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ARTIGO 1: COMO EXPLORAR CONTROVÉRSIAS COM A TEORIA ATOR-REDE

1. DEFINIÇÃO E ORIGEM DA CARTOGRAFIA DAS CONTROVÉRSIAS

 Foi iniciado por Latour na École des Mines de Paris por volta de 1997 e depois foi um projeto financiado pela União Européia - MACOSPOL (MApping COntroversies in Science and techonology for POLitics). Desde sua introdução serviu como uma versão educacional da ANT, e, como ela, é um método "to live, to know and to practice in the complexities of tension" (LAW, 1999, p.12 - Actor Network and After). Mas diferente dela, suas contribuições e implicações conceituais são mais acessíveis a estudantes.

"The cartography of controversies is the exercise of crafting devices to observe and describe social debate especially, but not exclusively, around technoscientific issues". (VENTURINI, 2009, p.259).

"The cartography of controversies should be rather be defined as the practice of ANT once all theoretical and methodological objections are overcome". (p.260)

JUST LOOK AT CONTROVERSIES AND TELL WHAT YOU SEE.

"Researchers are not even asked to *explain* what they study, but only to observe a controversy and describe what they see. "Controversies mapping entails no conceptual assumptions and requires no methodological protocols. There are no definitions to learn; no premises to honor; no hypothesis to demonstrate; no procedure to follow; no correlations to establish. (p.258)

2. THE THREE MEANING OF "JUST"

1) Primeira consequência: Cartography does not require any specific theory or methodology. **The cartography of controversies invites scholars to use every observation tool at hand, as well as mixing them without restrain**. (p.260). Observação sempre precede a teoria e a metodologia.

2) Perspectivas e métodos de pesquisa nunca são imparciais. Researchers cannot pretend to be impartial just because they comply with some theoretical or methodological guideline. (p.260)

Promiscuidade metodológica. Objetividade só pode ser perseguida com múltiplos pontos de observação.
"Objectivity can be pursued only by multiplying the points of observation. **The more numerous and partial are the perspectives from which a phenomenon is considered, the more objective and impartial will be its observation**" (p.260).

LATOUR, OBJETIVIDADE DO SEGUNDO DEGRAU: esforço de considerar quanto mais objetividades quanto possível. Diferente da objetividade de primeiro grau, que define uma situação de

acordo coletivo, a objetividade de segundo grau é atingida revelando toda a extensão da discordância dos atores: "."is attained by revealing the full extent of actors' disagreement and is thereby typical of controversial settings".

De acordo com a TAR, a observação de cada fato é indissoluvelmente relacionada a um ponto de vista particular que "does not constitute a limitation as long as researchers are able to multiply their observations while switching perspective from one to another". p.260

LATOUR (2004a), multiplicar os pontos de vistas, multiplicar as objetividades. "The great thing about a standpoint is, precisely, that you can change it! Why would I be stuck with it? From where they are on earth, astronomers have a limited perspective... And yet, they have been pretty good at shifting this perspective, through instruments, telescopes, satellites. They can now draw a map of the distributions of galaxies in the Whole universe. Pretty good, no? **Show me one standpoint, and I will show you two dozen ways to shift out of it**".

 "On Using ANT for Studying Information Systems: A (Somewhat) Socratic Dialogue," in C. Avgerou, C. Ciborra and F. F. Land (eds) The Social Study of Information and Communication Study, pp. 62–76. Oxford: Oxford University Press.

3) Reconsiderar a atitude do pesquisador. Negligenciar as observações e as ideias dos atores porque eles não estão baseados numa perspectiva científica ou metodológica é arrogância. Researchers are obliged to reconsider their attitude toward their subjects of study. The cartography of controversies entails the idea that participants to social phenomena may be as informed as investigators (p.260)

RECAPITULANDO:
1. Não restringir sua observação a uma única teoria ou metodologia;
2. Observar dos mais diferentes pontos de vistas quanto possíveis;
3. Escutar as vozes dos atores mais do que suas próprias presunções

SCIENTIFIC KNOWLEDGE IS THE RESULT OF AS MANY CONTAMINATIONS AS POSSIBLE. (P.260)

3. O QUE É UMA CONTROVÉRSIA?

Controversies are situations where actors disagree (or better agree on their disagreement). Controversies begin when actors discover that they cannot ignore each other and controversises end when actors manage to work out a solid compromise to live together. Anything between these two extremes (the cold consensus of reciprocal unwareness and the warm consensus of agreement and alliance) can be called a controversy. (VENTURINI, 2009, p.261)

1. ENVOLVE TODO TIPO DE ATORES, não apenas seres humanos ou grupos humanos, mas também elementos biológicos, produtos industriais e artísticos, instituições econômicas, artefatos técnicos e científicos e assim por diante. Controversies are the place where the most heteregeneous relationship are formed. (p.261)

**** A IDEIA DOS ARRANJOS HETEROGÊNEOS que participam de controvérsias foi mostrada por Law (1989) e seu artigo sobre a expansão do Império Marítimo Português no século XV. Law chama de "engenharia heterogênea" "this gathering of elements coming from different worlds "that range from

people, through skills, to artifacts and natural phenomena" (LAW, 1989, p.129).

Law, J. (1989) "Technology and Heterogeneous Engineering: The Case of Portuguese Expansion," in W. E. Bijker, T. P. Hughes and T. Pinch (eds) The Social Construction of Technological Systems, pp. 111–34. Cambridge, MA: MIT Press.

2.MOSTRAM O SOCIAL EM SUA MAIS DINÂMICA FORMA. In controversies, **any actor can be decomposed in a loose network and any network, not matter how heterogeneous, can coagulate to function as an actor**. (p262)

**** NOÇÃO DE ATOR REDE foi desenvolvida por Callon (1989) como um esforço para descrever a implacável associação e dissociação de atores e redes de controvérsias: "the actor network should not ... be confused with a network linking in some predictable fashion elements that are perfectly well defined and stable, for the entities it is composed of, whether natural or social, could at any moment redefine their identity and mutual relationships" (p. 93).

"Society in the Making: The Study of Technology as a Tool for Sociological Analysis," in W. E. Bijker, T. P. Hughes and T. Pinch (eds) The Social Construction of Technological Systems, pp. 83–103. Cambridge, MA: MIT Press.

3. SÃO RESISTENTES A REDUÇÃO. Actors tend to disagree on pretty much anytrhing, included their disagreement itself. That's why issues are so difficult to solve, because they are impossible to reduce to a single resuming question. **The difficulty of controversy is not that actors disagree on answers, but that they cannot even agree on questions** (262)

4. CONTROVÉRSIAS SÃO DEBATIDAS. "Controversies emerge when things and ideas that were taken for granted start to be questioned and discussed".

Necessidade de quebras trágicas (e as disputas que advém daí) para começar a refletir sobre as tecnologias.

5. CONTROVÉRSIAS SÃO CONFLITOS.

OBJETO DA CC: "when you look for controversies, search where collective life gets most complex: where the largest and most diverse assortment of actors is involved; where alliances and opposition transform recklessly; where nothing is as simple as it seems; where everyone is shouting and quarreling; where conflicts grow harshest. There, you will find the object of the cartography of controversies. (p.262)

4. THE MAGMATIC FLOW OF COLLECTIVE LIFE

if the cartography of controversies is complex, it is because collective life itself is complex. (p.263)
Social life is a hard work.
PERSPECTIVA CONSTRUCIONISTA, nada existe sem um esforço coletivo.
the cartography of controversies is utterly constructivist. According to this approach, nothing can attain a collective existence without being the result of collective work and controversies are the settings where this work is more visible.

[Sobre a crítica da construção social da realidade, o problema não é a ideia de construção, mas a ideia de social dessa perspectiva que a TAR critica. Ver anotações aula Antropologia, 7/6/2016).

To understand how social phenomena are built it is not enough to observe the actors alone nor is it enough to observe social networks once they are stabilized. What should be observed are the actors-netoworks - that is to say, the fleeting configurations where actors are renegotiating the ties of old networks is redefining the identity of actors. (p.264)

5. ESCOLHENDO BOAS CONTROVÉRSIAS

When starting a mapping project the first thing to choose is always which controversy to analyze.

1) Evitar controvérsias frias. Good controversies are always "hot": they may involve limited number of actors, but there must be some action going on. (p.264)
2) Evitar controvérsias passadas. Past issues can be investigated only if observation can be moved back to the moment when the controversy was being played out.
3) Evitar controvérsias sem-limites: The more a controversy is restricted to a specific subject, the easier will be its analysis.
4) Evitar controvérsias underground: para ser observável, a controvérsia tem que ser, pelo menos parcialmente, aberta para o debate público.

If they want to grasp modern debates, cartographers have no choice but to dive into the technoscientific details. (p.265)
The more technical is a controversy the easier will be its observation.

6. CINCO LENTES DE OBSERVAÇÃO

1. Das declarações pra literatura.
The first task of social cartography is to map this web of references, revealing how dispersed discourses are weaved into articulated literatures (p.266)

2. Da literatura para os atores.
Following the webs of relations surrounding controversial statements, social cartographer are inevitably brought to consider connections that spread beyond the limits of textual universe.

SE FAZ DIFERENÇA, E SE ESSA DIFERENÇA É RECONHECIDA PELOS OUTROS ATORES, ENTÃO É UM ATOR. Whenever you wonder if something is acting in a controversy, just ask yourself if its presence or absence does make any difference. If it does and if this difference is perceived by others actors, then it is an actor. (p.266)

**** John Law (1989) explicita esse princípio: "The scope of the network being studied is determined by the existence of actors that are able to make their presence individually felt on it ... Conversely, if an element does not make its presence felt by influencing the structure of the network in a noticeable and individual way, then from the standpoint of that network the element in question does not exist".

3. Dos atores para as redes.
Não há ator isolado: actors are always interfaces among different social collectives as they are both composed and component of networks. (p.266)

4. Das redes para o cosmos (ideologias?)

ATORES (MUITOS) ASPIRAM ESTABILIDADE: The emphasis we laid on networks' dynamics should not lead us to forget that most actors and groups aspire to some kind of stability. Few actors are interested in destabilizing existing social networks just for the sake of chaos. If you set up a crusade against transgenic crops, it is probably because you long for organic agriculture; if you fight modernization, chances are that you like tradition; if you sabo- tage global systems, you are a potential partisan of local communities. Even anarchists have pictures of the society they wish to establish; even opportunists have utopias (p.267)

O fato de que as controvérsias fabricam coletivamente mais e mais complexidade não significa que aqueles que lutam nela não são guiados por um desejo de simplificação.

O papel das ideologias não deve ser subestimado.

"While collective life is chaotic and erratic, ideologies are orderly and harmonious: they are not universes, but *cosmos*. As such, ideologies can be more influential that any realistic calculation. **Observation, therefore, cannot be limited statements, actions and relations, but has to extend the meaning that actors attribute to them**. Only roaming from cosmos to cosmos, social cartographers can perceive the full extent of their controversies. (p.267)

****Latour, Reagregando o Social, "Panoramas": p. 187-189 (da versão em inglês).

5. Do cosmos para a tecnopolítica.

NÃO HÁ REALIDADE OBJETIVA INDEPENDENTE DO HOMEM OU DO QUE OS ATORES DIZEM.

Its understanding requires abandoning one of the most venerable ideas of Western culture: the belief that, behind all ideologies and controversies, some objective reality must exist independently from what actors think or say. According to this idea (which can be traced back to Plato's cavern 36), both ideologies and controversies derive from the imperfection of human intellect. (p.267)

_ IDEIA QUE ACABA JUSTIFICANDO ABSOLUTISMOS DE QUE SÓ OS SERES HUMANOS (PRIVILEGIADOS) PODEM NEGOCIAR RACIONALMENTE A EXISTÊNCIA ATRAVÉS DA FILOSOFIA, RELIGIÃO, ARTE, CIÊNCIA OU TECNOLOGIA - E QUE, APÓS ESSA NEGOCIAÇÃO, TODOS VÃO EVENTUALMENTE CONCORDAR.

If all men could see reality as it really is, they would peacefully and rationally negotiate their collective existence. **Besides being too human-centered (as it forgets that not all social actors are human beings), this idea has a major disadvantage: it often ends up justifying absolutism. As soon as an ultimate substratum of truth is postulated, actors start claiming to have a privileged access to it. Through philosophy, religion, art, science or technology—they hold—reality can finally be revealed and everyone will eventually agree (whether they like it or not)**. Unfortunately (or rather fortunately), no matter how confident these prophets may sound, not everyone eventually agrees.

_ NENHUMA REALIDADE CHEGA SEM DISCUSSÃO

Take any philosophical, religious, artistic, scientific or technical truth and you will find a controversy. Sometimes disputes are temporarily silenced by the fact that some cosmos has prevailed over the others or by the fact that actors have found a resisting compromise, but no agreement, no convention, no collective reality has ever come without discussion. This does not mean that we could never inhabit a peaceful world, that we could never align our visions, that we could never agree on truth. A common world is possible, but not as "something we come to recognize, as though it had always been here (and we had not until now noticed it). A common world, if there is going to be one, is something we will have to build, tooth and nail, together" (Latour, 2004c: 455).

*** LATOUR, 2004. Latour, B. (2004c) "Whose Cosmos, Which Cosmopolitics? Comments on the Peace Terms of Ulrich Beck," Common Knowledge 10(3): 450–62.

7. HOW TO BUILD RICH OBSERVATION DEVICES

Latour e a TAR são frequentemente acusados de não tomar posição sobre aquilo que estuda, e ser politicamente ingênuo por isso, acreditando que as ciências sociais podem descrever e observar sem interferir nos seus objetos) ou cínico - acreditando que as ciências sociais não podem influenciar a vida social.

QUAL CONTRIBUIÇÃO E COMO A TAR DEVE CONTRIBUIR? This is not the case: ANT never tried to avoid its responsibilities and never questioned the fact that social sciences could and should contribute to public debate. **The problem is what contribution they should give and how**. (p.268)

IMPORTANTE. O papel da pesquisa, de acordo com a ANT, não é direcionar a pesquisa; quem são os responsáveis por suas controvérsias são os próprios atores. Os investigadores não tem o direito de entrar e impor suas próprias soluções. Não é que não se deva manifestar a opinião dos pesquisadores na pesquisa, mas que estes devam prestar atenção para que a sua opinião não esconda a dos outros - os atores. Não é ser imparcial, mas apresentar outras parcialidades além da sua própria.

According to ANT, the role that research should play in collective disputes is not that of steering their closure. Actors (not scholars) are responsible for deciding controversies. Once again, it is a matter of respect. Controversies belong to actors: it was actors who sowed their seeds, who raised their sprouts, who nurtured their development. Scholars have no right to jump in and impose their solutions. Researchers can certainly express their ideas and social cartography encourages them to do so. Still, in displaying their opinions, they should pay the greatest attention not to hide others'. Unlike most social approaches, the cartography of controversies does not boast impartiality—it just requires its practitioners to present other partialities besides their own. Social cartography is not meant to close controversies, but to show that they may be closed in many different ways. (p.267)

A HESITAÇÃO DA TAR EM TOMAR UM LADO VEM DO MEDO DE ENCERRAR O DEBATE, COM A OPINIÃO DO INVESTIGADOR, ANTES DO TEMPO - E ASSIM CORTAR A RIQUEZA DAS MÚLTIPLAS VOZES QUE OS ATORES PODEM SE EXPRESSAR. It is true ANT is often hesitant when it comes to taking a stand, but such hesitation doesn't come from naïvety or cynicism. It comes from the fear of shortcutting the debate before it had the time to deploy its full richness, of pushing an interpretation before all actors had a chance to express their own (p..268)

MAS ESSA É APENAS UMA PARTE DA HISTÓRIA....
Quando observamos controvérsias, nos concentramos no lado do líquido. Quando descrevemos controvérsias, contribuímos para a solidificação de algumas partes do magma social.

When we observe controversies, we focus on the liquid side. When we describe controversies, we contribute to the solidification of some portions of social magma (p.268)

QUATRO RECOMENDAÇÕES DE LATOUR NA PRÁTICA DE MAPEAR O SOCIAL: PERPLEXIDADE, CONSULTA, HIERARQUIZAÇÃO, INSTITUIÇÃO.

Priorizar a articulação (capacidade de ser afetado pelos diferentes) mais do que acurácia ou consistência.

Observing a controversy is like setting up a scientific observatory: the quality of observation depends on the capacity to multiply the number and increase the sensitivity of monitoring devices. (p.268)

O mais importante é detectar a contradição destas duas etapas (observar e representar): Cartographers should not forget that whenever they chart a debate they lose part of its vibrancy and interest: an inevitable choice, of course, and still not to be taken light-heartedly. (p.268)

*****

LATOUR, 2007. "We, researchers, users, sponsors, simple citizens, students or journalists, we are all confronted to a new question: how could we display all the opposing versions of the technological and scientific issues, which, in every interesting matter, require our attention and our deliberation? How could we find an objectivity which doesn't lie on a deferential silence, but on the range of contradictory views on the same issues? How could we reconnect all these versions to build our own opinion? This is the challenge of the cartography of controversy" (Latour, 2007: 83, translation supplied).

Latour, B. 2007 "La cartographie des controverses". In Technology Review, N. 0, pp. 82-83.

ARTIGO 2: COMO REPRESENTAR CONTROVÉRSIAS COM MÉTODOS DIGITAIS

1. NÃO HÁ EXPLORAÇÃO SEM REPRESENTAÇÃO

Depois de falar como explorar e detectar boas controvérsias, nesse artigo Venturini trata de alguns métodos descritivos de como representar estas controvérsias.

Observações em cartografia social rapidamente se tornam muito complexas para serem administradas, por isso é que precisam ser desdobradas (unfoldings). : "That is why the task of *unfolding the complexity* of controversies should never be separated from the task of *ordering such complexity*. (VENTURINI, 2010, p.2).

*** Complexidade diferença pra ANT: na ANT, não se acredita que a ordem pode espontaneamente surgir da desordem. Ordem pode ser obtida apenas com o trabalho coletivo de construção e manutenção.
If there is something that distinguishes the cartography of controversies (and ANT) from a theory of complexity it is that it does not believe that order could emerge spontaneously from disorder. Order can indeed be obtained, but only at the price of a collective work of construction and maintenance. Such work is the object of social cartography. (p.14)

Observações e descrições de uma vez só, sem separação: mapas acompanham desde o princípio.
"No serious cartographer would travel a territory without taking notes, sketching plans, amending previous atlases. This is how maps have always been manufactured: through a recursive adjustment of observations and descriptions. The same holds for the cartography of controversies. Social cartographers should work out their observations and descriptions at once. Right from the beginning of their campaigns, they will deal with maps. At first, such maps will be rough and incoherent. Yet, these initial and tentative sketches will support observation and facilitate their amending." (p.2)

**** Ajuste do mapa ao território é contínuo: Franco Farinelli (2003: especially pp. 12–23) suggests

that the progressive approximation of representations and referents should be considered as a two-way movement. The correspondence between map and territory derives not only from adjusting the map to territories, but also from using the map as a model which the territory is progressively adjusted to (p.14)

BORGES CONTO EM A HISTÓRIA UNIVERSAL DA INFÂMIA, observação e representação não devem ser confundidas; o mapa não é o território observado, nem deve ser: though always performed together, observation and representation should be not confused. As illustrated by Borges' novel on the exactitude of science, nothing is vainer than a map tracing its territory point by point. The map is not the (observed) territory, neither should it be. This is especially true for controversy mapping (p.2)

Mapas sociais não devem espelhar a complexidade das controvérsias, mas fazer a complexidade ser legível. (p.2)

Como as controvérsias são as mais complexas possíveis e as descrições as mais simples possíveis?

2. BUILDING QUAKEPROOF REPRESENTATIONS

SEGUNDO DEGRAU DE OBJETIVIDADE:
Second-degree objectivity is not interested in identifying the *matters of facts* that arouse everyone's agreement, but rather in revealing the full range of oppositions around *matters of concern*. (p.3)

OBJETIVIDADE DE SEGUNDO GRAU VEM DE ATRIBUIR A CADA ATOR UMA REPRESENTAÇÃO QUE SE ENCAIXA A SUA POSIÇÃO E RELEVÂNCIA NA DISPUTA:
Objectivity does not come from crediting the same weight to all perspectives, not even from balancing the space allotted to each side. Second-degree objectivity comes from attributing to each actor a representation that fits its position and relevance in the dispute. (p.3)

Na prática, isso significa que uma boa cartografia social deve dar visibilidade para diferentes pontos de vista de acordo com 1) SUA REPRESENTATIVIDADE 2) SUA INFLUÊCIA 3) SEU INTERESSE.

1) REPRESENTATIVIDADE: depends on how many actors subscribe to it. A statement or an argument shared by many of the actors of a controversy deserves more visibility than one that is relatively marginal (P.3)
2) INFLUÊNCIA: Actors occupying influential positions deserve special attention because, like it or not, they will have better chances to shape controversies.

*** Diferença entre representatividade e influência, ver *spokeperson* e *obligatory passage point* em Callon (1986): Callon M (1986) Some elements of a sociology of translation: Domestication of the scallops and the fishermen of St Brieuc Bay. In: Law J (ed.) Power, Action and Belief: A New Sociology of Knowledge? London: Routledge, 196–223.

3) INTERESSE: Não se contentar com relatórios de maioria. Aquilo que é muito visível no mapa não é necessariamente muito visível no território.
If representative and influential viewpoints should have a central place in social cartography, they should not fill up the space of representation. Controversy mapping cannot content itself with majority reports, as the very rise of disputes depends on the presence of disagreeing minorities. No matter how marginal, disagreeing viewpoints can be interesting because they offer original perspectives and question what is taken for granted. **Something that is very visible on a map is not necessarily very visible in the territory** (this is the very basis of treasure hunting). (p.3)

Critérios de resistência na construção dos mapeamentos sociais:

1) ADAPTAÇÃO.
2) REDUNDÂNCIA.
The key for drawing effective representantions is drawing many of them: each one dedicated to a different aspect of the phenomenon . Even if each map fails in capturing the richness of the disputes, all together they may do the trick. Of course, this implies that many pieces of information will be repeated, but that is not embarrassing. Quite the contrary, redundancy stabilizes representations and makes them able to stand the quakes of public debate.
3) FLEXIBILIDADE. Objetividade depende da possiiblidade de deslocamento entre a representação e o objeto:"A vida no Laboratório", Bruno Latour "show that objetctivy does not depends on the resemblance between the representation and the objects, but on the possibility to move from one to the other"(p.4).
MUITO TRABALHO: To sum up, the objectivity of cartographic representations depends on the quantity and the quality of the work spent to build them. What is true for buildings is true for representations as well: the better they are built (the more they adapt to their territory, the more they are redundant and flexible), the more solid they will be.

3. GOING DIGITAL
Recomendações:
1) você deve ouvir mais as vozes dos atores do que suas próprias presunções;
2) Você deve observar de tantos pontos de vista quanto possíveis;
3) Você não deve restringir tua observação a nenhuma única teoria ou metodologia;
4) Você deve ajustar suas descrições e observações recursivamente;
5) Você deve simplificar a sua complexidade respeitosamente;
6) Você deve atribuir a cada ator uma visibilidade proporcional ao seu tamanho;
7) Você deve providenciar descrições que são adaptadas, redudantes e flexíveis

Rastrear na rede: Such an honorable enterprise has been somewhat defeated by the speed at which digital technologies have infiltrated modernity. Electronic interactions have become so pervasive that they can no longer be conceived as a separate social space. No longer limited to a specific sector, digital interactions are now woven throughout the fabric of collective existence. (p.5)

DIFERENÇAS PRO DIGITAL: TUDO É TRAÇADO E AGREGADO: to trace a phenomenon means converting it into a piece of writing. This process (also known as "inscription" or "formalization") plays a pivotal role in modern science

As scholars had access either to the direct observation of situated interactions or to aggregated data on global structures, they were led to believe that these were two separate dimensions. The very notion of actor-network was introduced to follow collective phenomena without separating inter- actions from structures.

LATOUR, DIGITAL: The ancient divide between the social on the one hand and the psychological on the other was largely an artefact of an asymmetry between the traceability of various types of carriers: what Proust's narrator was doing with his heroes, no one could say, thus it was said to be private and left to psychology; what Proust earned from his book was calculable, and thus was made part of the social or the economic sphere. But today the data bank of Amazon.com has simultaneous access to my most subtle preferences as well as to my Visa card. **As soon as I purchase on the web, I erase the difference between the social, the economic and the psychological**. (Latour, 2007)

3. NAVIGATING THROUGH DIGITAL DATASCAPES

Mais observação, mais representação. Rastreabilidade é inútil sem agregação.

To aggregate information means displaying it in a condensed form, transforming data so that a few elements become representatives of many others. Several examples can be provided: synopsis and listing in writing. Through each transformation, observations gain readability by losing some of the original richness.

Reversibilidade é importante. Certainly, aggregation is a risky process: it always entails the risk of dumping something important. That is why reversibility is so important. Like Theseus, scientists wouldn't wander the maze of representation without a thread to follow back. By maintaining the reversibility of aggregation, researchers assure themselves (and their peers) the possibility of climbing back up their formalizations and then trying other descents (p.7)

Capacidade de "zooming" em diferentes níveis de agregação é o que faz a representação digital ser tão útil para as ciências sociais. The capacity for zooming through different levels of aggregation 24 is what makes digital representations so convenient for social sciences (p.7)

1. search engines are not the web;
2. the web is not the Internet;
3. the Internet is not the digital;
4. the digital is not the world.

FRAMEWORK DE ANÁLISE

1. Glossário dos elementos não-controversos
2. O repositório de documentação. Documentação que possibilite reverter as simplificações (transparência), tudo na rede! To assure the reversibility of the simplifications, a controversy- website should provide access to the complete documentation gathered by the study. Field notes, interview recordings, raw data, archive documents, all traces should be offered for public examination. Analogously, in a hypertextual environment, bibliographic references should provide direct linkages, thereby facilitating access to the original sources. Thanks to digital environments it is now possible to publish not only the results, but each and every step of an investigation, encouraging the reuse of data and research techniques.(p.9)
3. Análise da literatura científica.
4. Review da mídia e das opiniões públicas.
Not only are media discourses, institutional statements and public opinions now traceable, but they can also be presented in the same visualization space employed for sciences and technology.
5. Árvore do desacordo (fluxograma).
6. Escala das controvérsias. No controversy is an island. Take whatever controversy, it will always be composed of several sub-controversies, it will always be connected to several other controversies situated at the same level and it will always be part of one or more super- controversies. Identificar como as controvérisas são ordenadas de acordo com o degrau de sua generalidade-especificidade é crucial porque o desenvolvimento de uma disputa é frequentemente afetado por eventos que tomam parte acima ou abaixo dessa disputa. To be sure, what counts as general and what counts as specific can be completely reversed by the very dynamics of disputes, yet scholars should try their best to show how controversial spaces are organized. (p.11)

7. Diagrama dos atores-rede. The basic tenet of ANT is that every actor can be decomposed into a network and that every network can be connected tightly enough to become a single actor.

8. Cronologia da disputa (linha do tempo). Controversies are, by definition, the most dynamic phenomena of collective life. As such they need to be explored in time. Thanks to the interactivity of digital tools, it is possible not only to show the position of actors at a given moment in time, but also to show how positions change through time and how this has affected the definition of the controversy itself (p.12).

9. Tábua do cosmos: The table of cosmoses should represent all those involved in a controversy showing where cosmoses diverge and where they may overlap.

Sites-controvérsias: Besides observing and representing public debates, controversy-websites might also provide a space to perform them. If there is one thing that sets the web apart from all previous media, it is the possibility to establish a symmetrical communication among a large number of actors. The web is the only broadcasting medium that does not distinguish irreversibly between source and audience. (p.13)

FUNDAMENTAL.

According to several scholars working on politics with an ANT approach, t**he contemporary crisis of political representations is largely due to the difficulty of negotiating modern controversies within the existing public forums**. **Traditional institutions (such as parliaments, referendums, newspapers) may have difficulties in hosting techno-scientific disputes, because they are not issue- specific and because they are incapable of handling enough heterogeneity.**

Uma alternativa interessante:

Based on heterogeneous observations and issue-centered representations, controversy-websites might become an interesting alternative setting for collective debate, thereby participating in the digital renewal of the public sphere. Unfortunately, discussing such an intriguing possibility is well beyond the scope of this paper and must be postponed to further researches.