Mappings as joint spatial display

Séverine Marguin, Dagmar Pelger, and Jörg Stollmann

Mappings are common tools of analysis, conceptualization, and communication in architecture and urban planning. Architects and planners use them to understand, imagine, and design space. There are numerous established mapping techniques that move relatively freely between the cartographic measurement of space, draft sketches, and detailed site plans or floorplans. Nolli plans[1], GIS visualizations, axonometric spatial image[2], and site visit notes—these and other types of mapping are used both for the collection and analysis of spatial information and for the actual design phase. Methodologically, mapping has also drifted away from its original meaning of cartography. Not all mapping is cartography, but all cartography is mapping.

The methods that are becoming widespread (Corner 1990; Cosgrove 1999; Müller et al. 2010) are primarily mapping techniques used in design and planning, which are largely disseminated in teaching and practice. Like many tools used in architecture, mapping has become part of the embodied, practice-based knowledge of the profession. For this reason—and surely also because research is not yet an established field in architecture (Marguin 2021)—mapping techniques are common in architecture and urban planning research projects but seldom reflected on as a research method (Pelger 2022). Basic questions remain unanswered: As a method of spatial analysis, what can mapping contribute to the production of knowledge about space? What challenges need to be considered?

These questions in architecture also parallel methodological needs expressed in the discourse of the sociology of space (Baur et al. 2014): The classic, mostly text- and number-based instrumentarium of the social sciences appears insufficient to empirically capture the refiguration of spaces (Löw/Knoblauch 2017). There is a particularly urgent need for visual methods as so far only photography (see Rose in this volume) and videography (Tuma/Schnettler 2019) have been methodologically considered to any significant

1 From 1736 to 1748, Italian architect and cartographer Giambattista Nolli drew up the city plan of Rome, known today as the Nolli plan. A Nolli plan is a two-dimensional drawing used to understand and document accessible spaces within a city.

2 An axonometric spatial image is a geometric drawing of spatial objects on one drawing plane in an inclined (skewed) parallel projection. It is a simple way to represent spatial volumes.

extent. We believe mapping has considerable potential and wish to spark a methodological deliberation at this juncture: How can mapping techniques—as cartographic design tools that allow for a synthesizing analysis of different data types relating to urban planning and architecture (research)—be used as an instrument in spatial research?[3] We suggest turning to current methodological discourses in sociology, especially the mixed methods literature (Thierbach et al. 2020), for conceptual help. Specifically, we mean the current debate about the tool called joint display (Creswell/Plano Clark 2011; Guetterman et al. 2015; Kuckartz 2017), which makes it possible to integrate and synthesize heterogeneous data by visual means. We wish to define mapping as a *joint spatial display*, since—like *joint displays*—it can integrate qualitative and quantitative information by using a graphic, spatial form of representation to relate these to each other. In this article, we seek to introduce the possibilities mapping offers to integrate and *synthesize* different types of data and media, such as drawings, diagrams, base plans, photographs, statistical data, and ethnographic data, by spatializing them and superimposing them.

First, we will describe the research gap in these different discourses (mixed methods, architecture and planning), which our approach addresses. *Second*, we will give an overview of different data integration possibilities by reconstructing each step of an example mapping process. *Thirdly* and finally, we aim to demonstrate both the potential findings and the challenges presented by this synthesizing instrument rooted in the social sciences and spatial research.

1 Architectural practice and sociological mixed methods approach

1.1 Mapping: The object of a heterogeneous discourse

In the humanities, mapping is gaining increasing attention in both cultural studies (Schmidt-Lauber/Zechner 2018) and history (Rankin 2016), as well as in ethnology and anthropology (Roberts 2016). A variety of definitions and processes of mapping are discussed and used in these heterogeneous discourses, but they rarely include a visual aspect. Even where this literature contributes to the understanding of the concept, it rarely provides field-specific methodological thoughts on applying mapping to empirical research.

At the same time, mapping has established itself as a popular practice in architecture and planning. Reference works for the methodology include urban planning handbooks and monographs written by design and planning offices that also engage in research. These include works like those by James Corner, Atelier Bow-Wow, AMO/OMA, Vigano Secchi, Dean Simpson, and Bureau D'Etudes, but artists like Larissa Fassler and graphic designers like Eva Le Roi have also contributed to the understanding of cartography in the research. They provide a large stock of techniques for studying socio-spatial phenomena, which have only begun to be appraised for scientific purposes (O'Rourke 2013; Müller et

3 We wish to refer here to the ideas generated in the "Hybrid Mapping Methods" work group, which underpin this article: https://www.sfb1265. de/forschung/methoden-lab/arbeitsgruppe-hybrid-mapping-methods/

al. 2010). Architects and planners also draw on critical geography when reflecting on their use of maps and mapping techniques. Following critical geography, the term *mapping* is often preferred to *map* because it emphasizes the process and not the "finished object of the map" (Cosgrove 1999: 1).

1.2 Status of the discussion about data integration in (critical) cartography

A rich discourse exists in cartography and geography about techniques of production, analysis, and representation of maps. Classic (quantitative) geography offers an extensive set of methodological tools for the production of allegedly "objective" measurements of territorial spaces. This tool set is designed to create the most accurate representation of Earth possible, first with topographical maps, then with photogrammetrical ones, and finally with GIS technology (Kohlstock 2004: 27 et seqq.). This positivistic idea of the "objective" measurability of space is the object of sharp critique in critical geography, which instead understands mapping as a co-construction of the observed reality (Harley/Markham 1989; Wood 1992). The critical perspective of maps as political constructs developed into a call for a "participatory" process of mapping (Bittner/Michel 2018: 304 et seqq.), which, as a practice-oriented and transdisciplinary approach, seeks to have a direct social effect.

In general, these geographical-cartographical debates offer an important foundation for the use of mapping as a tool in visual qualitative spatial research. However—and we see this as a fundamental challenge—the cited literature remains split into a strong dichotomy between a classic geographical, usually quantitative, research approach and a human geographical or socio-spatial, usually qualitative, research approach (Schäfer et al. 2018: 167). A consequence for the theory of space is that territorial and relational understandings of space are positioned as opposing each other and, as a result, are never empirically researched together. By conceptualizing mapping techniques as *joint spatial displays*, we seek to bring together and empirically parse these different understandings of space: territorial and quantitative on the one hand, and relational and qualitative on the other (see Löw et al. in this handbook).

The debate about "qualitative georeferenced information systems" (Schäfer et al. 2018) already calls into question any such epistemological dichotomy between the qualitative and the quantitative in cartography and seeks opportunities for integration. Yet this leaves open the question of how exactly heterogeneous data are to be integrated: in what order, using what practices? To address some of these blind spots about integration, we consolidate the methodological sociological literature in the mixed methods field below.

1.3 Joint display as a useful heuristic in the mixed methods literature

Since the 2000s, there has been a discourse about mixed methods research in the empirical social sciences. The purpose of mixed methods approaches is to bridge the two otherwise relatively hermetic fields of qualitative and quantitative social research. The necessary methodological discussion has so far focused primarily on the compatibility of research designs and epistemological paradigms. This disregards one of the great-

est challenges: the actual *integration* of the diverse data and results (Creswell/Plano Clark 2011; Kuckartz 2017); other synonyms in use are *combination* or *mixing*. The goal is to bring together different kinds of data and make them talk to each other (see Heinrich in this handbook). So far, the debate within the mixed methods discourse has distinguished between two methods of integration: either parallel or sequential implementation of qualitative and quantitative procedures (Creswell/Plano Clark 2011; 287–354). In parallel research designs, there is an additional split by point of integration, depending on whether integration is carried out at the level of the data or at the level of the results. The integration itself is, however, neglected (Kuckartz 2017: 159). Two reasons for this have been identified: first, a *technical* reason, because there is not yet a reliable software, and second, an *epistemological* reason, because "the quantitative data is analyzed using quantitative statistical methods and the qualitative data using qualitative methods" (Kuckartz 2017: 160).

It is in this connection that we consider the possibilities of integrated representations of data in "joint displays" (Creswell/Plano Clark 2011: 212–243; Guetterman et al. 2015). As a new tool from mixed methods research, joint displays are defined as follows:

> A mixed methods joint display represents integration or mixing in a single visual display. The overall intent is to represent integration and assist the reader in understanding the study. The content may consist of quantitative and qualitative data, analysis, results, or interpretation. It is important, however, that the display includes both qualitative and quantitative data, and clearly labels each for the reader. (Guetterman et al. 2015: 158)

Joint displays already exist in various formats—for example, as images, tables, matrices, or graphics—but are visually still relatively rudimentary. We believe that mapping processes can offer innovative strategies for integrating data and that cartography-based procedures can lead to novel findings. In other words, mapping makes it possible to display more than the sum of the individual (qualitative and quantitative) parts. It is the *spatialization* and *superposition* of heterogeneous data that gives mapping the ability to offer a synthesizing data integration process beyond the mere juxtaposition of the datasets.

2 Data integration through spatial translation and projection

Diverse types of data can be generated about the experience of space. Whether these are qualitative or quantitative depends on the research question. According to Dangschat and Kogler, "the qualitative spatial methods described below are the most widespread: observations and on-site viewings of space, visual approaches (like mental/cognitive maps and other visual techniques such as photo-elicitation), and spatial interview and combination techniques (like activating opinion surveys and the 'go-along' method)" (Dangschat/Kogler 2019: 1340, own translation). Quantitative methods in spatial research (especially in geopolitical and geographical sciences) primarily use survey data (whether generated by the researchers or as a secondary dataset), geotracking data, administrative data, official statistics, digital data, or network data.

The joint *spatial* display method is an integrative approach that creates varying combinations of these types of data, such as observational data combined with tracking data, or go-along interview data with digital data, and so on (see Fig. 1).

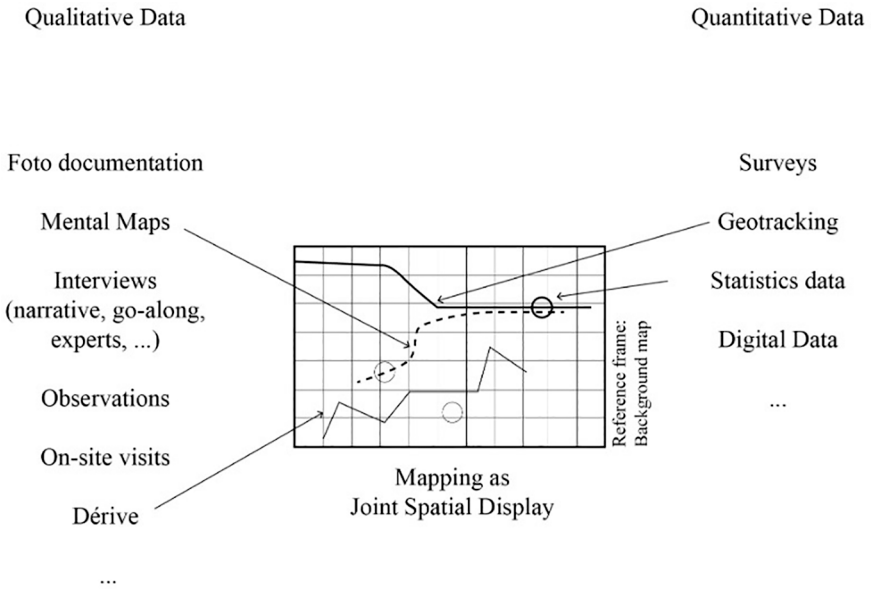


Fig. 1: Spectrum of possible data combinations in a joint spatial display | © Author's own diagram

Mapping offers the advantage of a standard reference framework (in the form of a background map) that acts as an interface for the integration, forming an artificially constructed "metaphorical," but convention-bound space in which the data can meet. This allows researchers to *view* and *read* congruences, interdependencies, proximity-distance relationships, etc. The great potential of the joint spatial display concept is therefore the integration of heterogeneous data within a spatially structured reference system.

This process requires a number of translation steps, as the datasets usually have different medialities—textual (e.g., interviews), numerical (e.g., official statistics), or visual (e.g., photodocumentation)—and yet must be related to each other. In addition, the spatialization or at least positioning of the more abstract data from interviews or statistics is indispensable: While geotracking data is already georeferenced, meaning positioned within the reference framework of *Earth*, sketches from on-site viewings must first be turned into *geo*data (Lakes 2019). It is not necessary for them to be *geo*referenced with exact coordinates, but they must be localized in the sense of assigned to some location. The second step is then to relate these geodata to each other by projecting them onto a shared reference framework or onto a background map. Data that cannot be positioned *per se* can be graphically inserted into the background map, for example, by thematic relationship. Rather than simply placing the datasets next to each other, the researcher is superpositioning them in a "layered display" (Löw/Marguin 2021). We would like to present

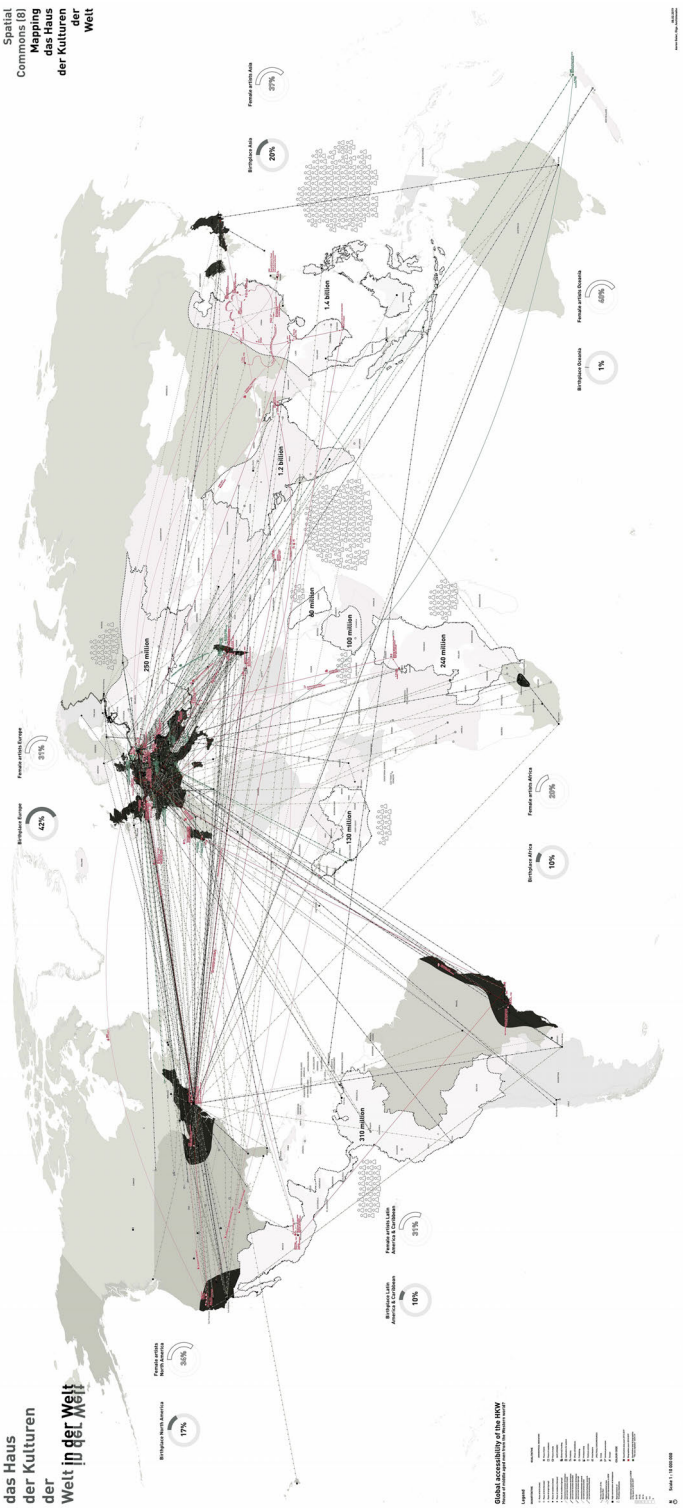
an example of this procedure to illustrate how it generates results before addressing the methodological questions raised by the positioning and superpositioning of heterogeneous data in the final section.

3 Case study: Mapping the accessibility of a cultural institution

As part of a methodological teaching research project combining sociology, architecture, and urban planning, we experimented with various mapping methods for a joint spatial display. The topic was the accessibility of one of Berlin's cultural institutions, the *House of World Cultures* (*Haus der Kulturen der Welt*, HKW). How global or local, how inclusive or exclusive is the institution?—we asked on both a spatial and a social level. To gather data about both the physical accessibility of the building and the social accessibility of the institution, we performed our analysis on four different scales: the interior spaces of the HKW, its embedding in the environment of Tiergarten Park, its situatedness in Berlin, and its location in the world; as well as four different user groups: employees, passers-by, visitors, and artists. Below we will discuss only the example of *world mapping* (see Fig. 2) in which we focused on artists.

We worked with two datasets on a global scale. The first consisted of a statistical record of all (n = 600) artists represented in the HKW between 2013 and 2017 and included information about place of birth, place of residence, gender, and age. The second dataset consisted of biographical data about a selection (n = 15) of artists originating from the Global South and resulted from an Internet search. The demographic data about the 600 artists was first transformed into geodata by determination of the geo-coordinates of the places of birth and residence. This made it possible to trace the movements of the artists from place of birth to place of residence and to the HKW on world map using the *QGIS* software. The geographical points of birthplace and residence were connected by arrows to make the movements more visible. The patterns arising from this quantitative aspect of the data (e.g., many residences in western Europe, very few birthplaces in Eastern Europe) could then be emphasized using a graphics program to make the key finding legible: There is a stark discrepancy between the few artists from Eastern Europe and the many artists from Western Europe. The former border of the Warsaw Pact was graphically inserted to show that this geopolitical-spatial barrier remains in effect in the group being studied even today.

Fig. 2: World mapping | ©Aaron Geier and Olga Juutistenaho



We worked on the legibility of this representation of biographical-geographical differences in (many) iterative steps. The secondary data consisting of the artists' biographies was evaluated using a thematic content analysis to search for factors related to the success of artists from the Global South. Almost all the artists had an academic career, but the key was recognition by western institutions or media. It was possible to identify different factors that "open the door" to the HKW, such as receiving a grant, publicity in international media, or attention garnered through political activism. These "door openers" on the "paths" of the artists to the HKW were displayed on the map as small iconographic codes created in the graphics program and positioned "by hand" (see Fig. 3).

The legend (see Fig. 4) became a central topic of discussion during the mapping iterations. Not only did it list the elements considered relevant to each level of analysis—whether global movements or individual biographies—it also grouped, categorized, and ranked these elements. The legend therefore became a tool for organizing the arrangement of mapping data. The superimposition of the two datasets on one world map showed that German political foundations (like the *Heinrich Böll Foundation*) and state cultural institutions (like the *Goethe Institute*) only open doors to artists in specific regions of the Global South (namely, the Near and Middle East and East Asia). These spatial patterns make it possible to carry out far-reaching analyses of the complex and ambivalent treatment of citizenship, nationality, and territoriality by a decidedly critical and post-colonial western cultural institution.

4 Methodological challenges in synthesizing mapping

Mapping is based on a synthesizing integration mechanism that results from the spatialization and simultaneous superimposition of data. However, this poses specific methodological problems for researchers: One the one hand, the necessarily deliberate handling of scalar and semiotic conventions in cartography (see Pelger et al. in this handbook), and on the other hand, the comprehensability of the process of creating maps, which must be ensured due to the inductive nature of mapping in research.

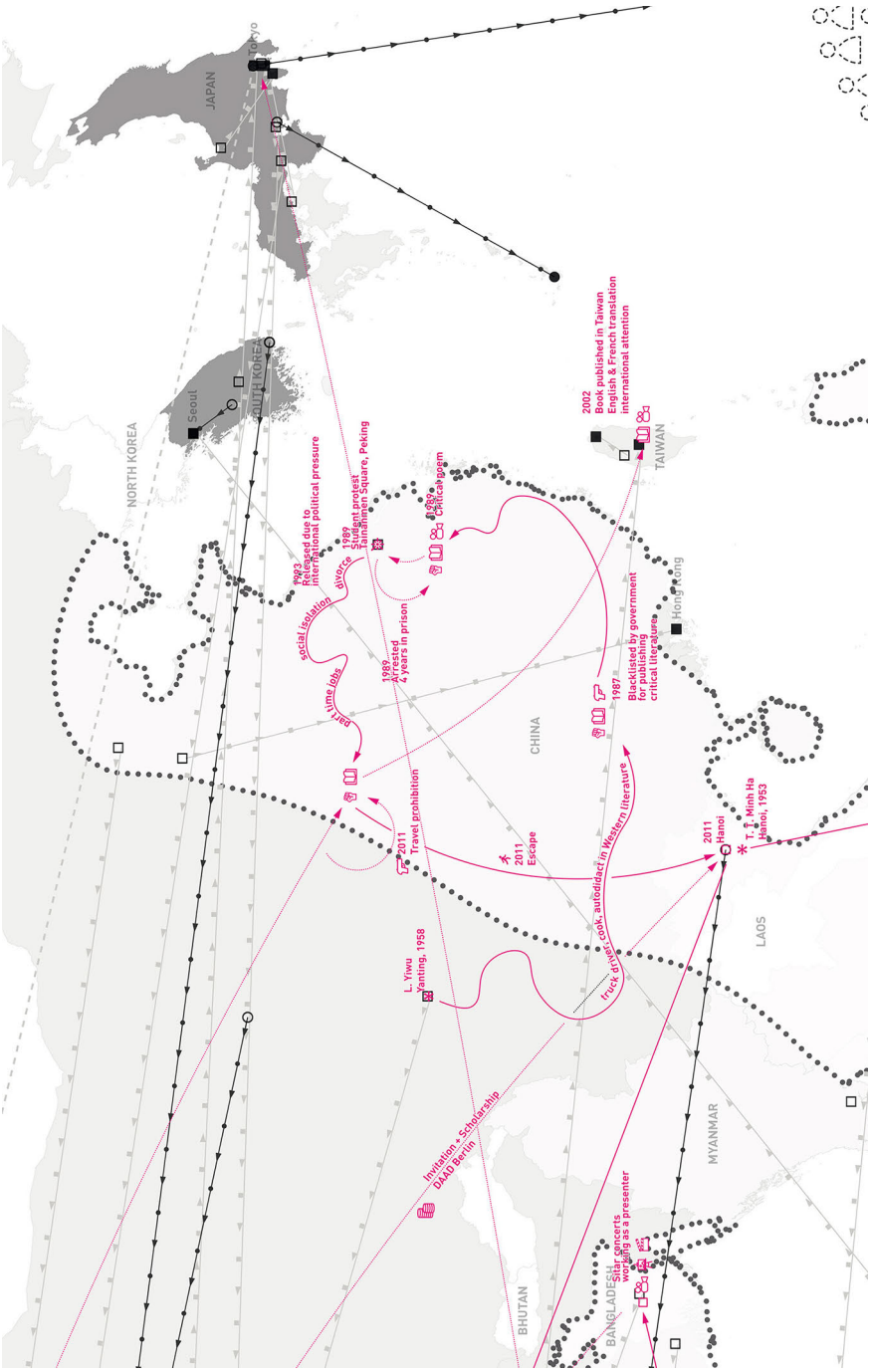


Fig. 3: Zoom-in with biographical narratives. | ©Aaron Geier and Olga Juutistenaho

Fig. 4: Legend of the world mapping with graphical symbols for gate openers. | *©Aaron Geier and Olga Juutistenaho*

4.1 Scalar and semiotic conventions of cartography

The translation of the data through localization or georeferencing and the resulting question of how to represent the data requires the data to be adapted to a spatially structured reference framework, which can imply leveling. As discussed in the cartographic literature (Lambert/Zanin 2017), it is important to be very conscientious when determining the parameters of the framework.

Scales: Critical geography has shown that scales do not describe pre-existing territories but are co-constructed during the mapping process (Harley/Markham 1989). The scale should be determined accordingly based on the questions and the data being collected. However, qualitative and quantitative data may have to be projected together even if they do not share the same scale. It is important to understand that every scale implies all other scales and that a spatial phenomenon is never studied on only *one* scale. Rather, scales are interconnected (see Pelger et al. in this handbook) and are constructs that help the viewer navigate within the space. When creating the world mapping, for example, we discussed the scale of nation states extensively because the students possessed data about collaborations between the HKW and other *countries*, which they wanted to relate to the biographical data of the artists. It quickly became clear that neither place of birth nor place of residence indicated anything about the nationality or cultural identity of the artists—a fact also reflected in discourses critiquing a widespread national methodologism.

Representations: The second challenge concerns the choice of graphical means of translation. On a world map, for example, different projections can be used to project the sphere of Earth onto a surface (Robinson, Mercator, Buckminster Fuller, etc.), each of which comes with its own distortions and positioning of, for example, the continents with respect to one another. Hence the chosen form of representation must be developed based on the research question: If we are interested in the materiality of the city, for example, we can prepare an axonometric drawing because it provides the volumes of buildings as a reference framework, while if we are interested in the accessibility of public space, a Nolli plan can be useful, etc.

In a mixed methods approach to mapping, the particular challenge is to choose a form of representation that makes the graphical information legible for the purposes of the research question—for example, by facilitating the spontaneous association of a drawing with quantitative or qualitative data: Topographical maps are a common reference framework for quantitative research projects, while axonometric drawings have become well-established in ethnographic research approaches in architecture (Kaijima et al. 2010). As a combination of different forms of representation, a collage can be an additional inspiration in preparing joint spatial displays.

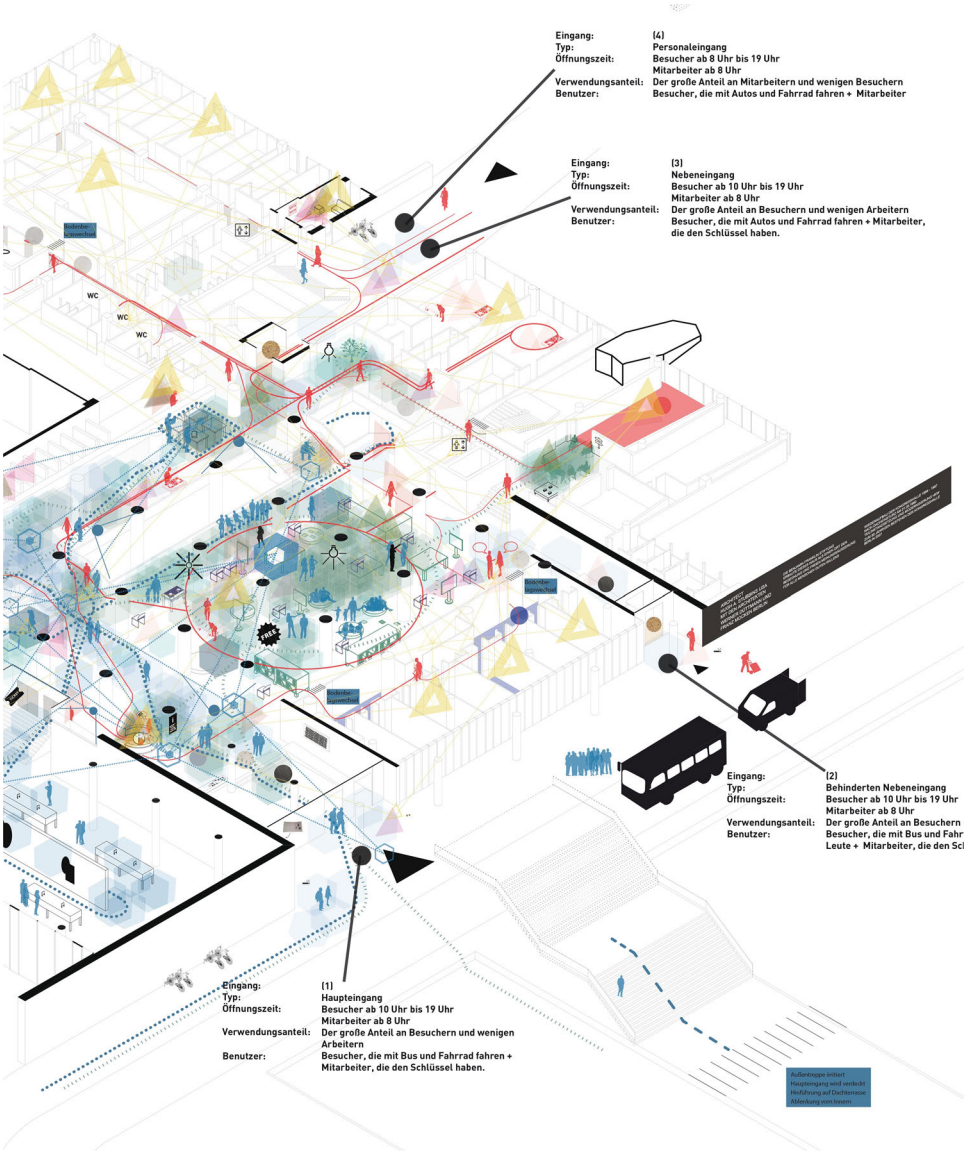


Fig. 5: Zoom-in on entrance hall of the HKW. | ©Anna Lesch and Muhannad Ghaza

We used the Robinson projection as the basis for the world mapping of the HKW (Fig. 2). Unlike other (more recent) projections, it is not based on a fixed geometric formula, but was developed to depict a two-dimensional representation of the world with as little distortion as possible. As with many older maps, the vertical middle point runs through Europe, reproducing its claim to hegemony. This by now disputed projection was chosen on purpose because a certain European focus on the part of the HKW crystallized out of the research process. When mapping the interior spaces of the HKW, on the other

hand, we chose an axonometric representation that makes it easier to orient oneself in the building and simultaneously makes legible the spatial structure of the building as a co-creator of processes (see Fig. 5). The placements of different user groups—employees and visitors to different exhibitions or events—can be read as movement patterns with the help of color codes and, at the same time, shed light on the social aspect of the overlapping systems of space within the building.

4.2 Iteration and comprehensibility

Mapping is iterative, each repetition bringing together seeing, thinking, and interpreting with the aim of extracting an argument in response to the research question. It is important to understand that the mapping need not be thought of as the end product but rather as a series of attempts in which we approach the argument.

Hierarchy: To construct a hierarchy, we visually evaluate the projected data: quantitative data analysis typically using a GIS software, qualitative data analysis using drawing tools chosen depending on the topic and scale. The resulting mapping is read, reflected on, interpreted, added to, reworked, potentially discarded, re-synthesized, etc. It is always helpful to (where applicable, print out and) hang up the mapping-in-progress to jointly discuss and evaluate the results, draw on it by hand, and add notes and corrections. It is precisely this iterative process of conceptual design that produces insights, as the researchers re-interpret the projections with every iteration. They try to reduce the projections, to group elements, to strike out the unnecessary, to emphasize different elements, until legible statements crystallize out of the work. A drawing program or manual drawing technique that supports the desired form of representation should be used to add notes, delete elements, or make corrections. For us, the difference between mapping and a map is this: mapping is a repetitive negotiation between the research question and the research data.

The process of reduction results in a selection and hierarchization of the data. The goal is for the qualitative and quantitative data not to cover each other up but to overlay each other. This makes it necessary to find a semiotic language for the representation that allows different types of data to be distinguished but still facilitates an interplay between them. The goal of this synthesizing integration is ultimately to draw out and elucidate the congruences, interdependencies, and proximity-distance relationships between the heterogeneous data. All of these connections then produce the findings (see Fig. 6).

Intersubjectivity: An important aspect of this process is the collective dimension of interpreting the mapping results. In architectural and planning practice, a group views and comments on mappings together. The interpretation is intersubjectively tested and potentially validated. In research projects, this should be done in data sessions with colleagues or, in participatory research, with the co-producers. The sessions should be recorded so the research process is documented.

Communication and conceptualization: The back-and-forth between concepts and visualizations plays a major role in the synthesis process based on the superimposed data in the mapping. The legend undergoes constant revision. This makes it necessary to bear in mind what type of data are being used, especially if they are secondary.

Fig. 6: Mapping process during the workshop at the House of World Cultures, in collaboration with the SFB. | ©Photo: Marc Volk

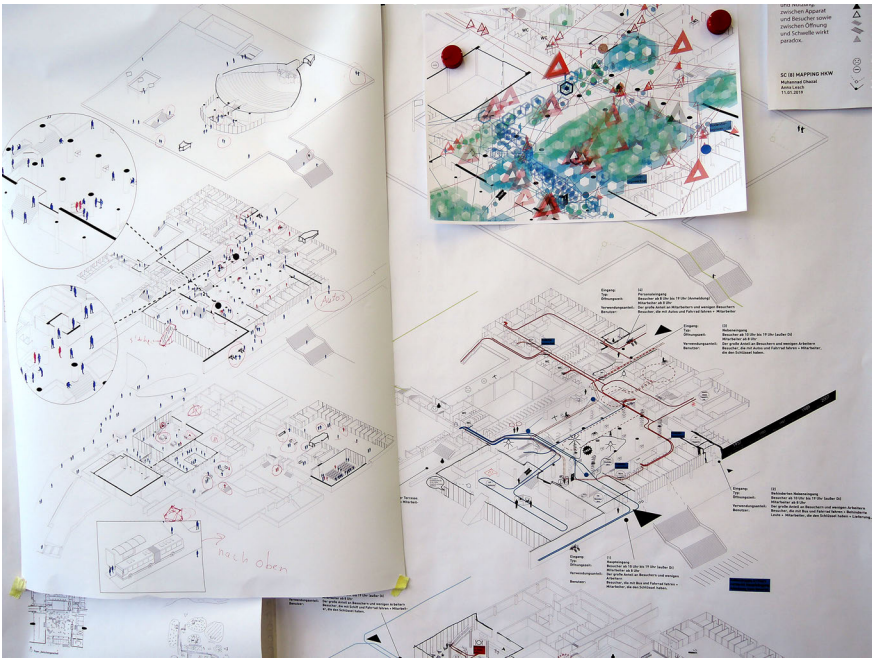


Fig. 7: Mapping process in the studio. | ©Anna Lesch and Muhannad Ghazal; photo: Dagmar Pelger

The conceptual formulations in the legend and the descriptive texts clarify what is being shown. On the other hand, visual conclusions make it possible to adjust the research question. As already mentioned, the legend plays a central role in this context. Mapping cannot stand alone as a reliable research tool: it gains its entire meaning from the descriptive text and the research question. We see several ways to ensure the comprehensibility of the findings. The most important one is to establish and record the research process in the text portion for purposes of reconstruction: how the important decisions about evaluating the mapping results were made and on what arguments they rest. Another is to make this process transparent using a series of mappings as working stages (see Fig. 6 and 7) to reveal the iterative character of the production. In addition, a reading aid can lead the viewer through the mapping using prototypical stories or narratives.

5 The temporal and the social

But what does this mean for the social sciences? What does it mean to take all data collected to answer a specific research question—qualitative or quantitative—translate them into geodata, and synthesize them in a spatially structured reference framework? How can the temporal dimension be integrated into a mapping? There have already been interesting attempts in geography and urban studies to incorporate temporality into cartographic production: through the creation of a sequence of mapping—for example, following the development of the Ukrainian border (Eckert 2017); for digital mappings, by embedding a time bar in the mapping—for example, for the development of Berlin's *Projektraum* scene; or through a multimedia presentation—for example, on the development of settlements in Palestine (Forensic Architecture 2019). These techniques for integrating temporal aspects are of great significance to the further methodological development of mapping as a joint spatial display as this is the only way the processual character of the social production of space can be carried forward into the research findings.

Even when it is possible to embed change over time into mappings, they often continue to depict "containers" in the sense of static depictions of space. This static character is due not only to the question of time, but also to the difficulty of depicting the social dimension, or as Harley writes: "Maps as an impersonal type of knowledge tend to 'desocialize' the territory they represent. They foster the notion of a socially empty space" (Harley 2001: 81). It is precisely here, in the integration of qualitative and quantitative data within mappings as a joint spatial display, that we see the chance to integrate the spatial shape of the social with the spatial shape of the place into something common: that is, to grasp and interpret its mutual conditionality.

References

Baur, Nina/Hering, Linda/Raschke, Anna Laura/Thierbach, Cornelia (2014): Theory and Methods in Spatial Analysis: Towards Integrating Qualitative, Quantitative and Cartographic Approaches in the Social Sciences and Humanities. In: *Historical Social Research*, 39(2), pp. 7–50.

Bittner, Christian/Michel, Boris (2018): Partizipatives Kartieren als Praxis einer kritischen Kartographie. In: Wintzer, Jeannine (Ed.): *Sozialraum erforschen: Qualitative Methoden in der Geographie*. Wiesbaden: Springer, pp. 297–312.

Corner, James (1990): The Agency of Mapping. Speculation, Critique, and Invention. In: Cosgrove, Denis (Ed.): *Mappings*. London: Reaktion Books, pp. 213–300.

Cosgrove, Denis (1999): *Mappings*. London: Reaktion Books.

Creswell, John W./Plano Clark, Vicki L. (Eds.) (2011): *Designing and Conducting Mixed Methods Research*. 2nd Edn. Los Angeles, CA: SAGE.

Dangschat, Jens S./Kogler, Raphaela (2019): Qualitative räumliche Daten. In: Baur, Nina/Blasius, Jörg (Eds.): *Handbuch Methoden der empirischen Sozialforschung*. Wiesbaden: Springer, pp. 1337–1344

Eckert, Denis (2012) : L'Ukraine ou les contours incertains d'un Etat européen. In: *L'espace politique,* 33(3).

Forensic Architecture (2019): *Conquer and Divide. Remote Sensing Map 1987–2017*. Online: https://conquer-and-divide.btselem.org/map-en.html (accessed: 28 September 2020).

Guetterman, Tim/Creswell, John W./Kuckartz, Udo (2015): Using Joint Displays and MAXQDA Software to Represent the Results of Mixed Methods Research. In: McCrudden, Matthew/Schraw, Gregory/Buckendahl, Chad (Eds.): *Use of Visual Displays in Research and Testing: Coding, Interpreting, and Reporting Data*. Charlotte, NC: Information Age Publishing, pp. 145–176.

Harley, J. Brian/Markham, Beryl (1989): Deconstructing the Map. In: *Cartographica*, 26(2), pp. 1–20.

— (2001): Maps, Knowledge, and Power. In: Laxton, Paul (Ed.): *The New Nature of Maps. Essays in the History of Cartography*. Baltimore, MD/London: The Johns Hopkins University Press, pp. 51–82.

Kaijima, Momoyo/Junzo, Kuroda/Yoshiharu, Tsukamoto (2010): *Made in Tokyo.* Tokyo: Kajima Institute Publishing.

Kohlstock, Peter (2004): *Kartographie: Eine Einführung*. Paderborn: Schöningh: UTB.

Kuckartz, Udo (2017): Datenanalyse in der Mixed-Methods-Forschung: Strategien der Integration von qualitativen und quantitativen Daten und Ergebnissen«. In: *KZfSS Kölner Zeitschrift für Soziologie und Sozialpsychologie,* 69(S2), pp. 157–183.

Lakes, Tobia (2019): Geodaten. In: Baur, Nina/Blasius, Jörg (Eds.): Handbuch Methoden der empirischen Sozialforschung. Wiesbaden: Springer, pp. 1345–1352.

Lambert, Nicolas/Zanin, Christine (2017): *Manuel de Cartographie: Principes, Méthodes, Applications*. Paris: Armand Colin.

Löw, Martina/Knoblauch, Hubert (2017): On the Spatial Re-Figuration of the Social World. In: *Sociologica*, 2, pp. 1–26.

Löw, Martina/Marguin, Séverine (2022): Eliciting Space. Methodological Considerations in Analysing Communicatively Constructed Spaces. In: Christmann, Gabriela/

Knoblauch, Hubert/Löw, Martina (Eds.): *Communicative Constructions and the Refiguration of Spaces*. London: Routledge.

Marguin, Séverine (2011): *Interaktive Karte über die Berliner Projekträume seit 1970*. Online: http://www.projektraeume-berlin.net/interaktivekarte/index.php (accessed: 28 September 2020).

Marguin, Séverine (2021): Interdisziplinarität als polykontexturale Wissensproduktion. Über die Kollaboration zwischen SoziologInnen, ArchitektInnen und PlanerInnen. In: Löw, Martina/Sayman, Volkan/Schwerer, Jona/Wolf, Hannah (Eds.): *Am Ende der Globalisierung. Über die Re-Figuration von Räumen*. Bielefeld: transcript.

Müller, Sabine/Wall, Axel/Kopper, Marcus/Weissmann, Markus (2010): *Multiskalar* (Lehrstuhlpublikation). Karlsruhe: Universität Karlsruhe, Institut für Orts-, Regional- und Landesplanung (ORL).

O'Rourke, Karen (2013): *Walking and Mapping: Artists as Cartographers*. Cambridge, MA: The MIT Press.

Pelger, Dagmar (2022): Mapping the Commons. In: Pelger, Dagmar: *Spatial Commons. Zur Vergemeinschaftung urbaner Räume*. Hamburg: adocs.

Rankin, William (2016): *After The Map. Cartography, Navigation, and the Transformation of Territory in the Twentieth Century*. Chicago, IL: The University of Chicago Press.

Roberts, Les (Ed.) (2016): *Deep Mapping*. Printed Edition of the Special Issue Published in Humanities. MDPI.

Schäfer, Susann/Muenchow, Jannes/Harnisch, Benjamin (2018): Qualitative Forschung und Geographische Informationssysteme. In: Wintzer, Jeannine (Ed.): *Sozialraum erforschen: Qualitative Methoden in der Geographie*. Berlin/Heidelberg: Springer, pp. 167–80.

Schmidt-Lauber, Brigitta/Zechner, Ingo (2018): Mapping. Begriff und Verfahren. In: *Zeitschrift für Kulturwissenschaft*, 1, pp. 11–18.

Thierbach, Cornelia/Hergesell, Jannis/Baur, Nina (2020): Mixed Methods. In: Atkinson, Paul A./Delamont, Sara/Williams, Richard A/Cernat, Alexandru/Sakshaug, Joseph W. (Eds.): *SAGE Research Methods Foundations*. London/Thousand Oaks, CA/New Delhi: SAGE, pp. 23–30.

Tuma René/Schnettler, Bernt (2019): Videographie. In: Baur, Nina/Blasius, Jörg (Eds.): *Handbuch Methoden der empirischen Sozialforschung*. Wiesbaden: Springer, pp. 1101–1202.

Wood, Denis (1992): *The Power of Maps*. New York, NY: Guilford Press.