HUB4NGI

D3.1 INNOVATORS ENGAGEMENT STRATEGY

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Abstract	This deliverable presents activities that the HUB4NGI partners have pursued for the set-up and promotion of the NGI Initiative to facilitate access to the NGI resources for all innovative European SMEs and start-ups, reporting on achievements and outcomes. Moreover, this document provides the strategy for the engagement of innovators into the NGI ecosystem.
Keywords	NG Initiative, SME, Start-up, Engagement, Strategy, Innovators, Promotion, Stakeholders

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* R: Document, report (excluding the periodic and final reports)

 DEM: Demonstrator, pilot, prototype, plan designs

 DEC: Websites, patents filing, press & media actions, videos, etc.

 OTHER: Software, technical diagram, etc.

EXECUTIVE SUMMARY

The HUB4NGI Work Package 3 (WP3) is dedicated to "NGI CATALYST – Accelerating the NGI Programme implementation" and includes two Tasks: T3.1 "NGI Researches and Innovators Engagement Strategies" and T3.2 "Prototyping and validation of the NGI approach".

This deliverable presents activities that the HUB4NGI partners have pursued for the set-up and promotion of the NGI Initiative to facilitate access to the NGI resources for all innovative European SMEs and start-ups, reporting on achievements and outcomes. Moreover, this document provides the strategy for the engagement of innovators into the NGI ecosystem.

Based on the experience from previous HUB4NGI activities and achieved results the strategy to engage SMEs and start-ups has been formulated. The following list presents the main elements of this strategy:

➔ Building a strong NGI brand on national and international levels

➔ Incentives and success stories

➔ Light feedback collection and observation to assess the results of activities

➔ Consultations

➔ Leaders to promote NGI

➔ Customised messages to stakeholder groups

➔ Collaboration with other Coordination and Support Action projects

This strategy gives a strong message that the revolutionary social and economic changes that are expected cannot happen without the active participation of small- and medium- innovative business players.

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ABBREVIATIONS

AI	Artificial Inteligence
BOF	Birds of a Feather
CSA	Coordination and Support Actions
DIN	Digital Innovation Networks
EC	European Commission
FAANG	Facebook, Apple, Amazon, Netflix, Google
FIF	Future Internet Forum
FIRE	Future Internet Research and Experimentation
H2020	Horizon 2020 Programme
IoT	Internet of Things
NCP	National Contact Point
NGI	Next Generation Internet
R&D	Research and Development
SME	Small or Medium Enterprise
TNC	Terena Network Conference

1   INTRODUCTION

The Internet is changing and this has an impact on people. New technological domains like the Internet of Things or Artificial Intelligence are rapidly growing and take place in everyday life. They are still in the first stages of their development, so there is still time to have an influence on how they will look like in the future, and thus what influence they are going to have on people. The NGI Initiative gives all the interested entities in Europe the opportunity to actively participate in this process of change. Because many questions regarding technology in the future are still open, or investments in those technologies are risky, small- and medium-business entities are hesitating to take on new directions of development. Others want to take risks but need support. The HUB4NGI project has been established to facilitate access to information, knowledge and experience. It is determined to promote the NGI Initiative and involve a large number of innovative SMEs and start-ups in the Member States. The engagement strategy presented in this document is a way to achieve this objective.

2   PAVING THE ROAD TO AN EFFICIENT ENGAGEMENT STRATEGY

This section contains the information about the previous activities that the HUB4NGI project has pursued to promote the NGI Initiative and involve European SMEs and start-ups in the broad discussion about the Internet of the future (more details regarding organisational aspects can be found in the HUB4NGI project report document D4.3 "Report on community building and promotional activities").

2.1 COORDINATING EFFORTS TO STRENGTHEN THE NGI INITIATIVE

2.1.1 Future Internet Forum

The Future Internet Forum (FIF) is a group which aims to exchange views on the H2020 topics relating to "Future Networks" (5G, Cloud, Next-Generation Internet and IoT) [1]. Representatives of the Member States and Associated Countries (officials from the relevant ministries and/or experts from public or private institutions mandated specifically to represent national Future Internet initiatives) regularly meet to:

- share knowledge, experience and best practices,
- identify key national actors, activities and institutions,
- devise common approaches and complementarities between the various frameworks.

In the FIF meeting on 27th of April 2017 each FIF member was asked to [2]:

- identify a person or institution that will work as the NGI Contact Point in the respective Member State,
- organise an NGI Workshop with the real Internet innovators in the Member State (i.e. those who innovate the most on the Internet, the young researchers and hi-tech start-ups),
- identify the NGI stakeholders on the NGI map.

All of these actions are important for the HUB4NGI project in the context of engagement efforts to promote the NGI Initiative among SMEs and start-ups:

- the NGI Contact Points provide the information that could be used to find new opportunities for development (national programmes, projects, financing, potential partners for joint initiatives, etc.)

- The NGI Workshop in each Member State is an opportunity for business entities to discuss, present their experiences, plans, development ambitions and needs addressed to academic and research institutions as well as policy makers, authorities and the EC. Representatives of different sectors may build the relations which may result in joint initiatives.

- The NGI map that is created and maintained by the HUB4NGI project will increase the visibility of stakeholders willing to search for new partners for the joint initiatives.

2.1.2 NGI Contact Points

The Future Internet Forum has been asked to nominate an NGI Contact Point in each Member State [3][4]. This can be an organisation or an individual who shall help to reach out to the right group of stakeholders, get actors on board and exchange with the Forum members and the European Commission regarding ongoing trends and topics in the field. The Contact Point would link to the future key actors, i.e. high-tech start-ups and SMEs, young researchers and civil society, and root the initiative within these groups, i.e. raise awareness (e.g. about H2020 funding possibilities in the Work Programme 2018-2020), promote it and build and broaden an NGI ecosystem. Equally, the Contact Point feeds back input from those groups in view of shaping the evolution of the NGI Initiative. This concerns questions about the direction that the initiative is taking, the topics and technologies it encompasses and the trends, needs and (research) topics that become salient from the point of view of those actors.

At the moment the NGI Contact Points support the HUB4NGI project by providing responses to the survey called "NGI Survey – National Activities" that is used to collect the information about NGI-related initiatives and stakeholders in the Member States.

2.1.3 Cooperation with ICT-41 CSA projects

Due to the fact that at the moment there are four Coordination and Support Actions, namely HUB4NGI, SpeakNGI.eu [5], NGI MOVE [6] and ENGINEROOM targeting the NGI engagement goals, it was agreed that selected actions should be coordinated to achieve the best results. The projects meet regularly to present their activities and have already started establishing joint Task Forces (The NGI Communications Task Force to coordinate communication efforts and The NGI Stakeholder Engagement Task Force to coordinate engagement efforts) to consult, plan and support concrete tasks. From the HUB4NGI point of view, such collaboration between the CSA projects is very useful and promising to reach a wider audience of stakeholders, including SMEs and start-ups, with initiatives like surveys, consultations, webinars and face-to-face events. Additional communication channels and networks of people engaged in the projects may have a very positive impact in carrying out different types of actions to engage a greater number of SMEs and start-ups.

2.1.4 NGI map

One of the results of the cooperation with the FIF so far is the interactive map that has been created to collect the information on stakeholders which are active in the NGI topics [7]. The following list presents all the entity categories defined in the current version of the map:

- Accelerator
- Civil Society Organisation
- Corporate
- Co-working Space
- Incubator
- Influencer

- Investor
- NGI Contact Point
- Non-Government Organisation
- National Public Research Funding Organisation
- Public Organisation
- Research Centre
- **Small Medium Enterprise**
- **Start-up**
- University

At the moment the NGI map is advertised on the HUB4NGI web site, twitter account and during the events organised or participated by the project members (FIF events, workshops and webinars).

	Entity category	Number of entities already registered in the map
1	Accelerator	1
2	Civil Society Organisation	2
3	Corporate	2
4	Coworking Space	0
5	Incubator	2
6	Influencer	2
7	NGI Contact Point	22
8	Non-Government Organisation	5
9	National Public Research Funding Organisation	1
10	Public Organisation	3
11	Research Centre	16
12	**Small Medium Enterprise**	**19**
13	**Start-up**	**5**
14	University	20
	Total	100

TABLE 1 STATISTICS OF THE NGI MAP (DEC 2017)

2.2 ENGAGING WITH THE NGI COMMUNITY

2.2.1 Events

Digital Innovation Networks Forum, Brussels

The Digital Innovation Networks (DIN) Forum was organised in Brussels (Belgium) on the 27th of June 2017, to bring in one place Internet researchers, innovators, representatives of SMEs, start-ups, technology providers, policy makers and investors [8]. The main goals of this meeting were as follows:

- to identify the major opportunities and challenges for society as a result of progressive digitisation and the evolution of the Internet,

- to identify the vision for the NGI Initiative,

- to build consensus on challenges, aspirations and research areas that the NGI should prioritise through opinions and knowledge from experts,

- to help establish and grow the NGI ecosystem,

- to engage all stakeholders needed for successful NGI digital innovation networks,

- to support transition of current research communities such as FIRE, CAPS, FIWARE etc. towards the NGI,

- to give guidance on how to get involved in the NGI Initiative.

Particular attention in the Forum was paid to innovation processes. The report from the event cites that analysis of the research activities around Human-Centric Internet shows a growing importance of SMEs involved, at least in the short term. In 2016-2017, SMEs took over from universities as the dominant players in the NGI research space [9]. A good panorama of grants, in particular EU grants, are targeting mainly SMEs (60%) then research centres (36%). Another interesting voice in the discussion was a statement by an expert who emphasised the dominance of the so called FAANG –Facebook, Apple, Amazon, Netflix and Google in the Internet landscape. FAANG are moving towards natural monopolies, and centralisation of control and power over the Internet. It is very difficult to disrupt this dominance, because of the scale and power, and European start-ups are finding it increasingly difficult to compete. The remedy (probably not the only one) for this can be alternative business models and alternative infrastructures to support alternative solutions to the current centralised situation with a few giant dominant incumbents. There was a comment on multidimensional networks and their increasing importance. Envisaged innovation networks consist of nodes of many different types, e.g. people, technology, data, processes, AI, etc. The last, but not least, observation from the Forum session on the innovation worth to cite in this document is that the key characteristics of innovative infrastructures are as follows: shared, open and of different types of resources. This is particularly important for start-ups and SMEs which cannot compete with big players (e.g. FAANG) with their own resources but definitely may look for their niches in the dispersed dynamic, service-oriented environment compliant with the NGI vision.

NGI Forum, Barcelona

The NGI Forum took place in Barcelona (Spain) on the 13th of September 2017 [10]. With more than 160 registered attendees, 92 contributors from 18 different countries, 15 speakers, and three parallel working sessions, the Forum engaged active participants in the Next Generation Internet community from across Europe and beyond. The aim of the NGI Forum was to gather together those prominent actors that through their work and active engagement in various R&D areas are paving the way to design, build and refine the Internet of tomorrow. It was also an opportunity to share knowledge with leading experts from across a variety of disciplines,

including privacy and trust technologies, decentralised data governance, discovery and identification, edge intelligence, etc. The event consisted of presentations and speeches about new trends, ongoing transformations, new technologies and challenges. Speakers talked about:

- the city evolution towards a digital, citizen-centric, sustainable and inclusive society (with the example of Barcelona and Catalonia),

- the link between research output and real world and the role of research infrastructures in the Internet's evolution towards becoming human and researcher-centric,

- the need of changes of low to adjust to new wave of technology,

- the human centric approach in the NGI vision,

- the user trust in the Internet of the future,

- responsible and ethical data management and analytics,

- Internet of Things and Internet of people.

Three parallel round-table working sessions were organised to allow attendees to provide valuable answers and comments for the specific NGI discussion topics:

- Identifying R&D Priorities for NGI,

- Recognising New Business Models & Opportunities,

- NGI Skills and Education: Opportunities & Challenges.

The second session (moderated by Richard Stevens, Director of the Government Consulting Unit in IDC) was dedicated specifically to private companies, like SMEs and start-ups. A picture of the future Internet transforming the types of interactions between actors was outlined. Also the notion of the Internet of Actions was introduced, where instead of being content driven, the Internet would be driven by actions and machine-to-machine communication. The status of the markets, business models and trends will need to take stock of this transformation. Insights were discussed to consolidate a vision of upcoming business models and opportunities for the commercial and societal exploitation of NGI research coming from the community. The session discussed several key topics including:

- Upcoming market dimensions and market potential

  Which Internet intensive markets are growing and which are shrinking? Which of these markets are expected to be driving the future Internet?

- Tomorrow's competitive landscape

  What will European companies' competitive position look like in these markets? Where can we expect to compete and where could we excel based on today's positioning?

- Future customers

  What will customer demographics look like in the coming years? Who will be buying NGI products and services and why?

- New value propositions

  Will technology or new organisational models affect how and who pays for future Internet services, will business models be the ones we know today?

- Distribution channels

What will the physical Internet look like how will people get Internet based products and services?

- Collaborations and strategic partnerships

What new type of alliances will emerge and how will players divide revenue streams? Concentration of power (media, capital) is an issue.

The main findings in this parallel session were as follows:

- Information is becoming monetary unit, thus:
  - o NGI stakeholders will need to understand how this affects traditional business before they are taken by surprise, or not aware of the value in data.
  - o Service providers will need to distribute value derived from service provision with data owners.
  - o Social currency and cooperative models will evolve and need to be correctly monetized.
  - o Internet neutrality will be challenged by those able to dominate the control of information and data.

- New distribution channels will arise:
  - o As Artificial Intelligence proceeds, devices themselves could be active in selling and buying goods (bot with a visa card).
  - o The market for devices in the Internet of Things paradigm to be offered "As A Service" will rapidly grow.
  - o The growing concept of Internet of the people, by the people will drive a social need more equitably distribute costs and income among users.
  - o Attribution of national licenses of spectrum which is today controlled by governments will need to be opened up to non-profit organizations, regional and local authorities.

- Information and Analytics as drivers of new business models:
  - o Big data analytics will increase the speed of new business models as it helps us understand what we do not know now and where new value can lie.
  - o Research communities will profit from analytics and the massive amount of data in the Next Generation Internet, for example disease correlation discovery in the healthcare sector.
  - o Industry will improve efficiency through prediction with help of AI + sensor data.
  - o SMEs will need to find economic models that allow them to use data and information and co-exist with big players.

During the Forum, Georgios Tselentis, Scientific Project Officer at European Commission, gave an overview of the Work Programme 2018-2019 that will include Research & Innovation Action projects (2-3 years). The EC will use a cascaded funding (Open Calls) mechanism in where the RIA project partners will fund 3rd parties (80% of the budget). This type of financing is particularly addressed, among other things, to SMEs and start-ups.

NGI Workshop, Poznań

The workshop in Poznań (Poland) organised on the 8th of June 2017 was an occasion for representatives of the EC, the Polish National Contact Point, business (including start-ups), local authorities, universities and research institutions (see Fig. 1) to exchange views and formulate the expectations from the Internet of the future [11]. The presentations and discussions during the discussion sessions (World Café sessions) outlined many topics and related challenges that the EU countries and the rest of world are facing now. The activity of the attendees indicates that this kind of meeting is needed and the EU citizens are deeply interested to participate in the technological revolution and transition to the Next Generation Internet era. Although the vision of the future is still not clear and well understood, the participants and represented communities are aware of the emerging potential, opportunities as well as corresponding issues and threats. The changes are happening not only in the technological domains. They influence the people and the way they live, work, entertain themselves, behave and communicate. New services and applications which are planned to be built on top of existing infrastructures and services will create a new human-centric environment, giving new functionalities and tools for the better well-being of individuals and societies.
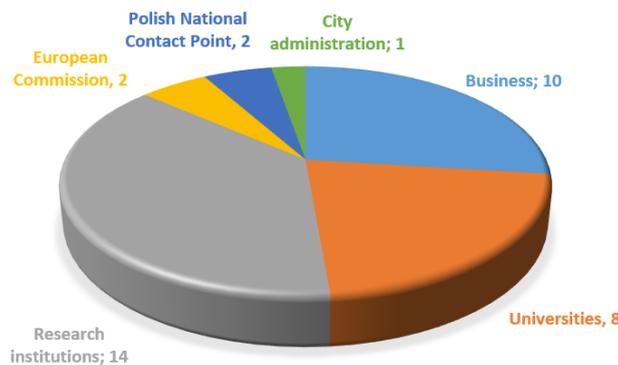

FIG. 1 DISTRIBUTION OF POZNAŃ NGI WORKSHOP PARTICIPATION

The discussions in the workshop touched many aspects of the Next Generation Internet and raised the question of how the EU may and should go towards this vision. As a general summary it is worth to emphasise a few general messages that emerged during the event:

- The EC works hard to help with the establishment of a new NGI ecosystem with optimal conditions for innovations and further development of novel applications and services, therefore it acknowledges that such workshops help to collect, categorise and analyse inputs from a wide range of stakeholders and transform the outcomes into concrete actions and programmes.

- The EU citizens are open and motivated to actively take part in the digital revolution. Although trust, privacy and security issues are underlined as key priorities for the NGI, the direct benefits for citizens are expected as an immediate result.

- New stakeholders are taking part in the digital revolution, exposing new requirements on the underlying infrastructure, services and applications. There is a need for new business models and changes to legislation to address emerging technological and socio-economic challenges.

- Representatives of business sectors are very active in the discussions on new emerging technologies (e.g. augmented reality, virtual reality, artificial intelligence machine learning, IoT), new business models, cooperation opportunities (projects with

universities and research institutions), legislation issues and funding opportunities. This means that they are aware of current challenges and future benefits.

NGI session in the TNC17 conference, Linz

The TNC17 Networking Conference, organised in Linz (Austria) on the 30th May 2017, was a large and influential European research networking conference, with more than 650 participants [12]. Every year TNC brings together decision makers, managers, networking and collaboration specialists, and identity and access management experts from all major European networking and research organisations, universities, worldwide sister institutions and ICT business sectors.

During the event, the HUB4NGI project organised a Birds of a Feather (BoF) session (35 attendees) to introduce the Next Generation Internet principles to the community and receive an early feedback on potential interest and new ideas for the NGI. The invited speakers expressed their views on various NGI-related topics. For business representatives, it could have been particularly interesting to listening to and participate in the discussion on openness of data, interfaces and standards and how this relates to traditional business approach of proprietary solutions.

The participants of the workshop jointly agreed that the NGI as a new flagship EC initiative opens new opportunities for business players (e.g. SMEs or start-ups). Overcoming the limitations of the current Internet architecture, as promised by the NGI, specifically by addressing needs of new emerging applications, creates chances for small business to build solid foundations for next generation solutions being able to compete with the existing leading application/service providers world-wide.

2.2.2 Consultations

The aim of the consultations executed in HUB4NGI is to provide details on technical subjects that are identified as important but are not yet obviously covered in the Work Programme planning to date. The chosen method to provide these details is consultation with world experts using a structured consultation methodology.

The project deliverable document D2.1 provided a synthesis of nine previous external consultation exercises conducted in the recent past on NGI, covering where the consultations agreed and where they differed. A total of nine major theme clusters were identified across all previous consultations.

Out of the subjects identified in the D2.1 analysis, two stood out as being seen as important but were not yet addressed in detail within the planned Work Programme. These are "Echo Chambers" and "Responsible AI", and these have been selected for more detailed consultations within Hub4NGI.

- Echo Chambers are situations where citizens may not be receiving full, accurate or unbiased information from their interactions with the Internet. Especially important is content verification (e.g. combatting fake news) and alternative strategies to the current one where content providers profile Internet users and deliver customised and filtered news, content feeds or search results to users that may present a biased perspective.

- Responsible AI concerns investigation into responsibility aspects, societal impacts and risks of Artificial Intelligence. There is clearly a need for multidisciplinary collaborative research into the ethical, legal, and societal impact of AI, how it can be regulated and certified for compliance to safety and ethical standards.

Each consultation uses the Delphi Method, a well-established pattern that aims to determine consensus or highlight differences between expert consultees [13]. Experts are asked to participate in a remote, non-interactive, anonymous, consultation that consists of three iterations, with consolidation of the answers in between iterations. This consultation is administrated by a facilitator who manages the consultation process and collates results. Three iterations will be undertaken with the overall aim of refining consensus between the responses, Each round will be a separate online survey, and the format of the rounds are described as follows:

1. Round 1. A selected panel of experts will be invited to participate in Round 1 based on their reputation in a field relevant to the core subject of this consultation. Round 1 is a web survey containing two broad open-ended questions, to which participants can make any responses in free-form text they wish.

2. Round 2. Using standard qualitative techniques such as grounded theory, the collected corpus of responses from Round 1 will be independently encoded to generate assertions. The assertions are presented back to the participants, and the participants will then be given an opportunity to confirm or revise their opinions in the light of the consolidated previous results. This will use a structured format web survey (e.g. the participants can agree or disagree with the assertions on a Likert scale).

3. Round 3. The results of Round 2 will be collated, refining the consensuses and disagreements and assertions will be again generated. These will be presented back to the participants and they are given the opportunity to further confirm or refine their opinions, again using a structured format web survey.

The results of the third round will be collated to determine the final consensus and disagreements.

A key property of the Delphi Method is that it is anonymous during its runtime, in that the participants do not know who the other participants are while the consultation is in progress. The purpose behind this is to avoid halo effects from influential figures within the community. This consultation will be conducted entirely remotely using a series of web surveys, and responses anonymised during the consolidation between rounds

The current status at the time of writing is that the first round of the consultation on Responsible AI is complete, the responses have been analysed and converted into assertions for presentation back to experts in the second round. More details will be presented in D2.2 and in subsequent WP2 deliverables. It is expected that the key recommendations will be written as White Papers to provide greater accessibility and exposure to the results.

2.2.3 Open Calls

In the past, IMEC – a HUB4NGI member, has organized a number of Open Calls within the context of the Fed4FIRE project. Fed4FIRE was a FIRE project in FP7 and had reserved a budget in order to give support to universities, research institutes, small and medium enterprises and large companies. The goal was to stimulate the usage of advanced future Internet research and experimentation facilities (similar approaches were used in other projects). The project federated a large number of advanced testbeds in Europe and beyond (USA, Australia, Korea, Japan). The Open Calls proved to be very successful and a large number of interesting experiments were realized. At that time, the format was quite stable and not specifically developed for SMEs (some initial experience was gained with SMEs and start-ups). It is clear that this instrument is very useful for engaging more SMEs and start-ups in the NGI area.

Within a follow-up project, Fed4FIRE+, with support from HUB4NGI, a new call has been launched, targeting SMEs and NGI-related topics. The goal of the call was to stimulate NGI

concept implementation and engage new stakeholders in the development of Next Generation services and applications.

General flow of an Open Call:

- After consultation with the EC, an Open Call is launched that is left open for a certain period (typically 3 months).

- After receiving the proposals, a panel of external experts is judging and ranking the proposals and based on this a number of projects is selected (limited by the available budget).

- Execution: a certain period is provided to execute the reports (typically half a year up to a year).

- Evaluation: the experiments end up with a report that is evaluated internally and by the project reviewer (as part of the EC review).

2.2.4 Webinars

NGI Contact Points Training Webinar

The HUB4NGI project, together with the European Commission/E3 unit organised a webinar (25 attendees) on the 18th of September 2017 for the NGI Contact Points in the Member States and in the Associated Countries of the European Union. This event was not intended for SMEs and start-ups but it is worth to mention in this document as the Contact Points are key to disseminating the information on the NGI vision and initiatives across countries. They should support the organisation of NGI workshops, promote the NGI map and provide feedback in the surveys arranged by HUB4NGI or other CSA projects. It is expected that the Contact Points, with the knowledge gained from this webinar, will actively take part in activities to reach and engage SMEs and start-ups in the initiatives for the development of the Internet of the future. Promoting the NGI map developed by HUB4NGI is an example. Medium and small business players should see this tool as a way to present themselves and to seek research and business partners.

Blockchain Webinar

The second webinar (80 attendees) organised on the 31st of October 2017 under the umbrella of HUB4NGI and led by the Open University (OU) concerned the blockchain, its impact (very optimistic predictions of World Economic Forum and Santander), business use cases, the concept and functional components, exemplary Ethereum blockchain platform and a blockchain application developed in the OU [14]. At the end of webinar the EU funding opportunities were outlined [15]. It was emphasised that in 2018 there will be a call (ICT-24-2018) for Research and Innovation Actions [16]. One of its three topics is "Decentralized data governance" that is understood as leveraging on distributed open hardware and software ecosystems based on blockchains, distributed ledger technology, open data and peer-to-peer technologies. Special attention is paid to ethical, legal and privacy issues, as well as to the concepts of autonomy, data sovereignty and ownership, values and regulations. The call has attractive conditions for high-tech start-ups and SMEs as it is stated that 80% of the EU funding should be allocated to financial support to the third parties. Moreover, the competition and thus the innovation will increase due to several short cycles of third party projects targeting the most promising ideas (use of cascading grants). Each of the selected third parties projects will pursue its own objectives, while the Research and Innovation Action will provide the programme logic and vision, the necessary technical support, as well as coaching and mentoring, in order that the collection of third party projects contributes towards a significant advancement and impact in the research domain. The focus will be on advanced research that is linked to relevant use cases and that can be brought quickly to the market.

2.2.5 Surveys

NGI Survey – National Activities

This on-line survey, launched on the 19th of September 2017, contains a set of questions to collect the information from the European countries in a standardised manner and build a knowledge database presenting the NGI-related national initiatives in the EU. Well-organised information will help research teams, entrepreneurs and other types of stakeholders to find financial, research and development opportunities as well as institutions and people with needed expertise. The involvement of the best Internet researchers and innovators (SMEs and start-ups) and collaboration are required to address technological opportunities arising from cross-links and advances in various research fields ranging from network infrastructures to platforms, from application domains to social innovation.

The following questions are included in the survey:

1. Indicate the public entities (national authorities, policy makers, associations, communities, etc.) which operate within defining, consulting, monitoring, assessing strategies, plans or policies embracing the NGI vision and goals. Select max. ten (10) most important, influential and active

2. Indicate the existing officially announced national strategies or policies which address the vision and goals of NGI. Select max. three (3) most important, influential and active.

3. Indicate the national initiatives (project programmes, public-private partnerships, etc.) addressing the vision and goals of NGI. Please, add the information about the founding size (total budget) in the description field if relevant. Select max. ten (10) most important and influential initiatives.

4. Indicate the regular national events (conferences, workshops, etc.) where representatives of public entities and business sectors can meet to discuss the existing challenges and the future of the Internet. Select max. three (3) most important and influential.

5. Indicate the key academic institutions in your country which are involved in the initiatives related to the Internet of the future and have a considerable expertise, particularly in the three technological domains (NGI priorities): 1) Privacy and trust enhancing technologies, 2) Decentralized data governance, 3) Discovery and identification technologies. Select max. five (5) most influential and active.

6. Indicate the key business entities in your country which are involved in the initiatives related to the Internet of the future and have a considerable expertise, particularly in the three technological domains (NGI priorities): 1) Privacy and trust enhancing technologies, 2) Decentralized data governance, 3) Discovery and identification technologies. Select max. five (5) most influential and active.

7. Indicate the key "other type" entities (Non-Governmental Organization (NGO), business angel, venture capital fund, influencer, etc.) in your country which are involved in the initiatives related to the Internet of the future and have a considerable expertise, particularly in the three technological domains (NGI priorities): 1) Privacy and trust enhancing technologies, 2) Decentralized data governance, 3) Discovery and identification technologies. Select max. five (5) most influential and active.

The collected results and final conclusions will be presented in the deliverable document D1.2 of the HUB4NGI project.

The Stakeholder Survey for the Internet of the future

This on-line survey was designed to get feedback (22 responses) from the attendees (Fig. 2) of the NGI Workshop in Poznań immediately after the event. During the meeting there were many interesting discussions on technological and societal challenges, trends, the role of EU and its initiatives to boost innovations, activities and engagement of stakeholders, relationship between business (especially SME and start-ups) and research domains as well as obstacles and threats.
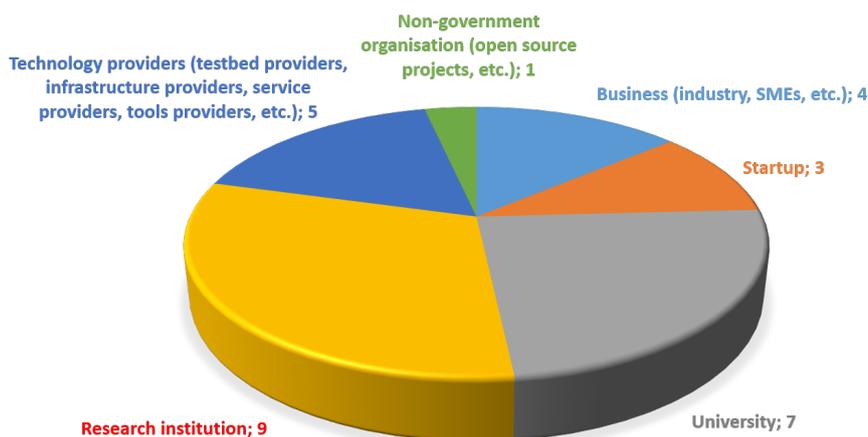

FIG. 2 DISTRIBUTION OF THE STAKEHOLDER SURVEY RESPONDERS

The HUB4NGI project received valuable answers to the following questions:

1. Has your organization already been involved in any initiatives addressing the Future Internet/Next Generation Internet vision and challenges?
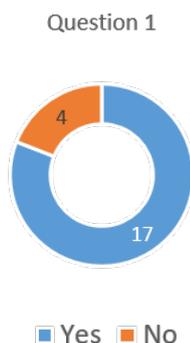

FIG. 3 THE STAKEHOLDER SURVEY – ANSWERS TO QUESTION 1

2. Indicate three challenges of NGI that you think they deserve to be on the top of priority list.
   a. Decentralisation/avoidance of data concentration in few proprietary platforms
   b. Interoperability and open standards
   c. Transparency and protection of privacy
   d. Security
   e. The use of artificial intelligence and advanced analytics

f. Social inclusiveness

g. Smarter environments (cities, places of production and consumption, homes, vehicles, etc.)

h. New economic models

i. New business stakeholders
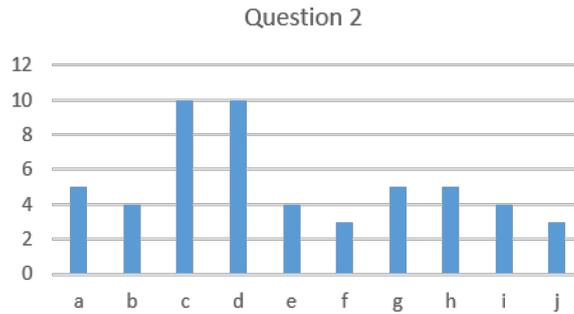
j. Legislation updates

k. Other

FIG. 4 THE STAKEHOLDER SURVEY - ANSWERS TO QUESTION 2

3. Indicate a threat of the Internet of the future that seems to be the most dangerous for the users (society, industry, public sector, etc.).

a. Lack of trust

b. Privacy violations

c. Weak security

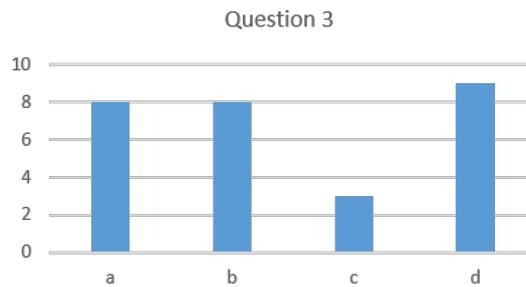d. Data concentration in few proprietary platforms

e. Other

FIG. 5 THE STAKEHOLDER SURVEY - ANSWERS TO QUESTION 3

4. Are there any obstacles to move your business, current activities and assets towards the Next Generation Internet?

a. Investments

b. Lack of expertise

c. Internal business procedures and processes

d. Immature technologies
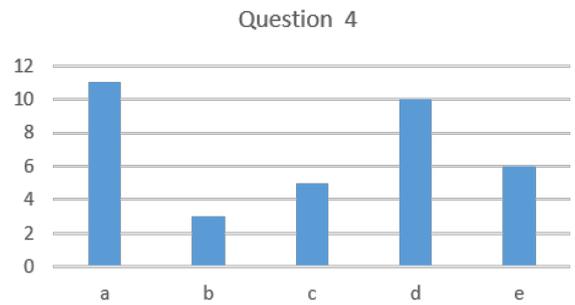
e. Legislation

f. Other

Question 4

FIG. 6 THE STAKEHOLDER SURVEY - ANSWERS TO QUESTION 4

5. What are the incentives for your organization to undertake the actions to move fast towards Next Generation Internet?
    a. New revenue streams
    b. Competitive advantage
    c. New groups of customers
    d. Integration capabilities with other service technology providers
    e. More advanced human-centric services
    f. New business models
    g. Readiness for new emerging technologies and business opportunities
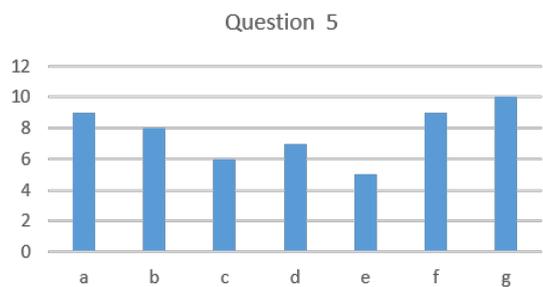   h. Other

Question 5

FIG. 7 THE STAKEHOLDER SURVEY - ANSWERS TO QUESTION 5

6. What support would you like to receive from the European Commission initiatives to move fast towards the Next Generation Internet?
    a. Funding opportunities, e.g. Open Calls
    b. Trainings and workshops
    c. Mentoring initiatives
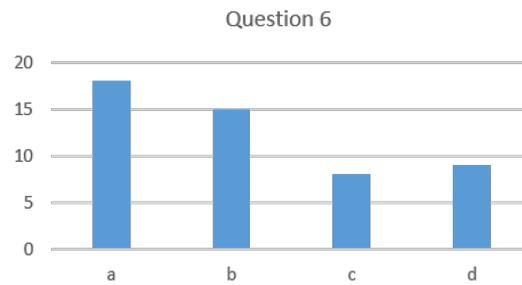   d. Knowledge bases
    e. Other

Question 6

FIG. 8 THE STAKEHOLDER SURVEY - ANSWERS TO QUESTION 6

The survey has shown that most of the responders already have an experience from the past or ongoing initiatives related with the newest Internet solutions and technologies. They are aware of challenges, especially those in the area of transparency and protection of privacy and overall security. Nowadays, although the services being offered by big players like Google, Facebook or Amazon are very popular, more and more people are seeing that collecting huge amounts of data on all aspects of social activity may be very dangerous. Data concentration in a few proprietary platforms was pointed out as a major threat. In the questions concerning the business development towards the NGI vision and expected EC support, the topic of investment and funding opportunities was particularly highlighted. Also, the survey allowed to select the incentives which are the most attractive for organizations to undertake the actions to move fast towards the Next Generation Internet. It turned out that the readiness for new technologies and business opportunities is taken very seriously and ranked highly. This may mean that stakeholders in Europe are aware of the challenges and their benefits, so they want to be ready for them taking part in various initiatives (for example, joint research, trainings, etc.).

2.2.6 White paper – NGI - The Emerging Research Challenges

Under the umbrella of HUB4NGI, a White Paper was created containing the key recommendations of project document D2.1 [19] and published on the EC NGI Futurium Website [17]. Its primary purpose is to disseminate the main conclusions of D2.1 to a wider audience than is usually reached by a project deliverable, and in a more concise form. It contains reference to D2.1, so the interested reader can refer to D2.1 for more details. The White Paper presenting emerging research topics is addressed to all innovators, including SMEs and start-ups.

3   ENGAGEMENT STRATEGY

The main goal of the HUB4NGI is to support the bootstrap, launch and growth of the NGI Initiative as a vibrant, inclusive and far-reaching R&D initiative that can grow within the Horizon 2020 and move beyond into the next Framework Programme as an ambitious flagship initiative.

To achieve that it is extremely important to engage all relevant players in the efforts defining, explaining and implementing the NGI vision. This document focuses on a subset of those players, which are SMEs and start-ups. The NGI initiatives must encourage them to interact, share their opinions and experience and efficiently use the instruments offered by the EC to develop and create new innovative solutions in Europe. The following points constitute the engagement strategy that is proposed based on experiences and thoughts collected from the past actions described in section 2 of this document.

- **Building strong NGI brand on national and international levels**

    The HUB4NGI project together with the EC and other CSAs must build a strong and attractive the NGI brand. European stakeholders, especially SMEs and start-ups, should recognise and trust it as a vision, actions, instruments and people. The mission of NGI should be clear and understandable. Technology innovators should be interested in attending various initiatives with the NGI label. The past events organised by the HUB4NGI project showed a great potential. The forums and workshops with discussion sessions proved that these kinds of meeting unleash a great deal of positive energy and a desire for open creative discussion. The participants are involved in the exchange of experiences and presenting their opinions and interesting ideas. They are informed that the EC wants to support them through different activities and funding capabilities. Face-to-face meetings, like those NGI workshops in Member States are very important for spreading the knowledge about NGI and increasing the engagement of stakeholders, but other activities, for example webinars and whitepapers presenting attractive research and related societal topics, are also valuable.

- **Incentives and success stories**

    The NGI network of partners - NGI map, is an important instrument to reach out to the SME and start-up community in Europe. It will provide a growing list of interesting contacts (triple helix: industry, research institutes and government) that should allow to capture the NGI roadmap and to establish fruitful collaborations at all levels. This easy way of getting information will be a strong enabler in the future development and adoption of NGI technology.

    A very important instrument, that is well established in recent European projects and also implemented by national initiatives, is the use of Open Calls. There has been a very positive experience with these instruments and many success stories have been reported. Currently the Open Call instrument is refined and special attention goes to different implementation strategies that could enhance the impact towards SMEs and start-ups. Some more details in the area of NGI experimentation:

    - In general, an Open Call has the goal to attract international institutes (universities, research centres, …) and companies and provides them with in-kind and financial support in order to support their research and innovation activities. In the area of NGI experimentation, a broad spectrum of advanced and unique test facilities are opened-up towards these Open Call partners. This allows them to test their innovative products (from the early design stage up to the pre-deployment testing).

- Towards SMEs and start-ups the major incentives are: (1) access to a wide variety of NGI infrastructures in Europe and beyond that are otherwise not affordable for them, (2) provide technological support in order to define the best testing strategy and to help in setting-up the experiments, (3) provide financial support to execute the testing of their innovation.

- Different refinements are possible within the Open Call concept:

  o Set-up specific Open Calls that are only accessible for SMEs and start-up companies. This is very important because in general it is very difficult for them to compete with large research institutes or bigger companies.

  o Set-up specific Open Calls with a focus on the NGI subjects. This is important to attract a specific segment of SMEs and start-up companies. Again, this allows a much more efficient and targeted selection of experiments.

  o Set-up a cascaded funding scheme. (1) In a first very light weight Open Call, support is given to define the required experiments and set-up a clear testing plan in order to advance the innovation activities of the SMEs and start-ups in an efficient way. (2) A follow-up (cascade) Open Call will allow the SMEs and start-ups that were selected in the first Open Call to submit a full proposal (that receives a higher support).

  o It is important to allocate also a budget to the facilities and technical partners that will support the experimentation.

  o Make sure that the process is sufficient lightweight as this is very important for SMEs and start-ups (short proposals, focused reporting, etc.).

  o Pay special attention to the overall turn-around time (from submission to finishing the project), because for SMEs and start-ups, this could be very important.

The expected impact of the above described actions could be high, both from an economic and a societal point of view. From an economic point of view, the actions will allow SMEs and start-ups to embrace the new opportunities offered by NGI developments. From a societal point of view, it is clear that NGI will be extremely important in the further growth of a sustainable society. Health care, mobility, energy supply, manufacturing, education are just a few examples where NGI will play a key role.

Today there have been a number of success stories as illustrated by other projects (e.g. Fed4FIRE and Fed4FIRE+). The major feedback received from many SMEs is that they were able to improve their innovation cycle and product development.

- **Light feedback collection and observation to assess the results of activities**

In order to work efficiently and to have the expected results of NGI activities, HUB4NGI needs to receive feedback from stakeholders. The project must know the answer to the following questions: What kind of information and support are expected by SMEs and start-ups? Which technological and societal topics are the most promising and interesting for their business plans and future development? Which problem and threats they perceive for their activity and their business environment? HUB4NGI already used surveys as a tool to collect such information. Although it is not easy to motivate people to fill in questionnaires, the knowledge from this source is worth the effort. A good example is the survey executed immediately after the NGI

Poznań workshop. The participants were still motivated and satisfied with the course of the meeting and provided valuable responses. The acquired knowledge allows us to tailor planned events to the needs of stakeholders and to familiarize ourselves with opinions on various topics for example those expressed by representatives of SMEs and start-ups. At the same time, it should be remembered that the surveys must be properly prepared. Too many of them and unsuitable questions may discourage people from using them It is also essential that CSAs do not duplicate the surveys and therefore coordinate their creation.

- **Consultations**

The objective for the consultations conducted by HUB4NGI is to elicit consensus from world-level experts regarding what research and innovation is needed for specific targeted themes within the NGI, so as to inform upcoming Work Programmes.

Given the specific nature of the subject areas, it was considered that targeted consultations were preferred over surveys open to the general public, because experts in relevant fields could be selected based on their reputations and consulted in a managed way. This provided reassurance about the validity of the opinions expressed, through the experts' track records and reputations in their respective fields. The chosen methodology for the consultations was the Delphi Method, a well-established pattern that aims to determine consensus or highlight differences from a panel of selected consultees. These properties make the Delphi Method ideally suited for the purposes of targeted consultations with experts, with the intention of identifying consensuses for recommendations. Full details of the methodology of this consultation can be found in the HUB4NGI document D2.2 [20].

It is important to note that all stakeholders interested and active in the NGI-related initiatives have been given a strong tool for open, public, well-organised consultation. SpeakNGI.eu CSA project has launched the Consultation Platform - the space for an open and broad conversation with those people who are drivers of the next generation Internet [18]. It is a knowledge base for analyses of what is being discussed and synthesis views of the outcomes of such discussions. Moreover the platform allows running a series of short, spotlight surveys on various topics. This is the chance for people from all walks of life to have their say on developments and values shaping the Next Generation Internet. The HUB4NGI project will be convincing all the partners and people attending the events organised by the project to use this platform as a source of knowledge and an efficient communication channel.

- **Leaders to promote NGI**

People usually listen to experts, who can convince them to trust and implement solutions. Their experience and knowledge leads to a higher level of attraction and engagement. NGI needs such people who can demonstrate the benefits of EC actions and the NGI vision. A suitable example was the presence of one of the Internet pioneers, the inventor of the data-frame Louis Pouzin, in the NGI Forum in Barcelona. Mr. Pouzin enriched the event contributing with his enthusiasm and lifelong experience to the working groups and the open discussion. He also gave an interesting speech on the future of the Internet talking about the increasing need of having smaller and more controllable networks and reminding the audience of the principles for building scalable and secure systems. This example shows a man who advocates modern, smart and innovative technologies for the Internet of the future. Recognized companies (especially SMEs and start-ups), whose successes are related to the latest IT technologies, can also take on the role of leaders.

- **Customised messages to stakeholder groups**

  In the process of involving SMEs and start-ups in the NGI initiatives, it is important to know who the message is addressed to, in which environment the recipient lives and what the expectations are. What are the preferences, etc. Content and initiatives should be targeted with such knowledge. Meetings at national level, which bring together companies operating in similar conditions, play an important role. NGI is a general concept for Europe and its societies but better and faster adoption of it may be achieved if selected initiatives are profiled. Such distinctions may relate to countries, industries, age structures, etc. Definition of targets may be considered not only with respect to meetings, like workshops or forums, but also White Papers, webinars and the HUB4NGI communication channels.

- **Collaboration with Coordination and Support Action projects**

  The EC decided that the work of CSA projects, which are HUB4NGI, SpeakNGI, NGI MOVE and ENGINEROOM, will be coordinated not to repeat or overlap their initiatives. At this moment, a group of representatives of each project has been established to plan and consult joint stakeholders' engagement efforts. An example of the close collaboration is the support by all other projects to the Consultation Platform created by SpeakNGI.eu.

4   CONCLUSIONS AND FUTURE

This deliverable reports all the past activities that the HUB4NGI project have pursued to promote the NGI Initiative and involve European SMEs and start-ups in the broad discussion on the Internet of the future. All the events, like forums, workshops or seminars, and other efforts, for example surveys, allowed to collect valuable observations and conclusions. Many groups of stakeholders (researchers, students, policy makers, representatives of cities and local communities, entrepreneurs, etc.) were able to exchange their opinions, expectations as well as concerns and fears regarding ongoing rapid transition to new technology-based reality. There are still many open questions about how the ubiquitous technology will impact our lives in a wider scale (economical, social, cultural). The future is vague but current activities and choices will shape it. If Europe wants to be a strong key player bringing its values in the future then series of activities must be executed now. The EC is aware of it and proposes various instruments to strengthen innovation and competitiveness. One of the goals of the NGI Initiative is to strongly engage SMEs and start-ups. They cannot compete with big market players now but they have a great chance to be a wave of new Internet technologies and services, which are inclusive, transparent, much more helpful and simple. It should be clear that Europe has the opportunity to create the future and also to benefit economically from it.

The HUB4NGI project has made the first step to engage all kinds of stakeholders, especially SMEs and start-ups, in the initiatives for the Internet of the future. Based on the above experience and results, further actions should be taken. For this to be coherent and effective, a strategy is needed. This document presents the elements of such strategy, namely:

- Building strong NGI brand on national and international levels

- Incentives and success stories

- Light feedback collection and observation to assess the results of activities

- Consultations

- Leaders to promote NGI

- Customised messages to stakeholder groups

- Collaboration with Coordination and Support Action projects

The strategy is a strong message that the revolutionary social and economic changes that are expected cannot happen without the active participation of small and medium innovative business players.

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APPENDIX A

The questions and all responses (including numbers of selected answers) of **The Stakeholder Survey for the Internet of the future** (see subsection 2.2.5):

1. Has your organization already been involved in any initiatives addressing the Future Internet/Next Generation Internet vision and challenges?
2. Indicate three challenges of NGI that you think they deserve to be on the top of priority list.
   a. Decentralisation/avoidance of data concentration in few proprietary platforms
   b. Interoperability and open standards
   c. Transparency and protection of privacy
   d. Security
   e. The use of artificial intelligence and advanced analytics
   f. Social inclusiveness
   g. Smarter environments (cities, places of production and consumption, homes, vehicles, etc.)
   h. New economic models
   i. New business stakeholders
   j. Legislation updates
   k. Other
3. Indicate a threat of the Internet of the future that seems to be the most dangerous for the users (society, industry, public sector, etc.).
   a. Lack of trust
   b. Privacy violations
   c. Weak security
   d. Data concentration in few proprietary platforms
   e. Other
4. Are there any obstacles to move your business, current activities and assets towards the Next Generation Internet?
   a. Investments
   b. Lack of expertise
   c. Internal business procedures and processes
   d. Immature technologies
   e. Legislation
   f. Other
5. What are the incentives for your organization to undertake the actions to move fast towards Next Generation Internet?
   a. New revenue streams
   b. Competitive advantage
   c. New groups of customers
   d. Integration capabilities with other service technology providers
   e. More advanced human-centric services
   f. New business models
   g. Readiness for new emerging technologies and business opportunities
   h. Other
6. What support would you like to receive from the European Commission initiatives to move fast towards the Next Generation Internet?
   a. Funding opportunities, e.g. Open Calls
   b. Trainings and workshops
   c. Mentoring initiatives
   d. Knowledge bases
   e. Other

Question number	Answer	Number of selections	Additional comments ("Other")
1	Yes	17	
	No	4	
	(no answer)	1	
2	a	5	
	b	14	
	c	10	
	d	10	
	e	4	
	f	3	
	g	5	
	h	5	
	i	4	
	j	3	
	k		• communication between participants; • Limitation of existing technology; Ethics • programmability, orchestration and automation
3	a	8	
	b	8	
	c	3	
	d	9	
	e		• topic oriented communication • No privacy any more;
4	a	11	
	b	3	
	c	5	
	d	10	
	e	6	
	f		• topic oriented communication • We need to follow market demands, obstacles are related to Ethics, unfair competition, human mistakes/unfair behaviour, policies • Limited horizontal standardized interoperability

5	a	9	
	b	8	
	c	6	
	d	7	
	e	5	
	f	9	
	g	10	
	h		• topic oriented communication • create value, give trust, cooperate and rely on loyal partnership • New research ideas
6	a	18	
	b	15	
	c	8	
	d	9	
	e		• support for fair business, no price dumping, respect efforts, consider added value of local developers, fair competition • Coordination actions for heterogeneous federations • More up-to-date content of new calls • further support of flexible testbed environments