

ADVANCEMENTS IN DESIGN RESEARCH

11 PhD theses on Design as we do in POLIMI



edited by Lucia Rampino and Ilaria Mariani



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DESIGN INTERNATIONAL

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A taxonomy of data visualization projects for alternative narratives

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Abstract

Data-driven alternative narratives are data activism communication practices. Non-expert and bottom-up groups of the datafied society are using open-source tools and data to provide evidence on social issues that have not been covered or made transparent by mainstream and official institutions. Data visualizations are decisive adversarial tools for the purposes of alternative narratives and thus data activism. Data designers assume the role of data intermediaries capable of transforming data into information and bringing it closer to the daily experience of individuals. This study states that data visualization for data activism must disclose their design process in order to communicate not only visual evidence but also the construction of the evidence, thus, democratizing the interpretation of data and its visual representations.

It is essential to recognize and promote practices in order to move towards a critical approach to the process of visual representation of data. Thus, raising knowledge about how data visualization for alternative narratives is occurring and how its construction process is proceeding. This chapter presents a taxonomy of data visualization for alternative narrative projects observing how data visualizations are executed to build up alternative narratives: by monitoring, reporting, investigating, archiving and cohering social movements. The aim of the taxonomy is to organize the exploration of the cases; it is not intended to over-label the organic development of alternative narratives, nor to impose a single classification. The taxonomy is proposed as a starting point for exploring the visual representation of data-driven alternative narratives.

Data activism and data driven alternative narratives

Emerging new social practices enabled by technology and data are taking a critical approach to datafication, privacy and the general use of data. These new practices use data «politically and proactively for meaning creation, coordination, participation and social change» (Gutiérrez, 2018, p. 2). One of the many ways in which data and technology are applied for social change is through the creation of narratives that subvert those delivered by dominant power structures. This study focuses on the way bottom-up groups of the datafied society are taking advantage of open-source data and tools for building up communication devices which carry alternative narratives.

Data activism is a type of activism that takes a critical approach to practices surrounding data for challenging existing power relations. «It involves a series of practices at the intersection of the social and the technological dimension of human action, with two aims: either resisting massive data collection or actively pursuing the exploitation of available data for social change» (Milan and Gutiérrez, 2015, p. 122). Data activism builds on the work of subcultures that precede it, taking main inspiration from hacker ethics and the open movement that have emphasized the use of data in activism by opening, sharing, modifying and using it to generate knowledge and seek out social change (ibid.). One of the main objectives of data activism is to remove individuals from passivity in the face of data. In this way, data activism will seek to inform how the mechanisms by which institutions of power control the data of individuals are constructed. It also seeks to share knowledge about technical and ethical practices with data, promoting training instances.

Data-driven alternative narratives are narratives based on data that shapes the facts that take place in a story not told by the dominant institutions, with the aim of making visible and evident issues for audiences to reflect over and continue to question. The use of data in this type of activism calls to action in two instances: during the process of working with data - from its extraction, collection, cleaning, analysis and shaping into visual narratives for advocacy; and after reading and understanding its visual representation, providing insights for making decisions and taking action on advocated issues. Both instances build up political statements in which designers and the related disciplines involved together decide which spectrum of reality has to be shaped and turned into communication artifacts for taking action. In this context «the visualization process is also, and directly, a tool for community building» (Manzini, 2015).

Data visualization for alternative narratives

Data visualizations for alternative narratives are adversarial tools that beyond exposing and giving visibility to issues of conflict, seek to promote a critical approach to data and its visual representation. This study raises the urgency of disclosing data visualizations so that audiences can interpret their content but also the logic behind their construction. In this way, audiences can re-interpret the data and its visual representation becoming a larger knowledgeable and critical audience of conflict representations. Thus, data visualizations are instruments for democratizing information and for the democratization of interpretation (Baack, 2015, p. 4) in which its authors and «consumers» have an ethical and moral responsibility (Tufte, 2006). Opening visualizations for its reinterpretation requires a critical design by its authors and critical reading by audiences. Both involve processes that can be guided.

The study identifies the need to raise awareness and understanding of how data visualizations in alternative narratives are occurring. A first step is to provide knowledge about how they are developed on digital platforms. As part of the research methodology, a case study analysis was conducted on 65 data visualization projects on digital platforms. This chapter presents a taxonomy of projects that use data visualizations for alternative narratives. The taxonomy is proposed as a first step for the study of alternative narratives. It offers an open method with which to observe the data visualizations involved.

Information designers as data intermediaries

Information designers have always had a relevant role in shaping and organizing information for people to decide and take effective action (DiSalvo, 2009). In today's milieu of data abundance and access, and the democratization of tools and connectivity through digital platforms, information designers assume the role of «data intermediaries» (Baack, 2015). They are capable of transforming data into information, bringing data closer to the daily experience of individuals.

Data visualizations for activism is a type of adversarial design, since they are aimed at triggering informed action. Adversarial design refers «to shapes, beliefs and courses of action with regards to political issues» (DiSalvo, 2012, p. 16), which is different from other design approaches. In other words, it is about how design can act in opposition to existing structures to make hidden agendas visible. The cases that will be reviewed through the taxonomy are built on critical narratives that use data, creating visions of

the world that represent an alternative to those provided by conventional structures of power. They are cases that define and take a position on topics of political and social conflict.

A taxonomy of data visualization projects for alternative narratives

The exploration of case studies outlines the current state of initiatives that use data visualization as evidence in projects which portray alternative narratives. It aims at gathering knowledge on current initiatives of data activism focusing on the visual elements and structures that make data actionable to advocate for different purposes. A qualitative approach was adopted in the selection of case studies, following projects: with social objectives that seek to engage audiences through the communication of alternative visions of the world; that use digital platforms and data in their communication design; that were developed by independent and mainly bottom-up organizations; that are non-profit and not business sector-oriented.

Selection criteria: spaces of confrontation

The 120 cases initially collected were filtered according to the “spaces of confrontation” criterion, selecting 65 of them. The excluded cases emerges as other ways of seeking social change through data and technology with focuses on urban and social transformations, data humanitarianism, data journalism, and digital social tools.

The criterion is structured over three main concepts borrowed from the «agonistic theory» (Mouffe, 2000) and «adversarial design» (DiSalvo, 2012) that serve as axes:

- **Dissensus** is considered a fundamental part of democracy: the starting point for creating or proposing points of view that are different from already well-established ones. It establishes a position, which is essential for debating and presenting contrasting opinions, in order to create an exchange of ideas.
- **Contestation** is a form of manifestation for challenging hegemony. It considers projects that take a contrary position on the matters represented in the visualization device. At the same time, it recognizes how challenging working with data can be due to how data is acquired and what tools are used in the process of building the visualization.

- **Revealing** directly challenges the dominant narrative by uncovering concealed facts (Tactical Technology Collective, 2013, p. 23). It makes debate, additional research and positions of influence available for future action. This axis examines those projects in which design helped people to find hidden patterns of information and aided in their reading.

The three axes work as grids for positioning the cases, observing their process of working with data (as much as it could be inferred from their available information), analysing their purposes and target audience, as well as their output through data visualization interfaces. The selected cases are «disruptive aesthetic» (Markussen, 2013) practices that re-configure the power system , opening spaces that enable alternative ways of acting.

Spaces of confrontation and “outsiders” clusters

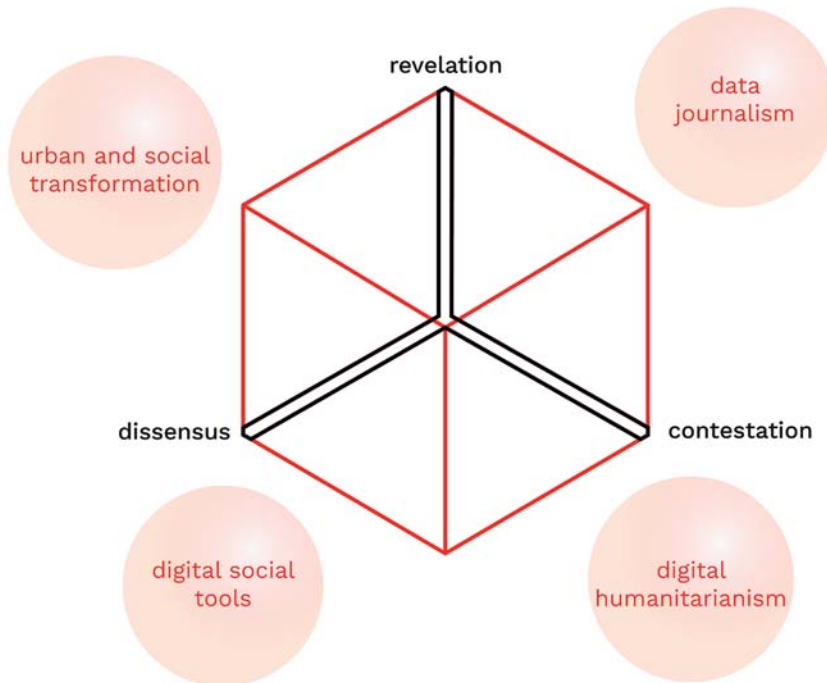
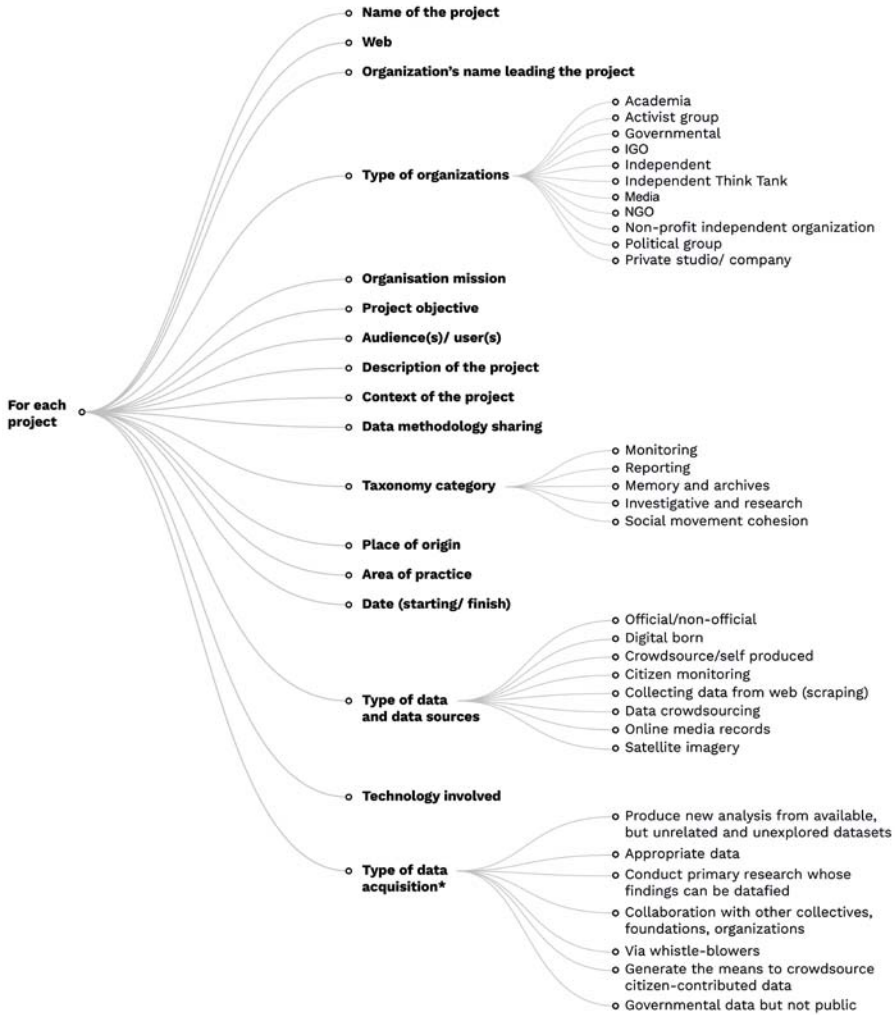


Fig. 1 – Diagram of space of confrontation (red cube) structured by the three axes: revelation, dissensus and contestation. Outsider clusters (pink spheres) are not part of the cases study. Nonetheless, they are other ways of creating alternatives for social change through different renegotiation practices with the dominant power.

The taxonomy of data visualization projects for alternative narratives

Selected cases were systematically organized according to the variables for analysis (fig. 2).



* Classification based on the work of Mirén Gutiérrez on how activist get their data (Gutiérrez, 2018, p 49).

Fig. 2 – Dendrogram diagram of variables for analysis extracted from each project.

Types of organization clustered by project topics

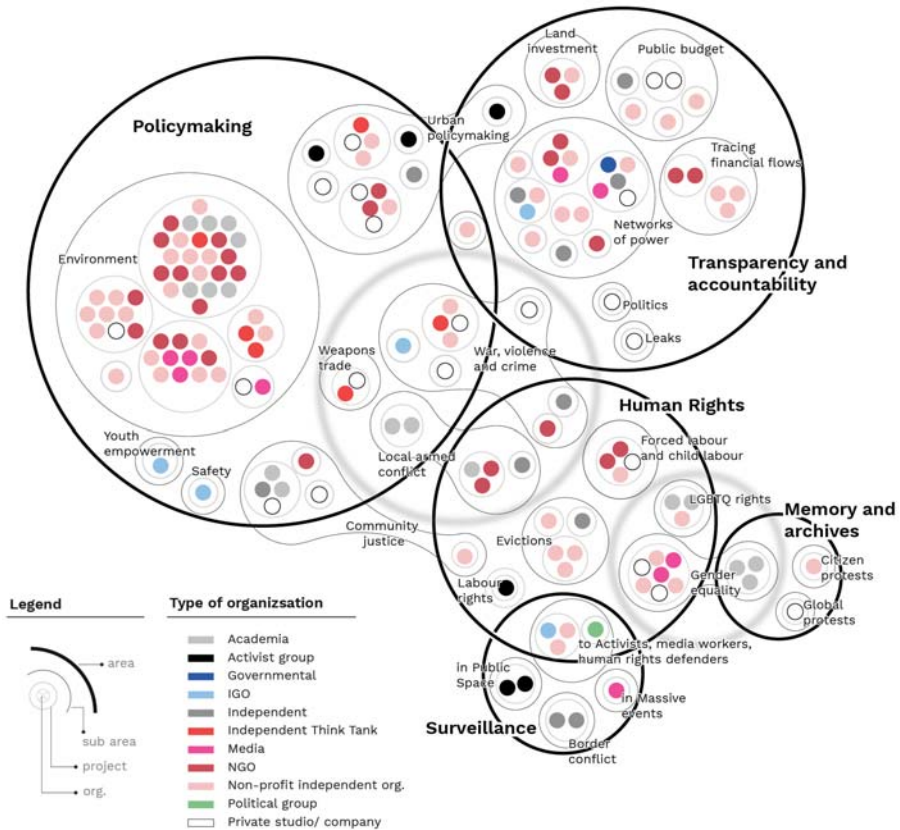


Fig. 3 – Map of the cases by area, topic, and type of organization that participates in the project, that shows how topics and areas overlap. One project can be led by more than one organization or individual. Some organizations participate in more than one project but in the same areas or topics, showing the consistency on their advocacy work.

Cases are first organized into clusters answering the question: *what does data visualization for building alternative narratives work for?* The categories were defined based on the analysis of the project objective, audience, and context. These categories are: ‘*Memory and archives*’, ‘*Investigative and research projects*’, ‘*Reports*’, ‘*Monitoring projects*’, and ‘*Social movement cohesion*’. The clusters identify the main purposes of visualization in the project they are in. The analysis of the cases allows us to identify other dimensions of the projects, such as the narrative style with which they commu-

nicate the data. The narrative styles are transversal to the identified purposes and are: ‘*Game style*’, ‘*Revealing*’, ‘*Emotional communication*’, ‘*Media remix*’, and ‘*Repurposing of existing media platforms*’. This chapter will focus only on taxonomy based on the purposes.

**Taxonomy map of data visualization projects
for alternative narratives**

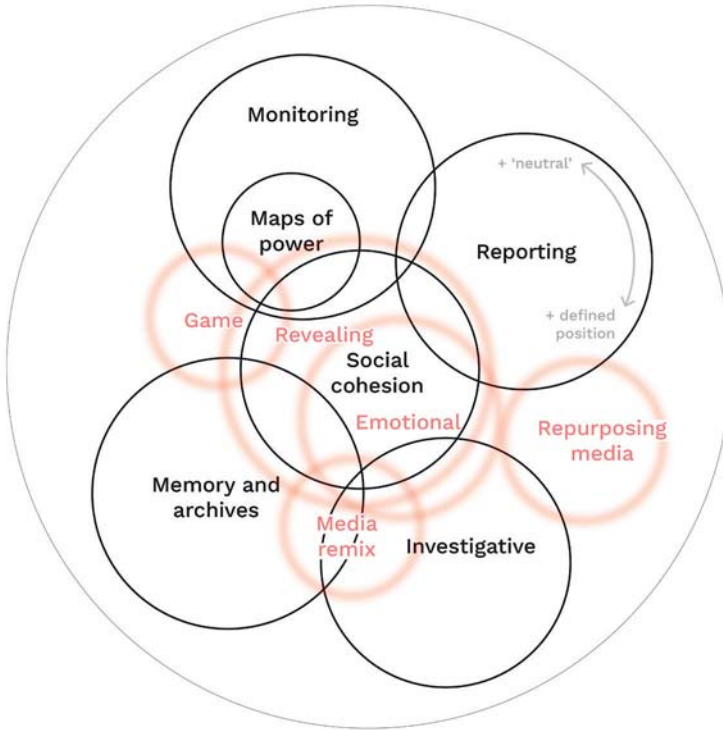


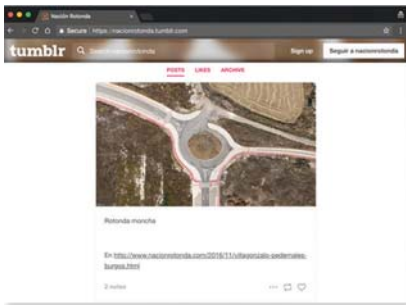
Fig. 4 – Taxonomy map diagram of the collection of data visualization cases (black circles). Narrative styles (blurry pink circles) emerge across different cases.

Memory and archives cluster

This cluster encompasses projects the main characteristic of which is to build on the memory of specific material through data collection. Archives «are not passive storehouses of old stuff, but active sites where social power is

negotiated, contested, confirmed» (Schwartz and Cook, 2012, p. 1), and thus they are power devices that create realities by storing and making pieces of evidence accessible. Archival activism is directly related to community-based archives around the world. They are «strongly rooted in grassroots activism, documenting social inequality and human rights» (McCracken, 2017).

Archival activism often serves two functions (ibid.): a) it offers access to stories, evidence, facts and arguments that can be used to advance causes and social campaigns; b) it can be considered a counterculture practices itself, archiving material that has not been recognized by the dominant official structures. The case studies in this cluster fulfil one or both functions. They embrace interactive features that allow users to explore the dataset through visualizations (on maps, networks, charts). In most cases users can download the databases and contribute to data collection (crowdsourcing data). Archives assume different features depending on the type of material collected. Material related to territorial conflicts, events, and objects respond to different requirements and thus different visual ways of representation. Archives focused on territorial conflicts usually collect georeferenced evidence that may be satellite images (fig. 5a) and georeferenced locations (fig. 5b) among others.



Project 's Tumblr archive

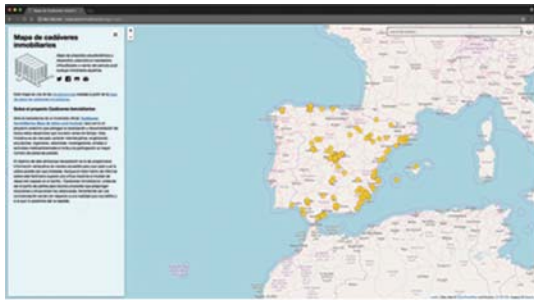


mapa de entradas (entry map)

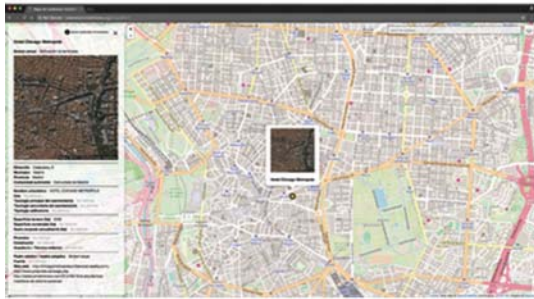


Satellite image comparison: before and after effects of the real estate bubble

Fig. 5a – ‘Nación Rotonda’ use satellite imagery for depicting the before and after effects of the real estate bubble in Spain. Screenshots retrieved from www.nacionrotonda.com in May 2018.



General navigation map (zoom out)



Detail exploration (zoom in)

Modular explorative maps



Fig. 5b – ‘Cadáveres Inmobiliarios’ is a mapping project of adopted vs “unearthed corpses” which collects the positions of houses of evicted families and phantom macro-urbanization. Screenshots retrieved from <http://cadaveresinmobiliarios.org> on September 2017.

Archives that document events use material that can vary widely: from the nature of the data collected (digital or digitized), their sources (official or unofficial) and type and format (images, videos, numbers, words, audio recordings, objects, etc.). Some inventive ways range from recreating virtual events (fig. 6a) to collecting the digital traces left by events as links to news articles on a map (fig. 6b).

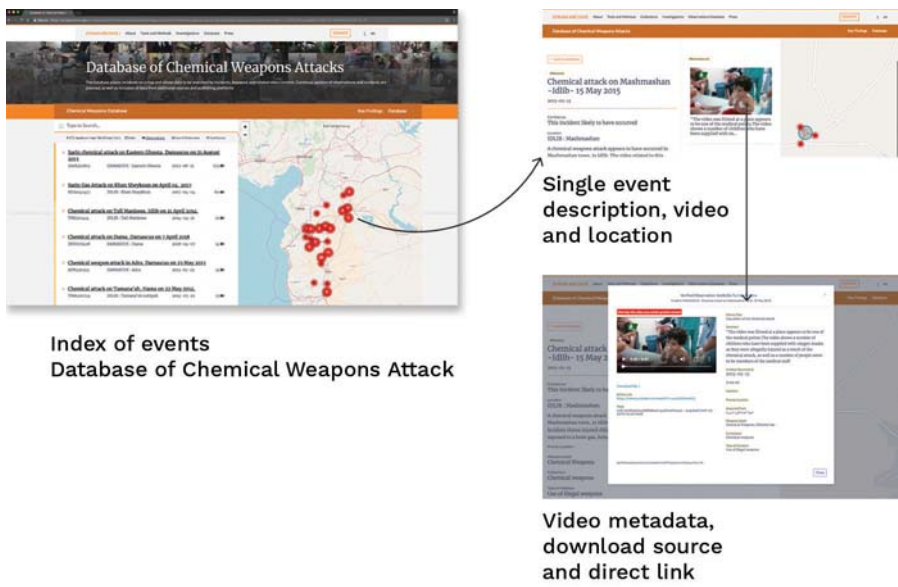


Fig. 6a – ‘In Marcia verso l'EuroMayDay 04’, a game-like interface where users create marching avatars building the database of No-global society. Screenshot retrieved from www.molleindustria.org/netparade04 in June 2017.



Fig. 6b – ‘Cartografías de la Movilización Estudiantil’ each clickable dot links users to a news article. Screenshots retrieved from www.cartografiadelamovilizacion.cl in November 2017.

Other archives aim to provide databases that can be used as tools for reporting and advocacy. The ‘Syrian Archive’ identifies, preserves, verifies, catalogues and makes accessible (fig. 7) videos recorded by individuals during the Syrian conflict. Videos are visualised on a map which works as a visual index to navigate the videos and provide context for understand their metadata.



Syrian Archive research methodology diagram

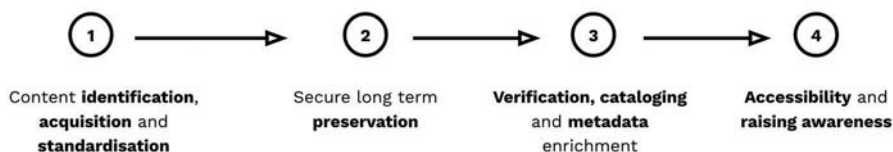


Fig. 7 – The ‘Database of Chemical Attacks’ is one of the Syrian Archive databases that archives videos from social platforms. Maps work as an index, putting in context videos, and thus attacks. Below, the project’s research methodology diagram which summarize their way of inquiring the collected material. Layout based on the description provided in the dedicated section of the platform. Screenshots retrieved from <https://syrianarchive.org> in January 2018.

Monitoring projects

In this cluster, projects seek to hold accountable and increase the transparency of the work done by top-down institutions by monitoring their actions: by constantly following, tracking, and comparing the changes. Often monitoring projects are fed by crowdsourced data. The audience is not only an observer but also a contributor of information. In this type of visualizations audiences may assume an active role in two moments: by exploring and engaging with their content; and through the process of crowdsourcing its data.

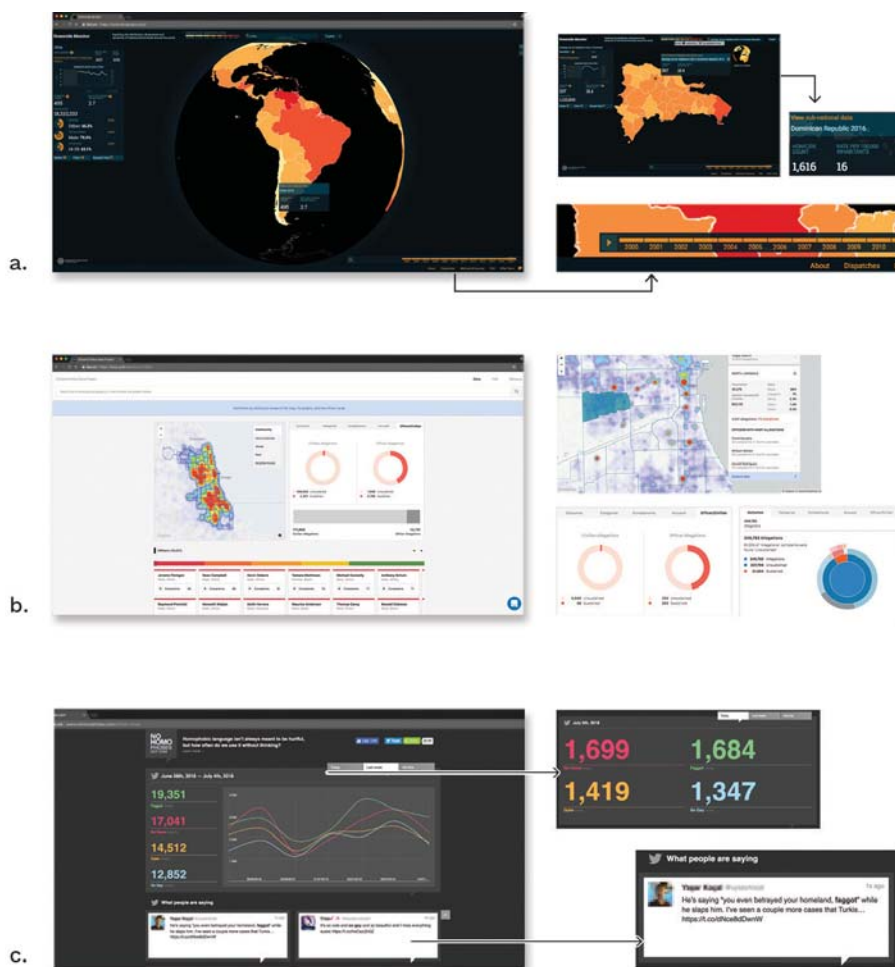


Fig. 8 – Screenshots from: a) ‘Homicide Monitor’, representations of the planet are the central element and are as important as the timelines and dashboard panel. Retrieved from <https://homicide.igarape.org.br/in> in May 2017; b) the ‘Citizens Police Data Project’ interface offers a clean clickable dashboard, allowing multiple entry points for exploration. Retrieved from <https://cpdp.co> in June 2018; c) NoHomophobesDotCom dashboard shows the number of times that hashtags are used on Twitter, aggregated by time. Retrieved from <http://www.nohomophobes.com> in June 2018.

The use of timelines to represent monitoring ranges and territorial representations to contextualize movements are recurrent. Timelines have a relevant presence, allowing users to explore the variations of an observed

phenomenon over time. Territorial representations are often used for mapping monitored flows. From representations of the Earth (either as flat world maps or a 3D globe as in fig. 8a) or zoomed-in maps (fig. 8b). Other forms of visualizations for monitoring approach dashboard interfaces that allow multiple entry points for exploration of dynamic databases over time (fig. 8c).

Maps of power is a sub-group within this cluster that monitors the influence and power relations between actors and institutions. Unlike previous cases, *maps of power* usually don't use up-to-date crowdsourced data. They monitor how power relationships operate and change in different contexts usually through network visualizations. Other inventive ways to represent these relationships can be found through the use of metaphors (fig. 9a) and customizable timelines (fig. 9b).

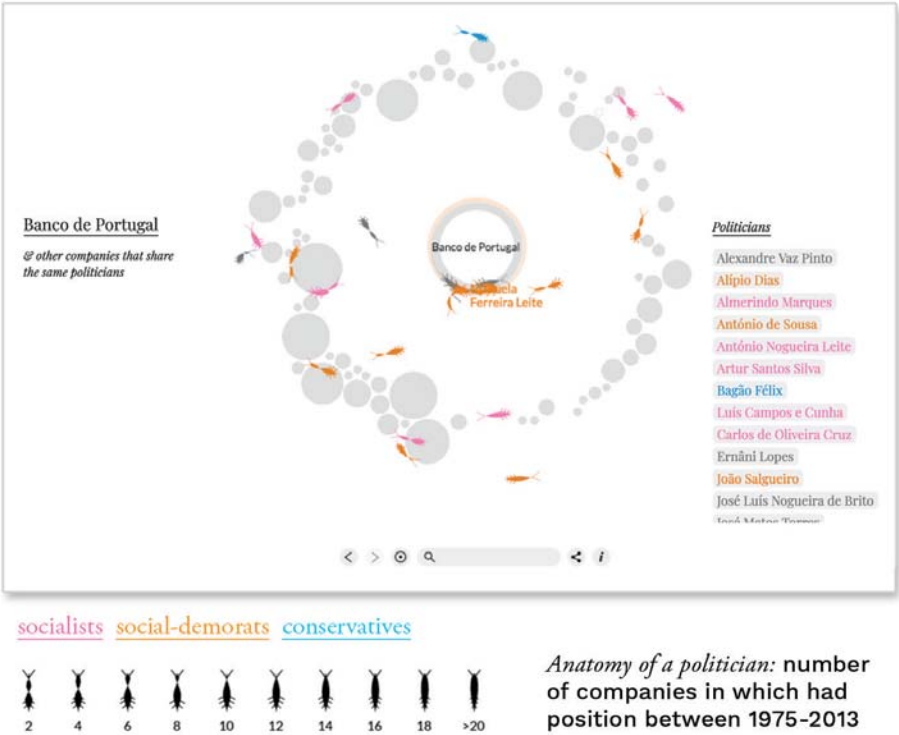


Fig. 9a – ‘An ecosystem of corporate politicians Portugal 1975-2013’ uses insects as a metaphor. Retrieved from <http://pmcruz.com/eco> in May 2018.

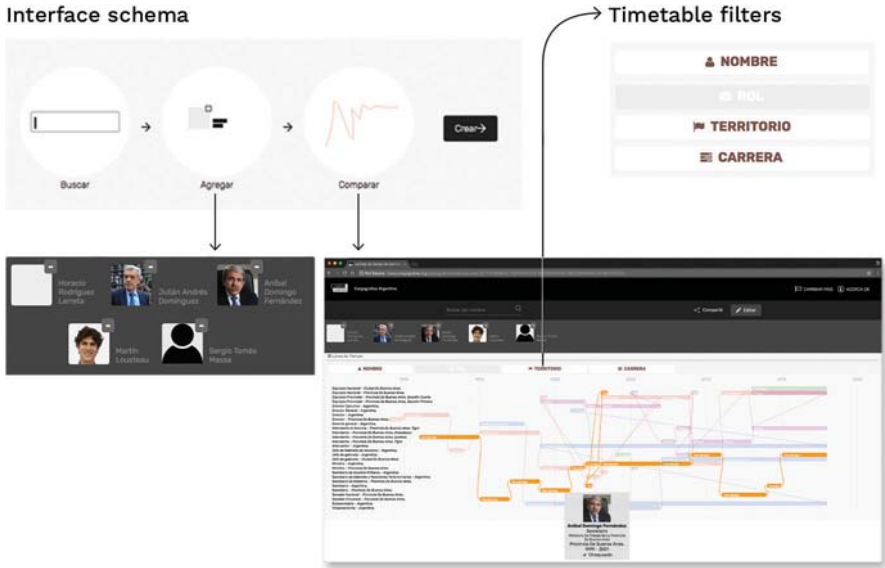


Fig. 9b – ‘Cargografias’ web interface allows users to select the actors whose relationships they wish to map, the interface creates a timeline of connections that can be filtered by “role”, “territory” and “career”. Retrieved from www.cargografias.org in May 2018.

Reports

Reports study, observe and share evidence of specific phenomena, providing an overview of something that most of the time already happened within a specific range of time, and can be verified by anyone. Their main purpose is to raise awareness and present information about the specific matter studied. Most of the collected cases that belongs to this cluster try to report a phenomenon by sharing evidence from a “neutral” position, which can be observed from their graphical resources and/or their narrative of structure: the use of labels to show the exact number represented in a chart, clear titles over visualizations, the presence of text paragraphs interwoven with visualizations, among other things. Even if no completely “neutral” position exists, these reports seek to provide facts and evidence of the phenomenon.

A wide range of report types were observed, from unemotional ones that seek to be objective without declaring a position, to reports with a stated position, which present the data as verifiable facts but offer a guide as to how they should be read. The following diagram (fig. 10) defines four areas

in which the collected cases can be divided depending on how clearly each project defines its position on the issue; or on the emotional attributes of the visual and interactive resources.

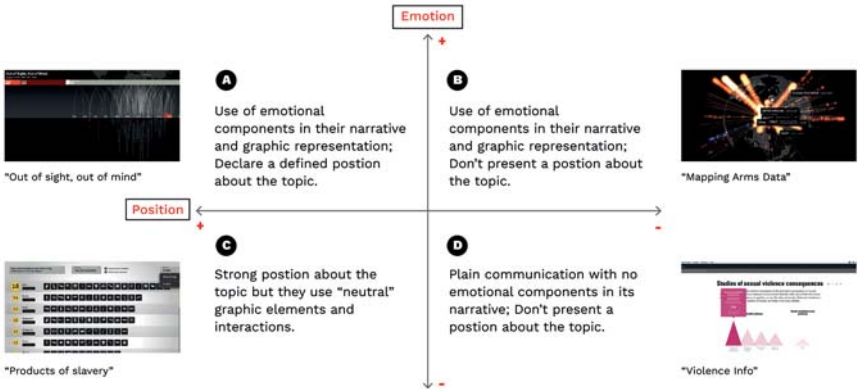


Fig. 10 – Grid of reports according on their position and use of emotion through visual and interactive resources. Diagram by the author.

Investigative and research projects

Cases in this cluster show how organisations and individuals with different skills, motivated by personal curiosity among other reasons, form groups to carry out their own research on subjects that have not been addressed by authorities or other institutions. Citizen investigations brings together different capacities (e.g. hackers, journalists, data visualization designers, academics, non-governmental organisations, artists, sociologists among others) creating new collaborations. They combine their abilities in order to collaborate in bringing to light issues that are not visible but are all around us. This cluster brings together multiple interests that may come from academia, global organisations or local counterculture groups, as well as issues that may range from local to global.

Unlike reports, investigations are usually intended to be a catalyst for further questions rather than a snapshot of the current state of affairs. This cluster corresponds to projects that delve deeper into a specific topic, gathering information from different angles and exploring different documentation techniques. It includes projects that come close to the porous boundary of data journalism. There are plenty of civic and grassroots organisations carrying out their own investigations and telling their own stories because of the

a.



b.

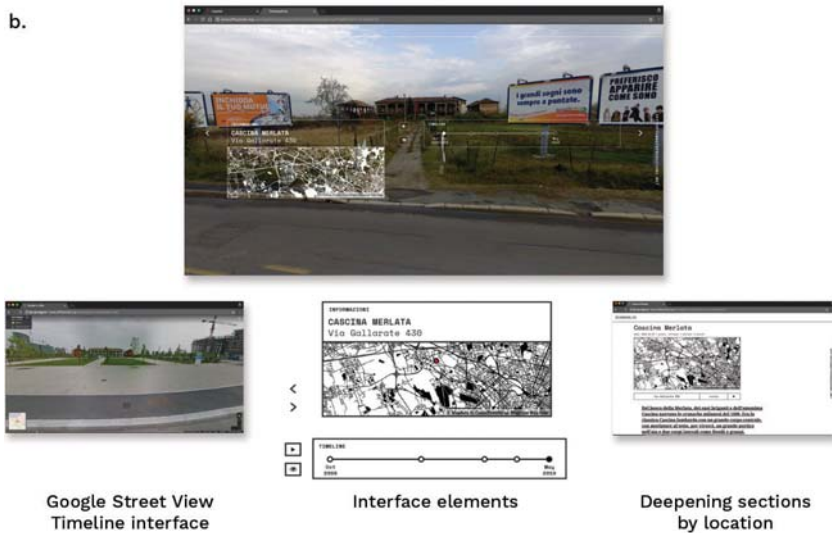


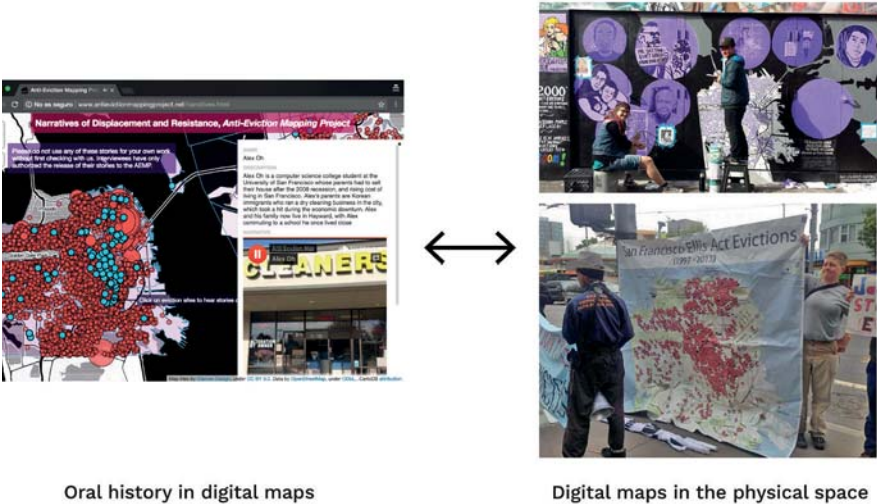
Fig. 11a and 11b – Two projects which carry out investigations using data visualization by repurposing media interfaces. a) ‘The virtual watchers’ adopt Facebook’s interface to portray their research. Retrieved from www.virtualwatchers.de on June 1st, 2018. b) ‘Scandaglio’ episode 1 adopts Google’s Street View Timeline service to dive back in time and see how speculation changed the Milan urbscape. Created by Off Topic Lab, a grassroots political lab in Milan. Screenshots retrieved from www.offtopiclab.org/scandaglio/ on May 17th, 2017.

lack of journalistic coverage of their issues (Gutiérrez, 2018, p. 43), and this may be one of the main reason that many of the investigative projects have similar characteristics to data journalism investigations.

The projects in this cluster share characteristics such as: the predominance of territorial evidence as a relevant strategy for situating the context of the investigation; the combination of different sources of data and information; use of multiple types of media to visualize different angles of the topic being investigated; and lack of crowdsourced data. Investigative and research projects mainly explore complex topics that may reference multiple layers of data and analysis, this is one of the reasons that the above-mentioned characteristics can be found in many of them. They use experimental means of visually representing their investigations. ‘*Repurposing media*’ is one of the experimental ways in which to make the role and nature of data evident as seen in ‘The Virtual Watchers’ (fig. 11a) and ‘Scandaglio’ (fig. 11b).

Social movement cohesion

Projects in this cluster seek to mobilize movements in the long term, not only for specific events or campaigns. The projects within this cluster actively combine virtual campaigns with physical activities and encounters such as protests, meetings, workshops, etc.



Oral history in digital maps

Digital maps in the physical space

Fig. 12 – The AEMP brings oral history into digital maps, which are in turn brought into the physical space of the city, participating in urban public spaces in protests and murals and other media. This project is alive in both the digital and the physical space.

The Anti Eviction Mapping Project (AEMP; fig. 12) is «a radical data-visualization, data analysis, and multimedia storytelling collective documenting the dispossession and resistance of San Francisco Bay Area residents facing gentrifying landscapes» (Anti Eviction Mapping Project, 2018, p. 289). It is an example of how information visualizations (through data visualization on maps and data stories) organize and mobilize collective action and crowdsourced practices, empowering citizens with new evidence. The visualisations and data allow users to create a space where they can dissent, reveal and contest, situating the collective as a relevant actor in the displacement and gentrification conflict.

The produced maps are created thanks to the participation of a vast number of people. They don't just represent "dots on a map" that geolocate a number on a displayed map. Instead, they are designed with built-in interactions that allow the user to explore and analyse what is in between the dots. In addition, they combine storytelling with data. The collective is careful not to reduce people merely to their evictions, instead they focus on the interpersonal stories of people involved through the collection of oral stories (ibid). The group also takes action in the physical space of the city, promoting and participating in encounters with the community involved in public spaces. In a very unique way, the project goes from people's stories to the digital space of the map, and from the digital space of data into the physical space of the city. This project is alive in both the digital and the physical space.

Disclose to tell

The exploration of case studies outlines the current state of initiatives that use data visualization in projects which portray alternative narratives. It brings knowledge on current initiatives of data activism focusing on the visual elements and structures that make data actionable to advocate for different purposes.

Transversally to the different clusters, it is observed that the visualizations are not completely open, obscuring authors' interpretations in the process of working with the data and its visual translations. It is a techno-solutionism to use visualization in data activism if its design processes are not disclosed in order to open up the possibilities of its re-interpretation. Data activism is as vulnerable to fall into technofixes as any other practice that uses technology and data (Hankey and Tuszynski, 2017). Disclosing the design process of visualizations is a way to counteract data opacity. At the same time, it turns visualizations into tools for empowering publics (Dörk *et al.*, 2013) to take

on an active role in the interpretation and subsequent re-interpretation of data and its visual representations.

The taxonomy presented is part of a larger study that proposes a theoretical framework to disclose the process of building visualizations. The disclosure of the visualizations is pertinent to authors and audiences: their design and critical reading. Based on this relationship, the *Data design framework* seek to promote a critical data literacy for the datafied society. The framework outlines four lenses that guide the questioning of data and visualizations: Open/close, Composition, Zoom and Sanitization. Each lens proposes strategies for understanding how to design and read data. The framework is an «attempt to construct alternative cultural visions as drivers of social transformation through design» (Escobar, 2017, p. 32). Many questions remain open about the possible implications of the disclosure of visualizations for alternative narratives, such as the tools and platforms with which they are constructed and displayed.

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