



How to Gain Knowledge When Data Are Shared? Open Government Data from a Media Pedagogical Perspectiveⁱ

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Abstract

Numerical data are becoming one of the dominant codes for describing society. Public services are sharing Open Government Data (OGD) as public goods. Academic interest so far has focused on political, technical and organizational implications. Educational research has been widely neglecting OGD. I argue that contemporary media pedagogy needs to productively and critically consider this development in research and practice, engaging with the question of how these data can be turned into knowledge. What objections to OGD as a political project have emerged, and what skills are required by data users? Apart from giving examples of how data use can be learned and supported, this paper illustrates and discusses potentials and risks for OGD use in terms of learning and subject transformation. Various objectives for media pedagogy – such as media, digital and data literacy, numeracy and picturacy – will be discussed in order to draw conclusions on a conceptual level. This paper aims at a differentiated approach to OGD and data education, taking into account their growing importance as well as emerging paradox constellations.

Key words: open government data, OGD, open data, media pedagogy, education, digital and media literacy, data literacy

Shared Datascares

Technological developments in recent years and decades seem largely to follow Gordon E. Moore's law (1965), in which he declared the biannual doubling of transistors on integrated circuits. This exponential increase similarly applies to digital storage capacities – and stored digital data (Mayer-Schönberger & Cukier, 2013, p. 9). Accompanied by a constant growth of these already 'big data' we've come to a point where *Wired* magazine, in 2008, can title its special feature "The Petabyte Age: Because More Isn't Just More – More Is Different."ⁱⁱⁱ Until now, big data has remained in the hands of the state, academic users, and business, since using them meaningfully requires specific hardware, software and adequate skills (Manovich, 2011, p. 1).

Data are not only shared and processed in terms of big data. Digital sharing cultures are blossoming in general. Volker Grassmuck (2012) names this trend the "Sharing Turn", in the same breath stating that sharing can be understood as an anthropological constant of human existence. Not only are we talking

about private users who are leaving digital footprints and exchanging thoughts, ideas and knowledge. More and more governments and administration departments are following the call by the open government data (OGD) movement to open their data storages.^{iv} Several democratic promises accompany this openness and are gratefully picked up by governments, such as the Obama administration: “We will work together to [...] establish a system of transparency, public participation, and collaboration. Openness will strengthen our democracy.”^v One might ask: Who are ‘we’? And what kind of ‘work’ are ‘we’ to do?

The OGD concept is implicitly thought of as a three-step procedure: At first, these digital data are gathered and shared online according to principles such as accessibility, free licensing, and machine-readability (Sunlight Foundation, 2010). In a second step, data are refined by professionals (finding, cleaning, linking, analyzing, visualizing, interpreting data or developing applications) and transformed into *in-form-ation* until non-expert users can start to work with them. There appears to be a divide, however, between this mediated access to information and any idea of immediate civil participation, as proclaimed by OGD enthusiasts like the Open Government Working Group:

The Internet is the public space of the modern world, and through it governments now have the opportunity to better understand the needs of their citizens and citizens may participate more fully in their government. [...] Open data promotes increased civil discourse, improved public welfare, and a more efficient use of public resources (Open Government Working Group, 2007).

We can conclude for now that data of different scale are becoming one of the dominant codes to describe society and therefore are acquiring an increasingly decisive role in “public space” – and even more within the public sphere. Civil society is invited to participate actively in governance by analyzing and querying this shared data. We might remark sceptically that not only data are shared. All citizens – by part-time ‘working’ for their governments – equally receive their share of accountability. Referring to the Obama quote above (‘We will work together [...]’), we might ironically call this phenomenon *crowd sourcing governance*: Citizens are expected to participate in governing themselves and their fellow citizens.

Thus, we find a situation that, on the one hand, might be interpreted as a unique chance for democracies to foster the communication and interaction between citizens and administrations and for teachers and learners to use these free learning materials in meaningful ways. On the other hand, we have to acknowledge the double-bind of this invitation to participation.

While scholars from various disciplines, such as informatics, economics, organizational studies or political science, have engaged with the field of OGD and data use in general, there hasn’t been any noticeable response from education, and media education in particular.^{vi} Therefore, the issue of citizens learning how to use (open government) data is not yet resolved. It is assumed that a response from media education scholars and practitioners is required to provide citizens with orientation within these datascares – thereby transcending the mere technical or knowledge-based use of data.

To avoid naive enthusiasm in educational conclusions, a cross-disciplinary, critical approach has been chosen to address certain problematic aspects emerging around open government data.

Objections to OGD

Numerous objections have been expressed towards OGD. Media pedagogy necessarily needs to take them into account before it can respond to the current 'open data condition' by proposing learning *with* and *for* OGD use.

Starting with the motivation for promoting OGD in the first place, the leading proponents of OGD seem to be widely neglecting the possible side effects of this project. Additionally, conflicts of interest might arise regarding their own professional background, since they are largely ICT experts. While democratic intentions are positioned in the foreground of public debate, lobbying for OGD can at the same time be understood as extending the significance and value of digital industries. Hence, OGD is not only a political project. Neelie Kroes, European Commissioner for the Digital Agenda, blogged about the enormous economic potential of OGD:

[A]ll together, public sector information generates over 30 billion euros per year in economic activity, with services from geo-location services to weather forecasts. By opening up this resource fully, we could more than double the value of this activity – to around €70 billion. This opening up can generate tax revenues which far exceed revenue from any fees previously charged for the data (2011; emphasis in original).

An optimistic view might regard these expectations as another argument for a winning game on all sides. The counter-perspective, however, has to ask: What power structures arise from this constellation? What data are to be published in what form? Who will benefit (the most)? And what effects on governance will become visible? It certainly makes a difference to have to wait for governments to share certain data versus having the right to demand them. While in Sweden, the United Kingdom, the United States of America and many other countries Freedom of Information is regarded as a basic democratic principle, in Austria it legally collides with an overruling, constitutional Obligation of Discretion (Austrian Constitution).^{vii}

Either way, the basic principle of sharing these data can be queried, if we assume that "sharing is an act that takes place among equals – power relations cancel the spirit of sharing, which is based on free will and generosity", as Katherine Sarikakis (2012, p. 37) puts it. Obviously, this complex arrangement of motivations complicates the analysis and leads simple analytical approaches astray.

Longo (cf. 2011) adds another perspective, naming some indications that OGD functions as a "Trojan horse" for New Public Management strategies by letting citizens participate as informers and assistants. Working on specific quests like comparing educational institutions, mapping crime scenes or finding 'questionable' publicly funded cultural projects, their output can for instance result in the cutting down of subsidies. Public services are monitored by the public and held accountable, while the government can easily retreat into a moderating position. Additionally, conducting this monitoring is not considered to be 'work', but 'participation' or 'honorary work'. Sarikakis' writing on economic structures in social network sites (2012, p. 38) matches these open government scenarios:

The deprivation of privacy of individuals strengthens the public monetary position of the industry. Again, this contradictory element of invisibility of private/public through the publicness of the user, is accompanied by the invisibility of labour/leisure [...] that articulate[s] vast amounts of un-remunerated labour hours.

Users within the OGD apparatus find themselves in a twofold position: enhancing participatory democracy on the one hand and creating (public and/or private) value for undefined beneficiaries on the other. This challenge of the public/private distinction seems to go along with the abovementioned “invisibility of labour/leisure”.

Furthermore, the OGD condition of mutual and self-observation generates a normalizing effect on individuals and institutions, as Johnson (2013, p. 9) argues, referring to the Integrated Postsecondary Educational Data System (IPEDS) in the United States.^{viii} While Johnson introduces Foucault’s concept of a disciplinary society to describe those effects, I propose to refer to ‘governmentality’ as an analytical category better to understand the phenomenon of OGD. This concept interrelates governance to (quantitative) information and knowledge:

The theory of the art of government was [...] connected to a set of analyses and forms of knowledge which began to develop in the late sixteenth century and grew in importance during the seventeenth, and which were essentially to do with knowledge of the state, in all its different elements, dimensions and factors of power, questions which were termed precisely ‘statistics’, meaning the science of the state (Foucault, 1991, p.96).

While in the early times of governmentality these governing techniques remained reserved to professionals (scientists, administrators), contemporary strategies blur the competences and responsibilities within political processes:

[I]f the state is what it is today, this is so precisely thanks to this governmentality, which is at once internal and external to the state, since it is the tactics of government which make possible the continual definition and redefinition of what is within the competence of the state and what is not, the public versus the private (Foucault, 1991, p. 103).

Intensified by digital access, information on societal conditions is mirrored to the general public and necessarily provokes consequences in knowledge structures and behaviour. In his study *A Trial on Normalism (Versuch über den Normalismus)* (1997, p. 452ff), Link elaborates on the subjectivizing forces of “datizing cultures” and their ensuing “curvescapes” on the three dimensions of signal, orientation and control. Statistically processed representations of ‘facts’ predominantly operate with bell-shaped curves and, hence, bring forward a *normalism* tendency: Deviant behaviour becomes less probable, since the majority is ‘pushing to the middle’. The equivalent on a state level can be found in the use of benchmarking as a controlling technique.

Finally and most importantly, we have to ask, “Who is in a position to make ‘effective use’ of this newly available data?” (Gurstein, 2010a). If OGD are only used by privileged citizens, they might just exacerbate the digital divide and extend it to a ‘participation divide’. Hence, a realistic view on OGD shows that data *per se* are no legitimate cause for euphoria. To handle all these challenges well,

we need to learn how to read and interpret them critically, to read between the lines, to notice what is absent or omitted, to understand the gravity and implications of different figures, and so on. We should not imagine that anyone can easily understand any dataset (Gray, 2012).

Drawing educational consequences from the abovementioned objections, it seems highly relevant to consider the political as well as the socioeconomic context of collecting (*production*), archiving/publishing (*distribution*), understanding (*reception*) and using (*transformation*) data. At the same time, social

injustice ('participation divide') appears to be one of the main perils we are facing in the context of open data.

So far, it has been argued *that* data education is necessary and *under which circumstances* it is taking place. Now, we can concentrate on *what* data education might look like in practice and theory – by taking a look at 'what's already out there' and, finally, by transferring these insights into educational terminology and a conceptual framework.

Meaningful OGD use

Different approaches to achieve meaningful use of OGD are already being tested. It is virtually impossible to draw a clear line between projects which are aiming at democratizing meaningful use by technology and others trying to support teaching and learning this meaningful use, since the latter are largely working with 'learning by doing' approaches. I will sketch three short examples and then draw conclusions for media pedagogy on a conceptual level.

In June 2012 a W3C (World Wide Web Consortium) workshop on *Using Open Data* took place in Brussels.^{ix} A group of researchers and software developers from Dresden, Germany, presented a concept of *OPEN – The Open Data Processing Engine*, an enhanced Database Management System (DBMS) to enable non-expert users to identify, extract, integrate and analyze datasets. It is meant to serve as a single access point and tool for democratization of data use. Users will be invited to contribute (Braunschweig, Eberius, Thiele, & Lehner, 2012). Simplifying infrastructures, like with OPEN, can indeed be helpful in educational settings. However, even operating this software is still demanding to non-expert users. Also, the authors regrettably do not comment on how the DBMS shall be licensed.

A second example is the *UK Data Service*, "a comprehensive resource funded by the ESRC [Economic and Social Research Council] to support researchers, teachers and policymakers who depend on high-quality social and economic data". They provide advice, online as well as face-to-face training and courses, guidebooks for learning and teaching and a "wide range of secondary data" (University of Essex & University of Manchester, 2012). For full access to the available datasets, one is obliged to register. All accessible data are preprocessed. About 30 case studies indicate that the service is in use by university and college teachers at both undergraduate and postgraduate level – mainly within the field of social sciences. UK Data Service is using proprietary software (Nesstar) for online publishing and analysis of statistical information.^x

In terms of 'openness' the most consistent service is the *School of Data* by the Open Knowledge Foundation. It proclaims to "empower **civil society organizations, journalists and citizens** with the skills they need to use data effectively in their efforts **to create fairer and more sustainable societies**" (Open Knowledge Foundation & Peer 2 Peer University, 2013; emphasis in original). Various learning materials are offered online, such as a handbook or tutorials, and everyone is invited to join so-called explorer missions. The latter are set up as self-organized, informal MOOCs (Massively Open Online Courses) including narrative or game-like elements and aiming at specific results, such as analyzing Nigeria's oil revenues^{xi}. Since no formal certification is offered, the *School of Data* is experimenting with OpenBadges.^{xii} All content displayed is licensed under a Creative Commons Attribution-ShareAlike v3.0 license. In Autumn 2013 the Austrian branch of *School of Data (School of Data Austria^{xiii})* launched a pilot course on data analysis, which was conducted both online and offline. As in the online expeditions, *learning by doing* played an important role within the course concept.

Now, what can we learn from these examples? Especially within an educational context it is crucial to have free or at least affordable software to hand in order to process data^{xiv} – and to find a compromise between required complexity and barrier-free simplicity. This can be achieved through adopting a holistic approach as proposed by the OPEN team, uniting all required functions within one single application, which might reduce constraints at first sight. At the same time it might reduce the user’s opportunities of looking behind the scenes and understanding how the single jigsaw pieces fit together. This largely depends on how transparently the structure itself is built.

The UK Data Service has chosen a predominantly academic audience and restricts freedom of action to particular steps of data refinement. Secondary data might be adequate to learn about quantitative methods in social science within institutional settings by working on ‘real data’. However, strictly speaking the data are not ‘open’. Registration and proprietary software pose additional deterrence to interested users. If using OGD in formal learning scenarios, the possibility of applying it to various subjects could be considered. Apart from allowing users acquisition of instrumental competences in statistics, OGD can enrich political education in schools with relevant, contemporary data. The School of Data (SoD) is free of institutional restrictions and can focus its activities and learning objectives on open data. This informal, mutual ‘private’ learning space seems to be more publicly relevant than the UK Data Service, for instance. Who is using this service remains open. Even if everyone is invited, we might expect to find expert and semi-expert users on SoD data expeditions.

If aiming at non-experts on a broad community basis, we need to step back even further. Gurstein (2010b) lists seven “elements that are required to be in place on the end-user side for the effective use of open data to take place.” I quote those elements in a shortened version:

1. **Internet access** adequate to support making data available and barrier-free;
2. **Computers and software** sufficiently powerful, sufficient time for users;
3. **Computer/software skills** to use the software and hardware;
4. **Content and formatting** – having the data available in a format such as to allow for effective use at a variety of levels of linguistic and computer literacy;
5. **Interpretation/Sense making** – sufficient knowledge and skill to see what data uses make sense (and which don’t) and to add local value;
6. **Advocacy** – having supportive individual or community resources sufficient for translating data into activities for local benefit;
7. **Governance** – the financing, legal, regulatory or policy regime, required to enable the use to which the data would be put;

To complicate this plain list, further-aspects can be added:

- knowing about open data
- motivation to engage with them

- context information on open data sets and sources (who collected it how, when, where and for what purpose?)
- online or offline communities to exchange ideas and skills^{xv}

Gurstein (2010b) asks “What are the language, computer literacy, data analytic literacy levels that are required for an effective use of the ‘open data’?” But before we try to answer this question regarding ‘levels’ – as the notion of “Interpretation/Sense making” remains rather abstract – we have to ask which specific skills are required for an effective and critical use of OGD.

Conceptual remarks

If media pedagogy decides to engage with the open data issue, the objectives it wants to envisage must be discussed. The variety of definitions for literacies, competences and education models exceeds the scope of this paper. Some of the most predominant lines of thought should be outlined briefly, largely following Hug’s (2012) argumentation. The most established approach in Anglophone literature and classrooms is certainly the media literacy concept, which Hobbs (2011, p. 12ff) expands to “digital and media literacy”, defining it by five “elements”: to *access* (using, finding, comprehending), to *analyze* (critical thinking), to *communicate* (expression), to *reflect* (social responsibility) and to *act* (ethical democratic citizenship). This definition shows slight differences to the one the NAMLE (National Association for Media Literacy Education; US)^{xvi} offers. The NAMLE sees media education on a predominantly knowledge-based level, while media literacy merely refers to practical abilities. The European Charter for Media Literacy^{xvii} raises additional concerns over harmful content.

As NAMLE is calling for a “wider set of *literacy skills*,” an obvious confusion of terms arises. What do *literacy* and *skills* mean in this context? Kress (2004, p. 21ff) critically addresses misleading compounds including ‘literacy’ – and there have been several within recent years: visual literacy, information or computer literacy, critical or political literacy, statistical literacy and so on. Data analytic literacy, as mentioned above by Gurstein, and data literacy are just two examples out of many.

Two aspects appear problematic at this point. First of all, there has not been any widely accepted definition for data literacy (cf. Mandinach & Gummer, 2013, p. 30). In their article on data literacy for educators, Mandinach and Gummer (ibid.) “broadly” define data literacy

as the ability to understand and use data effectively to inform decisions. It is composed of a specific skill set and knowledge base that enables educators to transform data into information and ultimately into actionable knowledge [...]. These skills include knowing how to identify, collect, organize, analyze, summarize, and prioritize data. They also include how to develop hypotheses, identify problems, interpret the data, and determine, plan, implement, and monitor courses of action.

This example shows that there are certainly ideas about data literacy. Still, these propositions remain restricted to their specific fields^{xviii} – in this case focusing on educators, whereas no equivalent models have been developed within media education. In addition, as we have seen, the OGD phenomenon raises political implications of data use. This complicates answering the questions of why data literacy should be separated from media literacy and which particular components it contains, if it does not contain those named above in Hobbs’ digital and media literacy.

Secondly, if we take Kress' critical remarks on literacies into account, we ought to think of more fundamental skills and abilities to describe what data use requires: literacy in its literal meaning, numeracy and signing. To stress the powerful democratic and sociopolitical character of mathematics, Skovsmose (1998) elaborated his concept of *mathemacy*, which transcends the more basic mathematical operations that are being addressed in numeracy. 'Signing' might be misleading, compared to alternatives like Heffernan's concept of *picturacy* (2002). In turn, picturacy focuses on comprehension of photography and paintings. *Visuacy* (Hug, 2012) can avoid such restrictions and includes the latter as well as matters of design, graphics and visualizations.^{xix} Yet, considering complex and interconnected datascares, all these capabilities are needed to understand effectively all steps of accessing, understanding, processing, displaying, encoding and decoding. These multimodal conditions not only can be found in this context, but are fundamental for digital environments in general (Kress, 2004). Here, we have to question the value of categories like literacy, mathemacy or visuacy beyond the analytical. Regarding the interdependency of these capabilities, *introducing another cross-sectional subject* to school would hardly lead to groundbreaking changes.

In contrast, the German notion of *Bildung* refers to an even more essential and abstract, subject-oriented category. *Medienbildung*, in a structural sense, designates the process of transforming relations to oneself and one's surrounding through mediatic experience, aiming at orientation in its widest sense, as well as critical reflectivity (Jörissen & Marotzki, 2009; Koller, Marotzki & Sanders, 2007). Hence, in this discussion, it might be helpful as an umbrella term, despite challenges in translation.

Shifting the question from one aspect to another, we might ask whether it can be constructive to introduce another cross-sectional subject *to school*. Although the School of Data is labelled a 'school', it in fact scrutinizes educational institutions by offering informal, project-based 'data expeditions' in disrespect of the classic learner/teacher distinction.

As to institutionalized education, large parts of it can be taken as examples demonstrating how much literacy-based forms of the communicative stabilization of learning cultures can restrict the probing of creative, conceptual and critical-reflexive scopes (Hug, 2012, p.123).

These remarks invite us to consider whether the institutionalization of data education is desirable at all. Foucault's governmentality concept sharpens our perspective on power structures within governmental conditions. On the one hand, this calls for a response to, and reflection on, governmental practices and apparatuses which can similarly be situated in formalized educational contexts. On the other hand, the role of teachers within governmental power relations has to be dealt with carefully. An educational conception towards 'governing students not to be governed (that much)' within formal, obligatory education can too easily act out what it pretends to counteract. Informal settings, however, run the risk of fortifying social injustice and privilege – if largely used by well-educated citizens and semi-experts, as assumed. A middle ground between public and privatized approaches might be opened by local community projects (Gurstein, 2010a). The educational character of these community informatics possibly goes along with its concrete political perspective.

Conclusions

Online sharing practices result in immense quantities of data. Various public services are continuously sharing their data storages as open government data.

Consequently, quantitative data is becoming increasingly significant as a representative code in digital environments.

While OGD proponents stress the potentials of OGD as a means to expand transparency and participation, numerous objections have been expressed. OGD can be read as both a political and economic endeavour. A political economy perspective reveals un-remunerated labour under the guise of participation. This double-bind applies to its advocates and users as well as to those releasing data. Hence, OGD can be understood to advance a renaissance of New Public Management in public services. Thus, citizens can be established as controllers and quality managers, while undergoing a normalizing shift that emerges from 'curvescapes' and comparative rationalities. Hence, participation may be understood as self-management and self-governance under the conditions of governmentality and governmediality.

Media educationalists need to consider these complex and ambiguous dynamics and find an adequate response in theoretical and practical terms. 'Literacy' compounds are misleading, as they either remain attached to a linguistic perspective or blur the denotation of 'literacy'. Effective use of OGD requires more than linguistic symbols. Numbers and visual forms are crucial codes in equal measure within multimodal digital and even more so in data environments. They therefore demand specific skills. Literacy, mathemacy and visuacy can serve as core competences for handling data, while 'Medienbildung' is proposed to embrace the other concepts towards a process- and subject-oriented understanding of 'learning'. While single skills might be taught in public institutions, their interdependence and the political implications of OGD challenge formal education. Meanwhile, informal learning projects are experimenting with community-based, self-organized learning arrangements. Here, empirical research is needed to understand better who is learning or teaching, what about and with OGD, in which context, and for which purpose.

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ⁱⁱⁱ http://www.wired.com/science/discoveries/magazine/16-07/pb_intro# [Accessed 2013-04-23].

^{iv} By the end of 2013, 77 access points were counted by the open data census, conducted by the Open Knowledge Foundation, as can be seen at <http://census.okfn.org/> [Accessed 2014-01-07]. The institutional recognition of OGD can be seen in official documents by the G8 or the European Union: <https://www.gov.uk/government/publications/open-data-charter/g8-open-data-charter-and-technical-annex> [Accessed 2014-07-09]. 62 countries already joined the Open Government Partnership (OGP) process, which includes OGD as a basic dimension. Find details at <http://www.opengovpartnership.org/countries> [Accessed 2014-01-07].

^v This quote can be read at <http://www.whitehouse.gov/open/> [Accessed 2013-04-24], quoting Barack Obama.

^{vi} Within media education there have been several works on privacy issues for Internet users in terms of security, predominantly resulting in protective approaches. According to these existing ideas, learners should become aware of existing risks and be capable of recognizing and avoiding them, instead of dealing with data as a symbolic code.

^{vii} The constitution online in German language: <http://www.bka.gv.at/DocView.axd?CobId=30953> [Accessed 2013-07-15]⁴ [outdated link]. Austria has been criticized for this issue by the GRoupe d'États contre la COrrup-

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- tion (GRECO 2011). An ongoing civil initiative is trying to implement a strong Transparency Act: <http://www.transparenzgesetz.at/> [All Accessed 2013-04-23].
- viii <http://nces.ed.gov/ipeds/datacenter/> [Accessed 2013-04-24].
- ix Find the report at <http://www.w3.org/2012/06/pmod/report> [Accessed 2013-04-24].
- x Find detailed information at <http://www.nesstar.com> [Accessed 2013-04-24].
- xi See the blog post about this specific expedition:
<http://schoolofdata.org/2013/12/23/mapping-company-network-in-the-nigerian-extractive-industry/> [Accessed 2014-01-10].
- xii Mozilla's OpenBadges are explained on their website: <http://openbadges.org/> [Accessed 2013-04-24].
- xiii Official Homepage (in German only): <http://www.schoolofdata.at/> [Accessed 2014-01-10].
- xiv See the Open Definition homepage by the Open Knowledge Foundation:
<http://opendefinition.org/okd/> [Accessed 2013-04-24].
- xv Some of those remarks are drawn from the *5 Stars of Open Data Engagement* that have been worked out by various contributors at the UKGovCamp 2012 to address nontechnical OGD principles (Davies, 2012).
- xvi Details at <http://namle.net/publications/media-literacy-definitions/> [Accessed 2013-04-25].
- xvii Read more at <http://www.euromedialiteracy.eu/charter.php?id=3> [Accessed 2013-04-25].
- xviii Within library studies, Carlson et al. (cf. 2011; 2013) are elaborating on the concept of "data information literacy" (DIL), which leads into a more specific direction of database and metadata management.
- xix The *visual display of quantitative information* (Tufte, 2006) confronts us with the problem of representation in a different way from e.g. realist art or war photography.