

Self-Sovereign Identity and Property Rights



An Introduction to Self-Sovereign Identity

Self-sovereign identity (SSI) is a new paradigm for creating digital identity systems that function more like identity does in the physical world, where every person has a unique and persistent identity which is represented to others by means of a collection of credentials. SSI allows people to collect digital “credentials”—pieces of evidence about their identity—attested to by various external sources of authority. Crucially, when “credentials” are issued by third parties, they come with a cryptographic signature that makes them virtually impossible to fake, but easy to verify without contacting the issuer. These credentials are stored and controlled by the identity holder—typically in a digital wallet on their smartphone and/or in the cloud—and can be presented to different people for different purposes at the identity holder’s discretion. The identity holder controls what information to present based on the environment, trust level, and type of interaction. Moreover, even if a user’s credentials change over time, their fundamental identity, once created, cannot be deleted by anyone except the user.

SSI has been used for a variety of purposes including alternative credit scores for financial inclusion, distribution of food aid, and issuing educational credentials.

Here’s an example of how SSI works:

A user, let’s call him Bob, creates a self-sovereign identity on a platform of his choice through a process known as enrollment. To be precise, he is creating a public identifier that he controls via a public/private key pair. Bob’s identity is enriched over time as credentials are added to it by credible third parties. Data input may include basic demographic and contact information, like a full name, phone number, and email address.

Bob wants to open a bank account, and the bank asks for Bob’s proof of address as part of its due diligence process. Bob does not have a formal street address, however he does have a mobile phone. Bob asks his telecom company to issue him a proof of address based on his location history as a signed credential that he can present to the bank (and to whoever else may need it in the future). Bob stores this credential in his digital wallet, along with various other credentials, and the bank can request access to this credential to verify Bob’s address.

In this example, the verifiable credential is provided by a known and trusted entity (the telecom) and stored by Bob in a tamper-resistant location—his digital wallet. Furthermore, because the location credential is cryptographically signed by the issuer, the bank doesn’t need to contact the telecom to verify the information; checking the credential against the telecom’s public key is proof enough.

Why SSI is Important for Property Rights

The most basic application of SSI for property rights is to provide people with identities that they can use to interact with land administration services. 1 billion people around the world lack identity documentation. In the absence of a state-issued identity document, SSI provides a way to build a progressively more trustworthy identity through the accumulation of credentials issued by trusted third parties like NGOs and financial institutions.

SSI can also help people build evidence of their property holding in the absence of formal documentation like a signed survey plan or a notarized will. SSI credentials are extremely flexible and need not be limited to digital versions of traditional paper documents. With the proliferation of smartphones, satellites, and social media platforms, more and more of our daily activities are creating a data trail. This is increasingly true even in the developing world, where access to the internet and smartphones is growing rapidly. Taken together, this new data can be used to create a tapestry of evidence that property holders could use to document their rights. SSI can provide a system for turning data into credentials that administrative agencies can trust. For example, a person could combine their verified location history from their mobile phone provider, transaction history from the power company serving the property, financial transaction records of improvements, and an attestation from an NGO as collective evidence of a property ownership claim.

In addition, a verifiable claim of land ownership issued to an SSI holder could be used to access other services, like banking, credit, and government benefits. A farmer could present a digital title to receive agricultural subsidies, or to apply for a loan. This document would also constitute a permanent record that the property holder's rights were acknowledged by the government agency that issued the credential at a given point in time. If government records were destroyed or the property holder were displaced, that record would still remain.

The Strengths and Limitations of SSI

Similar to other emerging technologies, SSI possesses both strengths and limitations for property rights:

Strengths

SSI combines the flexibility and security of digital identity systems with the best features of paper documents—that they can be stored by the identity subject, are easily portable, and can be used for many different purposes.

It is also built to maximize user privacy and control over personal information, giving users a digital identity that is anonymous where appropriate and allowing them to assert their legal identities when necessary. Identity data is stored by the identity holders on their smartphones or in decentralized cloud storage. This means there is no central repository of identity data under the control of a third party. Moreover, different identifiers can be used for different relationships to prevent observers from being able to piece together

information about the user. For example, an identity holder would use one identifier with the bank, a different one with their phone provider, and a third with the land agency. However, all credentials gathered through these interactions are linked to the user's core identity in such a way that they can be verified when used in new relationships.

Limitations

The largest current drawback is the degree to which SSI depends on access to technology. It is possible for people to be enrolled in cloud-based SSI that they access through devices owned by third parties, but in order to receive the full benefit of SSI users should have their own smartphones. Without regular access to a smartphone, the identity holder will have fewer opportunities to collect and use credentials, especially credentials derived from user data like social networks and location history.

The value of the SSI model also depends upon the number of participants issuing, presenting, and verifying credentials. With respect to property rights there must be buy-in from administrative agencies in accepting credentials gathered through SSI. In order for that ecosystem to emerge, there must be interoperable standards as well as a shared public infrastructure for registering and verifying identities.

Use Cases of SSI for Property Rights

SSI is an emerging technology, and although it has been employed for purposes like distributing food and energy aid, and establishing economic identity for refugees, it has not yet been used for land and property rights. However, there are several promising use cases, including:

Property rights in post-conflict environments: The legal return of property to refugees and internally displaced persons (IDPs) is critical for rebuilding in post-conflict situations. But the process of restitution is complex, as many of the displaced lack important land-related documents and/or fear persecution for asserting their claims. A self-sovereign identity solution could enable these vulnerable individuals to securely store property ownership documents or to receive verifiable credentials from an NGO in order to better record a claim in the absence of a functioning registry.

Natural disaster resilience: As vulnerable communities confront natural disasters, land administration is increasingly recognized as a critical part of the emergency planning and recovery process. In the aftermath of a natural disaster, SSI could provide individuals with more agency and opportunities to assert their property rights. Due to decentralization, a self-sovereign identity solution will be more resistant to infrastructure failure, more accessible to vulnerable populations, and will allow for improved data management. In situations where formal documentation is missing, SSI can allow new evidence of property rights to be used.²⁴ For example, a person's verified location history, derived from their location history, rideshare trips, and package deliveries, could serve as proof of address.