Transdisciplinary approach to the
Emerging **CH**allenges of **NO**vel technologies:
Lifeworld and **I**maginaries in **F**oresight and **E**thics
(TECHNOLIFE)

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Social imaginaries and ethical issues in deliberative process on Digital Globes

Authors: K. Gunnarsdóttir, A. MacKenzie, B. Wynne - Cesagen, Lancaster University

Contributing partners: Cesagen, Lancaster University, Bergen University, REEDS Lab. (Ex IACA-C3ED), Université de Versailles Saint-Quentin-en-Yvelines.

Introduction

This deliverable reports on the analysis of a virtual forum discussing digital globes. The forum was facilitated by KerTechno (see D3.1)[1], and invitations were extended to a number of individuals and groups who are considered stakeholders of one or another kind: experts, administrators, relevant occupations, interest groups, and more (see D2.0)[2]. Discussions were kick-started with a short provocative film, drawing on the Technolife report, titled: "Scoping the ethical dimensions of Geographic Information Systems" (D1.2)[3]. The report underscores how the use of geographic, geo-referenced and spatial information has migrated from military uses to urban planning, resource management, epidemiological analysis, and the tracking of socio-economic fluctuations. It also illustrates how the strategic deployment of GIS-related technologies is supported with persuasive scenario-building and visionary work by technical and industry experts, politicians and policy-makers. The terrain is disclosed as a "playground" for the monitoring and tracking of movements and whereabouts, including objects, persons and natural phenomena (see also National Research Council, 2007). We can manage farmlands, residential developments, natural resources, law enforcement and disasters. As D1.2 also points out, geographic, geo-referenced and spatial information serve as templates for GIS-related commodities. In principle, anyone can use imaging, tracking and modeling techniques at home (using Google Earth and related applications) or on mobile nomad systems that operate real-time geo-localisation and geo-traceability (e.g., the 3G+ mobile system and the GRSS mobile network). As the scoping paper suggests, "[e]very part of the Earth, of the geographic space is today geo-visualisable. Every geographic object is geo-referenced and everybody on the Web or the 3G+ can look [at] it" (cf. D1.2 in Rommetveit et al, 2011).

Securing that access to GIS-related information for political institutions, professionals and civil societies is open, has been a central concern. But developments are are radically diversifying representations of space and changing the concepts and substantive textures of place and belonging. Participation, place, belonging, the right to privacy and the scale and resolution of the information intersect, and particular complications arise against the challenge of trusting maps, models and images. That challenge arise, when the modes of producing, diffusing and disseminating geo-referenced materials undergo such rapid change and grow in variety of use. The limits of prediction in forecasting and roadmapping also remains a great challenge. Both forecasts and roadmaps act as part of the "evidence" that enables evaluation and justifies particular actions. Future terrains are revealed through predictive modeling, in terms of risk and security, and how to manage the futures made possible with such modeling which is called upon to assist in the management of increasingly complex problems, e.g., climate change and flood planning. In short, trust in people, mapping technologies, institutions and natural phenomena, represented through the emerging digital media, should be further examined in public debates and KerTechno was positioned as an instrument to attempt such an exploration. The digital globes forum was designed to hone in on three focus issues for discussion and debate:

1) **Trust in maps and images** - How can we know that images circulated on the web are realistic? And how can we know that maps of the future can be relied upon?
2) **Surveillance and privacy** - High-resolution imagery and increased capacity for seeing comes along with increased opportunities for surveillance.
3) **Equality and power** - Access to valuable resources and critical information could be limited to only those with influence and money.

Our methodological approach to the forum, the aims of our analysis and a summary of the many disparate findings, are elaborated in the D4.0 introductory report.[4]

1 http://neicts.lancs.ac.uk/pdf/Technolife-D3-1-DocumentationOfKerDST.pdf
2 http://neicts.lancs.ac.uk/pdf/Technolife-D2-TheoreticalFramework.pdf
3 http://neicts.lancs.ac.uk/pdf/Technolife-D1-2-Scoping-GIS.pdf
4 http://neicts.lancs.ac.uk/pdf/Technolife-D4-Introduction.pdf

1. Identifying actors' assumptions

In this section we describe the short film, intended to kick-start forum discussions on digital globes. In particular, we like to draw attention to two interrelated representations of continuity. One indicates that using maps to *find our way in the world* is on a continuum with maps to *find our way into the future*. The other one indicates that pervasive surveillance, manifested in claims like [*w*]*e can all watch and be watched*, is on a continuum with increasing surveillance of social and natural trends for predictive purposes, for which trusting the ability of scientists to model and forecast would be at the heart of preparing for increasingly complex situations.

We explore the few comments that are contributed in response or reference to the film. The registers of perception and reaction show mainly how the film supports the assumption that science is good for prediction, to build rules and parameters, and that we should trust maps to illustrate geographical, natural and cultural trends, especially, with widespread citizen contribution to map-making. We also observe how the film confirms assumptions about conflicts over land and environment, manifested in the use maps to push for or against particular developments or actions.

Narration in voice, image and sound

The film opens with a claim about older maps. Starting at 0.03, a narrator states that [*f*]*or a long time* ***we have*** *used maps* ***to find our way*** *in the world* (0.03-0.17). Then, in a sequence starting at 0.20, the narrator explains how the world and our maps are digitised, how we *use electronic devices, GPS, internet or mobile phones*, for example, *to travel* or *when we look for a good neighbourhood* - in short - [*e*]*lectronic things*, ***digital maps and globes have become important*** *thing for living* ***in an uncertain world*** (0.20-0.43). These statements overlap with scenes which show a map of the “new world” from 1565, then the revolving earth in blue behind a grid with information on longitudinal and latitudinal coordinates, coming closer into the frame until, eventually, the view centres on the landmasses of Europe.

At this juncture the narration shifts radically, to draw attention to the uncertainties of natural disasters throughout history. The narrator explains how [*e*]*arthquakes, hurricanes and floods kept appearing in the stories we told to each other.* For example, *Michelangelo painted the ceiling of the Sistine Chapel with images from the book of Genesis*, and the narrator claims that such stories *are retold as forecasts* (0.52-1.19). Then the narrator continues to claim, that *scientists say [****flooding****] **will** only **get worse**. The **ice on the poles will melt*** and [*s*]*ea levels keep rising*. He states that [***y***]***ou have to prepare***. ***We make*** *flood* ***maps for the future***. ***We can all make maps*** *now*. ***We can all watch and be watched***. *The world has become visible*. ***Everybody can map*** *everybody else* (1.37-2.33). Then the narrator argues that [*y*]*ou* ***have to depend on models of science*** to prepare for the future, take precaution and plan, at this point, focussing the significance of predictive map-making on questions of global warming and the transnational efforts made to cope with environmental challenges. ***We make agreements***, [***w***]***e place our faith*** *and hope*, [***w***]***e seek security***. ***We are*** *the* people, the government, the activists, the corporations, the army. ***We want*** *justice, security and care* (2.35-3.15).

This narration, from 0.52-3.15 (or 2.33 sec), is spoken on top of a collage of scenes which invite a number different possibilities to focus what the issues or “hot topics” actually are. First there are apocalyptic scenes, showing William Etty's painting, *The Deluge* with superimposed lightnings, then cross-fading to Michelangelo's ceiling in the Sistine Chapel also with superimposed lightnings, then proceeding to show a hurricane approaching land, heavy waves on the ocean, and water rushing up the Thames river, breaking its banks. From here on, the scenes

seem only loosely related, shifting from a satellite shown in orbit, to an overview map of London, zooming in and out, to a scene showing traffic in heavy rain, to weather reporting, to landmasses vanishing into the ocean, to a distant view of earth, zooming back in on Britain and London boroughs, then back to an outer-space view of earth with a satellite in orbit, then a close-up of a camera lens, surveillance images on monitors, men standing by a fortified house, a view over a harbour / coastal area, then back to London boroughs with the Thames braking banks, to the camera lens again, a view of floods in neighbourhoods, protesters pressing for environmental responsibility, and back to the satellite in orbit.

Arguably, the voice of the narrator is persuasive and authoritative, producing only claims and explanation. Floods will get worse, ice will melt, you have to prepare, everybody can map everyone else, and so on. The narrator also speaks on behalf of citizens in very general terms, or on behalf of governments, corporations and armies: we can all make maps, we make agreements, seek security, and so on. A sound track is designed to dramatise these claims and explanations, using science fiction-like tones and chords, high-pitched noises appearing to come from electronic devices, and a rhythm hovering in the background, occasionally accentuating shifts between scenes. But the ways in which the composition of the film represents continuities, as stated above, it also appears to conflate the politics of creating and using maps, the politics of predictive modelling and its role in planning for the future, and the politics of surveillance, involving live satellite feeds, map overlays and street views. At the very end, a different voice explains that digital globes are not like ordinary maps. They are 3D models based on live satellite feeds, combined with maps. *Get your own digital globe. Put the world in perspective* (3.19-3.35).

We observe some confusion among participants, as to what the film is really about: `“The films is good, but the middle part with the storms, floods etc. is less coherent (or better not clearly linked) with the start and the end”`. Also, this remark: `“Very interesting the topic and the project. However, the video seems to be a bit unrelated to it”`. The first remark indicates that mapping to find one's way – to observe the world in the past, present and future – has much less to do with threats like catastrophic storms and flooding than the films seeks to portray to the viewer. The second remark indicates that the film does not adequately relate to the focus topics on trust in maps and images, surveillance and privacy, and equality and power. If indeed the film gives these or similar impressions, it may indicate why we receive very little response to it, as well as how selective participants are in commenting on singular aspects of mapping in relation to the film.

For example, we observe how the film supports the assumption that science is good and should help to address global challenges:

Fragment: ***D4.2.1***

```
1  Abby
2  Science is good to support predictions, but it cannot avoid natural developments
3  and reactions. What science can do is to build rules and parameters to avoid
4  misuse of technology to the disadvantage of humans.
5
6  Bob
7  GIS - a very important tool to visualise and hopefully help address some of the
8  'global challenges' in the world today.
```

As Abby argues, `“[s]cience is good to support predictions”`, however, it does not prevent natural developments. It supports the building of `“rules and parameters to avoid misuse of technology”`. Bob's opinion is that GIS-related technologies are not only important for visualisation but current global challenges could be better served. Bob also makes remarks in

response to the film, suggesting that maps should be trusted to illustrate "actual / potential geographic trends", as well as social/neighbourhood and natural trends, involving widespread citizen contributions:

Fragment: ***D4.2.2***

```
1  Bob
2  Openstreetmap.org is a digital map owned by the community - anybody can
3  contribute whatever detail they want, fix any mistakes and share their local
4  knowledge for the world to use.
5
6  Digital maps allow population trends in nature to be visualised... the spread of
7  some species northwards ... perhaps with milder winters? ... the contraction of
8  others as land use changes, and who knows what impacts will be visualised in the
9  years to come Maps are a very important education tool too. Children around
10 Europe are logging their sightings of migrating wildlife to build a dynamic map
11 showing the spread of species across the continent in the Spring.
```

In other words, the film supports the view that map-making should be a collective effort, not only to fix mistakes but also to log and "share their local knowledge for the world to use (lines 3-4; also 9-11).

It is noteworthy how authoritative these contributions are in character. Both Abby and Bob make direct statements or they seek to explain: "Science is good […] but it cannot avoid… What science can do" (**D4.2.1**, lines 2-4). "GIS - a very important tool to visualise… (**D4.2.1**, line 7). "Openstreetmap.org is a digital map owned by they community […] Digital maps allow population trends in nature to be visualised […] Children around Europe are logging their sightings of migrating wildlife…" (**D4.2.2**, lines 2, 6 and 9-10). There does not appear to be anything in particular to question or cast doubt on, using modifier, or to persuade using extreme formulations. Rather, participants use matter-of-fact rhetoric. This indication of trust is also evident in a remark by a participant who mentions the old map in the opening scene of the film and asks if maps were ever perfect and why we think questions of accuracy and trust are so much different now than they ever were. A Technolife researchers also makes a reference to the film in response to the opinion of a participant that digital globes can bring the world together:

Fragment: ***D4.2.3***

```
1  Technolife researcher
2  In the film it says conflicts over maps, land and environment will only increase
3  in the future...will digital globes and maps solve conflict or create more
4  conflict?
```

The participant agrees with the possibility that sheer visibility of what your neighbours are doing can spark conflicts, however, s/he argues convincingly that digital globes will encourage cooperation on matters of development or the environment, simply in the very capability to capture terrains and environmental/social trends on a large scale.

Triggering discussion

If the film itself was designed to raise particular concerns or questions such as whether, "digital globes and maps solve conflict or create more conflict?", it fails to do so. There is no direct evidence that the film raises alarm among participants and, according to our data, there

is no evidence that the film triggers actual discussions among them either. Rather, we observe how fragments of the film can confirm particular assumptions about the good of these technologies—about visualisations to illustrate past and future trends and address challenges, about the application of science more generally for predictive purposes, about the setting of rules, and so on. These assumptions already make substantive contributions to the focus issue on trust in maps and images by emphasising trust in scientific practice and science-centred planning. The question of participation in map-making is seen in a positive light as well, i.e., the possibility that if everyone can contribute content or identify flaws and mistakes. This question addresses the focus issue on power and equality by foregrounding the democratic potential of contemporary map-making. That said, any world-making and meaning-making initiated in the film, ideally, should be an ongoing labour of co-construction among its viewers. But a concern here is the lack of contributions from participants and the comments on the film we do receive make selective moves to portray particular social and technical possibilities in a matter-of-fact manner. As we now continue our analysis, we leave the film behind to explore ongoing contributions over three or so months.

2. Addressing the topics: Issues of ethical and social relevance taking shape

In this section, we explore the ways in which the focus issues are addressed and how they take shape: *trust in maps and images*, *surveillance and privacy*, and *equality and power*. There are questions of scientific confidence, data values and subjective perceptions. There are issues concerning the profiling of mobile groups and socially significant conditions, how access to geo-referenced data is controlled, and the ways in which maps are at the heart of territorial and environmental conflict, as well as debates on safety and liability. We observe that the focus topics overlap to some extent but, for the sake of clarity, we deal with each separately. The contributions we refer to and analyse, demonstrate struggle over meaning-making and world-making whereby concerns, claims and questions are articulated with reference to understanding or assumptions which are either explicitly explained or presupposed. Some participants are well-versed in the potentials of GIS-related technologies, others simply signal their interest but it strikes us how authoritatively participants make their claims, explain what they know and project visions and points of view.

1) *Trust in maps and images*

Questions of trust are anchored in contributions, touching on issues of scientific standards, confidence of data accuracy, collective validation criteria, as well as subjective perceptions that can educate, contribute to debates or mobilise political action. For example, in the previous section, Bob claims that anyone can contribute, fix mistakes and share knowledge on Openstreetmap.org (**D4.2.2**), implying that this type of ownership by the community is essential to trusting the product. But questions of how experts work and what their standards are, play a significant role in the way in which maps are trusted, for example maps of floodplains:

Fragment: ***D4.2.4***

Charles
In order to determine if a specific property is in the floodplain **we need VERY detailed information** on elevation […] **you could get lots of errors** of ommission or commission […] **We are being REQUIRED to collect this information**, and […] **data must be extremely detailed** for it to be usable […] all of the information is dependent on spatial accuracy. Is it good or is it poor? Like all sciences, **GIS folks deal with data confidence intervals**. **Data should never be stated as pure truth** because nothing is perfectly accurate. **There is always error** in all data. How much? That depends on the methods, etc. In my field we spend a lot of time discussing data quality and metadata (data about data) […] That being said, if something is accurate to the 95 or 99% confidence interval, shouldn't we call that close enough to truth.

Charles contributes the viewpoints of the GIS expert who is bound by particular standards of practice. Information needs to be "VERY detailed […] you could get lots of errors […w]e are being REQUIRED to collected this information […] GIS folks deal with data confidence intervals. Data should never be stated as pure truth […t]here is always error in all data" (lines 2-4 and 7-9). In other words, the way in which trust is established is not by ascribing truth value to scientifically collected data, but by assessing the scientific method, i.e., the confidence one can have in the data on the basis of what methods are used: "…depends on the methods, etc […] if something is accurate to the 95 or 99% confidence interval, shouldn't we call that close enough to truth" (lines 9 and 11-12).

Charles' explanation of how experts work, suggests that maps reflect methods of depicting the world, in his case, the geography of floodplains. But the issue of trust is also explored by participants with reference to the question of *who* the actors are:

Fragment: ***D4.2.5***

Donald
…I guess that it[**the map**] **reflects the perception and skills of the actors** […] Trust the actors and you will trust the information. Not all private companies and public authorities are equally trustworthy or competent […] quality and accuracy have to be first defined so they can be appraised, and the definition will depend on the actors perception and understanding of the world. **As a scientist I tend to trust maps made by scientists or technicians** as we are likely to agree on what is relevant and accurate, but even then of course there are disagreements as **we have different ways to define quality and accuracy**…

Donald is not a GIS expert but a scientist who tends "to trust maps made by scientists or technicians as we are likely to agree on what is relevant and accurate (lines 7-9). Donald does not necessarily trust either all authorities *or* all private companies in matters of quality assurance, "quality and accuracy have to be first defined […] the definition will depend on the actors perception and understanding of the world" (lines 5-7). In other words, there are differences in understanding the world, in the ways in which perception is trained, subjective, and "we have different ways [methods] to define quality and accuracy" (lines 9-10).

The question of subjectivity's role in mapping is pushed even further (accuracy and quality) in this contribution:

Fragment: ***D4.2.6***

```
1  Elly
2  …accuracy in maps depends on actors involved in the mapping process requirements
3  […] representation of space depends on the cartographer perspective, even a
4  scientific one is made by a person with its own subjectivity […] this is the
5  greater potential of mapping besides its scientific one, to express and share
6  subjectivity, thus contribute to discussion, education, political action.
```

Elly argues that even the scientific perspective "is made by a person with its[her] own subjectivity" (line 4). The inclusion of subjectivity is precisely where Elly sees the greater potential, i.e., "to express and share subjectivity, thus contribute to discussion, education, political action" (lines 5-6). She then continues to argue that collaborative none-private GIS platforms should be promoted, which is suggestive of her uneasiness with the power advantage private platforms can gain, as we will discuss further in relation to the topic on equality and power. But, the democratic potential of collaborative map-making is foregrounded by participants with reference to community participation, thus, possibly more effective quality control, among other reasons to better trust the data.

Fragment: ***D4.2.7***

```
1  Fritz
2  Goodchild (a GIS guru) […] writes that we are 6 billion sensors, precisely
3  alluding to the possibility for citizenry to supplying geo-referenced
4  information to the types of systems we are discussing here; this is explicitly
5  recognizing that citizenry have specific knowledge not necessarily articulated
6  in scientific language, but probably experiential and legitimate.. There are
7  transatlantic initiatives thinking on how to use citizenry information […] to
8  help authorities with e.g. early warning systems for weather events, etc.
```

To summarise, participants mainly associate trust with questions of how maps are made and who the makers are. But they also address questions of distributed versus centralised practices, open-access or proprietary tools, what kinds of perspectives are included and what the map-making is for. Fritz's contribution brings many of these factors together, i.e., by referring to Goodchild's idea that people can be crowd-sourced to improve the management of public information systems supporting critical infrastructural and environmental developments: "this is explicitly recognizing that citizenry have specific knowledge not necessarily articulated in scientific language, but probably experiential and legitimate". The question still remains, what exactly is being mapped and who makes those decisions. Is it geographical variables, antisocial behaviour, desirable neighbourhoods, the socio-technical (re)organisation of a terrain or future collaborations? The question also remains what the role of authorities will be in the future, as certifiers of geo-referenced data, when ownership is uncertain, as well as the management of access.

2) *Surveillance and privacy*

Participants do not appear very interested in privacy protection or even in discussing what breach of privacy might stand for in relation to digital globes. Elly claims that "Google earth information is accurate enough to have data of many of us", and about Street View she adds that "it has gone beyond a line that threatens privacy and freedom". A couple of Technolife researchers take up the issue of threat to privacy and freedom, but other participants

do not, even if the facilitator makes attempts to encourage comments or discussion on the matter. However, privacy-related issues find expression in the question of which information is made freely available and which is "blanked out":

Fragment: ***D4.2.8***

Gavin
…**private enterprise** offers the digital maps, so they **have the option of "blanking out" where ever they like** for what ever reason. This becomes more complicated when it is the government that is offering the digital map. For instance, **if a person chooses, they can buy satellite photos that offer more detail** (and sometimes pictures of "blanked out" areas unavailable on free digital maps) […] **A person just has to accept that there will be certain restrictions on free information**.

As Gavin further explains, the "blanking out" applies to VIP residence, private roads or strategically important locations for which enough influence is exerted to leave them blank. Another participant also mentions the relevance of terrorist activities but, according to Gavin, these locations are at least not visible for free: "A person just has to accept that there will be certain restrictions on free information" (lines 7-8). On a different note, another contributor paints visual analytics in a positive light because they take privacy protection seriously when tracing and data mining mobilities. A Technolife researcher responds here with a concern which is not about individual privacy but social privacy:

Fragment: ***D4.2.9***

Technolife researcher
…preserving the privacy of persons and only using this technology to profile movements of groups or socially/culturally significant conditions and how they change over time […] My question is […] what purposes analytics serve […] I can see the point about smarter traffic […] But **why should people as groups be accepting of group profiling, profiles of how they [groups] move through space or "who" they are and what they are up to more generally**?

No follow-ups on this or similar issues of surveillance for social sorting come from other participants.

3) *Equality and power*

Issues of equality and power are most widely addressed in the forum and, as we have seen, they often overlap with issues of trust in maps or images. For example, Charles and Donald talk about trusting scientists and their standards, which is suggestive of the authoritative status of scientific practice and science-centric planning (**D4.2.4** and **D4.2.5**). Fritz talks about "the possibility for citizenry to supplying geo-referenced information" to improve critical information systems, but it is unclear who would actually own that information and manage the access (**D4.2.7**). In short, map-making over time is intricately linked to questions of power, equality or justice, but also how we can say that maps bring people together:

Fragment: ***D4.2.10***

Henry
Consider the maps from the WWII battles. **They celebrate land** that has been conquered. **Maps of the old British Empire** "where the sun never sets" **were global**, but there was little in them that inspired global community. Granted,

```
 5  contemporary global “live” maps work on our minds along with the now shared
 6  opinion that he globe is not well […] What we are seeing is not just an
 7  outstanding planet. We are looking at ourselves. What we see is a resultant of
 8  what nature and we jointly do. “What on earth are we doing?” presses itself upon
 9  all of us […]
10
11  Maps can intensify local conflicts, of course. If satellite maps show that your
12  neighbour is in the process of sprawling settlements on your territory, the maps
13  will naturally kindle conflict.
```

By drawing attention to imperialism and warfare, Henry reminds us how subjectively purpose-built map-making can be when it is used to distinguish conquerors or rulers from others: “They celebrate land that has been conquered” (lines 2-3). Compared to that, global “live” maps could bring us <u>all</u> together: “We are looking at ourselves. What we see is a resultant of what nature and we jointly do” (lines 7-8).

Henry's contribution is a part of a lengthy exchange with a Technolife researcher in which they debate whether or not their discussion should be about who can benefit instrumentally from global maps. As Henry admits, “Maps can intensify local conflicts”, but he remains committed to the question of how different possibilities in making maps serve as screens upon which we can project our place in the world, with each other, with nature, and so on. Other participants however, contribute directly to questions of conflict, for example, to what end science-centric mapping and planning dominates in coastal management:

Fragment: ***D4.2.11***

```
 1  Jeremy
 2  I would like to talk about coastal erosion/inundation zones used on planning
 3  maps to dictate where future coastal development can be situated […]
 4
 5  …the mapping showed the immense power invested in consultant applied scientists;
 6  their knowledge is preferred given it is deemed more legally defensible, and
 7  thus more likely to stand up to the inevitable legal challanges. The problem was
 8  that this particular region had very little in the way of 'hard facts' on the
 9  behaviour of its coast […] the zoning was very 'broad brush,' sometimes
10  following a completely straight line that ignored the contours of the coast.
11  Scarily, this 'hit-and-miss' mapping was being used to write VERY concrete rules
12  to the extent that landowners where needing to move their new proposed house
13  50cm, at massive expense, to avoid a huge court-case […]
14
15  …many coastal communities had long-time residents who represented a rich source
16  of knowledge on local coastal dynamics (photos of their childhood, changed
17  fishing habits, memories of specific floods/cyclones etc), yet were very rarely
18  consulted […] the challanges to this coastal planning initiative represent an
19  interesting commentary on the way power finds explicit expression through local
20  government planning maps […] power is largely represented by financial
21  resources, and the resultant legal and scientific expertise they are able to
22  engage - effectively the decision-making process is a legal one.
```

What Jeremy points out here is how the “coastal erosion/inundation zones used on planning maps” (lines 2-3), become key weapons in the battles of powerful development interests. “[C]consultant applied scientists” are hired for the task, to propose future coastal developments that need “to stand up to the inevitable legal challanges” (lines 5 and 7). The example Jeremy takes however, concerns a region where “'hard facts' on the behaviour of its coast” are few, thus, “the zoning was very 'broad brush,'” (lines 8-9). But this “'hit-and-miss' mapping was being used to write VERY concrete rules” (line 11). In this

case, crowd-sourcing for better quality and more trustworthy data is not prioritised and the challenges introduced by the planning initiative become an expression of power, "represented by financial resources, and the resultant legal and scientific expertise they are able to engage" (lines 20-22).

On the one hand, the final verdict Jeremy has to offer is that "effectively the decision-making process is a legal one" (line 22), where science also finds its expression of power as the supporting science-centric paradigm. On the other hand, what he is also pointing out is the role of geographic variables in challenging the science-centric paradigm, i.e., if residents happen to be a rich source of quality data. We see here how tensions between the perceived validity of expert versus other sources of data are framed as questions of power, in particular, in sensitive affairs involving legal battles. But we also observe in other contributions how tensions between proprietary and open-access data are framed as questions of equality and power:

Fragment: ***D4.2.12***

Kirsty
I think maps have two main big potentials:
a) Scientific research: […] GIS have revolutionized spatial research […] **public administrations and universities have invested great effort on producing accurate georeferenced data to be used by scientist that bit by bit are being published so that anyone can use them** […] if we leave this investment to private companies, prices of GIS databases will rise so that only those able to pay for ir will be able to use them. If a company needs a more accurate map, ok pay for it, but it is important to claim for good public GIS databases.

b) Social movements: […] the social production of maps, normally online, is becoming such a powerfull tool to enhance the coprenhension of territories (including space and people), social processes, expressing denounces, building participatory proposals, and thus taking part on governance […] **it strenght is its democratic nature. There is no public investment at all, and google has been the main tool used, which implies that all socially generated data instantly became ownership of a private company**.

Kirsty foregrounds here what she sees as the "two main big potentials" of maps, i.e., for scientific research and social movements. In the former case, spatial research has been revolutionized to produce more accurate geo-referenced data "that bit by bit are being published so that anyone can use them" (lines 5-6). She adds that the prices of these data will be too high "if we leave this investment to private companies (lines 6-7). "[I]t is important to claim for good public GIS databases" (lines 8-9). In the latter case, Kirsty claims that "the social production of maps, normally online, is becoming such a powerfull tool" to support active participation in governance. It is the democratic nature of these practices which is the big potential but also a culprit. As Kirsty puts it, "[t]here is no public investment at all, and google has been the main tool used, which implies that all socially generated data instantly became ownership of a private company" (lines 15-17). Indeed, the role of Google tools in the democratisation of map-making keeps coming up in the forum. As one participant puts it: "Google has created these tools and made them available for everyone" but people are realising the democratic problems:

Fragment: ***D4.2.13***

Larry
It is a matter of time and voluntary effort that […] alternatives become available. In the mean time...google will be accounting with our georeferenced data, and our mails, docs , videos, etc

In other words, unless voluntary efforts make alternatives to Google tools available, `“google will be accounting with our georeferenced data, and our mails, docs , videos, etc”` (lines 3-4).

To summarise, participants deal with questions of equality and power by foregrounding the authoritative status of scientific method and science-centric planning for critical development. Good example of that are Jeremy's explanations which place the power of science at the centre of legal battles over planning decisions. Participants also foreground new trends toward the democratisation of map-making to better comprehend of territories, social and environmental changes, and to build participatory proposals in order to impact decisions by authorities or decisions by neighbours. We learn that global maps can serve as screens upon which we project our place in the world and we learn that the democratic potential of map-making is significantly subject to doubt, for example, if corporate enterprise supplies all the tools and keeps the data in storage. Finally, an issue which is briefly alluded to, concerns the extent to which map-making can actually be democratised if crowd-sourcing is used to simply attract free labour or if it is a method that places the activities of individuals and groups under new forms of surveillance.

Participation in the forum on digital globes

As we have already mentioned, the participation in the forum on digital globes was less than satisfactory, although, we observe a variety of perspectives in the contributions we did receive. What needs further discussion however, are the orientations participants demonstrate toward claims, explanations and persuasion. Apart from exchanges taking place between single participants and Technolife researchers, participants are rarely in dialogue with each other about the contents of the film or the focus topics more generally. This report omits most of the exchange with Technolife researchers and the comments the researchers contribute. The contributions we analyse and discuss in this report are for the most part by invited participants. We observe very direct forms of expression, using matter-of-fact rhetoric, the vast majority of which are self-standing comments, however, some hold references to previous comments simply as gestures of approval or agreement. In other words, participants make direct claims and they explain what is the case about various practices they are either directly involved in or acutely aware of for one or another reason. The fact that there are not that many comments overall and the contents vary, does obviously not support dialogue on particular issues. However, it strikes us that the ones that do address same or similar domains of activity do not form a debate but, rather, they form exchange of “statements”. That said, one might ask if potentially contentious issues are simply not well known, in particular, those that have to do with surveillance and privacy protection or questions of power and equal access to important resources. This may or may not be the case. What we do know is that much wider discussion and debate on matters of map-making and the use of real-time geo-localisable data exists in the blogosphere than we managed to recruit to the Technolife forum on digital globes.

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