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D2.2 – FIRST CONSULTATION PROCESS REPORT

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0.16	27.04.2018	Sara Pittonet (Trust-IT)	Revised Sec. 2.1
1.0	27.04.2018	Jim Clarke	Final review, spell check and grammar check. Fine tune formatting.

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Executive Summary

As background to this deliverable, in Work Package, 2, Consultation Platform, there has been one deliverable already submitted. The first deliverable of WP2, entitled Deliverable **D2.1, Consultation Platform, Knowledge Base and Digital Processes**, is listed as an "Other" type of deliverable in the Description of Action (DoA) as it is an on-line software platform. The platform was launched early and made available to the NGI communities at https://consultation.ngi.eu/ since November 6th, 2017.

In addition, the project has submitted an accompanying written report with D2.1 in January 2018 to accompany the aforementioned on-line consultation platform and knowledge base platform with a through description of its current status and the related roadmap for future iterations of development, as well as a description of the processes involved in operating the platform itself.

This current deliverable, **D2.2, First Consultation Process Report,** on the other hand, focuses on the actual contents of the Consultation Platform and Knowledge base, in terms of an analysis breakdown of the NGI community of users and moderated and recorded inputs to the many NGI discussion channels. It also analyses the results to date with respect to the other Inter-CSA activities taking place, including the scoping of NGI research topics carried out by the other pathfinder CSAs, especially Engineroom, NGI Move, Hub4NGI, and a previous NGI Study funded by the European Commission.

The NGI Consultation Platform and Knowledge Base has been designed with relevant "discussion channels", which can be entered by the moderators and/or suggested by the registered users of the Consultation Platform. There are currently 17 distinct discussion channels described within this report. In the moderation process, the project makes sure that new channels are not being set up in case of overlaps with existing channels and/or tags, especially if they are in relation to the three topics already selected for WP2018, namely the already established discussion channels on Privacy and Trust Enhancing Technologies, Decentralised Data Governance, and Discovery and Identification. Similarly, a discussion channel was established for early discussions about potential WP2019 and Beyond H2020 topics, in order for the NGI communities themselves to organically suggest and build upon the necessary topics and sub-topics that will be selected for the next rounds of the Work programmes in relation to the Next Generation Internet initiative. In addition to these 4 pre-entered channels, an additional 13 discussion channels have been entered into the Consultation Platform / Knowledge Base by members and these are described in more detail in this deliverable.

A summary of the most popular channels is as follows:

1. **Privacy and Trust Enhancement**

    Discussions on this topic focus on how the GDPR and ePrivacy directives will impact upon NGI research and innovation and its stakeholders, especially both large and small industries. While GDPR is seen as being a positive step to enforce the use of appropriate processes and technologies in order to keep personal data handled with diligence, there are some concerns being raised about its impact especially on the smaller SMEs and start-ups, which wouldn't have the resources and/or legal expertise or funds for the administrative and legal costs. In addition, the GDPR impact on technologies such as blockchain technologies is discussed on the consultation platform, as some of the protection mechanisms and encryption techniques being used by blockchain don't exactly match the requirements of GDPR, as even though they are quite secure and robust, it doesn't match the definition of data "should be erasable" even if it is encapsulated quite securely.

    The scale of cyberattacks is steadily growing, and many anticipate the likelihood of catastrophic cyberattacks in the future. Trust will be the most vital part of the future Internet realm. Too often companies and other entities are reluctant to share security related information ignoring the fact that most security breaches take place using known vulnerabilities. These breaches can be minimised through the creation of trust domains and promotion of cooperative security mechanisms.

2. **Decentralised Data Governance**

    Decentralised data governance in the NGI is seen as a key element to empowering citizens in terms of understanding fully what their data is being used for and by whom. That is why it is one of the core selected topics in the upcoming WP2018 for NGI. The discussions

around this topic focus on the challenge in achieving a balance between a truly human-centric next generation internet and service and applications that are largely based on the data economy. Offering alternative technological solutions (e.g. blockchain) coupled with services that at least feel equivalent to existing services is another question to be answered. There are other numerous topics on data governance e.g. looking at novel ways of incentivizing the sharing of data for wider societal benefits as opposed to hoarding of data by large companies, and using the new more secure and privacy protecting technologies of the NGI.

Although dominant data platforms have extremely centralised architectures, especially at the level of data governance, the key question is whether technological solutions enabling intrinsically decentralised data governance break the "rules of the game" that have made current data incumbents successful. The shift would come from the distributed architectures that enable fully decentralised storage and management of data. In such a scenario, peer-to-peer technologies and distributed ledgers technologies would enable a fully decentralised certification and security of transactions: monetary exchanges and data exchanges.

3. Socio-economic and Legal Considerations for NGI

It is believed that the Internet should empower users with certain capabilities that must remain at the heart of the Internet experience for everyone and everywhere. The users must be able to connect, speak, innovate, share, choose and trust. The digital society is expanding with the growth of Internet. The governments have to play a proactive role and accelerate the legislation process in order to keep the pace with the technological developments. There will be ever increasing pressure on governments to act with the pace of change. Are governments prepared for the drastic changes in the economy, especially in traditional industries most challenged by technology? Government's tendency to apply legacy regulatory models to new and emerging issues is of particular concern.

There is another challenge under this discussion on how to speed up the uptake of eIDAS compliant identification and authentication by private service providers, and discovery of services, including new forms of media based service, and the necessary interoperability and security and privacy preserving elements for the IoT technologies in the Next Generation Internet.

4. Responsible Artificial Intelligence and New Business Models

"Responsible AI" concerns applications of AI whose actions need to be explainable and governed from both a legal and ethical standpoint because they are either safety critical or impact the lives of citizens in significant ways. Participants on the consultation platform raised numerous questions which are related to the AI domain. Some of the exemplary questions are:

- How can human and machines coexist in the economy?
- What roles are humans ideally suited for and what roles are machines best at?
- How can humans' livelihood be sustained?
- How can machines be paid for?
- How the autonomous machines be legislated?
- Will AI empower us as human beings or kill us?
- Should robots and AI be legible to pay taxes?

According to the NGI communities, the above mentioned open-ended questions need to be addressed in the future calls. The role of AI is pervasive in the future Internet economy. On the other hand, many believed that AI would steal thousands of jobs. However, the nature of work will drastically change as the AI and automation drive significant structural change across industries. It is possible that this change will empower workers and minimize the inequalities among people and between countries. Many existing jobs may be displaced as AI moves beyond monetising user data to changing how products and services are delivered. But AI also presents enormous opportunities to create new jobs, new industries

and new ways of connecting. It leads to the question about how the global society will make itself ready to absorb the change, and be prepared for new economy models and new business models? The intelligence and services used to manage and implement manufacturing or services may still reside in developed countries rather than being developed locally. AI might exacerbate the digital divide in significant ways that would have geopolitical implications.

Compared to other business types, SMEs are seen to be at a disadvantage and need help to take advantage of NGI. Investment policies and legislations should aim to increase the abilities of SMEs to profit from NGI technologies. Furthermore, new business models are needed to challenge the current dominance of the large incumbents. New collaboration based business models that integrate people and resources from various disciplines might help significantly. Conversely, we must also examine ways to get the large incumbent industry players "on board" with the notion of developing a human centric next generation internet based upon EU values.

At the time of this report being written, the emergence of results from the Engineroom project indicates that there is a convergence of these topics. Engineroom has taken a bottom up approach of data analysis in initially identifying a set of topics that are seen as the most important in advancing the NGI ideals. This initial analysis is then expanded and prioritised through workshops with invited experts. The most popular topics raised by the community through the Consultation Platform are also among the prioritised topics emerging form Engineroom results, which is a strong indicator on the importance of these NGI topics as building blocks for the development of the Next Generation Internet flagship.

The Consultation Platform has also been utilised for collection of information from NGI related events, both legacy and present, and also channels have been set up to collect material from NGI related reports and activities, in order to bootstrap and kick-off the consultation process, and this strategy has been quite successful in getting the community engaged early in the consultation process.

The report gives a number of the initial lessons learned; examining what worked well and what didn't, and helps the project to formulate the next steps in the consultation process. It was clear that while the quantity of users wasn't as high as initially expected, the quality was indeed better than expected, and the project has put forward some clear plans on how to increase on the quantity aspect of users in the next period.

1 Introduction

1.1 Purpose and Scope

D2.2 is the first version (of 3 in total) of the deliverables entitled "Consultation Process Report". The deliverable describes the content arisen from the consultation process followed by the SpeakNGI.eu project in the first six months of engagement with the NGI communities proactively in an open and dynamic consultation capacity.

As shown in Figure 1, SpeakNGI.eu is one of the Coordination and Support Action projects in the NGI ecosystem, whose responsibility is to build an open, dynamic and continuous consultation process around Next Generation Internet (NGI) that engages all relevant stakeholders with a long-term perspective and multi-disciplinary approach.
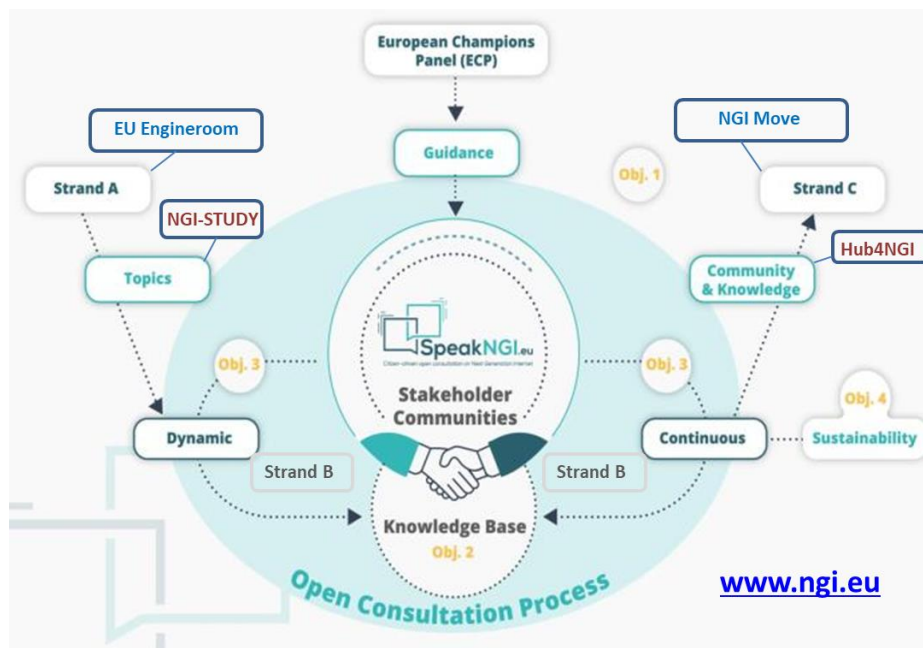
Figure 1: The NGI ecosystem of projects plus existing NGI projects (Inter-CSA)

The entire set of projects in the NGI ecosystem have a balanced approach towards their collective pathfinder roles in the development of a Next Generation Internet Initiative, that is based on the development of a safe, secure and trustworthy human-centric Internet.

For this process to work effectively, an Inter-CSA working group[1] (Inter-CSA WG) was established at the very start, in September, 2017, even prior to projects' contracts signing. The different approaches of the Inter-CSA WG projects were well recognised and key strengths of their approaches identified: on one hand, a bottom-up approach was adopted to allow independent, open and inclusive progress on identification of specific topical areas of interest for research and innovation (R&I) in NGI in an agile way. On the other hand, stakeholder engagement, communications and coordination is ensured by implementing simultaneously a top-down approach to apply a unifying vision and an overall concertation. Figure 2 shows the approaches of the Inter-CSA projects based on top down (mainly consultation and stakeholder based) and bottom up (mainly research and innovation topic based).

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[1] Described in more detail in Deliverable D3.1 Stakeholder Engagement Plan [2]

Figure 2: Positioning of NGI projects (Inter-CSA) based on their approaches

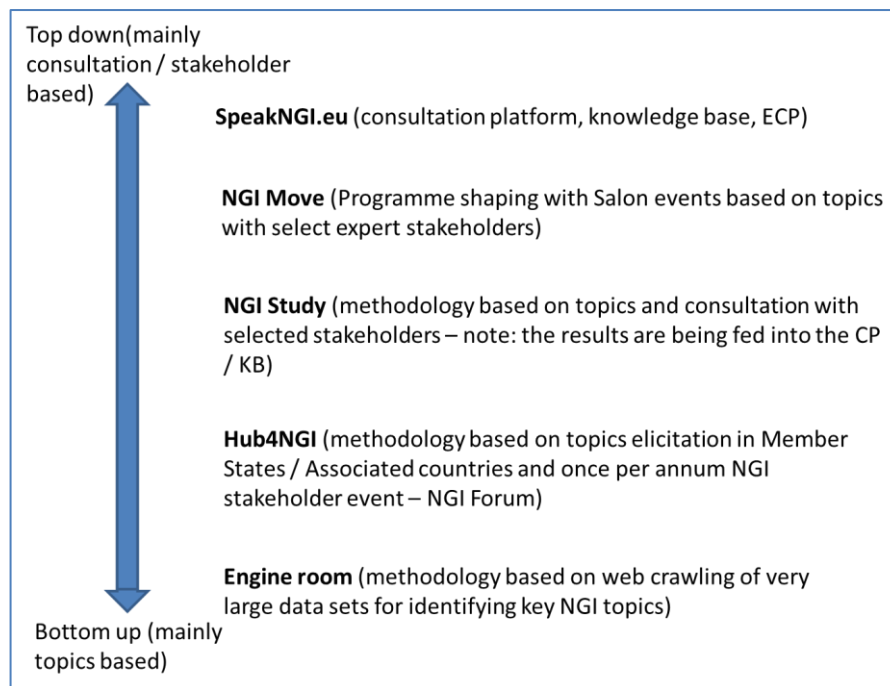The scope of this deliverable is a presentation of the results of the first phase of the consultation process element in the NGI ecosystem, with a clear view to making the process sustainable beyond the life of the project. This document provides a status update of the SpeakNGI.eu's NGI Consultation Platform and Knowledge Base (CP / KB) and a roadmap for future activities involved in the consultation process based on lessons learned in the first phase of the project.

In essence, the Consultation Platform and Knowledge Base is an open platform available to proactively capture the inputs from the multi-stakeholders in the NGI communities in order to discuss, debate and put forward ideas for this novel programme of developing a human centric next generation internet. Through its Knowledge Base, the project regularly moderates, collates and feeds the information into the NGI's Inter-CSA process, which cuts across all of the NGI Coordination and Support action projects, including NGI Move, Engineroom, and Hub4NGI. This Inter-CSA process has been set up since the inception of the ICT-41-2018 projects so that the suite of NGI projects operates as one in unison and close alignment and, most importantly, without duplication.

The consultation platform provides an always available opportunity to every registered user to begin a new discussion on any NGI related topic relevant to the Discussion Channel and gather feedback from the community of users. Any registered member of the NGI community can comment or ask questions on the platform according to the existing discussions, or they can begin new discussions if they feel something is not covered. The process is moderated to ensure that duplication is minimised and that the contents of the discussions are populated into the right channels, and with the correct and most relevant tags.

In addition to moderating, the content is reported regularly in a number of different perspectives, including by roadmap (timeline) view, topic view, technology view and socio-economic and legal viewpoint. The Knowledge Base also acts as a repository for curated material from legacy reports of events and other forms of deliverables from relevant NGI related projects and initiatives. The inputs from various stakeholders and analysis reports continuously feed the knowledge base, which offers a comprehensive search facility. An on-line living report is also being maintained on a weekly basis about the activities on the CP. Since it is an ongoing process, the Knowledge Base will become more exhaustive with the increase in number of new discussions, comments and analysis reports.

1.2 Structure of the document

The document is organised as follows:

- Section 2 describes the components and contents of the consultation process itself including membership, bootstrapping activities with some content, surveys, and relevant statistics;

- Section 3 is comprised of the living report, which is a summarised version of all the activities on the Consultation Platform / Knowledge Base to date;

- Section 4 contains a brief analysis about how the CP / KB content, providing a specific view on four relevant aspects emerged during the first phase (November 2017 – April 2018) of the NGI consultation process, viz.: Privacy and trust enhancement; Decentralised data; Socio-economic and legal considerations for NGI; Responsible Artificial Intelligence and new business models.

- Section 5 describes the lessons learned, future directions and next steps.

- Section 6 provides a conclusion of the current report.

1.3 Relationship to other project deliverables

The first deliverable of WP2, entitled Deliverable D2.1, Consultation Platform, Knowledge Base and Digital Processes [1], was an on-line software platform, available at https://consultation.ngi.eu/ since November 6th, 2017. In addition, a comprehensive report was submitted in January, 2018 entitled D2.1, explaining the rationale and make-up of the Consultation Platform and Knowledge Base. This current deliverable, D2.2, reports on the results of the consultation processes, in essence, the knowledge base, which includes the results from the monitoring, reporting and analysis, from launch of the first versions of the consultation platform (November 2017) to mid-Month 07 (mid-April 2018). This deliverable also makes references to D3.1, Stakeholder Engagement Plan [2] and D4.1, SpeakNGI.eu Communications Plan, 1st Version [3]. The report is also highly relevant to the Deliverable D4.2, SpeakNGI.eu Report from the 1st event [4], *Business, Career & Funding Opportunities, while developing a human-centric internet*, that was organised by SpeakNGI.eu on 27th March, 2018, in Milan, Italy[2], as a draft of the findings of this report were presented at this successful event.

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[2] https://www.ngi.eu/event/lets-speak-ngi-business-career-funding-opportunities-while-developing-a-human-centric-internet-milan-27-march-2018/?instance_id=92

2 NGI Consultation Monitoring

The present section describes activities recorded during the consultation process, reporting on 4 areas:

- Community of end-users;
- Channels activated on the platform;
- Results of the surveys;
- Legacy reports.

2.1 Community - Data gathering from NGI individuals - CP Community analysis of members

As of mid-April 2018, the platform counts over 230 registered users.

In the registration form, there are four variables that are relevant to perform a first analysis of the community of registered users in the Consultation Platform. These are:

- Geographical Provenance;
- Field/type of organisation of the participant making the entries;
- User levels based upon quantity of inputs;
- Salutation of the users, giving an indication to their education levels.

Moreover, users have been analysed according to these categories:

Geographical Provenance

95.24% of registered users are from European Countries. Users from 19 out of 28 Member States are present. The 1st non-European Country is the United States (ranking 15th).
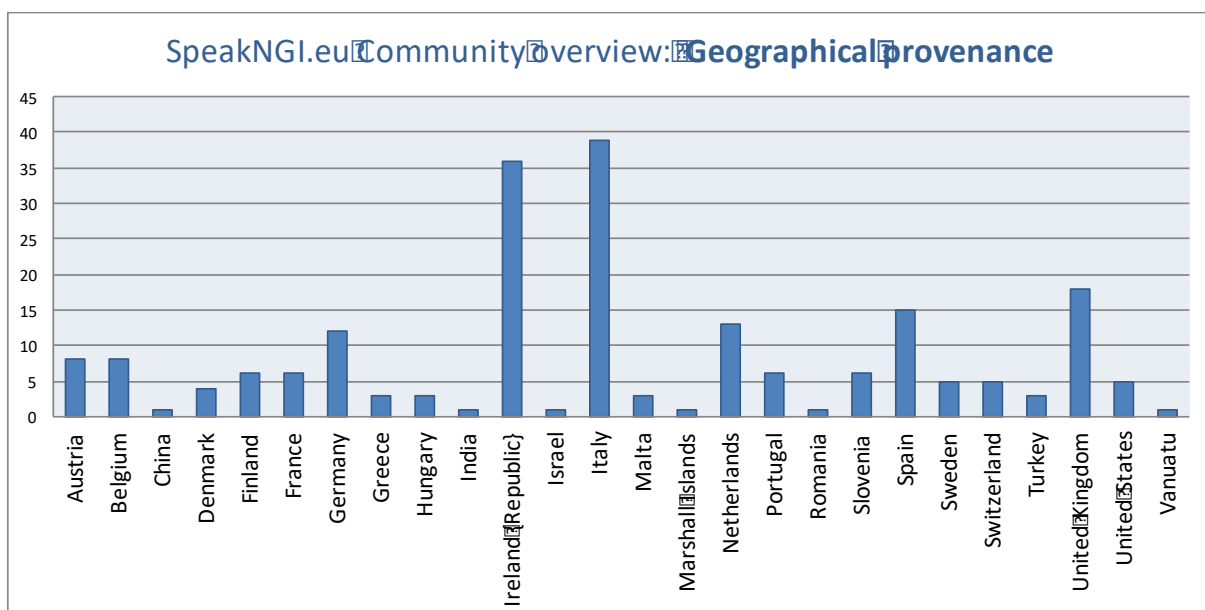
Figure 3: Country of Provenance

Field of participant

Almost 50% of the registered users are from the ICT industry. The second most representative field of activity is education, as to be expected. The remaining represented fields are: Public Administration, Advertising and Media, Financial services, Legal services, Aerospace, Automotive, Environmental services, and Transportation.
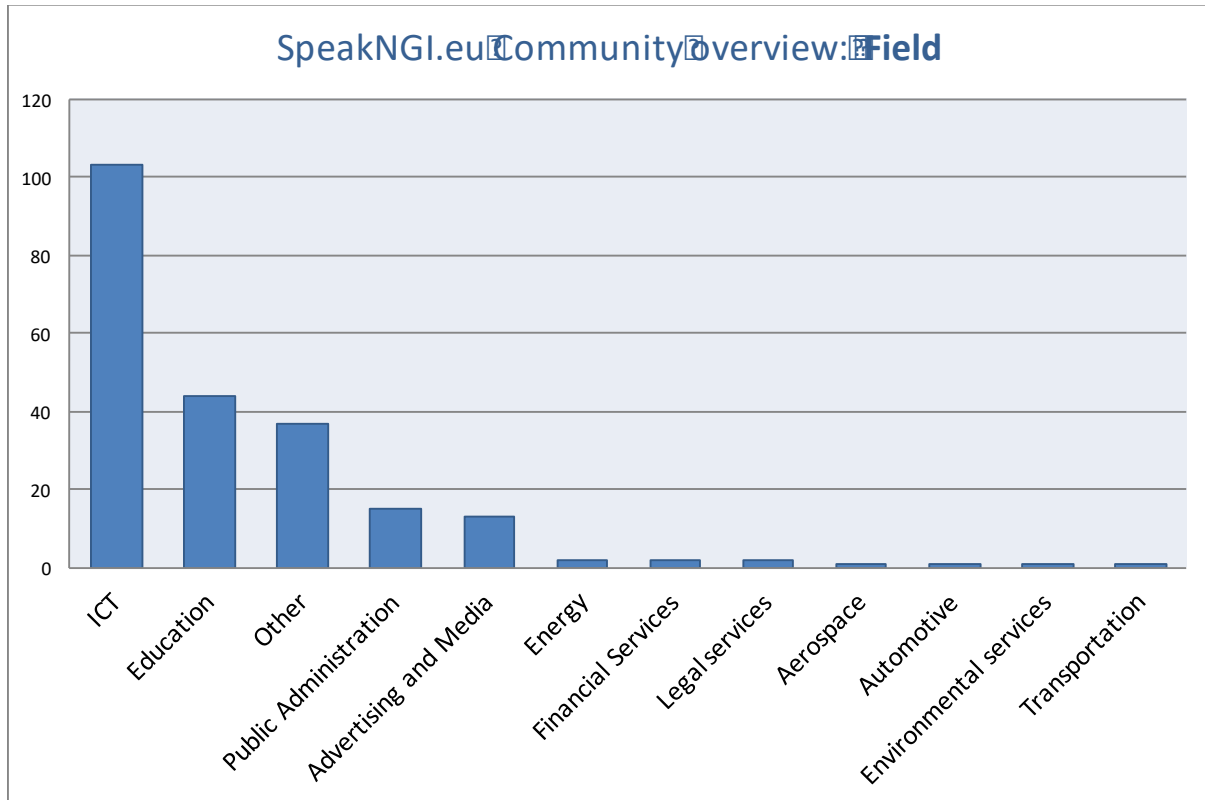
Figure 4: Field of Consultation platform's community of users

Salutation

From the declared salutation form, it appears that around 40% of the platform registered users are either Professors or have a Doctoral degree. Of the remaining 60%, around 70% are males.
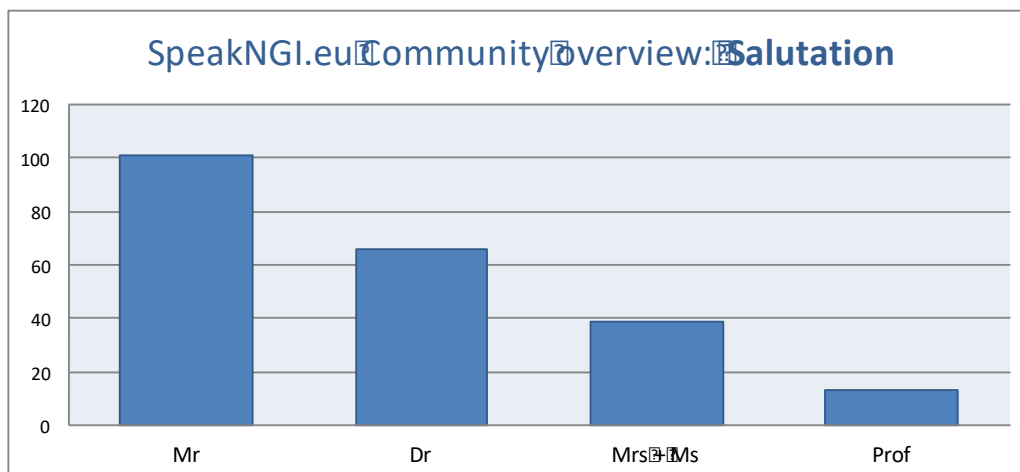
Figure 5: Salutation of registered CP members

User levels

As described in more detail in D2.1, Consultation Platform, Knowledge Base and Digital Processes, there are three categories of user levels for NGI Consultation Platform members:

1. **Contributor** = defined as the number of users with a written comment on the platform;

2. **Expert** = defined as the number of users with more than 10 interactions (comments, likes, etc.);

3. **Trusted** = defined as the number of users with more than 30 written comments only.

After 6 months of activity, the suggested classification was improved to be more in line with the user activity and to monitor the real engagement of the more active users. 37 users turned out to be the real contributors to the platform (in the order of 16% of the total registered users), commenting on the suggested channels with new discussion topics and new comments. We, therefore, envisage that in the next release (Version 4) of the Consultation Platform, scheduled for end of May 2018, the **registered users will be rewarded with an "Expert" and "Contributor" qualification** depending on their loyal engagement and valuable contribution effort to the discussions being carried forward on the Consultation Platform. "Trusted users will be those allowed to create new discussion channels, which are in the present time done only by SpeakNGI.eu users. The table below shows that, 49% of the active users are already part of the Inter-CSA projects, while a promising 51% is made up of external users. The objective of the consultation process is to increase the percentage as time progresses.
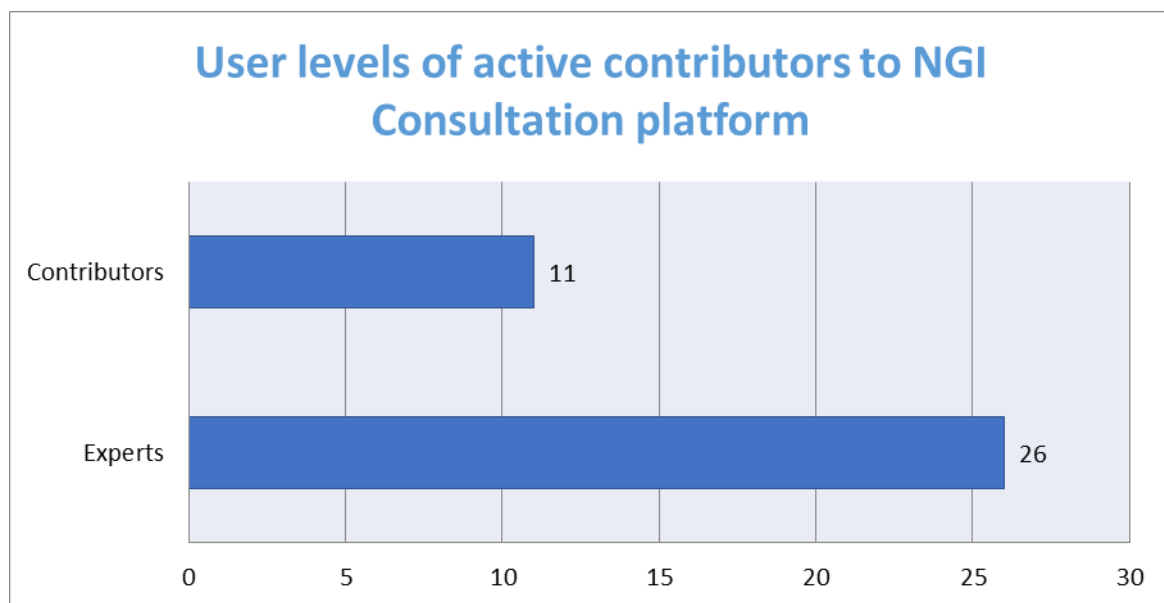
Figure 6: User levels of current active contributors

A revised classification of Contributor/Expert/Trusted user will be more accurately discussed as part of the Version 4 release of the Consultation Platform (May 2018).

Provenance of the active users
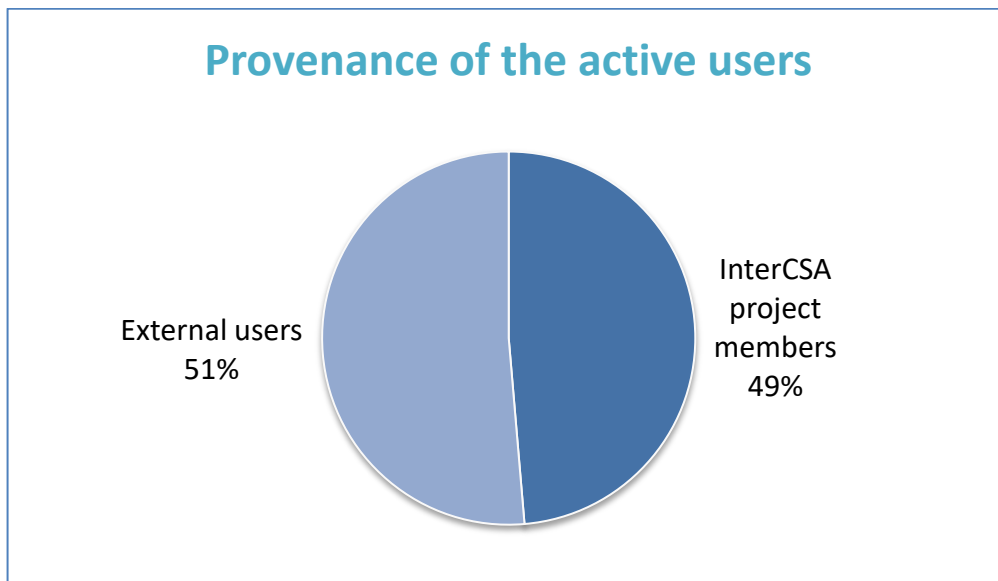
Figure 7 Provenance of the NGI Consultation active users

As shown in Figure 7, an analysis of internal user (Inter-CSA participants of the NGI pathfinder projects) versus external users has been conducted. As expected, about half of the users "animating" the platform are from the Inter-CSA NGI team (and particularly from SpeakNGI.eu, as expected), as this is a necessary part of the efforts to kick-off and bootstrap the consultation process, knowledge gathering, and discussions. The goal is to significantly reduce this fraction of "internal" users in the upcoming months by increasing effect of the absolute number of external users.

2.2 Discussion channels

2.2.1 Discussion Channel Analysis

As of April 2018, there are 17 discussion channels in total on the Consultation Platform. Each channel covers at least one of the broad areas in the NGI domain. A brief introduction and objectives of each discussion channel can be seen below. The list is in the order of most popular first:

1. Responsible AI

This discussion channel concerns applications of AI whose actions need to be explainable and governed from both a legal and ethical standpoint because they are either safety critical or impact the lives of citizens in significant ways.

As AI and automated systems have come of age in recent years, they promise ever more powerful decision making, providing huge potential benefits to humankind through their performance of mundane, yet sometimes safety critical tasks, where they can perform better than humans. Research and innovation in these areas will not abate and functional progress is unstoppable, but there is a clear need for ethical considerations applied to, and regulatory governance of, these systems, as well as AI safety in general with well-publicised concerns over the responsibility and decision-making of autonomous vehicles as well as privacy threats, and potentially prejudicial or discriminatory behaviours of web applications.

The focus of most of the discussions in this channel is on the ethical and legal aspect of AI. The participants show their concerns over the potential threats of undisciplined AI. It is agreed by all the participants that regulation and ethical governance of AI and automation is necessary, especially in safety critical systems and critical infrastructures.

This discussion channel can be accessed through this link on the consultation platform:

https://consultation.ngi.eu/taxonomy/term/55

2. Privacy and Trust Enhancing Technologies

With proliferation of sensors and AI based devices in our digital environment, there is a need to develop robust and easy to use technologies in order to help users increase trust and achieve greater control when sharing their personal data, attributes and information.

This discussion area helps to identify the challenges arising within the scenario described above, as well as potential solutions to address these challenges, and to identify gaps that need to be filled by research and innovation projects within this topic area.

This channel also provides an opportunity for the participants to discuss and comment on GDPR and its impact on NGI. There is a strong feeling about the right to know who has collected your personal data and who controls it. Participants discuss about the need for all EU countries to formalise this through legal channels. People also discuss about the preservation of net neutrality and equal access to the Internet, or making sure that user privacy, security, and data ownership are preserved, and that data based profiling doesn't result in manipulation of people or the democratic process.

This discussion channel can be accessed through this link on the consultation platform:

https://consultation.ngi.eu/taxonomy/term/45

3. Socio-economic and Legal Considerations for NGI

This discussion area covers all social, economic and legal considerations for the Next Generation Internet.

The internet has become an integral part of every walk of our life and would profoundly impact all sectors of our society and economy. As there is a mix of public and private sector services, the roles and responsibilities among governments and private sector is blurred and complicated. The private sector is also subject to the same accountability and governance mechanisms as governments. In the future Internet economy, the use of IoT and artificial intelligence will increase the need to be vigilant about transparency and accountability in decision-making and governance. With the increase in the more complicated relationships between public and private sectors, transparency and accountability will also be needed to understand and manage. The participants in

this discussion channel emphasises the need for the acceleration of the legislation process in order to keep pace with the technological developments.

Moreover, there will be ever increasing pressure on governments to act with the pace of change. Are governments prepared for the drastic changes in the economy, especially in traditional industries most challenged by technology? Government's tendency to apply legacy regulatory models to new and emerging issues is of particular concern.

This discussion channel can be accessed through this link on the consultation platform:

https://consultation.ngi.eu/taxonomy/term/94

4. Open Internet Initiative

The needs and requirements for a human-centric internet is the focus of discussions in this channel. The participants discuss about the need for a more human-centric internet supporting values of openness, co-operation across borders, decentralisation, inclusiveness and protection of privacy. In order to increase the users' trust in the Internet, we need to give more control to them. Providing more transparent services, more intelligence, greater involvement and participation, leading towards an internet that is more open, robust, dependable, more interoperable and more supportive of social innovation.

The backbone of new digital world is the connectivity and ubiquitous coverage. However, the future of ubiquitous connectivity is not without challenges. Networks have to sustain increasing connectivity and bandwidth demand as result of mushrooming IoT, HD and 4K videos, and on top of that have to encourage yet being imagined new use-cases. The proliferation of connected systems and wireless devices, will make the network edge more complex, and as a result may lead to specialised and proprietary standards. Therefore, it is also essential to focus on development and deployment of open standards that facilitate interoperability so that people can roam seamlessly across different wireless technologies.

This discussion channel can be accessed through this link on the consultation platform:

https://consultation.ngi.eu/taxonomy/term/13

5. Decentralised Data Governance

This discussion area helps to identify the challenges arising within the scenario of distributed hardware and software ecosystems based on blockchain, distributed ledger technology, open data and peer-to-peer technologies. Attention is paid to ethical, legal and privacy issues, as well as to the concepts of autonomy, data sovereignty and ownership, values and regulations. This discussion channel helps to identify the potential solutions to address the challenges of decentralisation and data sovereignty. It also helps to identify gaps that need to be filled by research and innovation projects within this topic area.

Dominant data platforms have extremely centralised architectures, especially at the level of data governance. The key question is whether technological solutions enabling intrinsically decentralised data governance break the "rules of the game" that have made the current data economy – based incumbents so successful. The participants agree that the shift would come from distributed architectures that enable the fully decentralised storage and management of data. In such a scenario, peer-to-peer technologies and distributed ledgers technologies would enable a fully decentralised certification and security of transactions: monetary exchanges and data exchanges.

This discussion channel can be accessed through this link on the consultation platform:

https://consultation.ngi.eu/taxonomy/term/46

6. NGI Technologies

This discussion channel focuses on the technological development for NGI. The emphasis is on three key technologies; AI, IoT and interactive technologies. Advances in AI are critical to turn information into knowledge and to embed autonomy and intelligence into networks, robots and other connected devices. IoT technologies and applications are changing the way users, services and applications interact with the real-world environment in a trusted way. Future interactive technologies like Augmented Reality (AR) and Virtual Reality (VR) will allow users to access, process and deliver information in more natural, efficient and less intrusive ways, providing enhanced and personalised experiences.

Emerging NGI technologies mostly talked about in this discussion area include, but are not limited to: IoT, blockchain & distributed ledgers, big data, edge and cloud computing, AI and autonomous machines, and open data.

This discussion channel can be accessed through this link on the consultation platform:

https://consultation.ngi.eu/taxonomy/term/14

7. Hyper-connected Sociality

Social networks and online gaming aren't just changing the way we lead our lives day-by-day but may also be altering our self-perception. There is a visible rise in social exclusion for some and problems with balancing rights and liberties against privacy and security. There have also been recent reports that smart cities may be excluding certain sections of society like the elderly. In this discussion channel, the participants discuss about the ways to improve the role of prosumers, communities and small businesses. This area addresses the critical issues about trust and governance and identifies the actions that need to be taken to shape future hyper-connected sociality based on democracy and user experiences.

This discussion channel focuses on the future hyper-connected society with a realisation that social media will increasingly play its role in communication, exchange, business, learning and knowledge acquisition. The participants discuss about how to overcome the critical issues of trust and governance through democratic reputation mechanisms and user experience and how a global social sphere can be created.

This discussion channel can be accessed through this link on the consultation platform:

https://consultation.ngi.eu/taxonomy/term/12

8. Innovation Networks

'Innovation networks' is an important theme for the NGI initiative, and therein considers the collaboration spaces as an essential network infrastructure to foster innovation in NGI related issues. As a starting point, it defines collaboration spaces as places where stakeholders concerned with the future of Internet can interact and share ideas be it physical places (incubators, etc.) or virtual (Internet forums). This discussion channel is giving focus to the importance and need for collaboration spaces. The participant acknowledge that more efforts are needed at European, national, and local levels to create spaces and places where citizens, stakeholders, and policy makers could exchange on the future of NGI related issues. It is important to facilitate collaboration in highly interconnected research system space which should characterised by freedom of movement and action. This discussion channel can be accessed through this link on the consultation platform:

https://consultation.ngi.eu/taxonomy/term/81

9. Inclusive NGI

An empowered, inclusive next generation internet can enable every citizen, from all walks of life, to fully take part in the digital single market. The next generation internet will have to empower users, including the most vulnerable or challenged, to have access to the same digital learning opportunities, in forms that are accessible, perceivable and understandable by everybody. This discussion channel provides a forum to each participant to discuss their ideas about how every citizen can be equally befitted from the technology irrespective of any disability, sex, religion, race, or age group. Everyone has the right to learn and knowledge. The focus of discussions in this channel is to identify how the next generation internet can change the nature of education and learning so it empowers the many, not just the few, including the most vulnerable users with open, trusted and personalised learning solutions that optimise digital learning and allow users to engage and interact with content and with peers.

This discussion channel can be accessed through this link on the consultation platform:

https://consultation.ngi.eu/taxonomy/term/16

10. Discovery and Identification Technologies

This is one of the one of the R&I Actions for H2020 Topic identifier: ICT-24-2018-2019, Next Generation Internet - An Open Internet Initiative. According the call text, this RIA will cover the following scenario:

"To search and access large heterogeneous data sources, services, objects and sensors, devices, multi-media content, etc. and which may include aspects of numbering; providing contextual querying, personalised information retrieval and increased quality of experience."

This discussion area will help to identify the challenges arising within the scenario described above, as well as potential solutions to address these challenges, and to identify gaps that need to be filled by research and innovation projects within this topic area.

This discussion channel can be accessed through this link on the consultation platform:

https://consultation.ngi.eu/taxonomy/term/47

11. Blockchain as an Enabler for NGI

Blockchain can really change society if this technology is used to re-establish human values. If elections can get hacked, blockchain can make them safe again. If people feel unrepresented by politicians, blockchain has the potential to create new forms of group decision making. If ownership or personal data is not registered by the state properly, a blockchain can be a safe vault. Blockchain has the possibility to restore norms like the rule of law, liberty and non-discrimination. But we need to realise that these norms will not code themselves. They need good blockchain-governance.

In this discussion channel, the participants discuss their own views of how blockchain can enable the Next Generation Internet and how can this technology be applied to empower European citizens in being part of the Next Generation Internet. This discussion area focuses on the blockchain related challenges; technically, socially and legally.

This discussion channel can be accessed through this link on the consultation platform:

https://consultation.ngi.eu/taxonomy/term/58

12. The Next Generation Internet and Skills

This discussion area helps identify the skills that are needed for workers and citizens to fully contribute in the next generation global infrastructure. This will guide us what should we teach our children (and what not to teach). The participants in this discussion channel can give their own opinion on the use of innovative technologies such as AI and blockchain in education and learning.

This discussion channel can be accessed through this link on the consultation platform:

https://consultation.ngi.eu/taxonomy/term/51

13. Work Programme 2019 - An Open Internet Initiative

This discussion area helps to identify the challenges related to values and topics the participants feel should be addressed in WP-2019, as well as potential solutions to address these challenges, and to identify gaps that need to be filled by research and innovation projects within this topic area.

As the focus of discussion in this channel is on the identification of new topics, this channel is also regularly used as a Tag in various comments in other discussion channels, where users felt it might be addressed as well in WP2019 topics. Internet resilience is considered to be the main focus area by the users as part of WP2019. Users believe that the internet needs to be extremely resilient and should be able to cope with many parts of the modern threat landscape. Whenever new protocols, technologies are developed or existing protocols and technologies are modified, threats to their security must be evaluated again.

This discussion channel can be accessed through this link on the consultation platform:

https://consultation.ngi.eu/taxonomy/term/48

14. Multi-lingual NGI

There is a need to ensure that every European citizen have access to the contents and can engage in written and spoken communication activities without language being a barrier. This discussion area allows the participants to share ideas on how to overcome linguistic fragmentation in order to

enable all citizens and businesses to engage in online activities and benefit from online content and services.

NGI envisage Internet as an inclusive digital single market that breaks down language barriers and that connects and empowers every citizen and business across Europe. There is a need for the development of a public, open and interoperable European language grid that connects resources and tools, combining and sharing them across a network of people. The work programme 2018-2020 of the European Commission's next generation internet initiative includes an Innovation Action for a European language grid. Experts are called upon to develop the architecture and components for an open and interoperable language grid by developing and deploying language technologies - software and services - across Europe. This Innovation Action will, among other things, encompass easy access to basic natural language processing tools and services for European languages with end-users of the grid closely involved in the process.

This discussion channel can be accessed through this link on the consultation platform:

https://consultation.ngi.eu/taxonomy/term/15

15. Interactive Technologies

Interactive technologies such as Augmented (AR) and Virtual Reality (VR) are set to transform the ways in which people communicate, interact and share information on the internet and beyond. This will directly impact a larger number of European industries ranging from the cultural and creative industries, manufacturing, robotic and healthcare to education, entertainment and media, enabling new business opportunities. This discussion area is focused on how to forge a competitive and sustainable ecosystem of European technology providers in interactive technologies.

This discussion channel can be accessed through this link on the consultation platform:
https://consultation.ngi.eu/taxonomy/term/59

16. Science, Technology and the Arts

This discussion area invites all artists to help unleash the potential of technological (ICT) projects, by engaging in discussions that stimulate human-centred innovation and sharing of transversal competencies and unconventional thinking. The intention behind this channel is to better address innovation in industry and society by engaging artists in European R&I projects, and together explore unconventional art-inspired solutions to industrial/societal problems.

This discussion channel can be accessed through this link on the consultation platform:
https://consultation.ngi.eu/taxonomy/term/102

17. Funding Opportunities Workshop – Milan

This discussion area was created to offer a platform for the remote participants of the NGI workshop so that they can put their questions and comments on different talks here. This 1-day workshop was held in Milan, Italy on March 27, 2018.

Next Generation Internet is offering organisations, researchers and entrepreneurs across Europe a formidable chance to build a Human Internet for a better future. This is a long-term goal, with opportunities already being available now, including European-funded calls. This workshop aims to unlock business, career, and funding opportunities for representatives from business, academia, and regulators, discussing social challenges and technical insights about the solutions that could be taken forward in the European calls for proposals, also as part of the so-called "smaller grants" envisaged by the currently open NGI calls closing in April 2018. NGI Champions (ECP, European Champions Panel) and Early Adopters will participate to debate.

This discussion channel can be accessed through this link on the consultation platform:
https://consultation.ngi.eu/taxonomy/term/116

2.2.2 Tag Analysis

The authors of the discussion channels introduced various new tags in the Knowledge Base on the basis of which we can get an idea of the current and future trends in the next generation internet. While analysing those dozens of tags, we can divide those into three main groups, which are Artificial Intelligence, Security and Privacy and Infrastructure. Here, we are introducing some of the most commonly used tags in different discussions:

Artificial Intelligence (AI)

This is itself one of the mostly referred tags and in fact the mother tag used to generate many additional tags as well including Ethical AI, Responsible AI, legislation, personalised learning, and Responsible Machines. Undoubtedly, artificial intelligence, robotics and 'autonomous' systems can bring prosperity, contribute to well-being and help to achieve European moral ideals and socio-economic goals if designed and deployed wisely. The main focus of discussion in this group of tags is the ethical and legislative aspects of the AI and to set the fundamental ethical principles and democratic prerequisites, based on the values laid down in the EU Treaties and the EU Charter of Fundamental Rights, which may serve as a basis for the establishment of global standards, legislative action, and ethical guidelines for AI and autonomous systems. All autonomous technologies must hence honour the human values such as autonomy, dignity, justice, equity, responsibility, rule of law, accountability, privacy, safety, and sustainability. While developing future AI technologies, these values and guidelines should be considered as stimulus and opportunities for innovation, and not impediments and barriers.

Security and Privacy

Security, privacy, trust, safety, confidentiality, accessibility, GDPR, identity, cyberattacks, cybersecurity, and echo chambers are some of the tags that fall under this umbrella. There is a considerable fear that citizens' privacy is being eroded by the exploitation of citizens' personal data by profiling, and citizens have no control over this. It is an open secret that the dominators of the Internet economy; Facebook, Apple, Amazon, Netflix, Google, are using and selling our personal data. There is a need to make sure that user privacy, security, and data ownership are preserved, and that data based profiling doesn't result in manipulation of people or the democratic process. People must be given the right to know who has collected their personal data and who controls it. GDPR is the first step to the preservation of net-neutrality and personal privacy rights. This will frame the new technologies like IoT and Big Data according to the European values.

Infrastructure and Technology

The Consultation Platform contains various discussions in which future infrastructures and technologies are thoroughly discussed. These discussions introduced many tags such as decentralisation of control, decentralised infrastructure, distributed architecture, interoperability, digital inclusion, Big Data, cloud computing, edge computing, blockchain, IoT, augmented reality, virtual reality, and open standards. As the Internet economy evolves over the next ten years, fuelled by innovations in technology and business models, advances such as the Internet of Things (IoT), Artificial Intelligence (AI), and blockchain could bring about an industrial and technological "renaissance", and only those who adapt quickly to technological change will be successful. The pace of this technological change will dramatically accelerate as IoT, AI, and blockchain technologies are fully deployed. Governments will need to increase spending on training programs to help workers impacted by technological displacement. The growth of IoT will effectively make all companies technology companies. This shift to greater dependency on technology will be accompanied by new security concerns. As one Internet Society survey respondent in North America noted, "Losing control of your data is catastrophic today. Tomorrow, it could mean the death of your business". The impact that technical advancements can have on traditional economies is a question as old as the age of technical innovation itself. There is a similar widespread concern currently fuelled by the potential disruptions of hyper-connected world and AI. Measures should be taken for general human civilisation and economy to adapt to this technical renaissance.

2.3 Surveys - Consultation Surveys analysis

2.3.1 Members surveys

The SpeakNGI.eu member surveys are part of the project's communication strategy to engage with all types of stakeholders. Designed as short, spotlight surveys on diverse topics related to the next generation internet, they are an opportunity for people from all walks of life to have their say on developments and values shaping the NGI.

They are also an interesting additional source of information about NGI stakeholders, which, in the case of SpeakNGI.eu covers 8 distinct categories: Category 1: Multidisciplinary NGI researchers; Category 2: Innovation platforms & IT clusters; Category 3: IT Operators and Service Providers; Category 4: High tech Start-ups & SMEs; Category 5: Internet Policy Experts and Activists; Category 6: Policy makers, Funding Agencies including EU & national digital agencies; Category 7: Civil Society; Category 8: Standards Organisation.

SpeakNGI.eu has so far designed and promoted four-member surveys via the Consultation platform. Results from these surveys are summarised below.

1. **Your engagement in NGI,** October 2017 (closed and results published[3]): gain an understanding of how the 8 stakeholder categories match the membership of the Consultation Platform, and how they see themselves in the NGI ecosystem.

The survey shows that in the first month of project activities most members of the SpeakNGI.eu community come from research and SMEs, both at 38.9%. Entrepreneurs/business angels stands at 11%; social innovators at 8% and civil society at 2%. The latter stakeholder group is now represented in the ECP with engagement plans also potentially through NGI Move Salons.

67% of respondents have already worked in the NGI-related fields in national and EU projects though 33% are newcomers.

The survey also indicated high interest in submitting proposals for NGI calls: 74%.

2. **The Future of Net Neutrality**, December 2017 (open)[4]: understand the position of members in terms of the EC's policy on net neutrality[5].

While the survey shows overall awareness of net neutrality (87%), it also reveals that 62.5% agree while 37.5% strongly disagree or disagree with it. However, the small survey sample (the smallest so far) makes it hard to gauge opinions on the topic. One of the lessons learned from this survey is that a topic popular on social media[6] does not necessarily translate into an effective survey topic, and that it may be more worthwhile following online discussions to assess opinions and directly through stakeholder engagement.

3. **Are you ready for the upcoming NGI Calls (ICT-24-2018 and IC-T31-2018)**, February 2018 (open)[7]: designed to assess interest and plans for the upcoming NGI calls with a deadline in April 2018.

This survey was useful in identifying interest in the various strands of ICT-24 and ICT-31. Interestingly, it shows that most respondents (90%) were not part of a proposal at the time of the survey; however, most expressed interest in RIAs under ICT-24. The most popular call strands in ICT-24 are:

- RIA - Privacy and trust enhancing technologies, 40%;
- RIA - Decentralised data governance, 40%;
- RIA - Discovery and identification technologies, 30%;
- CSA - Technology Strategy & Policy, 20%;
- CSA - Technology Harvest & Transfer, 20%;
- CSA - Outreach Office, 10%.

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3 https://consultation.ngi.eu/your-engagement-ngi
4 https://sponsultation.ngi.eu/survey/future-net-neutrality-eu.
5 https://ec.europa.eu/digital-single-market/en/open-internet-net-neutrality.
6 https://twitter.com/violaroberto/status/941672011423735808?lang=en.
7 https://consultation.ngi.eu/survey/are-you-ready-upcoming-ngi-calls-ict24-ict31.

Results for ICT-31-2018 shows equal interest in the two call strands – CSA - Organise workshops and other support activities and CSA - Fellowship programme (both at 10%).

The survey was important in raising awareness about opportunities to participate in NGI as a small project (€50,000-200,000 in cascading grants) with only 30% aware of such opportunities.

4. **What should the next generation internet be like, to best serve the next generation of citizens?**, March 2018 (open; results presented at the SpeakNGI.eu Workshop on 27 March, albeit with a slightly smaller sample)[8]: obtain perspectives on young people as the long-term beneficiaries of the next generation internet, and provide a starting point for discussions on future directions.

This survey has been the most popular so far, and also the longest. It was supported by the associate professors in the ECP and in synergy with Eurodoc[9] by distributing the survey to their students/research teams, and members.

Survey sample. Most respondents are from academia (66%), covering doctoral candidates (38%), post-doctoral researchers (17%) and students (8%). This is followed by civil society (8%); hi-tech start-ups and SMEs (6%); multi-disciplinary researchers (4%); innovation platforms and IT clusters (4%); and internet policy (2%).

Age groups range from 20-24 to 65+. Most respondents are within the age groups of 25-29 (37%) and 30-39 (42%), totalling 79%. Responses from the other age groups are as follows: 20-24 (2%); 40-49 (11%); 50-64 (4%); 65+ (2%).

In terms of **country coverage**, respondents come from/are based in 14 countries, with the highest number of responses from Italy (28%), Hungary (26%), France (8%), Poland (6%) and Portugal (6%). Other countries represented include Austria; Croatia; Germany; Ireland; Latvia; Netherlands; Norway; Ukraine and UK.

Daily uses of the internet in order of ranking:
- For work and/or study (73%);
- Source of information (16%);
- Daily personal communications (e.g., email, social media) (11%).

Areas for improvement to increase benefits for younger generation in order of ranking:
1. Quality & veracity of information (42%);
2. Personal freedoms and rights (24%);
3. Internet governance (17%);
4. Media, culture and society (8%);
5. Narrowing of digital divides (8%).

Consensus about **young people not being sufficiently concerned about risks for privacy**:
- Strongly agree: 62%;
- Agree: 32%;
- Disagree: 6%.

Ranking of **improvements** necessary for younger generations to benefit from the internet:
- Internet should be more private, secure and safe (46%);
- Internet should be more human, social & easy (17%);
- Internet should be more accessible globally equal (15%);
- Internet should be more inclusive and transparent (15%);
- Internet governance should change (4%).

Most promising technological areas in delivering a better next generation internet, based on highest rankings of 5:

1. Cyber security;
2. Artificial Intelligence;
3. Big Data;
4. Blockchain;
5. IoT.

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[8] https://consultation.ngi.eu/survey/what-should-next-generation-internet-be-best-serve-next-generation-citizens.
[9] European Council of Doctoral Candidates and Junior Researchers (EuroDoc) http://www.eurodoc.net/

With regard to **familiarity** with the **technological areas**, most respondents indicated those most closely related to their own research or work. One respondent indicated work on cyber security with the aim of creating a new internet experience, while another highlighted the importance of inter-related technological areas such as AI, big data and IoT.

Perceptions of the next generation internet. Many respondents provided statements of how they see the internet evolving towards NGI. Examples include:

- *With a PhD in Philosophy, I am working on Digital Ethics, Challenges of a Digitised Society; Systems, Cybernetics, Ethics, Epistemology and Philosophy of Science*, **Multidisciplinary researcher, Austria.**
- *It is the right time to take up a systematic review of the internet and think further about how to advance the internet collaborating with the next generation technologies like augmented reality, AI, virtual reality, spatial enablement, and ubiquitous presence all around users for amazing experiences*, **Post-doctoral researcher, Portugal.**
- *Decentralised: Internet not governed by a state/group. Accessible: To all & regardless of disabilities. Expressive: Low & fair level of content policing. Accountable: Official media accountable for truth. Basic right: free connectivity as basic right. Privacy: All to choose online behaviour be private*, **President of Eurodoc.**
- *My vision of a next generations internet is, to allow users to use the net, without being data suppliers to the hubs - that is an important concern for education systems too*, **Multidisciplinary researcher, Austria.**
- *Safe, inclusive, allowing for sustainable social, environmental, and economic development, enabling creativity and collaboration*, **Associate professor, Norway.**
- *A totally free and decentralised, autoregulated platform as the most efficient to allow the creation of original and open tools and contents*, **Doctoral candidate, France.**
- *Open but secure. Open source, open access*, doctoral candidate, Norway.
- *More education on the limitations of internet and how to select and obtain information*, **Doctoral candidate, France.**
- *More decentralised, more inclusive, with more and more efficient tools to entrust privacy*, **Post-doctoral researcher, Italy.**
- *The next generation internet should prioritise the user as a person; should allow people to interact in a sociable way, with respect, as two people would when meeting in person*, **post-Doctoral researcher, Italy**.
- *More transparent about the usage of collected data. The collection is already regulated sufficiently*, **Hi-tech start-up, Germany.**
- *Internet should guarantee a higher level of privacy*, **Post-doctoral researcher, Italy.**

2.3.2 ECP survey

The purpose of the first ECP survey, created in March 2018, is to gain feedback on the current SpeakNGI.eu strategy for stakeholder engagement and advice on future directions.

The survey asks the selected ECP[10] members about 1) alignment with the 8 "Stakeholder Groups"; 2) whether these categories cover all NGI stakeholders; 3) meaning of NGI from their stakeholder perspective and what are the short, medium and longer-term goals for those groups; 4) rating of current stakeholder engagement and knowledge of the NGI initiative; 5) barriers to stakeholder engagement with EU research; 6 and 7) best ways to raise awareness of the NGI initiative and encourage engagement for their stakeholder groups and quickest way to reach and inform them.

Survey distribution mostly focused on those ECP members able to attend the SpeakNGI.eu Workshop on 27 March, 2018 in Milan[11] as they are well placed to provide advice from their first-hand engagement experiences. Additional responses are currently being requested from other members and as new members come on board.

The main results from the survey are summarised below.

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[10] https://consultation.ngi.eu/ecp

[11] https://www.ngi.eu/event/lets-speak-ngi-business-career-funding-opportunities-while-developing-a-human-centric-internet-milan-27-march-2018/?instance_id=92

Stakeholder Category Alignment and SpeakNGI.eu coverage (questions 1, 2, and 3)

Most of the ECP respondents identify themselves as belonging to or having strong links to several stakeholder categories. They can, therefore, provide valuable inputs across a variety of issues and topics relevant for the NGI. Their alignment with the 8 SpeakNGI.eu stakeholder categories is indicated in the table below.

	Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 5	Cat. 6	Cat. 7	Cat. 8
Monique Morrow	X	X			X		X	
Tua Huomo	X							
Ales Cernivec	X		X	X				
Michel Drescher		X	X	X				X
Jamal Shahin	X				X		X	
Alessandro Bassi		X		X	X		X	
Wolfgang Jamann							X	

Table 1: Alignment of ECP Respondents with Stakeholder Categories

The identified stakeholder categories are

Cat. 1)   Multidisciplinary NGI researchers in ICT, social sciences & humanities

Cat. 2)   Innovation platforms & IT clusters

Cat. 3)   IT and Network Operators, Service Providers

Cat. 4)   Hi-tech Start-ups & SMEs

Cat. 5)   Internet Policy Experts and Activists

Cat. 6)   Policy makers, Funding Agencies including EU & national digital agencies

Cat. 7)   Civil Society, NGOs, Citizens

Cat. 8)   Representatives from Standards Organisations

All respondents agree that the stakeholder categories defined by SpeakNGI.eu cover all NGI stakeholders, though one member also added governments and regulators.

All respondents provided their views on the perceptions and goals of their stakeholder groups in the short-, mid- and long term. These views are summarised below.

1. *Shaping the narrative around governance for these technology sets is critical and ethics must be part of that narrative.*

2. *In the short to medium term, we will see new innovations especially in traditional industry segments such as manufacturing, energy and logistics. While they have been slow to emerge, real-life examples will increasingly emerge. Applications, solutions or process improvements are not necessarily mind-blowing but they are important steps in digitalisation/autonomous systems & renewing of industry. From this perspective, it is important to understand impacts of change in terms of combining technologies (photonics/HW sensors, SW, AI, etc.), systems side, security/privacy and impacts on the society (disruption of work, ethics).*

3. *For me as a stakeholder from Hi-tech Start-ups and SMEs, NGI means the usage of the state of the art technologies in new agile and rapid development of new services - innovations should be taken into account in the complete development cycle. Development tools should be made easier to use without spending time deploying them. Services should be easier to deploy, test and to make security assessments; service runtime and deployment cycle should be already set and templates provided (through marketplace(s) and use of already pre-set pipelines). It is in these kinds of service marketplaces with data sources (from IoT devices)*

and (AI) tools that new services will emerge. This is the kind of platform that should contribute to the Next Generation of services for the internet - open, transparent.

4. *The internet - as opposed to the Internet - is no longer the "techie's" playground. From a technical point of view, it fundamentally underpins and enables all kinds of networked, distributed, disparate, coordinated, uncoordinated, benevolent, malevolent, despicable, admirable and all other activities, businesses, services of sorts. It is increasingly seen as the coagulation of the underpinning technology, the services that make use of it, and the actual added value these are generating. From that perspective, it has fundamentally re-shaped the perception and composition of everyday activities: Companies are no longer "tech companies" or the adverse - every company is a tech company and needs to be one simply out of necessity: This is the heart of the digital transformation. On the civil society front, similar trends are emerging, what I would dub as "the giant awakens", though with all the unpleasant side effects of mirroring and magnifying society's makeup into the digital space.*

   Therefore, the Next Generation Internet needs to address the challenges in what is in military terms called a "pincer movement": Tackle the technological revolution to become a truly immersive medium at unprecedented scale, while at the same time exploit the technological advances to prepare and elevate society beyond its currently unlearned usage and assessment of social media and digital services at large: Often dubbed as "digital competence", "social media competence" or other vaguely digital/electronic-related skills, citizens need to be given ample opportunity and access to information and material to be able to advance from current coping skills to mature processing skills for the new digital era.

5. *From the viewpoint of internet policy, we can identify the following goals*

   o *Short-term: understand how to engage with ICT researchers, particularly those involved in business sector and in engineering fields. This can be through concrete joint activities (learning activities, therefore not necessarily joint research projects (which is a step too far, still), but 'projects about learning'.*

   o *Medium-term: build stronger linkages (going beyond 'specialist' institutes) between SHH and internet researchers. This could be through broader activities that are specifically targeted at stakeholders *whilst they are in their home discipline*.*

   o *Longer-term: become fully-fledged (and valued!) research partners in projects that take a human-centric perspective on what digital era formation means for society.*

6. *NGI has potential to improve our work and our situation in many ways - practically, politically (through inclusion and participation), and economically (improving access to opportunities). Each dimension has downsides and dangers - from privacy / data protection to rising inequality (lack of access) to monopolization of economic developments and innovation. The stakeholder 'Civil Society' in all its forms (organised, activist, citizens) need to be given a voice, achieve capacities and be actively included in NGI.*

Rating of current level of engagement and knowledge (question 4)

The most common score for stakeholder engagement is 4/5 (good level of engagement) for multi-disciplinary researchers, IT operators and the small business community. One member believes there is no knowledge amongst the groups representing internet policy and civil society, while another believes engagement with these groups is currently very low.

The most score for stakeholder knowledge of NGI is 3/5 (satisfactory level of knowledge) amongst their respective groups apart from internet policy and civil society, which remains very low. Increased knowledge is expected to come from the integration of the GIPO Community into the SpeakNGI.eu consultation platform and for both internet policy and civil society through increased engagement and visibility at stakeholder events.

Barriers to engagement (question 5)

Most members agree that the lack of knowledge about funding opportunities is the biggest barrier to engagement. Competing priorities and lack of human resources are cited as other barriers to engagement.

Work is under way in the Inter-CSA Stakeholder Task Force to map the NGI offer to stakeholder categories and identify new opportunities to increase awareness, drawing on the experiences of the SpeakNGI.eu workshop in March 2018.

Best and quickest means to reach stakeholders (questions 6 and 7)

The channels were ranked as follows along with some pointers and tips for joint actions with SpeakNGI.eu.

- **Social Media (e.g. Twitter, LinkedIn)**: This is top ranked though no specific advice is provided.

  Communities and associations are cited as being important, such as trade associations for SMEs and start-ups, as well as others indicated below.

  Implicitly, increased engagement with the stakeholders through LinkedIn groups and other forums would broaden outreach.

- **Events**: Digitalisation related conferences; international Business Festival, Web Summit. For internet policy: UACES, ISA, EISA, ECPR.

  Members also indicated examples of events they plan to attend or are interested in attending in 2018. Examples include the Digital Assembly; national events on opendata, sectalks, cryptoparties (e.g. in Slovenia). Other events are linked to the most of the mailing lists cited below.

  All members are aware of the national events organised by NCPs through the Future Internet Forum of Member States and Associated Countries (FIF[12]). All but one of the respondents are interested in attending such events.

  Quickest ways to engage with internet policy makers include IGF; UN; EU related events though more discussions are required with the ECP to define specific actions.

  Mailing lists: Examples include the EIT community, EU Technology Platforms, the Big Data Value Association (BDVA) network for IT clusters and big data (ECP member Tua Huomo). UACES, ECPR, EISA for Internet Policy (ECP member Jamal Shahin). For Civil Society, ICSCentre (ECP member Wolfgang Jamann) and similar conveners, such as CIVICUS, Interaction.

- According to one member, mailing lists can be cumbersome (and sometimes it is difficult to request and persuade the list moderator to send timely messages to the entire list as they would prefer to do it as a sub-topic of another larger mail or newsletter instead).

- **Newsletters**: EU-centric newsletters. UNU newsletter. They need to be catchy to attract attention.

- Brief personal updates to / through multipliers, as well as through mailing lists.

Discussions are continuing to define an updated joint engagement plan.

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[12] https://ec.europa.eu/digital-single-market/en/future-internet-forum

2.4 Legacy Reports data gathering – bootstrapping process

D2.1 contains a section entitled "Populating the Knowledge Base" which describes an inter-CSA process of curating knowledge across the other CSA projects and inserting that knowledge in the CP / KB. This process was developed by the coordinators of SpeakNGI.eu, NGI Move and EU EngineRoom during the second Management Team meeting held in Brussels in November, 2018 and shared and refined through the subsequent Inter-CSA conference calls. The main purpose of designing this process to gather initial information from legacy reports into the Knowledge base was twofold: 1. the information would be used to bootstrap the initial discussions on the consultation platform; and 2. to ensure that this legacy information wasn't forgotten about and that it was being used in the overall NGI process of gathering and analysing information from the engaged communities.

Since that deliverable was published, this process has been implemented, and the Knowledge Base has been populated with curated analyses from reports of the other CSAs and also the interim and final version of the NGI Study reports.

To date, the following reports have been used to generate useful content in the Consultation Platform and Knowledge Base, using this data gathering process:

- HUB4NGI D2.1 NGI GUIDE V1 (https://hub4ngi.eu/wp-content/uploads/sites/11/2017/09/hub4ngi_d2.1_v1.0.pdf)
- CITIZEN ENGAGEMENT AND MEDIA CAMPAIGN ON THE NEXT GENERATION INTERNET
- (Analysis and results of the launch of REIsearch 2.0) (https://reisearch.eu/pdf/REIsearch-SecondInitiative-Report.pdf)
- The FIRE STUDY Next Generation Internet (NGI) White Paper Survey Results (https://www.ict-fire.eu/download/2059/)
- 2017 ISOC report on "Paths to Our Digital Future" (https://future.internetsociety.org/wp-content/uploads/2017/09/2017-Internet-Society-Global-Internet-Report-Paths-to-Our-Digital-Future.pdf)
- Interim Study Report for European Commission Directorate-General for Communications Networks, Content and Technology (https://nlnet.nl/NGI/reports/SMART20160033_NGI_interimstudyreport.pdf)
- The Blockchain-GDPR Paradox (https://medium.com/wearetheledger/the-blockchain-gdpr-paradox-fc51e663d047)
- Ethics in Artificial Intelligence: Statement on Artificial Intelligence, Robotics and 'Autonomous' Systems (https://ec.europa.eu/research/ege/pdf/ege_ai_statement_2018.pdf)

At the Inter-CSA WG audio conference meeting held on 20th March 2018, the process of selection of WP2019 topics was further elaborated and discussed by all in attendance, in order to ensure the selection is carried out on an inter-CSA level. A workable model was agreed based on two elements:

1. The umbrella topics selected with the EngineRoom methodology (when available and distributed to the Inter-CSA) would be checked against the CP / KB and other Inter-CSA projects works and if there are any points covered in both, references could be included. An initial analysis of this comparison is already carried out in section 4 of this report based on the EngineRoom London workshop results.

2. If needed, the umbrella topics could be eventually fed back into the CP/KB for a round of consultation by the NGI community for further elaboration in preparation for the next calls, similar to how the Consultation platform was utilised for the scoping of the WP2018 NGI topics.

This process has been discussed with the European Commission and it will be further elaborated during the Joint Inter-CSA review / management team meeting being held on 16th May, 2018.

3 NGI Consultation synthesis report

On a weekly basis, a summary report of the Consultation Platform contents is produced. This section provides a snapshot of that report for week ending 20th April 2018.

This consolidated report provides four different synthesis views of the content available on the NGI online consultation platform (consultation.ngi.eu). As each of these "views" represent different ways of looking at the content, some discussions will be available from multiple views.

3.1 Roadmap View

3.1.1 2018 - 2021 (WP 2018 Topics)

This section represents discussions that are related to topics that could be addressed in topics that are targeted in WP-2018 calls for proposals.

Privacy and Trust Enhancing Technologies

This discussion area helps to identify the challenges arising within the privacy and trust enhancing scenario, as well as potential solutions to address these challenges, and to identify gaps that need to be filled by research and innovation projects within this topic area. H2020 WP 2018-2020 includes three calls for proposals related to this discussion channel: ICT-24-2018-2019: Next Generation Internet - An Open Internet Initiative SU-ICT-03-2020: Advanced cybersecurity and digital privacy technologies EUJ-01-2018: Advanced technologies (Security/Cloud/IoT/Big Data) for a hyper-connected society in the context of Smart City Read more about this discussion channel here...

Responsible AI

AI is already being used to augment human potential in many ways including cancer diagnostics. With AI becoming more ubiquitous, there is a need for means of redress where decisions made by machines are difficult to understand, or unethical or even illegal. "Responsible AI" concerns applications of AI whose actions need to be explainable and governed from both a legal and ethical standpoint because they are either safety critical or impact the lives of citizens in significant ways. There is still an open question that "will AI empower us as human beings or kill us?". H2020 WP 2018-2020 includes two calls for proposals related to this discussion channel: CT-09-2019-2020: Robotics in Application Areas ICT-26-2018-2020: Artificial Intelligence. Read more about this discussion here and here.

Discovery and Identification Technologies

According to the call text related to R&I Actions for H2020, there is a need to search and access the technologies for large heterogeneous data sources, services, objects and sensors, devices, multi-media content, etc. and which may include aspects of numbering; providing contextual querying, personalised information retrieval and increased quality of experience. H2020 WP 2018-2020 includes one call for proposals related to this discussion channel: ICT-24-2018-2019: Next Generation Internet - An Open Internet Initiative Read more about this discussion channel here...

Blockchain as an enabler for NGI

This discussion is related to the view of how blockchain can enable the Next Generation Internet. How can this technology be applied to empower European citizens in being part of the Next Generation Internet? What are the challenges, technically, socially and legally?

While the TCP/IP made communication easy since it allowed devices to talk to each other, the blockchain technology could help advance it further by making data interoperable in such a way that having to hard code APIs for accessing databases would be a thing of the past.

As someone who deals with data extraction, verification and analysis, it is believed that blockchain can help restore trust in the Internet by allowing storing and dealing with data more interoperable, reliable, convenient and efficient. Doing so helps journalists and the public less prone to falling into fake news traps. H2020 WP 2018-2020 includes one call for proposals related to this discussion channel: ICT-28-2018: Future Hyper-connected Sociality Read more about this discussion channel here...

Experimentation Support for Start-ups

Experimentation platforms are important to test and validate new products and services for compliance with real-world conditions, which can be really expensive to simulate particularly for start-ups. Therefore, experimentation resources such as hardware, cloud and software should be provided to them as a service. Additionally, for SMEs and start-ups requiring experimentation funding, there should be support for flexible funding (responsive mode and fast turn-around) in addition to existing open calls. H2020 WP 2018-2020 includes one call for proposals related to this discussion channel: ICT-35-2018: Fintech: Support to experimentation frameworks and regulatory compliance Read more about this discussion channel here...

Algorithmic Accountability

In the Hub4NGI D2.1, a significant issue regarding the responsible AI has been raised which is about whether and how can an AI algorithm be accountable for its actions.

The issue of Algorithmic Accountability was also raised in Net Futures debate "Legal, ethical and social issues in a software defined world" and the participants agreed that there is a responsibility gap for the AI systems.

Transparency is considered to be a key aspect of algorithmic accountability as depicted in the Net Future 2017 debate session. And it is widely agreed that the algorithms need to be able to explain their decisions.

H2020 WP 2018-2020 includes two calls for proposals related to this discussion channel: SU-ICT-02-2020: Building blocks for resilience in evolving ICT systems ICT-35-2018: Fintech: Support to experimentation frameworks and regulatory compliance Read more about this discussion channel here...

Ethical Frameworks for Autonomous Machines

- It is important to have an ethical framework in place for artificially intelligent and autonomous machines. It is however still a question to be answered that how ethics can be designed into AI technology and where these ethical and legal questions lie. Multi- disciplinary research and discussion are undertaken to provide answers to legal and ethical questions surrounding AI and its applications. Read more about this discussion channel here...

- The European Group on Ethics in Science and New Technologies (EGE) released a statement calling for the launch of a process that would pave the way towards a common, internationally recognised ethical and legal framework for the design, production, use and governance of artificial intelligence, robotics, and 'autonomous' systems. Read more about this discussion channel here...

H2020 WP 2018-2020 includes two calls for proposals related to this discussion here: CT-09-2019-2020: Robotics in Application Areas ICT-26-2018-2020: Artificial Intelligence

Decentralised Data Governance

- Dominant data platforms have extremely centralised architectures, especially at the level of data governance. The key question is whether technological solutions enabling an intrinsically decentralised data governance break the "rules of the game" that have made current data incumbents successful. Read further here

- This discussion in addressing ICT-24 call proposes creations of personal data spaces that the users have complete control over, and thereafter provides access to the desired applications to use this data.

- Arguing that data is of common good, new economic models will be beneficial that incentivize the sharing of information hoarded by applications and companies such as Google. Read further here

H2020 WP 2018-2020 includes two calls for proposals related to this discussion channel: ICT-28-2018: Future Hyper-connected Sociality CT-24-2018-2019: Next Generation Internet - An Open Internet Initiative

Decentralisation of Control

One of the topics raised in the Hub4NGI D2.1 deliverable that needs to be addressed by NGI research topics is that of "Decentralisation of Control". The report provides evidence from multiple sources including the 2017 DIN Forum Report which acknowledges that the GAFA (Google, Apple, Facebook, Amazon) incumbents are in such a dominant position that it is difficult for European start-ups to compete. The NGI should enable alternative business models and infrastructure to support alternative solutions to the current centralised service offerings. H2020 WP 2018-2020 includes two calls for proposals related to this discussion channel: ICT-28-2018: Future Hyper-connected Sociality CT-24-2018-2019: Next Generation Internet - An Open Internet Initiative Read more here and here...

The Pressing Need for IoT Security

The Internet Society 2017 report- Paths to our Digital Future quoted "IoT compounds every security problem ever seen and multiplies every problem of the Internet. Your toaster could be sending out spam". This highlights the magnitude of risks posed to critical Internet infrastructure and applications if security frameworks are not included early into the IoT innovation process. The case of Mirai attack of 2016 is often taken up to prove the extent of damage mere plug-and-play remotely-managed IoT devices can have on the broader Internet. H2020 WP 2018-2020 includes two calls for proposals related to this discussion channel: ICT-27-2018-2020: Internet of Things EUJ-01-2018: Advanced technologies (Security/Cloud/IoT/Big Data) for a hyper-connected society in the context of Smart City Read more about this discussion channel here

IoT, Interoperability and the Future of Internet

Interoperability is fundamental to the success of IoT. As Jari Arkko, former chairman of IETF quoted - "I cannot think of a better example where interoperability is more important than the Internet of Things. Without interoperability, lights won't work with the switches, sensors can't be read by your smartphone, and devices cannot use the networks around them". Without giving significance to Interoperability, we face the risk of fragmentation of Future Internet as in a race to progress ahead of their competitors, businesses will deploy and develop proprietary solutions. H2020 WP 2018-2020 includes two calls for proposals related to this discussion channel: ICT-27-2018-2020: Internet of Things ICT-29-2018: A multilingual Next Generation Internet Read more about this discussion channel here

3.1.2   2019 - 2022 (Potential WP-2019 Topics)

This section represents discussions that are related to topics that could be addressed in topics in the WP-2019 calls for proposals.

Work Program 2019, An Open Internet Initiative

There is need for a more human-centric Internet supporting values of openness, co-operation across borders, decentralisation, inclusiveness and protection of privacy. Giving users control to increase trust in the Internet. Providing more transparent services, more intelligence, greater involvement and participation, leading towards an Internet that is more open, robust, dependable, more interoperable and more supportive of social innovation. Read more...

Compliance with GDPR

GDPR offers a great chance to improve the protection of the user's privacy, but on the other hand it is a big burden for companies with all the new regulations, and especially with the fear to get huge fines. There might be little support for SMEs and high personal risks for SME owners due to the potential high fines. Read more about this discussion channel here...

Limitations to Democracy and Liberty

Another widespread concern, raised in Hub4NGI D2.1, is the abuse of Internet technologies causing threats or limitations to democracy and liberty.

In an online article titled "Will we still have a single global internet in 2025?", the Ditchley Foundation also mentioned that the authoritarian governments wish to use the capabilities of the Internet to exert controls over citizens and keep their data at home in order to ensure access. Read more about this discussion here...

Technology Evolution vs Legislation

A very important point raised in Hub4NGI is that legislative speed cannot keep up with technical development, resulting in ineffective and out of date legislation. Legislation and the legislative process are recurring themes in the sources.

It is usual that citizens and businesses are ahead of governments in understanding the implications of Internet, and overall conclusion is that the legislative process must reform to adapt to the speed that technology evolves at. Changes are rapid, so legislation must adapt. Read more about this discussion here

Governance and Ethics in a World of AI

- Technologists themselves say the technology needs to align with human values, and that ethical dimensions must be prioritised at every stage of the design, development and deployment of AI systems. The ISOC report on "Paths to Our Digital Future" released in 2017 brought attention to the fact that there could be extensive ethical concerns due to AI and automation. The speed at which AI and related technologies are being developed and deployed will require significant investment and effort in the short term to avoid unintended consequences for society and humanity. "We will need focused research and effective governance structures to make sure AI technologies create opportunities and not harm". Read more

- The European Group on Ethics in Science and New Technologies (EGE) released a statement calling for the launch of a process that would pave the way towards a common, internationally recognised ethical and legal framework for the design, production, use and governance of artificial intelligence, robotics, and 'autonomous' systems. Read more about this discussion channel here...

Next Generation Internet and Skills

This discussion is more focused to find out the answers to the following questions:

- What skills will workers and citizens need to fully contribute to and participate in the next generation global infrastructure?
- What should we be teaching our children? (and what not?)
- How may new Internet technologies enhance education?
- Can we go beyond MOOCs (Massive Open Online Courses)?
- Will AI supplant tutors?
- Can blockchain be used to dis-intermediate higher education?

Avoiding Echo-Chambers and Fake News

There is a risk that the Internet becomes an "echo chamber", where profiling of citizens, "fake news" and citizens' own preferences and social groups distort the information citizens can see to biased opinions or sympathetic views that reinforce entrenched views. Read more about this discussion channel here...

Integrated Collaboration Spaces

Collaborations spaces such as incubators and internet forums are essential platforms bringing together stakeholders to innovate on NGI related issues. 2017 DNI Forum report suggested

integrating them with other innovation networks like social networks, experimentation platforms and evidencing platforms so that people from different disciplines can apply technologies to solve real-world problems. Read more about this discussion channel here...

Innovation Agencies for Commercializing Innovation
There is an identified gap between applied research output that addressed and solved some real-world problem and its transition into a marketable product or service majorly due to the traditional way of funding of these two activities, applied research by EC or national grants, and product development through private money like venture capital. To address this, it has been recommended that such innovation support be provided by national innovation agencies to create sustainable businesses, expert base, and strengthen economy. Read more about this discussion channel here...

Safeguarding Confidentiality
Privacy and confidentiality are essential human values which should be ensured in the single largest ubiquitous fabric of modern communication that is Internet. On a contrary, shocking revelations from whistle-blowers like Edward Snowden have made it very clear that this shared trust in the internet has been naive and undeserved, and that weak parts of the design of the internet have being systematically abused at a scale beyond comprehension. NGI initiative seeks to craft an internet that is resilient, trustworthy and sustainable, and varied aspects that would inject confidentiality into the core Internet have been suggested. Read more

Internet Threat Catalogue critical to NGI
The internet needs to be extremely resilient and should be able to cope with many parts of the modern threat landscape. Different threat categories are identified which could be prioritised for mitigation in the NGI initiative. Grouped together as 'Force majeure' (Natural disaster, Man-made disasters, Adversary AI), 'Technological' (Cascade of system failure, Spill over from inadequate isolation/segmentation), and 'Human intent' (Cyber warfare and cyber conflicts). Read more

Improving Maintainability and Deployability
Flexibility and responsiveness is essential for Internet as a system. Without proper procedures for maintenance and without auditability, a system cannot be expected to be secure and reliable. It is also important for NGI initiative to make sure that R&D efforts should be deployable and maintainable in the context of actual Internet environment. A successful approach for NGI would be to create a universal and reliable path to automatable deployment even during (continuous) development. Read more

3.1.3   2020 and beyond (post H2020)

This section represents discussions of topics that need to be addressed beyond H2020 in the NGI flagship era.

NGI Beyond 2020
This is the discussion about the vision for NGI beyond H2020 focusing on the longer-term priorities for NGI.

Emerging NGI Technologies
This discussion is focused on the application of NGI technologies like AI, IoT and Interactive Technologies including Virtual Reality (VR), and Augmented Reality (AR).

Hyper connected Sociality
This discussion channel is focused on:
- Mobilising a positive vision as to the role that social media will increasingly play in communication, exchange, business, creation, learning and knowledge acquisition.
- Overcoming the critical issue of trust and governance through democratic reputation mechanisms and user experience.
- Creating a Global Social Sphere.

Inclusive NGI
The envisaged goal is enabling every citizen, from all walks of life, to fully take part in the digital single market. The next generation internet will have to empower users, including the most vulnerable or challenged, to have access to the same digital learning opportunities, in forms that are accessible, perceivable and understandable by everybody.

Multilingual NGI
The objectives of this discussion channel include:

- Supporting technology-enabled multi-linguism for an inclusive digital single market.
- Ensuring every European has access to content and can engage in written and spoken communication activities without language being a barrier.
- Overcoming linguistic fragmentation to enable all citizens and businesses to engage in online activities and benefit from online content and services.

Wealth Distribution in Digital Economy and New Business Models
Wealth distribution and economies are being increasingly influenced by the digitisation and Internet. The proliferation of AI and automation is becoming a major threat to human employment. As the machines will take over certain tasks in the economy, there is a need to find new ways of distributing wealth. Compared to other business types, SMEs are seen to be at a disadvantage and need help to take advantage of NGI. Investment policies and legislations should aim to increase the abilities of SMEs to profit from NGI technologies. Furthermore, new business models are needed to challenge the current dominance of the large incumbents. New collaboration based business models which integrate people and resources from various disciplines might help significantly. Read more...

Need for a new Internet Architecture
It is argued by many researchers and technologists that the five decades old Internet architecture is not proved to be able to provide best foundation for the next generation services and applications. The simple 4-layer TCP/IP model has now become a very complex structure. To solve the emerging problems, more and more building blocks were added and a very complex solution is the current result. Today's Internet is it has bad performances, bad security, hard to build and maintain, and configuration and operational costs are through the roof. Read more...

Evolving Edge and Safeguarding Open Internet
Increasingly many new services (IoT, smart grid, health) are being delivered from Internet edge (home or enterprise access networks, their ISPs). However, these emerging services require specialised infrastructure, which may create private islands of connectivity that don't use public Internet posing a risk for interoperability and to the future of global open Internet [Read more]. Another driver for specialised edge networks is the need to provide ubiquitous connectivity for emerging latency/bandwidth intensive applications such as IoT, HD video, the proliferation of which will make the user edge more complex and lead to the deployment of proprietary and specialized solutions [Read more].

Safeguarding Standardisation and Innovation
Open and voluntary standards have long been the core of the Internet's success. However, standardisation process will be challenged in the future by the speed of Internet innovation, the complexity of the emerging infrastructure and services, and possible inclination towards proprietary systems. Standards development processes thus have to evolve to mitigate manipulation from big corporations, in making the process less cumbersome and incentivizing as well as engaging more and more innovators into the standardisation process. Read More

Cooperative Security Needed in the Future Internet
Too often companies and other entities are reluctant (for good reasons) to share security related information. Prevailing principle is: what is inside my walls is my business, the rest of the Internet including my customers, does not concern me. Also, everyone handles security patching themselves or leaves it until later. It is no surprise that most security breaches take place using known vulnerabilities for which patches exist. The hackers can keep on using the same resources against many potential victims. The solution is cooperative firewall (customer edge switching). Read More here

3.2 Topic View

Privacy

This discussion area helps to identify the challenges arising within the privacy and trust enhancing scenario, as well as potential solutions to address these challenges, and to identify gaps that need to be filled by research and innovation projects within this topic area. Read more...

Trust

As sensors, objects, devices, AI-based algorithms, etc., are incorporated in our digital environment, there is a need to develop robust and easy to use technologies in order to help users increase trust and achieve greater control when sharing their personal data, attributes and information. Read more...

Social Liberty

Restrictions on Internet through interventions by authoritarian governments and limited or biased search results from Internet search providers causes the limited or biased information generation. Social groups that pursue a particular agenda by reinforcing certain arguments, ignoring other opinions are also the cause of restricted and fabricated information. Read more here. For further discussion, click here...

Net Neutrality

Internet service providers must treat all data on the Internet the same, and not discriminate or charge differently by user, content, website, platform, application, type of attached equipment, or method of communication.

Need for a new Internet Architecture

It is argued by many researchers and technologists that the five decades old Internet architecture is not proved to be able to provide best foundation for the next generation services and applications. The simple 4-layer TCP/IP model has now become a very complex structure. To solve the emerging problems, more and more building blocks were added and a very complex solution is the current result. Today's Internet is it has bad performances, bad security, hard to build and maintain, and configuration and operational costs are through the roof. Read more here...

Governance and Ethics in a World of AI

- Technologists themselves say the technology needs to align with human values, and that ethical dimensions must be prioritised at every stage of the design, development and deployment of AI systems. The ISOC report on "Paths to Our Digital Future" released in 2017 brought attention to the fact that there could be extensive ethical concerns due to AI and automation. The speed at which AI and related technologies are being developed and deployed will require significant investment and effort in the short term to avoid unintended consequences for society and humanity. "We will need focused research and effective governance structures to make sure AI technologies create opportunities and not harm". Read more

- The European Group on Ethics in Science and New Technologies (EGE) released a statement calling for the launch of a process that would pave the way towards a common, internationally recognised ethical and legal framework for the design, production, use and governance of artificial intelligence, robotics, and autonomous systems, compared to current landscape of disparate initiatives. Read more about this discussion channel here. It also highlighted moral questions, need for a wide-ranging ethical framework, and described a set of ethical principles to support the development of a conclusive and inclusive process in making of a diverse ethical framework for a responsible AI.

Decentralised Data and Infrastructure

- Dominant data platforms have extremely centralised architectures, especially at the level of data governance. The key question is whether technological solutions enabling an intrinsically decentralised data governance break the "rules of the game" that have made current data incumbents successful. Read further here...

- This discussion proposes decoupling of data storage, control and governance from its applications.

Heterogeneity

According to the call text related to R&I Actions for H2020, there is a need to search and access the technologies for large heterogeneous data sources, services, objects and sensors, devices, multi-media content, etc. and which may include aspects of numbering; providing contextual querying, personalised information retrieval and increased quality of experience. Read more...

Multidisciplinary and End-to-End Design

Multidisciplinary Design is viewed as important by almost all of the sources surveyed as mentioned in Hub4NGI D2.1, and involves bringing together the right mix of experts from different disciplines who collaborate to address the problem at hand. Read more...

Interoperability

Generally speaking, Interoperability is critical to ensure that users are not locked into a particular service or vendor, and applications can function end-to-end up to the last mile of connectivity.

- Interoperability has been identified fundamental to the success of IoT as there will be a proliferation of heterogeneous devices, applications and networks and it will be important for them to work with each other to harness the full value of IoT [Read more].

- Another domain where there are increased interoperability challenges is the user edge as there is a perceived deployment of proprietary and specialised networks in order to power new emerging services [Read more] and to provide ubiquitous connectivity for new demanding applications [Read more].

Standardisation

Complementary to interoperability is the process of standardisation. Open and voluntary standards have long been the core of the Internet's success. However, standardisation process will be challenged in the future by the speed of Internet innovation, the complexity of the emerging infrastructure and services, and possible inclination towards proprietary systems. Standards development processes thus have to evolve to mitigate manipulation from big corporations, in making the process less cumbersome and incentivizing as well as engaging more and more innovators into the standardisation process. Read More

Deployability

Deployability means that it should be possible to easily distribute and combine new technologies in order to deploy them. It is important for NGI initiative to make sure that R&D efforts should be deployable and maintainable in the context of actual Internet environment. A successful approach for NGI would be to create a universal and reliable path to automatable deployment even during (continuous) development. Read more

Maintainability

Without proper procedures for maintenance and without auditability, a system cannot be expected to be secure and reliable. The systems should also be equipped with periodic self-test procedures in order to check the system's integration and immunity against various malicious attacks. Read more

Confidentiality

Privacy and confidentiality are essential human values which should be ensured in the single largest ubiquitous fabric of modern communication that is Internet. On a contrary, shocking revelations from whistle-blowers like Edward Snowden have made it very clear that this shared trust in the internet has been naive and undeserved, and that weak parts of the design of the internet have being systematically abused at a scale beyond comprehension. NGI initiative seeks to craft an internet that is resilient, trustworthy and sustainable, and varied aspects that would inject confidentiality into the core Internet have been suggested. Read more

3.3 Technology View

Blockchain

This discussion is related to the view of how blockchain can enable the Next Generation Internet. How can this technology be applied to empower European citizens in being part of the Next Generation Internet? What are the challenges, technically, socially and legally?

While the TCP/IP made communication easy since it allowed devices to talk to each other, the blockchain technology could help advance it further by making data interoperable in such a way that having to hard code APIs for accessing databases would be a thing of the past.

As someone who deals with data extraction, verification and analysis, it is believed that blockchain can help restore trust in the Internet by allowing storing and dealing with data more interoperable, reliable, convenient and efficient. Doing so helps journalists and the public less prone to falling into fake news traps. Read more...

Responsible AI

AI is already being used to augment human potential in many ways including cancer diagnostics. With AI becoming more ubiquitous, there is a need for means of redress where decisions made by machines are difficult to understand, or unethical or even illegal. "Responsible AI" concerns applications of AI whose actions need to be explainable and governed from both a legal and ethical standpoint because they are either safety critical or impact the lives of citizens in significant ways. There is still an open question that "will AI empower us as human beings or kill us?". Read more about this discussion here and here.

Internet of Things

IoT is marked as the top technology driver by the number of sources. From the results of a large scale survey of European citizens; IoT, Big Data and machine learning are considered to be the most promising technologies which may have larger impact not only on people's personal lives but also in the labour market. Read more..

At the Digital Innovation Networks (DIN) Forum held on 27 June 2017, from the opinions expressed by experts, almost 80% of participants expressed IoT as the key technology driver for NGI.

Big Data

Big Data is also seen by the European citizens as the most promising next generation technology. Read more.

Edge (Computing)

- Edge Computing is considered as top-priority technology area by 30% experts at the Digital Innovation Networks Forum held on 27 June 2017 [Read more].

- Edge space is seeing increased development due to emerging IoT, and the need to provide ubiquitous connectivity for intensive applications like 4K, 8K video streaming which is also pushing towards storage of content at the edge itself (CDNs) [Read more]. While this enables operators in providing good quality service to their users, it also poses risk for the development of specialized and proprietary networks risking fragmentation of open Internet [Read more].

Decline of Transit Networks

Complementary to the evolving network edge, the traditional hierarchy of backbone, access and enterprise networks is flattening. In the past, this hierarchy meant that backbone networks would handover traffic destined for access networks they did not directly connect to other transit ISPs. However, the increasing use of CDNs and the continuous growth of Internet Exchange Points (IXPs), where traffic is often passed directly to access networks, have reduced the need for transit networks changing the Internet landscape as a result. Read More

Cloud Computing

Although cloud computing pose some security and privacy threats however it is important because of many reasons. For both education and business, cloud solutions are seen as a great opportunity. In order to overcome the challenges of security, privacy and surveillance, new security-built protocols could be designed to support new business and social domains. Read more.

Open Data

Discoverable and easy to process data is important from the perspective of start-ups. There is a need to develop and "open link" in order to overcome the challenges of format interoperability among data representation and data sources. Read more.

Need for a new Internet Architecture

It is argued by many researchers and technologists that the five decades old Internet architecture is not proved to be able to provide best foundation for the next generation services and applications. The simple 4 layer TCP/IP model has now become a very complex structure. To solve the emerging problems, more and more building blocks were added and a very complex solution is the current result. Today's Internet is it has bad performances, bad security, hard to build and maintain, and configuration and operational costs are through the roof. Read more...

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Application Areas for NGI Technologies

The following are the key application areas which are expected to be greatly impacted by the emerging NGI technologies:

- **Industry 4.0**
  Industry 4.0 is a big change as agreed by the experts in "The Next Generation Internet Workshop" on "Widen the European Space of Life and Work" held on 8th June 2017. It is considered to be the next phase in the digitisation of the manufacturing sector. It relies on Internet services and knowledge is largely shared across the network in order to exploit this available knowledge for faster and better robotic learning.

- **Immersive Environment**
  With the advancement in AI and learning algorithms, the immersive environments such as Virtual Reality (VR), Augmented Reality (AR) are also expected to be leveraged. However, these new forms of interactions and immersive environments might also face the challenges of data privacy, diversity and the concentration of data into proprietary platforms. Understanding the psychological & biological effects and threats and opportunities for industry and citizens is necessary in the VR world.

- **Collective User Experience**
Decentralised, heterogeneous and distributed architectures are important in the next generation digital society. For an enhanced user experience, human-centric technologies need to be identified, propagated and managed.

- **Lifelong Learning**
ICT lifelong learning is important in order to raise people's awareness of the significance of acquiring ICT skills throughout their lives.

- **Inclusiveness**
Each citizen has the right to benefit from modern ICT services and technologies. And the services should be designed in simple and easy to use way so that everyone including persons with disabilities could get benefit. Ubiquitous access to Internet and other ICT services is the right of each citizen just like access to clean water or energy infrastructure. Inclusiveness and ubiquitous connection are the key themes for civil society.

- **Protection from the dangers of the Internet**
Ordinary Internet users are not fully aware how deep they are in the Internet. They sometimes disclose very personal information against social engineering attacks. This poses not only data protection problem but also people themselves protection. It is important for emerging NGI technologies to protect people from dangers of the Internet.

3.4 Socio-Economic and Legal View

Social Liberty

Rise in social exclusion for some and problems with balancing rights and liberties against privacy and security aren't just changing the way we lead out lives day-by-day but may also be altering our self-perception.

Intervention by Governments (Government Policies)

- Government and law enforcement agencies have greater impact on driving the people's opinion. Restrictions on Internet through interventions by authoritarian governments causes biased or limited information dissemination. Read more about this discussion channel [here] and [here].

- IoT will pose a risk to critical infrastructure as there will be a plethora of multi-vendor and heterogeneous connected devices that may not be trusted. Governments will be forced to intervene as a result, but there is a fear that the government response will be mindful of privacy, individual autonomy, and not deterring innovation process. [Read More]

GDPR (General Data Protection Regulation)

GDPR offers a great chance to improve the protection of the user's privacy, but on the other hand it is a big burden for companies with all the new regulations, and especially with the fear to get huge fines. There might be little support for SMEs and high personal risks for SME owners due to the potential high fines. Read more about this discussion channel here...

Echo Chambers

There is a risk that the Internet becomes an "echo chamber", where profiling of citizens, "fake news" and citizens' own preferences and social groups distort the information citizens can see to biased opinions or sympathetic views that reinforce entrenched views. Read more about this discussion channel here...

Socio-economic Impacts of Artificial Intelligence (AI)

This discussion is particularly important with the proliferation of artificially intelligent machines in our society. Further reading and discussion can be found here that how AI could impact our society.

Socio-economic implications of New Technologies (IoT/Blockchain/etc.)

- IoT is bringing about a convergence of our digital and physical worlds, where Internet will be used to control much of our objects and environment. This disruption can have a big impact on our society and economy - jobs will be effected as many of the mundane tasks can be automated, there will be convergence of ICT and traditional industries, and new cross-industry regulatory frameworks [Read more]

- In a hyper connected world, no sector of the economy will be untouched by technology and only those who adapt quickly to technological change will be successful. Governments will need to increase spending on training programs to help workers impacted by technological displacement. The growth of IoT will effectively make all companies technology companies [Read more].

Impact of NGI Technologies on Cost of Innovation

As state-of-the-art expensive Internet architecture is made available to provide better services to the users, the gap between the big players (who can afford the increased cost) and smaller ones (who cannot) will increase. For instance, services are being distributed at very user edges through costly technologies like Content Distribution Networks (CDN), and this may not be feasible for SMEs and start-ups to provision. Read More

Decentralised Governance

One of the topics raised in the Hub4NGI D2.1 deliverable that needs to be addressed by NGI research topics is that of "Decentralisation of Control". Read more here and here...

Wealth Distribution in Digital Economy and New Business Models

- Wealth distribution and economies are being increasingly influenced by the digitisation and Internet. The proliferation of AI and automation is becoming a major threat to human employment. As the machines will take over certain tasks in the economy, there is a need to find new ways of distributing wealth. Compared to other business types, SMEs are seen to be at a disadvantage and need help to take advantage of NGI. Investment policies and legislations should aim to increase the abilities of SMEs to profit from NGI technologies. Furthermore, new business models are needed to challenge the current dominance of the large incumbents. New collaboration based business models which integrate people and resources from various disciplines might help significantly. [Read more]

- The future of Innovation and Entrepreneurship is dependent on following factors as per The Internet Society 2017 report- Paths to our Digital Future - The ability of innovative start-ups to tackle dominance and takeover from big corporations, availability of interoperable and open standards so that construct of permissionless innovations from new businesses is maintained, and rise of new dominant Internet economies from emerging Asian, African and Latin American markets. [Read more]

Limitations to Democracy and Liberty

Another widespread concern, raised in Hub4NGI D2.1, is the abuse of Internet technologies causing threats or limitations to democracy and liberty.

In an online article titled "Will we still have a single global internet in 2025?", the Ditchley Foundation also mentioned that the authoritarian governments wish to use the capabilities of the Internet to exert controls over citizens and keep their data at home in order to ensure access. Read more...

Technology Evolution vs Legislation

A very important point raised in Hub4NGI is that legislative speed cannot keep up with technical development, resulting in ineffective and out of date legislation. Legislation and the legislative process are recurring themes in the sources.

It is usual that citizens and businesses are ahead of governments in understanding the implications of Internet, and overall conclusion is that the legislative process must reform to adapt to the speed that technology evolves at. Changes are rapid, so legislation must adapt. Read more

Algorithmic Accountability

In the Hub4NGI D2.1 deliverable, a significant issue regarding the responsible AI has been raised which is about whether and how can an AI algorithm be accountable for its actions.

The issue of Algorithmic Accountability was also raised in Net Futures debate "Legal, ethical and social issues in a software defined world" and the participants agreed that there is a responsibility gap for the AI systems.

Transparency is considered to be a key aspect of algorithmic accountability as depicted in the Net Future 2017 debate session. And it is widely agreed that the algorithms need to be able to explain their decisions. Read more...

Ethical Frameworks for Autonomous Machines

It is important to have an ethical framework in place for artificially intelligent and autonomous machines. It is however still a question to be answered that how ethics can be designed into AI technology and where these ethical and legal questions lie. Multi- disciplinary research and discussion are undertaken to provide answers to legal and ethical questions surrounding AI and its applications. Read more...

Lack of Control over Data

There is a fear that citizens' privacy is being eroded by the exploitation of citizens' personal data by profiling, and citizens have no control over this. Read more

Implications of giving away Personal Data

The importance of giving more attention to the debate about privacy. Read more

Role of Innovation Agencies in strengthening economy

National innovation agencies can support innovation by helping applied research results that addressed some real-world problems transition into marketable product and services creating sustainable businesses, expert-base, and thus strengthening national economy. Read more

How Technologies impact Privacy

The power balances between providers and users created by IoT and Big Data needs to be framed by European values, as discussed at the workshop on Personal Data Spaces and Privacy. Read more

Ensure continuing confidence in the system

When considering highly interconnected networks, it's clear that Trust, Security & Privacy concerns feature prominently. Read more

Governance and Ethics in a World of AI

- Technologists themselves say the technology needs to align with human values, and that ethical dimensions must be prioritised at every stage of the design, development and deployment of AI systems. The ISOC report on "Paths to Our Digital Future" released in 2017 brought attention to the fact that there could be extensive ethical concerns due to AI and automation. The speed at which AI and related technologies are being developed and deployed will require significant investment and effort in the short term to avoid unintended consequences for society and humanity. "We will need focused research and effective governance structures to make sure AI technologies create opportunities and not harm". Read more.

- The European Group on Ethics in Science and New Technologies (EGE) released a statement calling for the launch of a process that would pave the way towards a common, internationally recognised ethical and legal framework for the design, production, use and governance of artificial intelligence, robotics, and autonomous systems, compared to current landscape of disparate initiatives. Read more about this discussion channel here. It also highlighted moral questions, need for a wide-ranging ethical framework, and described a set of ethical principles to support the development of a conclusive and inclusive process in making of a diverse ethical framework for a responsible AI.

Policy Making in the Digital Age

Like civil society, with the evolution of the digital society and the expansion of the Internet into our economy, governments need to be more active as policymakers. From cybersecurity to societal issues to technologies such as the Internet of Things (IoT) and Artificial Intelligence (AI), governments will face a host of new and complex issues that might challenge all aspects of their decision-making. The pressure of security challenges is therefore growing the future of Internet is highly dependent on how the governments respond to this issue. Read more

Multi-stakeholderism and Multi-lateralism and the setting of global norms

The rise of nationalism and populism around the globe could cause governments build national policy barriers that fragment the Internet. If current trends are any indication, more and more governments will restrict and control Internet use and access through censorship, network shutdowns and other means. This is a matter of great concern. Read more

Impact of AI on the Internet economy

Many in industry and government believed that the role of AI is pervasive in the future Internet economy. AI presents enormous opportunities to create new jobs, new industries and new ways of connecting. At the same time many believed that AI would steal thousands of jobs. The nature of work will drastically change as the AI and automation drive significant structural change across industries. This change will empower workers and minimise the inequalities among people and between countries. Many existing jobs may be displaced as AI moves beyond monetising user data to changing how products and services are delivered. Adapting to the pace of change will be a major global challenge for the immediate future. Read more

Impact of AI on Internet security and network intelligence

As networks and traffic streams become increasingly complex, AI can help network managers to understand traffic patterns and create heuristics that identify security threats. At a basic enterprise level, AI can perform tasks normally carried out by an IT helpdesk, such as troubleshooting employee computer problems. In this way the IT professionals will get more time to implement security best practices and better secure their systems and networks. Read more

Inadequacy of Responses and the Impact on Trust

Cybersecurity will be the most pressing challenge of the next decade. Inadequate management of cyber threats will put users increasingly at risk, undermine trust in the Internet and jeopardise its ability to act as a driver for economic and social innovation. Disproportionate government responses will threaten freedoms, and contribute to a climate of fear and uncertainty. The ISOC report on "Paths to Our Digital Future" released in 2017 brought attention to the fact that we need new models to increase cybersecurity readiness and reduce vulnerabilities but also to ensure end-user security. The complexity and scope of cyberattacks necessitates multi-stake holder and expertise-driven responses for the digital economy to thrive and for trust in the Internet to be rebuilt. Read more

Market Consolidation and Walled Gardens

Closed platforms and proprietary ecosystems, referred to as walled gardens, may proliferate without the lack of a competitive environment as market leaders may consolidate their powers. This will result in the loss of choice and constraints on innovation and lead to Internet fragmentation. Walled gardens could also arise as a reaction to political concerns such as economic isolationism and national security, hindering the development of the global economy. Read More

Impact of GDPR on Blockchain Technologies

There is an interesting blogpost on the paradoxical potential impact of GDPR on Blockchain technologies and some possible workarounds to ensure GDPR compliancy. Certainly, solutions will need to be developed in the NGI programme. Read more here

4   NGI Consultation Analysis

As mentioned in section 3, the Consultation Platform's Knowledge Base has a living summary report of the activities in the discussion channels about the latest Research & Innovation challenges that are reflected in WP2018 and WP2019 calls and also in many other NGI related study reports. This summary report provides four different views into the current status of the NGI online consultation platform: Roadmap (timeline) View, Topic View, Technology View, and Socio-Economic View. The updated version of this report can be seen here (https://consultation.ngi.eu/ngi-consultation-platform-summary-report).

While going through all the discussion channels and subsequent comments, the participants discussed on many new topics and challenges including sustainable Internet, net neutrality, data sovereignty, machine learning, identity and trust, cybersecurity and resilience; however, there are four main topics that can be termed as those and raised quite often on the Consultation Platform by the participants:

1. Privacy and Trust Enhancement;

2. Decentralised Data Governance;

3. Socio-economic and Legal Considerations for NGI;

4. Responsible Artificial Intelligence and New Business Models.

It is worth noting that some of the topics under consideration are cross cutting and supportive of some of the other topics. For example, "decentralisation of power" can support other topics such as new models of online ownership and personal data governance. Also, some topics might be perceived to be more urgent such as "trustworthy online media" and "ethical AI", where there are immediate concerns even among the wider public. That is why a view of multi-stakeholder groups has been taken into account in the consultation platform.

In the following sub-sections, these topics are analysed according to the recent Work Programme calls and users' comments.

4.1 Privacy and Trust Enhancement

The focus of this discussion channel is on how the GDPR and ePrivacy directives will impact upon NGI research and innovation and its stakeholders, both large and small. While GDPR is seen as being a positive step to enforce the use of appropriate processes and technologies in order to keep personal data handled with diligence, there are some concerns being raised about its impact especially on the smaller SMEs and start-ups, which wouldn't have the resources and/or legal expertise or funds for the administrative and legal costs. In addition, the GDPR impact on technologies such as blockchain technologies is discussed on the consultation platform, as some of the protection mechanisms and encryption techniques being used by blockchain don't exactly match the requirements of GDPR, as even though they are quite secure and robust, it doesn't match the definition of data "should be erasable" even if it is encapsulated quite securely.

The scale of cyberattacks is steadily growing, and many anticipate the likelihood of catastrophic cyberattacks in the future. Trust will be the most vital part of the future Internet realm. Too often companies and other entities are reluctant to share security related information ignoring the fact that most security breaches take place using known vulnerabilities. These breaches can be minimized through the creation of trust domains and promotion of cooperative security mechanisms.

Horizon 2020 – Work Programme 2018-2020 contains the following calls that are closely related to privacy, security and trust:

1. ICT-02-2018: Flexible and Wearable Electronics;

2. ICT-08-2019: Security and resilience for collaborative manufacturing environments;

3. ICT-13-2018-2019: Supporting the emergence of data markets and the data economy;

4. SU-ICT-01-2018: Dynamic countering of cyber-attacks;

5. SU-ICT-02-2020: Building blocks for resilience in evolving ICT systems;

6. SU-ICT-03-2018: Establishing and operating a pilot for a Cybersecurity Competence Network to develop and implement a common Cybersecurity Research & Innovation Roadmap;

7. EUJ-01-2018: Advanced technologies (Security/Cloud/IoT/BigData) for a hyper-connected society in the context of Smart City.

The Engineroom project aims to identify key NGI technologies using a data-driven approach, specifically analysing the trend of occurrence of NGI terms in major scientific and news articles. Similar to the NGI consultation platform surfacing out Privacy and Trust Enhancement technologies as one of the important topics, in their *Reimagining the Internet* event in London on 21st March, 2018[13], the Engineroom project also brings out *privacy and cybersecurity* related topics as the second most dominant umbrella topic relating to the social issues. Further down, the most trending sub-topics as analysed by Engineroom are ransomware (cyberattacks) and GDPR, which are coherent to the consultation platform and knowledge base content, while some wider issues such as body cameras and temporal concerns such as of *shadow brokers* also occur.

4.2 Decentralised Data Governance

Decentralised data governance in the NGI is the key to empowering the citizens in terms of knowing fully what their data is being used for and by whom. That is why it is one of the core selected topics in the upcoming WP2018 for NGI. The discussion in this channel focused around the challenge that how to balance between a truly human-centric next generation Internet and service and applications that are largely based on data economy. Offering alternative technological solutions (e.g. blockchain) coupled with services that at least feel equivalent to existing services is another question to be answered. There are other numerous topics on data governance e.g. looking at novel ways of incentivizing the sharing of data for wider societal benefits as opposed to hoarding of data by large companies, and using the new more secure and privacy protecting technologies of the NGI.

Although dominant data platforms have extremely centralised architectures, especially at the level of data governance, the key question arises whether technological solutions enabling intrinsically decentralised data governance break the "rules of the game" that have made current data economy – based large incumbents so successful. The shift would come from the distributed architectures that enable fully decentralized storage and management of data. In such a scenario, peer-to-peer technologies and distributed ledgers technologies would enable a fully decentralised certification and security of transactions: monetary exchanges and data exchanges.

Horizon 2020 – Work Programme 2018-2020 contains the following calls which are closely related to Data governance and decentralisation:

1. ICT-12-2018-2020: Big Data technologies and extreme-scale analytics;

2. ICT-13-2018-2019: Supporting the emergence of data markets and the data economy;

3. ICT-24-2018-2019: Next Generation Internet - An Open Internet Initiative;

4. ICT-28-2018: Future Hyper-connected Sociality;

5. DT-ICT-05-2020 Big data Innovation hubs;

6. DT-ICT-11-2019: Big data solutions for energy.

The Engineroom study[14] also reflects similarly based on their London workshop outcomes. While decentralized data governance in itself is not reported by the study as a trending NGI focus, *internet governance* and *distributed systems* separately emerge as the two biggest groups of NGI topics in their analysis pertaining to technological and societal issues, respectively. Within internet governance, the issues relating to net neutrality dominate the trend while within distributed systems, blockchain, edge computing and digital currencies emerge as the most robust occurring issues in the analysed sources.

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[13] https://www.ngi.eu/event/reimagining-the-internet/?instance_id=94

[14] This study refers to the online data capture site provided by Engineroom to the Inter-CSA projects.

4.3 Socio-economic and Legal Considerations for NGI

It is believed that the Internet should empower users with certain capabilities that must remain at the heart of the Internet experience for everyone and everywhere. The users must be able to connect, speak, innovate, share, choose and trust. The digital society is expanding with the growth of Internet. The governments have to play a proactive role and accelerate the legislation process in order to keep the pace with the technological developments. There will be ever increasing pressure on governments to act with the pace of change. Are governments prepared for the drastic changes in the economy, especially in traditional industries most challenged by technology? Government's tendency to apply legacy regulatory models to new and emerging issues is of particular concern.

There is another challenge under this discussion is how to speed up the uptake of eIDAS compliant identification and authentication by private service providers, and discovery of services, including new forms of media based service, and the necessary interoperability and security and privacy preserving elements for the IoT technologies in the Next Generation Internet.

Horizon 2020 – Work Programme 2018-2020 contains the following calls which are closely related to Legislation and Socio-Economic considerations for NGI:

1. ICT-09-2019-2020: Robotics in Application Areas;
2. ICT-13-2018-2019: Supporting the emergence of data markets and the data economy;
3. ICT-24-2018-2019: Next Generation Internet - An Open Internet Initiative;
4. ICT-26-2018-2020: Artificial Intelligence;
5. ICT-28-2018: Future Hyper-connected Sociality;
6. DT-ICT-09-2020: Digital service platforms for rural economies.

The Engineroom study similarly reports socio-economic aspects of NGI as robustly occurring ones in analysed texts in their extensive analysis. Socio and economic (employable) challenges are grouped separately in their analysis. For example, the issues of sexual harassment and healthcare emerge as the dominant social sub-challenges, while the impact of automation emerges as the dominant employment sub-challenge.

4.4 Responsible Artificial Intelligence and New Business Models

"Responsible AI" concerns applications of AI, whose actions need to be explainable and governed from both a legal and ethical standpoint because they are either safety critical or impact the lives of citizens in significant ways. Participants on the consultation platform raised numerous questions which are related to the AI domain. Some of exemplary questions are:

- How can human and machines coexist in the economy?
- What roles are humans ideally suited for and what roles are machines best at?
- How can humans' livelihood be sustained?
- How can machines be paid for?
- How the autonomous machines be legislated?
- Will AI empower us as human beings or kill us?
- Should robots and AI be legible to pay taxes?

The above mentioned open-ended questions need to be addressed in the future calls. The role of AI is pervasive in the future Internet economy. On the one hand, many believe that AI would steal thousands of jobs. However, the nature of work will drastically change as the AI and automation drive significant structural change across industries. It is possible that this change will empower workers and minimize the inequalities among people and between countries. Many existing jobs may be displaced as AI moves beyond monetising user data to changing how products and services are

delivered. But AI also presents enormous opportunities to create new jobs, new industries and new ways of connecting. It leads to the question about how the global society will make itself ready to absorb the change, and be prepared for new economy models and new business models? The intelligence and services used to manage and implement manufacturing or services may still reside in developed countries rather than being developed locally. AI might exacerbate the digital divide in significant ways that would have geopolitical implications.

Compared to other business types, SMEs are seen to be at a disadvantage and need help to take advantage of NGI. Investment policies and legislations should aim to increase the abilities of SMEs to profit from NGI technologies. Furthermore, new business models are needed to challenge the current dominance of the large incumbents. New collaboration based business models which integrate people and resources from various disciplines might help significantly.

Horizon 2020 – Work Programme 2018-2020 contains the following calls which are closely related to this area:

1. ICT-09-2019-2020: Robotics in Application Areas;

2. ICT-13-2018-2019: Supporting the emergence of data markets and the data economy;

3. ICT-24-2018-2019: Next Generation Internet - An Open Internet Initiative;

4. ICT-26-2018-2020: Artificial Intelligence: Consolidation of the European AI-on-demand platform through Research and Use-cases;

5. SU-ICT-01-2018: Dynamic countering of cyber-attacks;

6. ICT-30-2020 An empowering, inclusive Next Generation Internet;

7. ICT-38-2020 Artificial intelligence for manufacturing;

8. DT-ICT-12-2020 The smart hospital of the future.

The Engineroom Study reports AI as the second most trending NGI technological topic. Although, unlike how the Consultation Platform reflects AI in a NGI world from broader ethical, legal and societal standpoints, the Engineroom study reflects AI majorly from the technological standpoint through sub-topics like machine learning, neural networks and facial recognition.

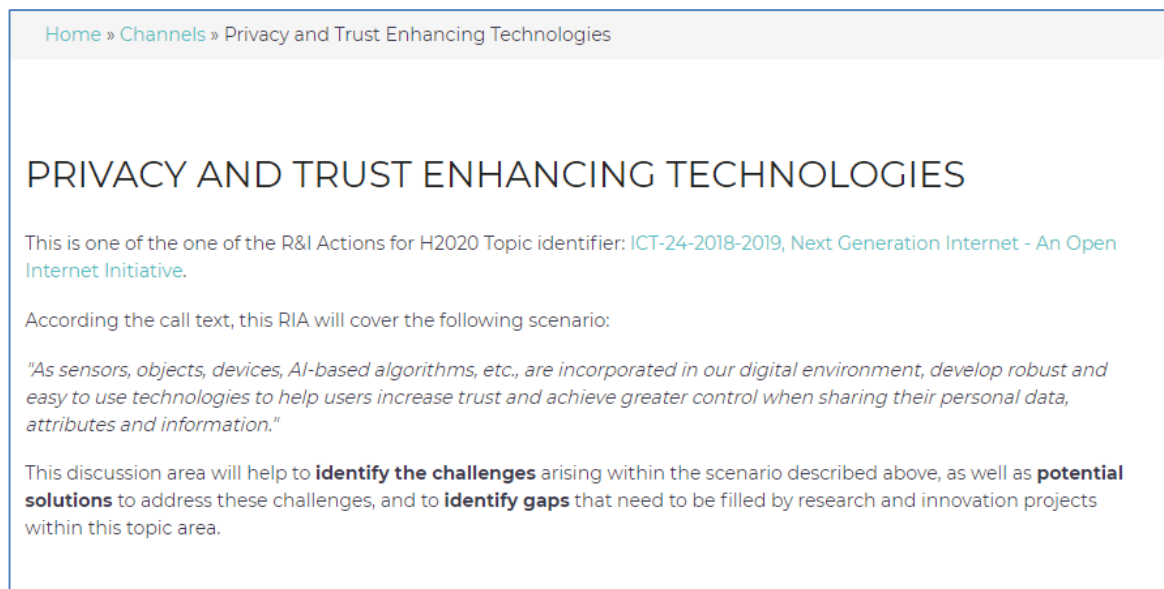# 5 Lessons learned, future directions and next steps

At the six month point, we felt it was a good opportunity to take stock and review a number of important questions:

- What has been learned thus far?

- What has worked well?

- What has not worked well?

- How can we improve our uptake and capture a better snapshot of the knowledge and the experts opinions?

- What is the future direction and the next steps for the Consultation Platform / Knowledge base?

This section will address these questions and provide some initial answers and strategies developing.

5.1 "Channels" and organisation of the content

In the first launched version of the Consultation Platform, the users could enter new discussion channels, and we found this quite often led to the entry of disjointed topics, with inadequate information provided. Therefore, we took a decision to enter a discussion channel for the already available WP2018 topics, Privacy and Trust Enhancing Technologies, Decentralised Data Governance and Discovery and Identification. At first, there was still an issue where the entries were sometimes vague or more focused on products and/or specialties of the organisation of the contributing members, so we decided to give some guidance on the type of entry that would be most useful in the discussion channels, as shown in the Figure 7 below.

Home » Channels » Privacy and Trust Enhancing Technologies

PRIVACY AND TRUST ENHANCING TECHNOLOGIES

This is one of the one of the R&I Actions for H2020 Topic identifier: ICT-24-2018-2019, Next Generation Internet - An Open Internet Initiative.

According the call text, this RIA will cover the following scenario:

"As sensors, objects, devices, AI-based algorithms, etc., are incorporated in our digital environment, develop robust and easy to use technologies to help users increase trust and achieve greater control when sharing their personal data, attributes and information."

This discussion area will help to **identify the challenges** arising within the scenario described above, as well as **potential solutions** to address these challenges, and to **identify gaps** that need to be filled by research and innovation projects within this topic area.

Figure 8: Example of guidance on data entry for discussion channels

As a result, the entries were of more focus on the challenges and research and innovation topics needing addressing in the discussion channels' main topics. This also helped in the generation of the live running Knowledge Base report, which is updated continuously and published on a weekly basis (see chapter 3).

The users were also able to **create new channels**, but in some cases, if the moderator felt that the entry would fit better within an existing channel, the user was notified and with their permission, the discussion entry was moved to the most appropriate discussion channel.

An interesting observation made by the project in this period was that the clear focus has been squarely on the available WP2018 topics and not so much on the potential topics being selected for WP2019 or post H2020. In fact, although we were promoting the WP2019 discussion channel, there were very few entries made to this channel. It seemed to be the case that the users were more interested to contribute in the topics where there was going to definitely be funding via a defined call held in 2018, and they wanted to contribute towards the building of those calls in the nearer term, rather than focus on the uncertainty of the NGI topics for WP2019.

5.2 Surveys

Online surveys provide additional information about our stakeholders that would be hard to obtain through other channels, making it a cost-effective exercise even when sample sizes are small. Surveys can also yield statements on perceptions and work towards NGI that can be promoted via NGI.eu channels (with consent of respondents). The results of the surveys are summarised in section 2.

Future efforts will include co-creating surveys with the European Champions Panel (ECP) and key stakeholder groups so promotional support can be provided and findings fed back to the supporters, thus increasing mutual knowledge about perceptions and interest in NGI.

5.3 Content curation

As elaborated in the written report submitted with D2.1, Consultation Platform, Knowledge Base and Digital Processes, in order to bootstrap the data gathering and to capture the significant amount of legacy material available from recent activities related to NGI (e.g. national workshop reports, NGI related studies, etc.) and new events being held by national groups, projects, and others, SpeakNGI.eu developed and has been promoting an Inter-CSA process model for curating and entering these materials into the CP/KB. While the idea was based on all projects participation to the curation process, the uptake of this effort was rather slow due to lack of time and resources available and an uncertainly in relation to IPR management of the reports, and difficulty in determining who would give final "sign off" on the curated material before entering to the CP/KB. For example, even though there is a number of NGI National workshop reports available to the Inter-CSA (not necessarily publically however), it was difficult to determine whether they were actually public reports, whose content could be curated for the CP / KB. Thus, we could only focus on some of the reports that were explicitly identified as public documents through the use of a Creative Commons license. The formats of the reports were also quite different in style and content, causing in some cases a difficulty in the curation of materials from the reports into consistent entries for the CP / KB. In order to keep up, the SpeakNGI.eu partner, WIT, has been undertaking the curation process on various reports, which is a painstaking process, especially in getting approvals from the authors. A full list of the reports curated can be found in section 2.4 of this deliverable; some examples of how this worked well were the HUB4NGI deliverable D2.1, NGI GUIDE V1, The interim report from the NGI Study (this included validation and editing with one the main authors, NLNet, of the NGI Study). A good example of an external report being analysed and generating suitable content for the Consultation Platform and Knowledge Based was the Internet Society's 2017 "Paths to Our Digital Future". Therefore, taking the lessons learned from the above, we feel that the model for capturing this legacy information will need to be discussed and agreed on the Inter-CSA level in moving forward into the next period.

5.4 Support to user engagement on the NGI CP

In order to gather additional ideas from the Inter-CSA WG on how to increase the number of entries to the CP / KB, and to deal with the slow process of gathering legacy materials into the CP / KB, the topic was put onto the agenda and discussed at length during the Inter-CSA Working Group audio conference meeting held on 20th March 2018. As a result, a fruitful discussion was held with the other NGI projects' participants in relation to the next steps for the CP / KB, and how the numbers on the platform could be increased.

Some of the outcomes of those discussions included insightful suggestions for additional functionality and integration with the other Inter-CSA projects' work, which will be discussed with the SpeakNGI.eu team members involved in road-mapping for future versions.

1. **Create channels for major events** to start the conversation prior to the event and use the inputs in the event organisation and implementation. This would show commitment to the CP / KB and it requires committed participants to get registered to the platform before the events. A default channel could be created for all major events in the pipeline and the organisers will be informed of its availability and they can receive a bespoke tutorial in advance. A number of upcoming events are already planning to use this functionality including SpeakNGI.eu event in Milan (March. 2018), Internetweek DK (May, 2018) and IoT Week, Bilbao (June, 2018).

2. In addition to **curating material from reports and events**, we should **create channels for all major documents produced by the projects**, e.g. NGI Study report. We plan to have something like an "NGI Book club" with Inter-CSA members as participants, which is then used to bootstrap and animate the discussions in the CP / KB.

3. **Discussion channels for topics in the call**, which for WP2018 is already available, can now start for WP2019 as there will be a significant amount of content published from Engineroom's methodology over the next period and we could work together closely to transfer as much as this content as possible as topics of discussion into the CP / KB. We plan to collectively discuss and brainstorm some creative ways to help foster debate on the CP / KB especially when this new content goes online.

4. We should use the CP / KB to **stimulate discussions** in terms potential open calls, partner searches, highlighting benefits of participation, etc.

5.5 Synergy with events

In terms of gathering engagements from events and webinars, it was very clear from our monitoring activities that new members and content were generated at the same time and shortly after the NGI webinars. It should be noted that in the case of the webinars, users are provided with hyperlinks directly to the consultation platform as part of the webinar medium. This immediacy and convenience clearly causes for an increased conversion rate from non-user to registered user. SpeakNGI.eu has learned from this and will leverage this knowledge in the next period in order to increase membership and engagement further.

5.6 Support to topic selection

In terms of utilising the CP / KB in the topic selection process for WP2019, at the Inter-CSA WG audio conference meeting held on 20th March 2018, the process of support towards selection of WP2019 topics was further elaborated and discussed by all in attendance, in order to ensure the CP / KB will be utilised, when needed, in the process. The information being entered into the CP / KB is regularly shared between the relevant projects in order for the information to be taken into account.

A potential model for going forward was discussed based on two main elements:

1. The umbrella topics selected with the Engineroom methodology (when available and distributed to the Inter-CSA) would be checked against the CP / KB and other Inter-CSA projects works and if there are any points intersected, references would be included. An initial comparison of the CP / KB content with the outcomes from the Engineroom event, *Reimagining the Internet*[15], held in London on 21st March, 2018, is already carried out in section 4 of this report.

2. If needed, the umbrella topics would be fed back into the CP/KB for a round of consultation by the NGI community for further elaboration on the selected topics in a similar fashion to how it was carried out in the process for the building up of the scope of the WP2018 topics into sub-topics to be implemented within cascading funded projects.

This process is currently under discussions with the European Commission Management Team and it will be elaborated and refined during the Joint Inter-CSA review / management team meeting being held on 16th May, 2018.

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[15] https://www.ngi.eu/event/reimagining-the-internet/?instance_id=94

6 Conclusions

The first report on the consultation process has provided a few relevant elements of value:

- The **community of registered users** (over 230, after 5 months from launch of the NGI consultation platform) well represents the European Union's Member States and Associated Countries.

- Overall, the registered **users actually contributing to the discussions** are in the order of 20% of the total. The objective of the consultation process is to increase this percentage.

- The **surveys** appear to be an effective tool for engaging the users. In the future, synchronisation of the surveys with the events and other relevant milestones in the NGI roadmap will be further improved, to envisage a greater impact.

- As expected, the **channels** are a valuable source of information from the technical point of view and provide a great deal of content to produce in-depth analyses.

- A weekly **synthesis report of the content** on the Consultation Platform and Knowledge Base in the period November 2017 through April 2018 has been produced, developing four different views of it:
  - Roadmap (timeline);
  - Topics;
  - Technology;
  - Socio-economic & legal aspects.

- A first analysis of the consultation process has been performed and **four main aspects** have been highlighted in Sec. 4:
  - Privacy and trust enhancement;
  - Decentralised data;
  - Socio-economic and legal considerations for NGI;
  - Responsible Artificial Intelligence and new business models.

- A number of **lessons learned** have been distilled, and they will be taken in good account for the evolution of the consultation process in the next periods.

7 References

[1] Fontanarosa, G., et. al., D2.1 – Consultation platform and digital processes, available at https://consultation.ngi.eu/, November, 2017

[2] Parker, S, et. al., D3.1 - SpeakNGI.eu Stakeholder Engagement Plan, January, 2018

[3] Parker, S, et. al., D4.1 - SpeakNGI.eu Communication Plan Version 1, February, 2018

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