

A Socio-Ecological view of Decentralized Identity

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This purpose of this essay is to attempt to explore ways to understand how digital and decentralized identity will evolve over the coming years, by examining the interplay between the various forces that shape it using a socio-ecological framework.

As our transition to a more digital society continues, what will this look like from the individual's perspective, and to what extent will the individual have any agency in how their digital identity is manifested?

The reason I chose to write this essay is because this is a question that has come up in a number of conversations recently. It is a question I've been trying to think about, and I have found it particularly challenging. Most of what I've written for this essay has been deleted, re-written, and deleted again. I've applied various models to try to understand how the various aspects and concerns of digital identity relate to each other. I began to think that the very concept of digital identity is just too broad, because digital identity is related so closely to individual identity, which itself is an unfathomably complex topic, and made more complex by the fact that identity technology is continually evolving.

If part of the complexity of understanding digital identity is the intrinsic relationship to an individual's identity, then perhaps we need to borrow tools from fields of research in the social sciences that have already explored this subject in depth.

Applying a Socio-ecological Model

Ecological models are derived from systems-theory, which examines how the various discrete elements within a system are related and are interdependent. Socio-ecological models are frameworks for understanding the ever-changing interplay between various individual and environmental factors.

One such socio-ecological model is Bronfenbrenner's Ecological Framework for Human Development [1]. This framework attempts to understand how a person develops in the context of their environment, or rather the entire socio-ecological system to which they belong.

This sounds like the sort of framework that can be used to start structuring the complex topic of digital identity in order to get a sense of what it might look like from an individual's perspective over the coming years.

Bronfenbrenner's model consists of five nested subsystems that each affect an individual's development, and each subsystem influences, and is influenced by, the next nearest inner and outer subsystem. These five subsystems, or levels of influence, are as follows:

- The microsystem

is the subsystem that is closest to the individual. In the original model this would be family and peers, and in terms of digital identity, it would include the individual's interactions with their personal devices and online accounts and/or wallets.

- The mesosystem

is a layer in which we find two or more connections between elements of the microsystem. In digital identity terms, we would consider the connections and relationships between the individual's devices and accounts and wallets.

- The exosystem

contains various structures that affect the individual, but in which the individual does not directly participate. In identity terms, we would consider technology trends or market dynamics that may affect product features or privacy policies.

- The macrosystem

defines the larger political and cultural context in which the individual exists, and structures in this layer have a cascading influence on the relationships between entities and structures on all other layers. In terms of digital identity we would consider the global political and economic systems that shape the development and implementation of decentralized identity technologies, and we might also consider broader societal and cultural norms and values surrounding identity and online behavior.

Using this model, we can begin to develop a framework for understanding what digital and decentralized identity will look like from an individual's perspective as it evolves over the coming years, by examining how the various structures in each subsystem interact with each other and the individual.

Microsystem

The microsystem is the system that is closest to the individual and represents their immediate environment. From an individual's perspective, there are several trends that may emerge that define how a user interacts with both their online environment and their local environment, using their personal devices, wallets and online accounts.

One such possible emerging trend is that we may see increased network effects of the incumbent big tech companies such Google, Apple, Facebook and Microsoft, who will continue to increase their custody of our data, and will accrue more influence over how we manage our digital identity.

Conversely, we may also see an emerging trend towards the adoption of decentralized identity technology, which allows for more privacy, control, and self-custody.

Web2 Wallets

Both Apple and Google have ostensibly started re-appropriating the concept of a "wallet" from web3, and have started slowly pivoting from the Apple Pay and Google Pay solutions, which allow users to make contactless payments, to a more general purpose "wallet" feature, that allows for a wider range of use cases.

[Apple Wallet](#) for example allows users to carry their [driver's licenses and state IDs](#) in several states in the USA, and allows for storing transit tickets, show tickets, flight boarding passes, as well as employee or student ids, vaccination records, and even house and car keys.

This is the vision of an open identity wallet, but without the openness. Apple seem to have eschewed the use of open standards such as Verified Credentials and Decentralized Identifiers, and have instead opted for proprietary protocols, with the exception of support for the ISO-18013-5 mDL [Mobile Driver's License](#) specification for driver's licenses, though this may have been prompted more by certain state's policies than a willingness to embrace open standards.

In an almost identical move, Google has started transforming its Google Pay feature to [Google Wallet](#). It will have largely the same features as Apple Wallet in as far as it functions as a general purpose "credential wallet" for storing tickets, identity documents, membership cards, boarding passes etc. Similar to Apple Wallet, Google Wallet is not built on open standards.

It will be interesting to see if the adoption of these wallet apps by the general public will pave the way for alternatives that are based on open and interoperable standards to come to prominence. It is reasonable to assume that once the concept of a "credential wallet" gains widespread adoption, that there will be a market for alternatives, including potentially web3 wallets, if they can offer at least an approximate level of functionality and convenience, and also find a way to counter the network effects of big tech.

European Identity Wallet

In June of 2021, the European Commission published a proposal for a [European Identity Wallet](#). The proposal states that very large platforms will be required to accept the use of European Digital Identity wallets upon request of the user. According to the proposal:

"Under the new Regulation, Member States will offer citizens and businesses digital wallets that will be able to link their national digital identities with proof of other personal attributes (e.g. driving license, diplomas, bank account)."

This would obviously be a huge boon for [digital identity](#), and decentralized identity. With the availability of mobile enabled identity wallets, and the requirement that "very large platforms" must support the use of these wallets, millions of users will become familiar with the concept of using wallets for managing digital credentials.

This initiative may help to normalize the idea of a "credential wallet" or "identity wallet". This in turn will hopefully drive more adoption of open-source self-custodial web3 wallets, and encourage more issuers to issue wallet-agnostic credentials based on open, interoperable standards.

Web3 Wallets

Web3 wallets are themselves continually evolving and becoming easier to use. Many of the primitives that web3 natives take for granted such as the ubiquitous "secret recovery phrase", or the UX around setting transaction fees, can be hard to grasp concepts for the crypto curious, and this has proven to be a barrier for adoption. A number of wallets designs have appeared that allow for easier onboarding and progressive self custody. Some of these designs include features such as "seedless setup" that rely on the social recovery features of smart contract wallets, or leverage MPC. See [Magic](#) as an example of a wallet that provides easier onboarding. Other wallets go further and abstract away transaction fees entirely for

certain use cases, such as [Unipass](#) for example.

What remains to be seen is whether Web2 wallets and Web3 wallets will ever attain approximate feature parity, or whether they will diverge and remain different applications entirely. Will Web3 wallets begin supporting Verifiable Credentials and other formats such as ISO-18013-5 mDL for example? Will Web2 wallets ever support self-custody of digital assets?

From the individual's perspective

If successful, this European Identity Wallet should pave the way for a huge reduction in cumbersome bureaucracy and should allow users to safely transport their identity across borders. It should see an end to printing out a form, filling it out in black ink, and then seeking notarization from some official, only to bring it to a government department so that they can laboriously type it into some siloed IT system.

If more issuers of credentials decide to support Apple and Google Wallets, it will make everyday interactions within the individual's immediate environment seamless and frictionless. Presenting a ticket for public transport or parking, availing of student or OAP discounts, accessing a gym or borrowing books from a library (both of which require proof of membership), or accruing and spending loyalty points, will be almost invisible processes.

Whether this leads to more surveillance and influence by big tech and governments or more control to the individual depends in part on higher levels of influence.