"b_verify" summary of blockchain asset registries. One of the most promising use cases of blockchain technology involves the development of secure digital registries for property title and smart contracts. The paper-based world of trade is about digitize. This presents a time-sensitive opportunity to make that world safer, more transparent, and more inclusive so as to promote shared prosperity. Whereas many companies are seeking government contracts to implement closed systems with proprietary technology, we aim to develop thin protocols that promote public auditability and inclusive systems where companies compete on servicing shared standards rather than become gatekeepers. Our objective is to lay the technical foundation for an open-source public asset registry that could support commodities, accounts receivable, equipment, and/or land, enabling financial tools such as secured loans, factoring, and futures (for small-medium enterprises especially) and ensuring safer, more transparent derivatives markets. We also aim to partner on a real world pilot implementation and evaluation of the protocol we aim to develop.

Problem statement. Research funded by the Inter-American Development Bank estimates over $20 trillion of "dead capital" worldwide, a term coined by Peruvian economist De Soto to describe the lost economic potential of everyday people struggling against dysfunctional property title systems. In wealthy and developing countries alike, legacy systems are failing to serve an increasingly complex and interconnected global economy. Examples: 1) Obscurity in asset-backed securities markets, central to the 2008 crisis, 2) Illegal evictions and property rights abuses by governments such as in Cambodia in 2008, 3) property rights violations by police against the inventory and equipment of microentrepreneurs sparked the Arab Spring revolutions, 4) In 2014, a $10 billion fraud in the Qingdao, China involving the double spending of warehouse receipts for metal awakened the trade finance sector to massive institutional and systemic risk, 5) 2017, Mexico suffered a $64 million fraud involving hedges corn that didn't exist.

Impact hypothesis. Improved digital systems utilizing the unique features of blockchain technology, while remaining true to open-source principles, could help improve the socioeconomic landscape in the following ways: 1) Reducing risks and costs of due diligence and contract enforcement for lenders, 2) Increasing access to affordable credit and other financial instruments, especially for small-medium enterprises (SMEs), 3) Protecting the rights of title holders by providing time-stamped, tamper-proof, publically verifiable records, 4) Contributing to economic stability and food security with real-time data insights into the market, 5) Ensuring transparency and auditability for the proper regulation of business and financial activities, including derivatives markets, 6) In one study of a natural experiment in Argentina, land entitled families increased housing investment, reduced household size, and improved education of their children relative to the control group with a doubling of the completion rate of secondary education.

Landscape analysis and "b_verify" prototype. We have conducted a preliminary analysis including a review of published research and a quantitative survey of lenders, with special attention to warehouse financing, to test our assumptions and identify pain points in current systems. We have also developed a working prototype for a blockchain-based asset registry with Internet-of-Things integration. The prototype, named "b_verify," can facilitate actions including depositing goods with independent verification from an IoT-enabled digital scale, withdrawing goods in the same manner, securing goods as collateral for a loan, and programmatically enforcing loan terms such as title transfer of collateral upon default. The completion of each action is time-stamped to the testnet Bitcoin blockchain, providing an independently verifiable and immutable history of all activity.