CommonsHood: Participatory design of token economies in local communities

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***Abstract*—We introduce a participatory design approach to blockchain-based tokenization for local communities. Blockchain-based systems for the social economy, such as Community Currency Systems (CCS), have different requirements from decentralized finance applications in terms of incentive mechanisms, governance and scale. For this reason, we aim to address the lack of methods and tools enabling social economy stakeholders to represent and transfer tokenized assets. In order to do so, we developed the CommonsHood web application. This is a wallet-app based on the Internet of Values 2.0 concept, whereby each user can easily deploy tokens representing assets and rights based on a no-code approach. We adopted co-design with local stakeholders both in the definition of the concept of the application and in the modeling and design of the specific functionalities supporting token economies of local stakeholders. This work is considered as an essential step towards a comprehensive socio-technical infrastructure facilitating civic engagement in smart cities.**

***Index Terms*—blockchain, token economy, co-design, social good, civic engagement, smart cities**

I. Introduction

Blockchain technologies [1] catalyzed a revolution, referred to as "the Internet of Value", which opened a wide range of possibilities in terms of value transfer and representation. Blockchain facilitates disintermediated transfer of value among parties not necessarily trusting one another. After the launch of Ethereum in 2014 [2], blockchain, Turing-complete smart contracts could easily be developed, deployed and executed on-chain. These facilitated the application of blockchain technology in a wider range of contexts and domains in which transparent and decentralized execution was needed. Diverse blockchain-based applications were recently developed to support *smart cities*. Arbiter DAO [3], for instance, aims to provide an decentralized governance infrastructure for managing cyber-physical systems in a smart city. Still, little attention has been paid in research to systems facilitating citizen engagement through tokenization, which is an essential aspect of *smart cities*. Community Currency Systems leverage blockchain-based tokenization to bootstrap local economies. These also allow to incentivize cooperative behavior and voluntary mobilization of citizens for the collective good. These differ drastically form NFT platforms or cryptocurrency exchanges in terms of incentive mechanisms, governance and scale. Some examples are Sarafu Network [9], Circles UBI [4] and Trustlines [5]. However, none of these is designed to integrate with the cyber-physical layer of a smart city. Moreover, even though these projects share similar aims, each is based on different token economy models that are mostly hard-coded in the system, which limits interoperability and customizability of the system to citizens' needs. Therefore, further research is needed to address the lack of standard methodologies and tools for token economy design and implementation in *smart cities*. In this paper, we illustrate the approach of the Digital Territories and Communities research group to building civic technologies facilitating design and implementation of token economy systems meeting the needs of social economy stakeholders. This is done via the CommonsHood decentralized application (DApp) [6]. Its value proposition is to make tokenization accessible to the general public via a no-code approach. Hence, social economy actors often lacking the knowledge and means to develop DApps from scratch, can bootstrap and interact with token economies representing values specific to their contexts through CommonsHood. CommonsHood also takes into account the social and information dimensions of local communities, key components of *smart cities*. For this reason, it is integrated by virtue of a Rest API with the local *civic social network* FirstLife [7], developed by the University of Turin. This is a civic social network that allows community-based interactions involving georefenced contents. Our approach is based on the concept of Internet of Values (IoVs 2.0). The IoVs 2.0, is defined in analogy with the Web 2.0 revolution that transformed the World Wide Web from an IT tool reserved to programmers to one allowing everyone to produce and publish content online. Internet of Value 1.0 refers to the capability to transfer values instantly without intermediaries through blockchain-based tokens. The Internet of Values 2.0 enables everyone to issue new types of tokens, representing assets of value, and to distribute them with a no-code approach from a web or app interface without any technical knowledge on the blockchain technology.

II. Our approach

Social-economy actors need different incentives and governance models compared to global-scale communities, but no one-fits-all solution can be adopted in these contexts. Therefore, we consider participatory design as key to facilitate

tokenization. This also offers research and experimentation opportunities, as no standard approach to token economy design in local communities exists.

Participatory design is used to assess social economy actors' actual needs. Co-design takes place at two levels: participatory design of the **technological infrastructure** needed by local stakeholders for citizens to engage in tokenization and of the **token economic mechanisms and interaction models** needed in the local context. The first layer co-design has enabled the research group to enrich the CommonsHood platform with functionalities needed by the social economy in different use cases. The second layer is based on facilitating modeling of the token economy, and user engagement with the platform.

III. The CommonsHood wallet app

CommonsHood consists of a general-purpose wallet DApp allowing every user to create and transfer tokens representing tokenized assets. Users can mint and exchange tokens via a web-app interface based on a no-code approach. Moreover, they decide the terms and conditions of the tokens minted in human readable *manifestos*. These features increase the accessibility of tokenization and makes it adaptable the local stakeholders' needs. At the current stage of development, CommonsHood offers three kinds of assets and financial tools: *coins, coupons and crowdsales*. **Coins** are represented by fungible tokens that can be used to model prepaid cards, cashback initiatives, and complementary currencies. **Coupons** are represented by non fungible tokens which can model tickets, discounts and rewards. **Crowdsales** are smart contracts supporting crowdfunding, which is done by issuing cryptographic tokens that are purchased by contributors to finance some initiative. In CommonsHood we use the term as a generalization of the notion of crowdfunding, that takes different meanings, depending on the output token. Users can model group-buying, discount initiatives, tickets buying, prepaid card distribution, and so forth. As soon as a crowdsale collects the requested amount of coins (successful crowdsale), the corresponding smart contract sends to the wallet of each participant the coupon tokens purchased, as specified in the smart contract and in the *manifesto* inserted at the moment of creating the crowdsale. *Liquid crowdfunding* is supported, as subscribers of a crowdsale can update their pledge before the closing time. The smart contracts are deployed on a consortium Ethereum blockchain, whose validator nodes are run by public bodies, including the University. The platform co-design took place in the context of several regional and European pilot projects. Co-design took place in the European projects WeGovNow and Co-City [8] for the implementation of the core functionalities and piloting. In the initial phase, the app was used to build circular economy services to increase the economic sustainability of urban commons that are social and economic hubs in the city of Turin, named *Case del Quartiere* (Houses of the Neighborhood). This was done by integrating different tokenization schemes including prepaid cards financing commons activities, fundraising initiatives, a library of things, purpose-driven tokens to reward volunteering, within the European project CO3. Pilot projects concerning the adoption of CommonsHood to enhance local trade were carried out. In particular, the VisitPiemonte Destination Management Organization promoting tourism in the Piedmont region adopted the app to facilitate the distribution of discount coupons through the website of the organization [8]. In addition, the research group is actively supporting local stakeholders including local municipalities and districts, cultural associations, volunteer associations and social cooperatives in shaping their own token economies through participatory design in the context of diverse ongoing local and European projects. In particular, the NLAB4CIT [1] European project involves a network of Italian, Belgian, and Greek municipalities. In this context novel functionalities of CommonsHood are being implemented and experimented.

IV. Conclusions

We discussed co-design of tokenization systems for local communities and the CommonsHood platform. Unlike existing complementary currency systems, this enables tokenization at multiple levels of system complexity, including smaller scale contexts and exchange patterns, empowering users to shape their token economy. Future research directions include the co-design and experimentation of functionalities to enable deployment of fully fledged Decentralized Autonomous Organizations for local communities.

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