COMMONS FOR THE CARTOGRAPHY: HOW SOCIAL COMPUTING CHANGES THE DESIGN OF INTERFACES

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"The transformation of the map into an interface medium has not only changed the use and aesthetics of maps, but has also caused a new spatial perception."

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Left: Port au Prince on OSM (OpenStreetMap) January 12, 2010
Right: Port au Prince 28 days later
Source:
https://www.slideshare.net/Sev_hotosm/hot-osm-community-mapping-in-lower-shire-malawi

A remarkable example for commons in mapping is the *Haiti Map* 2010, which has changed humanitarian aid from the ground up. After the severe earthquake in Port-au-Prince, a crisis map was created using OpenStreetMap (OSM). Just a few hours after the earthquake, a high-resolution satellite image of the region was usable, and after a few days, several hundred volunteers had supplemented the online map with life-saving information. For this purpose, the map provided all the available topographical data that are helpful after such a disaster—open hospitals, running water and energy supplies, damaged roads, the condition of buildings, and more. Such a map was only possible with a surface that is a mashup (a combination of text, image, and audio with the map) and with a new paradigm of the map as an interface. Here, interface means the user-centered design of the connection between humans and machines.

This article intends to show how the use, interface, and creation of maps has changed since the ubiquitous use of mobile devices and georeferenced data have arisen. It will also show how web-based maps commons can be a powerful alternative to commercial online map services.

On the one hand, mobile devices have changed the interfaces of maps, and on the other hand, they have changed how and by whom maps are produced. Cartography once served to represent the world. With the rise of the Google Cartography monopole (there are hardly any alternative services for free online maps), this has changed. Since Google makes a profit mainly through advertising revenue, its online map services pursue no cartographic purpose, but rather a commercial one. The result is that its representation of the world is manipulative, incorrect, and oriented to the search query. To create maps, geo-data is acquired by license from one of the few providers and supplemented with satellite images, street view recordings, and local information. The method differs little from previous analogue mapping systems. At that time, there was a so-

called "base plate," which was supplemented with layers of map-relevant information and revised every few years. What is new is the speed of the data (real-time), the interactive contents (personalized), and the fact that today's online commercial map services are more or less a monopolistic market field. The process is complex and expensive and requires a vast level of knowledge. In a few years, Google has built up its online map services around Google Maps (2005) and is now a world power of cartography without any significant competition.

It is estimated that one billion people use the free online map services by Google. As geographic data or geographic access to information becomes more and more important, Google has set itself the target of measuring and locating not only the entire world, but also the ocean, the moon, and the universe. The company explains its intention, stating that the existing map material is not good enough or that no suitable material exists. The intention and production of good map material (especially for developing and emerging countries) is certainly justified; it is the monopoly behind the ambitious project that should be considered. Google Maps serves as an interface to Google's search engine, and the search queries provide Google with access to a huge data pool that allows them to build an immense archive of geo-referenced data. As a result, the company is continually expanding its position of supremacy and thereby possesses a data sovereignty. In times of big data, collecting and possessing data is linked to a power monopoly. Creating a good map from scratch requires a lot of knowledge and resources. The billion-dollar-strong Google (which, in addition to Apple, Microsoft, Amazon, and Facebook, Jaron Lanier includes in his Big Five; Lanier 2013) has the necessary infrastructure, finances, and competence.

As a result, the company not only improves its dominant position but ultimately also decides on the content of its maps. This data sovereignty is a critical distinction; British historian Jerry Brotton points out that Google keeps the codes on which its maps are based, secret. He puts it this way:

> For the first time in recorded history, a world view is being constructed according to information which is not publicly and freely available.[1].

This power is perhaps most clearly illustrated by the idea that anything not located on Google Maps does not exist. This is relevant insofar as maps are of increasing importance. It is estimated that more than half of the information on the Internet is already geo-referenced, meaning the content is located and localizable. Further, as noted by Gordon and De Souza e Silva:

> As localities become networked, maps serve as representations of those networks

1 Jerry Brotton, *A History of the World in 12 Maps* (New York: Penguin Books, 2012), 431.

(this is in addition to their function as tools)[2].

With the launch of driverless cars, the importance of geo-referenced data will become even more enhanced. According to Google itself, their existing maps are inadequate for the new technology because they lack detailed information.

An alternative to commercial online map services is the Commons project OpenStreetMap (OSM) (Arsanjani et al. 2015; Ramm, Topf, and Chilton 2011, amongst others). Commons are socially supported projects that use generally accessible resources and collaborative processes that lead to innovative solutions. They are characterized by the fact that they are based on participatory initiatives and managed and organized jointly (Helfrich and Bollier 2015). Commons models are also interesting because they are an alternative to data sovereignty and market-oriented monopolies. This data is open to all and free for use and further processing. Open data is an important prerequisite for the democratic use of the power of these algorithms[3]. The quality of the maps is so good that these are quite competitive with online map services (even if Google has a market share of 70%). Commons projects and open data are also therefore successful because they are based on the participation of users and are continually self-regulated, reworked, and improved upon.

The free online map OSM was founded by Steve Coast in 2004 and is based on the Wiki principle. The map content is created and brought together by the crowd and put to a cartography commons. Currently, there are about 3 million users (https://wiki.openstreetmap.org, accessed July 20, 2017). The user-generated content is collected via personal GPS-enabled devices such as smartphones, and then it is tagged and uploaded. In addition, satellite images are digitized, and existing materials are collected from public sources. The collected geo-referenced material is open source, meaning it can be used free of charge and license-free to create new maps (Open Data Commons and Open Database License; Ramthun 2012). Google also worked together with the crowd to create their maps. However, their Map Maker project (2008) was closed due to abuse. Today, Google decides what is added to their maps and what is not. Unlike Map Maker, OpenStreetMap works very well, having no commercial intent behind it, and the crowd is interested and motivated in pushing the project forward. Mapping commons are particularly successful in countries where there is no public material to purchase and the need for qualitative maps is significant.

Since the *Haiti Map*, free online maps have proved particularly valuable in disaster relief. After the severe earthquake and the powerful aid of a mapping commons, a Humanitarian OSM Team (HOT) was

2 Eric Gordon and Adriana de Souza e Silva, *Net Locality. Why Location Matters in a Networked World* (West Sussex: Wiley-Blackwell, 2011), 33.

3 Felix Stalder, *Kultur der Digitalität* (Berlin: Suhrkamp Verlag, 2016), 270.

founded for natural catastrophes and crisis situations. HOT is part of a growing global commons of volunteers who are entering geo-referenced data into maps using the principles of open source and open data sharing. Thus, free data helps to save lives or improve conditions in terms of lifestyles as well as work and living circumstances, especially after areas are affected by natural disasters or other crises like Ebola (Chapman 2015).

With the advent of mobile GIS web data as well as the support of appropriate devices, the interface becomes spatial and is transformed by a "graphic user interface as desktop to new metaphors of rooms, streets, cities and even the planet as a whole"[4]. Such interfaces require a networked system and social computing. Thus, the paradigm of communication and interaction of one person with their computer is transformed into a paradigm of communication and interaction with many[5]. Classical data structures in the form of lists are replaced by geo-referenced visualizations. Therefore, the map is used as an interface for finding, locating, and distributing information.

Such an interface is particularly effective for humanitarian OSM maps. The possibility of a user-centered interface is a boon for digital disaster relief. With the help of OSM, a detailed and effective free online map can be built by a decentralized crowd in a short time. Such an interface contains much greater levels of detailed information than other online maps like Google Maps. It can contain all the information that is particularly relevant to emergency teams after disasters: water points, sanitary facilities, road quality, fire hydrants, power grids, streetlights, and social facilities[6] . In this way, these maps differ greatly from existing online maps that contain only general topographic data as well as possibly commercial information (points of interest).

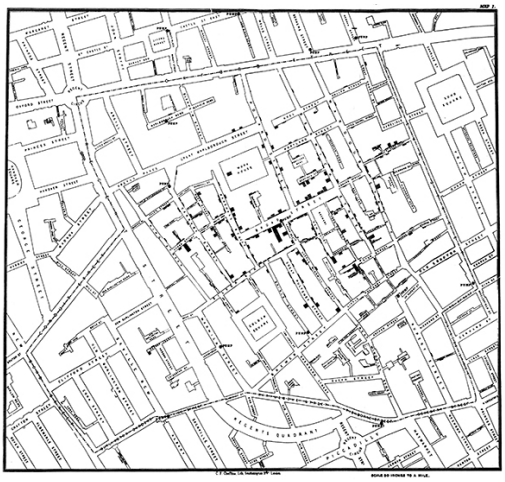
A very early example of a similar approach to that which HOT is doing now is the 1865 *Cholera Map* from the British physician John Snow (1813–1858). Snow noticed that the cholera epidemic that raged in London in 1854 occurred primarily in one district. Asking all the inhabitants of the district from which pump they accessed their water, he visualized the deaths on a map and was able to narrow down and locate the contaminated water pump on Broad Street. The map was primarily produced to spatialize information rather than provide information about a space. This was an important step in the history of cartography and a shift from mapping social information rather than purely geographic data. The

4 Marc Tuters and Michiel de Lange, "Executable Urbansims: Messing with Ubicomp's Singular Future," in *Locative Media. Medialität und Räumlichkeit. Multidisziplinäre Perspektiven zur Verortung der Medien*, eds. Regine Buschauer and Katharine S. Willis (Bielefeld: Transcript, 2013), 49.

5 Julie Woletz, Human-Computer Interaction. Kulturanthropologische Perspektiven auf Interfaces (Darmstadt: Büchner-Verlag, 2016), 61.

6 Kate Chapman, "Commoning in Katastrophenzeiten. Das OpenStreetMap-Team für humanitäre Einsätze," in *Die Welt der Commons: Muster gemeinsamen Handelns*, ed. Silke Helfrich, David Bollier, and Heinrich Böll Foundation (Bielefeld: Transcript, 2015), 203.

Cholera Map has been cited as an example by recent maps that show economic, social, and ecological connections, enabling a different kind of reading of the world.



Cholera Map
Source: Published by C.F. Cheffins, Lith, Southhampton Buildings, London, England, 1854 in Snow, John. On the Mode of Communication of Cholera, 2nd Ed, John Churchill, New Burlington Street, London, England, 1855.

Both the *Cholera Map* and the HOT projects were concerned with the visualization of data into maps to gain an overview and coordinate missions. In these times of geo-referenced data, digital maps, and social media, such a map can have an even greater impact. The *Haiti Map*, which was initiated by an individual in response to an emergency (Meier 2015), quickly developed into a commons project, where voluntary helpers were involved around the clock to create the map. With the support of the crowd, a project started by a single person grew within a few days to a professional tool serving as a master plan for coordinating humanitarian aid missions attempting to locate victims. The map was created on an Open Data Commons and supplied by SMS and tweeted (#Haiti and #Earthquake) messages to the volunteers from people outside of Port-au-Prince and victims inside the area. If a message could not be geo-referenced, satellite imagery was used to try to locate its point of origin. Within a short time, a globally acting crowd created a highly complex map without being on-site. The map was continuously updated, distributed, and shared via social media. For the first time in history, an area that was barely accessible after a disaster, and for which practically usable maps did not exist before, was quickly and effectively made clear for local helpers.

The transformation of the map into a digital interface medium has not only changed the use and aesthetics of maps, but has also caused a new spatial perception. As a result of the human-machine-space relationship and the presence of digital communication technology, hybrid spaces are created. Hybrid spaces are here understood to be the merging of a physical space with a digital service. Hybrid spaces are characterized by the fact that they are part of the physical world as well as part of a digital network. If the interface is understood as a medial space for interaction, the map changes to a medium between the user and the world around him and thus becomes a new paradigm. Since the map has become a digital interface, more and more users are looking for information on map-based services. This logic creates a new application where the map

becomes an interface between us and the things that surround us, causing a shift of interaction—interaction with the environment is replaced by interaction with the map as an environment[7].

7 Christine Schranz, "Die Karte als Interface," in *Jahrbuch Immersive Medien. Interaktive Medien: Interfaces – Netze – Virtuelle Welten*, ed. Institut für immersive Medien (ifim) (Marburg: Schüren Verlag, 2017), 27–37, 28.

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