

NEXT GENERATION INTERNET

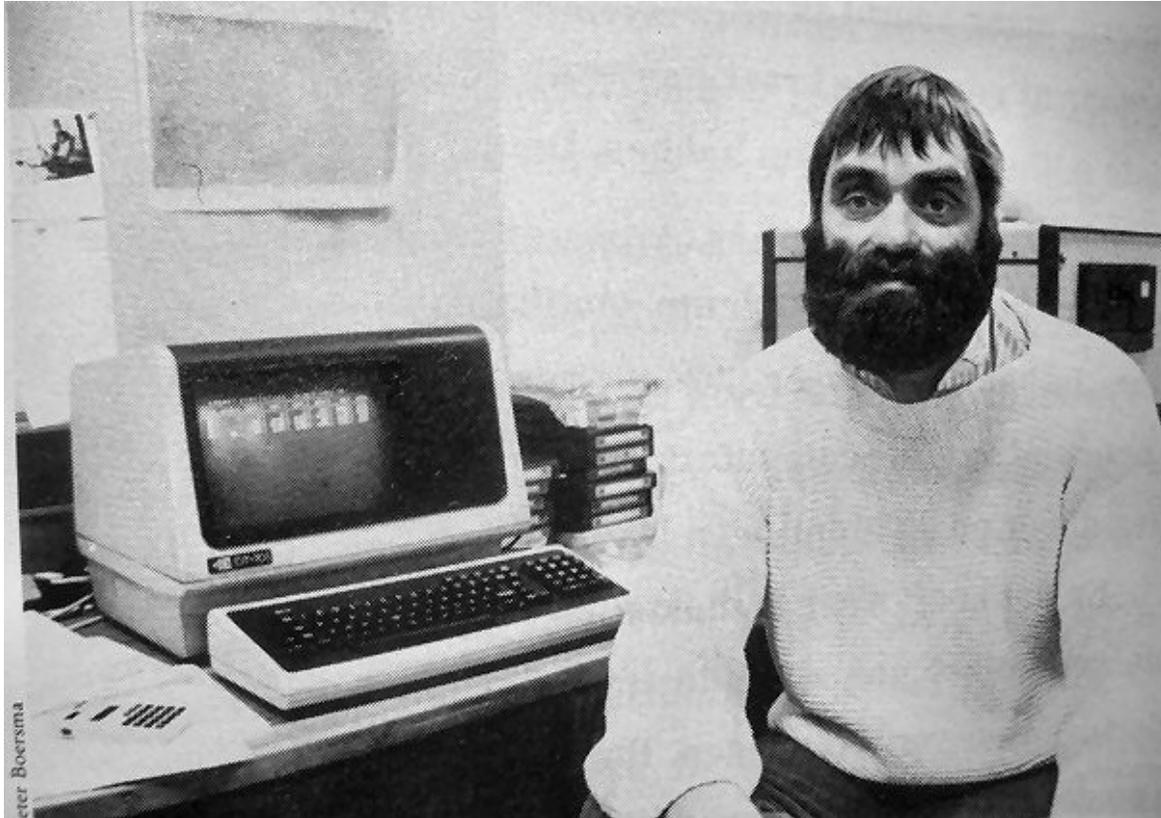
At RIPE 79, Rotterdam

RIPE 79
Rotterdam, Netherlands
14 - 18 October, 2019

NGIO: come work for the internet Michiel Leenaars



Back in 1982 ...



... scientists and engineers like **Teus Hagen, Jaap Akkerhuis** and **Daniel Karrenberg** started building a grass roots computer networks that grew into the European internet, together with their friends from the **European UNIX user groups** (like **Peter Collinson** and **Keld Simonsen**).

This is the joint history of **NLnet** and the **EUnet**.

Just for clarity's sake...



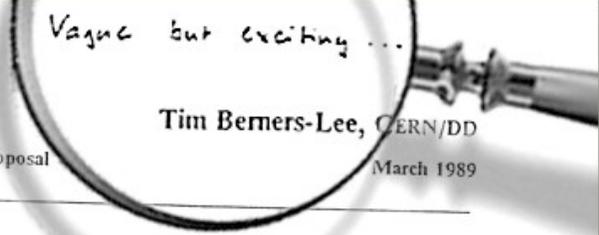
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Est. 1989



Est. 1999

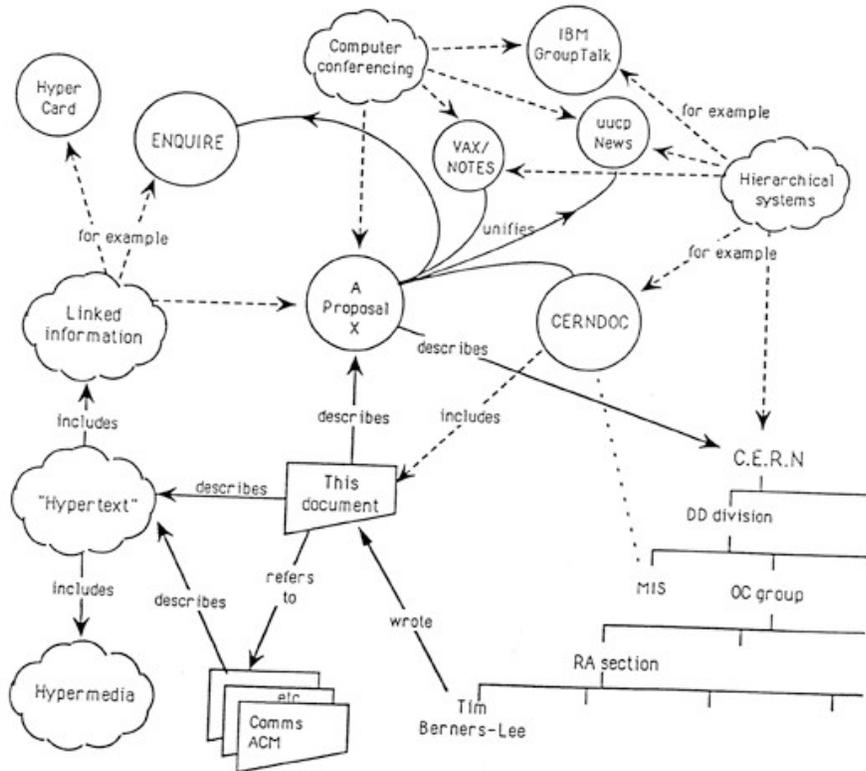


Information Management: A Proposal

Abstract

This proposal concerns the management of general information about accelerators and experiments at CERN. It discusses the problems of loss of information about complex evolving systems and derives a solution based on a distributed hypertext system.

Keywords: Hypertext, Computer conferencing, Document retrieval, Information management, Project control



A mere thirty years ago..

... the world wide web was still a “vague but interesting” proposal inside CERN to manage information

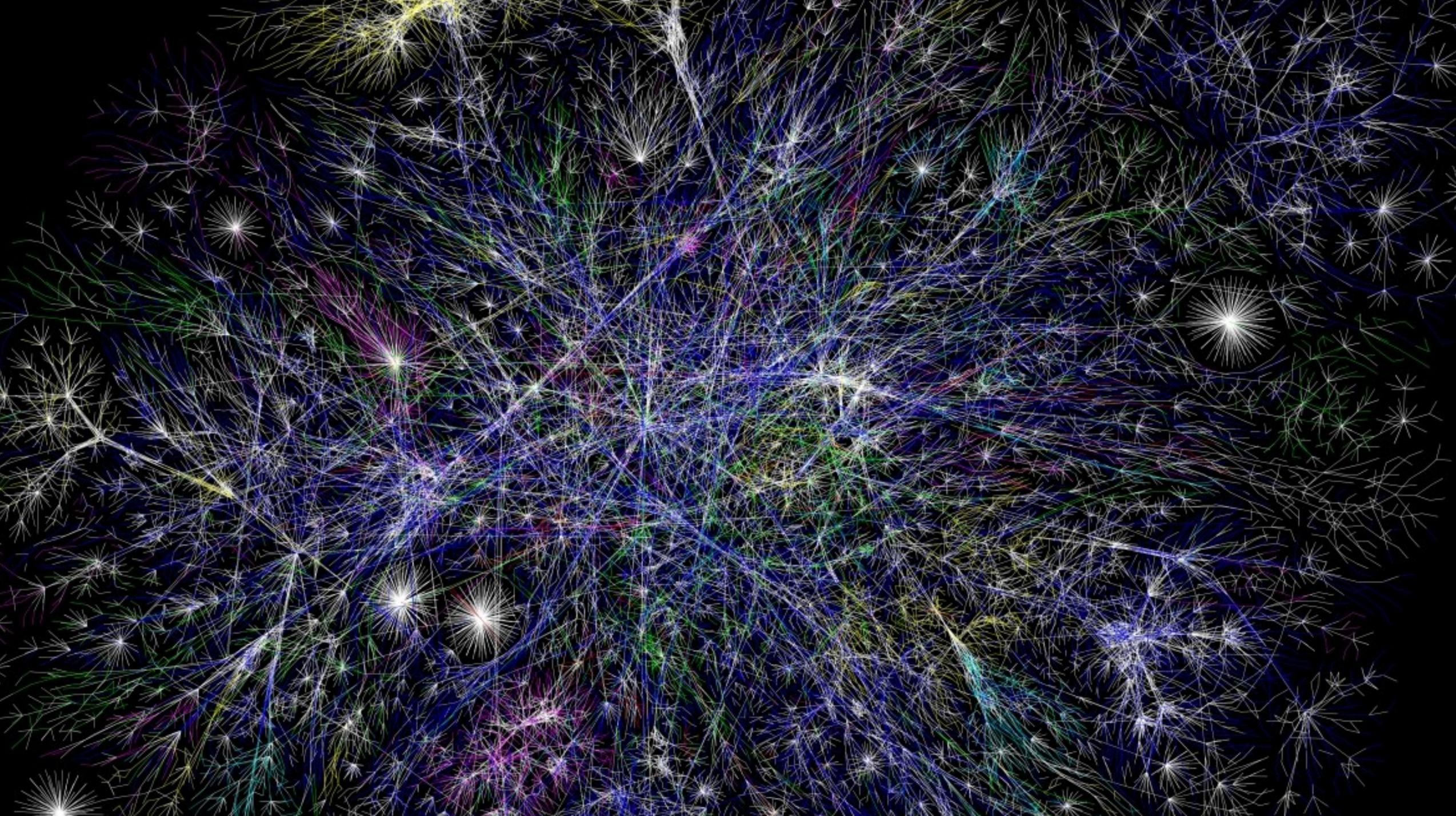
... Stichting NLnet formally became a legal entity (a foundation), in an effort to scale up the adoption of the early internet in Europe (after 7 years of informal operations) ... and it caught on

“From utopia to dystopia in just 29 [30] short years”



“We demonstrated that the Web had failed instead of served humanity, as it was supposed to have done, and failed in many places. The increasing centralization of the Web ended up producing—with no deliberate action of the people who designed the platform—a large-scale emergent phenomenon which is anti-human.”

Tim Berners-Lee



TODAY WE CREATE THE
INTERNET
OF TOMORROW



An internet of human values

Resilient. Transparent. Sustainable.

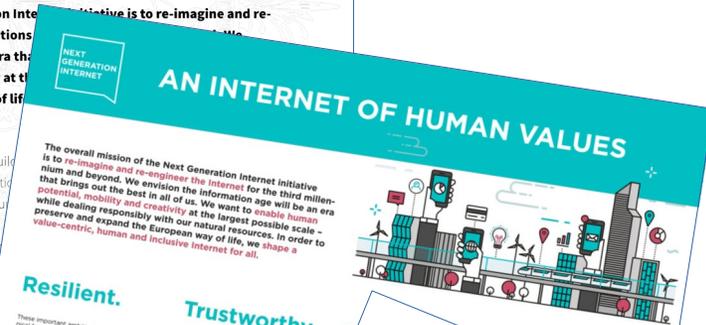
The overall mission of the Next Generation Internet initiative is to re-imagine and re-engineer the Internet for the next generations. We envision the information age will be an era that enables human potential and creativity at the largest possible scale – while dealing responsibly with our natural resources. In order to preserve and expand the European way of life, we shape a value-centric, human and inclusive Internet for all.

These ambitions need a solid foundation to build on. The legendary reality of the Internet must become actual reality in the Next Generation Internet. A multi-layered, resilient and secure network is embedded in concrete, circling in space and time. The Next Generation Internet has to be a network where companies or parts of the network go down but the rest of us should be close to zero.

There is another important dimension to trust. It is a **transparent** technological environment, transparent policies structure how entire societies and speech and private enterprise and much more. The Next Generation Internet should avoid any bias or systematic abuse of globalisation, rising above international politics and strengthening the health and autonomy of our markets.

The enduring success of the Internet lies in permission-free innovation, openness and interoperability. The Next Generation Internet is set up to create wider choice. It fosters diversity and decentralisation, and grows the potential for disruptive innovation. This extends far beyond the technical realm. The Next Generation Internet will achieve a **sustainably open** environment for our cultures and economies, celebrating our values and promoting creativity and well-being.

Let's re-invent Internet to reach the full human potential, for all generations.



Resilient.

Trustworthy.

Let's re-invent



Next Generation Internet 2025
A study prepared for the European Commission
DG Communications Networks, Content & Technology by



SMART 20160233_NGI_Final_draft_v0.25

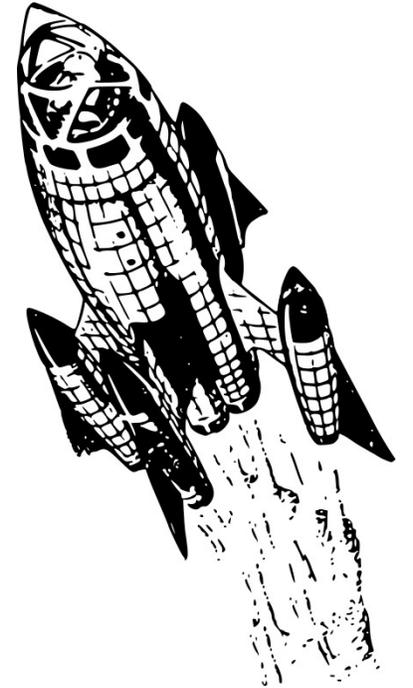
In 2016 the **European Commission** took up the idea for the **Next Generation Internet** initiative:

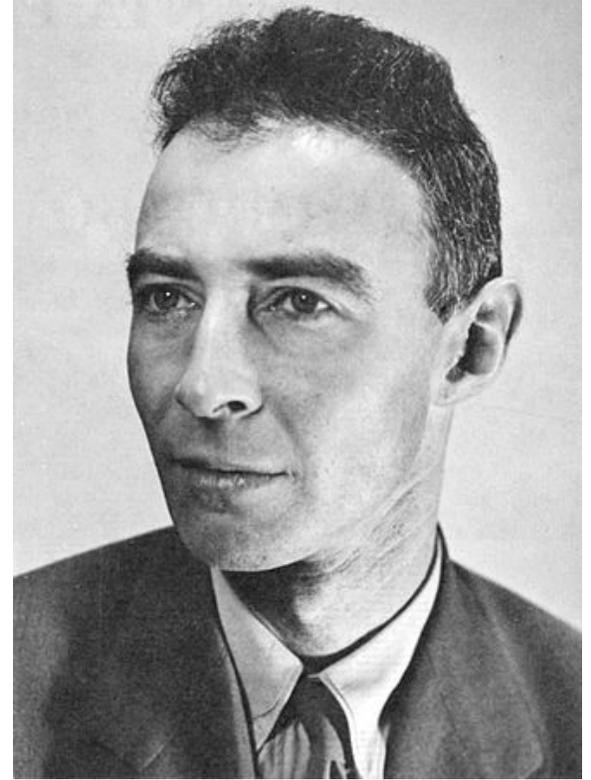
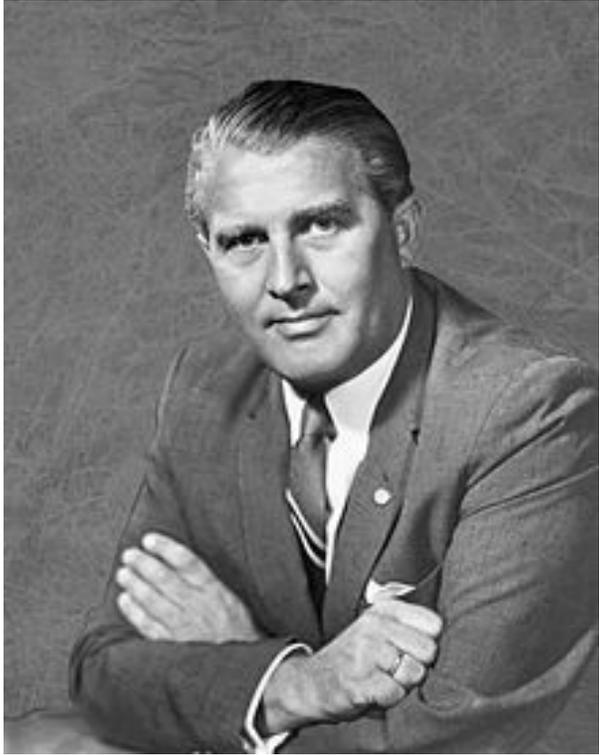
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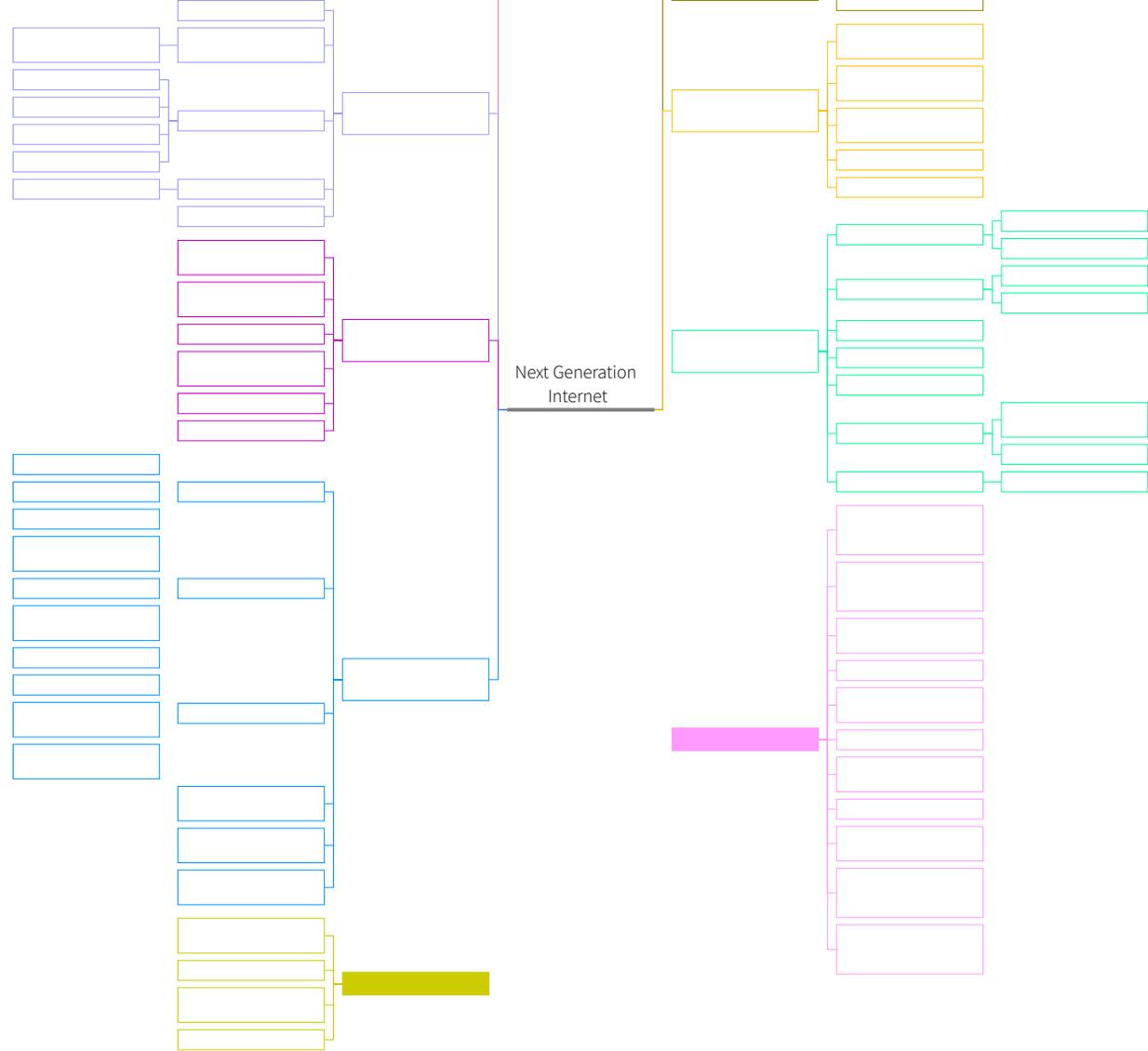


NGI is a moonshot ++ effort

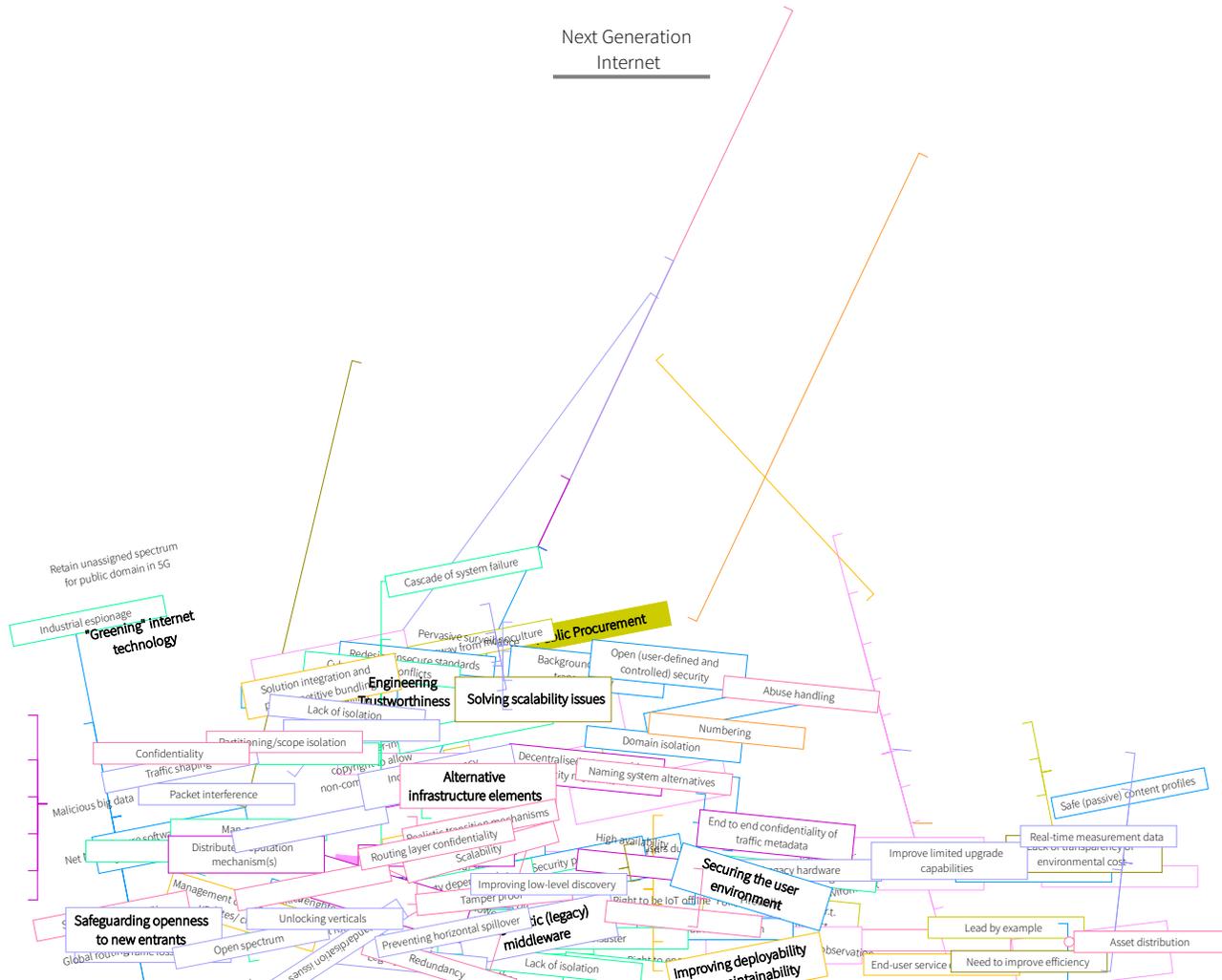
- The internet is the **largest** and **most pervasive** technical construct ever made by humans
- And we need to change it with 3.8+ billion people 'on board'.
- High political stakes. High economic stakes. Highly critical users users. Overloaded with expectations. From everybody.
- Work consistent and forward-thinking. No time to lose.







Next Generation Internet



The vision: Preamble

“The overall mission of the Next Generation Internet initiative is to re-imagine and re-engineer the Internet for the third millennium and beyond. **We envision the information age will be an era that brings out the best in all of us.** We want to enable human potential and creativity at the largest possible scale. In order to preserve and expand the European way of life, we shape a value-centric, human and inclusive Internet for all.”

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These ambitions need a solid foundation to build on. The legendary robustness of the Internet must become actual reality in the Next Generation Internet. A massive global fleet of connected devices is on its way to enhance and control our homes, factories, offices and vehicles. Technology is embedded in concrete, circling in space and is increasingly entering the intimacy of our human bodies. The Next Generation Internet has to be highly adaptive and resilient. Whatever companies or parts of the network go down by some natural or other disaster, the effects on the rest of us should be close to zero.

There is another important dimension to trust, which lies above physical availability. We need a transparent technological environment, that is trustworthy. The architecture, governance and policies structure how entire societies and economies interact. By design it should protect free speech and private enterprise and much more. The Next Generation Internet is to be designed to avoid any bias or systematic abuse of global trust in the Internet. It shall be a true global commons, rising above international politics and competition. It will guarantee the safety of citizens and strengthen the health and autonomy of our markets and societies.

The enduring success of the Internet lies in permission-free innovation, openness and interoperability. The Next Generation Internet is set up to create wider choice. It fosters diversity and decentralisation, and grows the potential for disruptive innovation. This extends far beyond the technical realm. The Next Generation Internet will achieve a sustainably open environment for our cultures and economies, celebrating our values and promoting creativity and well-being.

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First goal: resilience

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Second goal: Transparency and trustworthiness

There is another important dimension to trust, which lies above physical availability. We need a **transparent technological environment**, that is **trustworthy**. The architecture, governance and policies structure how entire societies and economies interact. By design it should protect free speech and private enterprise and much more. The Next Generation Internet is to be designed to avoid any **bias or systematic abuse of global trust** in the Internet. It shall be a true global commons, rising above international politics and competition. It will guarantee the **safety of citizens** and strengthen the **health and autonomy** of our **markets and societies**.

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Third goal: Sustainably open.

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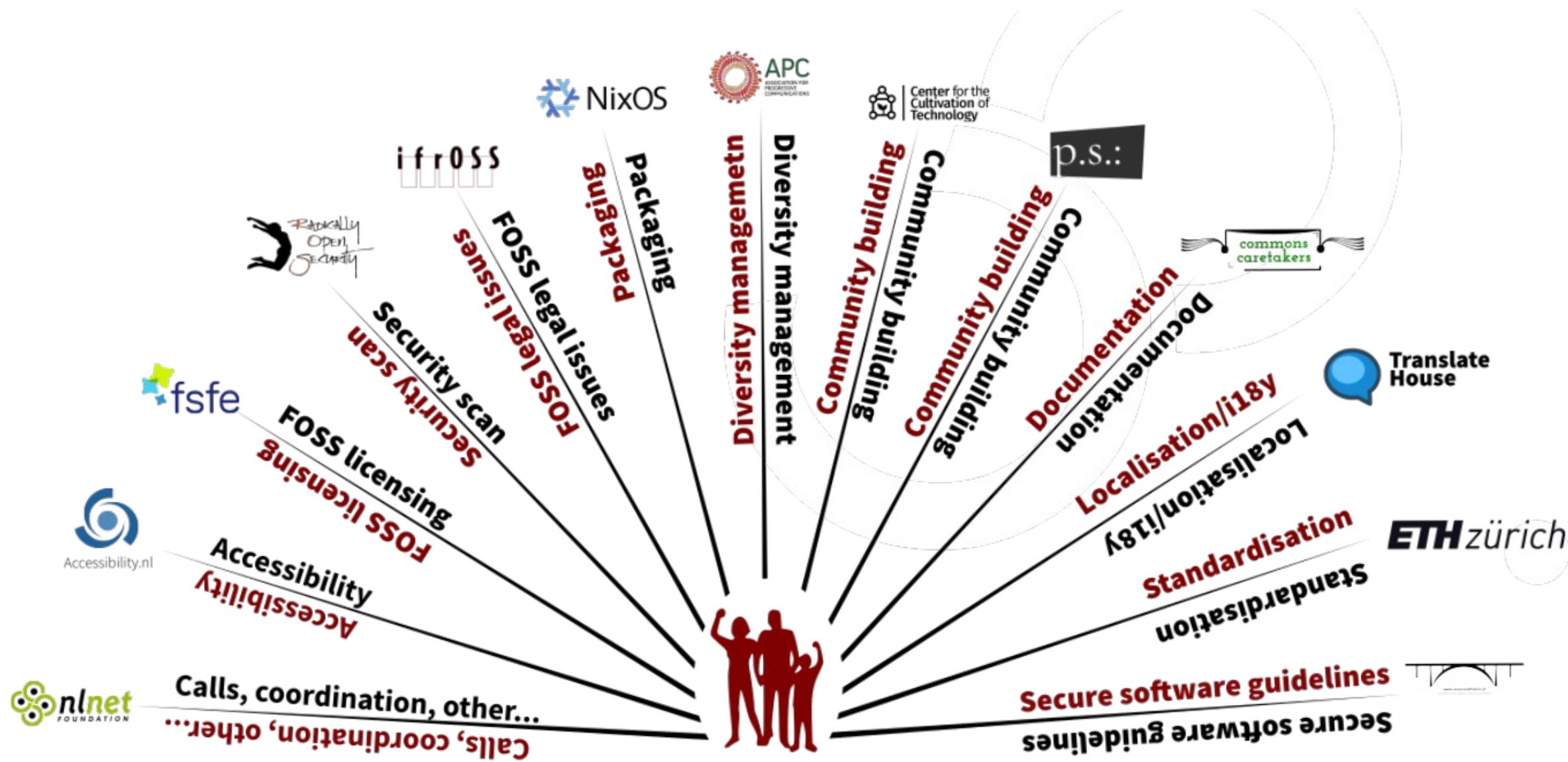
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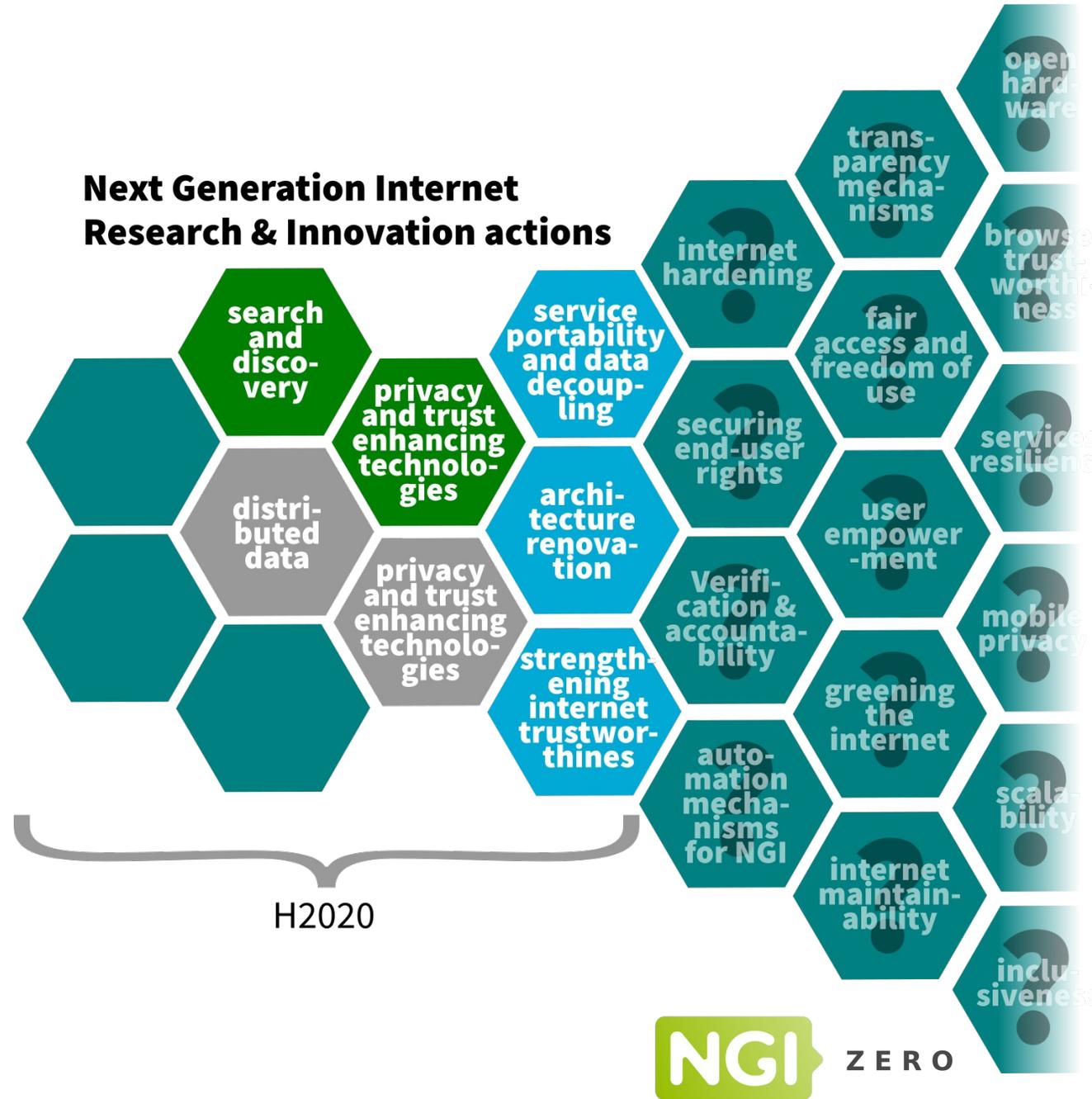






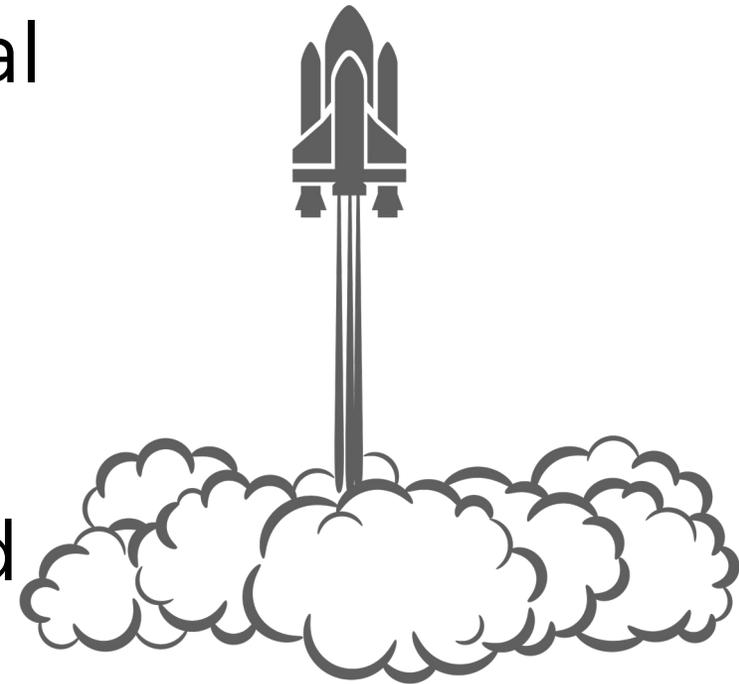
Z E R O

**Next Generation Internet
Research & Innovation actions**



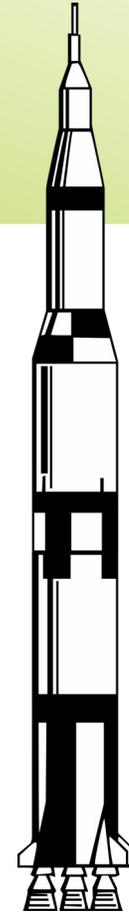
What we wanted to achieve

Design a light-weight and confidential application procedure providing adequate insight into technical capabilities as well as the urgency, relevance and relative cost effectiveness of the projects proposed at a low cost to the **applicants**.



Low barrier to entry

- .. we use a **staged approach** which identifies and amends missing or inadequate aspects of the proposals prior (and conditional) to the start of a project.
- ... and **guide** and **support** projects with essential QA and strategic aspects that require additional expertise



- Make sure every project delivers on **accessibility**
- Make sure projects can be localised c.q. **internationalised**
- Make sure **licensing** is compatible and all legal stuff is in order
- Support with dealing with **standards setting** organisations
- Provide a **responsible disclosure** procedure
- Provide **documentation** for users/developers

Be consistent in requirements and best practices

- **Mentor** with applying best practices in secure software development across all projects
- Make things **deployable** through packaging
- Create a **reproducible build environment** and help design automated tests
- Perform an early stage independent **security scan** of the project plan
- Make software **available** early to allow for 'many eyeballs'
- Independent **security scan** of the actual outcomes

Be consistent in requirements and best practices

- Liaise and mentor projects with interacting with **ecosystem** and **target groups**, e.g. technical and operational community, digital rights organisations, free software community, businesses, consumer organisations, end users
- Manage and support **diversity** and gender bias in the design phase

Be consistent in requirements and best practices



5.6 million euro
in small grants
until 2021

47 active projects
already running

> 90% new to
H2020

Competitive calls every
two months until the
budget is allocated.

Projects between 5k-50k
Follow-up possible

Walk the talk:

Inclusion

Security

Localisation

Open Standards

Free & Open Source

Deliver to deploy



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77 active projects
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Key characteristics



RIPE NCC
RIPE NETWORK COORDINATION CENTRE



W3C[®]



eco

The larger ecosystem

DIGITALEUROPE





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the next generation internet initiative cordially invites you to

work for the internet

Full time and part-time paid and unpaid positions available.

- 👉 Work from home (or anywhere you like)
- 👉 Collaborate with people from all over the world
- 👉 Challenge your talents to the extreme
- 👉 Help save future generations





your donations
make a difference

News

NGI Zero awarded two EC research and innovation actions 2018/12/01

EC publishes study on Next Generation Internet 2025
2018/10/05

Bob Goudriaan successor of Marc

Open call for funding

Deadline for submission: April 1st 2019

[Submit a proposal](#)

Do you have a valuable idea in the area of networking and internet technology, [privacy and trust enhancing technologies](#) or [search and discovery](#)? And are you looking for financial means to make your ideas come to life? Or do you

Calls

Send in your ideas.
Deadline April 1st, 2019.

HELP FUNDRAISING FOR THE
OPEN INTERNET
WITH FIVE MINUTES OF YOUR TIME

Calls are open ...



Next Generation Internet

Alternative infrastructure elements

- Routing layer confidentiality
- Naming system alternatives
- Search and discovery
- Global routing table size
- Distributed trust mechanism
- Confidentiality
- Scalability
- Tamper proof
- Realistic transition mechanism

Safeguarding openness to new entrants

- Unlocking verticals
- Preventing horizontal spillovers
- Improving low-level discovery
- Open spectrum
- 5G standardisation issues

Solving scalability issues

- Numbering
- Need to improve efficiency
- Lack of transparency of environmental cost

"Greening" internet technology

- Solution integration and precompetitive bundling
- Management of high volume of updates/ changes
- Best practises and bundled expertise
- Improving multilingual support
- End-user service deployability

Improving deployability and maintainability

- Disaster
- Cascade of system failure
- Cyber warfare/conflicts
- Industrial espionage
- Industrial sabotage
- Pervasive surveillance
- Malicious big data

Addressing threat categories

- Natural
- Man-made
- 3rd party dependencies
- Lack of isolation
- Programmes exposed by whistle blowers
- Unknown capabilities
- Passive observation

Legislative aspects

- Dealing with negligence w.r.t. maintenance as a threat to the whole ecosystem
- Modernise over-invasive copyright to allow non-commercial sharing
- Right to have insight into big data gathering
- Right to encryption
- Duty to update/mandatory open sourcing at EOL
- Net Neutrality
- Right to be IoT offline (including environment)
- Data retention
- Retain unassigned spectrum for public domain in 5G
- Stricter maintaining of existing laws and regulations protecting users
- Mandatory hard switches for embedded cameras and other devices

Antagonistic (legacy) middleware

- Partitioning/scope isolation
- Redundancy
- Abuse handling
- Asset distribution
- High availability
- Real-time measurement data
- Improve limited upgrade capabilities
- Packet interference
- Traffic loss
- Lack of isolation

Engineering Trustworthiness

- Decentralised internet-wide identity mechanisms
- Distributed reputation mechanism(s)
- Transport layer security
- End to end confidentiality of traffic metadata
- Verifiability of routing paths
- Security transparency

Public Procurement

- Follow best practises w.r.t. overall system impact
- Steer away from monoculture
- Design for robustness and autonomy
- Lead by example

Securing the user environment

- Safe (passive) content profiles
- Declarative interaction
- Strengthen encryption
- Secure software/scripting distribution and updating
- Domain isolation
- Open (user-defined and controlled) security
- Sensor data firewalling
- Security proofs
- Background process transparency
- Open (user-defined and controlled) security
- Browser environment
- Mobile operating systems

- Protecting users during nomadic access (e.g. wifi)
- Contain digital spillover in physical world
- (Hardware) Isolation of cryptographic material



join us and help discover and shape the next generation internet
and claim your spot in human history

Full time and part-time paid and unpaid positions available.

Read all about it on

- 👉 <https://nl.net.nl/discovery>
- 👉 <https://nl.net.nl/PET>
- 👉 <https://ngi.eu>



ZERO



Probably outcomes of other projects are interesting for you...

For instance **Verifpal**, new software for verifying the security of cryptographic protocols. Building upon contemporary research in symbolic formal verification, Verifpal's wants to serve real-world practitioners, students and engineers without sacrificing comprehensive formal verification features.

In order to achieve this, Verifpal introduces a new, intuitive language for modeling protocols that are easy to write and understand. At the same time, Verifpal is able to model protocols under an active attacker with unbounded sessions and fresh values, and supports queries for advanced security properties such as forward secrecy or key compromise impersonation.



Where does **your** idea fit?



Image courtesy of VerifPal

We are searching for awesome projects to fund.

The next deadline is December 1st...

What can you do for the open internet, for the privacy and security of users? What better alternative can you create, or add to?



Questions?



If not, enjoy RIPE 79 and Rotterdam!



NGI Zero project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 825322 and 825310. Visit: <https://NLnet.nl> for more information.