

A photograph of children's hands reaching into a cardboard box filled with many colorful crayons. The children are wearing casual clothing, including a striped shirt and a blue denim skirt. The scene is brightly lit, suggesting an indoor play area.

**BLOCKCHANGE**

BLOCKCHAIN TECHNOLOGIES FOR SOCIAL CHANGE

**CASE STUDY:**

**AmPLY - Blockchain and  
Secure Identity for Early  
Childhood Development  
(ECD)**

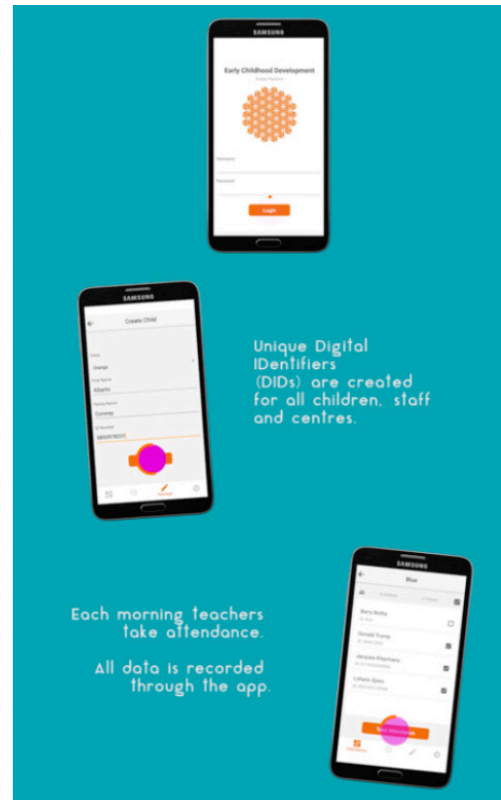
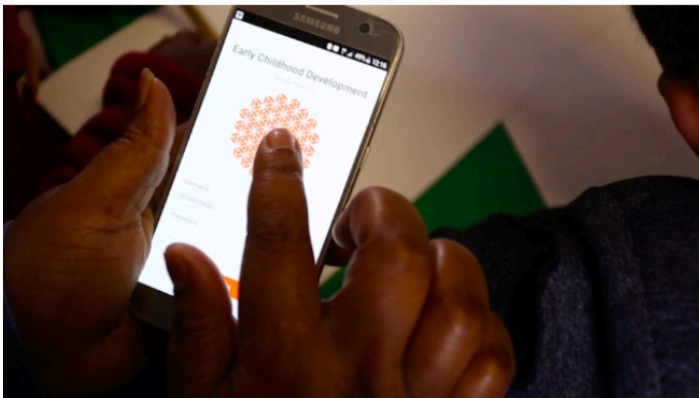
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## PROJECT DESCRIPTION

### Problem Definition



Since the end of Apartheid, South Africa has been supporting integrated, multi-departmental policies and programs to foster childhood development from an early stage. The latest National Development Plan<sup>1</sup> addresses Early Childhood Development (ECD) by focusing on healthcare and nutrition for both mothers and children. In 2015, the government issued a supplementary ECD policy,<sup>2</sup> which further spells out the steps needed to ensure the well-being of children, such as food and nutritional support, early learning support and services, and play and recreational facilities, among others. ECD includes the delivery of multiple services ranging from early school enrollment to housing subsidies. At least six South African government departments are involved in the process, and coordinating their activities is sometimes a challenge. They include: social development, education, health, home affairs (birth registrations), human settlements (housing subsidies), and energy and water.

Excluding health, most ECD services are provided by centers run by for-profit business, community-based organizations or large non-governmental organizations. However, in most communities, services are provided on a home basis as ECD centers have not been deployed. This is certainly the case for the poorest communities that cannot afford to pay the fees centers charge for their services.<sup>3</sup> The lack of proper ECD services funded by the government has created asymmetries in progress toward the goal of achieving the universal provision of ECD services to all children under the age of 6 in the country. South Africa has over twenty thousand ECD centers in the country covering around 800 thousand children. Out of 6.4 million children under age 6 in the country, 54% live below the poverty line.<sup>4</sup>

Children attending ECD centers receive a subsidy from the government if their family income is below a certain threshold. By the end of 2015, close to 700,000 children were benefiting from this subsidy.<sup>5</sup> In 2016-17, the combined allocations for ECD across the nine provinces amounted to R2,285 million (approx. 162 million USD). However, the ECD fund has been allocated only in just over a quarter of qualified households, further exacerbating asymmetries in the way the ECD program is operated and its benefits shared.<sup>6</sup>

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## Blockchain Use

Launched in 2015, Amply is implemented in a subset of ECD centers in South Africa with the goal of registering children's school attendance. Thus far, the project has focused its efforts on supporting ECD centers by allowing teachers to collect attendance data in a verifiable claim format, which is tokenized as a digital asset and may be exchanged for government subsidy grant funding.

The approach used by Amply seeks to address the inefficiency of the traditional subsidy claim system. Amply developed a mobile Dapp (Decentralized Application) in which teachers can immediately collect and aggregate student attendance records for quarterly submissions. Each ECD staff member has a unique identification that allows them to access and submit attendance through the app. An ID is generated for each student within the app, so that teachers can record attendance. Streamlining how identities are allocated and managed is thus central to the success of this particular blockchain intervention.

Attendance data is captured every morning by ECD teachers and submitted as an "impact claim" with its own digital signature. The impact claim is then hashed and stored in the blockchain.<sup>7</sup> The impact claim is verified by an evaluator. Once approved, the blockchain releases a token through a smart contract to the respective ECD center, which can use it to obtain more government funding and/or additional subsidies in the future. ECD centers can also opt to get a paper-based certification instead of a token but this opens the door to potential fraud. In practice, Amply confirms most ECD centers are using the paper option as local government entities are not ready to accept digital transactions.<sup>8</sup>

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## Blockchain Value Proposition

The value Amply intends to provide teachers involves the operational processes of tracking student attendance at the administration stage, and the ability to monitor attendance trends over time at the auditing stage. Not surprisingly, most of the benefits highlighted by the project are efficiency related, ranging from lower operational and management costs to simpler reporting and monitoring of ECD center activities.<sup>9</sup>

More specifically, Amply allows for a more time- and resource-efficient subsidy claims to be submitted by ECD centers. Attendance records generated through the Dapp are immediately captured and automatically aggregated in preparation for submission at the end of the quarter. It also serves as a proof of work and allows the government agency to expedite the subsidy disbursement to the ECD center – assuming that the agency is amenable to participating in the endeavor.

The ixo Foundation – Amply’s creator and an open-source blockchain for public impact organization – claims that as of the end of 2017, 72 ECD centers

have used the platform. According to ixo representatives, early insights engender optimism regarding Amply’s ability to achieve its goals of improving the ECD system. However, the lack of endorsement from some public institutions that are essential to the optimal functioning of the process, likely means that any efficiency gains will be limited as subsidies must still be claimed using the slower, traditional process.<sup>10</sup>

Even though some of the project’s more ambitious goals are being held back by a lack of engagement from important institutional partners, Amply is managing to create benefits from the digitalization of attendance records. Moving from a paper-based system to a digital one has the potential to create real efficiency gains related to time and cost savings, with the administrative burden of processing and managing paper records alleviated. In principle, teachers and NGOs in particular could see benefits from such administrative streamlining.

## PROJECT ANALYSIS

### Risks and Challenges

The Amply system only stores hashes of digital IDs on the blockchain, with no personal information made visible. This, combined with blockchain's in-built cryptography, means that there are strong in-built privacy protections. Still, there is always some level of risk when collecting and storing personally identifiable information, and the sensitivities are more acute when the information concerns young children. As it stands, there is no clear risk mitigation strategy for avoiding unauthorized access or breach of personally identifiable data. That said, any risk associated with holding data is not unique to blockchain projects, and, in fact, blockchain is likely a more secure approach compared to legacy database systems.

Beyond general risks to student privacy, Amply faces a number of challenges that could affect its ability to scale and create positive impact:

- **Problem Definition**  
Amply's initial implementation, focusing on ECD attendance, might not be conducive to its long-term goal of providing a fully self-sovereign identity usable across domains. Birth registration, for example, is also part of the ECD portfolio and could represent a more promising starting point. Given that 17% of children are not registered at birth in the country, there is a clear need for new solutions in this domain.
- **Public-Sector Engagement**  
While local public entities have been involved in the process, no real institutional partnership is in place. As a result, entities involved in furnishing ECD subsidies have not adopted the technology, and nor do they seem to have any plans to do so in the near future. This poses a serious challenge to effective scaling of the project.
- **Student and Teacher Use**  
While centers, children, and staff are issued blockchain-based IDs to record their attendance, not all of them use such IDs. Staff recording their attendance must log in using the mobile Dapp, but some still fail to do so, despite training. And children, who represent the main subject of the project, are not required to log their attendance at all. In this light, the systematic use of secure blockchain-based identities, while promising, seems limited at this point.
- **Readiness and Capacity**  
Access to smartphones, adequate connectivity and financial support are also required for Amply to function as intended. Additionally, the relative lack of local blockchain expertise creates challenges related to human capacity.

## Next Steps and Opportunities for Scaling

ixio launched a second phase of the pilot in April 2018. This phase will focus on 5 ECD centers, with the goal of fully operationalizing the use of blockchain across the entire ECD subsidy claim system. This will provide for a broader testbed for identifying and addressing challenges.

Beyond these immediate plans, scaling the project appears feasible as the process for onboarding new centers is not particularly cumbersome. Future scaling, however, largely depends on the internal capacity of ECD centers to adopt and adapt the new technologies into their current processes. In other words, capacity challenges in ECD centers across the country simultaneously augur well for future scaling efforts, given the need for more efficient administrative processes, but also could make implementation a challenge.

**Moving from a paper-based system to a digital one has the potential to create real efficiency gains related to time and cost savings, with the administrative burden of processing and managing paper records alleviated. In principle, teachers in particular could see benefits from such administrative streamlining.**

## ENDNOTES

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