29 NOVEMBER 2024 • *Brussels, Belgium*

CENTR Reply to the Web 4.0 and Virtual Worlds consultation

Replies to the open field questions

What are the key steps that need to be taken to facilitate the transition to Web 4.0 in multi-stakeholder settings?

The multistakeholder approach of internet governance is essential to maintaining a free, open and interoperable internet. To be effective, the multistakeholder approach must have the respect and continued support of all stakeholders involved, including the governments, business and the technical community. The first step is therefore to embrace the multistakeholder approach.

It is very likely that new standards are needed to make Web 4.0 a reality. For this reason, the development of any standards underpinning the Web 4.0 should not be duplicated on a regional basis or through multilateral fora, which could result in divergent legal and technical requirements leading to fragmentation and weakening of the universality of the internet. Standardisation efforts should be supported by providing resources for experts to participate in the established standards-setting organisations. One such standards-setting organisation is the IETF, which is open to all without any formal membership application.

Acknowledging the success of the past and current internet standardisation efforts, these new standards should also be developed as open standards. Thanks to open standards being developed on an inclusive and collaborative groundwork, they also drive interoperability and competition on the market. The adoption and the potential for widespread use of new open standards therefore also favours the evolution of the already-existing technical solutions.

Third, the internet as a network of networks has proven to grow and expand rapidly thanks to the distributed architecture of its underlying technical infrastructure, such as the Domain Name System (DNS). The evolution towards Web 4.0 and Virtual Worlds should therefore continue to build on top of the already existing and internet infrastructure and be fully interoperable with it.

Looking from the user perspective, how could users' rights (e.g. privacy and data protection, universal access, freedom of expression) change or evolve in Web 4.0 and virtual worlds?

Web 4.0 is the expected next generation of the World Wide Web, based on the advanced use of artificial intelligence, the internet of things, virtual worlds, and extended reality capabilities. It is expected that user-experience within Web 4.0 will be more collaborative and interactive, while digital and physical environments will become more intertwined.

However, the ever-increasing merging of the digital and physical lives should not lead to the weakening of data protection standards. On the contrary high data protection standards, including consistent enforcement should be one of the focal points in the Web 4.0 environment. Privacy-enhancing approaches should be encouraged already in the beginning of the product design stage and be developed with privacy by design and privacy by default in mind.

Web 4.0 and Virtual Worlds will also bring about new modes of communication and self-expression. The exact forms are yet to be developed and widely adopted, but it is already clear that as with any other online medium, there will be a need for content moderation and tackling illegal content. It is essential that the removal of this illegal content respects the principles of due process and proportionality, and that the content removal is addressed at the level where it can be dealt with the most effectively while respecting fundamental rights. Because of the potential impact on human rights of content removal at the infrastructure level (such as domain name suspension), each intervention must be respectful of due process, transparency and involve a competent public authority.

Finally, we can expect new forms of online identities. Citizens and businesses alike will need to have access to online identifiers, such as domain names or any other equivalent in the Web 4.0 environment. The user must exercise better control over their identity online, irrespective whether it is a public or commercial service. For this reason, access to online identifiers, including domain names, should not be made needlessly difficult.

Why are the topics of virtual worlds and Web 4.0 governance relevant to you?

The internet has been a resounding success. Building on open standards and protocols has allowed it to grow into the form it is today. A part of the success of the internet also lies with the Top-Level Domains (TLDs), which are responsible for operating and maintaining the essential Domain Name System (DNS). This scalable and secure infrastructure has been at the heart of the ever-growing number of use cases and services offered over the internet. The move towards Web 4.0 and Virtual

Worlds also brings potential challenges to interoperability, transparency and competition compared to the way the internet works in the present day.

CENTR members, the European country code Top-Level Domains (ccTLDs), have as their mission to serve their local internet communities and to contribute to delivering stable, resilient and secure internet at global level. Their mission will remain the same throughout the Web 4.0 and Virtual Worlds development. As such, as one of the key players in the internet ecosystem, the European ccTLDs should be treated by policy makers as partners in the future development of the internet, in the spirit of the multistakeholder approach.

What does Web 4.0 mean for you? What are the key functions, benefits and pitfalls of Web 4.0 that you foresee?

Web 4.0 and Virtual Worlds bring a lot of promises, both from the user's and business perspectives. These expectations include more life-like interaction facilitated by Virtual Worlds, leading to new and creative ways how to learn and collaborate at a distance. Similarly, the development and roll-out of the new 5G and 6G connectivity, enabling faster internet coverage with lower latencies, present new opportunities for the industrial use of Internet of Things.

However, Web 4.0 and Virtual Worlds are not necessarily on a clear path to success. One of the potential pitfalls would be the potential fragmentation of its technical underpinnings. Mandating use of certain standards or basing the Web 4.0 and Virtual Worlds ecosystem on proprietary standards would effectively limit the user choice, and risks creating incompatible platforms where user's ease of access would be limited.

There is also the pitfall of developing conflicting standards and policy-setting institutions, leading to the duplication of efforts, as there are already established policy and standards setting organisations that operate on the multistakeholder setting (such as ICANN or IETF). This inefficient use of resources should be avoided, by promoting better representation of Web 4.0 and Virtual Worlds stakeholders in established standards and policy-making organisations.

Multiple choice questions

On Web 4.0 technologies and internet architecture

Which Web 4.0 **technology clusters are the most critical** to the evolution toward Web 4.0 and virtual worlds? Please select the top 3.

- [ ] AI and natural language processing (NLP)
- [ ] Spatial computing
- [x] Internet of things (IoT) and ambient intelligence
- [ ] Edge, cloud, and fog computing
- [ ] Next generation networks, 5G, and 6G
- [ ] Blockchain and distributed ledger technologies, DAO, and NFT
- [ ] Semantic web (Web 3.0)
- [ ] Brain-computer interface (BCI)
- [ ] Quantum computing
- [ ] Virtual reality (VR) & augmented reality (AR)
- [ ] Multisensory modalities (including haptics)
- [x] Cybersecurity technologies
- [x] Internet protocols and routing strategies
- [ ] Other, please specify

Which of the below are the **most challenging** to achieve in the transition to Web 4.0, given the current internet architecture? Please select up to 5 top challenges.

- [ ] Achieving scalability to handle exponentially growing traffic
- [x] Ensuring interoperability between technologies and platforms
- [ ] Enhancing security and trust
- [x] Strengthening privacy
- [ ] Ensuring sustainable and efficient resource usage in technology development
- [x] Delivering a secure and user-centric online identity framework
- [ ] Achieving data processing capabilities to enable seamless experiences
- [ ] Deploying the latest generation communication protocols and advanced connectivity standards
- [ ] Leveraging distributed technologies to advance application decentralisation
- [ ] Achieving real-time data transmission capabilities for immersive technologies
- [ ] Strengthening network resilience
- [ ] Other, please specify

Please indicate to what extent you agree or disagree with the following statements on the transition to Web 4.0.

	Fully disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Fully agree	No opinion
The TCP/IP stack and its underlying principles should be maintained to ensure continuity and stability	○	○	○	○	X	○
The distributed nature of the internet should be preserved to ensure resilience and performance	○	○	○	○	X	○
New concepts and protocols enabling Web 4.0 should promote openness and neutral access	○	○	○	○	X	○
New concepts and protocols enabling Web 4.0 should promote universal accessibility, including in low-bandwidth conditions	○	○	○	○	X	○
Network management and interactions in the development of Web 4.0 should be transparent	○	○	○	○	X	○
Environmental sustainability should be a core consideration in Web 4.0 infrastructure development	○	○	○	○	○	X
Ease of deployment should be prioritised when introducing new features, such as APIs and protocols	○	○	○	○	○	X
Web 4.0 standards and protocols should be developed through a consensus-driven, inclusive, and multi-stakeholder process	○	○	○	○	X	○
Enter another option	○	○	○	○	○	○

On the governance of virtual worlds and Web 4.0

What foundational values and **principles should underpin the governance** of virtual worlds and Web 4.0? Please select up to 5 principles that you think are most important.

- [x] Transparency and accountability in decision-making
- [x] Inclusivity and representation of all stakeholders
- [x] Protection of privacy, data security, and user rights
- [x] Ethical use of technology and respect for human rights
- [x] Fair competition and prevention of monopolies
- [ ] Global coordination and alignment across jurisdictions
- [ ] Safeguarding users' rights in virtual economies and the monetisation of virtual goods
- [ ] Freedom of expression and protection from harassment
- [ ] Fostering innovation and new business opportunities
- [ ] Other, please specify

As Web 4.0 evolves, how **challenging** do you expect the **following governance and ethical issues** to be in managing virtual worlds and their integration with real-world systems?

	Not challenging at all	Slightly challenging	Moderately challenging	Very challenging	Extremely challenging	No opinion
Privacy and data security risks	○	○	○	○	X	○
Difficulties in integrating digital and physical spaces	○	○	○	○	○	X
Obstacles to ensuring interoperability between platforms	○	○	○	○	X	○
Ethical concerns related to the use of virtual worlds	○	○	○	○	○	X
Ensuring inclusivity and equitable access	○	○	○	○	○	X
Managing digital identity and representation	○	○	○	○	X	○
Intellectual property rights protection	○	○	○	○	○	X
Legal jurisdiction and enforcement	○	○	○	○	○	X
Enter another option	○	○	○	○	○	X

Reflecting on the above challenges, how **suitable are the** current internet governance mechanisms for future virtual worlds and Web 4.0?

- ○ Current mechanisms are adequate to deal with virtual worlds and Web 4.0
- X Current mechanisms are adequate but need to be adjusted to deal with virtual worlds and Web 4.0
- ○ Completely new governance mechanisms are needed to address virtual worlds and Web 4.0

How can stakeholders (users, governments, private sector, technical sector, small businesses, civil society, the public) be **adequately represented** in internet governance processes? Please select up to 5 most important elements.

- [x] Open and inclusive consultation processes for all stakeholders, regardless of expertise or background
- [ ] Capacity-building initiatives to provide underrepresented stakeholders with the necessary skills, resources, and information
- [ ] Enhanced coordination between discussions to prevent overlaps, fragmentation, and siloed efforts
- [x] Transparent mechanisms showing how stakeholder input is incorporated into decisions
- [x] Shared responsibility among all stakeholders for the outcomes of the discussions
- [ ] Recognition of the importance of diverse viewpoints and the value they bring to decision-making
- [ ] Robust conflict resolution mechanisms for addressing disagreements among stakeholders
- [x] Processes governed by the rule of law, upholding human rights, constitutional principles, and legal frameworks
- [ ] Adaptable processes that can respond to changing technological, geopolitical, and emerging issues
- [x] Fair and equitable discussions that address the distinct needs, capacities, and vulnerabilities of all stakeholders
- [ ] Other, please specify

The immersive and interactive features of virtual worlds are among the main drivers of the evolution of the internet towards Web 4.0. Which of the following trends, in your opinion, will have **the biggest impact on the transition of the internet to Web 4.0**? Please select up to 5 top trends.

- ☐ Integration of advanced technologies to enable a seamless and immersive experience
- ☐ Emergence of new digital assets and Web 4.0 business models
- ☐ Increasing power concentration with few dominant players driving the development toward Web 4.0 and virtual worlds
- ☐ Diverging attitudes and trust toward emerging technologies (ranging from enthusiasts to techno-sceptics)
- ☐ Varied approaches to government intervention in virtual worlds and Web 4.0
- ☐ Changing social norms and behaviours with regard to virtual worlds and Web 4.0
- ☐ Rising geopolitical tensions and the emergence of new forms of hybrid and cyber aggression
- ☐ Advancement of blockchain technologies
- ☐ Increasing accessibility and maturity of immersive technologies, such as AR/VR
- ☐ Prevalence of virtual private networks that bypass the public internet
- ☐ Advancements in connectivity (e.g., 5G/6G) driving the adoption of Web 4.0 applications
- ☐ Other, please specify