# Openness and Transparency in Network Topologies

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We live in a space of networks. The connections between people, data, spaces, and objects have become more apparent and even assumed thanks to the infrastructure that manifests its pulsating presence through our screens. Yet despite their prevalence, how can we re-appropriate networks and use them as a radical infrastructure? This paper will explore various embodiments of network topologies in the interplay of networked cultures, the original networking practices of *Neural magazine,* and the developments of human mesh networks, as a potential crucial strategy of change.

## 1. The Substance of Networks

We live in a space of networks. They manifest themselves continuously, in every screen among the many we recurrently consult, or casually stare at, relegating the 'offline' condition to a perceived 'malfunctioning'. They also manifest themselves in all sorts of 'smart' devices we are increasingly surrounded by, and relying to. They intertwine people, spaces and objects, in a perennial, ungraspable, and mostly involuntary exchange of data, acknowledging each other in a planned hierarchical infrastructure. This acknowledged and perceived 'presence' is infrastructural, too, built by a restricted number of telecom corporations and mostly exploited by a handful of global online corporations. These two groups together are predominantly determining the shape of these networks in both their infrastructure and services. But these are not the only possible networks we can aspire to be part of. There are plenty of examples of human-scale, critical, and fruitful networks. Before investigating their differences let's try to assemble a general definition of networks.

The definition of a 'network' depends on the various scientific disciplines and cultural domains it refers to. Networks are mostly made of 'elements, nodes, or sub-units connected as a whole.' This 'whole' defines the total networked space, and also its dynamic potential variations, sizes, and shapes. This 'whole' can be hard to visualise, if we refer to the current average huge scale and complexity, like, for example, imagining all the nodes of a social medium. Nonetheless, the parts of this 'whole' can determine the network itself, through the individuality of its essential components: the nodes.

The number of involved nodes is determining the scale and complexity of the networks, still, they are not the only strategic elements in contemporary networks. As Albert-László Barabasi affirms "a network is a catalogue of a system's components often called *nodes*" (Barabasi, 2017). One of the most relevant is certainly the 'transparency' or, on the contrary, the 'opaqueness' of networks. The nodes we mostly use now, as well as our devices, are highly opaque. The size of the global grid of interconnections, and its underlying economy, privileges centralized entities being in control of all the peripheral ones. Nonetheless, given that each node is individual, there remains an autonomous capacity to conceptually redefine networks through the creation of sub- or separated networks at will. Using the same technical infrastructure, we can connect with peers on almost infinite nodes that are just a few steps away, while escaping the official 'grids'.

We can then 'extract' and use the essence (or 'substance') of networks, which lies in the possible relationship conceivable through the network abstraction. Then we can think about the network as a paradigm, which reframes the technical structure as a conceptual model. In this text, I will try to analyze the political transparency of network topologies in contrast to the opaqueness embedded in the networks of power, in line with the

experiments we have accomplished with *Neural* magazine over the same time frame. By 'network topology' I mean a blend of the mathematical and more general definition of topology, applied to networks, so something close to: 'spatial relations, whose constituent parts are interrelated, unaffected by the continuous changes in shape, size, or nodes.' I will explore various embodiments of these topologies in the interplay of networked cultures, the networking practices of *Neural*, and the techno-cultural developments of networks, which can ultimately become a social factor of change.

## 2. The Disclosed Topologies of Power Opaqueness

Since the end of the 20th Century, the need to exemplify the increasing amount of complex information has led to the consolidation of disciplines giving a graphic form to specific data (like developing so-called 'infographics'). This process often means to create an understandable connection among crucial elements. So, technically, 'networking' the relevant data. Increasingly, radical artists have used digital means to map the 'networks of power', or how people with significant political and corporate responsibilities are connected, to enhance their structures. These kinds of works can be defined as "artifacts and processes" where "power can be depicted and exercised". (Dávila, 2019) The connections are unveiling the whole system of power and the nodes can be evaluated for their own 'weight' in the system. In this respect, the first emblematic work to consider is "They Rule"[1] by Josh On, which dynamically and interactively shows the complex power relationships between crucial people in U.S. institutions and corporations. When it was released in 2001, it had an exciting and daunting impact, clearly delineating the narrow and redundant power class of 'who's in charge' (hence the title). The perfect, evocative interface, proportionally depicting the amount of power a single person has, through visual rules, reinforced the literal unveiling of this class. Moreover, the gesture of spending a lot of time compiling the database is the essential foundation to properly show these networks of power, whose shapes and connections finally become public domain. They Rule is an excellent example of what Patricio Dávila defines a 'diagram of power', which always "speak from a position" being "situated". (Dávila, 2019)

In the same years, the networked maps of the French collective Bureau D'Etudes have been recognised not only as fascinating artworks, but also as mirrors of similar power systems, and have been disclosed through clever and self-aware use of networks. The systematic accumulation and proper rendering of data the group did reveal the capitalist democracies' "interlocking meshwork of maleficent intentions" (Holmes, 2014). Bureau D'Etudes helped to define a different meaning for "info-graphics" imbuing an exquisitely political attitude, where the shown relationships create new meanings. The semiotics of these networked maps trigger the ability to

**1.** http://www.theyrule.net.

reprogram the perception of power systems, through a carefully checked translation of information. The networks they show are the ones we're enclosed by, which we should aim to change and liberate from. Holmes defines Etudes' non-interactive maps as "working sketches for cosmologies of liberation.". This liberation can go through different steps and already in the early 2000s the group remarked an essential one: "to be autonomous today is to have the capacity to cut off a network". Which can lead to the interpretation that their gesture of accumulating and made these networks public, is meant to instigate cutting off them.

More recently the work of Burak Arikan has defined a different aspect of revealed networks of elements. He is addressing what he calls 'data asymmetries', referring to the disproportionate availability of data and functional algorithms between the industry and the individual. In his renown "Islam, Republic, Neoliberalism", for example, he uses static printed maps, which are very dynamic when considered in combination altogether. They are addressing the city of Istanbul through the dislocation of, respectively, mosques, republican monuments, and shopping malls. Opposing a shared overwhelming feeling generated by too many different data, these thematic detailed maps are easily hitting the attention target as they address coherent microworlds. Displayed one next to the other with each type of data in one single colour, they have their critical relation unfold in the mental juxtaposition of zones and presences, and in the state/religion/business triumvirate conceptual rule over the vast urban territory. The respective networks are confronted by the spectator, who then can figure out the possible connections. Arikan's work is exactly showing meaningful connections among non-evident elements, extracting sense from juxtaposing networks. It reflects the Zhang's concept that the network is primarily "the idea that everything is connected, and, as such, is a product of a system of belief." (Zhang, 2015)

All these artworks are elaborating networks of power in forms that result as purely transparent. They are applying different strategies to the respective data, using inter-related visualizations to highlight the underlying structure, but ultimately using the network form as a liberating paradigm.

## 3. Early Net Art and its Revealed Topologies

The transparency of networks was a significant topic in the first decade of the public and then mass internet (early 90s to early 2000s). At the time, the visualization of the network structure represented the new underlying digital structure behind the visual appearance of single pages as browser content. The lack of any accurately compiled topologies, due to the constant growth and evolution of these rapidly expanding networks, inspired the first generation of net artists to develop their own visualizations, either fixed or dynamic, to create an overview of physically or conceptually interconnected nodes. The *Web Stalker* browser (1997) and JODI's *Map* (1999) are among the most celebrated of these net art works.

The former, developed by I/O/D (Matthew Fuller, Colin Green, and Simon Pope), was a fully functioning alternative web browser whose main feature was visualizing the links connecting to the requested page. Fuller compared the dissection and rendering of the network to Gordon Matta Clark's "Splitting" action (1974) where he literally bisected a whole house, already slated for demolition. The *Web Stalker* generated an abstract map of connections, "as a crawler function gradually moving through the network. We saw the logical structure of websites, established by the links, in and between them, as another key resource."[2] Unveiling the infrastructure and relations of the network in this way, the *Web Stalker* was antithetical to the page-centered, accurate but opaque layout of the other browsers.

**2.** Matthew Fuller, 'The Web Stalker', *Net Art Anthology* (2018), https://anthology.rhizome.org/, https://anthology.rhizome.org/the-web-stalker.

**Fig.1.** The Web Stalker.



**3.** http://map.jodi.org.
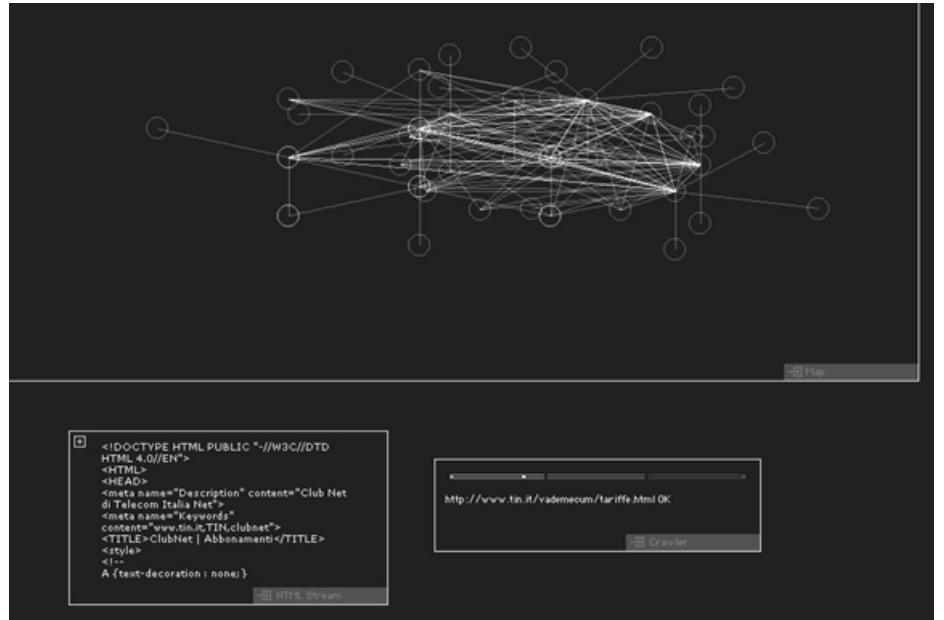
JODI's iconic low-tech *Map*[3] had a different, subjective perspective, and was created by internet artist duo Joan Heemskerk and Dirk Paesmans. It was a clickable online network diagram representing the 'landscape of domains and sites that most interested them at the time,' with subjective relationships. (Galloway, 2016) JODI's *Map* accidentally formalized part of the net art avant-garde and enlightened some of its obscure manifestations. The *Map* diagrammatically compiles an interconnected visual 'document' which outlived the time and context of its making. In a way, it was 'JODI's Internet', frozen in time and expressed through a curated selection of entities, all within net art circles. This selection both scaled-down the network to which they were referring, to a size and shape that could be manageably represented and restricted it to a sphere of mutual influence. (Incidentally, the earliest version of the *Neural* website was one of the nodes of the JODI's *Map*.)
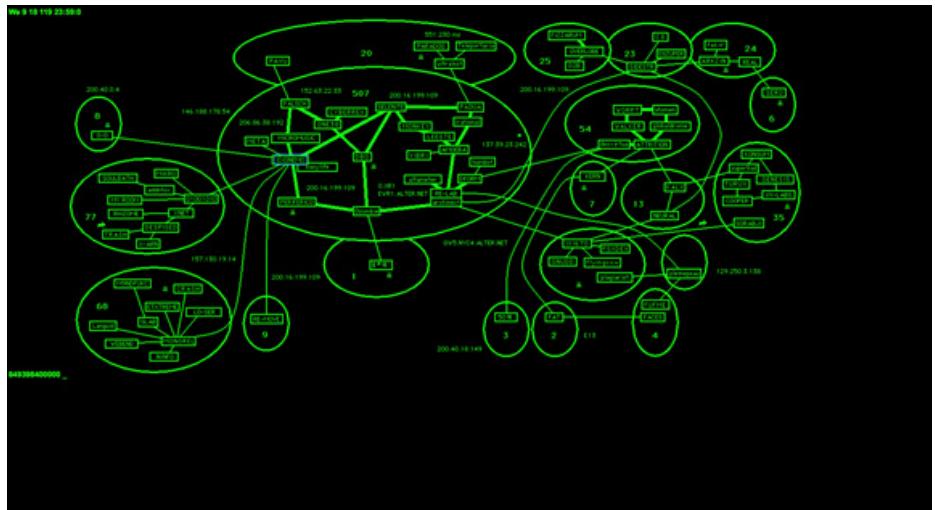
These works aimed to both autonomise and connect compatible nodes in independent sub-networks, transparent but protected, with the fascinating possibility of reconfiguring these same nodes in order to evolve their meaning and function. They can still be understood as what Hakim Bey (Peter Lamborn Wilson) defined in 1991 as 'temporary autonomous zones.' (Bey, 1991) A network ecology emerges from these practices, with some key elements: transparency, the creation of autonomous and negotiated sub-networks, the potential of interconnections, and their reconfigurations and extensions.

## 4. A Different Practice: The Interdependent Networks of Neural

A different network ecology was already flourishing in the pre-internet times, when alternative and radical networks of communication were sharing the figure of the 'networker': subjects developing their own networks, within or outside predefined structures. In mail art, the networker predominates, in effect replacing the 'artist', with the prerogative to create networks of artistic production, public sharing, and archiving. In the words of Vittore Baroni, one of the most prominent personalities in mail art: "I saw the networker as a new cultural figure, a sort of meta-author who created contexts for collective expression rather than conventional individual works, and whose activities eluded the "vicious circle" of the art market and therefore needed new critical parameters and instruments to be fully analyzed and understood."[4]

The networker and early net artists share an underlying structure and principles, if not the scope and nature of their tools. For example, the Decentralized World-Wide Networker Congress for mail art in 1992 was a bottom-up structure of gatherings and events, creating and expanding upon sub-networks, including a three-day performance of eight-six artists exchanging copy art via fax around the world. (Galántai, Klaniczay, Stiles, 2013) Net artists meanwhile were creating dynamic sub-networks, performances, and initiatives globally, connected by the same spirit of distributed production, collaboration, and knowledge-sharing.

**4.** Vittore Baroni, 'Memo from a Networker', http://www.lomholtmailartarchive.dk/texts/vittore-baroni-memo-from-a-networker.

**5.** Annette Wolfsberger, 'Interview with Alessandro Ludovico', in Nicola Mullenger & Annette Wolfsberger (eds), *Cultural Bloggers Interviewed*, Amsterdam: LabforCulture, 2010.

**6.** Ibid.

**7.** Ibid.

**8.** http://archive.neural.it.

These practices all inspired *Neural* magazine, its production, economy, and associated activities. Founded in 1993, *Neural* began with one specific concept: to be a single node within a larger network of magazines and sources of information, all delivering content on digital culture, both investigating and expanding the established domains. The role of *Neural* has always been to weave together different data and cultural domains, in order to trigger a new awareness of digital culture and the growing network of entities producing this culture, which increasingly break the boundaries between fields of research.[5] Phillip Gochenour defined this approach as 'nodalism', which 'emphasizes the importance of links and connections and stigmatizes disconnectedness and solitude.' (Gochenour, 2011) This is not meant as a description of a condition, but a whole system: 'in a network model each unit, though different in itself, is part of an overall smoothly functioning system'[6], or the 'whole' mentioned in the beginning.

The *Neural* project has been built to echo the networks it nurtures and connects with, in a critical, but also open and collaborative way. Moreover, the development of a proper focused network has transcended the many platforms it occupies and has entered into fruitful dialogues with other 'nodes'.[7] *Neural* took a few years to develop into a fully-fledged informal network. In 2002, a network of magazines was cofounded, whose members could support each other in their publishing efforts, and discuss their shared condition, particularly the nodal relationship between online and offline publishing. The network was called Mag.net (magazine network of electronic cultural publishers) and involved thirteen international editors whose collective slogan became 'collaboration is better than competition,' recursively reflecting its structure.

In *Neural*'s publishing practice, other networked layers has been developed. First, the infrastructure of distribution meant that our five hundred or so subscribers included more than 150 institutional, mostly academic, libraries. These libraries could be thought of both as a preservation strategy for the magazine, hosting 'back-up' copies in distant places, and as a distribution strategy for artworks embedded within the magazine. Secondly, a further layer is the Neural Archive, which consists of the submissions and donations of publications the magazine has received over the last twenty-five years.[8] It is a searchable online catalogue of print media and art publications, and acts as a progressively growing representation of the community to which *Neural* magazine belongs—it is an archive of this community's production. Finally, the funding itself of *Neural* is also 'networked', in that economic support for the project comes from a strategic network of subscribers, rather than from public funding or other funding applications. From the beginning, a kind of crowdfund *ante litteram* was nurtured, with direct relations and communication that goes beyond the mere exchange of goods and money.
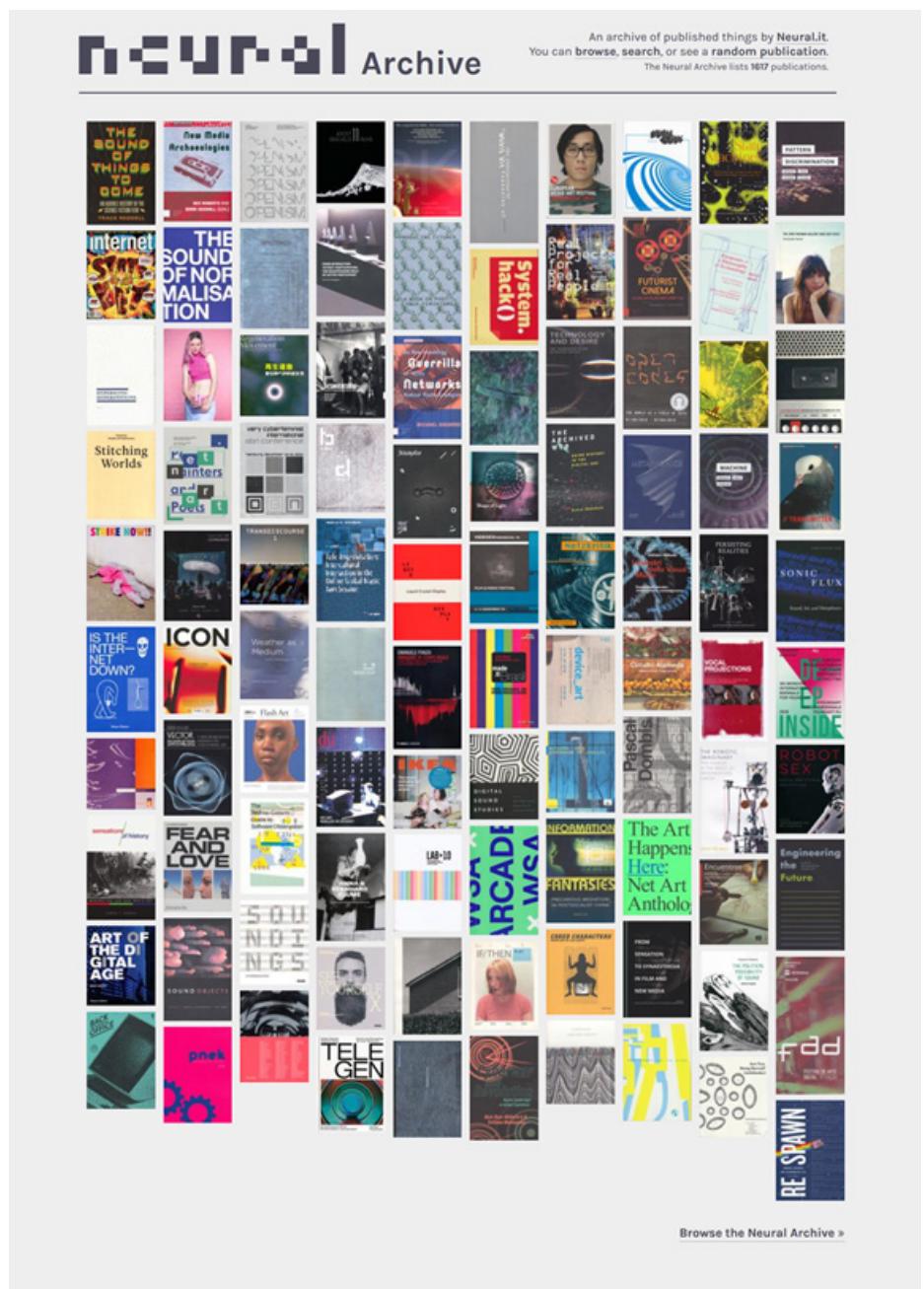
All these intertwining networks support the publishing, artistic, and archiving practices, but they also need to be nourished. Their interconnection generates sometimes unpredictable positive effects—strategic information or support which resonates from one layer to another, and from one node to another, transversally—but this is only manageable as long as the size and complexity of the network is maintained within a certain scale. With one-to-one relationships between all the nodes, their incredible human capital—fueled by emotional as well as technological resources—can become too much at some point, and lead to dysfunctions and cracks.

What results is a cultural version of an 'interdependent network'. The nodes depend on each other for their ecology and economy. The technical term for these types of networks, 'cascading', highlights their fragility in case of failure, potentially causing breakdowns of the whole system. (Vespignani,

2010) However, when they are culturally constituted and mediated, the networks have a different structure, as the single parts are protected by their various roles, although still interdependent. Moreover, these layers are mostly transparent (the institutional distribution, the external publications in the archive), offering a shared possible resource.

Such an interdependent network as we have built over time with *Neural* might represent a possible, hopeful model or strategy for managing our personal networks, preserving scale in direct relation to complexity, and creating long-term or short-term nurtured connections, instead of always looking for more—as is the pervasive commercial mantra.

## 5. Exploiting the Opaque Topology of Social Media

While these kinds of interdependent networks have a relatively transparent topology, the last revolution in communication we have seen, social media, is a self-transforming beast, which is less easy to discern. Social media platforms structurally hide their inner topology, all the while pushing for growth in the upper layer of users' connections, which boost profits, as a condition to thrive and survive. This process had already begun in the first decade of the World Wide Web, when the big players started to capitalize on the appropriation of the spontaneous network topology, through indexes and search engines or giving private space to host content, through 'portals'. The topology of networks became lucratively opaque and increasingly impenetrable, as a founding condition for large online businesses.

The early need and desire to be aware of the network topology has gradually shifted toward online corporations' need to include an ever larger number of users and content as the primary assets, which has exploded with the synergy between the social media paradigm and the 'appification' of everything, reiterated by most online platforms. This phenomenon is epitomized in the near total mediation of the economy of relationships, and so of networking, by social media. These platforms and protocols have triggered the largest voluntary creation of valuable and contextualized digital content, capitalizing on keeping their internal infrastructure hidden. It is an 'inclusive-exclusive' model: inclusive in terms of the functional accessibility of other users' data and connections (the capital of data), although dispossessing each user from its own data ownership; and exclusive insofar as the internal network is hidden and even adjusted by corporate technical and strategical secret algorithms (page rank, timeline order, etc.), which make any attempt to interpret or decode the model useless.

In this reality, the 'whole' topology is just too complex to map and detail, even at the level of single users with a relatively low threshold (or number of friends/followers/nodes): the user, pushed to increase his contacts/nodes, loses track of the 'whole' of his connections. The top-down inclusive-exclusive model works very well for the companies in this respect, handing management of the networks to the platform's owners.

It is nonetheless very important to interpret as far as possible these networks and act upon them. If in this model, technically 'conflict is non-functional,' as Gochenour stated, then we can consider that social media store an inordinate amount of useful contacts, which could become nodes of other focused personal networks, once identified and extrapolated from the corporate platform's rules (Gouchenour 2010). Using the existing infrastructure of social media as a source of possible nodes of new independent, and even possibly interdependent networks, rather than number-driven platforms that mostly encourage obsessive self-promotion, might trigger a different economy of networks and build new topologies. This economy would be built on networks through the exploitation of the social media infrastructures, re-appropriating the denied transparency, reassembled for personal purposes. This transparency would be finally negotiated with the members of the newly created networks.

## 6. Conclusions

It is important then to consider building networks of connections creating meaning. With rising commercial attention on the amount of connections having an impact on self-confidence, building scaled-down networks, characterized primarily by the meaning of the exchange rather than the quantity of exchanged signals could dismantle the popularity paradigm. Indeed, if this paradigm evaluates the number of associations as capital, then we'd consider that 'the more connected, the more individualized a point is.' (Latour, 2008) The network is, as Latour affirms, a 'privileged mode of organization thanks to the very extension of information technology.' It is a privilege to access infrastructures which reveal entities that could coalesce around specific ideas and projects, forming new independent networks and sub-networks, scaling down complexity through being aware of our networked topography, and enabling us to better explore it. As Jack Burnham comments on the clever organisation of a Dennis Oppenheim artwork in his 'Real Time Systems' essay, we should use: "untapped energy and information network of the day-to-day environment". (Burnham, 1974)

The six degrees of separation from the potential meaningful nodes should guide us toward finding the 'human capital' we want to cooperate with, escaping the sick dream of being either a hyperactive celebrity or a hyperactive audience. In this scenario, we should value our discoverability in chosen contexts, in order to gain and pass on proximity from the nodes we want to build networks with, acting mostly outside the industrialized platforms. We should build what Trebor Scholz envisioned in 2006 as 'extreme sharing networks' defined as "self-organised, technically-enabled [...] Extreme sharing networks are conscious, loosely knit groups based on commonalities, bootstrap economies, and shared ethics. They offer alternative platforms of production and distribution of our practice."[9]

**9.** Trebor Scholz, The Participatory Challenge, ISEA 2006 Proceedings.

What we should build are 'human mesh networks' with interdependences among the people/nodes, that would preserve multiple potential layers of application and collectivity. With a reciprocal trust and dependency, a negotiable relationship, and an infinite possibility of reshape, rescale and reconfigure it, these mesh networks might provide a new strategy to nurture human relationships. The network topology of critical cultural forms embodies the concept of the network as a supportive infrastructure, a flexible skeleton for vital action. Networks are collective agents that author, facilitate, and propagate content, an essential part of the strategies necessary for instigating rebellion and alternative visions of society, for rethinking digital limits and conceptual possibilities. Once we reclaim the infrastructures, and a human scale supersedes technological complexity, we can start to properly shape our own networks with trusted nodes, making alliances between trusted entities of information with an open, non-self-rewarding attitude.

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