D1.13: Value-driven future internet: A social science perspective I

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1 Introduction

Techno pessimistic and optimistic discourses of the internet have always existed, but we are currently witnessing a profound lack of trust in the internet. Earlier, the story of the internet was a story of a broader civic engagement and a healthier democracy (Abbate, 2000; Berners-Lee, Dertouzos, & Fischetti, 1999; Gillies & Cailliau, 2000; Rheingold, 2000). But as humans are losing control to data-driven business models and non-human-centric internet technologies, that story is changing.

Today, the story of the internet has two dominant narratives - both of which leave little agency to the users. The American model - ruled by capitalist market powers with internet giants harvesting massive amounts of personal data to shape human behaviour - and the Chinese model characterized by mass surveillance and government control of the internet exemplified by the Chinese Social Credit System.

But the two dominant internet models do not go unchallenged. Recently, several revelations have caused controversy - perhaps most notably the Cambridge Analytica scandal, coupled with the disclosure of frequent and massive scale hacking and surveillance operations, such as the Chinese hack of more than 500 million Marriott customer records and the case of Exactis where 340 million personal records were exposed on a publicly accessible server. The public backlash from these and several other scandals worldwide show a real demand for more ethical alternatives to the dominant internet models.

To support a more human-centric evolution of the internet, more progressive development of internet technologies and policy is needed. Otherwise, the development of the internet technologies of the future will remain in the hands of internet giants in monopoly-like positions on the global data market (e.g. Zuboff, 2019).

In this process, expertise from the internet research community will be crucial. With the purpose of feeding research insights into the European Commission's *Next Generation Internet* initiative, a future workshop (Jungk & Müllert, 1987) was held at the annual conference for the *Association of Internet Researchers* on October 2nd, 2019, kicking of a series of three expert workshops with leading internet research stakeholders.

1.1 Purpose and scope

The workshops are organized as part of NGI Forward, Work Package 1: *Topic identification*. The work package aims to identify and map emerging technologies and related social issues with the purpose of creating a shortlist of key NGI topics which will play a central role in shaping the future internet and help inform future NGI funding calls and research agenda.

At three points throughout the project, a formal selection of 8-10 key NGI topics is made based on a mix of quantitative and qualitative approaches. The quantitative approach will be based on big data insights from different online sources and databases, while the qualitative data is gathered through the above-mentioned workshops.

The present report details the qualitative approach to and the main outcomes of the first research workshop, held on October 2nd, 2019, at the annual conference for the *Association of Internet Researchers*. The results will be synthesized together with the results from the data studies in a future report to be published in March 2020, detailing the evaluation criteria behind the selection of the first set of NGI topics.

In the first part of the report - the methodology section - the qualitative approach used in the workshop and reasons for choices made in the preparation of the workshop are outlined, while the results from the workshop are outlined in the second part of the report - detailed results can be found in the appendices.

2 Methodology

With the aim of gathering insights from stakeholders in the internet research community on the future development of the internet, the workshop format is a useful qualitative data collection method. The workshop is an established research methodology to produce reliable and valid data about a domain regarding forward-oriented processes, and Ørngreen & Levinsen (2017) categorises workshops as is an especially useful research methodology in studies of emerging and unpredictable concepts - such as the internet (p. 73).

2.1 The future workshop format

This present workshop was conceptualised in the *future workshop* format originally developed by Robert Jungk, Ruediger Lutz and Nobert R. Müllert in the 1970s for groups of people to develop new ideas or solutions of social problems (Jungk & Müllert, 1987). Since, it has become a useful method for any kind of complex problem that requires the involvement of different stakeholders, particularly in the field of action research as a method to carry out participatory research aimed at bringing about social change (Alminde & Warming, 2019, p. 4).

Future workshops are split into three phases that participants go through: the critique phase, the fantasy phase and the implementation phase.

In the critique phase, the problem that is in focus at the workshop is investigated critically and thoroughly through visualised brainstorming. In a phase similar to this, we asked our workshop groups to identify two internet-related human and societal issues, two internet technologies and two internet-related values that they foresee will be dominant in 2030. They were then asked to write the issues, technologies and values up on common lists on the walls and prioritize the list of issues in accordance to their importance. 'Wall papers' - paper flip charts hung on the walls - are common in both the critique phase and the fantasy phase of a future workshop (Alminde & Warming, 2019, p. 5).

In the fantasy phase of a future workshop, participants work on utopian ideas about the best possible ways to solve the problems identified in the critique phase. We asked the workshop groups to pick one issue from the list and work on a solution to set issue. In this phase, reality is suspended to support creativity and imaginative thinking in order to avoid developing pragmatic solutions that may not actually solve the problem but just appear to be the most realistic option (Alminde & Warming, 2019, pp. 4–5).

Traditionally, participants work on these ideas in the last phase of a future workshop - the implementation phase - to plan how to transform them into actionable next steps (Alminde & Warming, 2019, p. 4). For this part of the workshop, we provided the participants with a list of eight internet-related topics identified in D1.2 from a dataset of news articles and academic papers (Gyódi, Nawaro, Paliński, & Wilamowski, 2019), and asked them to reprioritize, rename or replace the list to better reflect the ideas, values and solutions discussed in the two previous phases.

Although this is an alternative approach to the implementation phase - as the participants are not working directly with the ideas generated in the fantasy phase - the work in this final phase of the workshop will indirectly help realise these ideas, as the lists of topics will end up informing the future NGI research agenda and future funding calls.

After the three phases of the workshop, all groups presented their discussions to the other groups - a session that we chose to audio record with consent from the participants, all of whom are anonymized.

2.2 Choice of venue

The venue for the workshop was the annual conference for the Association of Internet Researchers (AoIR) held from 2-5 October, 2019, at Queensland University of Technology in Brisbane, Australia. AoIR is an international and interdisciplinary academic organization that is focused on the study of the social, cultural, political, economic, and aesthetic aspects of the Internet and its use. The AoIR Conference is an annual Internet Research conference that brings together hundreds of academics, researchers, graduate students and other participants ("About – AoIR," n.d.).

AoIR is one of the largest organizations in the world devoted exclusively to Internet research, and it prides itself in taking a leading role in advocating ethical and socially responsible approaches to Internet research. Thus, it is an obvious venue for the workshop. Also, the AoIR community is made up of internet researchers from mostly social sciences and the humanities - disciplines that will need to play a central role, if the future internet should be more human-centred and driven by ethics and values.

2.3 Participants and survey

40 persons from universities across 16 different countries participated in the workshop, and they were divided into eight groups of five people. The size of the workshop groups was restricted to allow everyone the chance to be heard.

Before the workshop, participants were asked to fill in a participant survey containing questions on academic background and field and one qualitative question asking participants for their initial reflections on the topic. This was included to collect the participants' immediate, individual reflections - before they are tinted by the workshop agenda and the other group members - and to prepare and prime their lines of thought in the direction of the workshop topic. The participant survey was answered by 26 (65%) of the 40 participants. The answers to the qualitative question are part of the results in the next section.

3 Key outcomes and discussions

In the following, results from the workshop are outlined. All results in detail can be found in the appendices.

3.1 Survey and first brainstorming exercises

In the pre-workshop survey, we asked about which technologies, values and ethics the person wishes to have in the core of the future internet. In the answers, there was a large focus on values with transparency and inclusion as consistent answers but also with several mentions of trust, equality, diversity and sustainability. In regards to technologies, only artificial intelligence and machine learning were consistently mentioned. See all answers in appendix 6.1.

In the critique phase of the workshop, three lists were produced. After group discussions, the workshop participants wrote up lists of internet technologies that they foresee will be dominant in 2030, internet-related human and societal issues that they fear may be dominant in 2030, and internet-related values that they foresee will be central in the development of a more human-centered future internet. Below you can find the three lists - presented in the order written by the groups on the wall papers. The groups wrote on the wall papers in turn and were told not to repeat already mentioned points, so the lists are not in any meaningful order (any repetitions are deleted below - see unedited lists in appendix 6.2).

Issues:
Community and community cohesion
Human dignity
Digital and data divide
Public vs. private ownership
The right to be forgotten
Deep fakes
Silencing and ostracization
Digital intimacies
Online violence
Data sovereignty
Fixed identities
Asymmetrical velocities of data management
Surveillance and privacy
Access and education
Social credit systems and social control
Environment
Control
Safety
Trust

Technologies:
AI
Quantum Computing
Sustainable data infrastructures
Children related technologies
Neurotech
(De)centralized control
BlockChain
IoT
Transport and logistics
Online Social Media (anti-social media)
IoT Plus (e.g. embodied technology)
Single key access to all services (biometric)
Obscured tech for personal privacy
Algorithmic transparency
Smart infrastructure
Multiplicity of technologies, platforms, etc. instead of widespread standards
Email (with only a pretence of encryption)

Values:
Collective data rights
Social justice
(Data) sovereignty and autonomy
Environmental sustainability
Accountability
Transparency
Forgiveness
Diversity
Caring autonomy (responsive choice)
Distributed leadership
Self determination
Individualism vs. common good
Social cohesion
Human-centred

When prioritizing the lists of issues, the workshop groups prioritized issues related to the environment very high - as one group put it; “everything else reflects on this” (appendix 6.3). All groups had “Environment” in their prioritized list of issues, and the five groups that ranked the issues all had “Environment” in their top three.

Other than the environment, issues such as trust, control and surveillance, privacy and data sovereignty, online violence and digital divide, access and education were consistently prioritized highly. See all prioritized issue lists in appendix 6.3.

Rather than prioritizing the list of issues, some groups divided the most important issues into clusters. For instance, one group divided all the issues discussed into three clusters that are distinctly different: *digital intimacies* covers one-to-one issues and technologies, *control* covers one-to-many issues and technologies, and *environment* covers one-to-all issues and technologies.

The aim of these exercises was to identify the issues that the groups were to solve in the fantasy phase and prime participants thinking in terms of technologies and values that may be central in these solutions.

3.2 Solution development

In the fantasy phase, a number of solutions to issues from the critique phase were developed. Below, three of the solutions are outlined, as they were the most thoroughly worked out solutions. Descriptions of the other solution discussions can be found in appendix 6.4.

3.2.1 The digital divide, access & education

One group used the fantasy phase to come up with potential solutions for the issue of the digital divide. The group focused on values such as dignity and autonomy at the center of their solution which decentralizing technology, policy and society. As one group member put it, it is about “recognizing that technology is just something you do” in your everyday life and not something that is reserved for big US-based companies.

Their major approach to achieving this is through education. The group critiqued schools for primarily contextualizing technology as ‘job skills’ needed for the future careers of students. The group argued that technology needs to be recontextualised as ‘life skills’ necessary in order to interact with the future world and easily acquired by non-technical persons.

This could for instance be achieved through classes focused on issues related to technology and how to deal with them, and classes in programming and software development that demystify technology development for non-developers.

Other than that, they proposed to better empower citizens to decentralise the internet themselves by encouraging and educating citizens to start managing their own communities on the internet in order to break away the idea of the internet being controlled by a few giant platforms. The group did however mention the problem concerning discoverability, since many of these communities will be difficult to discover, but due to the workshop’s time limitations the group did not further develop this part of their solution.

Recommendations:

- Improve digital literacy through education
- Educate in the use of technology as ‘life skills’ as opposed to ‘job skills’
- Educate citizens in digital community management to counteract the platforms

3.2.2 The environmental impact of digital technologies

Another group prioritized environmental problems the highest in their list of issues and chose to focus their efforts in the fantasy phase to propose solutions that highlight the environmental impact of digital technology.

The group mentioned several examples of this environmental impact, such as e-scooters that produce more carbon emissions per mile than traveling by bus, bicycle, moped or on foot (Hollingsworth, Copeland, & Johnson, 2019), carbon emissions produced by Bitcoin that sit between the levels produced by the nations of Jordan and Sri Lanka (Stoll, Klaaßen, & Gallersdörfer, 2019), the mining of lithium for batteries for smartphones, tablets, laptops and electric cars that cause water shortages and toxic spills (Frankel & Whoriskey, 2016), and services like Uber and Lyft that increase pollution and undermine public transport (Erhardt et al., 2019).

In their discussions, they focused on values such as common good, social justice and democracy and proposed a solution space, where a solution to this issue can be found. The

solution space includes a political dimension, a technological dimension and an educational dimension.

Examples of solutions in the political dimension include pressures of taxation, regulation, transnationalism and multilateralism.

In the educational dimension, environmental and media literacy should be improved through better education at schools and universities, through critical media coverage and through technological solutions for self-measurement and datafication of carbon footprint using Internet of Things technologies, e.g. apps that automatically track the user's personal carbon footprint.

In the technological dimension of a possible solution, the group discussed the impact of the internet, Internet of Things and AI on recycling, renewables, smart energy grids etc. They also propose establishing blockchain emission certificates that represent the amount of emissions offset by e.g. Bitcoin mining and control pollution by providing economic incentives to achieve emission reductions - similar to CO_2 certificates in other sectors.

Recommendations:

- Develop further environmental regulation of the tech sector
- Improve environmental literacy through education, media coverage and intelligent carbon footprint trackers
- Establish blockchain certificates that control emissions via economic incentives

3.2.3 Online violence

A third group focused on the issue of online violence - the use of online digital devices or services for abuse, harassment and threats resulting in physical, psychological, emotional harm to another person. The group proposed a solution space based in several different sectors.

As with the previously mentioned solutions, the education sector is a pivotal part of this solution space, and solutions include improving digital media literacy through education in the harm caused by online violence.

Another part of the solution space concerns platform responsibility, and the group proposes to enhance platform responsibility through regulation, moderation, terms of services and policy. They specifically recommend that more data is made available from social media platforms for researchers and other stakeholders to analyze social media behaviour and provide better basis for decisions made to prevent online violence.

A third part of the solution space concerns the incentives on social media. The group proposes to change the incentives for online violence by implementing changes to the social platforms. Examples include recent initiatives discussed by some platforms such as hiding information on the amount of likes on certain posts - a change that may also ensure that certain groups cannot overwrite others, and false subjects are not being highlighted.

Recommendations:

- Improve digital media literacy through education in online violence
- Force or incentivize social media platforms to provide data for researchers to study the issue
- Force or incentivize social media platforms to implement changes that change the incentives for online violence, e.g. hiding likes

3.3 Implementation of ideas

In the last workshop phase, the participants were asked to rewrite a list of eight NGI topics to better reflect the technologies, issues, values and solutions discussed throughout the workshop.

The list of topics were identified in D1.2 and consists of the following topics: *Artificial intelligence and machine learning; Internet of Things; Blockchain and cryptocurrencies; Quantum computing; Internet regulation; Social media and content crisis; Market competition; Chinese tech sector* (Gyódi et al., 2019). The reflections on each of these topics are outlined below together with new topics suggested by the workshop groups. The full lists from each group can be found in appendix 6.5.

As the rapid pace of development on the internet often confounds the slower tempo of especially academic publishing, these topics - identified from a dataset of academic papers and news articles - does not fully reflect the newest dynamics in internet development. It was thus unsurprising that the list of topics was criticized by workshop participants for being outdated by several years and not reflecting the discussions that are currently trending in the internet research community.

Generally, the technology focused topics were criticized for being meaningless without societal context. This coincides with previous thinking within the Next Generation Internet initiative, focusing on technology-agnostic solutions to human problems, where technology is not an end in itself, but rather a means to an end available to any group within society to make a positive impact (see Bego, 2018)

However, *Artificial intelligence and machine learning, Internet of Things,* and *Quantum computing* are still featured in some form on all the lists. Several groups suggested dividing *Artificial intelligence and machine learning* into more specific topics, either sector-specific - such as health AI, internet AI, etc. - or more topically specific - such as agency in AI, algorithmic big data, processing machine learning.

Four out of the eight groups completely removed *Blockchain and cryptocurrencies* from the list, and the topic was criticised for being largely irrelevant in the broader picture, especially cryptocurrencies in terms of actual adoption.

The topic of *Internet regulation* was also criticised in the workshop. As one group put it, the internet is just another zone to regulate, it’s not distinct or special. Six out of eight groups

suggested renaming the topic to cover other topics discussed in the workshop. Suggestions included civil rights, human digital rights, sovereignty, and freedom of speech.

Several groups criticised the topic of *Social media and content crisis* for being too broad, and one group suggested dividing the topic into other, more specific, topics such as disinformation, deep fakes, subjectivity, while other groups suggested renaming the topic to communication trust crisis, content and behavior crisis, or digital literacy.

Four groups completely rejected *Market competition* as a topic, and suggested more specific topics such as internet business models, monopolisation and consolidation instead.

Chinese tech sector as a topic was criticised by several groups for being too narrow as a stand alone topic and for implying that the western tech sector is neutral in regards to e.g. surveillance. Alternative topics suggested include the (mis) use of technologies by governments, surveillance, censorship, control and internet governance.

As mentioned previously, environmental sustainability was a high priority in many of the group discussions, and two groups chose the issue in the fantasy phase. When rewriting the topic lists, three groups also pointed out the topic as missing on the list.

Also, digital media literacy and education were a consistent topic of the workshop discussions, and three groups suggest adding it as a topic on the list, one group even argued that it should be the highest priority on the list. Other new topics suggested include human-centered aspects, tech infrastructure, transparency, and security.

4 Conclusion

It was very clear that despite the identified need for changes to the very technologically oriented topic list, the researchers did not want to make too many distinctions between fields and emphasised the need an interdisciplinary approach to solving these challenges.

However, the discussions in the workshop were largely focused on issues, values and the ethical implementation of technology rather than on the development of technologies. Without societal or sector-specific context, the technologies were deemed meaningless as discussion points in the workshop, and participants argued for a larger focus on technology-agnostic solutions.

This is not a major surprise given that the workshop participants were mostly from the social sciences, and the discussion would most likely have turned out very differently had the workshop been organized as part of a conference in computer science or engineering.

One of the main outcomes of the workshop was the plea from the internet research community for more focus on environmental sustainability in the discourse revolving around a next generation future internet - both in terms of the actual environmental impact of the internet and how internet technologies can help combat environmental issues.

Another outcome was the call for better education in internet-related issues - e.g. online violence and data sovereignty - and better digital media literacy.

These two topics were also significant in the workshop exercise involving the NGI topics list, where they were proposed as new single standing topics. The general focus on values and ethics and on societal issues caused by technologies was also very significant in this exercise, where purely technological topics were criticized. Based solely on the workshop discussions, the list of NGI topics can be rewritten to the following topics:

- Artificial intelligence and machine learning *(possibly divided into more specific topics)*
- Internet of Things
- Quantum computing
- Digital rights
- Information crisis *(possibly divided into more specific topics)*
- Monopolisation of the internet
- Governmental tech (mis)use
- Environmental impact of tech
- Digital media literacy

This list of NGI topics is purely intermediary, and the results from the workshop will be further synthesized with results from different data studies to inform the official selection of NGI topics and the future roadmaps of these topics. The topics and topic guides along with the evaluation criterias behind the selection of topics will be delivered in March, 2020, as *D1.9 NGI Topic guides & evaluation criteria report I*.

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6 Appendix

Notes from the workshop can be found here. Due to some seating confusion, there ended up being no group 7 in the workshop, so only groups 1-6 and 8-9 are featured in the notes.

6.1 Survey answers

The participant survey was sent out to 49 registered participants and was answered by 26 persons. The questions in the participant survey asking for personal information are excluded. Below are the answers to the qualitative question: *What technologies, values and ethics do you wish to be in the core of a Human-Centric Future Internet?*

democracy, anti-discrimination, transparent technology (biases, documentation, explainability), user agency
the role of ethics in AI, datafied society, data-driven policy making
Transparency, accessibility, empathy, social solidarity
Democratic Socialism and Red Innovation
I'm interested in what concepts of democracy and equality look like materially online, as nodes of contention.
Human Centered Design, Representation, moldability, reflexivity
Social justice
Open internet, Public infrastructure, Innovation focused on civic outcomes
Machine learning
Social media
Values that I wish to be in the core of a Human-Centric Future Internet is sustainability, inclusivity, innovation, trustworthiness, transparency in technologies that include artificial intelligence, immersive technologies that incorporate human experience and input.
The ability to interrogate
Since the internet is as global as it gets, it should be values and ethics with which most internet users (= people) can identify. For me, the internet has to be an anonymous space, yet not a legal vacuum. Basically, things that are not allowed in a free democracy should not be legal in the internet either. This also applies to very basic things such as insult, which seems to be very common now on online social networks. Privacy should be emphasised.
trust and accountability, diversity and inclusion, equity and responsibility
1. How do you define Human-Centric Future Internet? 2. Technology is not the core, it follows from the design process, which follows along with the values and ethics

3. The value I would like to see at the core is respect.
Primacy of human agency
Diversity & Inclusion?
AI accountability - diversity - taking care of cognitive/attitudinal divide - translation (de-blackboxing)
Where technology is advanced but still retains people's autonomy in managing their data/privacy, and where there is trust and respect.
Indigenous and intersectional narratives and approaches; extra/non-human (planetary?) considerations; ethics of care; fostering inclusivity, education, community, creativity, integrity, accessibility, empathy, social justice; integrating maker & material technologies alongside digital, visual cultural and sustainability-driven technologies
Equity, diversity, openness.
A money alternative based on digitally secured and recorded social micro-contracts which are evaluated by computationally operationalised values that are autonomously self-determined by groups of peers and not controllable by a central, single entity. Also, crypto-anarchism ¯¥_(ツ)_/¯
trans feminist queer, Black Indigenous people of colour (BIPOC), transnational anti-colonial collaborative care and networked intimacies.
Neutrality and transparency
Feminist technoscience
AI as in algorithms, big data and machine learning in different contexts

6.2 Lists of technologies, issues and values (critique phase)

Technologies:
AI
Quantum Computing
Sustainable data infrastructures
Children related technologies
Neurotech
(De)centralized control / BlockChain / IoT / Transport/logistics
OSMs / BlockChain / Anti-social media
IoT Plus (e.g. embodied technology)
Single key access to all services (biometric)
Masking or obscuring tech for personal privacy
Algorithmic transparency

Smart infrastructure
AI
Multiplicity of technologies, platforms, etc. instead of widespread standards
Email (with only a pretense of encryption)

Issues:
Community & community cohesion
Human dignity
Digital divide
Data divide
Public/private ownership
The right to be forgotten
Deep fakes
Silencing + ostracization
Digital intimacies
Online violence
Data sovereignty
Fixed identities
Asymmetrical velocities of data management + correction
Surveillance & privacy
Access & education
“Social credit” systems / social control / value transparency
Environmental damage / climate catastrophe
Control
Safety
Trust
Environment

Values:
Collective data rights
Social justice
(Data) sovereignty
Sustainability
Environmental sustainability
Sovereignty / Autonomy
Accountability
Transparency
Forgiveness
Diversity
Caring autonomy (responsive choice)
Distributed leadership + pushback
Self determination / individualism vs. Common good / social cohesion
Human-centered
Sustainable

6.3 prioritized issue lists (critique phase)

Group 1 interlinked the issues in a web, and prioritized the following issues the highest:

- Trust
- Environment (everything else reflects on this)
- Human dignity
- Safety
- Control

Group 2 divided issues into these three prioritized categories:

1. Environment
2. Privacy & data sovereignty
    a. Surveillance + privacy
    b. “Social credit” systems / social control
    c. Control
    d. Safety
    e. Trust
    f. Data sovereignty
    g. Public/private ownership
    h. Right to be forgotten
3. Cultural & social issues
    a. Access + education
    b. Digital intimacies
    c. Online violence
    d. Fixed identities
    e. Asymmetrical velocies of data MGMT
    f. Community + community cohesion
    g. Human dignity
    h. Digital / data divide
    i. Silencing + ostracization

Group 3 prioritized the issues:

1. Online violence
2. Trust
3. Environment
4. Surveillance + privacy / digital intimacies
5. Silencing
6. Digital divide / data divide / access
7. Control / data ownership

Group 4 did not hand in a prioritized list.

Group 5 five divided the issues into two categories: human rights and children rights.

Group 6 connected the issues into six clusters:

- Human dignity + Trust + Community cohesion

- Environment + Environmental damage / climate catastrophe
- Silencing + ostracization + The right to be forgotten + Data sovereignty + Control
- Asymmetrical velocities + Power + “Social credit” systems / social control / value transparency (*connects to clusters below*)
- Public/private ownership + Digital divide + Data divide + Access & education + Fixed identities
- Safety + Digital intimacies + Online violence + Surveillance & privacy

Group 8 created a top-5 list of the listed issues:

1. Deep fakes
2. Environmental damage
3. Access / education
4. Online violence
5. Silencing and exclusion

Group 9 divided the issues into three clusters:

- Control + Surveillance - social credit systems + data sovereignty + online violence + safety
- Environment
- Digital divide + data divide + access + right to be forgotten + fixed identities + + human dignity + trust + digital intimacies

6.4 Solutions (fantasy phase)

Group 1
See section 3.2.1 in the report.

Group 2
See section 3.2.2 of the report.

Group 3
See section 3.2.3 in the report.

Group 4 focused on algorithms and how to make algorithms more transparent, accountable, responsible and liable to democratic control. Among the group’s solutions were building trust into expert systems and building global community knowledge into creating these algorithms.

Group 5 focused on children’s rights on the internet that they feel are being infringed upon today. The group discussed engaging and empowering young people in the form of media literacy and education - much like how the younger generation in the more recent years have protested climate change - but also through more access and better political representation of younger people.

Group 6 focused on a cluster of issues that they call “a wicked problem”: silencing, control, data sovereignty and the right to be forgotten. They discussed the kinds of structures and systems that contribute to these issues, and how the issues will have to be addressed on

many different fronts, such as internet access, investments, infrastructures, global banking, new regulatory systems and regulation.

Group 8 grouped all the issues into three clusters - digital intimacies, control and environment - and focusing on all three clusters, the group discussed different solution spaces, and regulation and education specifically. They propose strong laws that keep companies accountable and transparent but doesn't handicap the companies compared to the rest of the world, as they think is the case with the GDPR. Also, these laws should be human-centered, so they are actually helpful to humans. They also propose better education, but balanced education that doesn't only focus on a really negative or a really positive story of the internet.

Group 9 prioritized environmental sustainability as the biggest issue going forward and chose to focus on the program of the environmental impact of technology production. The group proposed a global treaty or convention on sustainable technology production, also including cost accounting of marketing, use and recycling. They also proposed meaningful national incentives and disincentives, such as tech-subsidies for sustainable technological development and education.

6.5 Rewritten lists of NGI topics

Original list of eight NGI topics from D1.2 (Gyódi et al., 2019)
Artificial intelligence and machine learning
Internet of Things
Blockchain and cryptocurrencies
Quantum computing
Internet regulation
Social media and content crisis
Market competition
Chinese tech sector

Group 1
Artificial intelligence and machine learning
Internet of Things
- *Redefining concepts & policies of reuse & sharing*
- *The future of work, economy & society (automation and more)*
    - *Tech skills education as life skills, not job skills*

~~Blockchain and cryptocurrencies~~
Quantum computing -> *Paradigm shifts brought on by new technologies*
~~Internet~~ regulation -> *Redefining regulation (the internet is not special. It's another zone to regulate, it's not distinct) -> if you need to keep updating regulation for new tech, maybe you need a different model*
Social media and content crisis -> *Community governance*
Market competition -> *The effect of business models on society*
~~Chinese tech sector~~ *Governmental tech use/abuse -> Surveillance & governmental control of society*

Group 2

Artificial intelligence and machine learning
Internet of Things
Blockchain and cryptocurrencies
Quantum computing
Internet regulation -> *Privacy, surveillance & civil rights*
Social media and content crisis
Market competition
Chinese tech sector -> Privacy, surveillance & civil rights
Environmental costs/benefits and implications of internet technology
Cost & benefits (environmental / social / cultural / political)
Social & cultural issues (education, social credit systems, digital intimacies, online wire lands, fixated entities)

Group 3

1. *Digital literacy*
    a. ~~Social media & content crisis~~ -> *media/digital literacy*
    b. ~~Blockchain~~ -> *Literacy*
2. Internet regulation
    a. *Freedom of speech*
    b. *Software liability*
    c. *Trust in platforms*
    d. *Cryptocurrencies -> security*
    e. *Competition law*
    f. *Market-driven tech companies*
    g. *Market competition / net neutrality / transparency / anti-trust*
    h. *Monetary-related issues with content, e.g. clickbaits & misleading*
    i. *Right to be forgotten*
    j. *Chinese tech sector -> 5G*
3. *Human-centered aspects*
    a. *Online violence/online harm*
    b. *Humanity/technology relationship*
4. *Tech infrastructure*
    a. *Router security*
    b. *Open source hardware*
    c. *IoT -> surveillance & sustainability*
5. *Transparency*
    a. *AI -> transparency*
    b. *Algorithm/technology*
    c. *Information education*
    d. *Social media culture*
6. *Security*
    a. *Usable security*
    b. *No backdoor*

Group 4

Artificial intelligence and machine learning -> *Algorithmic justice / democracy*
Internet of Things
Blockchain and cryptocurrencies
Quantum computing -> *human rights / responsibility*
Internet regulation -> *Building trust in expert systems -> community knowledge protocols -> collective intelligence -> accountable knowledge systems*
Social media and *content crisis*
Market competition
Chinese tech sector
Priorities:
Environment / sustainability
Algorithmic justice / democracy
Machine learning accountability / responsibility
Network sovereignty
Building trust in expert systems
Building accountable knowledge systems

Group 5
Artificial intelligence and machine learning -> *Sector-specific (health, internet, tech)*
Internet of Things
~~Blockchain and cryptocurrencies~~ *Decentralisation*
Quantum computing *(very tech specific)*
Internet regulation -> *Control / sovereignty / human rights and privacy -> accountability and transparency -> freedom of speech, trust, distrust*
Social media and content crisis *very broad topic -> disinformation, deep fakes, subjectivity*
~~Market competition~~ *Monopolisation, Diversity (cultural, media, economic), Opportunity*
~~Chinese tech sector~~ *(too specific and not specific at the same time) Surveillance / censorship / control*

Group 6
The list reflects what people talked about in the last 2 years - not now or going forward (algorithmically inflicted reinforced spirals of news and reports)
Education and critical digital literacy should be at the top of the list
Content crisis should be reframed as content- and behavior crisis
Internet regulation should be reframed as human-digital-rights
Automated decision making as a new point, replacing narrow and tech-specific topics such as AI, IoT and quantum computing

Group 8
The list might be meaningful for computer scientists and for exact scientists, but not really for social scientists
Artificial intelligence and machine learning -> *Meaningless, just algorithms -> look at different elements of AI, e.g. agency in AI, algorithmic big data, processing ML*
Internet of Things -> *IoT + (plus)*
~~Blockchain and cryptocurrencies~~
Quantum computing -> *not really meaningful for non-computer sciences*
~~Internet regulation~~

Social media and content crisis *(deep fakes, fake news) -> exposure, Macro target, Macro personalize, qualitative role -> too cumbersome topics, renamed as Communication Avenue trust crisis*
Market competition *(assumption is market centered and not social, too capitalist) -> Public accountability (with attributes of different societies), internet as public utility*
Chinese tech sector *-> too narrow! -> implies Western is neutral -> attributes of different localities, opportunities, values, governance -> attributes of tech sector of different localities*

Group 9
Many topics missing; environments, social justice, equality/accessibility and rather than market competition look at consolidation, monopolies and so on.