



Overview on NGI access opportunities from EU and US (Final)

Deliverable 2.2



D2.2 Overview on NGI access opportunities from EU and US (Final)

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Abstract

This current document is a complementary guide to D2.1 (Overview on NGI access opportunities from EU and US-v1.0) which aims to provide an overview of the present funding environment for opportunities for EU or US researchers and innovators who want to join projects or initiatives on the other side of the ocean. The document does not intent to duplicate of re-produce that is already available in other guides, therefore it provides a brief overview of what the new Horizon Europe will be, while emphasizes in available “open” funding opportunities on specific NGI related topics which are on the heart of the Think NEXUS project.

Keywords

Next Generation Internet; EU-US collaboration; Policies; Joint Funding Opportunities; Initiatives providing funding;

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Acronyms and definitions

Acronym	Meaning
AI	Artificial Intelligence
DARPA	Defense Advanced Research Projects Agency
DoD – AMC	Department of Defense – Army Material Command
IoT	Internet of Things
NGI	Next Generation Internet
NIST	National Institute of Standards
NIH	National Institute of Health
NSF	National Science Foundation
R&D	Research and Development

Think NEXUS project

The Internet of the future should be more open, provide better services, more intelligence, greater involvement and participation. It needs to reflect the European values". EU's Next Generation Internet initiative is a key opportunity to rethink the way the Internet works today and develop a vision involving voices from across Europe, the US, and beyond, an Internet that embodies the values Europe holds dear, such as openness, inclusivity, transparency, privacy and cooperation.

Thinking global, the NGI will be successful only if a worldwide consensus is found, enabling the internet a Human-centric process. To that end, collaboration between the US and the US, both areas being strongly committed to develop the future of Internet, to shape a sustainable landscape for NGI developments. Indeed, the NGI initiative should design specific actions for policy collaboration, shared technology development and interaction between user-communities, with other initiatives in the world where parts of the NGI infrastructure are designed and deployed; and the US are one of the main places where such activities are held. Think NEXUS aims to reinforce EU-US collaboration, through its dedicated Think Tank, involving major stakeholders (researchers, entrepreneurs, policy makers) from both sides of the Atlantic on NGI-related thematic in three Focus Areas: Science and Technology, Innovation and Entrepreneurship and Policy. Its mission is to become an important and lasting entity, involving stakeholders and disseminating NGI visions in a collaborative approach for tackling NGI challenges, and benefit society at large.

More specifically, Think NEXUS is expected to boost the strategic research, industrial partnerships and policy compliances among the respective communities of the NGI areas and thus, result in substantial socio-economic benefits in both the EU and US regions.

Executive Summary

During these challenging times, international collaboration in research and technology between the two global innovation powerhouses is more essential than ever before. The new Horizon Europe programme could become a stepping stone for strengthening the existing collaboration framework between the two regions and establish a stable and concrete mechanism for collaboration.

However, one cannot ignore that as the current Horizon 2020 framework comes to its end and the US R&D innovation system has shifted its focus mainly on recent, health related, challenges, not many opportunities fostering international collaboration exist. Independent collaborations for jointly performing experiments on international testbeds, might be the way forward, at least during this transition period.

This current document is a complementary guide to D2.1 (Overview on NGI access opportunities from EU and US-v1.0) which aims to provide an overview of the present funding environment for opportunities for EU or US researchers and innovators who want to join projects or initiatives on the other side of the ocean.

The document does not intent to duplicate or re-produce that is already available in other guides, therefore it provides a brief overview of what the new Horizon Europe will be, while emphasizes in available “open” funding opportunities on specific NGI related topics which are on the heart of the Think NEXUS project.

Last not least, the current document can be considered as a live document which will be frequently updated and released whenever new relevant information is available.

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Introduction

As Horizon 2020 comes to its end, the new Horizon Europe will take its place in 2021, aiming to make Europe a leader in the global research and innovation ecosystem. On the other side, USA are competing with China in order to keep the first place in R&D spending. The current challenging and demanding environment can become a great opportunity in the hands of the two powerhouses, Europe and the USA.

The current deliverable is an additional overview of public funding opportunities provided by the EU or the US, open to researchers from both regions, in NGI related topics and themes, presented in D2.1. Some other key initiatives fostering collaboration in NGI between the two regions are also presented. Information has been collected through desk research plus consultations with Think NEXUS experts.

The European funded programmes that the current document covers, are only the ones that are currently “open and accessible” until the end of 2020, as the new framework programme has not been officially released. Also information about other initiatives that provide funding to EU and/or US researchers and innovators is presented, even though some of these initiatives are not currently open but will open in the forthcoming months. In addition, information about EU and US testbeds, related to NGI topics is presented. From the US perspective, the situation is more complicated as most US programmes are not open to international participants. This limited availability of research opportunities for EU researchers to received funding for international collaborations, also limits the material of this deliverable.

Last but not least, the list of opportunities is not exhaustive and mainly covers opportunities on a federal or EU wide level, as national related initiatives (if any) are not part of this study.



CHAPTER 2 – Horizon Europe and US participation

Horizon Europe: a short introduction¹

We are currently reaching towards the dawn of the current Horizon 2020 framework. However, Europe is working towards a new seven-year research and innovation programme, running from 2021 to 2027.

The programme's general objective is to deliver scientific, technological, economic and societal impact from the Union's investments in R&I, to strengthen the scientific and technological bases of the Union, and foster its competitiveness in all Member States.

With a proposed budget of €100 billion over seven years, **Horizon Europe** is the largest EU's largest R&I framework programme ever and responsibility for delivering on it will make you a partner in delivering on Executive Vice-President Vestager's mandate to 'maximise the contribution of investment in research and innovation in supporting our policy objectives'.

Horizon Europe has the potential to generate significant economic, social and scientific returns. According to the impact assessment, Horizon Europe has the potential to deliver up to €11 in Gross Domestic Product (GDP) gains for every euro invested, create up to 320,000 new highly skilled jobs by 2040 and consolidate Europe's leadership in research and innovation. Crucially, Horizon Europe is designed with an investment mind-set rather than as a 'funding' instrument; and built to help the EU make the transition to a sustainable and prosperous future.

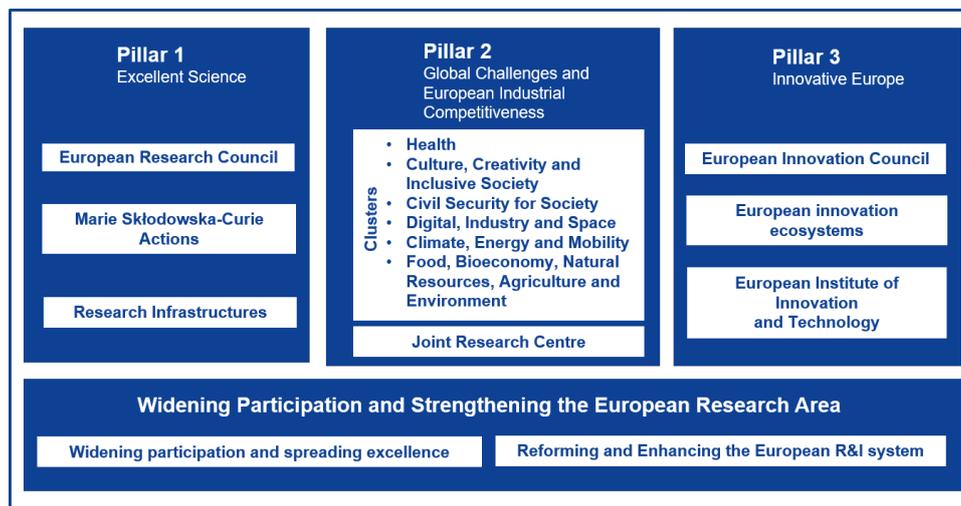


Figure 1: Horizon Europe Pillars

¹ Horizon Europe - the next research and innovation framework programme: https://ec.europa.eu/info/horizon-europe-next-research-and-innovation-framework-programme_en#documents

Horizon Europe will have three main pillars and one cross-cutting component:

- The **Excellent Science** pillar supports frontier research projects designed and driven by researchers through the European Research Council (ERC). It also funds fellowships and a mobility of researchers through Marie Skłodowska-Curie Actions, and invests in world-class research infrastructures.
- The **Global Challenges and European Industrial Competitiveness** pillar supports research into societal challenges, reinforces technological and industrial capacities, and sets EU-wide missions with ambitious goals tackling some of our biggest problems (health, climate change, clean energy, mobility, security, digital, materials, etc.). It will also support partnerships with Member States, industry and other stakeholders to work jointly on research and innovation. It includes action by the Joint Research Centre that supports EU and national policymakers with independent scientific evidence and technical support.
- The **Innovative Europe** pillar aims to make Europe a frontrunner in market-creating innovation and SME growth through the European Innovation Council. It will help develop the overall European innovation landscape. The European Institute of Innovation and Technology (EIT) will continue to foster the integration of business, research, higher education and entrepreneurship.

A fourth component on **Widening participation and Strengthening the European Research Area** underpins the whole of Horizon Europe. It will support EU Member States in their efforts to unlock their national research and innovation potential and it will especially help low R&I performing Member States to participate better in Horizon Europe.

At the time this document is produced, the Horizon Europe is a design and strategic planning process. The result of this strategic planning process shall be set out in a multiannual Strategic Plan (the first one for 2021-2024), for preparing the content of the work programmes, while retaining sufficient flexibility to respond rapidly to new and emerging challenges, unexpected opportunities and crises. The work programmes should be then prepared in time for the first calls under Horizon Europe to be launched in a timely manner to ensure continuity with Horizon 2020, which finishes on 31 December 2020².

2

The strategic planning process and the strategic plan (Factsheet): https://ec.europa.eu/info/horizon-europe-next-research-and-innovation-framework-programme_en#documents

Partnering with USA in Horizon Europe

Both USA and the EU are science powerhouses when it comes to research and innovation and both sided recognise the role of research and innovation in creating jobs and catalysing economic growth, and that transatlantic research cooperation has been key to the development of new technologies and scientific discoveries for over a century.

However, even though discussions regarding funding of US organisations in the future Horizon Europe are ongoing, there is a lot of ground to cover before coming to an agreement. At the time that the current document is written, there are several challenging open issues, such as IP rights, compliance with Europe Commission's admin procedures, compliance with EC contracts and EU law, and accepting the jurisdiction and jurisprudence of the EU Court of Justice³.

The current *"Implementation Strategy for Horizon Europe (version 1.0)"*⁴, leaves room for negotiations and discussions as it clearly indicated that measures will also be put in place to facilitate access to calls **involving international cooperation**. The future Work Programme wording will provide further clarity as regards standard calls with mandatory international participation and terms/specifications of different types of calls. Dedicated guidance for the implementation of special call will be developed. Building upon the international cooperation provisions under Horizon Europe legislation, the Managing Authority will introduce a number of improvements **in response to several concerns by third country participants** under Horizon 2020 while **further progress will be made to tackle the difficulties encountered by international participants with the validation process**.

Moreover, the recently published *"Recommendations for Strengthening American Leadership in Industries of the Future, A Report to the President of the United States of America"*⁵, published by the President's Council of Advisors on Science and Technology in June 2020, clearly indicated the need for establishing international partnerships in AI R&D with countries that share the same values with the USA, in the conduct of research, given compatible interests in AI technology and a strong pipeline of innovation and investments in AI at universities and industry in the respective countries. It also states that there is also a need to define **joint international research programs in AI** across the respective agencies—for example, by teaming NSF with

³ <https://www.universityworldnews.com/post.php?story=20200214145855786>

⁴ https://ec.europa.eu/info/files/implementation-strategy-horizon-europe_en

⁵ https://science.osti.gov/-/media/ /pdf/about/pcast/202006/PCAST_June_2020_Report.pdf

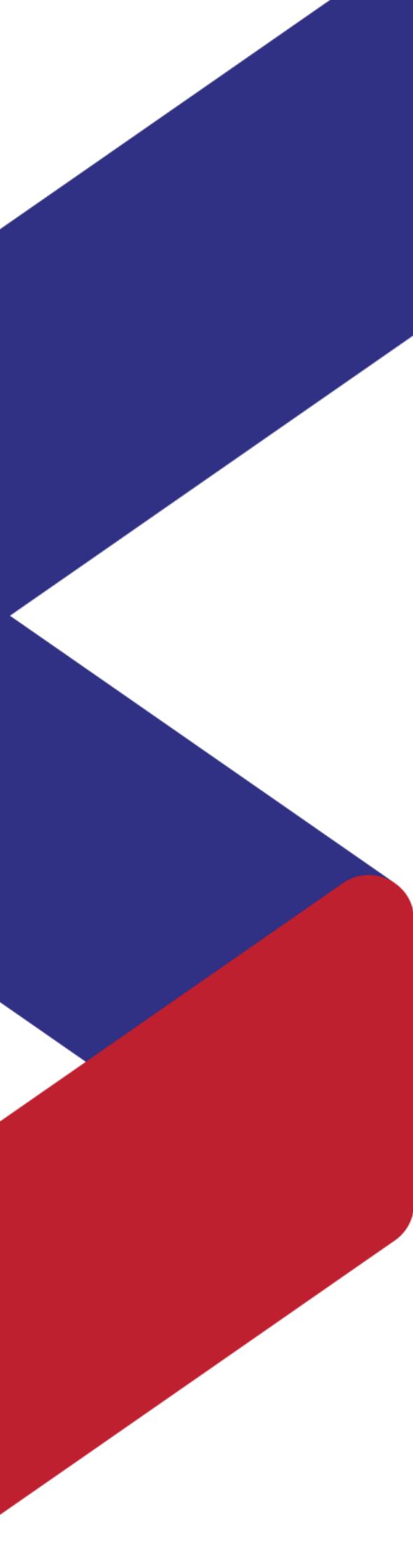
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corresponding agencies in the European Union to define research programs of joint interest in core and applied AI, as well as in the context of large centers such as NSF AI Institutes.

Another recent example is the **Global Partnership on Artificial Intelligence**. The partnership is a joint international initiative, including USA and European Union, aiming to guide the responsible development and use of AI, grounded in human rights, inclusion, diversity, innovation, and economic growth. In order to achieve this goal, the initiative will look to bridge the gap between theory and practice on AI by supporting cutting-edge research and applied activities on AI-related priorities⁶.

As it can be seen from the above, even though some steps forward have been made, there are still a lot of discussions to be made, regarding the funded participation of US organisation in the future European framework programme. Discussions are on-going and there is good will from both sides to reach to a common agreement for the benefit of the people.

⁶ <https://www.state.gov/joint-statement-from-founding-members-of-the-global-partnership-on-artificial-intelligence/#Ftnt1>



**CHAPTER 3 -
Opportunities
for EU and US
researchers
and innovators**

Overview

The current section provides an overview, dedicated both to EU and US researchers and innovators, of the European research framework and the public US funding system, related to NGI topics of interest, which are open to US and EU participants fostering international collaboration. Bilateral agreements between USA and European countries are not part of this discussion.

However, it is critical to highlight that as the current European R&D framework comes to its end and the US public R&D system has shifted its focus to emergency responses solutions (such as the recent Covid-19 pandemic), not a lot of opportunities exist.

Adding to the above, NGI topics presented below are only the ones which consist the main focus of Think NEXUS project.

European Funding Opportunities related to NGI topics

As already mentioned above, a number of NGI related topics are funded by the H2020 instrument. The categorization below has been made according to the strategic priorities already defined by the Think NEXUS project in deliverables **D1.2 Think tank strategic outline (initial)**, **D1.1 Think NEXUS think tank operational guidelines** and **D1.3 Think tank strategic outline (v2)**, The later can be found in <https://thinknexus.ngi.eu/repository/project-deliverables/>.

What is also critical to mention, for once again, is that in principle US partners bring their own funding to the table. This may be own funds of the participating institutions or funds from US funding agencies. Potential US participants are therefore encouraged to contact research and innovation funding organisations in the US to seek support for their participation in Horizon 2020. **No jointly agreed mechanism is currently in place for co-funding Horizon 2020 research and innovation projects.**

Artificial Intelligence (AI)

Opportunity Number	Opportunity Title	Deadline	Budget
SU-AI02-2020	Secure and resilient Artificial Intelligence technologies, tools and solutions in support of Law Enforcement and citizen protection, cybersecurity operations and prevention and	27 August 2020	17M Euros

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	protection against adversarial Artificial Intelligence		
SU-AI03-2020	Human factors, and ethical, societal, legal and organisational aspects of using Artificial Intelligence in support of Law Enforcement	27 August 2020	1,5M Euros
SU-AI01-2020	Developing a research roadmap regarding Artificial Intelligence in support of Law Enforcement	27 August 2020	1,5M Euros

Blockchains & Distributed Ledgers

Opportunity Number	Opportunity Title	Deadline	Budget
LC-SC3-EC-1-2018-2019-2020	The role of consumers in changing the market through informed decision and collective actions	10 September 2020	6M Euros

Big Data

Opportunity Number	Opportunity Title	Deadline	Budget
SU-FCT03-2018-2019-2020	Information and data stream management to fight against (cyber)crime and terrorism	27 August 2020	8M Euros
LC-SC3-B4E-14-2020	Enabling next-generation of smart energy services valorising energy efficiency and flexibility at demand-side	10 September 2020	6M Euros

Internet of Things (IoT)

Opportunity Number	Opportunity Title	Deadline	Budget
SU-DRS02-2018-2019-2020	Technologies for first responders ⁷	27 August 2020	21M Euros

⁷ In line with the objectives of the Union's strategy for international cooperation in research and innovation (COM(2012)497), international cooperation according to the current rules of participation is encouraged (but not mandatory), in particular with Japanese or Korean research centres. Co-funding opportunities from the Japan Science and Technology Agency exist for Japanese partners. Co-funding opportunities from the Korean MSIP/NRF exist for Korean partners.

US Funding Opportunities related to NGI topics

Opportunities for EU researchers to obtain US funding for their projects are limited. Most federal organizations provide grants only to researchers at US institutions (e.g., colleges, universities, corporations) or require US citizenship for the Principal Investigator and project staff. Since US taxpayer dollars primarily support federal organizations, the federal government aligns grantmaking priorities with those that benefit the nation and its people⁸. Recent global events, particularly outbreaks of the Covid-19 virus, are having an impact on the federal funding landscape. Some federal organizations, such as the National Institutes of Health, do allow international researchers to serve as Principal Investigators and/or have specific programs that even require an international collaborator, but these are not related to NGI and are not subject of this report.

AI and Autonomous Machines

Opportunity Number	Opportunity Title	Agency	Deadline	Budget
20-544 ⁹	Expeditions in Computing	NSF/CISE	16 February 2021	60M dollars
HR001120S0034	Strategic Technologies	DOD-DARPA-STO	31 March 2021	N/a
FOA-AFRL-AFOSR-2020-0002 ¹⁰	Multidisciplinary Research Program of the University Research Initiative (FY21 Air Force Submission)	DOD-AFOSR	14 September 2020	180M dollars
W911NF-20-S-0009 ¹¹	Multidisciplinary Research Program of the University Research Initiative (FY21 ARMY SUBMISSION)	DOD-AMC	14 September 2020	180M dollars
W911NF-17-S-0002	Army Research Office Broad Agency Announcement for Fundamental Research	DOD-AMC	31 March 2022	N/A

⁸ <https://www.euussciencetechnology.eu/>

⁹ EU organisations may participate but need to bring their own funding

¹⁰ EU organisations may collaborate on the research but may not receive MURI funds directly or via sub award. When additional funding for an ineligible organization is necessary to make the proposed collaboration possible, such funds may be identified via a separate proposal from that organization.

¹¹ EU organisations may collaborate on the research but may not receive MURI funds directly or via sub award. When additional funding for an ineligible organization is necessary to make the proposed collaboration possible, such funds may be identified via a separate proposal from that organization.

Blockchains & Distributed Ledgers

Opportunity Number	Opportunity Title	Agency	Deadline	Budget
<u>W911NF-17-S-0002</u>	Army Research Office Broad Agency Announcement for Fundamental Research	DOD-AMC	31 March 2022	N/A

Big & Open Data

Opportunity Number	Opportunity Title	Agency	Deadline	Budget
<u>CRCNS</u>	Collaborative Research in Computational Neuroscience	NSF, NIH	Waiting for New Publication	N/A
<u>W911NF-17-S-0002</u>	Army Research Office Broad Agency Announcement for Fundamental Research	DOD-AMC	31 March 2022	N/A
<u>W911NF-17-S-0003</u>	Army Research Laboratory Broad Agency Announcement for Basic and Applied Scientific Research	DOD-AMC	31 March 2022	N/A

Internet of Things (IoT)

Opportunity Number	Opportunity Title	Agency	Deadline	Budget
<u>W911NF-17-S-0002</u>	Army Research Office Broad Agency Announcement for Fundamental Research	DOD-AMC	31 March 2022	N/A
<u>W911NF-17-S-0003</u>	Army Research Laboratory Broad Agency Announcement for Basic and Applied Scientific Research	DOD-AMC	31 March 2022	N/A
<u>W911NF-17-S-0003</u>	Army Research Laboratory Broad Agency Announcement for Basic and Applied Scientific Research	DOD-AMC	31 March 2022	N/A

Cloud /Edge Computing

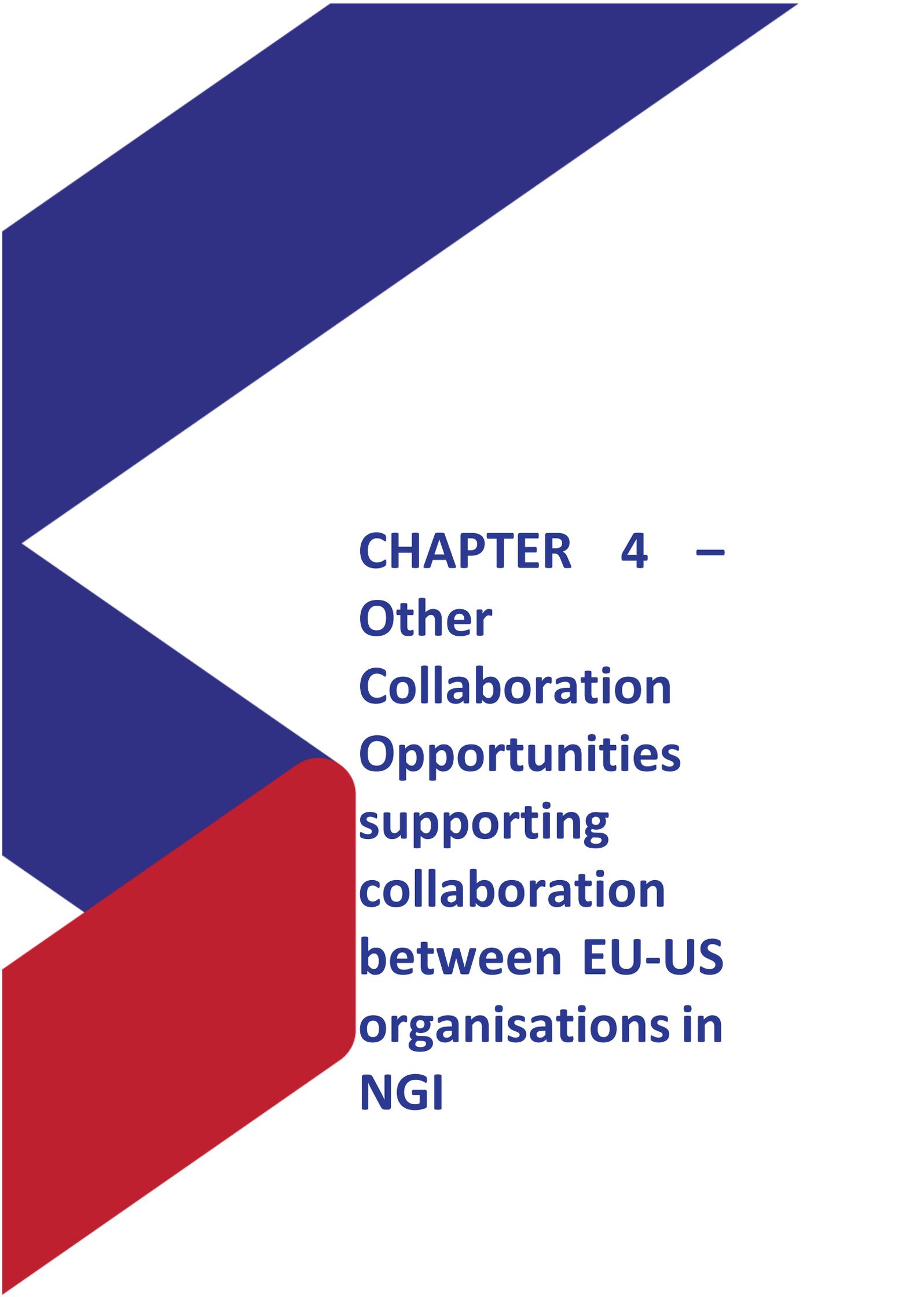
Opportunity Number	Opportunity Title	Agency	Deadline	Budget
<u>W911NF-17-S-0002</u>	Army Research Office Broad Agency Announcement for Fundamental Research	DOD-AMC	31 March 2022	N/A

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<u>W911NF-17-S-0003</u>	Army Research Laboratory Broad Agency Announcement for Basic and Applied Scientific Research	DOD-AMC	31 March 2022	N/A
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Future Architectures

Opportunity Number	Opportunity Title	Agency	Deadline	Budget
<u>W911NF-17-S-0002</u>	Army Research Office Broad Agency Announcement for Fundamental Research	DOD-AMC	31 March 2022	N/A
<u>W911NF-17-S-0003</u>	Army Research Laboratory Broad Agency Announcement for Basic and Applied Scientific Research	DOD-AMC	31 March 2022	N/A

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**CHAPTER 4 –
Other
Collaboration
Opportunities
supporting
collaboration
between EU-US
organisations in
NGI**

Overview

A number of funded initiatives, either by European Commission or NSF, have been launched that aim on supporting innovation in the NGI sector, which are open to US or EU participants as well. In some US or EU participants can be funded or join as supported organisations. What is important to say at this point, is that the list below is not exhaustive and can be seen as an addition of the list available in deliverable D2.1.

NGIatlantic.eu Open Calls¹²

- **Short Description**

The main goal of the NGIatlantic.eu Open Calls is to incentivize EU – US NGI teams to carry out experiments using EU and/or US based experimental platforms. This will take the form of funding to be provided through a cascade grant process for the EU counterparts of the teams formed. The focus of the Open Calls will be the first set of priority topics on the EU's Next Generation Internet (NGI) Initiative and related topics in which results are already available from previous NGI RIA projects to be partnered with an Experimental Platform of the proposer's choice.

- **Eligibility**

Private and public organisations of any size (not individual researchers) located within the EU Member States or Associated Countries and twinned with a US counterpart, as described above to carry out the activities proposed. Please note that the funding is limited to coverage of the work to be carried out by the EU team. For the US teams, please refer to the funding mechanisms of your US partners (e.g. National Science Foundation).

- **Deadline**

N/A. Please follow the NGIatlantic.eu website for more information

¹² <https://ngiatlantic.eu/>

FED4FIRE+: Continuous call “SME CASCADED EXPERIMENTS” | Stage 2¹³

- **Short Description**

Fed4FIRE+ is the largest federation worldwide of NGI testbeds, which provides open, accessible and reliable facilities supporting a variety of different research and innovation communities and initiatives in Europe. The goal of the Continuous Call is to make the federated infrastructure directly available for the execution of innovative projects from SMEs. The submission to stage 2 is open ONLY to successful proposals from stage 1.

- **Eligibility**

Proposals will only be accepted from SMEs eligible for participation in EC H2020-projects. Proposals will only be accepted from single parties (no consortia are allowed). Not open for US participation

- **Deadline**

22 September 2020, 17:00 CET

FED4FIRE+: 8th Open Call “MEDIUM EXPERIMENTS”¹⁴

- **Short Description**

Fed4FIRE+ is the largest federation worldwide of NGI testbeds, which provides open, accessible and reliable facilities supporting a variety of different research and innovation communities and initiatives in Europe.

The goal of the Open Call is to make Fed4FIRE+’s federated infrastructure directly available for the execution of innovative experiments by experimenters at both industrial (including SMEs) and research organisations. The Call has no specific theme, it invites experiments testing, implementing or optimising existing products or services on the Fed4FIRE+ testbeds.

¹³ <https://www.fed4fire.eu/continuous-call>

¹⁴ <https://www.fed4fire.eu/8th-opencall>

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- **Eligibility**

Proposals will only be accepted from SMEs eligible for participation in EC H2020-projects. Proposals will only be accepted from single parties (no consortia are allowed). Not open for US participation.

- **Deadline**

Feasibility check: 15 September 2020, 17:00 CET

Final submission: 22 September 2020, 17:00 CET

eSSIF-Lab Infrastructure-oriented call¹⁵

- **Short Description**

The European Self-Sovereign Identity Framework Lab (eSSIF-Lab) will support the development and testing of novel scalable and interoperable applications using eSSIF-Lab infrastructure or the provision of components to this infrastructure.

Solutions proposed must be in a Technology Readiness Level (TRL) of 3 to 5 and proposed applications should fall within the Self Sovereign Identity (SSI) concept (i.e. technologies which allow individuals to control their electronic identities and guard their privacy).

- **Eligibility**

The call targets innovators (such as outstanding academic research groups, hi-tech start-ups and SMEs), legally established/resident in a Member State of the EU or in a H2020 associated country. Not open for US participation.

- **Deadline**

30 June 2021

¹⁵ <https://essif-lab-infrastructure-oriented.fundingbox.com/>

Research Collaboration Opportunity in Europe for NSF Awardees¹⁶

- **Short Description**

To further scientific and technological cooperation between the United States and the European Community, the National Science Foundation and the European Research Council signed an Implementing Arrangement on October 29, 2019 to enable U.S.-based scientists and engineers with active NSF awards, particularly those early on in their careers, to pursue research collaboration with European colleagues supported through EU-funded European Research Council (ERC) grants

- **Eligibility**

This opportunity is open only to PIs and co-PIs of active NSF awards. Supplemental funding may not be used to support travel for senior personnel, postdocs, or others funded on the award. Please note, however, that NSF Postdoctoral Research Fellows with active Fellowships are eligible to submit to this opportunity.

- **Deadline**

N/A.

¹⁶ <https://www.nsf.gov/pubs/2020/nsf20069/nsf20069.jsp?>

Platforms and Initiatives supporting Joint NGI experiments

Overview

There are already multiple research infrastructures and efforts that have been closely interacting and collaborating between Europe and the US. In this section we focus on US and EU testbeds that are available to perform experiments from international partners. The list is not exhaustive and is an addition to the previous version of this deliverable (D2.1). It is critical to mention that these initiatives do not provide funding to organisations, but offer their infrastructures for testing.

FABRIC¹⁷

FABRIC is a unique national research infrastructure to enable cutting-edge and exploratory research at-scale in networking, cybersecurity, distributed computing and storage systems, machine learning, and science applications.

It is an everywhere programmable nationwide instrument comprised of novel extensible network elements equipped with large amounts of compute and storage, interconnected by high speed, dedicated optical links. It will connect a number of specialized testbeds (5G/IoT PAWR, NSF Clouds) and high-performance computing facilities to create a rich fabric for a wide variety of experimental activities.

ENTER¹⁸

This project addresses an emerging research need – namely the need to develop and transition to a new, advanced, mid-scale platform for CISE research. In particular, the project will update, adapt, operate and maintain the GENI infrastructure in order to support novel at-scale networking research across the CISE community, and to enable planning for a next generation mid-scale research infrastructure to occur. Our ENTeR project will facilitate the transition from GENI to a new platform capable of supporting a much larger portion of the CISE community. The ENTeR team consists of the University of Kentucky, RENC/UNC Chapel Hill, University of Maryland, University of Utah and Internet2 – all intimately familiar with designing, developing, installing, and operating the various elements of the GENI infrastructure. The team’s primary focus will be to ensure that the critical portions of the GENI infrastructure needed by the majority of the researchers remain available and relevant. Critical components include the

¹⁷ <https://fabric-testbed.net/>

¹⁸ <http://nrig.renci.org/project/enter-enabling-network-research-and-the-evolution-of-a-next-generation-midscale-research-infrastructure/>

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InstaGENI and ExoGENI edge clouds, the stitching service components, which allow experimenters to build inter-site topologies, the GENI Clearinghouse, GENI Portal, and the GENI Desktop that provide easy experimenter access to GENI tools, and the GENI Monitoring Service that allows users and operators/providers to collect infrastructure measurement data. The team will also continue to perform various mission-critical functions needed to enable and support new research and experimentation efforts in GENI, like project and account management, infrastructure support for tutorials and other outreach events, and issue tracking and troubleshooting, including dealing with security incidents, and escalation to appropriate responsible parties. The team will participate in planning efforts for a follow-on mid-scale testbed infrastructure, adapting ENTeR project efforts in an attempt to begin moving toward a future infrastructure that may emerge.

CityLab¹⁹

The CityLab testbed is a smart cities testbed federated through the Fed4FIRE federation, operated by imec. It is intended for large-scale wireless networking experimentation at a city neighborhood level in the unlicensed spectrum. CityLab is located in the city center of Antwerp, Belgium. The testbed can be found in the streets in and around the city campus of the University of Antwerp, in an area of about 0.5km by 0.5km. This testbed is located in a highly realistic environment where experiments typically face a lot of external radio interference from nearby equipment (e.g. WiFi networks, IoT devices, ...). Hardware is installed at 50 locations, each with its own gateway attached to houses in the street or installed on a pole on a roof. Each gateway houses multiple radios with full low-level access for experimenters, including WiFi at 2.4GHz and 5GHz, Bluetooth, Zigbee at 2.4GHz and 868MHz, custom sub-GHz protocols at 868 and 433MHz and a Lora client module. A gateway is connected to the academic fiber network over Gigabit Ethernet, enabling high-bandwidth low-latency experimentation.

NIST Industrial Wireless Systems Testbed²⁰

The Industrial Wireless Systems (IWS) Testbed integrates existing and emerging wireless technologies with live physical systems found in factories of all types. The testbed seeks to merge the physical systems and the radio frequency (RF) environment creating a framework for conducting measurements and test methods that advance the effectiveness, reliability, and

¹⁹ <https://www.fed4fire.eu/testbeds/citylab/>

²⁰ <https://www.nist.gov/laboratories/tools-instruments/nist-industrial-wireless-systems-testbed>

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security of industrial wireless deployments in factories. The IWS testbed is indeed a cyberphysical systems testbed as it connects the computing world with the physical world.

Grid'5000²¹

Grid'5000 is a large-scale and versatile testbed for Cloud, HPC, Big Data, networking, and AI. It is composed of 8 sites (located in France and Luxembourg), and more of 800 servers than can be reserved at the bare metal level. The sites are connected together with a 10-Gbps dedicated backbone.

National Software Reference Library (NSRL)²²

The National Software Research Library has a research computing environment containing over 40,000,000 unique original files derived from over 20,000 software packages and 15,000 mobile apps. The database contains metadata including filename, byte size, file path, etc. The testbed is not publicly accessible. In order to use the testbed, software must be submitted to the NSRL. The NSRL team can run your job against the file collection, returning the results and your code to you upon completion.

IoT Lab²³

IoT Lab is a research platform exploring the potential of crowdsourcing and Internet of Things for multidisciplinary research with more end-user interactions. It gives the power to the crowd to be at the core of the research and innovation process. It gives you the power to change the world and the way we understand it.

Deep Learning Facilities testbed²⁴

The goal of the Deep Learning Facilities testbed is the realization of a next generation smart facility solution using Deep Learning through Neural Networks, with meaningful gains in energy efficiency, asset utilization and maintenance. Specifically, the testbed will optimize diagnosis, maintenance, and repair of monitored assets; increase energy efficiency by adjusting power-consuming services, and improve visitor experience relative to wait times and ambient climate control. Additionally, the testbed will identify optimal deep learning techniques and best practices that are both computationally feasible and efficient for multiple classes of smart facilities (individual buildings, smart campuses, smart factories, etc.). Furthermore, the testbed

²¹ <https://www.fed4fire.eu/testbeds/grid5000/>

²² <https://www.nist.gov/itl/ssd/software-quality-group/national-software-reference-library-nsrl>

²³ <https://www.iotlab.eu/>

²⁴ <https://hub.iiconsortium.org/deep-learning-facility>

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will provide an environment where the IIC community can leverage the testbed for their own smart facility use cases.

TENGU²⁵

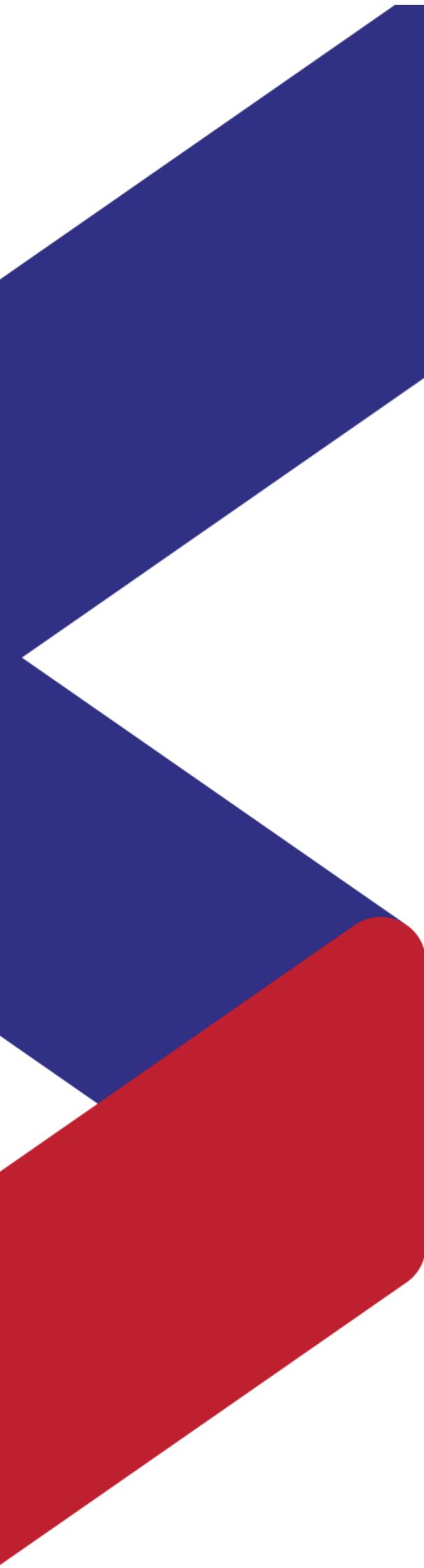
Tengu is a platform for big data experimentation, which allows for scalable streaming, analysis and storage of large amounts of heterogeneous data. Tengu offers access to heterogeneous storage technologies, supports both offline and real-time data analysis components and provides resource and data monitoring tools. Experiment setup configuration is fully automated.

International Future Industrial Internet Testbed (INFINITE)²⁶

The goal of the International Future Industrial Internet Testbed (INFINITE) is to develop software-defined infrastructures to drive the growth of Industrial Internet products and services. INFINITE uses Big Data to not only create completely virtual domains with Software-Defined Networking, but it also makes it possible for multiple virtual domains to securely run via one physical network - thus making it ideal for use in mission critical systems. Even more interesting, INFINITE makes it possible to connect to these virtual domains through mobile networks.

²⁵ <https://www.fed4fire.eu/testbeds/tengu/>

²⁶ <https://hub.iiconsortium.org/infinite>



CHAPTER 5 - Conclusions

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Information provided in this document aims at drawing a sufficiently representative panorama of what is currently being funded or opened for collaboration both in the US and the EU in the NGI priority areas that are the main focus of Think NEXUS project. Given the challenges that both regions face, not only on technological but also on health and financial issues, priorities may change as both regions are preparing themselves for 2021 and onwards.

Based on this, the **Think NEXUS project will examine the possibility of publishing an updated version of this document towards March 2021**, in order to include information of the new Horizon Europe framework programme. Adding to the above, the Think NEXUS team also welcomes any external contribution, suggestion or comment on the information currently available, with a view to provide a more complete photography of the present and future opportunities' landscape



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