Designing Controversies and Their Publics

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Designing Controversies and their Publics

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Keywords

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Abstract

Controversy mapping is a teaching and research method derived from the Science and Technology Studies and meant to explore and represent modern sociotechnical issues. Striving to make the intricacy of scientific debate readable for a larger public, controversy mapping is trapped in a classic simplicity/complexity trade-off: how to respect the richness of controversies without designing maps too complicated to be useful? Having worked on the question for almost two years in a project bringing together social scientists and designers (emapsproject.com[1]), we can now propose a way out of this contradiction and suggest three ways of moving through the simplicity/complexity continuum. The first movement -by multiplying the number of maps and by taking into account users before the beginning and after the end of the design process- allows to bypass the simplicity/complexity trade-off. The second movement bind together narration and exploration and allows the publics to venture in the maze of controversies unraveling the story that will guide them out. The third movement allows to involve the publics through all the phases of a cartographic campaign and to engage it again and again.

Asking the right question

Twenty years ago Bruno Latour conceived *Controversy Mapping* (CM)[3] as a method to train students in the observation and description of sociotechnical debates. Since then, CM evolved considerably not only because of the many universities that have adopted and adjusted it to their context[4], but also because controversy mapping has become the pivot of several international research projects[6].

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3 http://en.wikipedia.org/wiki/Mapping_controversies

4 See, for example, the most interesting work done by Albena Yaneva (2011) on architectural controversies at Manchester. Other cities in which CM is taught include Paris, Copenhagen, Milan, Manchester, Amsterdam, Liège, Lausanne, Padova, Trento, Buenos Aires and Rio de Janeiro.

6 MACOSPOL (mappingcontroversies.net), MEDEA (projetmedea.hypotheses.org), EMAPS (emapsproject.com, forccast.hypotheses.org).

Since the very beginning of this enterprise, it has been clear that the main challenge for the method was to engage with the publics of controversies, trying to address the question:

> *How to explore the practical tools to represent in a new ways scientific and technical controversies so as to equip the potential public and turn it into a real representative arena?* (MACOSPOL project document, 05/11/2007, p. 8)

To be sure, CM is not a method of social intervention. Unlike crisis management or conflict resolution, it is not meant to solve or channel debates (nor does it assume this is always desirable). CM is meant to explore and visualize controversies not to intervene in them. Yet, we knew all too well that maps are never neutral representations of a territory. Cartography has always been a political tool[8] and there was little reason to think that CM would be an exception. So, how could our tools and methods enhance democracy? What use will the public make of our maps? How can mapping improve the debate on science and technology?

When, at the end of the very first research project MACOSPOL, we gathered a group of journalists and policy makers to beta-test our results, we discovered that they could make little use of our maps. We were facing a classical trade-off in cartography: we could either offer maps that were rich but difficult to read, or maps that were easy to read but poor in content (see figure 1).
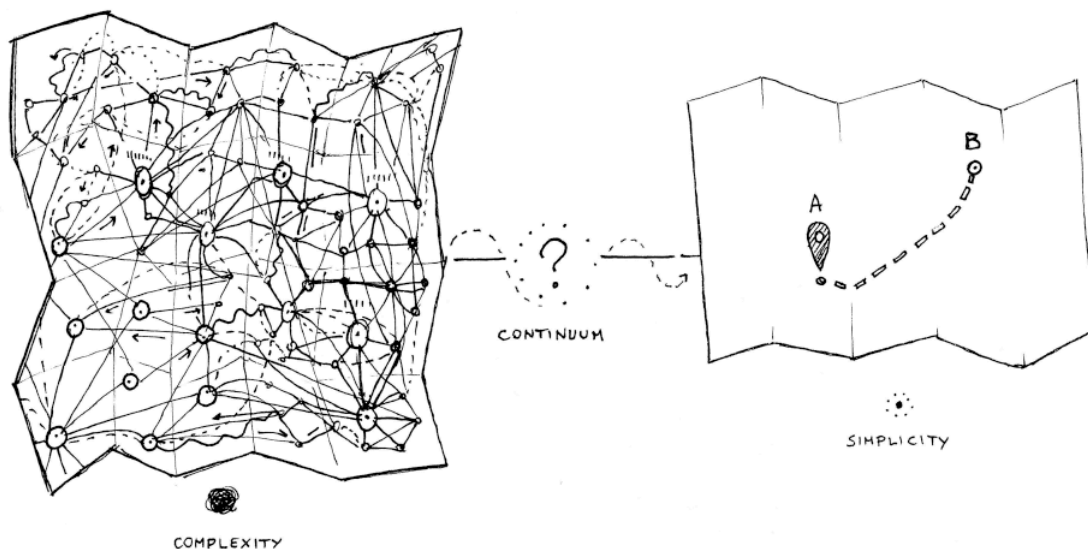

Fig. 1. Two maps both unsatisfactory but for opposite reasons[10].

The trade-off between richness and legibility mirrors another tension that we already encountered working with controversies: the tension between the wish to observe controversies in a state of unreduced complexity (Venturini, 2010) and the desire to make them simpler and understandable for a wider public (Venturini, 2012). Both of these objectives are crucial to our endeavor. Oversimplify the richness of controversies

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8 Cfr. *La géographie, çà sert, d'abord, à faire la guerre*, Lacoste, 1976.

10 All the beautiful images that illustrate this paper (except for figures 3 to 8) have been designed by Daniele Guido.

and you will lose all their interest. Simplify too little and the map will be as large as the territory and therefore useless[11].

To cope with this conundrum and to extend the public reach of controversy mapping, we started another research project, EMAPS[12]. This time, however, we took two precautions to make our experiment safer.

First of all, we searched backup beyond the frontiers of science and technology studies (where controversy mapping originated) in the discipline that is most essentially concerned by the question of usability, legibility and community engagement: *design*. The very idea that design could be the key activity in CM had been advanced by Latour himself in 2008 while addressing the Design History Society in Falmouth:

> *In its long history, design practice has done a marvelous job of inventing the practical skills for drawing [...]. But what has always been missing from those marvelous drawings (designs in the literal sense) are an impression of the controversies and the many contradicting stakeholders that are born within with these.* (Latour, 2008: 12)

> *So here is the question I wish to raise to designers: where are the visualization tools that allow the contradictory and controversial nature of matters of concern to be represented?* (Latour, 2008: 13)

Through design-oriented activities, we hoped we could find the right point of balance between legibility and complexity[13]. Once again, though, things turned out to be more complicated than expected. In June 2012, EMAPS organized in London its first encounter with potential users. The meeting was centered on the questions related to ageing in UK and was attended by about 35 'issue-experts'[14] Our workshop methodology was to seat participants at tables, over three hours, in mixed teams of about six people, each with at least one EMAPS researcher and one facilitator. The visualizations employed in the workshop were drawn from a set of 25 printed maps produced by researchers at the Sciences Po médialab and the Digital Methods Initiative and redesigned by the DensityDesign Lab.

Our design efforts, however, did not result in a dramatic improvement in our capacity to engage with the public. The responses to the maps showed a polite confusion, which was

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11 << "What do you consider the largest map that would be really useful?"
 "About six inches to the mile."
"Only six inches!" exclaimed Mein Herr. "We very soon got to six yards to the mile. Then we tried a hundred yards to the mile. And then came the grandest idea of all! We actually made a map of the country, on the scale of a mile to the mile!"
"Have you used it much?" I enquired.
"It has never been spread out, yet," said Mein Herr: "the farmers objected: they said it would cover the whole country, and shut out the sunlight! So we now use the country itself, as its own map, and I assure you it does nearly as well." >>
from Lewis Carroll "Sylvie and Bruno Concluded" (1893).

12 Electronic Maps to Assist Public Science, 2011-2014, financed by the Sciences in Society call for the UE FP7.

13 Following this lead, we made sure that the EMAPS consortium included partners with competences in communication design (DensityDesign Lab, Milan) and community design (The Young Foundation, London).

14 With 'issue-expert' we mean all person having a relevant experience of a given controversy. By definition all actors engaged in a controversy are also expert of it.

not just a matter of data visualization, but rather difficulty in grappling with what the maps were and how they might relate to the users' worlds. Maps still remained too difficult to read or too poor in content. Even worse, different testers found opposite faults in the same maps depending on the singular characteristics of the users, the maps and the user-map combination.

Though inconvenient, such a conclusion is not inconsistent with the political theories that inspired controversy mapping (cfr. Lippmann, 1927 and Dewey, 1946). If there is something that controversy mapping can learn from the American pragmatism is that there is no such a thing as a homogeneous public.

> *In no two ages or places is there the same public. Conditions make the consequences of the associated action and the knowledge of them different* (Dewey, 1946: 33).

> *It is not that there is no public… There is too much public, a public too diffused and scattered and too intricate in composition. And there are too many publics* (Dewey, 1946: 137).

The public is a phantom (Lippmann, 1927), or rather a gaggle of ghosts provisionally assembled around a specific issue and by no means made uniform by it. We knew that each controversy affected differently each of the actors involved; we only had to realize that the level of complexity that each actor is willing to handle varies accordingly. This reflection helped us to realize that we might have been asking the wrong question all along. Instead of asking where we should stand in the legibility/complexity continuum, we should have asked *how we could move through it*.

Luckily, in EMAPS we had taken a second precaution: we decided to schedule the first user test very early, a few months after the beginning of the project. This precaution has given us the time to explore the room for *manoeuvre* opened up by replacing the question of balance with the question of movements. Archived the chase for an impossible equilibrium, EMAPS turned out to be a more interesting exercise: cataloguing the various ways of walking the tightrope of controversies. The rest of the article will describe the three movements on which CM should be based.

The first movement of controversy design: extending the complexity/legibility trade off

The first movement we identified aims at extending the range of the complexity/legibility trade off, allowing researchers and users to move along the imaginary continuum we illustrated in figure 2. This movement is threefold as it can go from the center to the ends or from each end toward the center.
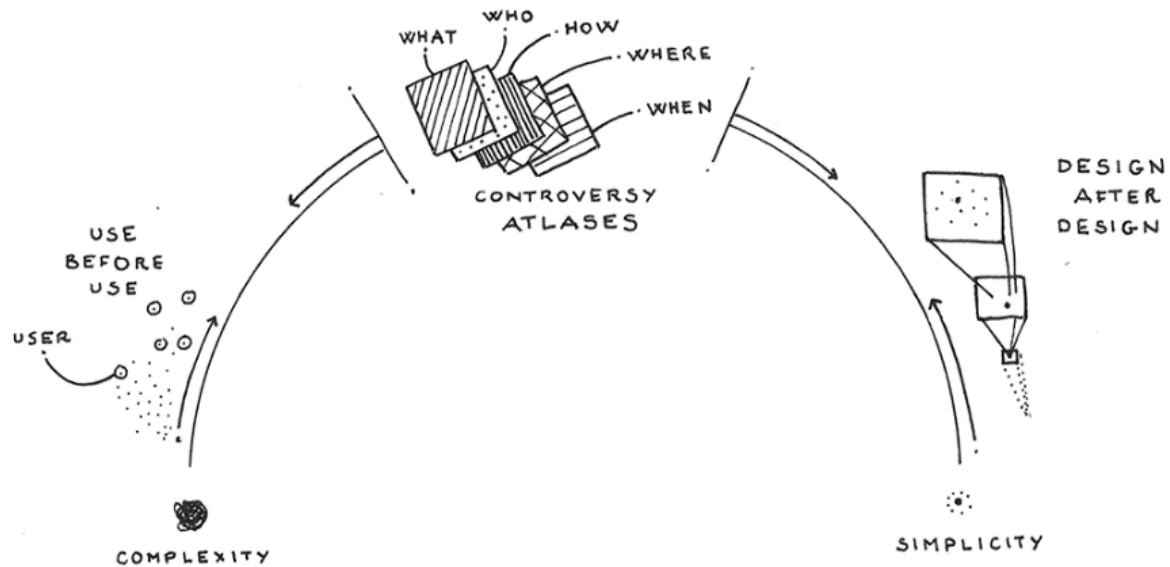
Fig 2. The three sections of the first movement along the complexity/simplicity continuum.

Movement one, section one: easing into complexity through controversy atlases

The first section of this movement (from the center to the ends) simply consists in the concatenation of several visualizations with different degrees of complexity. There where controversy maps are bound to fail, controversy atlases may succeed. The concept of atlas[15] is important here: Aas the mythological figure from which borrow its name, it bears a *reality* providing it with meaning. An atlas is the result of two distinct actions: *going in* -the action of observing- by which we try to get in contact with a subject and *going out* -the action of telling- by which we reconnect and compose the elements we observed. Only by coupling these two actions we can narrate our issue to our public. An atlas, and *a fortiori* a controversy atlas, is a container of different points of view (Ricci, 2010) expressed through different scales and granularities, languages and techniques of representation.

In two previous articles, we described a path through the complexity of controversies (Venturini, 2010) and a series of controversy maps (Venturini, 2012). In this article we shall put them together to describe a possible first section to our first movement. Other concatenations would be certainly possible. What is important is to break down the

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15 Far from being a mere juxtaposition of maps, good atlases allow their users to move through their charts. First used in 1595 as a title for a series of Gerhard Mercator's maps (Atlas, or Cosmographical Meditations upon the Creation of the Universe), the term atlas has known an increasing fortune and an immense array of applications. From history to politics, from arts to medicine, from astrology to psychology, the atlas is a systematic bind of representations relative to a specific but heterogeneous *universe of objects*:

> *"[...] aimed at representing complex contexts through the use of many partial overlapping narrations: a network of maps, diagrams, texts and peritexts, combined together to describe the space of research in its multifaceted aspects."* (Quaggiotto, 2010)

An atlas is the description of future explorations.

richness of a controversy and then rebuild it through a chain of subsequent representations[16].

1. *From statements to debates (what)*. The goal of this section is to show that statements in controversies are never isolated, but always connected in a dialogue made of endorsements and oppositions. Among the many ways to do so, the most popular among the students of controversy mapping is the 'tree of disagreement'[18] (a format as old as Greek philosophy).
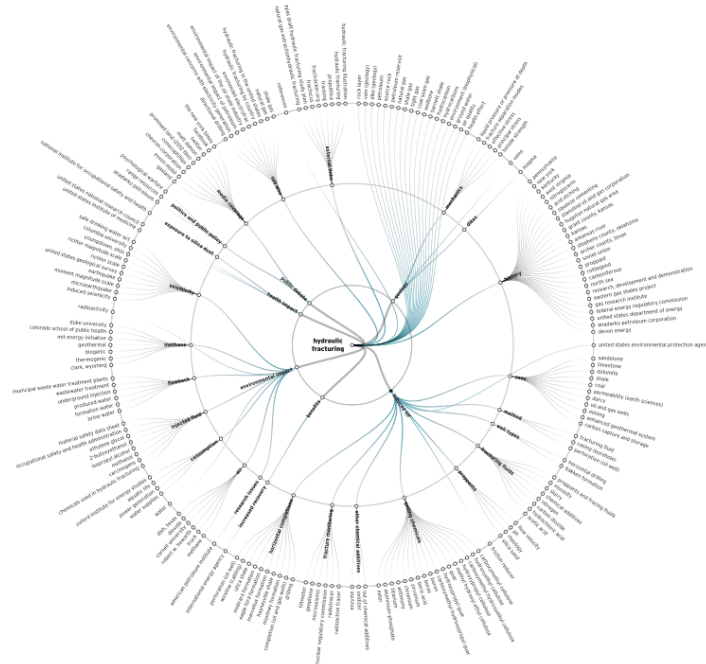

Fig.3 . An example of tree of disagreement tree.

2. *From debates to actors (who)*. The second goal of this section consists in re-attaching the statements to the their speakers. Proposing an argument (as well as refuting it) is never a mere intellectual move. In controversies, every speech act binds alliances and entrenches oppositions. Plotting who shares which argument with whom, the 'actors-arguments table' is therefore the very basis of controversy mapping[19].

16 In the next pages, we will provide examples taken from the work done by one of our best group of students on the hydraulic fracturing / fracking controversy (http://www.whatthefrack.eu/). Figure 3 to 7 have been designed by Chiara Andreossi, Massimo Guizzetti, Cristina Palamini, Giulia Peretti, Silvia Recalcati. Their extraordinary research report is available here: http://issuu.com/densitydesign/docs/whatthefrack/159?e=1199872/2100124

18 Of course, as Umberto Eco (1984, pp. 58-64) noted, taxonomies are always more complex than expected, and the branching of arguments are far being a simple Porphyrian Tree.

19 It is important to recall that, descending from actor-network theory, controversy mapping has a very extended definition of actors: scientists and engineers, of course, but also lay experts, activists, decisions-makers and not only individual actors but also collective actors (research institutions, enterprises, lobbies...) and non-human actors (instruments, theories, laws, natural elements...) (Callon, 1986).
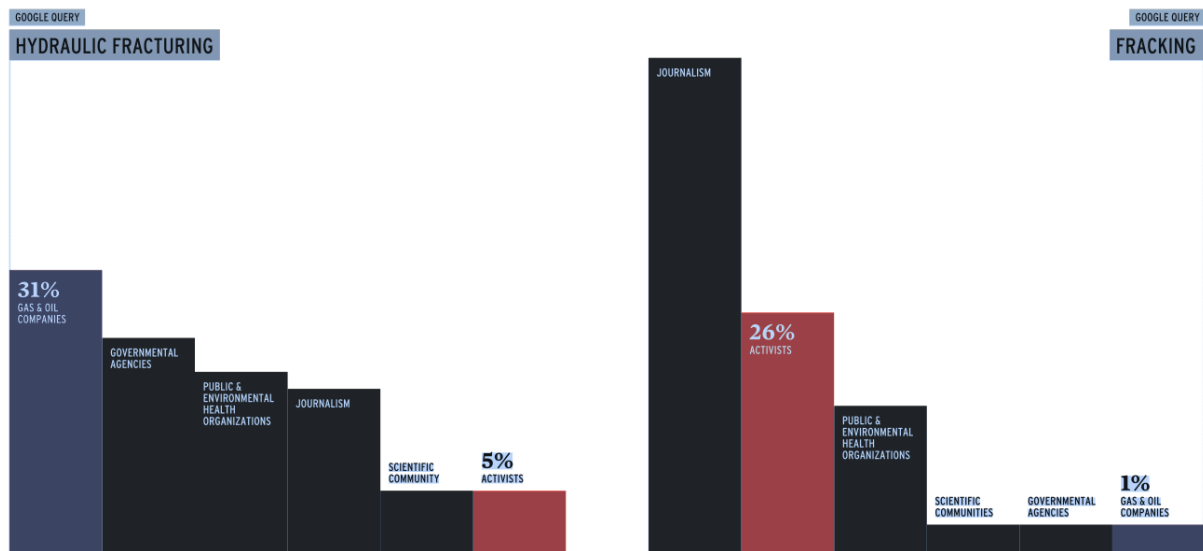
Fig. 4. An example of actor-argument table.

3. *From actors to networks (how)*. Actors, like statements, are never isolated in controversies. As Latour made very clear (1999), the hyphen in actor-network does not encourage researchers to look at one *and* the other, but to consider actors and networks as one thing. In controversies, their alliances and oppositions determine the position and the actors' identity and, conversely, networks are defined by the actors that they connect. The 'actor-network diagram' is meant to visualize the simultaneous movement of individualization and clusterization that characterize controversies[20].
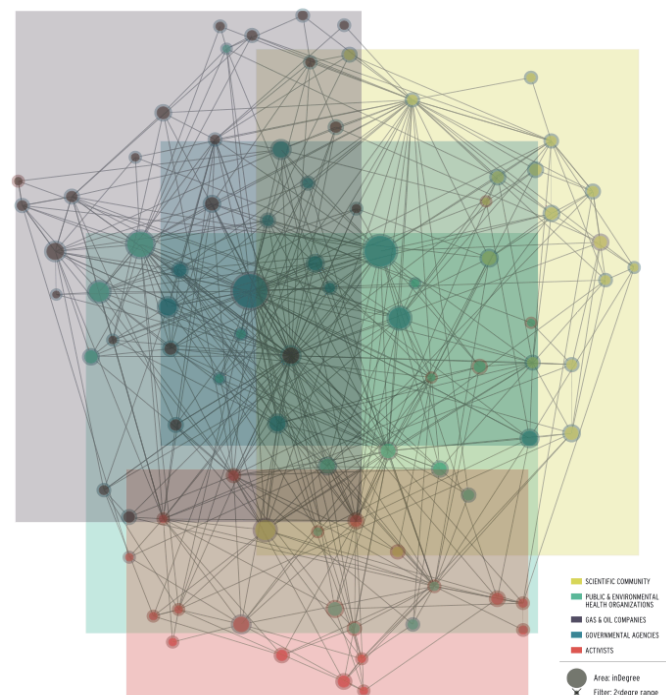

Fig. 5. An example of actor-network diagram.

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20 Not an easy task, to be sure, but one that is becoming less impossible thanks to the growing digital traceability (Venturini and Latour, 2010) of scientific citations (Börner, 2010), hyperlinks (www.e-diasporas.fr), quotations (Leskovec et al, 2009) and many other forms of social connections (Rogers, 2009).

4. From networks to cosmoses (where). Every controversy is will always be part of other larger meta-controversies and always composed of several sub-controversies. Cartographers are asked to choose their level of investigation and they must be able to situate their case study in the 'scale of disputes' to which it belongs. In particular, it is important to show that, though controversies are often fought on the battlefield of technical details, they always oppose conflicting worldviews[21].
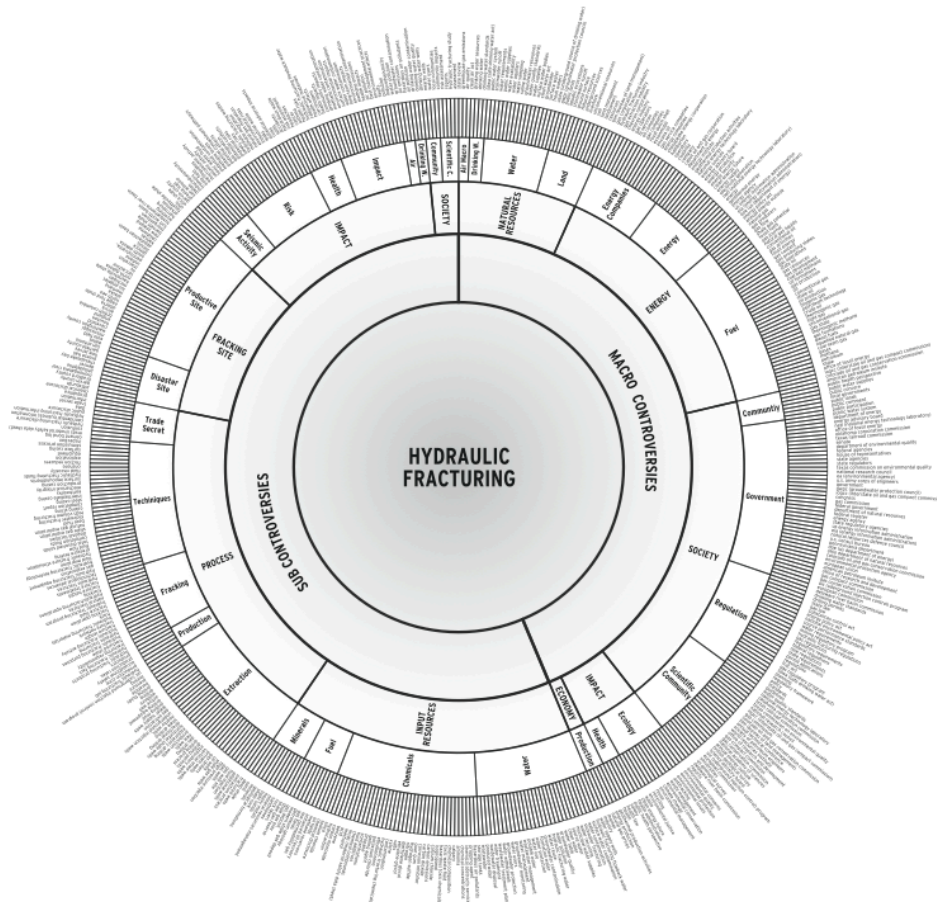
Fig. 6. An example of scale of cosmos.

5. From cosmoses to cosmopolitics (when). Besides presenting what controversies are about, who fights them, how they join or oppose their forces, cartographers must also show how all these elements evolve through time. Add to this the fact that the time of controversies is often heterogeneous (different part of the same controversy may remain dormant for ages and suddenly burst into the quickest developments) and the complexity of cosmopolitics will be evident.

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21 No matter how specific controversies may look from the outside, from the viewpoint of their actors they are a war of words. Conversely, no matter how abstract be the principles at stake, controversies are always decided by the most specific and concrete arrangements.

Fig. 7. An example of debate dynamics.

Movement one, section two: use-before-use and participatory design

The second and third sections of the first movement have been conceptualized within the tradition of participatory design. Speaking at the EASST conference, Pelle Ehn (2011), explicitly discussed the Latour's Falmouth challenge and proposed two complementary approaches called respectively "use-before-use" and "design-after-design".

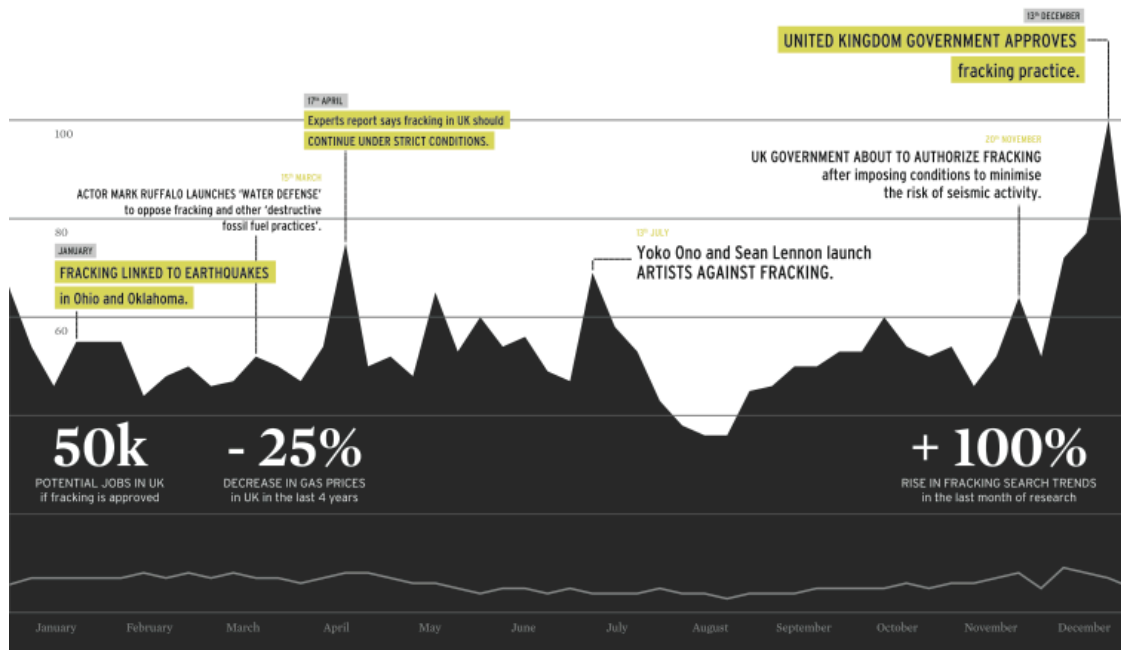Ehn defines the first approach as follows:

> *Basically, the idea is to say: well, Let's invite users – we know who they are, who the human constituencies are – and have them participate and, by that way, envision a future use, and we use all these tools, all scenarios and prototypes to do that. It could be said: to focus on assemblies before objects, and use before actual use* (Ehn, 2011: 43-44).

In order to implementing the "use-before-use" approach in EMAPS, we organized a second user test. This time we started from choosing one 'issue expert' to work with us as lead user. For this role we chose one of the participants at the first meeting, Maria Parsons (Creative Dementia Network/Eminence Grise). Between August and October, we spent several days with Maria as a participant observer as she went about her work. The aim of these sessions was to elicit Maria's "research questions" in relation to ageing.

On the basis of these observations, EMAPS researchers developed a second set of maps on ageing. These maps were then shown to a small group of issue professionals to discuss with them how the design of the maps could be improved. In contrast to the June event, in this test we tried to get the participants to try to use the maps and locate themselves within them and not just respond to them.

Drawing on the results of the Oxford meeting, the controversy maps were improved by collecting additional data and improving the design. The new set of maps then became the basis for another larger meeting held in London on 12 December 2012. Compared to

the previous occasion, the second London meeting was a clear success. Interacting with the users from the earliest phases of the mapping process helped us to anticipate and solve all the major discrepancies between the public and the maps[22]. We designed a better atlas and we invited a more suitable public, which bring us to the next section of this movement.

Movement one, section three: design-after-design and digital interactivity

The third section of the first movement, the "design-after-design" has been defined by Ehn (2011) as follows:

> *What we need to do is to design a thing that opens up for potential design after the actual design in the project has taken place, to defer some of the design until later on, assuming that people would be interested in doing that (an assumption that could be questioned)* (Ehn, 2011: 46).

Evidently, this section is more difficult to implement than the previous. While participatory design has long explored how to involve users in the early design stages (e.g. Ehn, 1988), little reflection has been dedicated so far to the art of designing visualizations that remain open to subsequent contributions[23]. Some experiences, however, have been attempted in the field of data journalism. Striving to explain complicated affairs while avoiding oversimplification, clever online journalists drew on digital interactivity to transfer the simplification work to their readers[24].

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22 The riddle of controversy mapping remains, but patching the bigger faults made it at least possible to reveal the smaller (and more interesting) ones. We observed, in particular, that the more interesting the users find the maps, the more they long to change them. Bad controversy maps leave users indifferent, better controversy maps leave users unsatisfied

23 Though much work has been done in the tradition of exploratory data analysis (Tukey, 1977) to develop interactive visualizations where data can analyzed and edited through direct manipulation, these interfaces have been opened to a non-academic public only very recently. Once exclusively addressed to scientists and engineers, information visualization has been recently proposed to less specialized users (Pousman, Stasko, and Mateas 2005). At least four areas of visualization for non-experts have been developed:
• ambient visualization (Pousman and Stasko 2006);
• social visualization;
• artistic visualization (Viégas and Wattenberg 2007, Kosara 2007);
• persuasive visualization (Fogg, 2002).

24 One of best example of such a strategy has been developed by Bostock and Carter to represent a classic political controversy: the US presidential election. The interactive visualization published by the New York Time, showed below is remarkable for it allows the reader to understand the weight of each swing State by simulating different combinations of results:
www.nytimes.com/interactive/2012/11/02/us/politics/paths-to-the-white-house.html

512 Paths to the White House

Select a winner in the most competitive states below to see all the paths to victory available for either candidate.

	Fla.	Ohio	N.C.	Va.	Wis.	Colo.	Iowa	Nev.	N.H.
⊗ Reset	Dem Rep	Dem Rep	Dem **Rep**	Dem Rep	Dem Rep	Dem Rep	Dem Rep	**Dem** Rep	Dem Rep

Obama has **103** ways to win   1 tie   Romney has **24** ways to win
80% of paths   0.76% of paths   19% of paths

R Florida

D Ohio   If Obama wins Ohio…

R Virginia

R Wisconsin

R Colorado

D Iowa   Iowa,

D New Hampshire   and N.H.,
Obama wins.

Florida is a Must Win for Romney
If Mr. Romney loses Florida, he has only one way to victory: through all the other battleground states. He has led most polls there, however, and is the favorite. If Mr. Romney wins Florida, he has 75 paths open to him.

View Obama Wins Florida

Ohio: Obama's Firewall
Of the three largest battleground states, Mr. Obama has the largest lead in Ohio – partly because of a strong local economy and the auto industry bailout. If he loses here, it's likely he will trail in Florida and North Carolina too. Losing all three leaves him with only 14 ways to win.

View Romney Wins Ohio, Fla. & N.C.

Times's Battlegrounds
Nine states are shown above, but The Times rates only seven of them as battlegrounds. If Nevada goes to Mr. Obama and North Carolina goes to Mr. Romney, as The Times's ratings suggest, the president will have four times as many paths to victory as his opponent.

View Battleground States

Edge of Your Seat Possibilities
There are five paths to a tie. In this case, the newly elected House of Representatives would select the president (likely Mr. Romney) and the Senate would select the vice president (possibly Joseph R. Biden Jr.).
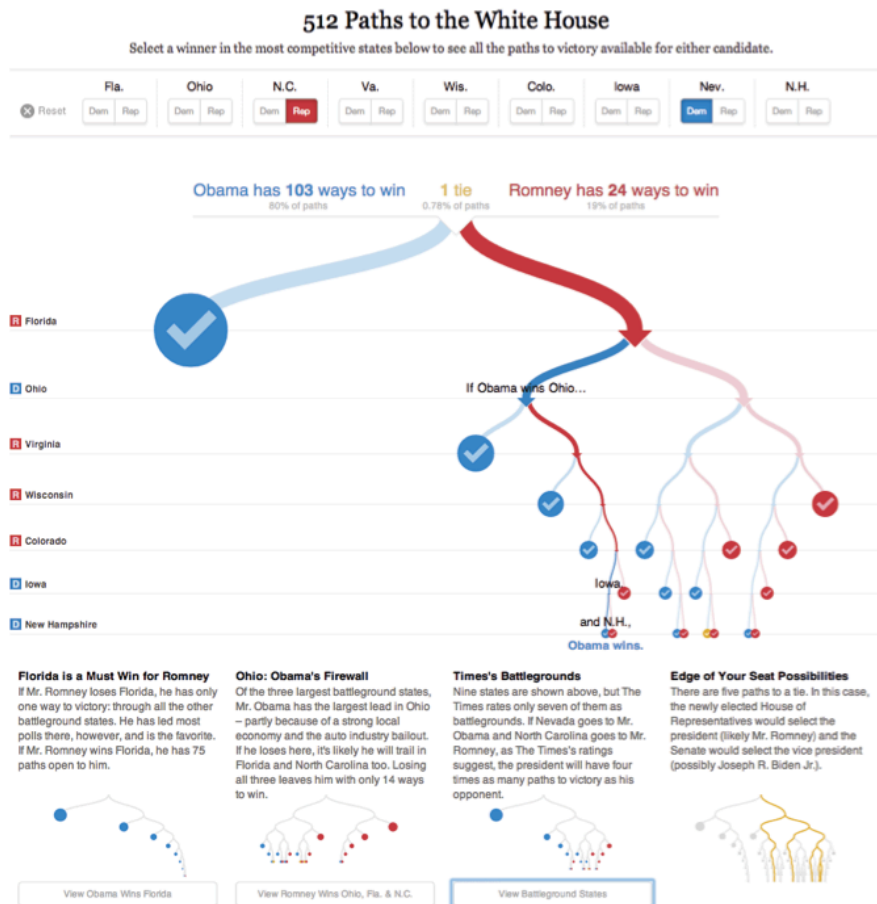
Fig. 8. 512 Paths to the White House. The visualization allows the users to select different possible outcomes for each 'swing state' and thereby dynamically changing the possibility to win of the two candidates. Exemplary cases are also provided by the editors of the NY Times. (www.nytimes.com/interactive/2012/11/02/us/politics/paths-to-the-white-house.html)

Interactivity is the key to the 'design after design' approach (at least in CM). Useful maps provide their users the possibility of looking at the bigger picture *and* focusing on specific details. In traditional cartography, such interactivity is reached by virtue of the extraordinary resolution and flexibility of paper. Every traveler knows that an atlas is only useful if one can put his/her finger on it, pull it closer or farther, browse it, twist it, fold it. Navigating *by* a map always implies navigating *through* that map.

Inferior in resolution, digital atlases can nonetheless rely on their embedded computation and interaction capabilities. Following Heer and Schneiderman (2012) the digital atlas should allow users :

- To focus on the most relevant contents for their analysis by sorting - rearranging items setting their priority-, filtering-reducing the displayed information- and deriving. Deriving means to keep the same data richness but aggregating[25] it at different detail levels. In this last operation, the complexity of data in not just cropped but translated.

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25 When aggregating, disaggregation and then re-aggregation are just a click away; it is difficult to believe in a substantial micro/macro divide (cf. Latour et al. 2012).

- To navigate the information space by scrolling it through, zooming in and out. Two actions are possible through visual interface: in the first one, users start from a broad view of the topic drilling down to single elements[26]. The second starts from a small portion of the data going far to obtain an overall view on them[27].

- To unlock iterative processes, to validate and confirm hypothesis. The interactive map should provide tools to create snapshots of point reached while exploring. Also the ability to annotate information, typical in printed artifact, should be preserved in digital, interactive tools.

Against these advantages, interactive maps bring also drawbacks mainly related to production time and the impossibility to control unexpected behaviors of elements when data is highly variable.

As we just saw, the three sections of the first movement are very different. In the first, we concatenated a series of maps to deploy complexity in a progressive way. In the second, we learnt from participatory design to anticipate users' involvement. In the third, we discussed how digital interactivity could open up controversy atlases to user interaction. In different ways, all three sections of the first movement share the same effort to turn the *meeting point* between public and maps into a *meeting process*: multiplying the occasions of interaction (section 1), involving the public earlier (section 2) and keeping the maps open longer (section 3). Movements two and three, as we will see, will be dedicated to steering this process.

The second movement of controversy design: the narration-exploration of datascape navigation

Through the first movement we moved away from the idea of a punctual equilibrium between complexity and legibility and gained some room to *manoeuvre* the interaction between the maps and the users. The second movement is meant to direct such interaction and is twofold, as interaction with complexity can move in two opposing directions that we shall call narration and exploration.

Movement two, section one: narrating our way out of the labyrinth

Far from being limited to CM, the narrative movement is common to the largest part of scientific literature. In such a movement, 'hard proofs' do of course play a crucial role; yet scientific literature cannot be reduced to hard proofs alone. If it is called 'literature', it is because it has literary qualities. A good scientific paper is not just a pile of facts: it is a good story in the same way a good crime novel is not just a game of clues (which is why we enjoy reading two hundred pages just to discover that it was Colonel Mustard, in the Library, with the candlestick).

The content of scientific stories may vary, but the structure remains the same. It always starts with a research question that generates a flourishing of data. Then comes methods

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26 This movement is well synthetized in the mantra "overview first, zoom and filter, then details-on-demand" (Shneiderman 1996).

27 "Search, show context, expand on demand" (van Ham et Al. 2009).

and analysis to harness and reduce complexity. Finally there is the exposition of the results in the article itself where the mess of scientific protocols is resumed to a clear and enjoyable story.

The same characteristics should be invoked in CM. This is where the notion of 'mapping' falls short in describing our efforts. In cartography, routing is as important as mapping. 'Controversy mapping' is both the atlas and the finger pointing at it. Just like good hotel receptionists, we cannot just hand over the plan to our publics: we have to give them some directions, indicate the attractions, suggest a couple of good restaurants and provide some narration of the city. Emphasizing a sort of *fabulation*[28], to be sure, does not mean neglecting the necessity of exploring the complexity of controversies.

Movement two, section two: exploring back to complexity

If scientific literature is a form of narration it is nevertheless a very special one. As Latour suggested in a seminal paper on scientific reference (1995), the specialty of scientific literature is its reversibility. Like every good narration, scientific papers reduce the complexity they address, yet unlike most other narrations they are always ready to provide details on demand: you don't trust our results? Here is the analysis we followed! You don't trust the analysis? Here is the raw data (or how to obtain it)! This is why scientific papers are persuasive, because they allow (even challenge) their readers to verify them[29].

In CM, in any case, exploration has always been as important as narration and for a very simple reason: the method has been developed to address debates that are not yet closed. Describing a controversy is telling a story that does not end at the close of the narration (and whose further developments might well deny all that was said before). This is why narration is not enough to tame controversies; exploration is necessary as well.

Movement two, section three: datascape navigation

Making controversies readable while preserving as much as possible of their complexity requires binding together the two movements of narration and exploration in a circle (as shown in figure 8). Such a circle offers the public a logic narrative path through the debate, but also the possibility of stepping out at any moment to explore the complexity of controversies. This circulation between complex and simple, data and results, maps and directions has been called *datascape navigation* (Latour et al., 2012) and it defines the second movement of CM.

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28 Da espandere http://en.wikipedia.org/wiki/Fabulation

29 The possibility to *explore back* the validity of a scientific argument becomes more and more prominent now that scientific publications are increasingly migrating online. Thanks to the decreasing cost of digital publishing, it is now possible and even required (Ince et al., 2012), to publish one's code and data along with the paper presenting the results extracted from them.
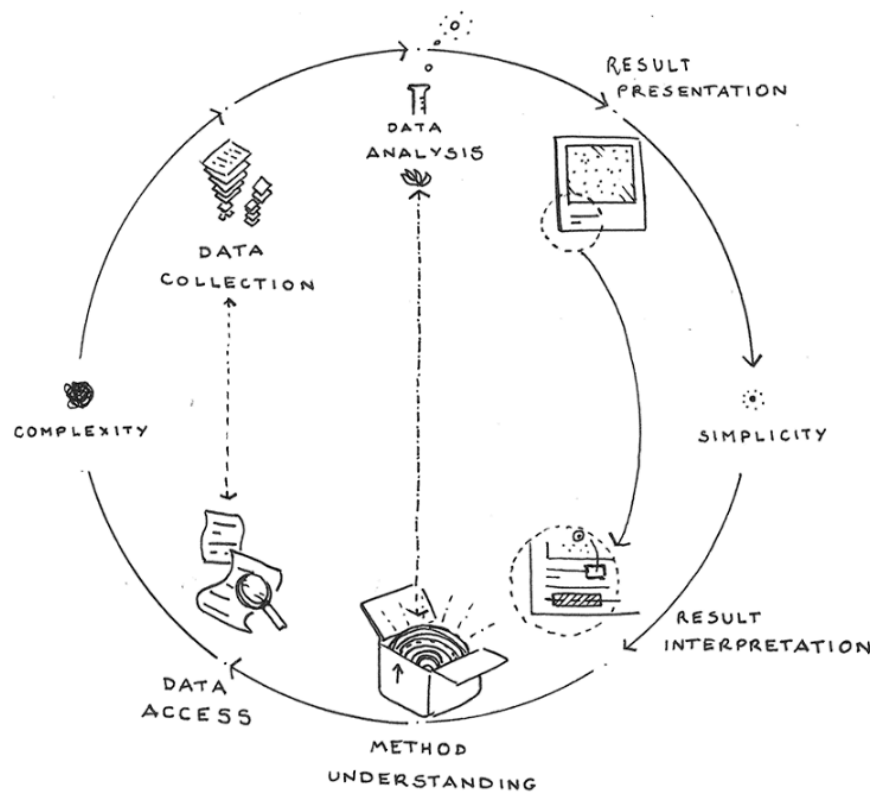
Fig. 9. The circle of datascape navigation through storytelling and exploration.

Implementing such a circle, however, is easier said than done because existing mapping formats are still unable to combine narration and exploration. Linear formats, such as texts or videos, tend to be more suited for narrating stories. Non-linear formats, such as diagrams or websites, do not impose a predetermined path but invite users to explore their richness. The difficulty to overcome the narration/exploration gap explains why few initiatives have succeeding in combining cinematographic/textual linearity with hypertext openness[30].

The third movement of controversy design:
the spiral of public engagement

Submitting the EMAPS project to the European Commission, we knew that CM was an unconventional object, yet we thought that we could handle it with a conventional approach made of four subsequent phases: first of all data collection, next analysis, after that visualization and finally dissemination of results.

The first London test, however, made dramatically clear that such linear organization was unsuited to our objectives, for a 'use-before-use' approach (described in the second section of the first movement) seemed unavoidable for our mapping campaign. From the

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30 Despite the mixing potential of digital technologies, most multimedia editors (i.e. http://www.rvl.io, http://prezi.com, http://zeega.com) are still little more than enhanced PowerPoint presentations. Outstanding examples of the narration-exploration circle exist in the domain of videogames (Murray, 1997) and interesting experiments are in progress with web-documentaries (see localore.net or webdocu.fr for examples), but little has yet been done in the domain of scientific communication (Segel & Heer, 2010).

very first test of our project we were confronted with the need to "engage the public in the process of design-making" as described by Tanyoung Kim and Carl DiSalvo (2010)

Movement three, section one: engaging the public throughout the mapping campaign

Far from being restricted to the dissemination phase, contributions from the public are crucial throughout all the phases of controversy mapping:

- **Hypothesis**. The first phase of all mapping campaigns should be carried out as a dialogue between users (suggesting which are the interesting research questions within an issue in which they are involved) and data experts (suggesting feasible operationalization).
- **Sketching**. In order to involve the users in the crucial work of hypotheses operationalization, it is useful to pass through a phase of sketching where information designers draft mockups of the final maps. These mockups are useful for discussing with the users and refining the research protocol before actually implementing it.
- **Data collection**. Users' help is also important when it comes to collecting data and creating maps. Users may already have interesting datasets or know where to look for them.
- **Analysis**. This is the only phase where users can be absent (though their presence may have advantages). In this phase the data experts and design experts realize the maps and interpret them.
- **Publication**. In the last phase, maps are assembled in atlases finally ready to be used by the public.
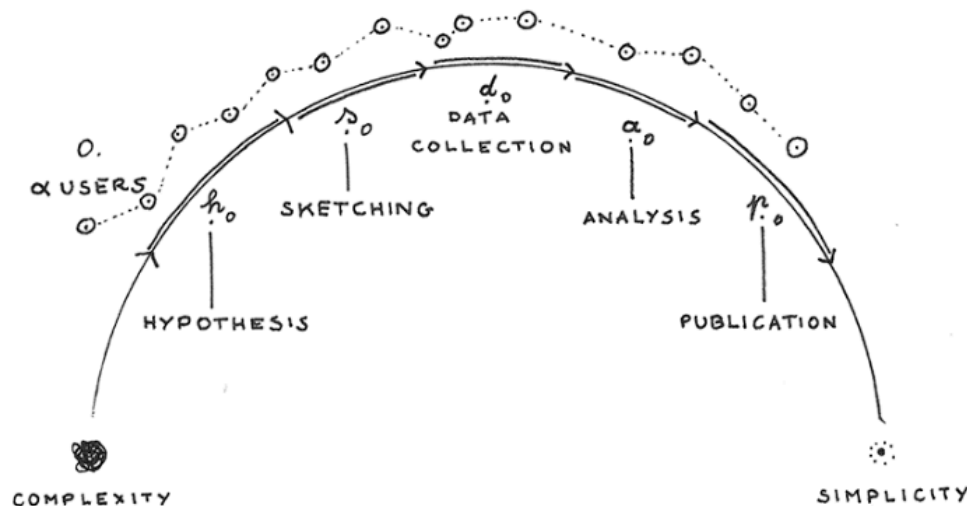

Fig. 10. The stages of the design of a controversy atlas

Movement three, section two: engaging the public again, and again, and again

After the positive results of the second London meeting, the EMAPS consortium was convinced of the importance of contributions from users and of the fact that the second case study of the project (the debates around climate change adaptation) could not be tackled without an early engagement with the public. Unfortunately, this turned out to be easier said than done. For one thing, as soon as we decided to 'go public', we had to

realize that we had little clue as to *who was the public*. Ready as we were to open the doors of our method, we did not know whom to invite in.

We were experiencing what media scholars (Lipmann, 1927 and Katz and Lazarsfeld, 1955) long suggested: there no such a thing as *the public*. Publics are always plural and always specialized, they gather temporarily around particular issues to deal with their specific consequences. As Dewey (1946) said:

> *"the public consists of all those who are affected by the indirect consequences of transactions to such an extent that it is deemed necessary to have those consequences systematically cared for" (pp. 16-17).*

In fact, the public of a controversy is nothing other than the assemblage of the actors involved in the debate. To be sure, such an assemblage is neither homogeneous nor stable: publics are summoned by controversies and their shape depends on how controversies are arranged. "No issue, no public" as Noortje Marres (2005) well put it.

This is where the connection between CM and its public becomes more complicated. By bringing together diverging viewpoints and arranging them in the same atlas, controversy mapping does more than just describing a state of affairs; it contributes towards articulating the debates and arranging their publics. If they want their maps to be politically relevant, social cartographers cannot shy away from the responsibility of transforming the territories they map[31]. As the EMAPS consortium soon realized, designing relevant maps for the publics and designing relevant publics for the maps are, in fact, one and the same movement[32].

Such realization, however, opens another riddle: how can we engage a large public without reliable maps to identify it? How can we obtain such a map without the help of a large public? Which rope can we grab to pull ourselves out of our Munchausen's swamp? As in all bootstrapping dilemmas, the solution comes from iteration. We can't design good maps from scratch nor engage large publics out of thin air, but we can design bad maps and then improve them; engage small audiences and then extend them[33].

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31 In this sense, controversy mapping is not so different from conventional mapping which has always had a profound impact on geographical territories. Far from being mere representations, maps have always been used to envision how the territories had to be ruled and transformed, for example when tracing the route of a new road to be build or a new border to be defended (Farinelli, 2003). On the political use of cartography see also Crampton & Krygier, 2005.

32 In this sense, EMAPS project represents a tangible example of the efforts to couple the ideas of John Dewey and the activities of design imagined by Carl DiSalvo (2009).

33 The progressive approach described here resembles closely the 'agile' approach to software development, where drawing detailed and complete specification is considered less important than prototyping and interacting with the users according to the slogan "release early, release often!" (Raymond, 2001).
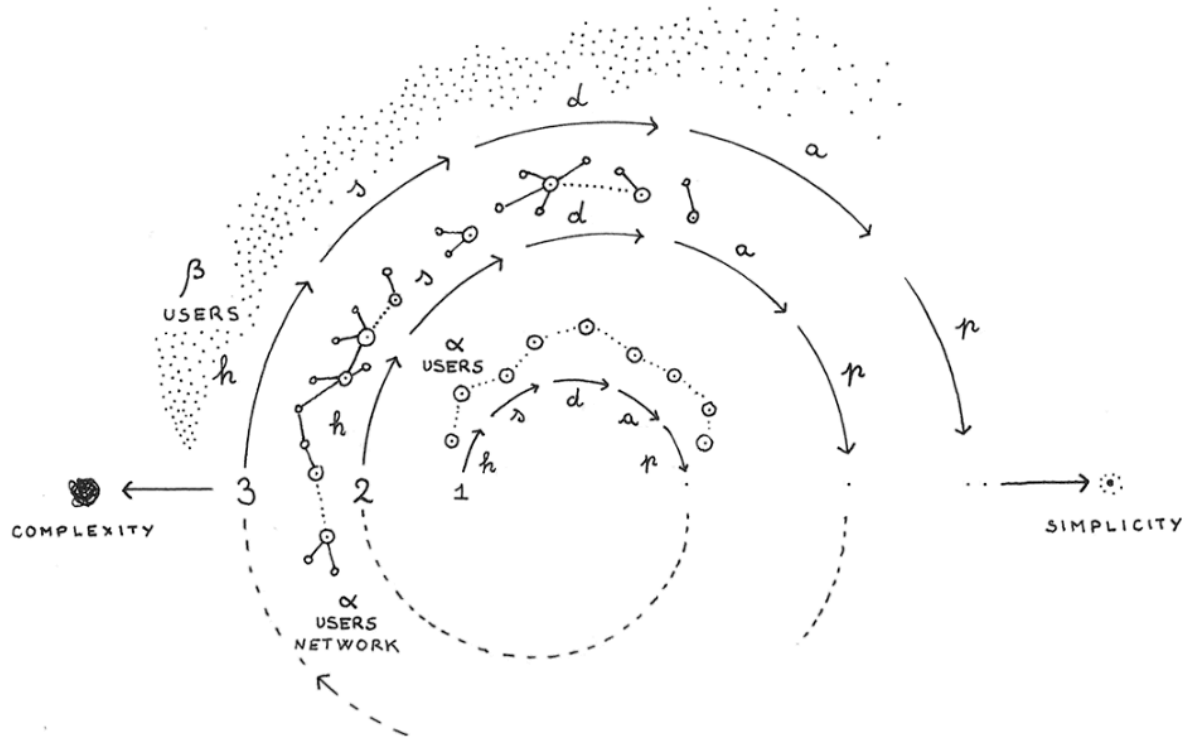
Fig. 11. The three-coils spiral of controversy mapping.

The second section of the third movement, therefore, bends the linear research protocol into a spiral where every coil delivers better maps and engages larger publics. In the EMAPS project this meant finding a few alpha-users willing to help us from the onset of our exploration. The natural choice was to turn to the leaders of other projects already engaged in climate adaptation.

This first group of alpha-users has helped us to proceed through the first coil of the spiral and develop a first series of maps on the adaptation debate. Such maps will hopefully be published on the websites of the alpha-users' initiatives and will serve as the starting point of a new iteration with the communities of those initiatives. This second iteration, we hope, will help us to improve our maps even more, learn about their possible uses, and make them ready to encounter the publics involved in the larger climate adaptation debate.

Conclusions

In this paper we claimed that the exercise of Controversy Mapping is interesting not in spite of its contradictions but *because of them*. Resolving such contradictions, we also said, is less a question of balance than of movement. In fact, mapping controversies for their publics entails three main movements each with several sub-sections:

I.   Extending the complexity/legibility trade off
   1.   Easing into complexity through controversy atlases
      a.   From statements to debates (the tree of disagreement)
      b.   From debates to actors (the actors-arguments table)
      c.   From actors to networks (the actor-network diagram)
      d.   From networks to cosmoses (the scale of dispute)

   e. From cosmoses to cosmopolitics (the controversy dynamics)
  2. Use-before-use and participatory design
  3. Design after design and digital interactivity
II. The narration-exploration circle
  1. Narrating the controversy fil-rouge
  2. Exploring the complexity of debate
  3. Datascape navigation
III. The spiral of public engagement
  1. Engaging the public throughout the mapping campaign
  2. Engaging the public again, and again, and again

These movements, to be sure, are not the only ones possible and others might be proposed to guide controversy mapping. Alternative movements, however, would have to provide the same articulations described here: to deploy gradually the complexity of public disputes; to engage the public from the beginning and leave the design open at the end of the cartographic campaign; to linearize the story of the controversy while allowing the richest exploration; to design ever better maps and engage ever larger publics.

Conceptualizing controversy mapping in terms of movement allows answering a question that is often asked about controversy mapping: what is most important part of the cartographic exercise the product or the process? The map or the mapping? We hope this paper made that there is in fact little difference between the two. Controversy mapping is neither a product nor a process, but a movement. Rather a series of movements that can be precisely defined and formalized. In this paper, we have proposed a vocabulary to identify and talk about these movements. Inventing concrete ways to implement them is the goal of EMAPS and the following controversy mapping projects.

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