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We live in engineered spaces. They structure our behavior, but are themselves subject to change by technology. As there are no rooms without technology, spatial research must respond to the challenges of technology and of theories of technology. The "spatial turn" has fallen short of providing these answers. There is no theory of space which adequately encompasses mediality, practices and materiality. Technical case studies, on the other hand, subject complex infrastructure problems and power relations to disciplinary reduction. Things should not stay this way. Here, we present jointly developed theoretical approaches, new methodological approaches and exemplary ideas as possible solutions.

From container space to the structure of relations, from the mere construct to the dispositif: topology of technology!

Space is always a conceptualized space. These conceptualized spaces are many. In actual fact they permeate, complement, disturb each other. In doing so, certain functions dominate. This is the approach used in this paper: our research projects examined a wide range of different spaces: perceptive and orientational spaces, movement spaces, communicative and discursive spaces, action and simulation spaces, possibility spaces, knowledge spaces, experimental spaces, administrative spaces, security spaces, commercial spaces, transport, transformational and storage spaces^{*}. We have examined these spaces by focusing on their topological constitution. The material did not provide the measure. That is to say: we did not pursue an absolute or (in an inadequate everyday approximation) quasi-objective concept, but rather a relational concept of space.

Security spaces. The specific practices of security – i.e. technology-based means of visualizing potential danger, maximizing evidence recovery, but also the placing of barriers, glass walls, edges and the sealing of containers: these methods constitute spaces under functional differentiations like safe/unsafe, dangerous/not dangerous, vulnerable/non-vulnerable, suspicious/beyond suspicion. For instance, we encounter this in airports: ranging from x-ray and other screening devices, preventive data collection, multiple identification, threat assessment and remote detection of intentions.

Visible items appear to be safe in three ways. First, secure spaces concurrently develop through the arrangement of filters. Second, the definition of internal spaces and topologies of surveillance occurs through the canalization of movement streams, and third, through the tolerated or prohibited variability in spatial use. Identified threats are supposed to be neutralized – whereas security cannot simply be "produced," but instead grows more fragile with an increasing degree of definition: within security spaces, both security and insecurity increase.

Economies of power render the exclusion of possible danger according to temporal and monetary optimization of air travel. Thus, security spaces (involving technology) also become vulnerable through rigid algorithms. Security precepts are **separate bodies!** and, **divide spaces!** In this way, practices and spatial types overlap, generating spatial dynamics. Security spaces are never big enough, never safe enough. The expansion of security zones at airports seeks to avert danger and also takes places due to cost concerns and commercial interests. Therefore, security spaces emerge through transparent design and segmentation.

Since security spaces privilege the possible over the actual, fictional media such as literature and film play a particularly notable role within them (and are of particular note for them). Their power is in the critical reflection of present security technology and practices, in the presentation of alternative patterns of action, interpretation and perception and especially in designing threat scenarios and their technological countermeasures.

Administrative spaces. There are practices of administration such as the identification, gratification, sanction, facilitation or hampering, incentivization or handicapping of individual or collective behavior. These practices constitute spaces concerned with higher levels of protection and stabilization of social lationships (n aintaining public order!). T place under historically variable basal distinctions: threatening/non-threatening, stable/unstable or productive/unproductive. In both governmental and non-governmental arrangements, capital and its streams (money, resources, energy, goods, information), individuals and populations, all become the objects of regulatory measures. These measures include specific disciplinary techniques, the constitution of legal processes, corresponding mechanisms for their enforcement, as well as complex incentive structures. They serve many purposes, among them the production specific forms of subjectivity. In order to be effective, admini-strative techniques first need to institute their own object: administrative spaces form through the design of their environment in which behavior can take place as something expectable individually and collec-tively. As higher-order topologies of regulation, administrative spaces not only integrate the subjects being administered, but also a multitude of other spatial types without completely defining their respective structures. Their function is in fact more one of interconnection. Overlaps which are prone to conflict, can be observed: for instance within the confrontation of administrative spaces and economic spaces – a confrontation characteristic of the modern age – in which the latter in fact *should not* be administered externally; or in transport and mobility spaces, in which directives always remain precarious. Simultaneously, however, the continuity of these spaces must be ensured.

In their specific manifestation, administrative spaces are the result of boundary definitions including risk and opportunity assessment. These factors decide where interventions must take place and where processes can be left to their own autonomous forms of control and regulation. The possibility of externalizing risk – also spatially – produces new dangers. Thus, the examination of administrative spaces refers to a historically contingent concept of "normality" and "growth" (in **chances**, as well as dangers).

Transport and mobility spaces. Practices of transportation – including navigation, determining temporal allocations, routes, speeds, etc. - of goods, mater-ial, energy, information,** and people constitute mobility spaces. Each are organized in a specific manner. Their constitution can be understood as a spatial manifestation of human activity and need for spatial exchange. On the one hand, there are existing structures ("networks," supply systems, and so on), factual and specific spatial movements (of people, materials, etc.). On the other hand, the intrinsic properties of specific techniques (in a broader sense) facilitate or hinder individual or collective participation in transport and mobility spaces. This dialectic of mere representation of the existing vs. the incentive for increased or the creation of new mobility becomes visible in rail-bound transport systems, for example. These enable (channel!) participation. They also severely restrict actions, partly to the point of making them impossible - for instance, through the connectivity of the rail network or the schedule and pricing policy of service providers.

The processes and structures implemented in transport spaces can be combined for a specific purpose. The choice of combinations is produced to optimally reflect consumer needs. It is also modeled with the intent to plan "transport networks," "material flows," "scheduling," "distribution" (of goods or luggage), and "passenger routing." The distinctions point of destination close/far andstill movement/ respectively mobile/immobile, position/ route or time - that is to say the **in-between** – are parameters of the relational transport and mobility space, as Foucault has shown with his train model. On the one hand, the constitutional elements of transport and mobility spaces determine goals, but on the other, they are also structured by these goals. This causes the permanent dynamic "reproduction" of transport and mobility spaces: they can be seen as moving/movable groups of (site) relata/relations - on the one hand being moved through their own dispositifs and practices, on the other hand also through superposition and disturbances of other spatial types. Transport and mobility spaces function as product and medium simultaneously. They espe-cially connect spatial types, such as commercial, administrative or storage spaces, with each other. They can be considered as catalysts between spatial structures. Due to persistencies in the material arrangement (path dependency!) and also in social, political or technical conflicts, the catalytic function of transport spaces can be restricted. Thus, for example, governmental regulatory imperatives such as immigration laws, regulations for the registration of residence or copyright law may be obstacles for the transnational character of individual and collective mobility spaces. Refugee movements, multilocal forms of residence or global air traffic systems are evidence of this.

Communication spaces act as catalysts upon transport spaces. Telecommunication can take place, even though we are mobile (being transported), since the location does not change within the communication space. Transport spaces can overlay and interfere with information and communication spaces in a particularly intense manner. The success of the attribute "global" is evidence of this.

Interactive technogenic perception spaces (virtual

Spaces). Spatial worlds that are controlled more or less masterfully are constructed through the interaction between bodily actions (movement) and sensory perception. They are the ubiquitous basis of individual self-localization and the organization of movement. By interposing technology in appropriate contexts, such as sports, navigation, computer games or training in a flight simulator, traditional perceptive spaces are modified, extended and functionally specified in terms of expected performance. Aside from this constitution (*augmented reality, mixed reality*, measuring-system training), they are also necessarily restricted (**decontextualized!**)

Sport is an example of a field of experimentation related to bodily techniques. It is not just highperformance, but also private amateur sports, which perfect the interaction with man-machine interfaces. Through 3D and game technologies, experiences of presence become possible: the feeling of being physically present in a presented/virtual space and actually participating in events. New perceptive and interactive spaces may be created when playing digital sports games by transferring large-scale movement specific to a form of sport on to the movement of an avatar and into a virtual space: through the overlay of real and virtual action and movement space, potential interactions, in which we are bodily embedded, can change (in the case of the "wii," for example in the sense of perception (3D) on the one hand and in the sense of the projection of the digital sporting game on the other hand). This can lead to rivalry between the stimuli of the real and the virtual world (sensory mismatch, motion sickness). A successful integration of stimuli opens up new (spatial) fields of experience in which specific performances can be trained and enhanced: reaction rate, spatial orientation, multitasking can apparently be improved to temporarily change perceptive economy and efficiency in a sustainable manner. However, competencies in the field of non-technogenic, kinesthetic processes may degrade (e.g. navigational systems may corrupt your sense of orientation).

Storage spaces. Wherever something needs to be made permanently available, specific spaces need to be created, which allow for the same thing to be available under identical conditions. Accumulation, conservation and sorting are the basic processes in storage spaces with the corresponding dichotomies: present/missing, obtainable/unobtainable, able to be located/unable to be located. A time-independent means of accessing spatially disposed entities is to be ensured. Storage spaces tend, by their very nature and more than all other spaces, to make time a dependent variable of spatial practices. While transport spaces align to the now, the any time applies in storage spaces. The tendency toward spatial closure is characteristic for storage spaces, that is to say a materialization of the structural difference between inside and outside. Without such exclusion, there is no storage space. Libraries, archives, slip boxes, registers, hard drives, databases, storage cellars, granaries, energy storage units, fridges and banks are typical instances of storage spaces. They can be differentiated by their disposition toward consumption of stock: stored food products, for example, will be used up at some point (or thrown away), money is invested with a view toward an increase in the portfolio, items in an archive, however, will be kept with the aim of safeguarding the inventory with a minimum in degradation.

Typically, storage spaces are points of origin and end points of transport and mobility spaces. Traditionally, they form locally fixed nodes in infrastructure networks, in which those things that are being made available in storage spaces can circulate. A specifically modern extreme is the *just-in-time* production network. It is based upon avoiding any stockpiling of inventory whatsoever and moving whatever is necessary (**and no more!**) straight to the place where it is needed, without any temporary or final storage. Logistical reasons can cause redundant circulatory movement in infrastructure networks (which can be noticed as traffic jams involving trucks on the highway).

Also, storage spaces always have an aspect of being security spaces: the risk of loss of inventory is to be minimized and the danger of its (coincidental or willful) destruction is to be excluded or prospectively compensated through the creation of duplicates (as far as possible). As a general rule, storage spaces are therefore equipped with security mechanisms, which regulate the increase of, access to, usage of and decrease in stock. Within those "rules," the power aspect of storage spaces manifests itself; this is what couples them with administrative spaces into a dispositive space: who administers the stock? Who has access? Which forms of usage are tolerated? Next to power structures, the media of storage spaces play an essential part in determining their dynamics: Do the mechanisms of closure have preservative aims, the media technology is based on thermodynamics, i.e. cool air in archives and fridges. Do they have sortal reasons, they are IT-related: shelves, registers, flash drives or databases. If they have accumulative reasons, then it is about capacity. The specific spatiotemporal structure of storage is based on the technical coupling of mechanisms of spatial and social closure and their connection with the spatial practices of preservation and organizing, searching and finding.

Discursive spaces. Even in the expressible, we find formed spaces. As storage for thought, they are narratively or argumentatively constituted and structure realities. In hindsight discursive formations can be identified which conserve statements, arguments, stories and thoughts. Archives build their horizon (l'archive d'une archéologie!). In their textual form, discursive spaces are detectable but also repeatable. Among those textual forms are text and audio documents, sculptures and buildings, images of any kind, numbers, statistics, musical scores and plans. They determine the legitimacy of statements and the comprehensibility of texts for the present. Thus, they also outline the thinkable and the expressible for the future, the leeway in perpetuation and modification.

Today, discourses are digitally interconnected and accessible, in a way they have never been before. They use new media and achieve a new effectiveness. Texts, intertexts and hypertexts form discursive and living spaces as seldom before. Ever since Big Data and the resulting complexity, the borders of discourses have been unrecognizable. Dealing with the results has produced new challenges.

In discourse, the following dichotomies are significant, historically as well as currently: able to be truthful/unable to be truthful, important/unimportant, problematized/taboo, contemporary/anachronistic, popular/unpopular, basal/complex, monocoded/multi-media, expert-centered/participatory, inclusive/exclusive. These differences can be problematized and can become the issue of negotiation processes in the shape of higher-level discourses.

Discourses are a kind of meta-space, in which all other spaces start standing out as conceptualized and can be experiences as such. Thus, they are a medium for the description of topologies, as it were. On the other hand, topological orders in their resistance push through to the discursive dimension and create them or uphold them.

If one examines the rhetorical status of a text, hidden discursive formations are reflected in metaphors, images, clichés or their aesthetics. Any such analysis will expose aspects in a more nuanced manner, than would have been possible using more conventional approaches, such as, for example, that of the power of technology – the theory of technocracy – or of the contrary position of a construction of "the" technology by "the" society. Extremely powerful discourses are condensed in con-

Extremely powerful discourses are condensed in conceptions of the world. In order to counteract the instrumentalization of such conceptions, it is extremely important for discourses to be handled competently. A topology of technology requires a topology of technological discourses and can rely on a technology of topology. A successful shaping of relations to the world is dependent on prior discursive dispositions. Topology as a process identifies discourses in their historicity and effectiveness. The reflection of the corresponding problem areas can open up discourses. It can even blast them open and create the space for vision and utopia.

* We believe that these spaces are not incommensurable. However, we also would not want to assert that they can be readily blended into each other.

** Energy and information – both are consciously not understood here as transmission, but rather emphasize the constancy in condition between sending and receiving. We refer to the **instantiation of a relational spatial concept**, because **SPACE** is to be thought of as the multitude of relations of relata; speaking abstractly: as consisting of (internal) possibility spaces, or, specifically: because it opens up such possibility spaces. Thus, two levels of **POSSIBILITY** can be distinguished. (1) The relation as such enables value ranges/domains of definition ("intra-action"/"structures"). (2) The respective relata being used here themselves open up (different) possibilities of actualization through individual constants ("inter-actions", interactive practices). We call the opening and closing of possibility spaces **POWER**. Power is a modal phenomenon rather than a capability, it follows no plan. Opening, closing etc. are not consistently disposable processes, not acts of agents. Power processes are preceded by "acts" (records, documents) and are upheld through them. They are distributed in networks. **TOPOLOGY** reconstructs power networks. Power networks have to be analyzed topologically.

What role does technology play? And the topology of technology? What the arrays of examples above have in common is that they analyze the possibilities of given relations ("structures") in order to examine the power of the relata – which can be modeled as effects in "networks". And reciprocally: the power of relations can be discerned from the observed possibility of the relata. Where the processing in this field appears to be expectable in its operation, we are dealing with TECHNOLOGY.

Spaces can only be transformed—given a will to change them!

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