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## INTERNET TRUST AND CITIZEN EMPOWERMENT: BOTH EU PRIORITIES AND OPPORTUNITIES FOR THE INTERNET INNOVATORS

The digitization process is considered as a one-way road that was quickly developed within the last decades under the development of information technology and the role of the Internet. Over the last few years, this evolution accelerated rapidly, without being able to resolve its long-term vulnerabilities and susceptibilities that mainly concern cybersecurity, cyber-crime and user infringement.

These issues as well as information credibility, validity of information processing and exchanging, personal data protection, copyrights etc. have become an area of interest for Internet innovators in Europe and all over the world. Blockchain technologies can provide further trustworthy safeguard measures: different transactions or actions in general are recorded at a distributed ledger so that everyone can be held accountable for one's actions. A typical example is that of cryptocurrencies, which are digital currencies that facilitate the transactions between partners without the involvement of a trustworthy central entity (bank) and through an integrated and an automated execution of software code in the blockchain network.

The European Union (EU), identifying the seriousness of Internet vulnerabilities/susceptibilities in the future of digitalization, prioritises trust and citizen empowerment highly in its agenda. The EU has already formed its own legal framework concerning the General Data Protection Regulation since 2018. At the same time, continuing in the same process, the EU forms policies as well as strategies in order to overcome its new challenges and in order to defend its interests within an ever-changing world status in the course of digitalization expansion in more and more sectors. Next Generation Internet (NGI) initiative constitutes such a dynamic tool that aims at re-shaping the existing developing network into a human-network. A network that corresponds to the fundamental human needs including the trustworthiness, security and integration, privacy, collaboration and diversity, reflecting also the values and rules that all European citizens should enjoy. Moreover, EU has recognized the significant role of distributed ledger technologies for restructuring current Internet by funding a number of blockchain projects and building a European Blockchain Services Infrastructure (EBSI) since 2018.

ONTOCHAIN project is funded by Next Generation Internet and the EU's Horizon 2020 research and innovation program. Its goal is to enhance and support innovation and

entrepreneurship, in Internet services, in order to develop reliable blockchain-based knowledge-management solutions as part of an ONTOCHAIN software ecosystem. At the same time, ONTOCHAIN project aims to shape an ecosystem that involves scientific and professional communities in building a blockchain platform, enabling business models of future decentralized applications that feature trust and empower users. It uses both the semantic web and the blockchain technology to deliver a new software ecosystem for trusted, traceable, and transparent ontological knowledge management.

Furthermore, it explores and delivers novel interoperable on-chain and off-chain data, ontology, knowledge and information management methods. The ONTOCHAIN software ecosystem basically consists of a novel protocol suite grouped into high-level application protocols and through this, trustworthy information exchange and trustworthy and transactional content handling can be achieved in future decentralized applications. Its end-goal is to develop scalable blockchain, decentralized and semantic web technologies. For this purpose, advanced theoretical and applied research is needed in order to set a multilayer and modular technological framework that will enable performance and scalability through the engagement of different business logics, access methods and governance models while ensuring secure and transparent content, information exchange as well as service interoperability.

“Trustworthy decentralized apps (dApps) bring back the power of data and information to citizens and strengthen a new multi-billion-euro economic sector with a high social impact. ONTOCHAIN platform will provide different libraries and components to future dApp developers for decentralized identities, exchange of verifiable credentials, reputation management, knowledge extraction, privacy-aware data processing, data provenance, copyrights management, and more. The train has already departed, and the EU is aiming to be in its first wagons...” says PI Dr. Thanasis G. Papaioannou from Athens University of Economics & Business (AUEB) and the Services, Technologies and Economics (STecon) lab led by Prof. George D. Stamoulis.

“Today our digital and physical worlds are converging to a point that has a great impact on the citizens themselves, on our society and all sectors of the economy. It is now possible for citizens from all over the world to participate in the generation and use of knowledge like never before thanks to the Internet. However, the Internet cannot assure that bias or systematic abuse of global trust are avoided. Indeed, the way knowledge is actually generated, curated and stored in our digital world does not prevent personal privacy violation and personal data exploitation, unknown provenance of information, aonymity in favor of criminal activities, biases in AI algorithms, spread of fake news, skills mismatches, serious breaches of security... To shape a trustworthy digital future for our Society and to

respond to its current needs, identity, privacy, security and citizen control of their digital life should be the four cardinal points that any new digital technologies/services should embed. The ONTOCHAIN consortium and its network of European innovators are working hand in hand to make it happen for different application domains such as eEducation, eHealth, eGovernment, eCommerce, eTourism, eInfrastructures and so on, contributing to strengthening Europe's digital leadership." says the ONTOCHAIN project coordinator Dr. Caroline Barelle from the research and development department of EUROPEAN DYNAMICS (Athens) led by Mrs. Anastasia Garbi.

## ABOUT ONTOCHAIN

ONTOCHAIN marries the Semantic Web with Blockchain to deliver a novel software ecosystem for trusted, traceable, and transparent ontological knowledge management. ONTOCHAIN, which is developed under the European Commission's Next Generation Internet initiative, explores and delivers novel interoperable on-chain and off-chain data, ontology, knowledge and information management methods.

The ONTOCHAIN software ecosystem consists of a novel protocol/Interfaces suite grouped into high-level application protocols, such as data provenance, reputation models, decentralised oracles, market mechanisms, ontology representation and management, privacy aware and secure data exchange, multi-source identity verification, value sharing and incentives and similar, and core protocols that include smart contracts, authorisation, certification, event gateways, identity management and identification, secure and privacy aware decentralised storage, data semantics and semantic linking, ONTOCHAIN optimisation and similar.

The ONTOCHAIN software ecosystem will demonstrate its potential in high impact domains, such as eHealth, eGovernment, eEducation, eCommerce, decentralised infrastructures and similar in order to achieve trustworthy information exchange and trustworthy and transactional content handling.

The project is operated by 7 partners with complementary expertise that form the core of a vibrant ecosystem: **European Dynamics** (Luxembourg), **University of Ljubljana** (Slovenia), **IntelliSemantic** (Italy), **iExec Blockchain Tech** (France), **Athens University of Economics and Business** (Greece), **German Hellenic Chamber of Commerce and Industry** (Greece) and **F6S** (Ireland).

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## PRESS CONTACT

Email: [ontochain@ngi.eu](mailto:ontochain@ngi.eu)

Website: [ontochain.ngi.eu](http://ontochain.ngi.eu)