D2.5. The Collective Intelligence NGI

Work package	WP2: Collective Intelligence
Task	2.4 Induce, visualize and analyse the semantic social network from the conversation
Due date	30/10/2021
Submission date	1/12/2021
Deliverable lead	EDGERYDERS
Dissemination level	Public
Nature	Report
Authors	Amelia Hassoun, Leonie Schulte, Kate Sim, Alberto Cottica
Version	1.1
Reviewers	
Status	Final

Acknowledgement: This Report is part of a project that has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°825652.

Table of Contents

Executive Summary

NGI Forward maps the "big picture" of the technological trajectory of the Internet as an ecosystem. Its objective is to offer (positive) perspectives on it, (normative) considerations on how to make it "human-centric" and consistent with Europe's foundations in human rights and the rule of law; and proposals on how to bridge the two. Within this project, the objective of Work Package 2 (WP2) is to add an intersubjective "community" perspective. We encourage more free-form dialogue among people who might not be credentialed experts, but experience the Internet every day, engage in adaptation strategies and perform innovative activities. From here, we try to understand how technology and business model choices impact the everyday life of people, in the words of the people themselves. To understand their worldviews, we use

ethnographic and network science methods to analyse discussions about the Internet on the NGI XChange forum, which we convened for 30 months (from early 2019 to June 2021).

Topic Areas

Five main topic areas emerged:

The future of work emerged as a central theme both before and during the COVID-19 pandemic. In section 1, we describe how NGI XChange forum participants identified ways for employees to adapt to shifts online and create healthier working environments. They analysed in-person, at-home, and remote/virtual co-working spaces. They also discussed sectors and areas less amenable to such shifts as well as listing the barriers to building alternative labour models. They linked work to questions of community building, shared values, and social interaction, illustrating the key interdependencies between online and offline space and sociality, work, and community. They also linked the future of work to the question of how networked technologies can contribute to increased human well-being.

Data, privacy, and control emerged as a central conversation theme in discussions about data-gathering technologies and the development of smart cities, networked technology and surveillance. In these discussions, participants usually identified problems at the institutional level (i.e. companies, monopolies, lack of strong regulation) but found many of the solutions they were offered were at the individual level (i.e. citizen education, individual open-source code projects etc.). We discuss this mismatch further in section 2.

Big tech, regulation & business models were key discussion topics, centred on the need for destabilising Big Tech's power monopoly over the future of the Internet and networked technologies, and the increasing reliance of online business models upon

targeted advertising. In response, participants suggested developing open-source alternatives and distributing control to a broader range of individuals and communities. We analyse their problem statements and imagined alternatives in section 3.

A wide range of discussion threads addressed themes of **crisis, resilience and environmental sustainability,** from discussions of environmental issues and deep green technology to resilience mechanisms in smart cities. NGI XChange forum participants argued that we cannot talk about the future of networked technologies without considering the complex ways in which they affect our health and welfare, both when they work and when they break down. The COVID-19 pandemic brought renewed urgency to assessing the stability and preparedness of the tools currently available to ensure public health and safety and to enable communities to recover and remain resilient during crises. We analyse these issues further in section 4.

Finally, discussions about **artificial intelligence, algorithmic inequality and justice** exemplified many participants' key concerns, evidenced by many threads on Artificial Intelligence (AI) and Machine Learning (ML). Participants described dystopian and utopian futures in conversations about the development of AI and machine learning. Such technologies engendered a sense of impending fear about autonomous systems operating beyond human control. Yet discussion also contained optimism about how AI and algorithms can be deployed to optimise and improve lives. We discuss these fears and hopes further in section 5.

Key Findings

Finding 1: The Next Generation Internet can and must help us build resilient offline spaces as well as online spaces.

Finding 2: We need to empower communities to effect appropriately scaled change – giving them solutions that neither individualise responsibility for global crises nor remove their power to make change that starts at a local level.

Finding 3: Governments need to do serious regulation work when it comes to Big Tech companies, because their financial incentives are fundamentally at odds with human well-being. *The role of policy is to ensure that technologies are developed, deployed, and monetised in a way that maximises human well-being.*

Finding 4: Not all good solutions are technological (and most are never ONLY technological). *We need to combine good organisational policy with good technology.*

Finding 5: There is a difference between "can" and "should" when it comes to creating new technologies, and we need community-informed policy to decide the question of "should" before powerful actors rush to implement the "can". *We always encode values into our technologies, whether we like it or not. We need to recognise what values are already being encoded, decide what values we want to encode, and make changes if those do not match: there is no neutral ground.*

Finding 6: We need to be both creative and practical about how we imagine possible futures. *We can and should use our (dystopian and utopian) imaginations as rational planning tools.*

The people who formed the NGI XChange forum community shared an interest in and sense of urgency to build a collective future. This future-making work requires analysing how networked technologies can both serve to further exacerbate existing harms, inequities and exploitative practices, as well as become tools through which to challenge existing forms of labour, imagine different political and economic systems, recapture power and agency over data, and create more resilient societies.

1. Introduction

NGI Forward maps the "big picture" of the technological trajectory of the Internet as an ecosystem. Its objective is to offer (positive) perspectives on it, (normative) considerations on how to make it "human-centric" and consistent with Europe's foundations in human rights and the rule of law; and proposals on how to bridge the two.

Within this project, the objective of WP2 is to add an intersubjective "community" perspective. Other WPs (like WP1) are charged with drawing a picture of expert opinion. In WP2, we encourage more free-form dialogue among people who might not be credentialed experts, but experience the Internet every day, engage in adaptation strategies, and perform innovative activities. From here, we try to understand how technological and business model choices impact the everyday life of people, in the words of the people themselves. To understand their worldviews, we use ethnographic and network science methods to analyse discussions about the Internet on the NGI XChange forum, which we convened for 30 months (from early 2019 to June 2021).

In this document, we first introduce the 5 main topic areas and the 10 key findings emerging from our study in WP2. We then move to an explanation of our methods: ethnography and semantic social network analysis (SSNA). Next, we dive into each of the 5 topic areas in detail. We conclude with a discussion of our key findings.

This report is not an exhaustive analysis of the rich and intricate contributions collected over the course of the NGI Forward project. Instead, its aim is to highlight, from an ethnographic perspective, key findings and to frame key questions for those interested in building the Next Generation Internet.

In this report, we provide live links to the NGI XChange forum when we reference specific stories or contributions from conversation participants. Participants are mentioned by username (e.g. @asimong, @katejsim) as this is the form that their contributions took on the platform. Ethnographic codes are displayed in a different font (e.g. `building alternatives`) to clearly mark them as such. Invivo codes (direct quotes from participants) have single quotes around them (e.g. `‘the rush to deploy’`). We also provide snapshots of the SSNA (which visualises ethnographic codes in a co-occurrence network, described in the Methodology section) to visualise participant contributions and analyse the connections they make. The report contains permalinks to the original content on the NGI Xchange forum. The reader is encouraged to follow them to hear the unmediated voice of the participants in the conversation.

1.1 Topic Areas

Topic 1: The Future of Work

The future of work emerged as a central theme both before and during the COVID-19 pandemic. In section 1, we describe how NGI XChange forum participants identified ways for employees to adapt to shifts online and create healthier working environments. They analysed in-person, at-home, and remote/virtual co-working spaces. They also discussed sectors and areas less amenable to such shifts as well as listing the barriers to building alternative labour models. They linked work to questions of community building, shared values, and social interaction, illustrating the key interdependencies between online and offline space and sociality, work, and community. They also linked the future of work to the question of how networked technologies can contribute to increased human well-being.

Topic 2: Data, Privacy, & Control

Data, privacy, and control emerged as a central conversation theme in discussions about data-gathering technologies and the development of smart cities, networked technology and surveillance. In these discussions, participants usually identified problems at the institutional level (i.e. companies, monopolies, lack of strong regulation) but found many of the solutions they were given were at the individual level (i.e. citizen education, individual open source code projects etc.). We discuss this mismatch further in section 2.

Topic 3: Big Tech, Regulation & Business Models

The interdependence between the business models of Internet companies and the scope for regulating them was a key discussion topic, centred on the need for destabilising Big Tech's power monopoly over the future of the Internet and networked technologies, and the increasing reliance of online business models upon targeted advertising. In response, participants suggested developing open source alternatives and distributing control to a broader range of individuals and communities. We analyse their problem statements and imagined alternatives in section 3.

Topic 4: Crisis, Resilience & Environmental Sustainability

A wide range of discussion threads addressed themes of **crisis, resilience and environmental sustainability,** from discussions of environmental issues and deep green technology to resilience mechanisms in smart cities. NGI XChange forum participants argued that we cannot talk about the future of networked technologies without considering the complex ways in which they affect our health and welfare, both when they work and when they break down. The COVID-19 pandemic brought renewed urgency to assessing the stability and preparedness of the tools currently available to ensure public health and safety and to enable communities to recover and remain resilient during crises. We analyse these issues further in section 4.

Topic 5: AI, Algorithmic Inequality & Justice

Finally, discussions about **artificial intelligence** exemplified many participants' key concerns, evidenced by myriad threads on Artificial Intelligence (AI) and Machine Learning (ML). Participants described dystopian and utopian futures in conversations about the development of AI and machine learning. Such technologies engendered a sense of impending fear about autonomous systems operating beyond human control. Yet discussion also contained optimism about how AI and algorithms can be deployed to optimise and improve lives. We discuss these fears and hopes further in section 5.

We conclude this introduction with a list of our key findings.

1.2 Key Findings

Finding 1: The Next Generation Internet can and must help us build resilient offline spaces as well as online spaces.

Finding 2: We need to empower communities to effect appropriately scaled change – giving them solutions that neither individualise responsibility for global crises nor remove their power to make change that starts at a local level.

Finding 3: Governments need to do serious regulation work when it comes to Big Tech companies, because their financial incentives are fundamentally at odds with human well-being. *The role of policy is to ensure that technologies are developed, deployed, and monetised in a way that maximises human well-being.*

Finding 4: Not all good solutions are technological (and most are never ONLY technological). *We need to combine good organisational policy with good technology.*

Finding 5: There is a difference between "can" and "should" when it comes to creating new technologies, and we need community-informed policy to decide the question of

“should” before powerful actors rush to implement the “can”. *We always encode values into our technologies, whether we like it or not. We need to recognise what values are already being encoded, decide what values we want to encode, and make changes if those do not match: there is no neutral ground.*

Finding 6: We need to be both creative and practical about how we imagine possible futures. *We can and should use our (dystopian and utopian) imaginations as rational planning tools.*

The people who formed the NGI XChange forum community shared an interest in and sense of urgency to build a collective future. This future-making work requires analysing how networked technologies can both serve to further exacerbate existing harms, inequities and exploitative practices, as well as become tools through which to challenge existing forms of labour, imagine different political and economic systems, recapture power and agency over data, and create more resilient societies.

The sections that follow explain each topic in more detail, concluding with a deeper discussion of these key findings. First, we explain our methodological approach.

2. Methodology

Over the last 30 months, The NGI ethnography team (Amelia Hassoun, Corinne Cath-Speth, Kate Sim and Leonie Schulte) observed, participated in, and coded on-platform interactions between a community discussing the Next Generation Internet on Edgeryders' online conversation platform, the NGI XChange forum. In WP2 of the NGI Forward project, we convened an online conversation specifically to discuss how participants envisioned the Next Generation Internet and treated their interactions as ethnographic data. In this approach, participants co-construct and sustain visible themes of conversation through interaction with the researcher and community managers (Cottica et al. 2020). This allowed researchers to code data directly on the NGI site in close to real-time, coding in the same 30-month timeframe as discussions took place.

We, ethnographers, read and assigned codes to written conversational and interview material on the Edgeryders NGI platform, producing an ontology of concepts used by the community as they discussed the Next Generation Internet. Codes are words or phrases that describe key concepts, concerns, emotions, and actions expressed by participants. These codes emerge from the ethnographer's embeddedness in the community, gleaned through extended participant-observation which contextualises on-platform interactions in participants' wider sociocultural environments (Emerson, Fretz, and Shaw 2011; Saldaña 2016; Rosaldo 1993). We then visualised these codes in a "Semantic Social Network" (displayed in the figures throughout this report) which displays the network of concepts used together by participants (Cottica et al. 2020). The more frequently participants connected two concepts together in the same post (creating a "co-occurrence"), the stronger their connection on the graph. The graph's analysis was done iteratively over the whole period of the study. A network scientist, Alberto Cottica, also participated in this phase.

We used open-source software, developed by Edgeryders, for the ethnographic coding and the analysis of the graph. The visualizations in this document were produced with Tulip.

2.1 What is Ethnography?

Ethnography is a qualitative research technique used to discover how groups of humans perceive sets of issues. It seeks analytical depth through long-term engagement with participants (Geertz 1994; Abu-Lughod 2000). Ethnographers study individuals as social members of communities, analysing how people with unique worldviews and life experiences live and work together. Ethnography is especially valuable because its findings articulate the analytical concepts and worldviews of the group(s) under study. It seeks to find novel social, political, and economic understandings that arise organically from human interactions rather than imposing researchers' preconceived categories of analysis.

When an ethnographer synchronically engages in online research with participants, she can contextualise the temporal unfolding of information rather than getting lost in noise as in other methods that analyse aggregated digital data after the fact (Coleman 2010). This approach builds upon work such as participant-observation with UNIX user-groups (Kelty 2008), online research with hackers (Coleman 2015), and fieldwork in virtual worlds (Nardi 2010; Boellstorff 2008). In these studies, anthropologists conducted long-term ethnography: interacting with participants in-setting, asking them questions, and generating context-specific data that evolved through interactions with participants over time. Some projects included offline components (e.g. Kelty 2008), while others were completely undertaken online (e.g. Boellstorff 2008), but all pay close attention to the ways informants make sense of their own worlds and define their terminology.

NGI ethnographers in WP2 similarly committed to long-term engagement with participants, but also convened the environment within which conversations unfolded.

This allowed researchers to code data directly on the XChange site, resulting in a rich overlay of quantitative data over the qualitative data generated by informants and coded by ethnographers. It is from this long-term engagement that the conclusions in this report emerge.

Our methodological procedure was as follows: we read the 4,094 posts in 394 threads of the NGI Exchange forum, hosted on the Edgeryders website in multiple iterations. Then we developed 1053 codes for the posts and comments that described the content of the conversations taking place, defining them in a shared open codebook. These codes emerged from "in-vivo" reflections (direct quotes from participants, noted in quotes below), descriptive terms systematically generated by ethnographers to summarise participant contributions, and established terms in academic and policy debates about Artificial Intelligence (AI), Blockchain, Cloud Technologies and other Internet-related topics. To ensure the transparency and methodological rigour of our work, we kept detailed memos in which we explained the decisions we made, identified concerns, and defined paths forward. We also had bi-weekly calls in which we discussed difficulties, codes under review, and relevant developments in the world of networked technology, policy, and digital culture (of which we also kept a log in the codebook).

We focused on the salient themes that emerged through on-platform interaction, paying attention to the language participants used to describe their experiences and the categories they themselves established discursively. 2020 and 2021 brought on a range of new topic areas spurred by the COVID-19 pandemic, with crucial insights on its implications for the Next Generation Internet from a range of participants.

The project attracted a community composed of many "citizen experts": people conducting research and teaching; developing software, platforms, and apps; leading start-ups and designers; and engaging in activism and journalism around networked technology. We accordingly tailored our questions towards gaining a deeper

understanding of emergent trends, policy, design, and innovation, eliciting participants' nuanced analyses of technology issues. While there was considerable diversity in the professions and areas of expertise from which participants approached issues of Internet technology, there appeared less heterogeneity in terms of ethnicity and socioeconomic class. Participants seemed to largely (though not exclusively) be composed of individuals from European, white, and middle class – or otherwise upwardly mobile – backgrounds. Defining the community's positionality helps us contextualise how and why they found certain issues important and the backgrounds they approached them with.

In the following sections, we explain the steps we took to generate and analyse ethnographic and network data. Some of these steps are algorithmic; they consist in applying algorithms to the data. Others are interpretive; they consist in finding meaning in the data, possibly re-organized by algorithms. Others still combine both algorithmic and interpretive moves. Their sequence is described in Figure 1.

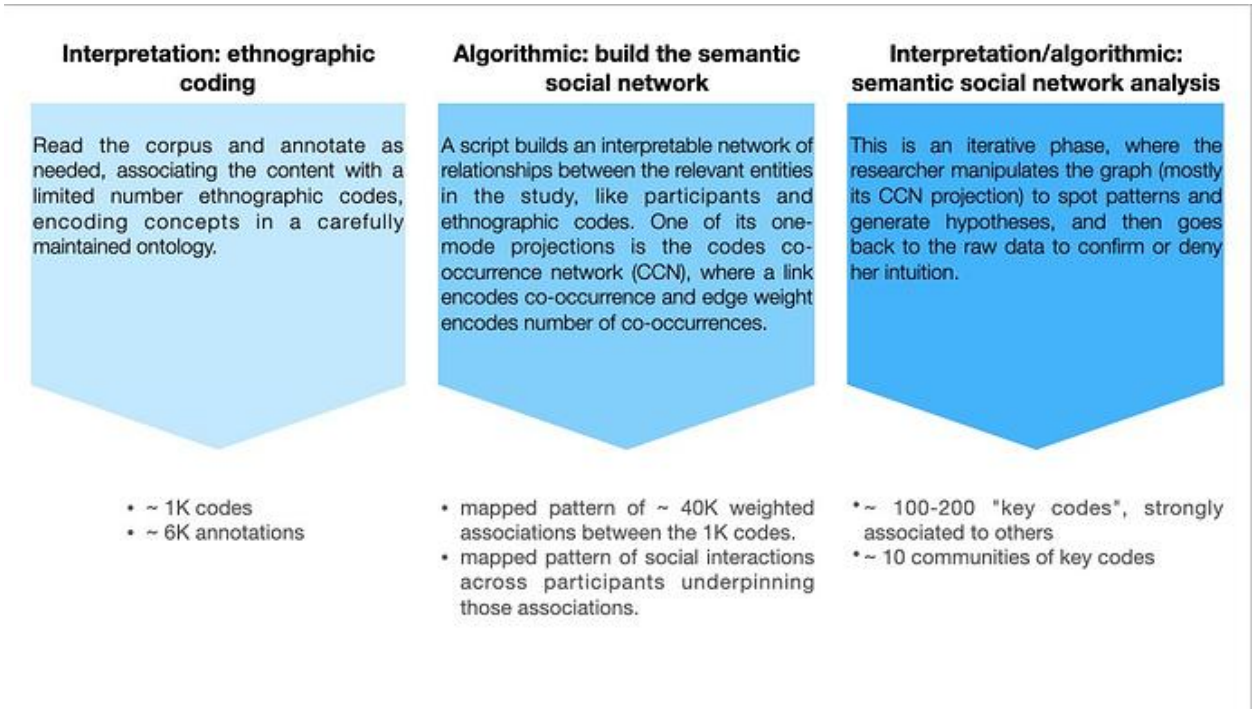

Figure 1: Methodology steps in WP2.

2.2 Context

The NGI Exchange forum had its own visual identity and third-level domain (https://exchange.ngi.eu), but it branched out from the pre-existing Edgeryders community and was, and still is, hosted on the forum of Edgeryders. Many of the 338 participants in the conversation joined the forum for the specific purpose of participating in NGI Exchange, but many others joined from other conversations in Edgeryders.

The Edgeryders online community counts about 7,000 accounts at the time of writing. It has its roots in digital culture as it appeared in the first decade of this century. As the name indicates, it tends to attract people with a high tolerance for technical and social change, and a certain sympathy for the practices of knowledge sharing of the early Internet. While probably a good fit for the objectives of WP2, it is obviously not representative of the European population as a whole.

2.3 Generating the primary data

WP2 generated its own primary data. By this expression, we mean the 4,094 forum posts that make up the corpus for the NGI ethnography. The process of generation consisted in opening an online forum, and seeding it with "conversation starters": high-quality posts, often written by people with some standing in certain communities, that highlighted a potentially relevant angle on Internet technology while still being grounded in human experience (as opposed to, for example, commercial messages[1]). The conversation starters and other interesting posts that the fledgling community produced were reshared on social media (especially Twitter) in a bid to attract more

[1] See the appendix for a list of conversation starters

participants and gather more points of view. On the forum itself, community managers made sure that participants felt welcome and appreciated, asked questions, and connected threads to each other. The goal of this activity was to have a plurality of points of view in every discussion.

Given all that, the discussions we ended up with were influenced by the conversation starters, which in turn were influenced by the political priorities that inspired the Next Generation Internet initiative at large, and by the mission of WP2 to involve unusual suspects, like Indieweb enthusiasts and privacy activists. Another influence was the social networks of key Edgeryders staff, that carried the signal of the conversation starters into the broader public.

All in all, the data generation phase has been highly interpretive, with a plurality of actors (the project officer, the NGI community at large, in turn communicating with DG CNECT, project staff) having to make decisions at every step about what mattered, what was worth debating.

2.4 Ethnographic coding: generating the secondary data

In this phase, professional ethnographers read the corpus and annotated it as needed, associating the content with a limited number of ethnographic codes. Coding activity followed the tenets of grounded theory (Glaser et al 1968). This activity resulted in about 6,000 annotations, that makes use of 1,000 codes. These codes constitute the ontology of the NGI Exchange conversation. Annotations and codes are used as secondary data in the following steps of the research process.

This phase, too, is interpretive, given that each annotation is the result of the ethnographer interpreting the informant's post on the forum.

2.5 Building the semantic social network

In this phase, a Python script builds an interpretable network of relationships between the relevant entities in the study, like participants and ethnographic codes. This network maps several types of relationships across entities: for example, authorship (from participants to the posts they wrote) and annotation (an annotation concerns a certain post). Through a technique called projection we transformed this network into one where all edges encode one single type of relationship, that of co-occurrence of codes. Two codes A and B are said to co-occur if each of them is associated to at least one annotation, and if at least one annotation associated to A and one associated to B are annotations of the same post.

We interpret this network as a pattern of associations. The concepts expressed by the codes have been associated in the forum post that was annotated with both A and B, and we represent this association with an undirected edge linking A to B. Two codes can co-occur more than once, giving rise to deeper association. We define the *association depth* between two codes as the count of co-occurrences between those codes occurring across all posts in the corpus. Association depth is encoded as the weight of the edge e connecting the two codes, and indicated by *d(e)*. The resulting network is weighted and undirected. We call it the codes co-occurrence network (CCN). The CCN of this corpus has the 1,000 codes as nodes, connected by about 40,000 co-occurrence edges.

Another projection operation maps the social network of interactions across participants in the NGI Exchange forum. Here, edges represent replies. This network is directed (Alice replies to Bob is not the same as Bob replying to Alice) and weighted, since Alice could reply to Bob several times. The interaction across participants is the social mechanism that spreads ideas and points of view, and puts them out for validation and improvement ahead of the ethnographic coding phase. The social interaction network has the 338 participants as nodes, connected by about 900 interaction edges.

This phase of the process is algorithmic, but it still involves interpretation in that the networks generated by the projection are claimed to have a straightforward interpretation.

2.6 Semantic social network analysis

This is an iterative phase, where the researcher manipulates the graph (mostly its CCN projection) to spot patterns and generate hypotheses, and then goes back to the raw data to confirm or deny her intuition. The main algorithmic moves are:

- filter the CCN, leaving out the weak associations.
- run community identification algorithms on the reduced CCN.

While these moves are algorithmic, the key parameters that the algorithms need to run are guided by interpretation. Based on having read the corpus, does it make sense to reduce the CCN from 1,000 codes and 6,000 edges, to, like below, 200 codes and 700 edges? Are we leaving anything important out? The choice is made on the basis of interpreting the reduced graph in the light of the corpus.

Doing SSNA on the NGI XChange ethnographic corpus has meant, for us, using the CCN to guide our interpretation of the underlying qualitative data. We did this in two principal ways. The first, is to use a strongly reduced version of the network (as described above) as a way to perceive the pattern of connectivity at a high level of description. The second is to inspect the CCN more locally, typically in the vicinity of salient codes like `artificial intelligence`. In this second type of analysis, free from the need to take in the whole corpus in a single glance, we were able to analyze our data in a richer way, pulling back in associations that were not the absolute strongest in the graph.

We also used SSNA to identify the five overarching topics mentioned in the Topic Areas section. We proceeded as follows.

1. Induce a human-interpretable CCN. Following the literature on network visualization (Ghaniem 2004; Melançon 2006; Munzner 2014) define "human interpretable" as a graph with at most a few hundred nodes, and whose number of edges is at most four times the number of its nodes. We take the whole codes co-occurrence network, rank its edges by importance, and start discarding the least important edges until we hit a graph with low enough density. We define importance as *association breadth*, the number of informants who authored at least a contribution coded with the two codes. We chose to reduce the network by filtering out all edges induced by fewer than 25 co-occurrences. The resulting reduced CCN has 202 codes, connected by 699 co-occurrence edges. [2]
2. Compute the reduced network's maximal modularity partition (Blondel et. al, 2008). This is a way to resolve the network into communities of nodes, where each node is more connected to the nodes in its community than to nodes in other communities. We also keep track of the modularity value. If it is close to zero, the whole exercise makes little sense: the network is indistinguishable from random, there are no meaningful communities of codes. [3] Visualize the network obtained, with color coding for the different codes communities (technically, the classes of the maximal modularity partition). The resulting network is highly modular ($C = 0.55$).
3. For each community, make a list of the codes in it.

Additional interpretive moves in this type of analysis are:

4. In each community of codes, the (topologically) central ones in the cluster define the semantics of the cluster itself: "this part of the conversation is about AI", for example.

[2] An alternative method based on the number of participants who have authored at least one post containing the two codes in question was also tried. While its results are in broad agreement with the method we followed, the reduction itself gave rise to a less modular network, and might have resulted in foregrounding "popular but shallow" associations.

[3] We compute modularity for the *weighted* graph, using association depth as weight.

5. The more peripheric codes in the same community encode information on which concepts the informants associate to the defining ones in the center. Some novelty can be looked for here: "oh, look, `AI` is connected to `public spaces` by way of `smart cities`", etc.
6. The codes that stand at the margin between two communities function as logical connectors. Again, some meaning can be glimpsed, like in `exploitative business model` joining up the `AI` and the `business models` communities of codes.

Applying the reduction method described above, we find that, if we filter out all edges *e*, *d(e) < 25* , we are left with a reduced CCN with 203 codes and 699 edges, not that different from the previous case. It is shown in figure 2 (brighter edges map to broader depth of association):

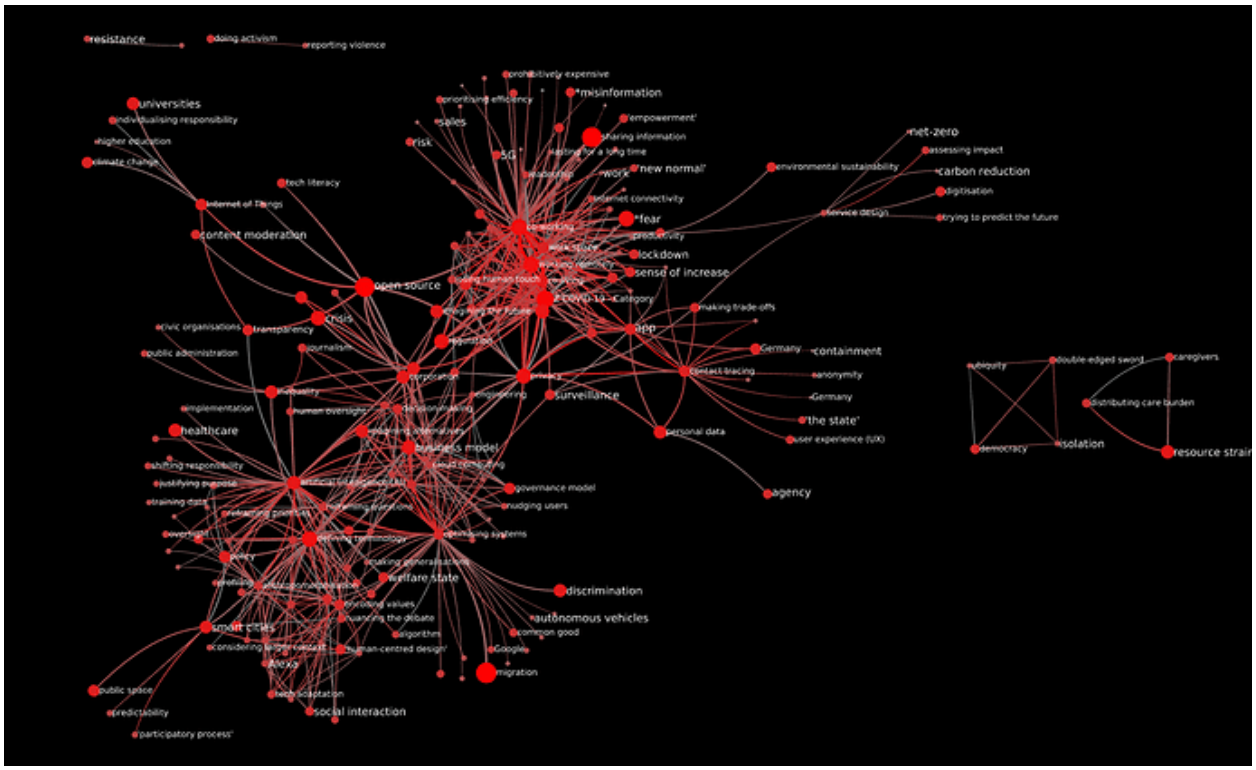

Figure 2. The reduced codes co-occurrence network of the NGI Xchange corpus. Edges encode a minimum of 25 co-occurrences. Brighter edges map to a higher number of co-occurrences.

The network's maximal modularity partition is shown in figure 3. The classes of the partition are 9. Some correspond to small connected components to the east and the north of the graph; the giant component has three large communities with 63, 49 and 38 codes respectively, and two smaller ones with 24 and 18 codes, respectively.

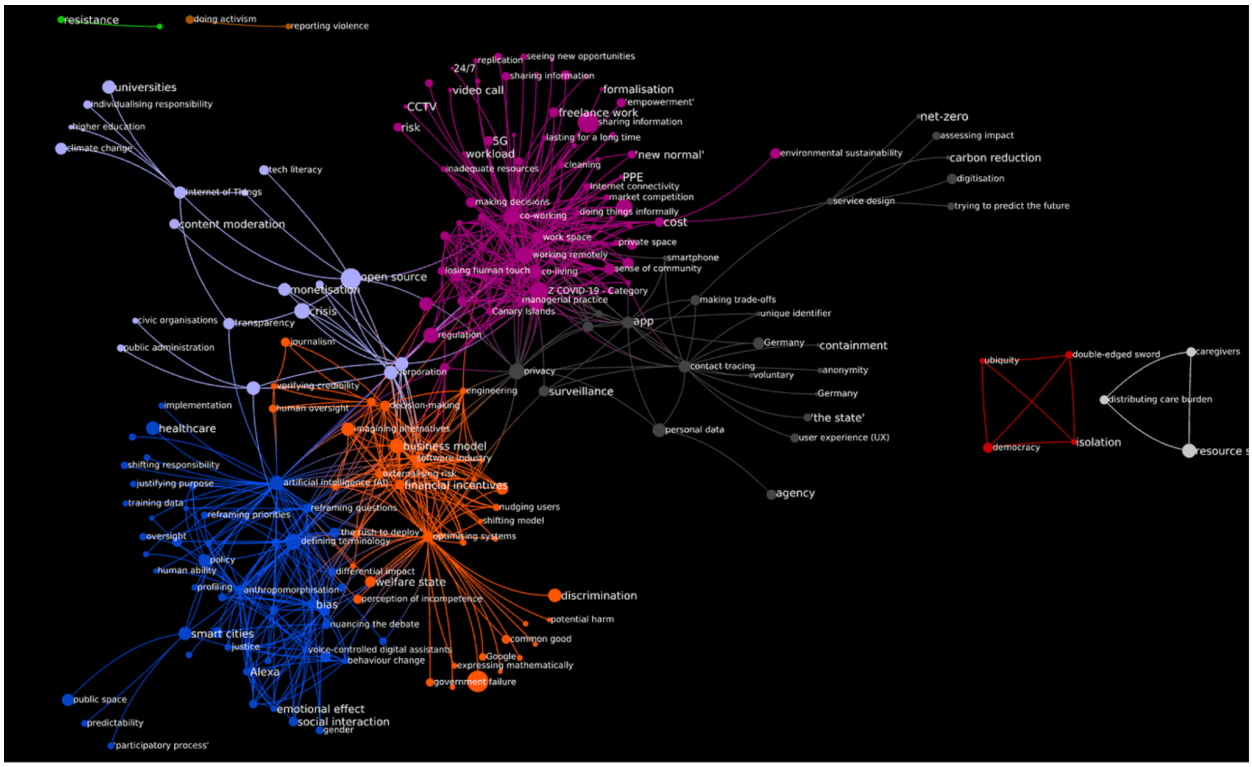

Figure 3: The same network of figure 2, color-coded by codes community.

Communities of codes identified by the algorithm tend to include semantically close codes, though they are identified by an algorithm purely on the basis of topology, without using semantic information. In other words, the topology of the CCN is a good proxy for its semantics, which validates the SSNA approach taken in this study. An example is shown in Figure 4, which is simply a zoom on one of the communities of codes of Figure 3. Most codes point to the organization of work and how it is influenced by the availability of Internet technology and by the COVID-19 pandemic.

The five communities of codes identified in the giant component of the reduced CCN identify each a key topic area. These are: **"The Future of Work" (Pink)**, **"Data, Privacy &**

Control" (Grey), "Big Tech, Regulation, and Business Modes" (Orange); "Crisis, Resilience & Environmental Sustainability" (Lavender, plus some grey codes), and "Artificial Intelligence, Algorithmic Inequality & Justice" (Blue). In the following sections, we zoom in ethnographically into each of the topics identified and unpack them in more detail. In each section, we walk through the SSNA (via partial images of it, as above), quote participants' platform contributions, and analyse both ethnographically to explain our key findings. Each has corresponding key codes and key questions that we suggest any NGI project must meaningfully engage with to facilitate just and equitable development and governance.

The topic area "Crisis, Resilience & Environmental Sustainability" is the only one whose key codes span across different partitions. We believe that its identification is, nevertheless, appropriate and methodologically consistent because (1) these codes are indeed associated, albeit at lower levels of association depth than those that allow a network reduction sufficient to make the reduced CCN amenable to visual analysis; (2) over the coding period, the CCN has naturally shifted as we merged, split, and renamed codes, and during many phases these codes were more strongly associated than they ended up being in the final analysis.

These topics overlap significantly across several focal issues: challenging the status quo and imagining alternatives to current modes of work, access and data control, reshaping regulatory and governance systems, pushing for justice and equality, creating resilient systems, and better distributing resources. Undergirding on-platform debates is an urgency to define values as creators and users of networked technologies and to implement new systems of policymaking and technology creation that reflect these values. We now move to an in-depth discussion of each topic area.

3. Topic 1: The Future of Work

Key codes: co-working, shared space, community building, social interaction, working remotely, covid-19, building alternatives, shared values, co-living

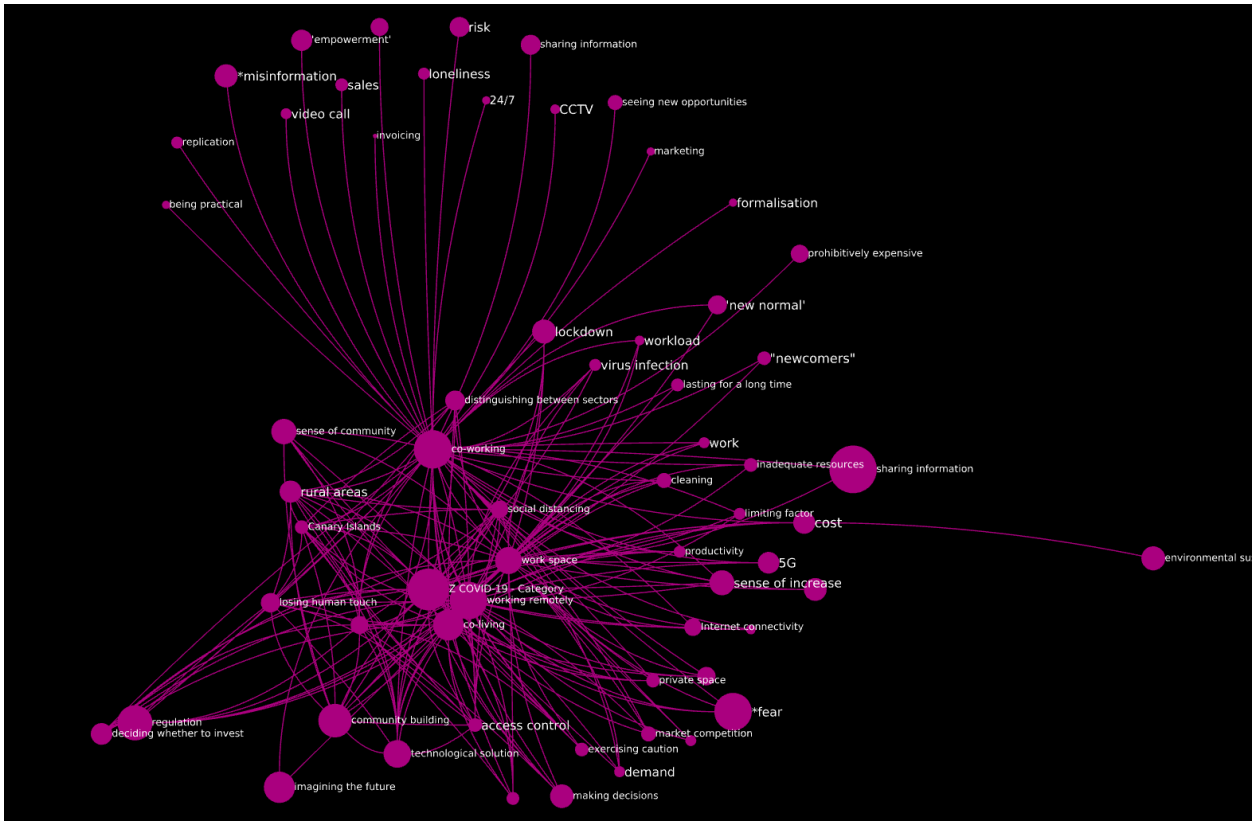

Figure 4. The "future of work" community of codes, as identified by a community detection algorithm in the reduced CCN of Figure 3.

In this section, we dive into forum threads and the SSNA to analyse the future of work in more detail. We describe how participants explored the relationship between work and community, both seeking more flexibility (often through `remote working`) and a `sense of community` (often through `co-working`). We explain how they navigated the forms of exploitation and precarity present in different work configurations, imagining arrangements better suited to maximising human well-being.

Participants included financial analysts, academic researchers, authors, open source software developers, founders of co-working associations, virtual meeting room developers, environmental tech practitioners and entrepreneurs. Most forum participants were themselves working outside of 'standard' employment models: many were self-employed, freelanced or otherwise engaged in remote or independent work. Their expertise thus derives from their lived experiences of working within these sectors and we therefore generate our observations from their first-hand understandings of labour and its interdependencies.

Participants generated these key questions: **As we look toward the future of work, what are our values and how do we ensure that our work life reflects them? What do we need networked technologies and digital policy to do as we attempt to redefine our working conditions? How can networked technologies and digital policy shape the future of work to improve, rather than hinder, human well-being?**

3.1 Co-Working: Sharing Spaces, Building Communities

One key practice that emerged in response to these questions was **co-working.** This practice emerged from participants' desire to re-imagine what it means to work together: from designing new digital platforms for individuals to work together remotely to creating in-person spaces where people can come together and work on their own projects.

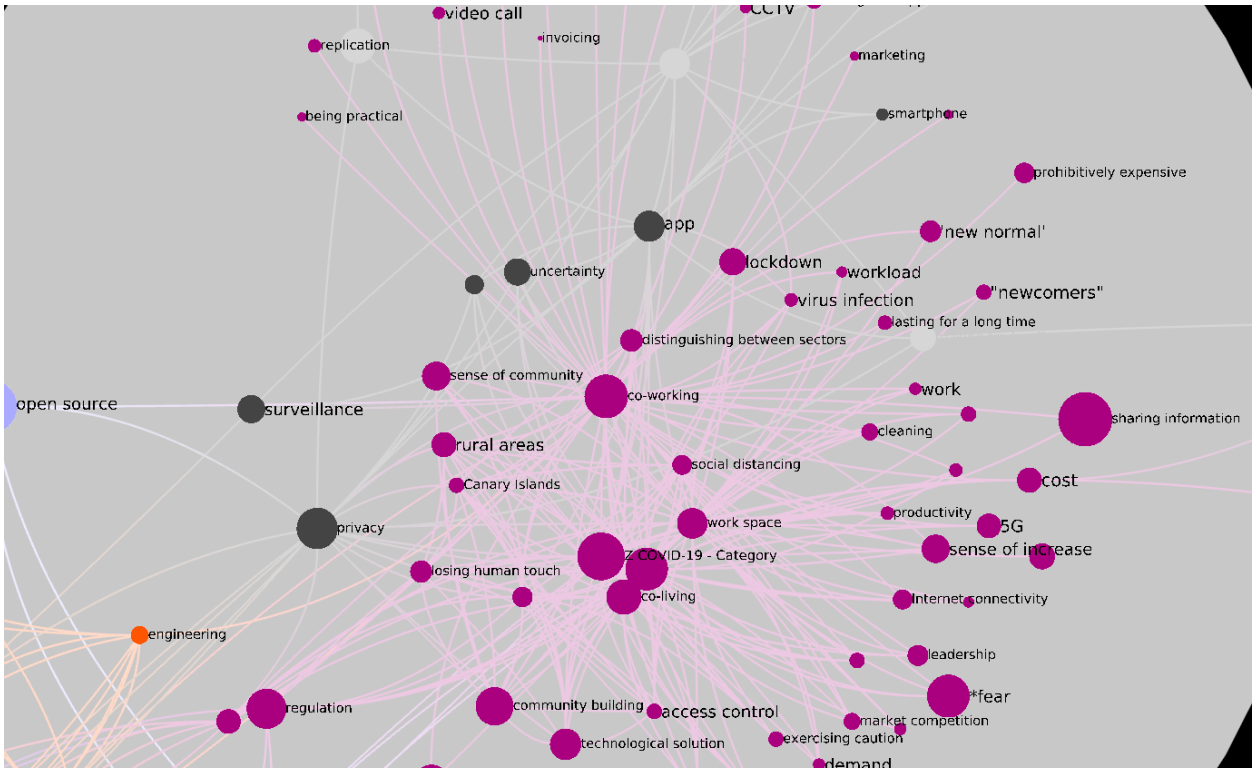

Figure 5: Ego network of "co-working" at association depth >= 25.

We can see shifts in traditional working arrangements visualised in the network: `working remotely`, (immediately to the southeast of `COVID-19`), `technological solution` and `shift to online` (not visible in figure 5, as it emerges at lower levels of association depth), accelerated by `covid-19`. We can also see participant needs and desires visualised: `sense of community`, `work space`, `community building`, and `social interaction` and `shared values` (the latter two not visible in figure 5, as they emerge at lower levels of association depth). `Co-working` emerges at the nexus of these working shifts and human needs: a way to connect new working modes to solutions for the losses they create (of community and social interaction). Co-working also meets needs that traditional work spaces may have lacked (seen through the codes `building alternatives`, `co-living`, and `shared values`).

Through the forum we heard from several members who founded their own co-working and co-living spaces. Many detailed how these spaces quickly transformed from shared office environments and short-term living facilities into central sites of community formation, collaboration, socioeconomic growth and mobility, as well as networks of solidarity. @jamieorr, who runs Co-Work Tahoe, stressed the community-building and social interaction elements of co-working. He argued that "remote work with human interaction is the way of the future..people tend to be transient, but if they can get those really great human connections in their workplace, then we can actually retain them much longer."

The practice of co-working also creates new forms of social organisation, allowing people who would never traditionally work in the same space to meet. As @ FayeScarlet, president of CoWorking Indonesia, put it:

> People are saying that the world is small. The world is not small. You're just stuck in your bubble. So then you just meet the same people again and again and again. You need to burst that bubble, to enter other people's bubble and other people's bubbles. But then a place like coworking space is the one that can connect you with the relevant bubbles. Because you can, of course, meet other people randomly on Tinder or someone's wedding, but then not necessarily relevant for your personal growth or your business growth. So coworking is accelerating that serendipity.

@jamieorr agreed:

> One of the great things about co-working is that you can facilitate these connections in a way, professionally, that is different from a traditional corporate structure working on a corporate campus. And it's great to see how people become inspired by one another professionally by learning about each others different fields and contracts of work. I think that helps to create this emergent community that focuses on the entire person, not just their work persona.

From a work space perspective, co-working seeks to provide alternatives to the conventional office setting in which work is conducted. It also creates a space for freelancers, 'digital nomads', entrepreneurs and a range of others engaged in the so-called gig economy: forms of work that typically do not begin in a traditional office

environment or give people a 'home' to work in. Before the pandemic, many participants described how co-working facilities provide physical spaces to those who would otherwise work from home and to those who work in disparate and mobile environments. For these people, co-working not only offers physical grounding, but also provides spaces for collaboration, networking, sharing resources and producing new forms of knowledge and modes of empowerment. As founder of C0Living Canary Islands @nachorodriguez found, people's needs extended well beyond access to office space:

> When we started, we didn't know too much about the whole coworking industry. It was more of a concept of a shared office. And we weren't aware that that was happening five years ago already in our hometown. And that's when we first decided to fully focus our coworking space into digital remote workers. And as this evolved, the second problem that we encountered was, that they needed flexible accommodation, which basically wasn't being offered in our home city. And that's how we started our first co-living, almost three years ago.

As many of our members pointed out, co-working is not just about space. Many argued that framing co-working in this way misses its core benefit: a `sense of community`. As @JvdLinden pointed out, "what I see around me is that the notion of coworking as rental of event space or as rental arbitrage is not sustainable". Instead, she contends that co-working should be understood as the "infrastructure of future work". Co-working spaces, both formal and informal, are springing up to meet the technological and social needs of working remotely as workers relocate all around the world. Some have had to move for care responsibilities while others are relocating in search of better quality of life. In the absence of the workplace providing natural space for social interaction, remote workers are seeking a sense of community. As @nachorodriquez explained:

> Above technology, the main reason, at least for us, why customers join our coworking space is because they want a work environment. Work environments is also connected to community, because if you don't have more people, you don't have a work environment, you just have an empty office. But also, to interact, and to generate positive synergies with other coworkers. And I see that this is even going to become more important, particularly because of COVID. I think that more and more communities are going to have to suffer from loneliness, and they are going to need that community aspect. So they're going to

> look for it, and they're going to be part of a community. And I think that flexible and coworking spaces have a lot to say. And for that, they definitely should be a priority to, not just provide a service, but also care a lot about the community.

The ego network of co-working, pictured below, gives insight into the issues surrounding co-working and the service it provides to participants. Co-working facilities often provide *work access* in areas where freelance, remote, and independent work traditionally does not take place. Since the COVID-19 pandemic, there has been a growing demand for co-working spaces, including in rural areas with poor Internet connectivity. Participants framed co-working spaces as providing freelancers and the self-employed agency and ownership over the places they work in and the means through which work is conducted by providing more flexible and equal access to a safe workspace.

For those operating formalised co-working spaces, their managerial practices of providing a safe, clean, and socially distant working environment posed a difficulty. On one hand, they wanted their services to last for a long time and see a real opportunity for market growth. However, with uncertain future lockdowns and social distancing guidelines in some countries, it was difficult for them to assess whether and how much to invest in operating or expanding facilities (making investment). At the time of writing, it appears that both the private and public sectors have responded to the demand for communal workspaces, but as the pandemic continues, operators are anticipating different business models for different sectors (distinguishing between sectors). Co-working spaces can provide a middle ground between working from home and going to a traditional office, as @RoRemote articulated:

> Since the (horror) experience of confinement here in Spain, I find I have to leave the apartment to concentrate fully and be focused. I need my coworking space to provide me with that support. So grateful for it!

To many, co-working offered a great sense of freedom, allowing people to adapt work to their time and space preferences rather than vice versa. Building alternatives to current work time structures, using apps and other digital access tools means

co-working spaces offer room for a range of work styles and habits. Their often very mixed design including open-plan office spaces, communal areas, meeting rooms and individual offices accommodate different temporalities of work. @saltwater, who runs a co-working space in Croatia, experienced “a steady trickle of new business, as a result of people wanting to escape the confines of more congested cities (mostly Europe) and have the Mediterranean lifestyle - work and vacation blend.”

Some operators turned to `technological solutions` like `apps` such as `Jellyswitch` to monitor their facilities and regulate members’ `access control`. The use of apps raised questions about `privacy`, but operators seemed to find access control apps to be the most practical option available for widening access to co-working space. @CormacMcCann stressed the importance of technology to successful co-working:

> technology is critical- from the tools to enable coworking to take place with people working for a variety of employers or for themselves through to the security, booking, location management of people using the co working spaces. For COVID19 control we need to be able to have accurate records of who is using co-working spaces to enable tracking and tracing of the virus to be carried out… Security for example is still an area that will require further work- challenges such as Data Security, security of the premises and property within it, personal security for those using such facilities (Cyber and personal). Much of my current focus is trying to establish if there is any successful examples of where this community based co-working model has worked and how can that be transcribed to what is happening in my Municipality.

Good technology access and data security was central to @jamieorr’s co-working space as well:

> We have very robust firewalls and protective systems in place, and the ability to set up individual networks if people need them. We have the most robust broadband and wifi signal you can get in town, which when you get snowstorms that can drop 10 feet of snow on you, is pretty important.

We often imagine co-working to be a purely office-based work phenomenon, but participants showed how co-working applies to other sectors, such as care work, nursing and trade professions. As @JvdLinden described:

> It is my own basic belief that coworking is best framed as the infrastructure of the future of work. I also think that COVID-19 has not so much changed the world as revealed to us things that always were there already and required us to deal with them. It has been a pulling back of the veil in that way…
>
> In one of our locations we specialize in the trades: electricians, plumbers, roofers, painters, floor guys, the whole ball o wax. It is a warehouse space. They don't need desks and it only has like two and one meeting table for meeting with suppliers et cetera. What it does have is lockers – did you know that many people in the trades keep tens of thousands of euros worth of specialized equipment in their vans parked on the street? I did not. Eek. It has forklifts and it has a space for prefabrication. In short it has what they need, which is not a designer space featuring baristas with short skirts. 🙂 Somebody needs to come to terms with how the world is changing for coworking to reach its full potential but I am not at all sure it is the coworkers. I think it's us.

Some participants argued that creating physical co-working spaces for freelancers was even more important for local communities, as these spaces spawned other forms of socioeconomic growth and resilience. @JvdLinden explained how her space helped those in the Netherlands cope with dramatic shifts to their working structure:

> In my town of 50,000 people was located a company which employed home nurses and sent them out all over the region. In one go they changed them all to freelancers, women (mostly women) who had never been nor had they ever wanted to be entrepreneurs. I call these the accidental entrepreneurs. People who either are switched from employment to freelance or find themselves with no alternative but to freelance. This happens to women a lot and has for generations: My grandmother was an accidental entrepreneur, my mother was one, and I was one.
>
> So as a coworking space we mobilized a six week crash course in basic entrepreneurship: we got a guy from the Tax authority to come tell them how to do their taxes and keep records, we got a lawyer to come tell them that their rights were and to look at their contracts, we brought in several coworkers who were intentional entrepreneurs to come talk to them about the good side of freelancing. We had a guy come talk to them about pensions and about disability insurance. That kind of stuff.

Our participants therefore understood co-working as building community and changing the broader socioeconomic system of work itself as much as building a place to work. For example, participants argued that co-working can make economies more

sustainable by providing revenue that can counterbalance the tourism industry, relying more on local actors. Co-working spaces were also seen as invigorating local businesses, including retail and the service/gastronomy industry emerging around physical co-working space. Co-working spaces can also put pressure on local governments to improve their Internet infrastructures, broadly beneficial to local communities.

Participants argued that they can also act as support networks for entrepreneurs (particularly female entrepreneurs), small business owners and start-ups, allowing them to build income security, and help distribute resources and opportunities in a more equitable way. @FayeScarlet uses co-working spaces to incubate young startups and provide space for "partnership and collaboration". She argued for co-working's ability to bring people together and activate developing economies: "I think the key is the power of community, and that's why we feel we can activate certain things to make them more equal. I also truly believe in the local heroes strategy."

Following the connections from COVID-19 shows the negative and positive disruptions to participants' organisation of their working lives. On one hand, participants felt profound feelings of loss: the connections stemming from shift to online are public space, social engagement, mental health, and sense of loss. For most people, being unable to access public spaces on their own terms severely restricted their social interaction. The loss of companionship and sense of community contributed to erosion in mental health. This was especially present for students in universities as their social and intellectual lives had to shift to online.

Yet this sense of loss also generated new opportunities as social distancing measures propelled participants to think and act more creatively (imagining the future and imagining alternatives). As aforementioned, another strong connection emerged between sharing work space and a sense of community. Co-working did not just involve going to a commercial co-working space, but for some meant co-living as well:

finding new (cost-effective and sustainable) ways to engage in `community building` by `sharing resources` and `organising space` differently. As @xaver put it:

> Follow your heart and learn while you go. This is a good way to grow community and build trust and engagement. I found this in some of the projects I am involved in: Community is formed by the members by their desires, behavior and actions. There is no big plan needed but some basic ingredients like space, shared values, openness and respect. Since cohousing and coliving rely on a healthy community this is the way to go: provide space and invite people to join who are willing to contribute to a fun, open, connected experience. And: let it grow.

Figure 6: ego network of community building *at association depth >= 10-*

As we can see from the codes connecting to `community building`, sharing `work space` helped build community, but also meant having to share resources as well as negotiating `shared values`. Sharing workspaces with `social distancing` measures incentivized many to `set boundaries`. This code emerged from participants discussing

how the burden of maintaining clean space often falls on those with higher standards of cleaning.

We recommend further study on how co-working offers stability and social protection to workers who do not have the kind of security (stable income, insurance, pensions) provided to many in traditional employer-employee relationships. This should be studied in relation to how the growing development of co-working spaces in Europe contributes to gentrification – which can further marginalise, rather than empower, local communities.

In that vein, participants asked: **what role does co-working play in larger-scale infrastructural, sociodemographic, and economic changes outside of the co-working space? What do these visions of future flexible work mean for other sectors such as temporary, migrant, and low-wage work?**

Key questions emerging from this analysis include: **what are the challenges and responsibilities of institutions, companies, and organisations to facilitate new forms of co-working and co-living that are more sustainable and equitable? What is the responsibility of governments – rather than third party actors – to safeguard freelance and gig-economy sectors from forms of exploitation and precarity?**

In one thread, a co-working space operator talked about the challenges of organising `community-building` events when everyone is experiencing `'Zoom fatigue'`. How do you bring people together when the one way to connect people is tiring them out? We now turn to remote work, another key mode of work that emerged on the NGI XChange forum.

3.2 Remote Work: Balancing Flexibility with Human Interaction

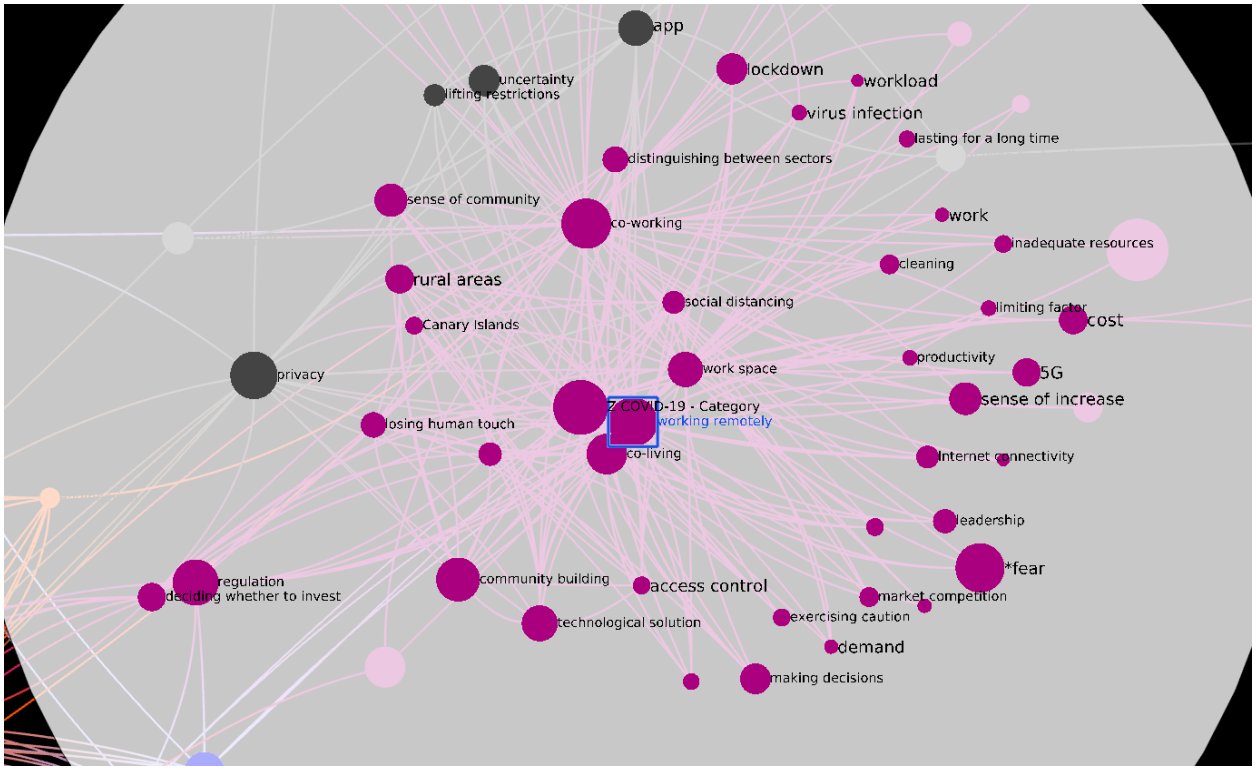

Figure 7: Ego network of code "working remotely".

The onset of the pandemic led many to re-evaluate their `business models`, with some shifting their attention to [creating online co-working platforms] and investing in digital tools that would make access to resources, work spaces and modes of collaboration easier and more flexible – no matter the physical location. The topic of remote work – which we coded as `working remotely` – dovetails into discussions around co-working, describing several working conditions/modes of working which have gained renewed emphasis during the pandemic.

The ego network of `working remotely` indicates the same tension between losses and gains as articulated in the previous section, also showing a key finding from the future of work analysis: people see the future of the Internet and the future of offline space as intertwined. Internet technologies facilitate new forms of labour less tied to traditional workspaces, shifting many online, but are necessary to build new offline spaces and communities, which participants saw as necessary to their health and

well-being. Internet connectivity mediates the connection between working remotely and community building, requiring us to ask questions about what the Internet does to communities' spatial organisations, how we build and break communities with networked technologies – and how we imagine other online-offline configurations of life and work together, through our everyday practices.

Since the COVID-19 pandemic's start in spring of 2020, those who could work remotely largely moved their offices into their homes (or similar safe working spaces). Some businesses saw benefits to this: allowing people to work from home can shift agency and control to individual employees by enabling them to more flexibly plan their workday and manage their availability. This is particularly important for those with young children. The pandemic led businesses and employees to re-evaluate what people must go into work for, what can be handled online and what needs in-person attention.

Many businesses are now considering opting out of traditional office lease models in favour of more purpose-oriented, short-term venue rentals. This means the future of many working conditions may involve a mixture of remote, digitally-mediated work and in-person meetings that can be arranged through flexible space solutions. This balance between increased individualised, remote work and personal interaction seems to be key: a transition to remote-work only is not a viable nor sustainable solution if we want to continue to ensure collaboration – which so much of freelance work relies on (not to mention the mental health ramifications of feeling disconnected from co-workers and colleagues). "Remote Work with human interaction is the way of the future", said @jamieorr, continuing:

> This pandemic has really accelerated the timeline on remote work, as many, many companies have had to quickly adopt work-from-home policies and stick with them for a pretty significant part of their workforce. The thing that I worry about the most is with all of the technological advances, is that if you lose the human interaction that we're so used to both personally and professionally then the remote work experiment will fail.

For many participants, remote work led to acute experiences of `social isolation`. The challenge is to foster human interaction while creating new ways to support people working from home. As Jamie made clear, the pandemic suddenly accelerated new, unanticipated forms of work, with negative effects that need addressing. Remote work, Jamie reminds us, is at its best a form of digitally-mediated human interaction, whereby advances in digital technology allow us to work flexibly while still staying connected to our colleagues, contacts and socio-professional worlds that make work meaningful. Loss of that human connection leads to a decrease in well-being.

Attention to difference is a key part of ensuring new work configurations benefit the well-being of all. Different people prefer different working models. Some need a work/life delineation to stay well, like @lornaILacey:

> I find simple daily rituals such as, taking a walk before I start work and working out once I'm finished for the day, helps me make that mental shift between the personal and professional areas of my life.

@matthias expressed the opposite need:

> I noticed that most contributors in this topic seem to advise for setting clear boundaries between work and non-work, between professional and private life, even including the choice of location. That is surprising, as I have the opposite in my own remote work philosophy, and am quite sure I'll not change that aspect. It's called "full work-life integration" in my mind, and really means that: I have no concept of "after hours" or "weekend" since I started self-employment in 2008, but I do have concepts of freedoms and flexibility that I use to mix work and non-work in my days. I usually mix in too much work, but to me that's a separate issue from "is it advisable to mix".

"Freedom" is a crucial part of why he feels this way:

> I want the freedom to switch between on-the-job activities and other activities at a moment's notice, and use that a lot. For mental wellbeing, I *need* the space to think, to follow ideas and inspirations during the day, to take two hours off and research about a new cool invention that popped up in my mind. The idea that an employer would force me into an office building and then force me to deal with on-the-job things for eight hours straight is horror to me, and a reason why I never took up such a job and instead became self-employed.

@rebecca articulated a need for flexible work, also connecting her well-being when working remotely to easily accessible, aesthetically pleasing physical space:

> I tend to work best when I can work flexibly - taking a couple of hours off mid-afternoon when I'm less productive, for example - so in many respects the work pattern I've been forced to adopt since the end of March has played to my preferences...Now I largely work from home, I find it easier to take breaks from work in some respects - I can go for a midday run with my neighbour, or do half an hour of weeding in my garden - but work still seeps into my evenings and weekends more than it probably should. But then, it did this pre-Covid, too. The fact that I live in a village, in rural North Wales, is good for getting me away from my desk - I have lots of beautiful places to walk and run. A definite antidote to screen time!

Many of the founders of co-working spaces on the NGI platform were thinking about how their locations can accommodate these kinds of shifts and differences as they imagined the future of remote working. Flexibility to accommodate different styles, rather than forcing either remote work or at-office work, seemed to be the key.

@matthias' post on work-life balance vs work-life integration proposed an interesting way of thinking about `privacy`, another code connected to co-working, and the dissolution of spatial boundaries — aligned with social science research on the disappearance of work-life separation, mediated by the dissolution of public-private boundaries enabled by the Internet, even pre-covid. Neither @matthias nor we take these changes as negative. @matthias saw it as enabling him to live his life in a more integrated way that matches his own personal rhythm. The way this interfaces with living and working with others, moving between `autonomy` and `shared space`, `sense of community` shows the importance of having control and agency over what we define as public or private, something that traditional models of work do not always accommodate – but that also require effort to maintain in more flexible working arrangements.

These codes on work connect in the SSNA to the codes `imagining the future` and `building alternatives`. In short, building the Next Generation Internet requires

considering *both* the online world and also how Internet technologies reshape public space and sociality.

3.3 Dystopian and Utopian Work Futures

When talking about the future of work in a digital age, many participants framed it in utopian and dystopian terms. Hope and fear are useful analytical tools: they tell us both what participants are attempting to build in their futures and what they are strongly hoping to avoid. The co-working movement was for some participants an aspirational utopian vision of future working conditions: more flexibility, more ownership, greater and more equitable access, increased collaboration, and networks of collective action.

But some participants imagined ways remote work could go horribly wrong, particularly if work governance continues to be weak. They cited a growing divide between those who are technology literate and those who are not, and those who do and do not have access to networked technology. They also expressed concern that a failure to properly regulate networked technologies and the industries that develop them will lead to further exploitative business practices and embolden Big Tech to exploit more workers. We address these concerns further in section 3 on Regulation and Big Tech.

Visions of dystopian futures often manifest as a fear over fully autonomous artificial technologies intervening with and obstructing our current working conditions in a way that fundamentally destabilises access to work. One community member mused:

> While fully autonomous forms of artificial intelligence still lie some distance in our future, there are some forms of labour within tech that should make us very concerned about *the present*. This is not so much because machines are doing our jobs, but because we are often doing the work that is purportedly done by machines.

`Content moderation` as an area of work generated lots of discussion on the platform. Members framed content moderation as one of the most precarious forms of tech

labour, largely because content moderation is a notoriously underpaid and under-regulated sector. participants explained how it seems a great gig for those like students and stay-at-home parents needing access to flexibly timed income sources. The work however requires exposure to traumatic content, is largely invisiblised by companies using it, and helps companies develop highly profitable (and highly flawed) AI and algorithmic models. We discuss these models and their ethics further in section 5 on AI and algorithmic inequality.

`Content moderation` demonstrates the complex and precarious ways in which human labour intersects with the development of digital technologies in often dangerous and exploitative ways. As we consider the future of the Internet, it is important that we address and challenge the ways in which current forms of labour are valued and safeguarded. This is the responsibility of employers, companies, and institutions more broadly. Work governance is at the heart of this challenge, as digital policy must regulate the labour exploitation of Big Tech companies whose financial incentives so often stand in opposition to human well-being.

We conclude this section with a discussion of the 4 key changes to work highlighted by participants on the NGI XChange forum: work time, work space, work access, and work governance.

Global lockdowns and constraints on mobility have brought the *spaces* we work into the centre of community discussions. With many moving their work from shared offices, schools and universities to at-home remote work, participants find themselves confronted with the physical and social demands of everyday labour. While in the past many felt able to spatially separate the private, professional, and social dimensions of their lives, many detailed the ways in which their work and private lives were spatially and socially compressed, and the challenges they felt of having to "re-design in a daily changing reality" .

Some participants found themselves overwhelmed with an excess of human interaction and loss of private space, forced to share space with family members or roommates. Participants found this meant physically reorganising and repurposing the spaces they lived and worked in and finding new ways to negotiate professional schedules with childcare: something, it is important to note, many (especially women-identifying) participants were doing pre-pandemic.

For many, the shift to online, remote work led to acute experiences of social isolation as familiar and taken-for granted interpersonal contact diminished. After all, "work environments aren't just people in a space together, they are about interacting and generating positive synergies with coworkers". As more companies adapted to remote work, a key challenge was and is maintaining a sense of community and conviviality.

During the pandemic the notion of *time* became an important conceptual frame: how long will these shifts to alternative ways of working last? How long will businesses and livelihoods be affected by these constraints? When will a sense of normalcy return? How long will we have to wait for solutions to materialise? As participants tried to answer these questions, codes like `imagining alternatives` and `imagining the future` shifted to a central position in the SSNA. On a day-to-day level participants proposed reorganising the time dedicated to work, family, friends, and leisure activities, or, finding ways to separate "the class objects for 'work' and 'non-work". Some advocated for a stronger sense of boundary or work-life separation, whereas others proposed "work-life integration": finding a balance, keeping healthy and figuring out how to "switch off, practically". Either way, the ability to have control over one's *time* was central to the experience of well-being at work.

Closely connected to considerations of work space and work time was work *access*. participants' physical mobility was increasingly limited by the pandemic. This meant less need for commuting to work or university or traveling to different countries for work (for some a positive, and some a negative). It also meant more need for access to

resources enabling remote work. As many forms of labour moved to online spaces, participants asked how to ensure socioeconomic as well as physical mobility. One of the main obstacles to online work was `resource access`. `Working remotely` requires reliable access to resources like good Internet connection, a quiet consistent workspace, technology literacy, and a manager and sector that allows for this kind of work. Sectors unable or unwilling to move online put workers at increased risk of infection and bodily harm, and ability to access work outside of those sectors is limited for some. Participants argued that inequities will continue to emerge from such differences in access if they remain unchecked and described how this might significantly impact disparities in socioeconomic mobility in the long-term.

This brings us to the responsibilities of employers, companies, and institutions more broadly. *Work governance* involves top-level decision-making processes and the ways in which labour is regulated and governed. Underlying many on-platform conversations was the question of **how work is currently regulated and how these models should change in the future**. The tension within this debate lies in building alternative labour models while negotiating the often exploitative business practices, financial incentives and power imbalances which saturate many of our existing labour sectors. Participants feared that Big Tech would maintain its monopoly and thereby thwart future efforts to better regulate, fund and diversify the governance of networked technologies. As @katjab pointed out:

> It's not just their sizeable chests that leaves Big Tech so well positioned in this current crisis. Because credit where credit is due: the privileged new class of remote workers can only be sustained because we have access to solid, well-functioning digital tools courtesy of the data barons of the new Gilded Age.

As @katjab's point makes clear, conversations during the pandemic brought into stark focus how existing inequities are not only exacerbated by crises, but also how they are exploited by powerful actors who create the technology that remote work cannot function without.

Conversely, when the NGI community imagined the utopian near future of work, they imagined changes to the current status quo. This means rethinking and re-structuring the ways in which we work, in terms of time, space, access, and governance. It means re-designing the infrastructures which underpin where and when we work, how we regulate work and how we value work. As NGI Xchange participants demonstrated, if we want to build alternatives to the present work environment, we need both digital policy and investment in networked technologies that facilitate community building, not social remoteness.

On the dystopian front, one overarching question emerging from the forum is the following: **how might the current rush to build and deploy new networked technologies exacerbate existing inequities, how are they exploited by powerful actors, and how can policymakers and participants intervene?** We turn to questions of data, privacy, and control in the next section.

4. Topic 2: Data, Privacy, and Control

Key codes: personal data, privacy, surveillance, regulation, (dis)trust, 'Big Tech', human rights, trade-off, open source, user control, contact tracing, GDPR

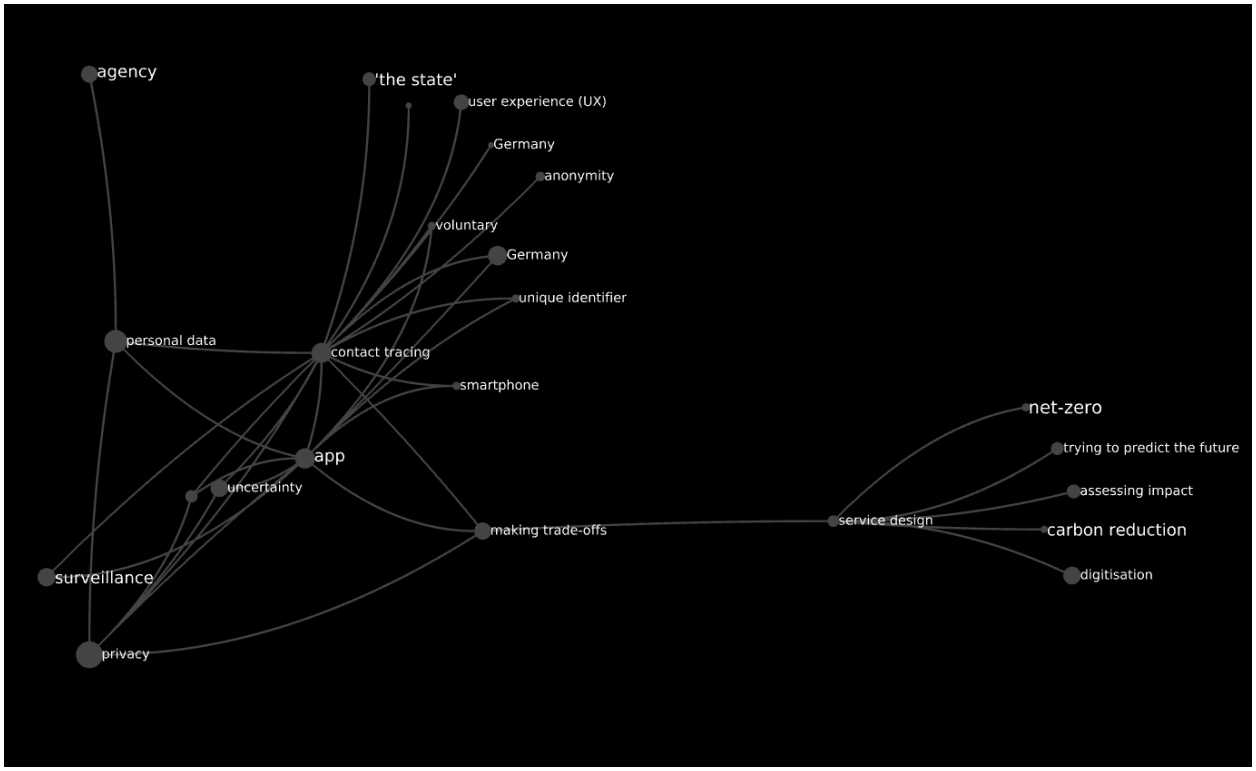

Figure 8. The "data, privacy and control" community of codes as identified by a community detection algorithm in the reduced CCN of Figure 3.

NGI XChange participants imagined a future where open source, inclusive and transparent networked technologies more equally distribute power and agency over personal data, data & networked technology access, data monetisation, and choices about technology deployment across individuals and groups. However, as members continuously highlighted, these values often clash with existing exploitative proprietary business models, surveillance technologies, opaque and inflexible policies, confusing and untrustworthy systems, and states serving corporate interests at odds with constituent well-being. In short, current monetisation models, if not the technology

itself, seem to promote non-inclusivity and opacity, since proprietary corporate control of data generates significant revenue.

In this section, we analyse key debates around data, privacy, and control.

4.1 Privacy Trade-Offs and Individual Decision-Making

When we examine the NGI conversation at k=4 , we see broad themes emerging around data privacy and control. Central codes include codes like `personal data`, connected to codes like `business model` and `advertising`. From this `personal data` code, we get an idea of issues participants wrestled with.

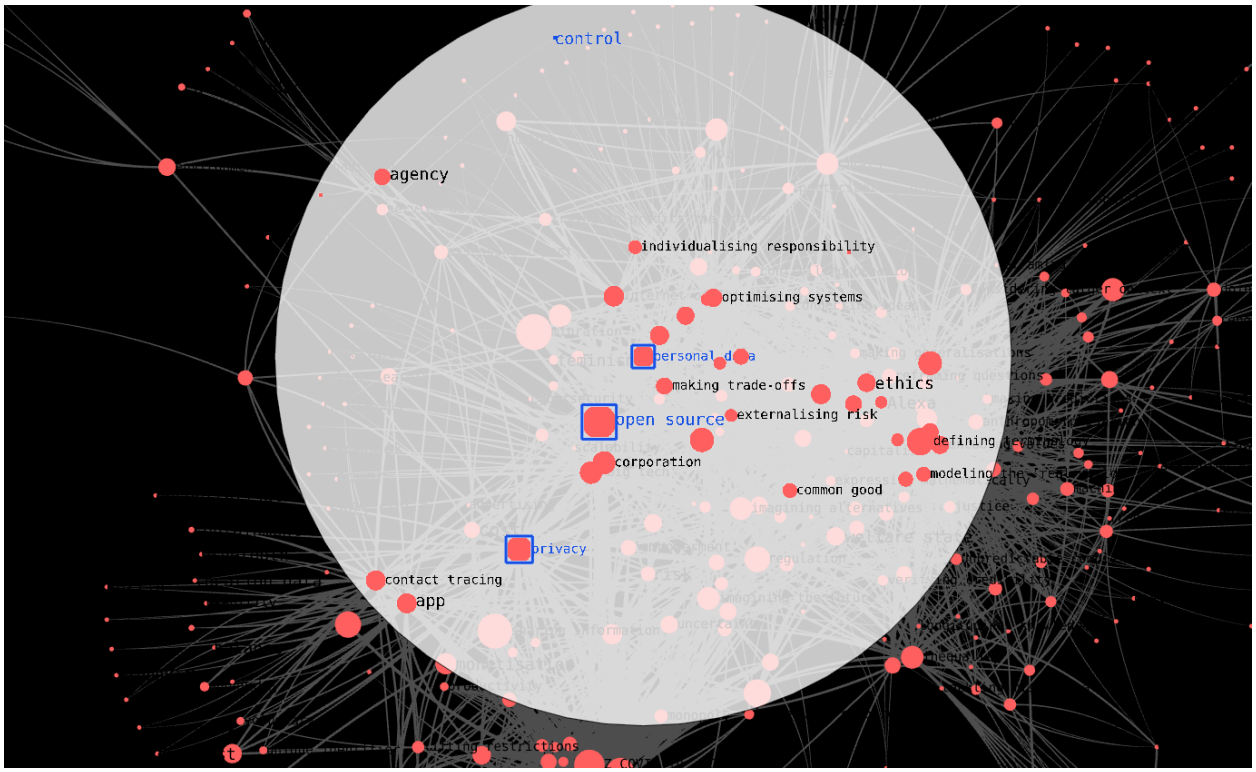

Figure 9: Co-occurrence network at association depth >= 10, highlighting the codes "personal data", "control", "open source" and "privacy"

If we follow the `personal data` code to `advertising` and `business model` to the left and `trade-off` to the right, we can see interesting debates emerge.

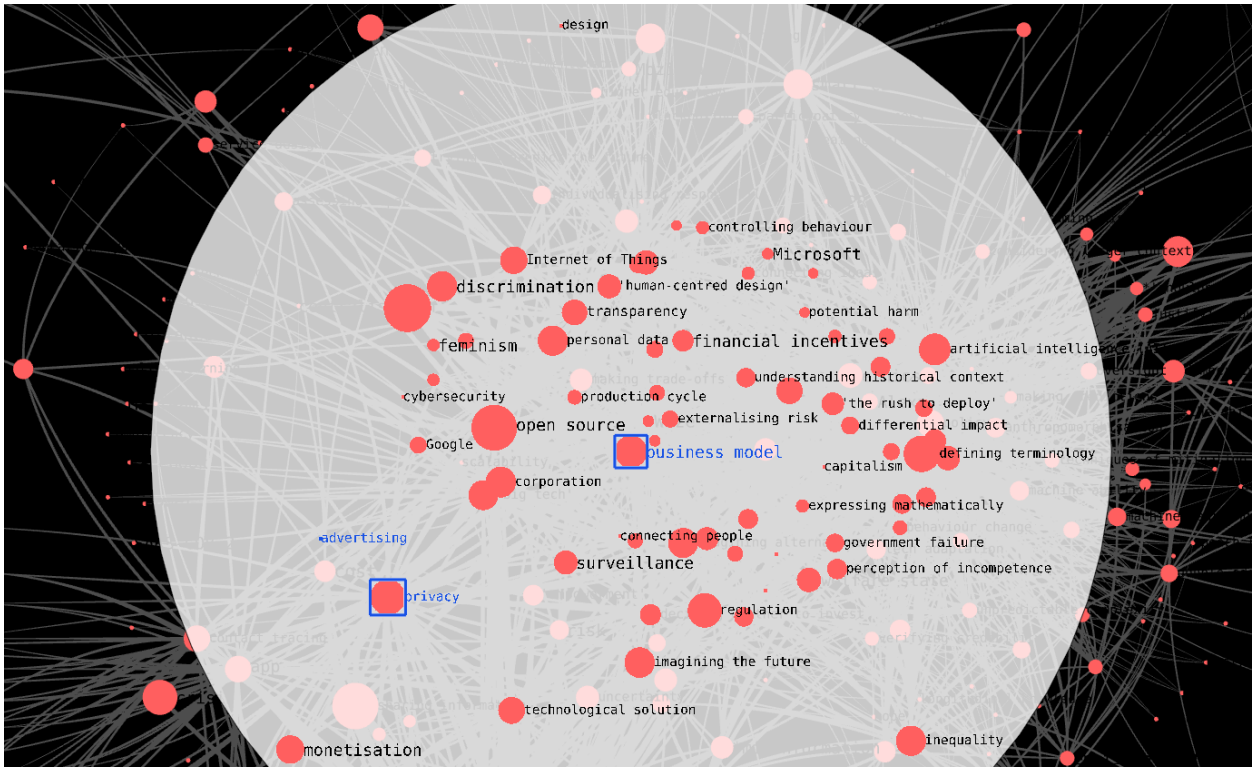

Figure 10. Ego network of "business model" at association depth >= 10.

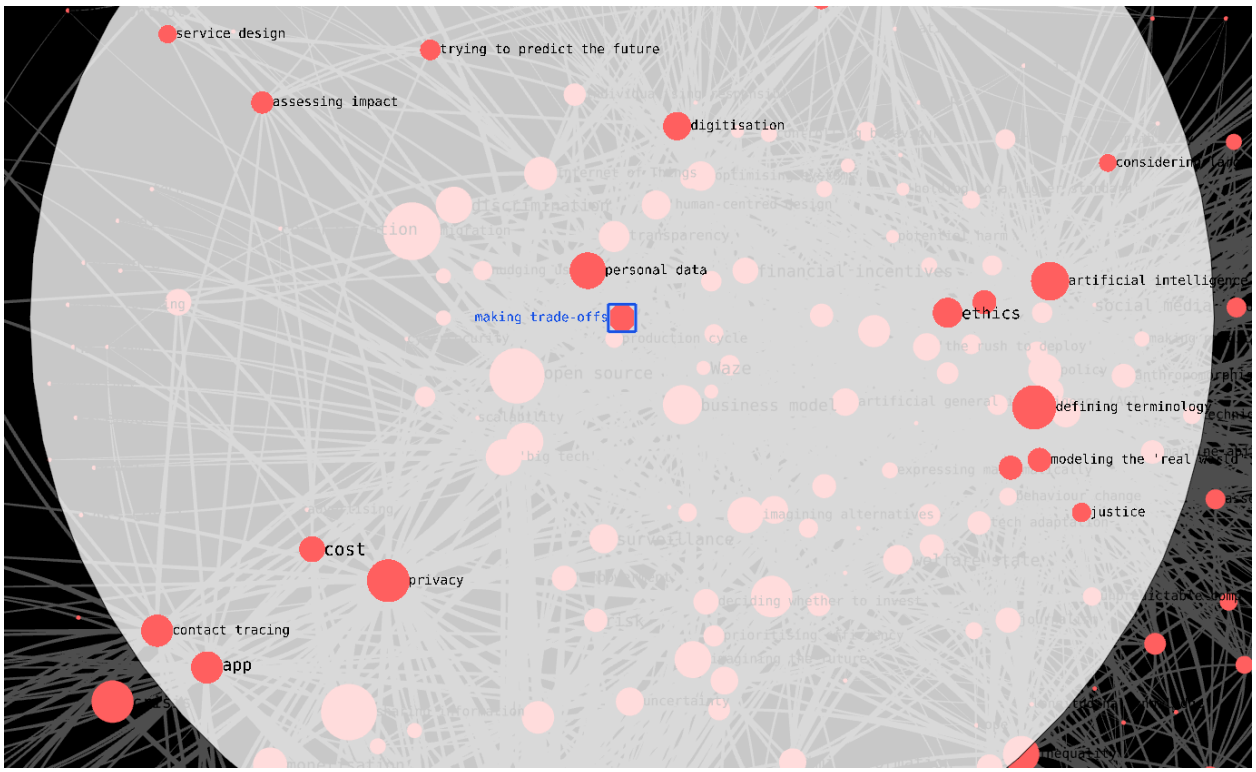

Figure 11. Ego network of "making trade offs" at association depth >= 10.

It is clear even at this zoomed-out level that the use of `personal data` sets up a `trade-off` for a lot of participants. In `decision-making` about sharing or protecting `personal data`, participants are `considering larger context` around its use and `assessing the impact` of the trade-off. `cost` is also a key consideration. `Personal data` also connects strongly, if we move south in the SSNA image above, to `agency`, in a highly illustrative cluster with `control` and `user experience`.

We see, again, participants encountering `trade-offs` – between `user control` and `user experience`, raising questions about what one gets when one gives up `personal data`, and how much control is possible. As @soenke, citing a paper by Noam Kolt at the Schwartz Reisman Institute for Technology and Society at the University of Toronto, pointed out:

> consumers routinely supply personal data to technology companies in exchange for services. Yet, the relationship between the utility (U) consumers gain and the data (D) they supply — "return on data" (ROD) — remains largely unexplored (see

> also Kolt 2019). Expressed as a ratio, ROD = U / D. While lawmakers strongly advocate protecting consumer privacy, they tend to overlook ROD. Are the benefits of the services enjoyed by consumers, such as social networking and predictive search, commensurate with the value of the data extracted from them? How can consumers compare competing data-for-services deals?

Participants also raised questions about the effort and cost of controlling personal data in the current environment, when responsibility is highly individualised (individualising responsibility is a salient code at a lower level of co-occurrences).

Trade-off also strongly connects with privacy, an extremely central code in the conversation (figure 11). Privacy connects back to personal data, and we see an illustrative network of privacy concerns articulated by NGI Xchange forum participants: around smart cities and human rights, covid-19 and contact tracing, and trade-off and decision-making. A salient theme was the question of how to weigh up privacy trade-offs to make optimal decisions about one's own data privacy, asking what it costs. There was uncertainty around how extensive surveillance is, and a distrust of the information that one is given about these technologies, which makes making informed decisions about these issues difficult for participants. We saw this in discussions around Covid-19 contact tracing apps, where @schmudde noted, "we can see the cognitive dissonance between those who do not trust the app but feel comfortable sharing deeply personal information on social media networks. I'm sure there are even those who do not trust this app but have volunteered their genetic information to 23andme".

Privacy as a code connects two concepts often considered separately — privacy on the Internet and privacy in real life. We instead found that people actively configure notions of privacy both online and offline in a way that relates to private and public space. Privacy and autonomy also connect to building communities, both offline and online, suggesting that people themselves consider privacy holistically. And, as

@JollyOrc argued, participants felt that these were decisions they should be able to make themselves:

> A lot of the data that I generate is not only highly useful for the surveillance capitalism, but also to me personally. My digital assistants get a lot smarter, I can examine my habits and thus have a better life. The important part though is that all this needs to be **my** data, not Googles or Facebooks data.
>
> Companies will always have a legitimate interest in using personal data to serve us better or more interesting products. But that doesn't meant that they should keep that data, or use it without our explicit and actually informed consent. That means that the systems need to become a lot more human-friendly, and the infrastructure should support oversight and watchdog organisations right from the ground up.

Participants reckoned with the present's increasingly unequal, non-transparent and under-regulated networked technology landscape**.** They identified the resulting trade-offs they must make as they pursued higher ethical standards, greater oversight, accountability, and transparency. Their key question was thus **how to imagine a more hopeful near future for networked technologies against the oft-dystopian ways in which they are developed, funded, and governed in the present**. Regulation was a central concern in this space, as reflected by @JollyOrc's asking for "oversight and watchdog organisations." As @schmudde asked:

> while there is a perception that the private sector can be modified by the public sector through law and regulation, once something is in the government's hands, where is the oversight?

Participants maintained that governments are not held responsible for regulating Big Tech companies and ensuring user safety. Instead, the burden to stay safe more often falls on individuals, who often feel confused and uncertain about the tools and systems available to seek this safety on an individual level.

This sense of uncertainty and distrust in current models emerges clearly from the data. Participants felt sceptical of surveillance technologies that captured their personal data but did not always know how to easily take back control. They cited constant trade-offs between user control and agency over their personal data with the

ease of `user experience`, as protecting data on an individual level is often a tedious and laborious process (which we see, for example, in current debates on GDPR checks). Often participants must choose between accessing necessary and/or desirable resources or maintaining control over their personal data but feel they cannot easily have both `access` and `privacy`.

They collectively raised the question: should **individuals have to constantly make decisions about their own data privacy? Can we imagine alternative models for ensuring data security without diminishing user experience?** This tension between `user control` and `user experience` continued in community discussions of `advertising` and `social media` platforms, which we discuss further in section 3. **How do we ensure privacy? Which rights are being threatened by the non-transparent and often exploitative practices of Big Tech companies?** We give examples of these concerns, and how they came to be so prominent in the SSNA, in the next section.

4.2 Crisis, Surveillance and Reactive Solutionism

The Covid-19 pandemic became a useful anchor for these conversations on data privacy, tradeoffs, and user control. In April 2020, as the first wave of the Covid-19 pandemic swept through Europe, the NGI XChange forum hosted a virtual conference on surveillance technologies and the pandemic. We talked to experts in the European legal community, medical and public healthcare, digital technology, privacy and human rights, public policy, and media sectors to discuss the ways in which networked technologies were being developed and used to combat the pandemic. As @alberto asked:

> people worry, but no one is sure what an appropriate diagnosis and response to the situation would be. Is the situation 'problematic' or 'dystopian'? Can we do anything about it, besides worrying?

Participants identified such a worry: the possibly dangerous, untested effects of using networked technologies to combat the pandemic. Participants warned against snap

decisions reflective of a *reactive solutionism* more focused on quickly fixing problems as they occur than considering their broader implications and long-term effects.

Many agreed that the rush to deploy apps like contact tracing apps, immunity passports and similar technologies forced an unnecessary trade-off in which civil liberties were sacrificed to 'fight' the virus. These tensions are visible in the SSNA, as contact tracing connects to personal data, agency, and surveillance. It also connects to making tradeoffs, lifting restrictions, and 'the state', as well as voluntary and anonymity, crystallizing some of the larger problems participants raised around data privacy and control. While contact tracing apps had the potential to help lift restrictions, participants were unsure if those possibilities outweighed the risks of state surveillance, lack of agency, and losing the privacy of their personal data.

Participants warned of three major risks:

1. In the absence of a clear privacy-friendly solution for the development of these technologies, it would be unclear where data would be sourced from (and by whom) and how it would be regulated.
2. There was an unequal distribution of risk as surveillance apps could lead to the disproportionate targeting of vulnerable communities.
3. The push for a technological solution before having clear organisational capacity to ensure the solution even worked in practice, let alone adequately protected people's data, meant that people's privacy would be breached for no concrete gains in fighting the pandemic. This also wasted valuable resources on technology that could have been put to better use on medical supplies and organisational capacity-building.

Participants argued that policy makers tended to overestimate the effectiveness of technology-based surveillance vis-a-vis the pandemic. Participants spoke of pervasive solutionism (in the sense of Evgeny Mozorov – "a little magic dust can fix any problem"). Digital surveillance companies are treating COVID-19 as a business

opportunity. Some of these have dubious track records on the respect of human rights online. In the words of one participant:

> Around a dozen governments are using Palantir software and that the company is in talks with several more. They include agencies in Austria, Canada, Greece and Spain, the US, and the UK.

Also, the public is scared, so willing to accept almost anything. Examples included: drones in Italy being used to check social distancing in public spaces,equipped with facial recognition algorithms, and the car manufacturer Ferrari's plan (called "back on track") to institute mandatory blood testing and a contact tracing act for employees returning to work. Participants asked: are these surveillance technologies going to become a permanent feature in our cities and workplaces? They identified two lines of defense against abuse of surveillance technology:

- Data protection laws, starting with the GDPR. They all state that any data retention should be "necessary and proportionate" to the need it tries to solve. Participants agreed that this is a weak defense, because all such laws provide exceptions for public safety. Also, governments and corporations have a history of ignoring "necessary and proportionate".
- If this fails, civil society can invoke the European Convention on Human Rights. This has its own court, which is not part of the EU, and so it is at arm's length from the EU political space.

Next, participants agreed that contact tracing apps are ineffective against COVID-19, but may help in the next pandemic. Everyone in the call, without exception, agreed that contact tracing apps will not help against COVID-19. The rationale for building one such app, people explained, is to quickly quarantine everyone exposed to the first few cases. Once the virus spreads, confinement is a more appropriate measure. It is difficult to think that even the best app would prevent more contacts than people staying at home.

Further, participants felt these apps were easy to do wrong. Among failure modes, people cited:

- Data governance issues: possible breaches, difficulty to anonymize the data, etc.
- Lock-in effects: for these app to work, they need 50-60% of the population to take them on. It's a "winner-take-it-all" service. There is potential for companies to lock authorities into long term contracts, invoke all kinds of confidentiality to protect their business models, and so on. This situation could prevent better solutions from emerging.
- Loss of confidence: if the authorities roll out an app, and it does not deliver, the public may lose confidence in *any* app. This could happen as new cases rise again after lockdown is loosened, as is happening currently across Asia. This might burn an opportunity to help contain the next pandemic at an early stage.

So, why was everyone (including several people in our call!) building contact tracing apps? Due to the political demand for them. Contact tracing apps were linked to the end of the lockdown, as is visible in the SSNA above (lifting restrictions). Leaders were seen as doing nothing, while leaving people behind locked doors. They were eager to provide solutions. Contact tracing, however, is very tricky to do. Evidence from Singapore showed that contact tracing was not working well to prevent new outbreaks. But alternatives were also hard for governments to imagine. Political leaders were reluctant to tell people "the danger is over, go back to your lives", knowing the approach was sure to backfire in the political arena if the epidemic entered a second wave.

This is where solutionism kicked in: building an app could be presented as "doing something about it". Further, building apps is much faster, cheaper and easier than retooling the healthcare system. Contact tracing apps were therefore seen as a political win, though not an epidemiological one. Several participants pointed out that while it is not a bad idea to build a contact tracing app, it is a bad idea to rush it, because:

1. To be effective, tracing needs near-universal availability of testing, which is currently not there. Without this, contact tracing needs to rely on self-reporting.
2. To be effective, they also need a large, probably unrealistic, uptake (50-60%, where Singapore managed 12%).
3. We will not need one until the next pandemic. Rushing development might lead to the deployment of evil, ineffective or broken solutions. One participant had this to offer:

> I am currently involved with a group building a contact tracing app. But I am uneasy, actually thank you for giving voice to my anxieties. I do not see my colleagues discussing the use cases for this tech. I do not see them asking themselves if their solution is going to be effective. I do not see them discussing failure modes of the technologies. Almost everybody is hiding their head in the sand about the consequences of these solutions, intended or not.

As a result, the consensus in the group pushed against reactive solutionism. Participants instead invested in technology for future crises developed over time, with careful consideration for its implications. As one participant argued:

> To keep it simple, most "obvious" solutions in an emergency turn out to be counter productive. […] You need to do your emergency homework in advance, and trust the experts. So for my contribution, I would argue you send every "develop an emergency app"/"do-something-itis" developer to work on *future pandemic* solutions, rather than give them reign in a crisis.

Participants also pushed back on the idea of immunity passports, agreeing that they can turn into a civil rights nightmare. As one participant said:

> They are going to be basically "passport to civil liberties". There are going to be a lot of perverse incentives around them.

A participant named one such perverse incentive:

> Would that not create a huge incentive for people to go out and get infected, so they can get natural immunity? So nobody would want to do distancing, and we do not flatten the curve.

Over and above such concerns, participants articulated that it was unlikely that immunity certificates would be effective. Issuing certificates means having capacity to do massive-scale testing. The medical professionals in the call also reminded us that we do not know how immunity works with SARS-CoV-2. How long does it last? Does it prevent reinfection, or only make it weaker? It is not even clear what certification would mean.

Privacy concerns were also raised with respect to location data. Participants argued that locational data are impossible to anonymize, and of limited utility. Further, government capacity for data governance is low. Participants agreed that it is not realistic to promise anonymization of location data. A famous 2013 study shows that human mobility traces are highly unique. Four datapoints were enough to de-anonymize 95% of individuals in a large cellphone operator dataset. As one person put it:

> I never trust a policy maker when they say “this data is going to be anonymized”. They do not understand what anonymisation means. And any solution will increase the amount of data in play.

Participants were also sceptical of the usefulness of locational data in fighting the pandemic:

> I do not think that you get any useful information from these apps. They will show that people get infected in places, like supermarkets or hospital, where people HAVE to come into contact with each other.

One participant proposed that these apps could help in assessing the efficacy of containment measures, which does not require granular data, but only pre-aggregated statistics. A 2020 paper in Science argues that it is possible to do this securely. The Electronic Frontier Foundation also released a policy proposal on this solution. Yet many were pessimistic on the ability of EU governments and companies to do advanced, ethical governance of large datasets. Participants argued that the daily data on confirmed cases, hospitalizations and deaths are a mess, lacking standardization, metadata, and with collection criteria that keep changing. One said that Belgium, for example, on some days reports on the same day the sum of two dishomogeneous

quantities: number of people who died in hospital on that day, confirmed positive for SARS-CoV-2, plus number of people who died in the “last few days” in retirement homes, not tested.

Another example given was that the former head of Italy’s pension administration authority deplored the lack of open data on unemployment benefit claims. Participants showed that scholars and policy makers themselves were flying blind, with no reliable data: but some also shared ideas for using apps and data rigorously and responsibly. One said:

> How can we trust people who cannot maintain a Google spreadsheet to steward a massive trove of sensitive locational data? A silver lining in all this is that contact tracing apps were battle-tested ten years ago. This means we have open datasets which can be used to model the impact of public health measures (example). If the goal is modelling, there is no need for more surveillance.

Participants offered several suggestions for solutions, or at least improvements. Medical and public health practitioners insisted on good execution over innovation. The WHO protocols, although devised for flu-type viruses, are well suited to coronaviruses as well. But their deployment was late and sloppy. The medical community sees this emphasis on tech as misdirection. Part of any solution is to do public health well, without cutting corners. One participant from Italy remarked:

> For example, we closed schools and universities, but did not inform students that they should not be hanging out with their friends. We did not tell students from different cities and regions to go back home. The rules are simple: if you are ill, tell your friends, and tell them to get tested. But in Italy it is hard to get tested, so the whole protocol fails. Contact tracing is the last thing we need. It is useless from a public health efficacy point of view, and not proportionate.

Other participants highlighted the positive of labor-intensive “boots on the ground”. A participant from the UK remarked:

> I am worried that people fall off the cracks, because they are not on government databases and we do not see them. Maybe they are disabled, but have a job. They never touch the state, and fund their own care. I am worried about people with learning disabilities, for example. If you are not on social media, you have not seen the messages of your local authority, telling you where to get help.

Several people remarked that the tech community can have the greatest impact by playing a support role. They identified three areas to do this in. One is supporting what doctors are already doing, for example remote diagnosis or e-mail prescriptions. Another is supporting community organizers – another example of "boots on the ground". The third one is the people manning the supply chain.

The tech community might find an important role to play in protecting the most vulnerable individuals from the worst consequences of the pandemic, and of the measures adopted to fight it. This was proposed in the ensuing online discussion. @eireann_leverett posited:

> Dare I say that if tech wants to make a contribution, a great way to do it, would be exploring the causal factors behind why minorities communities are being hit harder or perhaps not receiving the help required during this pandemic.

There was agreement that it might be helpful to lift IPR restrictions. One example was given of Italy, where a SME 3D-printed respirator valves that could not be obtained on the market fast enough to save lives:

> We contacted the producer, a multinational, and asked them for the CAD file. They expressed reluctance and would not reach a decision. There are protocols, safety concerns. These are doubtlessly important. But there were people in need of saving, so we went ahead and reverse engineered it. […] We have not been sued so far.

Several participants suggested that studying history (of epidemics, of technologies, of health and technology policies) could be useful. Solutionism has been with us for a long time (at least since the 1950s, according to a participant). Studying its successes (not many) and failure modes (many more) might help us not make the same mistake twice. Finally, people called for more patient, open deliberation:

> The dialog between the technologically possible and the politically acceptable needs to be had. Immediately it will be done by the elected politicians, that is what they are there for. Then, we should be moving to broader participation. We should be building technology for participation, as much as we should be building technology for tracing.

4.3 Questioning Data Urgency and Finding Non-Technological Solutions

In the community call and the NGI Xchange forum conversation around track and trace apps, many participants argued that while contact tracing apps are ineffective against Covid-19 – such as in the case of the German model (Oltermann 2020) – they may be potential tools to combat future pandemics. While most in the group agreed that tracing apps could, in principle, be enormously effective tools, they agreed that in their current form tracking and tracing apps simply faced too many data governance issues, and, relatedly, could not assuage public mistrust of government-sanctioned technologies. This partially also affects the apps' low levels of uptake across Europe, which make them even less effective. The technology works on paper, but only if infrastructure (production of PPE and reagents), capacity (testing) and public trust are there. And they are not, so it makes sense to start solving the problem from that end rather than from building apps.

These discussions raised two important systemic issues: the first is that European governments do not seem to have created a way to learn from past pandemics and to use this knowledge to address present and future ones. The second is that – though a new global pandemic had been predicted for several decades – governments lacked capacity to prepare for or anticipate crises like the covid-19 pandemic.

One consistent issue raised was that governments act reactively, proposing knee-jerk technological solutions that do not consider long-term effects. Participants in the surveillance pandemic event pointed to both near and long-term implications of using networked technologies to combat the pandemic. They argued that policy makers overestimate the effectiveness of tech-based surveillance tools to counter the spread of

the virus, and that little attention was paid to ramifications of deploying surveillance technologies including and beyond tracking and tracing.

Members on the call cautioned against the "rush to deploy" tracing apps, which had been emerging in weeks past, for the current pandemic, arguing instead to take this opportunity to start building a trove of resources to prepare for future crises: to learn from the immediate past (i.e. the failure of recently developed technologies) to prepare for future scenarios. Importantly, this reserve of resources members envisioned also includes pooling together knowledge from a range of fields: from medical researchers and practitioners, policymakers, local governments, and tech experts. In this way, the community agreed, we could start to better anticipate what we need to do in times of crisis and how technology can intervene: from supporting doctors and community organisers by streamlining remote diagnosis and digital prescriptions, to optimising communication technologies and the dissemination of vital information, to assisting in the production of medical equipment. Crucially, this also means studying the history of pandemics and health technologies and using this knowledge to build better tools to withstand future crises.

Anticipating future crises means determining our values and putting them into policy shaping the development and deployment of networked technologies. This requires determining what we need networked technologies to allow us to do in the near future and designing them accordingly. It also means building up knowledge, people, and organisational resources as much if not more than building new networked technologies.

While the pandemic, as all crises do, necessitated quick response, many members questioned the negative effects of this sense of urgency. They cautioned against quick technological development without careful consideration of its possible ramifications, particularly for data privacy and control.

Underlying these concerns was the question of necessity: why are these kinds of decisions being made? **Why is there a push to develop track and trace technologies, especially if we lack evidence to support their effectiveness?** As @matthias put it,

> there is a split between times of rapid development, and times of consolidating these developments and learning to live with them. The last few years have been about learning to live with the Internet and its consequences, and now we're back in the rapid development mode. We can't choose what comes when, but we can make the best out of both times.

Participants largely concluded that contact tracing was not the answer to fighting the current wave of the pandemic (May-July 2020), but that they may allow us to prepare for the next pandemic or future waves of the current one.

Those who use crisis as a narrative device open certain actions previously foreclosed, requiring us to ask *who* gets to frame something as a crisis. This draws our attention to how powerful actors like governments and corporations manipulate crisis language to further their own agendas and consolidate power. As @erik_lonroth argued, corporations like Amazon are using the language of crisis to persuade governments to give up citizens' personal data. He points out the other negative ramifications of such data-grabs justified by crisis:

> Collecting data from citizens. It is also great for tracking homosexuals. After all, homosexuality is considered a disease in many places. Also, tracking abortions could be possible. Tracking criminals, like environmental activists and writers of political texts. All for the "good cause."

Participants also stressed the importance of coordination and cooperation across governments and communities, which many argued was more pressing than developing new technologies. Participants expressed fear that the pandemic offered governments a pass to rapidly develop and implement surveillance technologies under the guise of public security and virus containment. They largely agreed that we need to maximize access to participation in these efforts (e.g. through slow media approach, collaborative and constructive journalism platforms, information sharing, collaborating with

researchers and experts and contact-sharing, as well as crowdsourcing existing data, tapping into open data sources). Focus, they argued, should be placed on improving existing infrastructures, cooperating across governments and harnessing the potential of local communities.

Expanding their observations from the current situation to wider questions of technology deployment in crisis, they asked: **what potential short- and long-term harms do we unleash when we make snap decisions about deploying technologies in times of crisis? What kind of failsafes do we have in place to counter these potential harms, should they occur?** While some members pointed to the GDPR and the European Convention on Human rights, scepticism prevailed over the EU's ability to safely deploy such technologies – even in exceptional circumstances. There was also concern that surveillance tools were now vulnerable to exploitation by companies that saw the pandemic as a business opportunity. This concern certainly came true over the course of the pandemic – or at least in part: one of the biggest financial profiteers of the covid-19 pandemic were arguably Big Tech companies.

@katjab summarised the problem:

> Where most sectors of the economy have seen demand collapse, many large tech companies are reporting record profits, and have been able to use this momentum to further consolidate market share. With more of us reliant on technology for our daily lives than ever before, we have become more willing to turn a blind eye to the excesses and ethical shortcomings of these companies and their business models. The so-called "end of the techlash" would no doubt be seen as a welcome break after years of negative headlines and mounting public pressure [...] but will it turn out to be a temporary respite for the Internet giants, or are we witnessing a more permanent concentration of power over yet more aspects of our society and economy?

The pandemic not only put our public health and medical institutions under unprecedented strain, but global lockdowns also forced many of us – those of us who have the resources to – to confine most of our work and everyday needs to our homes. This meant that our work and education relied centrally on the capacity of networked

technologies to enable us to pursue our livelihoods. Acquiring everyday necessities, from clothing to groceries also largely shifted online. As we have seen, this has greatly enriched the tech giants who, even before the pandemic, dominated much of the industry. And to many participants, they now because of their necessity enjoy even less ethical scrutiny.

As @katjab puts it, looking toward the future the fear is that Big Tech will not only continue to dominate, but that its dominance may take on new and more all-encompassing forms. The surveillance pandemic brought visions of a looming future dystopia to the fore, where private data, security and identities are in the hands of a small number of tech giants whose motives and business practices remain opaque and under-regulated.

These visions raise urgent questions about how the rapidly increasing monopoly of Big Tech may contravene efforts to build a more human-centric, safe, and transparent future Internet. **What can we learn from this present moment of crisis – which is in many ways being exploited by tech giants – as we continue to pursue a more just future including networked technologies?** What can the present teach us about how to prepare for the future?

Next we turn to the role of big tech and regulation in addressing and exacerbating the concerns raised in this section.

5. Topic 3: Big Tech, Regulation & Business Models

Key codes: business models, advertising, building alternatives, financial incentives, (dis)trust, regulation, monetisation, inequality, transparency, privacy, 'Big Tech', human rights, trade-off, open source.

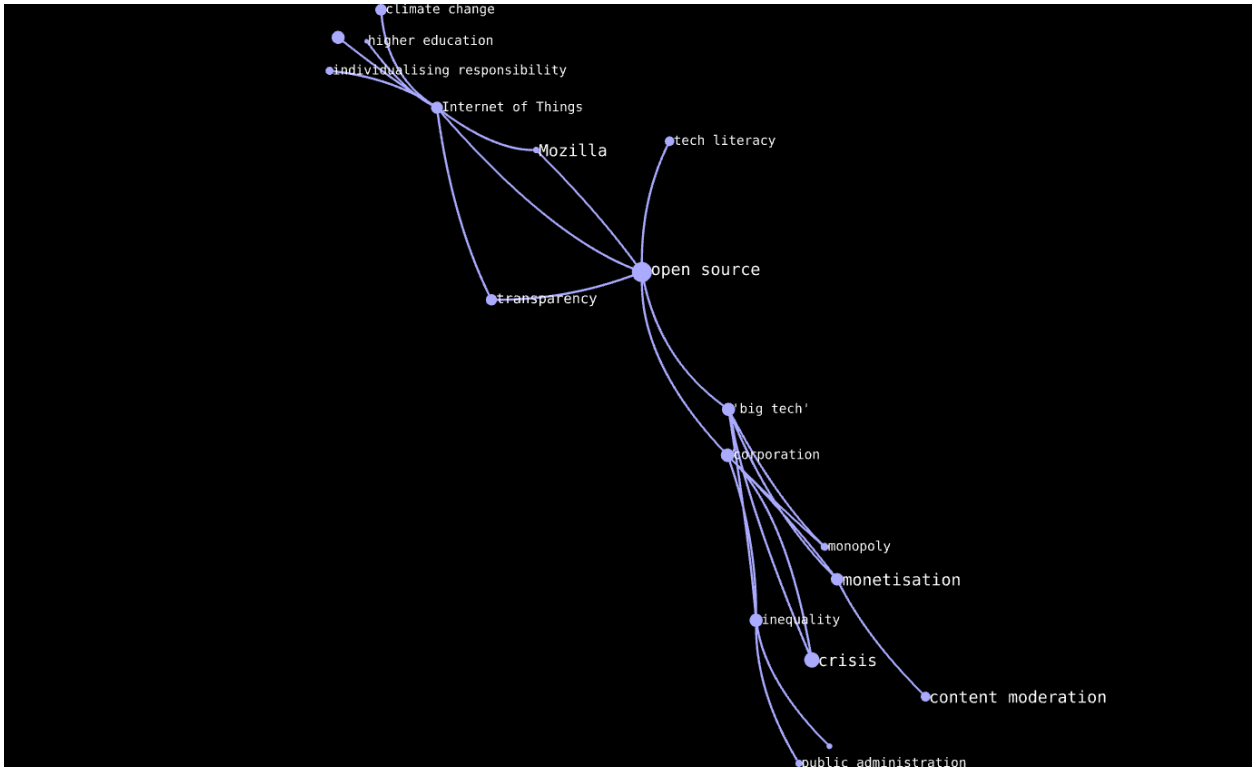

Figure 12. The big tech, regulation and business models community of codes, as identified by a community detection algorithm in the reduced CCN of Figure 3.

Many NGI XChange forum participants imagined alternatives to a data governance system dominated by Big Tech. They argued that we need to fundamentally change current business and governance models to move from Big Tech centred to open source technology centred development and deployment. They placed emphasis on human-centred design alternatives that allow users to connect, share and access

resources while maintaining decision-making power over how their data is accessed, stored, and used.

They asked: **How can networked digital technologies become a tool for social good rather than a monetisation tool in the hands of Big Tech? How can we shift our current models to move towards a more open and transparent Internet infrastructure? How can we develop digital tools to protect people's data privacy by default rather than exploiting their data for profit, making it easier for individuals to make decisions about their use of networked technologies?**

5.1 Business Models

The co-occurrence between `personal data` and `advertising` (figure 9) plays out in the case of `journalism`. Selling `personal data` for `advertising` creates `revenue` for `journalism`, without which there is an issue of `information quality`. But there are other potential `business models` to be considered outside of the selling of `personal data`, like `subscription models`. @inge proposed a few:

> great discussion and great topic: the never-ending question of how to fund news in an ethical way...we're still trying to figure it out, as most of the news organizations are - at every journo conference there's several panels on "how to not be paid by ads"...great examples of not relying on any ad-related income in journalism are the Dutch The Correspondent https://thecorrespondent.com/...and the Slovakian Dennik N https://dennikn.sk/: by using a complex analytical and automated system, they target their readers to become members. **They built this system by themselves, and it's open-sourced.** The cheapest membership is a one-month membership deal. The software helps them to target the right readers: analytics tell them that someone reading it on an iphone is 5 times more likely to buy a 3 month membership deal than someone on android - so they show a different deal to those than to android users. How it works: their long form reads are behind a paywall, but not fully. Readers can read several paragraphs, more than with others, before they hit the paywall. All members can get a shareable link and share the articles they want on social, giving their friends a one-time free pass to read the full story. They also publish one paragraph news stories without a paywall, often linked directly to other news sources. And they have a paper version, which they see as advertisement for their online platform…

She problematised the subscription model as well, citing access as a problem:

> I do agree with subscription argument to some degree, but it'd be great if there was a system that would not just have money be thing giving you access to things (as not everyone has money globally, and this obviously will exclude people from certain opportunities/knowledge)

We can also see through the SSNA that participants understand that `"free"` access to services is not always actually free, since the `catch` is the selling of their `personal data`. @erik_lonroth argued: "we are forced fed with ads by means that we as humanity are incapable of protecting ourself from. This is why Internet for humans is needed." @allegra agreed, citing `user agency` as important: "since our data is going to the ad industry anyways, why can't we at least have more sovereignty by pre-selecting who is receiving the data? I can still receive ads but at least I choose them."

Yet `journalism`, without a sustainable `business model`, is facing some serious `funding issues.` In an era of fake news, participants found this concerning, since `information quality` was seen as a value. `Assigning value` to digital resources like `journalism` opens the question of how to fund it without shady `advertising` practices. These codes are all strongly connected to `ethics`, a key concern in journalism writ large which is closely tied to ethical considerations around `advertising, monetisation,` and how to construct a sustainable `business model` without exploiting `personal data`. These connections also imply that participants perceive advertising as unethical, hinting at the deep unease with the financial and power architecture of the current Internet. As @inge asked:

> big tech is more than happy to revert it [business model] back to ad-based. Can we not come up with something more creative to make money but to shove products into our faces we don't really need?

@jasongreen proposed one such creative solution:

> A big step forward is moving social presence from commercial platforms that harvest data (in order to target ads) to platforms (personal domains, decentralized and p2p social networks) that users control. The ad economy

> feeds on the firehose of personal data. Take that away, and business models built on microtargeting become less practical.

Participants largely argued for moving away from a business-centric Internet model (driven by ad revenue) and towards a human-centric one, funded as an accessible public good. As a result, discussions centred on how to a) regulate Big Tech and b) fund open and accessible alternatives, to which we now turn.

5.2 Regulating Big Tech, Finding Open Source Alternatives

In the SSNA, `business model` and `advertising` are also connected to `monetisation` and `Big Tech`. A series of issues around `Big Tech` were outlined by the community – the need for `regulation`, especially of `artificial intelligence`, and the way it perpetuates `inequality` (`facebook` is a key example of `Big Tech`). As @alberto put it:

> Why are the two most hyped technical innovation of the past 20 years, the blockchain and artificial intelligence, *diminishing* human well-being instead of enhancing it? Why are we investing in things that make our problems worse, when the world is facing environmental collapse? My working hypothesis is that the financial world will put money into anything that promises returns, with little humanitarian concerns. They lead the dance; and governments the world over have been captured into supporting anything that promises GDP growth. If I am right, it is important to decouple support to innovations from their growth implications, and throw our institutional support behind technologies that uphold human well-being over capital growth.

@johncoate expressed similar concerns:

> The ethos of these companies, like Google and Facebook, can I believe be fairly characterized as “better to ask forgiveness than permission.” And so they do frequently say in public how they got this or that “wrong” and then carry on their merry way. And it has to be said that huge numbers of people, quite possibly a majority of users, are fine with this arrangement. or if they dislike something about it, they keep using the services. So I think realistically the key to this is working to increase public awareness and if there is to be regulation, it should be

in the area of, “do you know what you are trading off when you use these services and can you control it?”

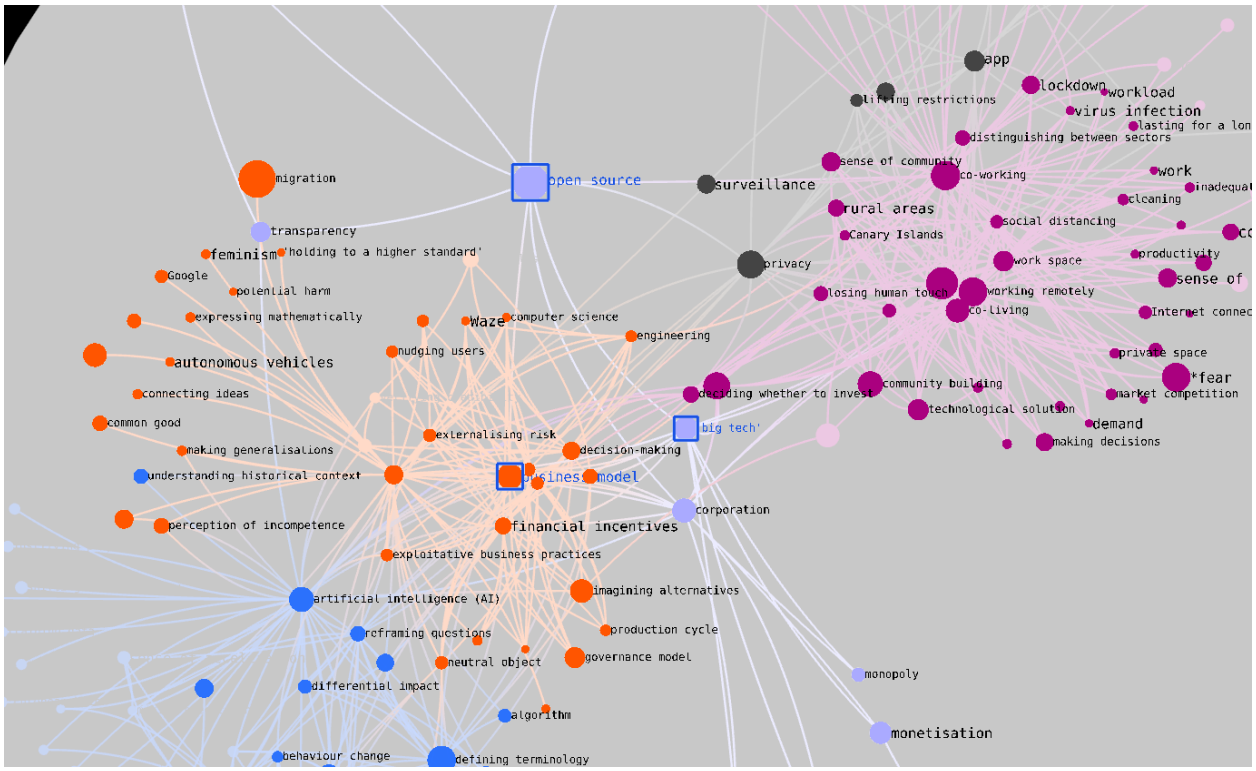

Figure 13. The second-order ego network of "Big Tech" at association depth >= 25..

What technologies might uphold “human well-being” over “capital growth”? The SSNA shows that alternatives to `Big Tech` emerge around `open source`, which has an interesting network of codes around it – questions of `'empowerment'` (does open source empower users?), the need for `training` to use open source tools, and the question of whether using open source tools opens one up to increased `risk`. As a `technological solution`, open source also allows participants to `imagine alternatives` to the status quo. It also connects to `'human-centred design'`, [as participants ask what exactly it would look like to design digital tools with and for humans: with human well-being, not profit, as the top priority]().

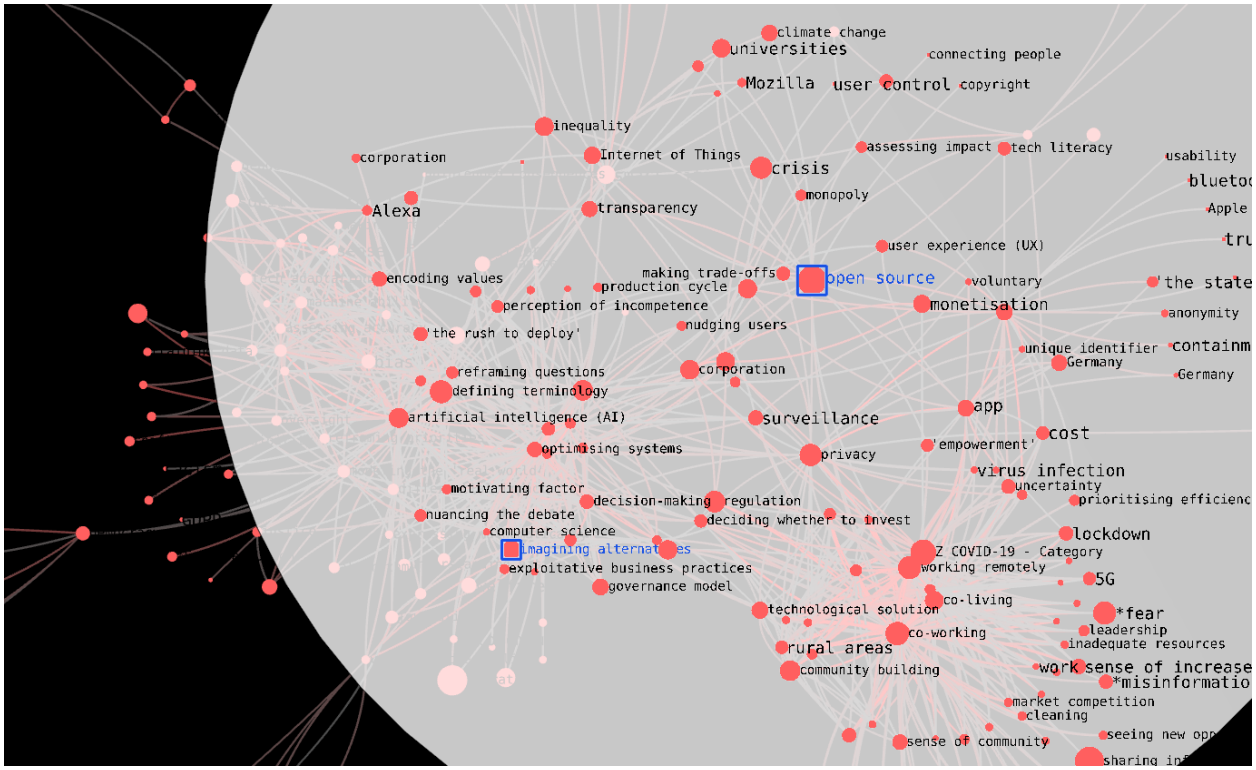

Figure 14. Second-order ego network of "open source" for association depth >= 19.

A great deal of the hope and enthusiasm on the NGI platform was invested in `imagining alternatives`, connected to `open source` in the SSNA: designing and developing digital tools, platforms and systems that depart from or challenge what we have available to us now. `open source` represents one of the central means through which these alternatives were envisioned. In practice, open source broadly describes a software or platform whose source is made available for modification by other users. This means that a broader range of people can participate in how a given tool or service is built and utilised, while also offering the potential for it to be adopted and expanded by others.

Importantly, to the NGI community, free and open source systems (or FOSS) also represent a set of fundamental values and actions that they frame as foundational to a more equitable and representative future Internet. These include, among others, “transparency, collaboration, freedom and empowerment”. The work that members of

the open source community engage with is undergirded and driven by a commitment to build digital tools that embody these shared values and challenge the existing – largely proprietary – systems that dominate our life and work. @mathias saw a decentralisation of control as central to this potential:

> I am picturing the current physical infrastructure being governed in a different way socially. Like right now there are 11 "keyholders" to renew the DNS root zones(?) of the entire Internet and that crucial infrastructure is entirely based in the U.S. which I think can be a security issue if things go wrong over there and someone tries to do something to that single node. I'm not putting emphasis on the technical side even though it is important, I'm putting more emphasis on how society organizes socially to develop a common infrastructure. At the current point it seems to me that a few strong players seem to build and run the entire infrastructure apart from servers and websites run by a larger variety of operators...**My proposal is to research: How can we organize for a big, complex and social multi-stakeholder challenge like the development of the Internet?** *A challenge which at first seems like a web of technical challenges and where it seems every issue can be solved with technical solutions - but in reality perhaps in essence is a social issue at its roots*...**to try to arrange distributed participatory processes to try to build the coalition throughout Europe needed to take on the challenge of reshaping the development of the Internet.**

As participants demonstrated, open source has the potential to create viable alternatives to existing models, redistribute ownership to developers and users in a way that shifts control away from big funders and business interests, make the process of knowledge production and knowledge sharing free and more widely accessible, and create avenues to ensure greater privacy, security and data protection.

Participants also considered the urgent utility of open source systems in times of crisis: we heard from members of COACT Lab, who are developing methods for not only combating climate change, but for protecting the environment long-term. As the COACT Lab model (and many other tech incubators like it) show, a commitment to open source solutions also relies on building a collaborative and supportive community of practice.

Open source systems were pivotal during the COVID-19 pandemic: in 2020, Germany developed a coronavirus tracing app using an open source code with the hopes that

other countries would follow suit - copying and updating it for implementation. This is only one example of the various usages of open source tools. However, it stands as a key reminder of the ways in which open source can not only streamline, but also *accelerate* our access to important information and resources in ways that proprietary models cannot. Proprietary models often *decelerate* and hinder knowledge and resource sharing.

Germany's tracing app had limited success, not only in mobilising enough users nationally, but also in incentivising other European countries to adopt its source code. This seemed to stem less from peoples' inability or unwillingness to work with open source models than with an ongoing mistrust of government-advertised applications. Reports from Germany and Europe described that despite repeated assurances over privacy protection, concerns over data privacy prevailed.

Showing this tension, `Trust` was a central code in our study, connected to `uncertainty` and institutions like `the state`, and an urgent topic in participant discussions over the future directions of Internet technologies. The dearth of trust in institutions raises the question of how we can rebuild trust in our digital tools and what role open source alternatives could play in that process. **How might past (and ongoing) abuses of and infringements on individual data privacy by governments, corporations and proprietary models act as a barrier to new developments? How might open source solutions help build back trust?**

One central tension that participants have pinpointed was that free and open source systems do not yet enjoy the kinds of sizable and robust financial backing that bigger proprietary systems and corporations do. As @johncoate put it, the reality still is that "the people getting ahead have funding and power". Big Tech still gets most big contracts, and many governments are hesitant to invest in open source technologies, opting instead to procure large contracts from big tech firms. Conversely, participants

find that open source funding is limited and inconsistent. Participants described this effort variously, as @Maria Euler summarised:

> as long as non-extractive resourcing technologies and their uses relies on voluntary donations or institutional funding fads we cannot secure a next-generation Internet that offers new functionalities to support people's needs and to address global sustainability challenges while respecting the fundamental values of privacy, participation, and diversity.

One symptom of the funding challenges open source development faces is that coders and developers themselves encounter a `trade-off` as they pursue their futures. As @Emile pointed out, they often must "choose between earning a living and doing something they believe in," The reality of insufficient access to funds and the inability for many to afford to remain in the FOSS arena puts developers under significant pressure. Many participants' open source projects lost momentum due to the financial precarity the open source community must negotiate daily. **How do we ensure that the kinds of knowledge and labour we need to build alternatives (like open source ones) are possible, safe, accessible, sustainable?**

Despite the hurdles and trade-offs involved in building open source models, a palpable enthusiasm for and dedication to the values of FOSS continued to mobilise and drive interaction on the NGI XChange forum. A lot of this energy was invested in finding viable and sustainable funding avenues: from secure stock options to public procurement at the municipal and regional level and developing smoother alignment and coordination between existing funding schemes and procurement budgets. We therefore propose that FOSS could find greater success and traction if greater institutional efforts were made to fund it consistently, helping it overcome the usability gap with respect to Big Tech.

The current predicament facing open source developers is not only that unstable funding sources limit their growth, but relatedly, that sustainable development relies on know-how: it depends on trained coders and skilled developers and relies on an ability

to communicate and disseminate knowledge in ways that are accessible and empowering. This means when we consider the future and the role of open source systems within it, we must also consider the ways in which we are equipping communities with the tools necessary to participate in this future.

As @erik_lonroth asked, **“what happens to knowledge in our future digital world if proprietary world views on computers, Internet and programming are left unchallenged?" Similarly, how can we better prepare and support future generations to challenge these proprietary worldviews and build alternatives to current models?** We discuss these questions in depth in the next section on Resilience, Welfare, and Sustainability.

6. Topic 4: Crisis, Resilience & Climate Change

Key codes: crisis, climate change, individualising responsibility, institutional response, failsafes, system failure, building alternatives.

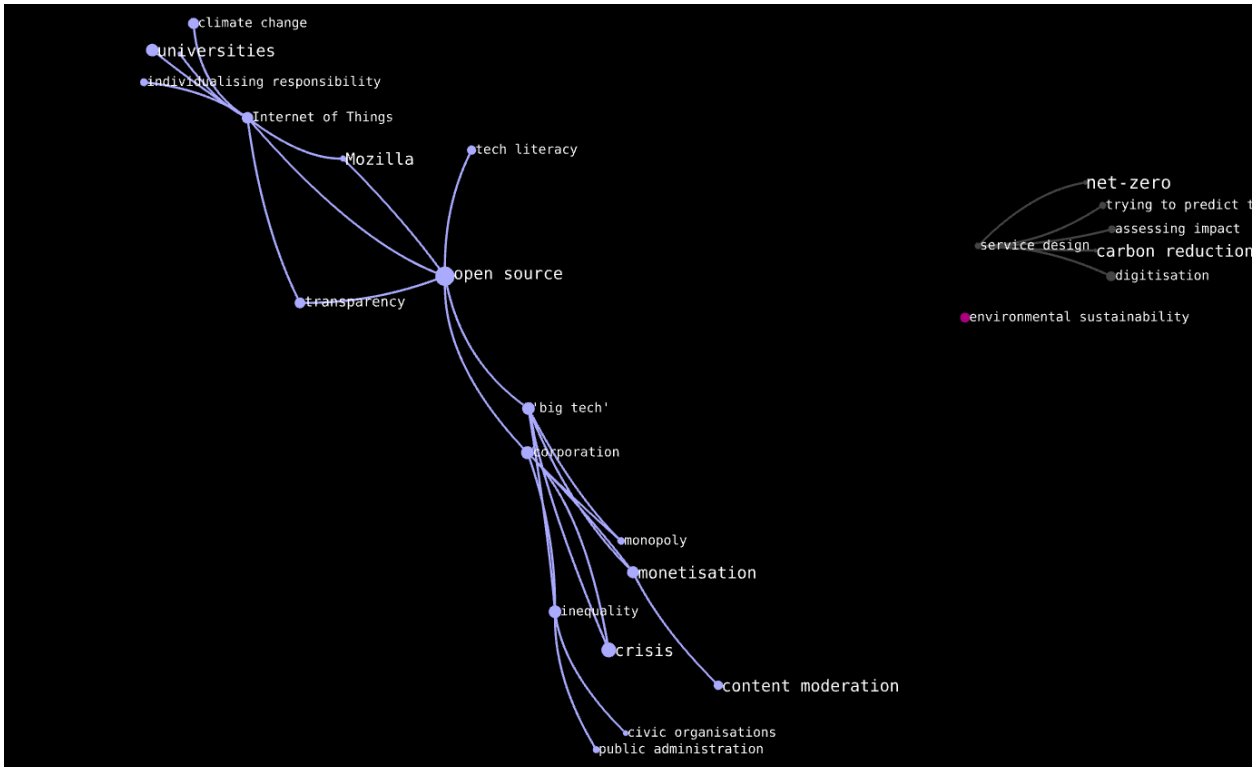

Figure 15. The crisis, resilience and climate change community of codes, as partially identified by a community detection algorithm in the reduced CCN of Figure 3.

Visions of dystopian futures often include scenes of natural disaster, the spread of diseases, the total collapse of infrastructures and the breakdown of social networks. In this vein, a key question posed by participants was: **how might the development of networked technologies contribute to an increasingly dystopian future? And how can we harness the potential of networked technologies to improve our existing systems and pave the way towards a resilient and sustainable future?**

In our unreduced CCN, service design is linked to a set of concerns around the environment: carbon reduction and net-zero, assessing impact and trying to predict the future. environmental sustainability and cost were often at odds, as financial incentives favoured many unsustainable business practices. Participants were concerned with defining the responsibility of policymakers, governments, and Big Tech to protect the climate (and also calling out corporations, governments and individuals who are failing to do so). As in many on-platform discussions, participants point out that technology can often act as a double-edged sword.

From un-recyclable devices and by-products to their energy consumption, participants pointed out that the technology industry, and technology products more broadly, significantly harm the environment. On the other hand, there was a great deal of optimism over how technology can help protect and even improve the environment. Smart cities and smart devices were oft-cited in these debates, as are notions of green and deep green tech, showing their double-edged nature.

The theme of resilience was central to understanding the relationship between networked technologies and stable societal futures. Public Health, Education, Climate Change, the Built Environment: all these domains rely on the stability of our basic networked infrastructures. It is therefore crucial to build networked technologies that undergird rather than impede more resilient, equally accessible, safe, and sustainable infrastructures – and, importantly, to do this in a way that supports better human organisation, well-being, and agency.

Resilience's ego network identifies both what promotes and obstructs participants' capacity to ensure their long-term positive imagined futures. As evidenced, resilience depends on greater regulation of Big Tech in terms of data privacy and user

control, while creating space for creative imagining of networked technology's capacity to enhance human well-being.

Resilience is linked to conversations around basic vital infrastructure, cybersecurity, institutional response, organising space, labour and education, technological solutions and privacy (to name a few). Many codes contain the concepts 'collective' and 'community', as well as 'helping others' and 'sharing information', evidencing that participants think about both infrastructures and the social interdependencies they support.

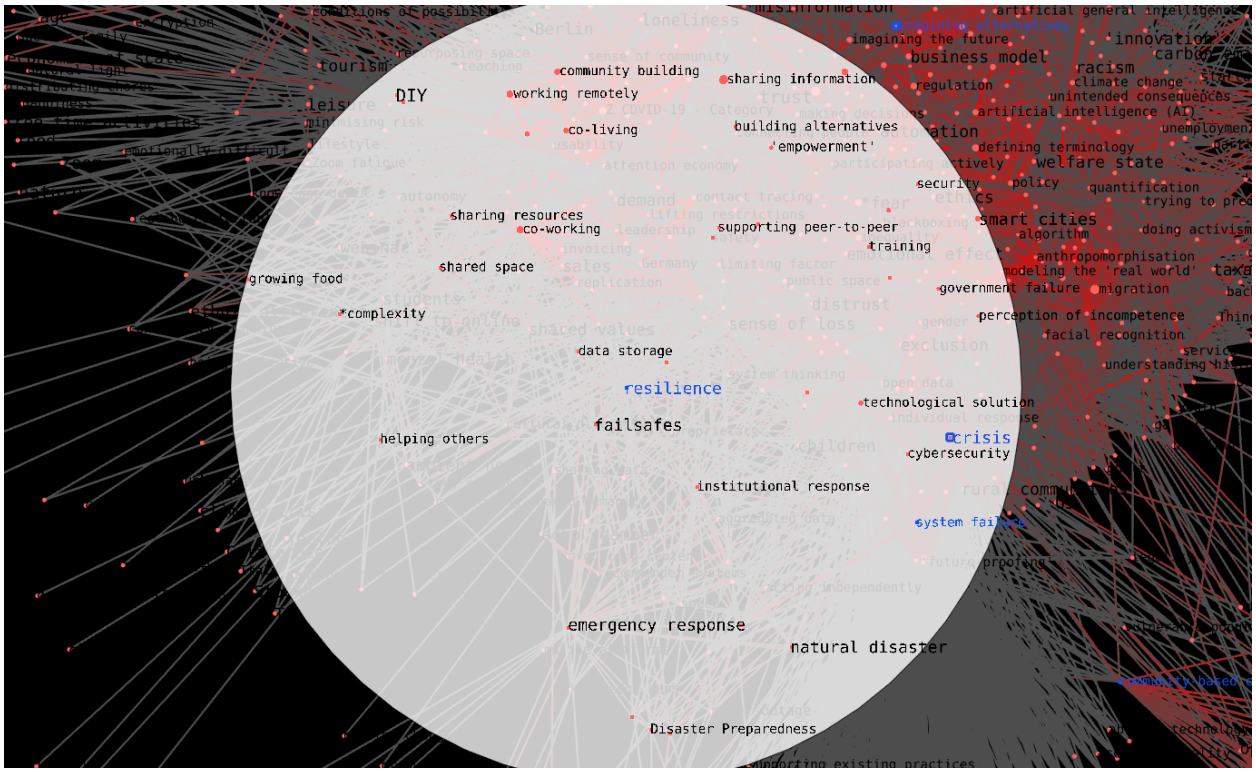

Figure 16. Ego network of code "resilience" at d >=2

Speaking to another facet of societal resilience, health, participants reflected that networked technologies can give education and agency to individuals and communities trying to make informed medical choices and find resources among a wealth of misinformation. On the other hand, participants voiced concern about how governments and corporations used and stored personal data (health, biometric and

location), bringing questions of regulation and transparency to bear on the sustainability of current models. They were also concerned that technology may further exacerbate disparities in healthcare access and contribute to exploitative business practices. Exposure to networked technologies, furthermore, played an important role in community mental health. During the pandemic, communication technologies allowed members to maintain social contact, establish networks of support and build online communities. However, participants also voiced that use of networked technologies can also heighten anxiety, sense of isolation and desires for human contact.

The role of Internet technologies in both exacerbating crisis and natural disaster (often brought on by climate change) and in emergency response was discussed at length. Internet technologies' ability to mediate rather than inhibit community-based care became key means of defining its usefulness. Brittle technologies leading to system failure and technology breakdown meant participants were skeptical of institutional responses overreliant on technology, causing decreased resilience and disaster preparedness.

Finally, participants asked: as we look toward the future, how can we ensure community resilience: allowing communities to sustain their collective ways of living? Participants asked: **What role will technology play in our ability not only to survive (to attain livelihoods, to establish systems of support, and to access necessities), but to thrive (to build abundant and sustainable ways of living)?** Participants asked these questions from a perspective of shared responsibility, making clear that thriving involves convivial labour and collective roadmaps to the near future based on shared values. Participants saw the human-centered aspect of human-centred Internet as helping human communities to build together (see the discussion of FLOSS above). They pushed back on business-centred understandings of individual humans as consumers and imagined beyond the potential of new technologies to help them to make individual consumption

choices. A better future Internet's potential, instead, was in building community-based alternatives to the status quo.

In this section, we unpack themes of resilience and sustainability as they emerged from discussions of education, climate and environmental protection and the development and maintenance of infrastructures. Topics in this area address participant questions of how technology variously interacts with education and access, vital infrastructures, and the climate and our natural and built environments. The pandemic brought renewed urgency to assessing the ability of our technological and non-technological tools to ensure public education and safety and to enable our communities to recover and remain resilient during disasters. Ultimately, these participant debates push us to consider – in a very holistic sense – how technology can allow us to not just survive, but thrive.

6.1 Access and Inequality: Educating the Next Generation

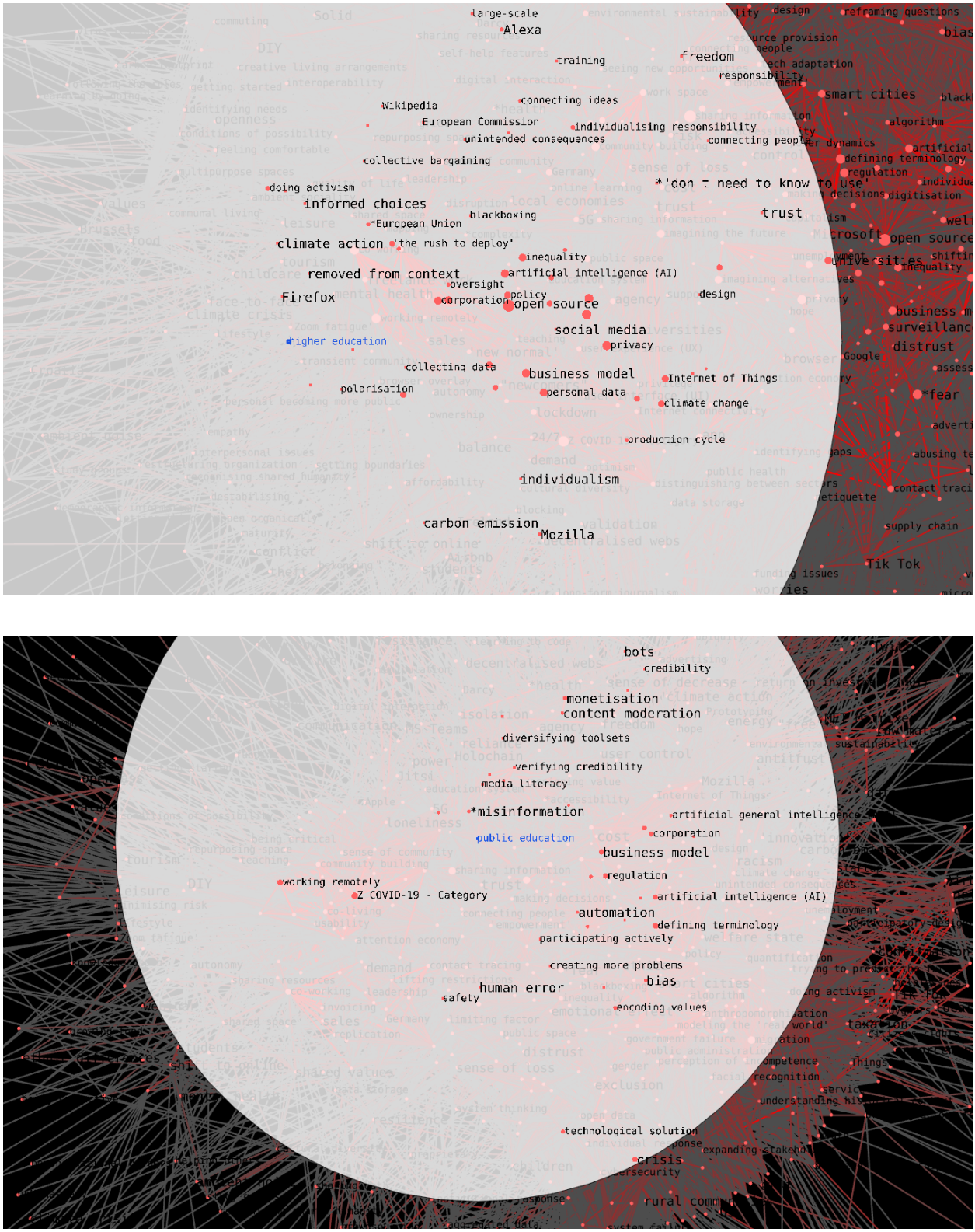

Figure 18. Ego networks of codes " higher education" and “public education”.

Education is among the most basic of human needs, central to well-being and the long-term resilience of societies. The NGI XChange community took a holistic view on the relationship between networked technology and education. Many saw digital technologies as having potential to improve and advance access to various forms of learning, education, and knowledge production. They detailed ways in which fin- and ed-tech can impact behavioural change among children. @Bohjort demonstrated the ways in which digitally mediated learning can more flexibly respond to a range of student needs and preferences than traditional education models do. Through such model shifts, educational technologies can at once respond to and better prepare young learners for the "digitalised economical landscapes" they will have to navigate in the future.

Such an approach cuts to the core of several debates that have taken place on platform: firstly, that increasingly digitised environments are a central part of many of our realities and that we ought to harness their potential for education, and secondly, that younger generations are often already so-called "digital natives", and we should support the development of their tech literacies.

However, as many participants pointed out, the values we want networked technologies to reflect and be used with need to be taught to the younger generation rather than taken for granted. Models of good technology use, not just practicalities, must be taught. Participants invested in strategies to teach teachers open source: through creating networks for educators and FOSS practitioners to collaborate and share their expertise, such approaches seek to fundamentally change the education system in a way that embodies shared values of transparency, collaboration, freedom and empowerment. They seek to ensure that these values are integrated into the ways in which younger generations learn to think about and interact with digital tools. In this way, following @erik_lonroth, "we can change the game for the benefit of future generations of Internet citizens".

Such an approach to education can help grow tech literacies – allowing present and future generations to navigate digital environments more easily and independently. Participants also hope that greater tech literacy would foster more critical relationships to the ways in which networked digital tools (and the information they produce) are developed, operated, funded, and regulated. As @johncoate expressed, this means that we are investing in future programmers, which in turn can lead to prototyping better programmes.

The Covid-19 pandemic further reified disparities in education access that need addressing, so the connection between technology and education is not always straightforwardly positive. Not only is there a growing divide between those who have access to the Internet, computers, and other digital infrastructures, but there is also a tangible gap between those who are tech literate and those who are not. Access to the Internet without tech literacy training increased vulnerability to misinformation, mediated by a lack of ways to ensure information quality, exacerbated by education inequality. Many participants were hopeful that the advancement of e-learning tools and virtual workspaces will help broaden access to work and education, particularly in rural communities, that digitally mediated work and education will offer greater flexibility in many sectors – particularly to working parents. There was a great deal of discussion around this issue on the NGI platform.

In the summer of 2021, as many looked towards an easing of Covid restrictions and a gradual return to "normal" life, the question was: how can we sustainably implement these double-edged lessons about digitally-mediated work and education? **Will we be able to decrease the inequity in access to networked technology through better education programmes, or will we speed ahead in developing technology for those who already have access to it, leaving those already behind, further behind?**

6.2 Climate Change and Environmental Sustainability

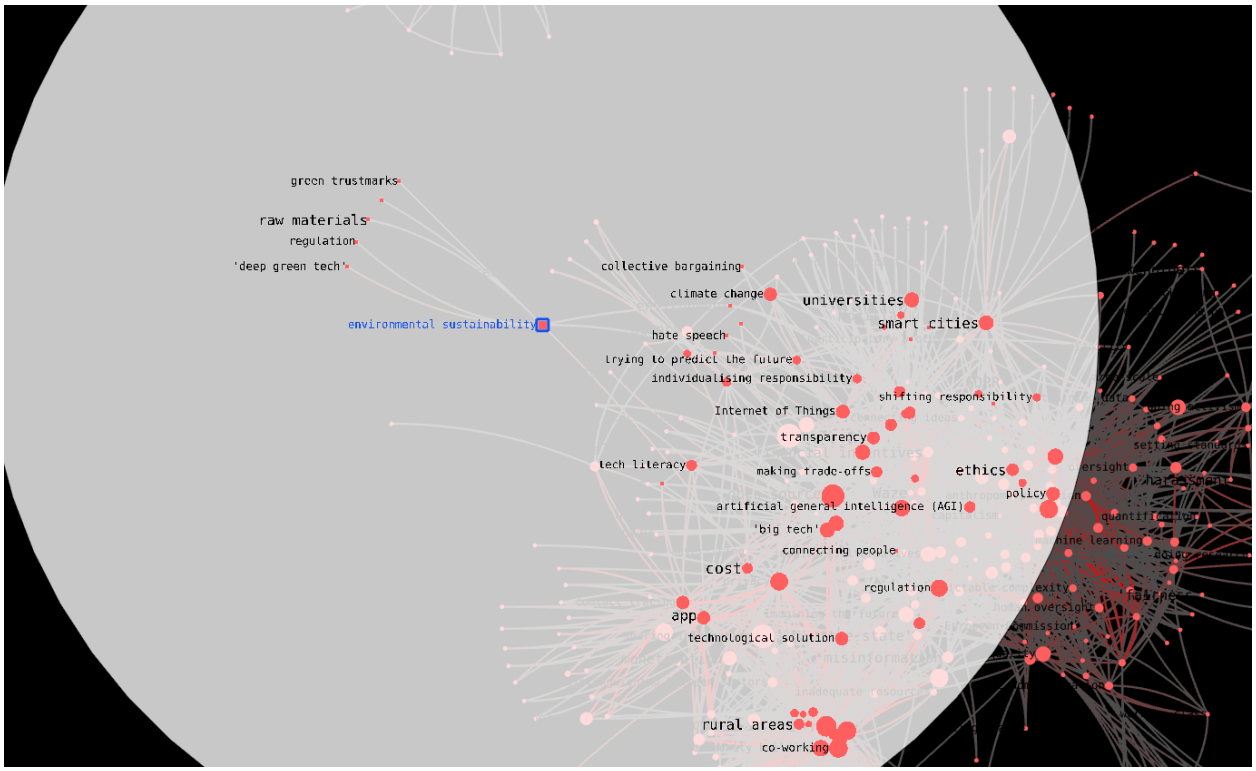

Figure 19. Second-order ego network of "environmental sustainability" with association depth >= 10.

Discourses of crisis often centred on themes of climate and environment: climate `crisis`, `natural disaster` and `environmental sustainability` are abundant terms in contemporary debates and [on the NGI platform]():

> The apocalypse has a new date: 2048. That's when the world's oceans will be empty of fish, predicts an international team of ecologists and economists. The cause: the disappearance of species due to overfishing, pollution, habitat loss, and climate change (see also DeNoon 2006).

The threat of ongoing climate disasters led many on platform to bring in a more nuanced focus on (a) how the tech world may be contributing to environmental harm and (b) how digital technology – and the tech community more broadly – can stem global warming and protect the climate through sustainable solutions.

Like many debates on-platform, talk around climate and environment began with deep conceptual work: participants shared a sense of responsibility to revisit, question and reframe the often taken-for-granted concepts and practices used when speaking about tech, digital tools, and virtual life. They asked: **What does it mean for technology to be 'green'? Can technology be truly environmentally sustainable? Are we addressing climate change from all angles?**

Participants pointed out that the growth of the tech industry and tech products, more broadly, can significantly harm the environment, from un-recyclable devices and by-products to their energy consumption. This includes the carbon footprint of online streaming and the greenhouse gases generated by the energy needed to transmit streaming content, so-called data "bloating" and the exorbitant greenhouse gas emissions generated by data centres. As @johncoate pointed out, new forms of energy consumption and carbon emission eclipse the effects of non-bio-degradable materials like plastic:

> the amount of that plastic has gone way down (from 61 million kilograms in the 2000s to about 8 million kilograms as of 2016), but at the same time the amount of carbon released into the atmosphere that can be fairly attributed to the amount of power required to serve all that streaming is huge and dwarfs that amount of plastic.

Participants argued that rapid emergence of new and drastically more harmful tech by-products means we need to more effectively research, assess and weigh out the potential benefits of technology development against the risks they pose for environmental health. However, as many on the platform pointed out:

> the problem is that we do not have a valid intuition for the carbon footprint of most modern activities or products. How could we work towards the development of such awareness and intuition?

We again find a tension between the drive to innovate and develop new technologies and the ability and willingness to predict and anticipate their potential harms. Platform

conversations around Holochain, crypto-currency mining and its potentially detrimental climate implications make even more urgent calls to assess and regulate tech-environment relationships.

In the CCN, this tension between navigating the ways in which networked technology can help combat climate change and protect the environment and the energy and ecological costs that technological advancement has on the environment.

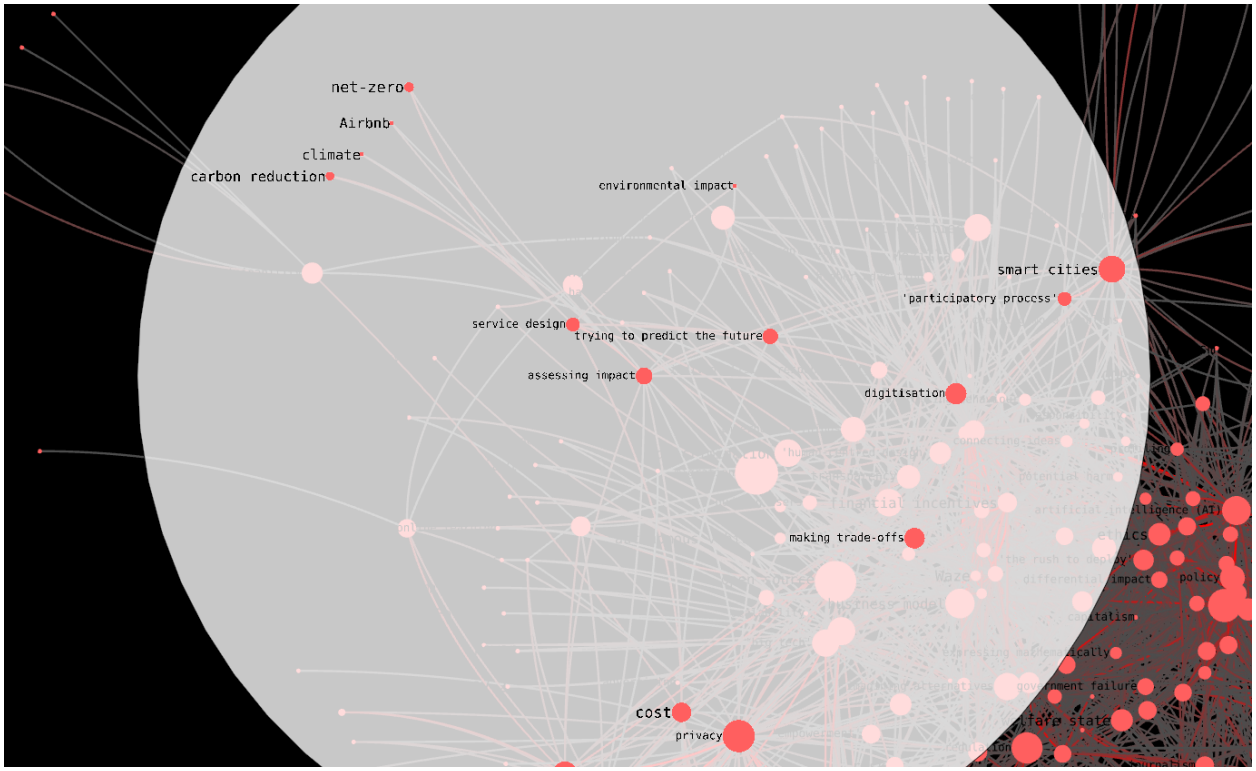

Figure 20. Ego network of "assessing impact" for association depth >= 10.

Connected to the codes `making trade-offs` and `assessing impact` are a series of environmental concerns. Questions of `climate` and `carbon reduction` are tied to `environmental impact` and `cost`. Participants found an underlying tension between acknowledging the ecological costs of the tech industry and finding ways to develop technological tools to protect the climate.

In response to the palpable environmental impacts of technology, several threads on the NGI platform revolved around the notion of `Deep Green Tech`. While there was a lot of interesting discussion around this concept, it was not clearly defined by the community. Deep Green Tech mainly describes start-up companies based on scientific research and innovations in tech engineering. However, Deep Green Tech also seems to more broadly describe technology that is ecologically sustainable, innovative, and based on scientific advancements. It appears to represent a larger idea or movement, capturing a sense of collective commitment to making our technological tools better for the environment As one community member argued during a 2019 discussion on deep green tech:

> given the situation we collectively find ourselves in, I think that definition[s] should be as inclusive as @pbihr suggests: materials, sources, processes, recyclability, shipping, packaging, energy use – all of the above and whatever else goes along with it.

Such a holistic approach to making tech 'greener' pushed many participants to offer up their ideas for deep green tech solutions. On the one hand this meant building more robust tools through which to predict, measure and control climate change. As @eb4890 suggested, this could mean using digital tools to measure climate and greenhouse gases:

> we will be able to better control our emissions if we know where they are happening and be able to make better predictions if we know what is happening in the climate today. We need to be able to transmit the data we collect around. Control of electricity consumption.

@eb4890 also urged that we harness the potential of '`Internet of Things`' [IoT] networked digital technologies to track changes and control electricity consumption and thereby develop more efficient tools for predicting the climate and monitoring energy waste:

> This is part of the promise of IoT and the thing I am interested in. It is hard to turn off items remotely or monitor their use, wasting energy. It could also help with avoiding energy companies spinning up fossil fuel power stations based on projected demand if they could get projected usage from households.

Another key area of inquiry was how we ensure and verify that our tech products really are 'green'. Proposals included "`green trust marks`", which would allow us to assess the environmental sustainability of electronics and other tech products. As @pbihr pointed out, the challenge in both setting up trust marks and ensuring that our products are 'green' lies in the complexity of the products themselves. He argued that when we assess whether a product is green, we need to take into account far more than just its physical parts, or *materiality* (from the kind of chips it uses to the materials that product itself is made from). We also need to consider how and where the materials are sourced, to what degree the materials are repairable or recyclable (and how those processes work). We need to account for how the products are packaged and shipped, and we need to take a big picture view of the energy use involved in all these aspects: from sourcing, production, shipping, consumption/use and disposal (or re-use).

There is no neat nor easy way to ensure that a tech product is completely green. While there are currently no blanket trust marks, one promising route for the immediate future seems to be creating better transparency around electronic products, as well as building searchable databases that report on their environmental impact. This can help us monitor and measure them from a policy and design perspective, but also allow consumers themselves to make informed decisions about the products they use. Participants see a great deal of potential in tools like Good Electronics Network, MET (material, energy toxicity) Matrixes, EcoCost and in establishing different types of repairability scores.

As @pbihr emphasised, we need to start asking the kinds of central questions that will enable us to move forward sustainably and responsibly:

> how can we mitigate the lack of transparency and still get to meaningful insights into how green a product is? What are best practices to make things more green? What are strategies to allow for this type of mark to evolve as things get more transparent over time?

Linking these concerns to broader discussions of community and responsibility, participants defined the responsibility of policy makers, governments, and Big Tech to protect the climate and identified corporations, governments and individuals failing. Ultimately, as @soenke stresses, this means creating and promoting an "holistic concept of openness", which considers all factors that play into technology's impact on the environment.

Smart cities and smart devices were often cited in debates around green and deep green tech. Participants encouraged consideration of our *built environments* and how these may allow us to protect our natural surroundings. On the NGI platform conversations centred around how we can build human-centred and sustainable cities and infrastructures. **How can we design cities that are not only environmentally sustainable, but also *resilient?***

What does it mean for a city to be smart? And do we really want our cities to be smart? `Smart cities` might broadly describe "the integration of several system-management cities, from energy grids to traffic, into one coherent whole". Smart cities manifest as digitally mediated urban design, or, as @Nadia put it, as sites "where the digital and physical meet".

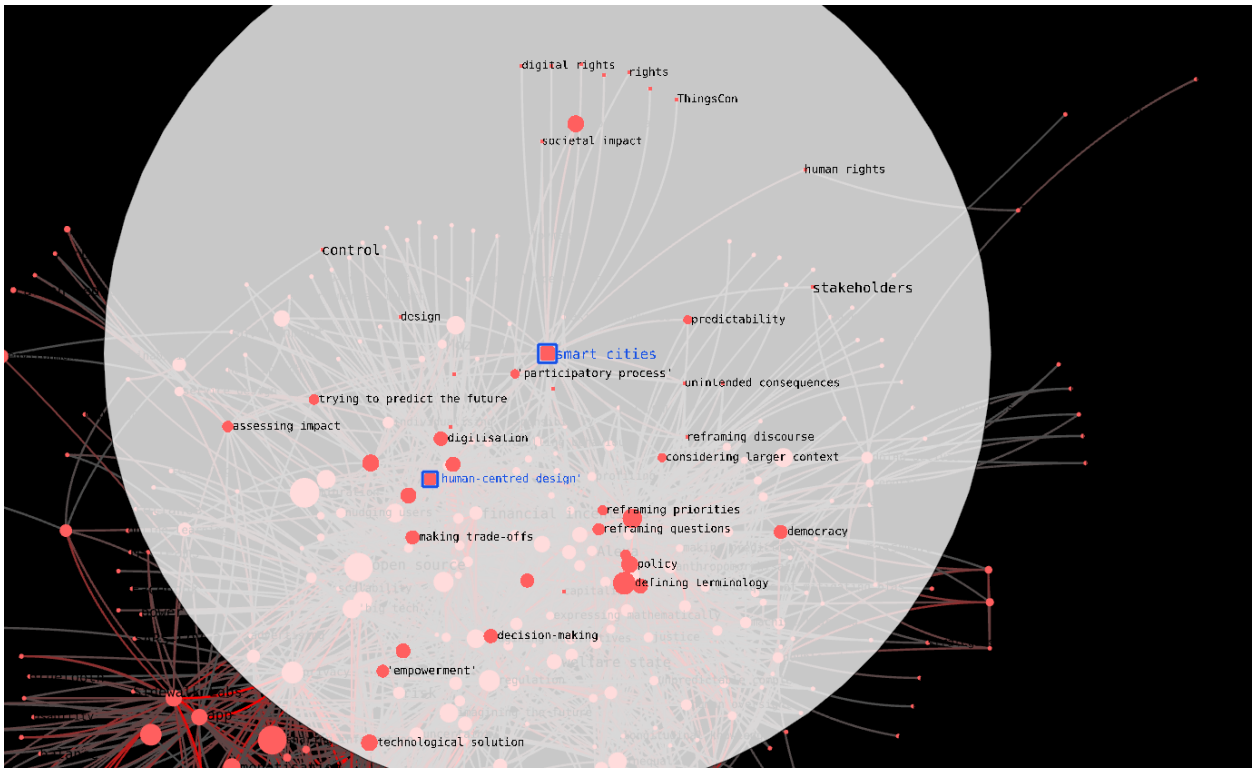

Figure 21. Ego network of"smart cities" with association depth >= 19.

As @BasBoorsma described, a “Smart City”, where it is a “vision”, can be both an organic iteration of innovation (by not just those big companies, but by many others) and a societal shift stimulated by numerous simultaneous realities (climate crisis; economic inequality crisis; pandemic; etc.). Given the range of potentials and possibilities smart cities seem to bring with them, it is important, as @pbihr made clear, that when we think about the future of our built environments, we first consider: **What are better urban metrics in cities increasingly governed or shaped by algorithms? How can we put people first and make sure that their cities, their public spaces and agoras work for all of them and not just for the companies that sell some of the infrastructure?**

Returning to the points highlighted above about deploying new technologies in times of crisis, participants also considered the long-term impacts of technologies in *future utopian* projects. Smart cities, in their most general sense, might envision urban

landscapes in which human resilience is enabled through digital tools. However, as many participants pointed out, their implementation is far from straightforward.

Nor are smart city designs unproblematic: participants voiced concern over how smart cities may lead to further and harsher surveillance technologies, how the gathering, storing and usage of data will be governed (see plans for Alphabet Sidewalk Labs in Toronto, discussed on the NGI platform), how the development of smart cities could further incentivise exploitative business practices – especially among Big Tech – and the various (often unpredictable) ways in which algorithms will discipline our daily lives.

Participants also gave substantial evidence showing that the use of algorithms is particularly dangerous, harmful and racist in the hands of law enforcement and within policing practices, more broadly (e.g. in predictive policing). Enormous and urgent concern therefore exists around how the increased use of algorithmic systems within smart cities will further exacerbate `bias`, `discrimination`, `injustice`, and `inequality`.

As @pbihr and others urged, while smart city projects continue to proliferate in future imaginaries, we need to find ways to ensure that their design and implementation are human-centred and participatory, environmentally sustainable, properly regulated and transparently governed. @tomab took a similar view, arguing that while there is an air of inevitability around the development of smart cities, this does not mean we need to be complacent. Instead, we can steer their development by creating standards for their design that protect and enhance humanity, by educating the public about technologies and how they interact with the world, and by identifying the benefits of smart city designs and introducing them to more local and distributed communities.

As evidenced, many participant suggestions around resilience revolved around greater literacy. They imagined a public opinion or community who can tell green- from non-green tech, understands the implications of deploying sensors on city

infrastructure, and can weigh in on technology developments' resulting techno-social impacts.

Some participants have proposed that smart city projects need to be aligned with the UN Sustainable Development Goals, human rights, and the simplified TAPS framework (Transparency, Accountability, Participation, Security). Some suggest all smart city projects should be built as carbon-neutral alternatives to our existing – highly pollutant– current urban spaces. There is thus a sense of opportunity and momentum behind the notions of smart cities, but the challenge is to find clear routes toward those that support human well-being: rather than stripping away more civil liberties from their inhabitants through surveillance technologies concentrated in the hands of Big Tech and governments.

6.3 Infrastructural Resilience

In the most optimistic view, making cities 'smarter' also means making basic vital infrastructures better and more reliable.

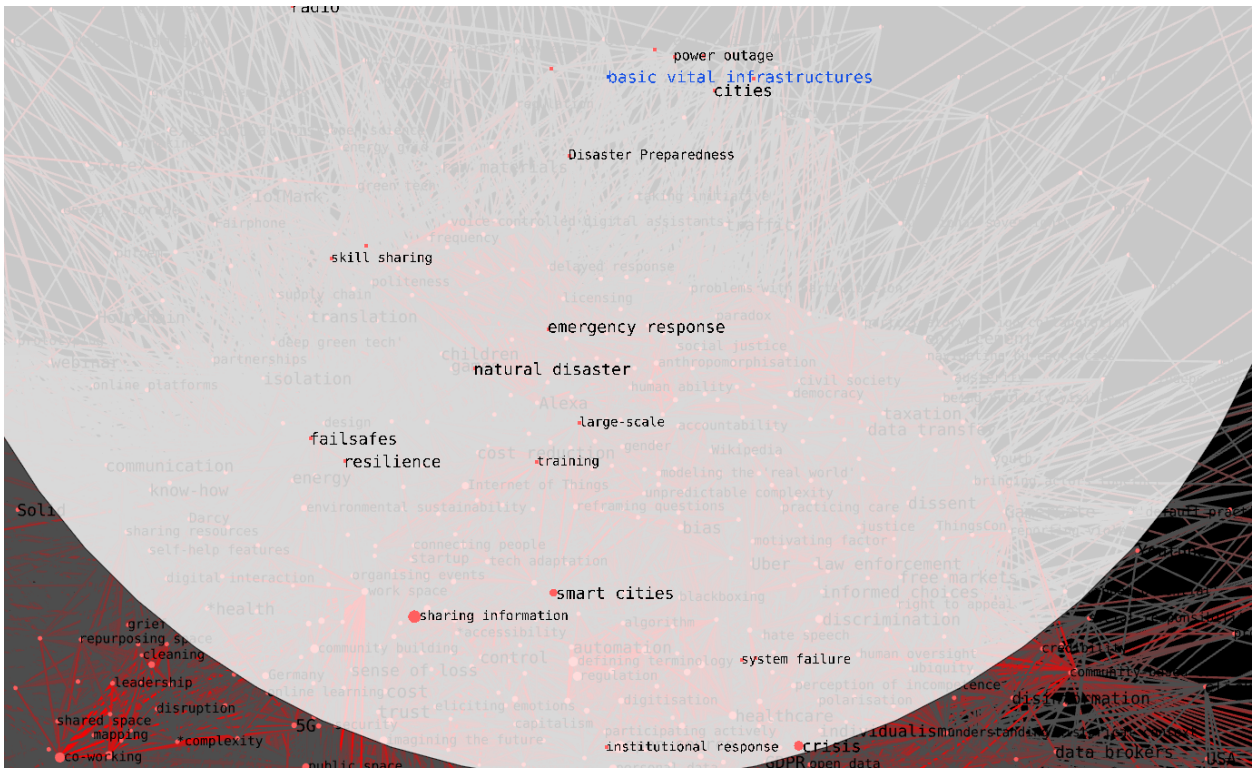

Figure 22. Ego network of code "basic vital infrastructures".

Relatedly, participants are aware of how existing `basic vital infrastructures` like roads, transportation systems, communication networks, sewage, water, and electric systems make our everyday lives possible; they connect us to each other and help us sustain our livelihoods. However, our existing infrastructures – which we so fundamentally rely on – are particularly vulnerable in times of `crisis` due to their `dependencies`: especially during `natural disasters`, wars, and global pandemics. As @Nadia described:

> I have experienced first hand how quickly basic infrastructures e.g food delivery break down when you have war eg. In the end what makes cities resilient is if people are good a[t] organising, you have emergency response mechanisms in place in government institutions that have money and training (e.g defence) and you have people with deep skills/knowledge to come up with creative solutions using tech that is self-standing i.e not dependent on complex tech and economic infrastructure.

As Nadia and many other on platform argued, to withstand crisis we need a holistic and well-organised model, which relies not only on technology but on collaboration, sharing information, skill sharing and the will to collective action. In crises that many members had experienced, technology broke down in part or almost completely. What made the crisis more or less severe was how well governments and communities could organise a rapid collective emergency response to the problem and if they had failsafes in place. The most useful technologies in these cases were those that were the most resilient, many of which were older technologies: freestanding technology like handheld radio devices, for example.

Participants showed a diffused appreciation of disconnected, self-standing devices and systems: valuing resilience over constant connection and optimisation. This should lead us to consider more carefully the implication of centralised connection and seamless data transfer: both because of the monopolistic Big Tech practices detailed in previous sections and the implications for resilience detailed in this one.

In short, participants considered the role technology ought to play in our ability not only to survive (to attain livelihoods, to establish systems of support, and to access necessities), but to thrive. They asked: **How can networked technology help us build abundant and sustainable ways of living?** Thriving, we conclude, requires convivial labour and a collaboratively imagined resilient near and long-term future: building robust policies, technologies, and communities.

We now move to a discussion of our final topic cluster, artificial intelligence, to further contextualise and exemplify many of the key themes and questions explained thus far.

7. Topic 5: AI, Algorithmic Inequality & Justice

Key codes: bias, inequality, automation, decision-making, regulation, modelling the 'real world', optimisation, justifying purpose, encoding values, making generalisations, neutral object

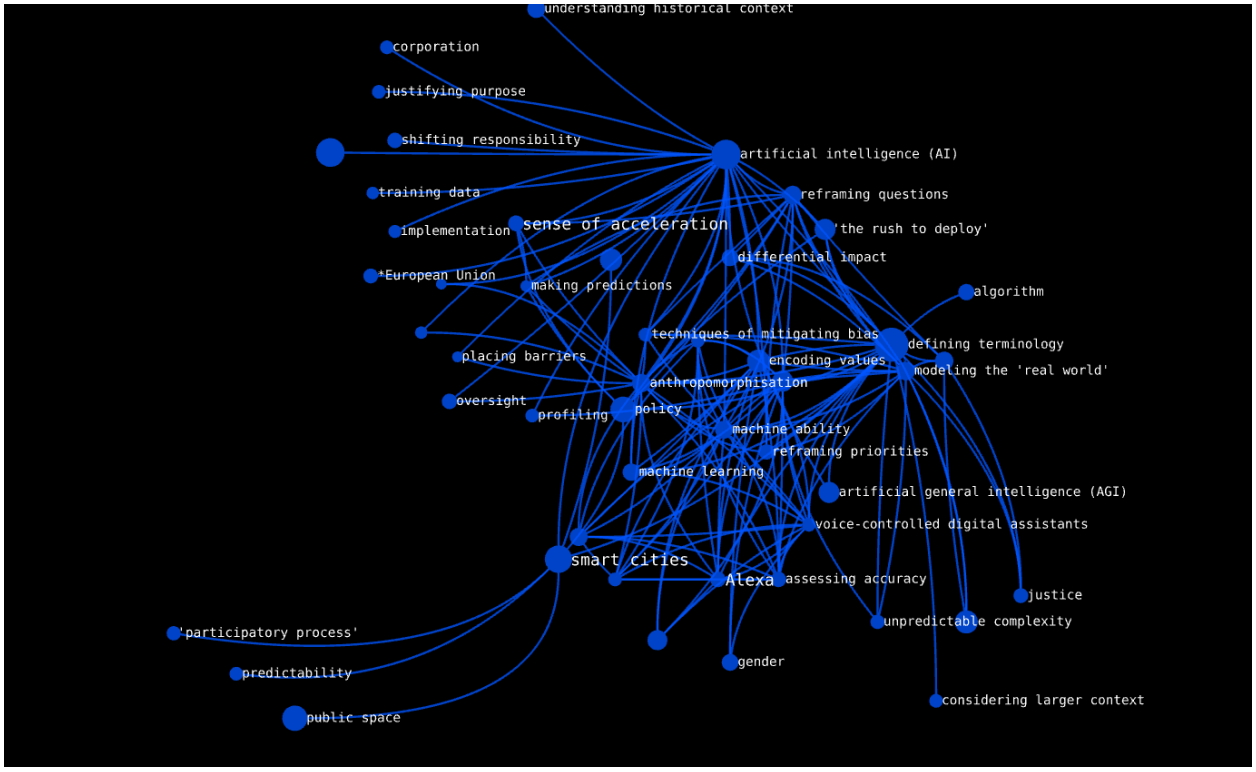

Figure 23. The AI, algorithmic inequality and justice community of codes as identified by a community detection algorithm in the reduced CCN of Figure 3.

Debates on Artificial intelligence (AI) exemplify many of the core themes discussed in this report. In this section, we analyse discussions on AI and the role it plays in community understandings of regulation, governance and business models, trust, accountability, and transparency. We analyse the slippery term "AI" and what it means, examine the "rush to deploy" that has become a theme across discussions of

networked technologies on the platform, explain how AI tries to model the “real world” and what that means for communities, and conclude with a discussion of AI dystopia.

7.1 The Many Faces of Artificial Intelligence

Artificial intelligence has many names, making rationally imagining the future of AI together somewhat difficult. In general, `artificial intelligence (AI)` refers to computer systems designed to mimic human intelligence through computational means. AI systems power much of our everyday experiences: `algorithms` underpin which headlines we see first on social media platforms, `automation` of public services facilitate how we make doctor’s appointments, and `machine learning` systems structure how we can converse with `voice-controlled digital assistants`. Narratives and images of AI taking over human lives appear frequently in our cultural imaginations through television shows and movies.

This terminological multiplicity reflects how our participants are trying to make sense of this emerging and emergent technology from their respective vantage points. By `defining terminology`, our participants perform explanatory work of interpreting and analysing AI as a sociotechnical system. Paying attention to this terminological multiplicity, we followed subtle differences in how participants invoked different terminologies to raise important considerations. The SSNA figures below depict AI’s many names and how they co-occur with clusters of codes:

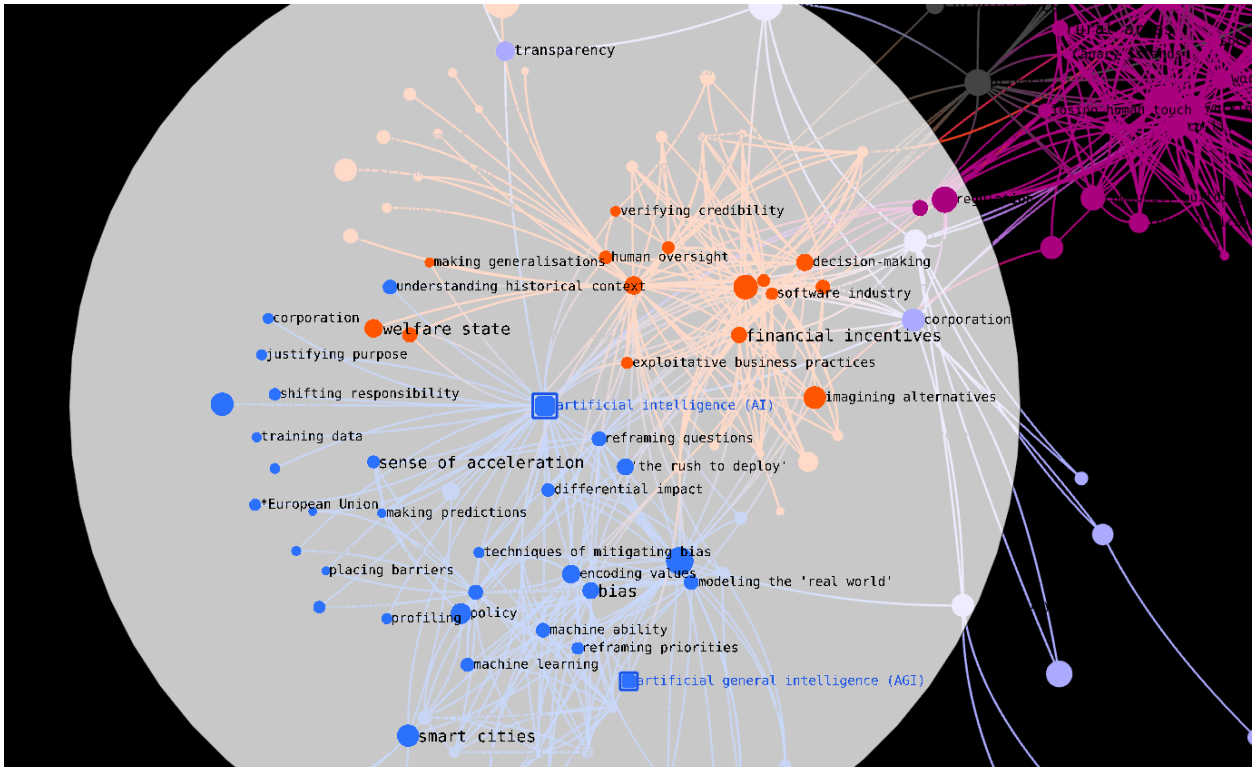

Figure 24. Ego network of "artificial intelligence" at association depth >= 25.

For example, civil society actors and lawyers expressed concern over the automation of public administration eroding the welfare state. Advocates called for a need to examine how bias is encoded in the design and implementation of machine learning systems to perpetuate injustice and inequality. Theorizing the long-term social implications of AI, academics contemplated how imaginaries of artificial general intelligence—the notion that intelligent computer systems will surpass human intelligence—shape how we distinguish (or don't) human ability and machine ability.

As @Nskocz aptly put it, the lack of consensus on what AI is raises larger questions about what it can and ought to be:

> Artificial Intelligence (AI) - flies airplanes, drives cars, writes news and forecasts the weather. Decides on life and death. Most inventions throughout history provoked controversy - but not many of them had been as widely debated as artificial intelligence. There is still no clear definition of what AI is and what does

> it do [sic], but its existence opens up many questions. Legal, technical and above all moral and ethical. What are its limits? Achievements? And - perhaps most importantly - who, and how, controls it?

The remainder of this section offers a view into what this “who and how controls AI” question looks from the point of view of the debate on the NGI Xchange forum.

7.2 The Rush to Deploy

Corporations and governments alike tout AI systems as apt and effective solutions to various social problems. However, our participants’ discussions around AI systems and their deployment reveal serious concerns about what it means to apply `technological solutions` to problems that are fundamentally social and, crucially, structural. Our participants expressed serious scepticism about the ways in which AI systems are proffered as optimal `technological solutions`. They expressed a real sense that technological solutions, rather than meaningfully engaging with structural problems, often `create more problems` instead.

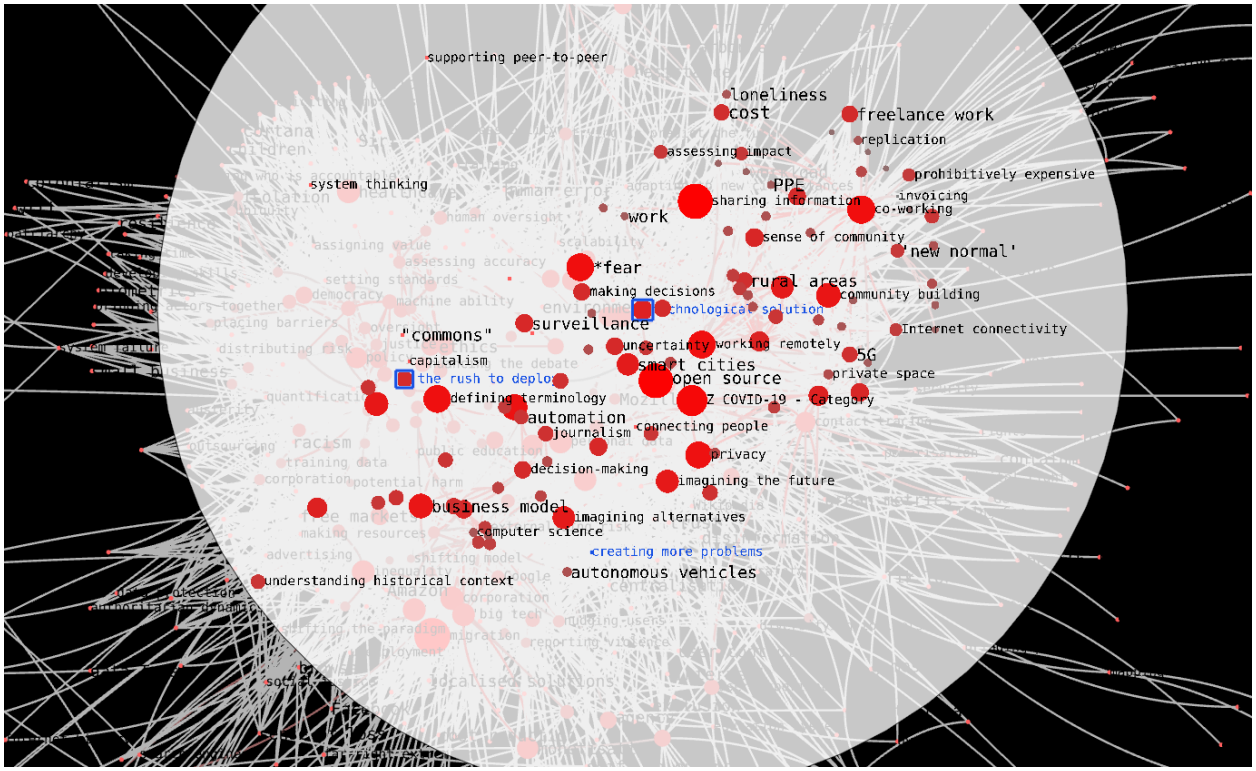

Figure 25. Ego network of"technological solution"with association depth >= 5.

The invivo code ‘the rush to deploy’ captures participants’ sense that AI systems are deployed too rapidly without warrant. The figure below displaying the code’s ego network details the underpinning rhetoric of efficiency deployed by those promoting AI systems (optimising systems; sense of acceleration) and certainty about the future (making predictions). The invivo code also co-occurs with the reality of a business model in which financial incentives and exploitative business practices drive AI product design and deployment. @Markomanka’s example in the medical field demonstrates how the ‘rush to deploy’ is creating more problems:

> What is happening right now is that the AI technology in Europe is being accelerated to be used. But we're massively risking getting the wrong results, because we're not asking the right questions. Medicine is one of the fields where there's not really a huge gain by using AI. But a lot of money is being spent both on the development and marketing of it. And this money absorbs other investments. Investing a lot of money trying to train an AI — that money isn’t

> going into training clinicians, not into getting better tools, not invested in your patients, not even in redesigning hospital spaces.

In @markomanka's example, a `sense of acceleration` drives the medical field's perception that AI systems are necessary and urgent. The resources directed to building and implementing AI technologies, however, perpetuate existing inequities that leave clinicians undertrained, equipment under-attended, and patients underserved.

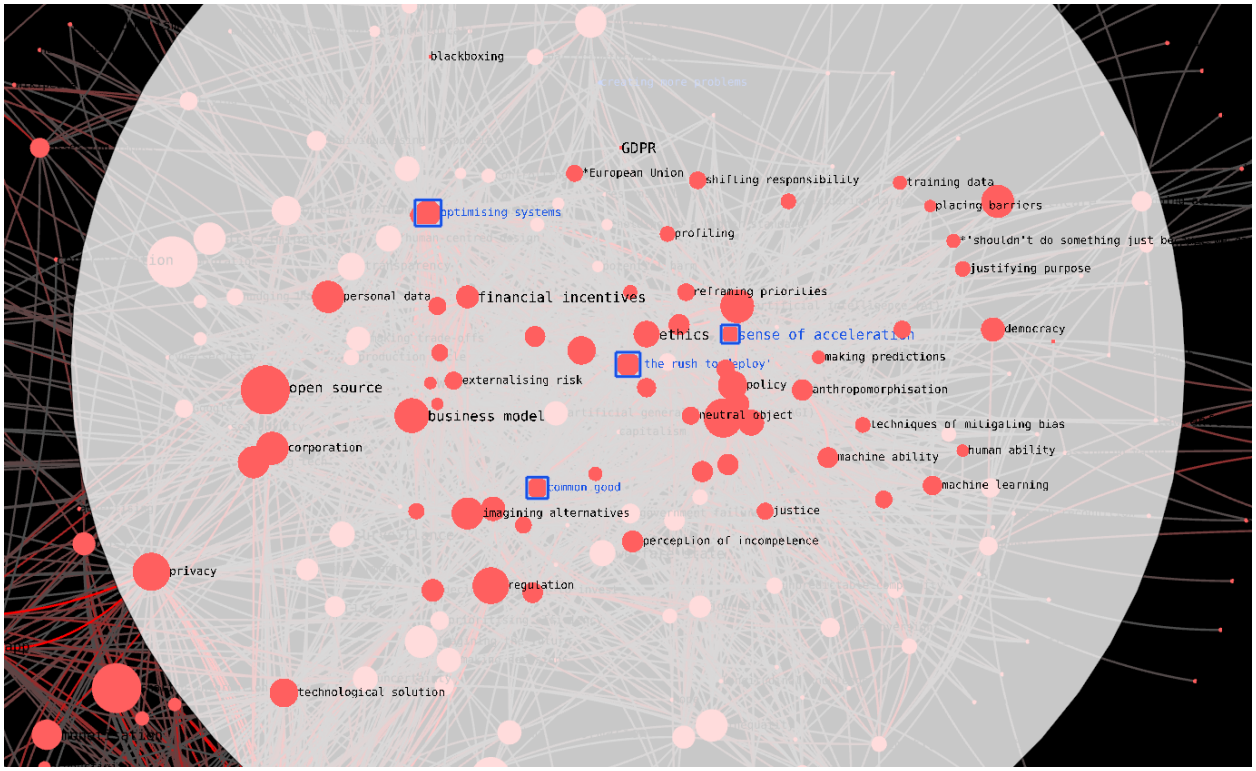

Figure 26. Ego network of "'the rush to deploy'" with association depth >= 10.

In addition to the `sense of acceleration`, the promise of `optimisation` offers a powerful allure. Some believe that AI technologies will reduce inefficiencies and optimise the impact of our systems — and that his move towards optimisation will serve a common good.

This rhetoric raised questions about what counts as "common good." As @sedyst explained:

> There's currently a run for AI. There's all this inevitability and urgency around it: "If we don't do AI, then China and the US will. So we need to do AI." On a cynical day, one could imagine this is a huge fraud scheme to transfer wealth from some parties to others in the name of innovation while changing our governance structures. At the same time, the academic and civil society discussion is focused on data and algorithms. But we really need to open up a discussion about what it means to use optimisation systems in managing all aspects of life.

@sedyst asked us to reflect on AI's promise of optimisation. What does it mean to optimise our social lives? **What precisely is getting optimised when we implement AI systems?** The next section delves deeper into the design of AI systems to examine their sociotechnical implications.

7.3 Modelling the Real World

In the previous section, we discussed how AI systems gain purchase through the promise of `optimisation`. Underpinning this promise is the notion that AI-powered technologies are a `neutral object` untainted and unlimited by human error. Our participants' discussions, however, stressed the many ways in which AI systems are `encoded with values` and in ways that reify social relations of power.

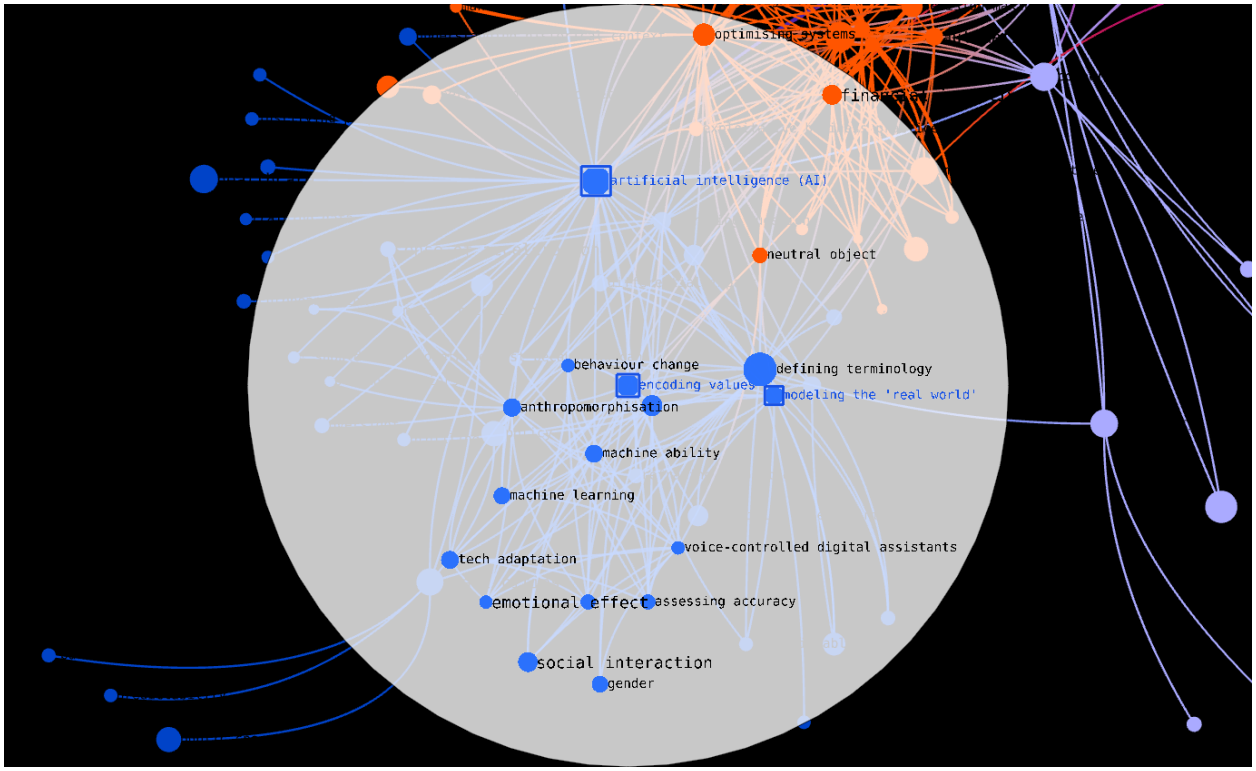

Figure 27. Ego network of "encoding values" with association depth >= 25.

As a technological system designed to mimic human intelligence, AI systems try to model the 'real world.' They abstract from the complexities of the real world to mathematically express social phenomena so that they become legible to computer systems. In other words, which social phenomena get represented and how they get represented mathematically carry important implications for how AI systems construct 'the real world.' @asimong drew attention to the gap between human reasoning and AI reasoning often elided in discussions of AI:

> I comment partly from PhD work in machine learning over 30 years ago. Right back then, the late Donald Michie was clearly pointing out that pure neural-net-based AI would never satisfy the human reasoning requirements that we sometimes have to fall back on. He favoured a rule induction approach, which is what I followed; and I looked at rule induction from the perspective of trying to figure out what rules humans themselves were unconsciously using, when they performed complex tasks fluently. I still believe that this approach would be very valuable to follow up, and would love to see evidence of it. Currently I remain disappointed.

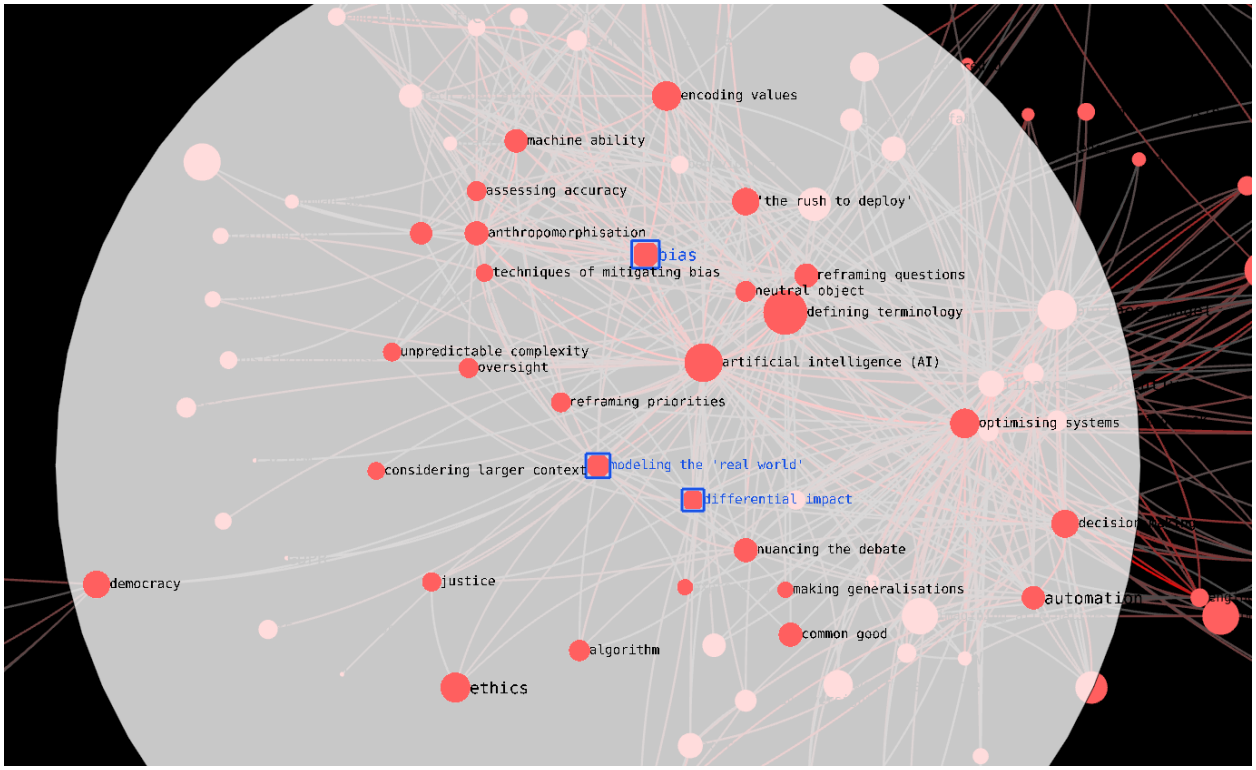

Figure 28. Ego network of "modelling the 'real world'" with association depth >= 19.

Consider the design of algorithmic decision-making systems used in credit scoring or hiring contexts. [In an interview posted in May 2020, Annette Zimmermann] – a political philosopher and ethicist working on AI – explained how hiring algorithms perpetuate gender `bias`:

> Consider the use of algorithmic decision-making in credit scoring or in hiring. When designing algorithmic tools, for this purpose, we have to come up with a way of measuring who counts as 'a good employee' or as 'creditworthy'. But those are not straightforward, unambiguous, and uncontroversial concepts. There are many ways of cashing them out, and if we do not think hard about what kinds of concepts we should be working with, bad things can happen. Amazon, for instance, was in the news recently because they used an algorithmic hiring tool that ended up having a disparate impact that disadvantaged women applicants, because the majority of applicants who had been successful at Amazon so far had been male. Suppose, for example, that an algorithmic hiring tool takes into account the number of years of coding experience for each applicant. Boys tend to be encouraged to start coding earlier in life than girls—but the amount of years of coding experience might be differently predictive for different genders in terms of future success as a 'good employee' in the tech industry. So, a female Amazon applicant with five years of coding experience

> might be just as well-suited as a male applicant with ten years of coding experience, if their current skill set is on par—but if the algorithm ranks 'years of coding experience' much more highly than 'current skill set', the algorithm will keep favouring male applicants.

Zimmermann pointed to several value-laden design choices. First, the hiring algorithm perpetuates `gender bias` because the data being inputted (in this case, successful candidates at Amazon) embody how male candidates have historically fared better in the company's hiring process. Second, the variables the hiring algorithm takes into consideration have the impact of favouring male candidates. Considering "years of coding" as a factor, for example, favours male candidates because men are generally encouraged to learn computational skills at a younger age. Quantifying successful candidacy as "years of coding" thus leads to Amazon hiring algorithm's `differential impact` that discriminates non-male candidates. The company may have interpreted such `discrimination` (this code is associated to `modeling the 'real world'` via `optimising systems` and `business model`) and as an `unintended consequence` but examining the hiring algorithm's internal logics illuminates how `gender bias` was very much an organic outcome.

Both the historical `bias` and variable choice reflect how the company failed to `consider the larger context` of the role of gender in access to computational skills. When we think of AI systems as a `neutral object`, said Zimmermann, "We risk ending up with technology that isn't merely inaccurate, in the sense that it doesn't faithfully represent the real world, but also with technological tools that fail differently for different people" .

7.4 "Sociopathic Tech", Inevitability and AI Dystopia

@alberto articulated a key tension between corporate financial interests and human well-being, a tension repeated by many participants over the course of the NGI project (so much so that it is one of our key findings):

> Artificial intelligence and the blockchain are the two main technological hypes of the past fifteen years. Both were hailed as technologies with the potential to solve many problems and change the world, for the better. It now looks like their impact is overwhelmingly negative. Though they could be used for the common good, it turns out they are not very good at that. They are better, far better at harming humans than at helping them. They encode dystopian, sociopathic world views; and tend to attract developers, investors and entrepreneurs that share those world views. So, once deployed, they tend to bring the world closer to them. They are sociopathic tech. This is disturbing, because mostly everyone fell for them: investors, developers, entrepreneurs, academics, government officials. I call for a re-examination of the achievements of these technologies and the impact they are having on our life and our societies. I would like to see support to innovation systems depend on how new technologies improve the well-being of humans and of the planet, and only on that.

He argued that AI is good for boosting consumerism, increasing surveillance, and deepfakes, as well as machine translation. Of these, he argued, all but machine translation are detrimental to human well-being. AI, he concluded, is a potentially "toxic technology", calling the public and private investment in it a "spectacular societal and policy failure".

@daveed largely agreed but also saw possible benefits of AI, if humans can hold the right people responsible to build a better future:

> AI and blockchain are currently mostly having negative effects. I also believe that these are tools which have a possibility for supporting a regenerative future and that it is all of our responsibility to demand that tools are used to support a regenerative future.

Notions of dystopian and utopian futures were often cited in reference to the development of AI and machine learning. Such technologies can, as evidenced, engender a sense of impending doom in which autonomous systems operate beyond human control. On the other hand, the debate around AI indicates optimism about how it can optimise and improve lives.

Zimmermann explained that:

> public discourse on this issue tends to split into two fairly extreme views, neither one of which is correct. On the one hand, there's 'AI optimism: the view that the

> increasingly ubiquitous use of AI is inevitable, that we can't return to not using AI once we have deployed it in a given domain […] On the other hand, there is a dramatically opposing view that says something like, "it is inevitable that all AI will lead to incredibly bad and harmful consequences". That's a different sense of inevitability right there. Tech pessimists seem to think that whatever we do, whichever domain we focus on in our AI deployment, the use of automated reasoning methods will always be somehow counterproductive or harmful.

The notion of inevitability is an important theme as we think about the future, particularly as it ties into our debates over how technologies are developed, whose values and positions they are based upon, who gets a say and how we can intervene. Within discussions around AI, `safety` and `security` were central topics. Security and safety are not static states but perceived outcomes of interplaying factors. **What are the safety risks for different groups if corporations and governments continue to develop AI without critical reflection? How can we consider these differences as we imagine, regulate, finance and deploy AI infrastructures and technologies (or don't)?** These questions of power and difference are vital across all the themes explored in this report, but they are particularly pronounced in the context of AI.

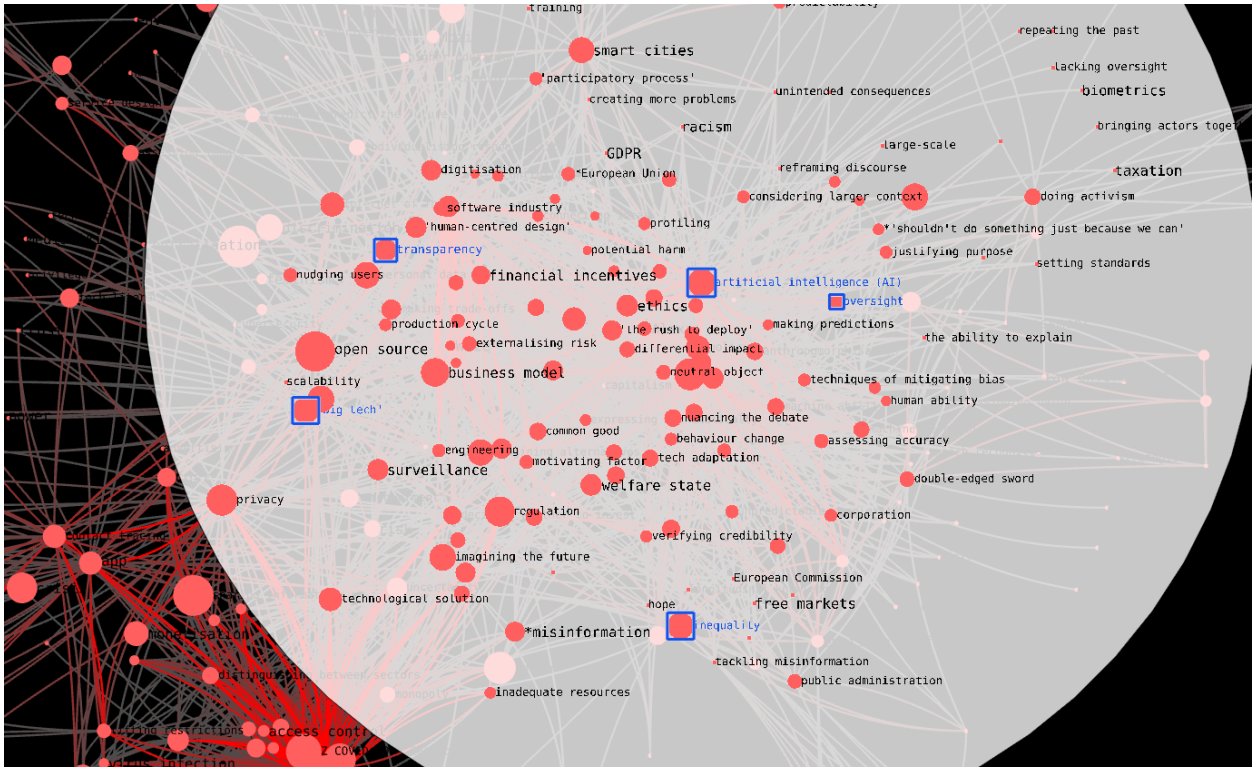

Figure 29. Ego network of "artificial intelligence" with association depth >= 10.

Returning to the topic of trust in technology, we see an interesting web of concepts around `artificial intelligence`. AI is connected to `inequality` and `Big Tech`. It is also connected to issues of `transparency` and `oversight`. This cluster of codes tells us that there is an ongoing conversation around what kinds of oversight of AI might a) be effective rather than performative and b) lead to increased transparency of AI and `algorithms`. We also see these connected to more concrete questions on what it takes to make these technological infrastructures: their `production cycle` and the `raw materials` needed.

7.5 Holding AI Systems Accountable

What, then, is to be done about AI systems? Our participants identified 3 areas—moving from the short-term to the long-term—for policy intervention for holding AI systems accountable.

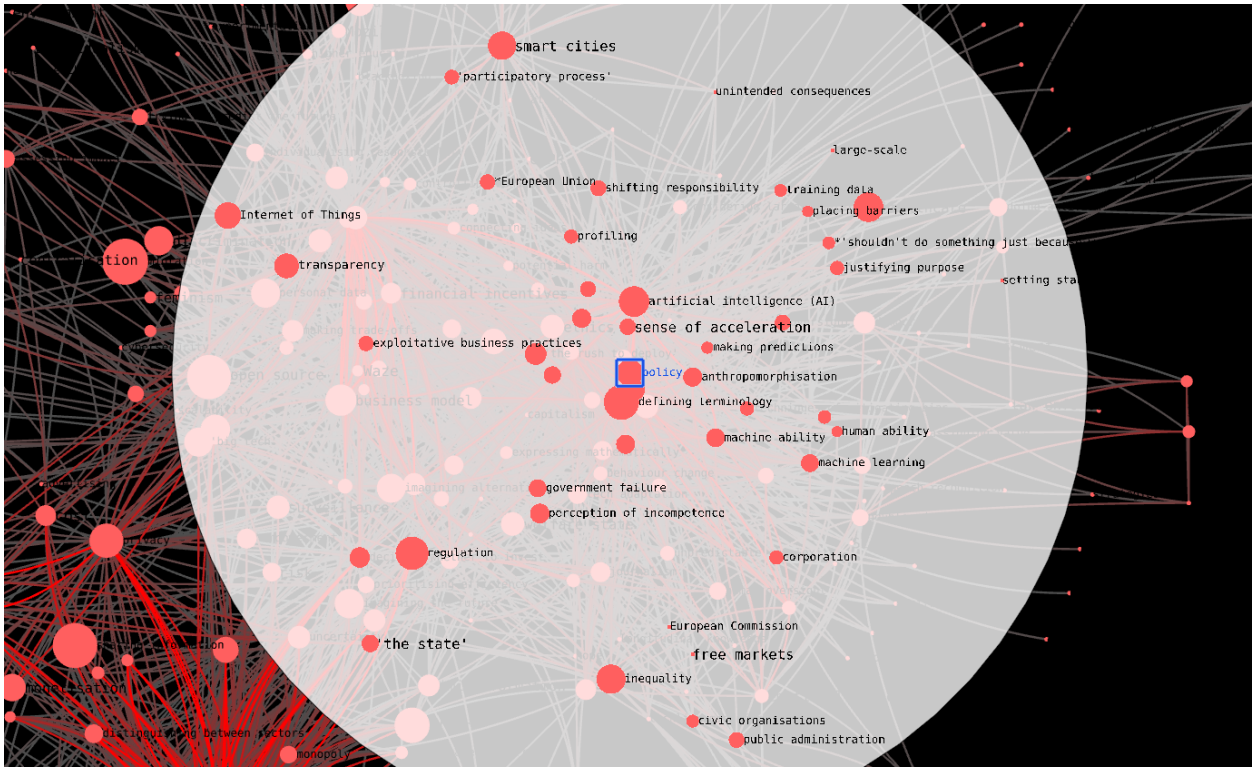

Figure 30. Ego network of "policy" with association depth >= 10.

1. Oversight

Participants expressed the overwhelming sentiment that deploying AI systems "just because we can" is not a sufficient reason. One way to challenge the 'rush to deploy' is by demanding a clear and compelling warrant from stakeholders, including governments and private actors responsible for implementing AI technologies. Justifications should also include information about training data, potential harms, and limitations that demonstrate whether stakeholders have seriously considered the technology's impact on social life. In this regard, justification also increases transparency. One medical professional at our 2019 workshop on AI, Inequalities, and Justice, echoed the importance of justifying purpose:

> I just read a review of 37,000 studies of AI in medicine. Of these, only about 100 had enough information on training datasets to do a meta-analysis on. Of these,

> 24 claimed prospective design (the algorithm had been trained without knowing the real data); of these, zero had actually done prospective design…I don't know any real medical problem that prospective AI model can solve.

The increased transparency from justification can enhance oversight of existing systems, both at the regulatory and technological level. Once made transparent, lessons from implemented systems can set industry standards. They can also advise techniques of mitigating bias so that technologies in use can reduce harmful impacts.

2. Government failure

The previous intervention addressed short-term impacts of AI technologies. Our participants called for a large-scale intervention that addresses both government failure and the increasing power of tech corporations. @J_Noga's reflections capture how Big Tech's power works in tandem with government failure:

> Governments often don't understand the systems, especially on the local level, they don't have access to the data that's being produced. They outsource the entire management of the systems, the key criteria, to private parties. And I think that's a problem. And I think that if we take a very close look at how we design the infrastructure, we will be locked into long term contracts, with very expensive systems that will decide how people live together in a city for decades to come. I think we have a real opportunity to make this more participatory and more accountable, but we have to take it.

In other words, governments have outsourced AI technology policy decisions and decisions about the public good to corporations. To rectify this, participants suggested strategies for challenging tech companies' exploitative business practices and redirecting resources by deciding whether to invest in AI technologies. Participants also discussed ways of empowering 'the welfare state.'

3. Paradigm shift

Finally, participants contemplated how AI systems—the people, resources, and institutions that make them possible—can be reoriented to serve common good. The first

step is `reframing questions` and priorities so that AI systems' purpose and potential impact are understood in relation to their contribution to public life. Zimmermann's reframing questions, for example, asked:

> To address the model-world interaction problem in a more meaningful way, we must ask: what is the purpose of using algorithmic decision making for a given problem in the first place? What—and indeed whom—are we defining as a problem? What sort of data are we trying to look at, and does that data really help us solve the problem? Which populations are most affected by technological innovation, both positively and negatively?"

Reorienting AI development and deployment toward human well-being requires shifting the order in which corporations and governments think about AI – first considering the problem, then asking if AI is the solution, rather than looking for places to develop and deploy AI technologies. It requires better education of government workers so that Big Tech does not take advantage of policymakers' ignorance, and it also requires more regulation of Big Tech so that financial incentives do not override the public good. And sometimes, perhaps even often, it means not using AI at all.

8. Conclusions

In conclusion, we return to the concept of convivial labour. Taking NGI Forward, according to the participants in the debate on the NGI Xchange forum, requires community-focused, collective work in everyday life, building the near future together. In this report, we have shown participants' commitment to articulate the steps necessary to realise the future of just and equitable technology development and each of our roles within it: unpacking what change needs to happen at individual, community, different government levels, and corporate levels to bring into being the futures we imagine.

These often involve pumping the brakes on technological development rather than accelerating it, reflecting deeply on the values we want to encode in our technologies

and identifying the actors impeding the creation of networked technologies and policies that truly support human well-being.

In ethnography, we do not just look at *what* people talk about, but also analyse *how* they talk about things. We identified three repeated actions that the community has continuously performed in discussing these topics: **"Negotiating Values"**; **"Imagining Dystopian and Utopian Futures"**; and **"Building Communities of Practice**." We begin by highlighting them.

8.1 Negotiating Values: Power and Agency

Interaction on the NGI Xchange forum was characterised by a shared sense of responsibility and an urgency to question and reframe the often taken-for-granted concepts we use when we speak about technology and policy. Participants asked questions like: what does it mean for technology to be 'green', to be truly environmentally sustainable? What does it mean for cities, homes, and digital tools to be 'smart'? Who or what is left out of being 'smart', or left behind in its pursuit? Engaging in this nuancing conceptual work – asking about the values and power dynamics embedded in technologies and who drives the social, political, and economic discourse about those technologies' utility – helped participants pinpoint where to intervene. It also allows us *to highlight our participants' understandings of the role of policy in ensuring that networked technologies are developed, deployed, and monetised in a way that maximises human well-being.*

Particularly in light of the international anti-racism movement, we saw a wide discussion of the ways in which networked technologies, AI and surveillance tools contribute to inequity: the development of facial recognition technology disproportionately puts people of colour at risk of being targeted by law enforcement which has significant impact on social and economic mobility and enfranchisement, algorithms – as they are currently being programmed – produce and reproduce racial

and ethnic bias, the Internet has become a key messaging tool for right wing and white supremacist groups, and there is still wide racial and gender disparity in technology research. Participants in the NGI Xchange forum showed substantial experiential knowledge of these phenomena. Their knowledge and experience would be precious for policy design.

This effort by participants to bring values into the conversation on Internet technology, we speculate, is why the codes `defining terminology` and `nuancing the debate` occurred so frequently in the corpus, and connect to `agency` via `personal data` and `open source`. The codes demonstrate a key point on values, repeatedly articulated by participants: *there is a difference between "can" and "should" when it comes to creating new technologies, and we need community-informed policy to decide the question of "should" before powerful actors rush to profit off the "can"*.

The less we take for granted both as participants and as ethnographers, the more we can see the double-edged sword of technological progress as producing both new opportunities for the future but also as potentially exacerbating existing inequity. This double-edged sword brings us to the next key action undertaken by participants when discussing the Next Generation Internet.

8.2 Imagining Dystopian and Utopian Futures

Most of the community's conceptual work was forward-moving and future-oriented, in many ways capturing the momentum behind early notions of the Next Generation Internet. Participants repeatedly asked: How do we need to change networked technologies and digital policy in the present to avoid manifesting the futures we wish to avoid?

NGI Xchange participants demonstrated the ways in which current decision-making maintains and even exacerbates existing power dynamics, allowing private corporations

and Big Tech to dominate the discourse. Many cited a notable disjuncture within state and social understandings of futurity, often grounded in competing and unequally prioritised temporal models. In this sense, an urgency exists to challenge the status quo and develop technology and policy that will contribute to greater equity, transparency, and individual agency: creating publicly accessible and resilient economies, infrastructures, and freedoms.

So, what does the future of the Internet and all it encompasses look like? And importantly, how do we concretely, practically, get there? Visions of the future often navigate between the dystopian and the utopian: future dystopias include global pandemics, runaway environmental disaster, fully autonomous, uncontrollable AI systems and other narratives of crisis, breakdown, and catastrophe. Utopian futures, meanwhile, envision new political-economic systems: resilient global communities built from the promises, not perils, of networked technologies. Social scientists have used these dystopian and utopian taxonomies to describe how individuals and groups orient and organise themselves in time and space, as well as how decision-making is embedded within our relationship to time and our imaginable temporal horizons.

NGI participants came together to consider how networked technologies contribute to 'crises' of the present, how they might lead to long-term dystopian outcomes, and importantly, how networked technologies can be used as a tool to promote human well-being (e.g. advancements in medicine and climate protection, the growth of global communities, and mechanisms to equalise resource distribution and increase organisational capacity).

8.3 Building Communities of Practice

In this report, we spoke about the hope that our participants invested in the work that they do. Their desire to realise the potential for networked technologies to facilitate human well-being and just alternatives to the current status quo often manifested as

hope about new ideas. The strength and quality of such affective positions may tell us a lot about the degree of momentum a given theme, project or issue may be gaining. In our project, the task of participants, ethnographers, and community managers was also to keep up the momentum: to capture the affective potential invested in imagining the future Internet and to provide a reason for people to invest in future-making projects together.

We met with one of our community managers, @MariaEuler to discuss her experience of coordinating the NGI platform. Maria talked about a range of issues raised by the community: from remote work and co-working, freelance work and the gig economy, start-up culture, the promise of open source models, the precarity of academia, project funding, advertising and content moderation, work in the time of Covid-19, the future of work and AI, as well as the ways in which 'classic' labour models are shifting in the digital age. She talked about the values participants place on different forms of labour and how new emerging business models are striving to re-frame people's priorities, particularly when it comes to empowering local communities and female entrepreneurs and facilitating childcare. Many of the topics Maria addressed overlap a great deal, particularly when it comes to the ways in which participants situate their expectations for more equitable, safe, and flexible working conditions – aided in large part through networked technology.

Maria described how her vantage point as a community manager allowed her to at once facilitate interaction, mediate discussions, and help build spaces for members to network and collaborate. This embeddedness over the course of the project means that both community managers and the ethnography team have a longitudinal view of community interaction over time: we were able to trace how projects are started and developed and how new collaborations are formed. We got to hear about the challenges our participants faced applying for funding, informing policy, developing new digital

tools, and building sustainable alternatives to our current models. In this sense, we observed how a range of experts were building the future of the Internet in real time.

Maria expressed that while it is important to come together to imagine a project, you also need people who champion it – who continue to drive momentum, facilitate collaboration, and provide resources (often across disparate spaces and groups). This forward movement requires people living in diverse communities to together lay out the steps necessary to realise better near futures. Anthropologists like Amanda Wise (2016) have termed this kind of community-based, collective effort *convivial labour* – describing the often difficult, practical, everyday work required to negotiate a shared life despite difference. This concept also foregrounds the ways in which people collectively imagine every day to plan the future, highlighting the importance of studying how people develop communities of practice both through and despite their differences.

It may not be initially surprising to find that participants sought to define and build collective futures. Such an orientation was not guaranteed, however, as the NGI XChange forum comprised a broad range of experts from different disciplines and areas of expertise. Such heterogeneity is important for eliciting a nuanced discussion on broad issues like the future of the Internet. However, it can sometimes lead to fragmentation, with members holding on to their own specific worldviews.

We did not find this siloing in the NGI community. Instead, from the beginning, we found an underlying sense of collective action, community organising and an interest in transparency and accountability: in short, in convivial labour. Furthermore, participants from different backgrounds overlapped quite significantly on some core issues, weaving together ideas (as evidenced by the semantic social network built from co-occurring themes). The community thus consisted of experts that overlap quite a bit demographically, but are experts in different things. Despite these different expertise areas, they agreed on several key values, and found it natural to organize each other towards common action.

To conclude this report, we provide key take-home points from our ethnographic study of the NGI Xchange forum debate.

8.4 Key Findings

Finding 1: The Next Generation Internet can and must help us build resilient offline spaces as much as online spaces.

The debate emphasized the connections between the Internet itself, and the effects it has on offline spaces. `covid-19` has led to an increase of `working remotely`, perhaps unsurprisingly. But it has also led to a shift of living conditions, particularly `co-living` and `co-working`, totally reshaping the division of `public space` and `private space`, leading community members to `building alternatives` and `organising space` differently.

Even in a project where we focused attention on the online sphere, impacts and effects on offline life show up everywhere, and making the Next Generation Internet involves changing physical space as much as changing online space. Networked technologies permeate every aspect of human life, and therefore have the potential to change it for the worse or better. Our findings do not just have relevance for digital policy – though we generated important recommendations like the need for governments to regulate Big Tech companies.

We can also conclude the following: people need a place to work (and live) that gives them a sense of community. Work-life balance is diversifying, so these spaces will not all look the same, and because of the capacities of online communication, we can begin to radically rethink what a workspace is, to make it more conducive for the well-being of more people.

We also learned important lessons about the limits of online communication – and how we must create hybrid online-offline solutions to ensure well-being. The Internet

holistically affects human experience, so considerations of public space and access should still factor in crafting the Next Generation Internet.

People need spaces, both offline and online, to labour convivially together. The next generation Internet can help make this happen. We therefore conclude that digital policy should not simply be understood as just creating or regulating digital technologies. It is also about ensuring people's right to access spaces, tools, and support to live healthful, sustainable lives in a world increasingly shaped and mediated by networked digital technologies.

Finding 2: We need to empower communities to effect change in their near futures – giving them solutions that neither individualise responsibility for global crises nor remove their power to make change that starts at a local level.

Community members repeatedly raised issues with the notion of individualising responsibility – pointing out that responses to problems that are created by and large by institutions are being proposed on the individual level (e.g. improving your own privacy settings, making decisions about what you're willing to trade off, becoming more educated about the promises and perils of online behaviour; recycling when corporations are responsible for the bulk of climate change issues). Their evaluations align with academic and journalistic assessments of neoliberalisation and the abdication of corporate and government responsibility (Parr 2012).

Throughout the debate, we see the emergence of community responses that are neither individualised nor emerge from bureaucratic institutions, like open source projects and citizen education movements. We wonder: are these the areas we might be able to effect change in — bigger than the individual, but not as daunting as trying to change the behaviour of big corporations head-on? Follow-ups emerge from this: how accessible are these collective responses? For example, are open source movements accessible to more than just a small amount of homogenous people in terms of socioeconomic demographics? Do these citizen education projects still serve to shift focus and blame

away from Big Tech/corporations, or do they offer another way forward in terms of collective action?

We propose that institutions like local governments should allocate resources at this level: small enough to still be dialled in to what people living their everyday lives want and need, but big enough to make real decisions for the collective and effect change that expands out from the community level.

Finding 3: Governments also need to do some serious regulation work when it comes to Big Tech companies, because their financial incentives are fundamentally at odds with human well-being. *The role of policy is to ensure that technologies are developed, deployed, and monetised in a way that maximises human well-being.*

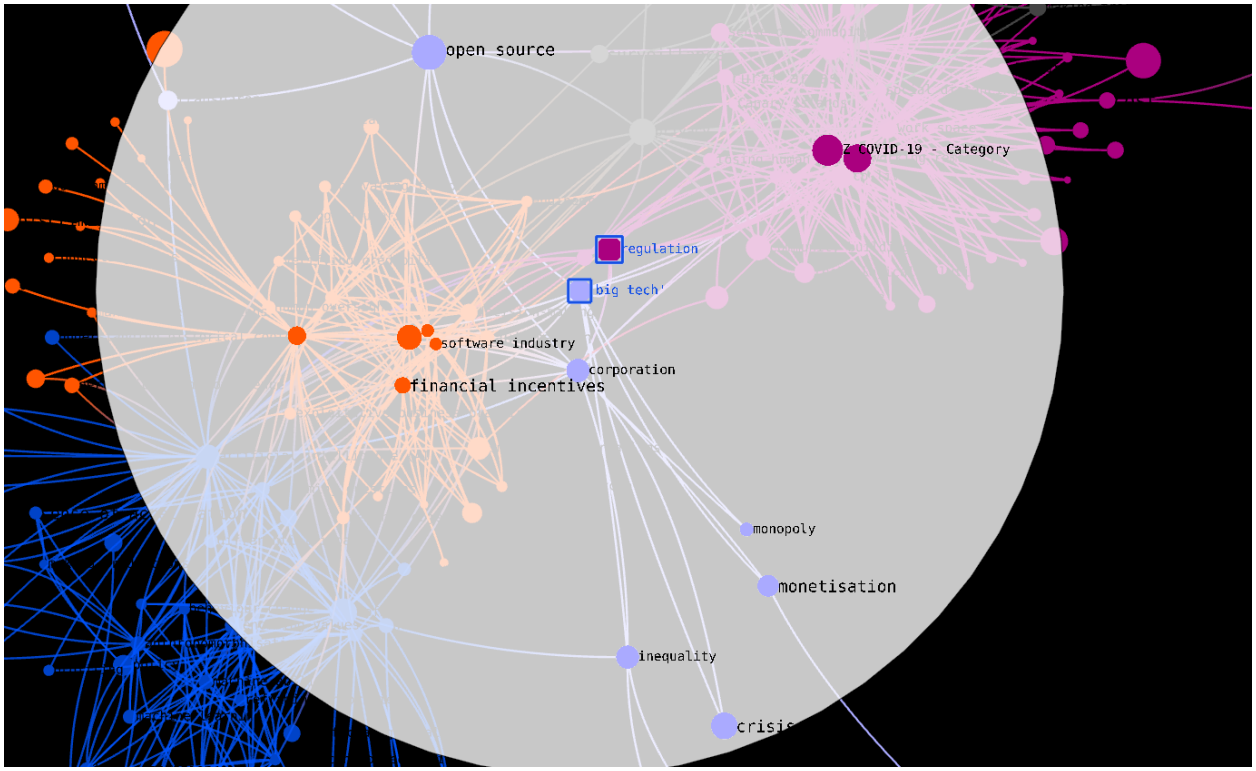

Figure 31. Ego network of "Big Tech" with association depth >= 25.

People feel hopeless in the face of Big Tech's power when it comes to making decisions about privacy or the safety of new technologies, especially as these technologies become increasingly impossible to live without. Repeated ad nauseam across different threads by different community members about different technologies was a call for more regulation of Big Tech companies and the technologies they create, whose financial incentives are too often antithetical to the public good. *Regulate Big Tech!* This point is straightforward but gravely important to heed.

Finding 4: Not all good solutions are technological (and most are not ONLY technological). We need to combine good organisational policy with good technology.

It is tempting to try and solve problems with technology, particularly for governments, who often see technological fixes as the shortest distance to a solution. But given that many issues, like resource access and inequality, are exacerbated by techno-solutionism, we stress that most solutions to crises and persistent problems are not going to be solved by technology alone. Though technology can help people innovate around problems, corporate greed and bloated regulatory bodies often stand in the way of open source development and of good organisational communication and coordination. Since these problems are socio-political and organisational, not technological, they require political will and organisational innovation to overcome. As @matthias argued:

> I strongly believe that this is more of a challenge of how we organize the work with these common challenges as a society rather than finding one or many technological solutions to all of it. Technological solutions solve technological challenges.

Finding 5: We always encode values into our technologies, whether we like it or not. We need to recognise what values are already being encoded, decide what values we want to encode, and make changes if those do not match: there is no neutral ground.

As @alberto puts it, reflecting on Blockchain:

> The original group of developers that rallied around Satoshi's Nakamoto White Paper had a libertarian ideology: they dreamed of a trustless society, where contact is reduced to a minimum and anonymised, and were obsessed with property rights. So, they built a technology that encodes those values, which in turn attracted more people than believe in those values. Code is law, they said. If someone *can* technically do something, that something *is allowed*, even moral, under some kind of tech version of social Darwinism. When the DAO was hacked in 2016, exploiting vulnerabilities in the Ethereum blockchain, the perpetrator *bragged* about it: if I stole your money, it's your own fault, because code is law. I am just smarter than you, and I deserve to walk away with your money.

As we foregrounded at the beginning of this report, the question of how to imagine and create the Next Generation Internet is at its core about the values we choose to encode in our technologies. Key to this insight is the point, hammered home by myriad community members and unpacked in nuanced ways, that *technologies always encode values and perpetuate those values through their use*. All technologies are human-made and therefore never neutral or without bias. Identifying and intervening in that process of value encoding is fundamental to the creation of a human-centric Internet.

Discussion of these values gets at the heart of how to imagine the Next Generation Internet in an equitable and just way. So, we return to our original question: who currently has the power to not only design the Internet, but define the terms on which it is designed, both discursive and material? and conclude: *there is a difference between "can" and "should" when it comes to creating new technologies, and we need policy to decide the question of "should" before powerful actors rush to implement the "can"*.

Finding 6: We need to be both creative and practical about how we imagine possible futures – and not evacuate the near future. Not all kinds of future imagining are equally useful.

Communities and governments often imagine the future at different timescales. We argue that we must not evacuate the near future in favour of knee-jerk reactivity (which often leads to failed tech-solutionism) or think too far in the long-term (abandoning the needs of those in the present and espousing abstract ideals rather than concrete plans). Taking care of the near future requires both imaginative creativity and practical, stepwise thinking – about what and whose actions in the present can concretely expand the equity and transparency of the Next Generation Internet.

References

Abu-Lughod, Lila

2000 Locating Ethnography. Ethnography 1(2): 261–267.

Adam, Barbara

2004 Minding Futures: A Social Theory Exploration of Responsibility for Long Term Futures. Citeseer.

Adam, Barbara, and Chris Groves

2007 Future Matters: Action, Knowledge, Ethics. BRILL.

Bloch, Ernst

1995 The Principle of Hope. Vol. 1, vol.1. Neville Plaice, ed. 1. MIT paperback ed. Studies in Contemporary German Social Thought. Cambridge, Mass: MIT Press.

Blondel, V.D., Guillaume, J.L., Lambiotte, R. and Lefebvre, E.,

2008 Fast unfolding of communities in large networks. *Journal of statistical mechanics: theory and experiment*.

Boellstorff, Tom.

2008 Coming of Age in Second Life: An Anthropologist Explores the Virtually Human. Princeton University Press.

Bryant, Rebecca

2016 On Critical Times: Return, Repetition, and the Uncanny Present. History and Anthropology 27(1). Routledge: 19–31.

Bryant, Rebecca, and Daniel M Knight
2019 The Anthropology of the Future. Cambridge University Press.

Coleman, E. Gabriella
2010 Ethnographic Approaches to Digital Media. Annual Review of Anthropology 39(1): 487–505.
2015 Hacker, Hoaxer, Whistleblower, Spy: The Many Faces of Anonymous. London: Verso.

Cottica, Alberto, Amelia Hassoun, Marco Manca, Jason Vallet, and Guy Melançon
2020 Semantic Social Networks: A Mixed Methods Approach to Digital Ethnography. Field Methods 32(3). SAGE Publications Inc: 274–290.

Criddle, Cristina
2021 Bitcoin consumes 'more electricity than Argentina'. BBC News (10.02.2021). Accessed 30.07.2021. https://www.bbc.co.uk/news/technology-56012952

DeNoon, Daniel
2006 Salt-Water Fish Extinction seen By 2048. CBS NEWS (02.11.2006). Accessed 30.07.2021. https://www.cbsnews.com/news/salt-water-fish-extinction-seen-by-2048/

Emerson, Robert M., Rachel I. Fretz, and Linda L. Shaw
2011 Writing Ethnographic Fieldnotes, Second Edition. 2 edition. Chicago: University of Chicago Press.

Geertz, Clifford
1994 Thick Description: Toward an Interpretive Theory of Culture. Readings in the Philosophy of Social Science: 213–231.

Ghoniem, Mohammad, Jean-Daniel Fekete, and Philippe Castagliola
2005 "On the readability of graphs using node-link and matrix-based representations: a controlled experiment and statistical analysis." *Information Visualization* 4, no. 2 (2005): 114-135.

Glaser, Barney G., Anselm L. Strauss, and Elizabeth Strutzel.
1968 "The discovery of grounded theory; strategies for qualitative research." *Nursing research* 17, no. 4 (1968): 364.

Gray, Mary L., and Siddharth Suri
2019 Ghost Work: How to Stop Silicon Valley from Building a New Global Underclass. Illustrated edition. Boston: Houghton Mifflin Harcourt USA.

Guyer, J.I.
2007 Prophecy and the near Future: Thoughts on Macroeconomic, Evangelical, and Punctuated Time. American Ethnologist 34(3): 409–421.

Kelty, Christopher M.
2008 Two Bits: The Cultural Significance of Free Software. Duke University Press.

Kolt, Noam
2019 Return on Data: Personalizing Consumer Guidance in Data Exchanges. Yale Law & Policy Review 38(1): 77–148.

Melancon, Guy.
2006 "Just how dense are dense graphs in the real world? A methodological note." In *Proceedings of the 2006 AVI workshop on BEyond time and errors: novel evaluation methods for information visualization*, pp. 1-7.

Munzner, Tamara.
2014 Visualization analysis and design. https://doi.org/10.1201/b17511

Nardi, Bonnie A.
2010 My Life as a Night Elf Priest: An Anthropological Account of World of Warcraft. Technologies of the Imagination. Ann Arbor: University of Michigan Press: University of Michigan Library.

Oltermann, Philip
2020 Glitches dent German enthusiasm for Covid contact tracing app. The Guardian (23.09.2020). Accessed 15.06.2021.https://www.theguardian.com/world/2020/sep/23/glitches-dent-german-enthusiasm-for-covid-contact-tracing-app

Parr, Adrian
2012 The Wrath of Capital: Neoliberalism and Climate Change Politics. Columbia University Press.

de Peuter, Greig, Nicole S Cohen, and Francesca Saraco
2017 The Ambivalence of Coworking: On the Politics of an Emerging Work Practice. European Journal of Cultural Studies 20(6). SAGE Publications Ltd: 687–706.

Roitman, Janet L.
2014 Anti-Crisis. Durham: Duke University Press.

Rosaldo, Renato
1993 Culture & Truth: The Remaking of Social Analysis: With a New Introduction. Boston: Beacon Press.

Saldaña, Johnny
2016 The Coding Manual for Qualitative Researchers. 3E [Third edition]. Los Angeles; London: SAGE.

Temple, James
2019 Bitcoin mining may be pumping out as much CO2 per year as Kansas City. MIT Technology Review (12.06.2019). Accessed 30.07.2021. https://www.technologyreview.com/2019/06/12/873/bitcoin-mining-may-be-pumping-out-as-much-cosub2-sub-per-year-as-kansas-city/

Wise, Amanda
2016 Convivial Labour and the 'Joking Relationship': Humour and Everyday Multiculturalism at Work. Journal of Intercultural Studies 37(5). Routledge: 481–500.

Appendix: a list of “conversation starting” posts

What follows is a list of the “conversation starting” posts mentioned in section 2.3.

1. Seda F. Gürses | Researcher on conceptions of privacy and surveillance in online social networks, requirements engineering, privacy enhancing technologies and identity management systems - link
2. What does it take to build a successful movement for citizens to gain control over when, how and to what use automated systems are introduced and used in society? – link
3. What does the future of civil society advocacy look like, given the prevalence of these digital technologies and their impact on the work that civil society is currently doing? - link
4. Can tech design for survivors? How sex, violence, and power are encoded into the design and implementation of data/AI-driven sexual misconduct reporting systems – link
5. Why is all this innovation not being channeled into ways for people to help them live a better life? – link
6. An interview with Fabrizio Barca Founder, Forum on Inequalities and diversity I Ex General Director, Italian Ministry of Economy & Finance – link
7. How can we put humans/citizens first in our smart city policies? – link
8. Startups' grand illusion: You have to be 10x better than what’s there – link
9. Ownership and Community Key to Coworking – link
10. Remote work with human interaction is the way of the future – link
11. Distributed Teams as Distributed Economic Development – link
12. Coworking has the potential to be a great equalizer – link

13. Recover from COVID with Flexibility – link
14. Covid presents opportunity to breathe life back into rural communities – link
15. Can coworking burst small-world complacency? – link
16. Virtual collaboration emerging as the competitive advantage of 2020 – link
17. 5 New Principles for Justice in the age of AI (and other networked technologies)? – link
18. Welcome to retirement! – link
19. On identity, trust and the horizon of technical progress – link
20. Where next for online identities? Notes from NGI Forum from workshop 1 – link
21. To synchronize or not to synchronize: How we collaborate over the Net – link
22. Research findings on Good Practices of Distributed Organizations: Culture, Communication and Technology – link
23. A surveillance pandemic? Results of the community listening post on risks for freedom in the wake of COVID-19 – link
24. Is the communitarian Internet back in the wake of COVID-19? – A conversation with Howard Rheingold – link
25. Ideas to demand more of the internet and for the planet – link
26. Interview: Jon Rogers of OpenDoTT & University of Dundee on participatory futures – link
27. Non-Ubiquitous and Communal Internets – link
28. Interview with Marcel Schouwenaar: Are housing cooperatives the future? – link
29. Edgeryders Internet of Humans Fellows: Interviews and Podcasts with Peter Bihr – link
30. How do we organize society for a whole-systems approach for developing the Internet? – link
31. My story - Thoughts on collaboration – link
32. Building my own browser to explore decentralized discovery – link
33. Managing the Infrastructural Unknown: Magic as Craft – link

34. A Radically New Internet - A Study on P2P Protocols and Mesh Networks – link
35. Zenna Interviews Max Schlüter on the Nature and Propagation of Memes – link
36. Hola from Pablo Velasco (xpablov) – link
37. Interview with Andre Staltz on Decentralized Networks – link
38. Noah Schoeppl - AI strategy associate at ALLAI and member of the management team of ProjectTogether, a Berlin-based digital incubator for social innovation. – link