much like Barthes – we ask, does it exist unless it is read?

We suggest a standard, a key for maps, to facilitate an open environment of transparent research, without the black box, where the concepts of the research are clear, and the methodology of the tool in its relationship to the specificity of the research question is explicit also.



One topic highlighted in the workshop was the need to match up to a variety of *standards*. Ethical standards was first mentioned, but clearly also political, aesthetic and economic standards must be addressed. There is always a cost involved in making visual research and representations work: the concept of *digital labor* was introduced.

We also discussed efforts to make *digital visualizations legible in depth*. This might for example be accomplished by *highlighting the diversity of temporal layers*. Viewpoints and surfaces of presentation could then be allowed to change, while *preserving the integrity of sources*.

In *interface design* (HCI) it is furthermore important that audiences are invited to *participate in manipulating data*, visual or textual. By "manipulation" we intend practical experiences of investigating objects and data in virtual space: lifting up objects and turning them around; or

moving around inside sites, archives, spaces and places. Interestingly, the word "manipulation" also emphasizes *the risk of corrupting sources*.

An important topic to be further explored is *"citizen crowdsourcing"*. What practices of employing digital sources are developed by users in various cultural, political and economic contexts? What *learning experiences* can be arranged between scholars and practitioners? What standards need to be developed?

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The workshop in a assembly in the excellent buildings of the University of Hamburg. Photo taken by friendly student.

Creative collaborations in different contexts