EMURGO AFRICA

Effect of Digital ID and Role of Decentralized ID (DID) in Africa

EMURGO Africa 2023 Q3 Report

Table of Contents

Credit

Published by EMURGO Africa
Website: https://www.emurgo.africa
Blog: https://www.blog.emurgo.africa
Twitter: https://twitter.com/EmurgoAfrica

Published Date: October 23, 2023

Authors:
Mayuko Kondo, Ph.D.
Tech Scientist at EMURGO Africa
Email: mayuko@emurgo.africa
LinkedIn: https://www.linkedin.com/in/mayuko-kondo/

Nwosu Munachimso Valerie
Research Associate at EMURGO Africa
Email: nwosumuna16@gmail.com
LinkedIn: https://www.linkedin.com/in/muna-nwosu-840422219/

Designer:
Muhammad Mohsen
Graphic Designer at EMURGO Africa
Email: muhammad.mohsen@emurgo.africa
Linkedin: https://www.linkedin.com/in/muhammadmohsen/

Download the full report online:
https://www.blog.emurgo.africa/emurgo-africa-2023-q3-report

Ch.1 Executive Summary

In this EMURGO Africa 2023 Q3 Report, we explore the effects of digital ID and the critical role of decentralized ID (DID) solutions in Africa.

Chapter 2 outlines the transformative effects of Digital IDs, enabling participation in various aspects of life, from financial inclusion to streamlined government services. We emphasize the need for careful implementation, prioritizing security, privacy, and inclusivity. This section also highlights Digital ID initiatives by African governments, supported by international programs like the World Bank's ID4D initiative. We provide an overview of these initiatives in countries such as Benin, Ethiopia, Ghana, Kenya, Malawi, Mozambique, Nigeria, and Uganda.

Chapter 3 introduces the concept of Decentralized ID (DID) and its three identity models: centralized, federated, and self-sovereign identity (SSI). We offer examples, mechanisms, and pros and cons of each model. Additionally, we delve into SSI models, demonstrating their practical use cases and components of trust diamond; verifiable credentials, holders, issuers, and verifiers of each use case. This section provides a comprehensive understanding of DID models.

Chapter 4 examines key players in the Digital ID landscape in Africa. We spotlight major telecom companies like MTN, Safaricom, Orange, Vodacom, and Airtel, emphasizing their roles in facilitating digital identity through mobile services. We also introduce African startup companies employing emerging technologies to create secure and inclusive digital ID solutions. International organizations and NPOs also play a vital role in bridging technology adoption and social inclusion.

In Chapter 5, we present updates from EMURGO Africa, showcasing our latest news for Q3 2023, our Reports & Newsletter, along with our portfolio companies.

A column sheds light on the global digital identity and currency project, Worldcoin. It is very insightful to know its ambitious aim to revolutionize the global identity and financial system and what happened in Africa.

Additionally, two interviews are featured: one with David Harding, General Manager of Atala PRISM at IOHK, and another with Lohan Spies, Founder and CEO of DIDx. These discussions explore the potential and applications of DID in various domains, emphasizing its empowering impact in low-income countries.

Ch.2 Effect of Digital ID and Digital ID Initiatives by Country

2.1 Effects of Digital ID Implementation

Advances in ID technology have revolutionized identification. Today, people can be uniquely recognized by biometrics such as fingerprints, facial recognition, and iris scans. Such technologies enable more individuals to obtain official IDs and thereby empower them to participate in economic, social, and political activities[1].

In terms of financial inclusion, digital IDs enable individuals to access bank and mobile money accounts, accumulate credit, and actively participate in the formal economy. The recording of an individual's credit history also enables access to loans and other important financial resources, including insurance.

In addition, digital IDs streamline essential services such as government subsidies, health care, and education. In the area of health care, it is possible to track health records, immunization histories, and overall health status linked to IDs. Regarding education, comprehensive monitoring of student learning, attendance, and grades is possible. In addition, it facilitates verification of academic credentials and simplifies access to educational opportunities, thereby increasing employability.

Digital ID systems are also excellent in ensuring efficient and transparent aid and relief distribution, especially during crises such as natural disasters and pandemics. They minimize the risk of resource misallocation while reducing the potential for fraud and improving the overall quality of service delivery. More to the point, digital ID systems provide comprehensive data that can be leveraged to fine-tune intervention strategies and target critical areas in need of assistance.

Finally, these identification systems help promote civic participation, as exemplified by biometric voter registration. Promoting citizen participation strengthens transparent and accountable governance and democratic processes in all communities.

These economic, social, and political values of digital IDs makes digital IDs a crucial policy imperative for low income countries and their partners. Overall, it is estimated that widespread use of digital finance could boost the annual GDP of all emerging

economies by $3.7 trillion by 2025, a 6% increase over the status quo[2]. Indeed, Goal 16.9 of the Sustainable Development Goals (SDGs) also aims to provide "legal ID for all" by 2030 (for the list of SDG goals, targets, and indicators, click here)[3].

Figure 1. Sustainable Development Goals (SDGs)

Source: Sustainable Development Goals | UN

Figure 2. Identification and SDGs

Source: "Identification Revolution" by Center for Global Development (CGD)

Note: You can find the list of goals, targets, and indicators of SDGs from here.

Implementing digital ID systems requires careful consideration, with a primary emphasis on security, privacy, and inclusivity. It is essential to ensure that all segments of the population, including marginalized and vulnerable groups, have access to and can benefit from these systems, both in government and the private sector[4]. Strong data protection measures are crucial for safeguarding individuals' personal information. When thoughtfully deployed, digital IDs can serve as powerful tools for driving positive change and enhancing the lives of people in low-income countries[4].

References of Chapter 2.1:

(1) Identification Revolution: Can Digital ID Be Harnessed for Development? | CGD
(2) "Digital identification: A key to inclusive growth" by Mckinsey Global Institute
(3) Goals, targets, and indicators of the SDGs | The Danish Institute for Human Rights
(4) Can digital IDs transform service delivery in sub-Saharan Africa? | JPAL

2.2 Digital ID Initiatives by Country

Governments in Africa play vital roles in spearheading the expansion of digital ID adoption across the continent with the support from international initiatives such as World Bank's Identification for Development Initiative (ID4D). They take charge of extensive ID registration, ensuring that citizens can readily access official digital identities. While we've seen notable progress in this regard, there's still work to be done, especially when it comes to establishing a comprehensive legal and institutional framework for digital ID, including robust data protection measures.

Benin

In 2019, the Benin government has prioritized improving digital ID access and introduced biometric cards through the RAVIP (Recensement Administratif à Vocation d'Identification de la Population) campaign[1]. The eID system has 4 phases: (1)preparation, (2)database building, (3)data updates, and (4)monetization. The

RAVIP focused on phases (1)-(3)[2]. By the end of 2019, around 350,000 biometric ID cards were procured for distribution to underserved areas[3].
In 2020, Benin joined the World Bank's West Africa Unique Identification for Regional Integration and Inclusion (WURI) program[4], which aims to connect civil registration with human development and financial services, ultimately achieving Phase (4) of the eID system[5]. In March 2020, they introduced a standard platform for over 300 e-services that uses citizens' personal identification numbers for authentication[6].

At the same time, in 2019, the Smart Africa Digital Identity initiative began as part of the broader Smart Africa Initiative launched in 2013 to provide digital IDs to previously excluded people across Africa and create a single digital market[7]. The initiative introduced a continental concept called Smart Africa Trust Alliance (SATA) for digital identity[7].

Benin, along with Rwanda and Tunisia, was selected in mid-2020 to host a pilot for the SATA digital ID project[1]. The project includes applications like cross-border mobile money, remittances, handicraft sales, and health insurance and/or test certificates for travelers[6].

References:

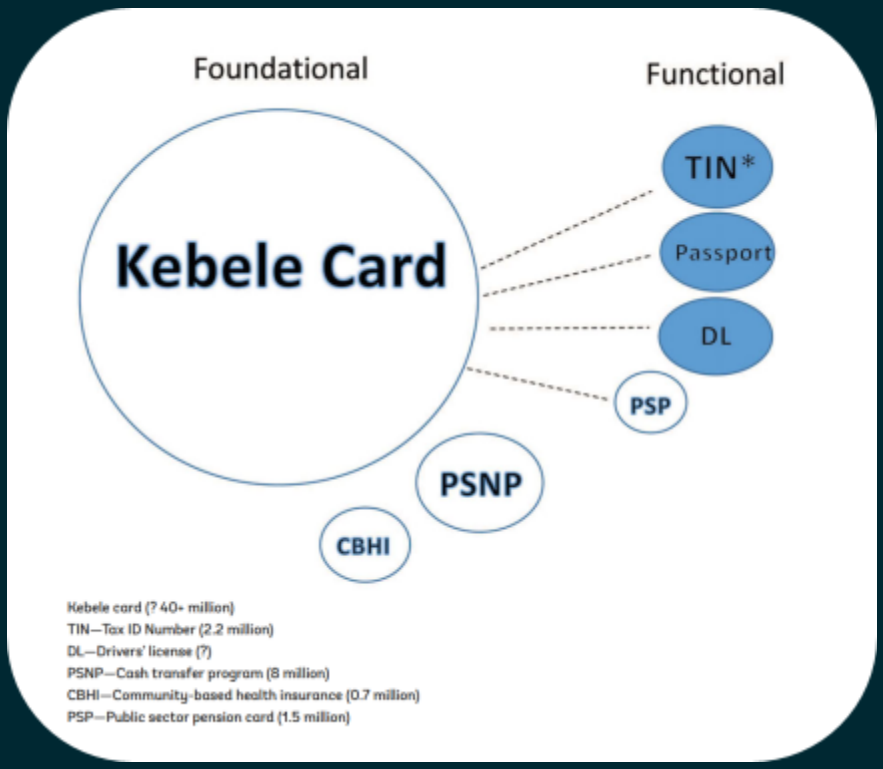
(1) "Reimagining identity ecosystems in Sub-Saharan Africa with mobile The case of Benin, Ghana, Kenya and Uganda" by GMSA
(2) "The Benen Recipe and Challenges for Electronic and Biometric Identification Data Capture" by Agence pour le Développement du Numérique (ADN)
(3) Digital ID in Africa this week: biometric bank cards, birth registration doubles and ePassport problems | Biometric Update
(4) Togo, Benin, Burkina Faso and Niger Join West Africa Regional Identification Program to Help Millions of People Access Services | World Bank
(5) West Africa - Unique Identification for Regional Integration and Inclusion - Phase 2 | World Bank
(6) "BLUEPRINT-SMART-AFRICA-ALLIANCE---DIGITAL-IDENTITY" by Smart Africa
(7) Smart Africa to hire Project Manager for Digital Identity initiative | Biometric Update

Ethiopia

In 2022, National Identity Programme (NDIP) initiated the enrollment process for the Fayda ID, a digital identification system in Ethiopia. NDIP was preparing to issue over 10 million digital IDs to citizens in the 2022/2023 fiscal year[1]. By August 2022, they completed a use-case pilot phase of their project, enrolling over 100,000 people, and started focusing on scaling up operations[1]. By October 2023, over 1.4 million Ethiopians had registered for the Fayda ID[2].

Before Fayda, Ethiopia had a paper-based ID system where the foundational ID was issued by local administrative units called Kebeles[3]. Over 16,400 Kebeles provided this ID after confirming a person's residence in that area. The Kebele ID mainly shows where someone lives and is widely accepted, with around 90% to 95% of adults using it[2]. People often use this card alongside other IDs like driver's licenses and passports to prove their identity[3].

Figure 3. Kebele ID as Foundational ID and Associated Functional IDs in Ethiopia



Source: "ID4D Country Diagnostic Ethiopia" by World Bank

Starting in July 2023, Ethiopia made Fayda ID, mandatory for financial transactions, promoting financial inclusion and improving security[4]. Additionally, Fayda ID is being integrated into healthcare for patient registry and health records[5]. It's also the official student ID in educational institutions, streamlining administrative processes[6]. Pilot

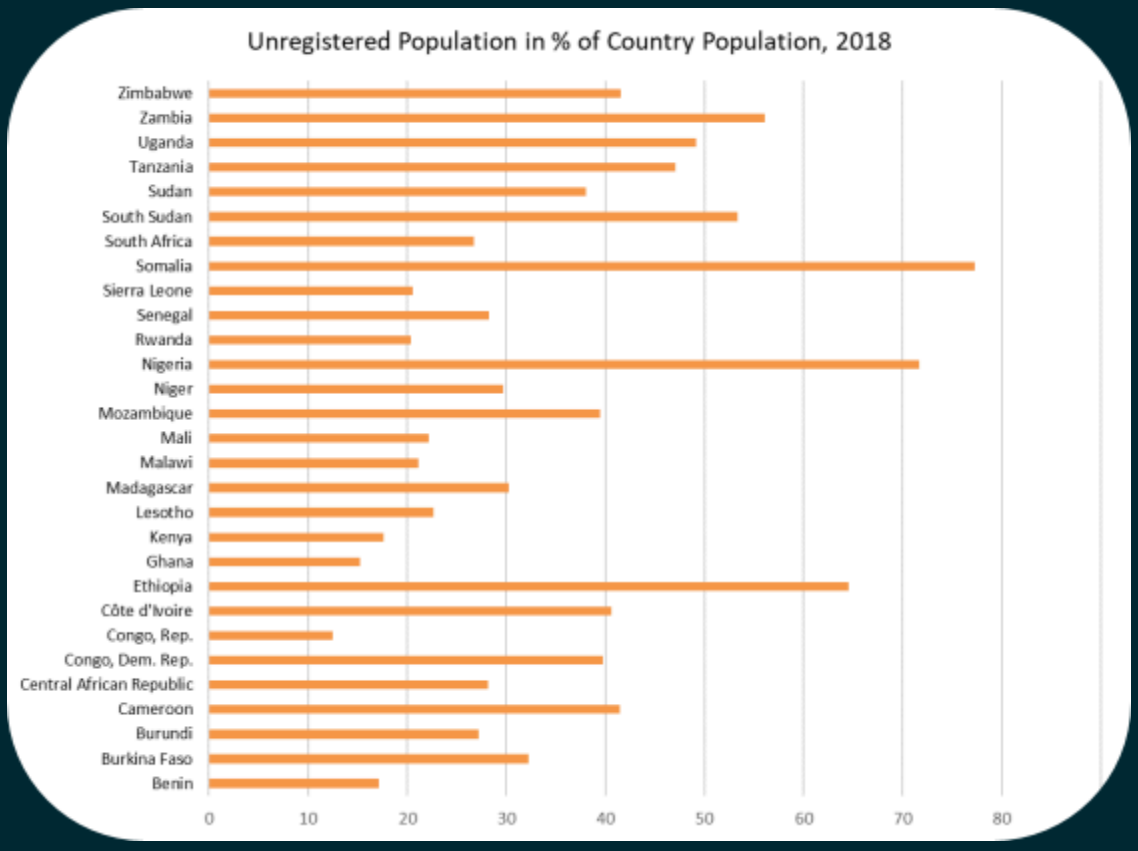
projects have already registered post-secondary students. The release states that "around 640,000 students' biometric data was migrated into the National ID Program's system for Fayda ID generation"[6].

Furthermore, Fayda will become the primary ID for civil servants, enhancing transparency and efficiency while curbing corruption[7]. Ethiopia aims to issue 75 million digital IDs by 2025[1].

References:

(1) Ethiopia plans upgrades to meet 10M digital IDs target by 2023, draft law approved | Biometric Update
(2) Ethiopia's Digital ID Rollout | Abren
(3) "ID4D Country Diagnostic Ethiopia" by World Bank
(4) Ethiopia to make digital ID obligatory for banking operations | Biometric Update
(5) Ethiopian government agencies partner on digital ID for health sector | Biometric Update
(6) Ethiopia rolls out student IDs, integrates biometric data to issue Fayda | Biometric Update
(7) Ethiopia makes Fayda the main credential for civil servants | Biometric Update

Figure 4. Unregistered Population in % of Country Population, 2018



Source: Identification for Development (ID4D) Global Dataset | World Bank

Ghana

Until 2017, Ghana had six separate biometric databases, including national ID, health insurance, passports, driver's licenses, immigration, and voter rolls[1]. In 2017, the government started a project to centralize these databases by overhauling the Ghana Card.

The new Ghana Card aims to enhance the credibility of private borrowers and reduce interest rates, with potential use as a primary registration document and a central data repository for personal credentials[2]. It may become mandatory for government and private services like passport applications, bank account openings, property registration, and education certificates[2].

In August 2023, all babies born in Ghana started receiving a Ghana Card number for life and a Birth Certificate Identification number[3]. The Ghana Card is increasingly being used as the single proof of ID among Ghanaians, although the problem of uncollected cards remains rife[4]. There has also been a move by the Ghana Election Commission to make it the sole ID for voter registration[5].

References:

(1) "Identity management and citizen scoring in Ghana Rwanda Tunisia Uganda Zimbabwe and China" by AlgorithmWatch
(2) "Reimagining identity ecosystems in Sub-Saharan Africa with mobile The case of Benin, Ghana, Kenya and Uganda" by GSMA
(3) Ghana to begin issuing digital IDs to newborns from August | Biometric Update
(4) National ID cards launched in DRC, remain uncollected in Ghana | Biometric Update
(5) EC presses on with plan to make Ghana Card lone ID for voter registration | Biometric Update

Kenya

In early 2019, Kenya began registering people for the National Integrated Identity Management System (NIIMS) or Huduma Namba. The project's goal was to create a single digital ID for easier access to public services[1]. As of May 2019, nearly 31 million Kenyans had already had their fingerprints scanned for this new biometric system[2]. In May 2019, the World Bank approved $750 million to support Kenya's inclusive growth reforms, including the digital ID strategy, with the goal of improving government service delivery[3].

However, challenges such as travel distances, poor network coverage, and legal concerns emerged. To address data protection issues, the Data Protection Act was passed in late 2019[3]. In January 2020, the High Court ruled in favor of NIIMS but called for a regulatory framework for data collection[3].

Source: Tweet on X

In August 2023, Kenya partnered with the United Nations Development Program (UNDP) to create an advanced digital identity system with iris, facial, and fingerprint biometrics, designed to improve access to online services, comply with international travel standards, and drive development[4]. This system comprises four parts: Maisha Namba (a unique personal number), Maisha Card (a third-gen ID), Digital ID (for online authentication), and the National Master Population Register (combining existing data)[4].

While planning to unveil it in early October, the Principal Secretary for Immigration and Citizen Services, Julius Bitok, announced that unforeseen issues led to a postponement in October 2023[5]. Public engagement and stakeholder discussions continue, building on lessons from the Huduma Namba project[5].

References:

(1) Govt Spokesman urges Huduma Namba registration ahead of deadline | Capital News
(2) Huduma Namba for all: 31 Million Kenyans reported to have been registered so far | KTN News
(3) "Reimagining identity ecosystems in Sub-Saharan Africa with mobile The case of Benin, Ghana, Kenya and Uganda" by GSMA
(4) Kenya to partner with UNDP in creation of digital ID | Citizen Digital
(5) Kenya delays new digital ID launch due to 'unfavorable circumstances' | Biometric Update

Malawi

In May 2017, the Malawi government, with support from UNDP, UK Aid, Irish Aid, USAID, the European Union, and the Government of Norway, aimed to provide legal identification to over 9 million citizens for them to access their rights. By November 2017, all 9 million citizens received national IDs or passports, achieving a 100% coverage[1]. A 2018 census revealed that nearly 97% of rural adults had legal identification[1].

In October 2022, the government pushed to register 8.4 million children below the age of 16 by the end of 2023[2]. During the pilot phase, which was completed in

November 2022, in various regions, over 600,000 children below the age of 16 were registered[3]. The National Registration Bureau (NRB) in Malawi rolled out the second phase of mass child registration between April and May 2023[3]. This registration exercise is expected to promote child protection issues in the country.

In July 2023, UNDP and the Government of Malawi started collaborating on a project for inclusive digital transformation, which leverages UNDP's national expertise and the forthcoming digital ID system to drive social change at scale[4]. It has 3 core areas: Inclusive Digital Infrastructure, Strengthening Digital Governance, and Bridging the Digital Divide[4]. The ultimate goal is to stimulate innovation, create jobs, and promote social inclusion through a more inclusive and equitable digital economy[4].

References:

(1) Malawi's foundational legal identity system sets the stage for a more efficient and responsible digital future | UNDP
(2) As Malawi issues IDs for children, privacy concerns rise | Reuters
(3) Mass Child Registration Second Phase to Commence April- NRB | Zodiak Malawi
(4) Digital Transformation for Sustainable Development: UNDP Validates Initiative to Promote Inclusive Digital Transformation in Malawi | UNDP

Mozambique

Mozambique is working towards establishing a foundational digital identity system, although it lacks comprehensive legislation for personal data protection[1]. In 2010, the Unique Citizen Identification Number (NUIC) was introduced. Key institutions like National e-Government Institute (INAGE), National ICT Institute (INTIC), Directorate of Civil Identity (DIC), and National Immigration Service (SENAMI) are involved in different aspects of the digital ID system[1].

In 2018, the Electronic System for Civil Registration and Vital Statistics (e-SIRCEV) was established and launched in 2019. It focuses on collecting vital data like births, marriages, divorces, and deaths, aiming to establish a comprehensive database enabling efficient data collection for statistical purposes and seamless integration

with other government systems by assigning NUIC at birth[1]. By 2021, it had been implemented in 121 out of 164 registries[1].

In 2021, the World Bank granted approval for a $150 million fund from the International Development Association (IDA) to support Mozambique's Digital Governance and Economy Project (EDGE)[2]. In 2022, civil registration and ID card issuance campaign supported by World Bank's ID4D provided legal identity to around 21,000 Internally Displaced Persons (IDPs)[3]. ID cards and birth certificates were issued simultaneously and enabled IDPs to access formal employment, training, education, and healthcare[3].

References:

(1) "Digital Identity in Mozambique" by Research ICT Africa
(2) World Bank Supports Mozambique's Efforts towards Access to Identification and Digital Transformation | World Bank
(3) World Bank is helping the displaced in Mozambique get IDs, birth certificates | Biometric Update

Photo: Dhow, Inhambane, Mozambique by Pixabay by Canva

Nigeria

In 2007, Nigeria established the National Identity Management Commission (NIMC) to manage the National Identity Database, issue Unique National Identification Numbers (NINs), and General Multi-Purpose Cards (GMPCs) for citizens and legal residents[1]. The goal was to create a unified national identification system for government purposes.

NIMC faced challenges, including a scandal with MasterCard in 2014, leading to legal actions in 2019[2]. By 2017, 10 years after NIMC's creation, only 20 million Nigerians (about 10% of the population) were in the digital identity database[3]. In 2019, the Commission claimed that it needed 10,000 registration centers but only had 1,000[3].

The current NIMC effort, supported by the World Bank in 2020 through the ID4D initiative, aims to integrate various ID systems, promote gender inclusion, and strengthen the legal framework[4]. Despite existing data collected by multiple agencies, the new system involves mandatory registration at designated centers, assigning NIN[5]. An eID card linked to the NIN is issued for various applications like payments, security, e-SIM, and more[5].

Photo: Students in Nigeria by Pexel by Canva

In 2020, NIMC released a mobile app for generating NIN, but it was insecure and raised privacy and security concerns[2]. The lack of high-level technology impact assessment poses risks to citizens' privacy and rights[2]. By September 2022, Nigeria has registered nearly 90 million citizens for NIN, with plans to enroll 148 million by 2024[6]. They faced capacity challenges but have been partnering with traditional institutions to reach rural areas[6].

References:

(1) National Identity Management Commission Website
(2) Eke, Damian, et al. "Nigeria's Digital Identification (ID) Management Program: Ethical, Legal and Socio-Cultural concerns." Journal of Responsible Technology 11 (2022): 100039
(3) Ecosystem Approach to Digital Identification Enrolment in Nigeria | CIPESA
(4) Development Projects : Nigeria Digital Identification for Development Project | World Bank
(5) "NIGERIA DIGITAL IDENTIFICATION FOR DEVELOPMENT (ID4D) PROJECT SHEET" by World Bank
(6) Nigeria reaches 90M digital ID registrations as database capacity issue looms | Biometric Update

Uganda

In 2014, Uganda launched the national ID program under the National Security Information System (NSIS) project, which later became a permanent foundational digital ID system[1]. The Registration of Persons Act (ROPA) of 2015 established the National Identification and Registration Authority (NIRA) responsible for civil registration and national IDs[1]. In 2017, the National Identity Number (NIN) started to be used across institutions[2].

To improve efficiency and boost birth registration, NIRA has opened offices and mobile units across Uganda, partially funded by the World Bank's Reproductive Maternal and Child Health Services Improvement Project (URMCHP)[3]. The "My Country, My Identity" campaign in 2014-2016 registered millions of voters and residents for National Identity Cards[3]. However, it was reported that at least 2.4 million Ugandans (about 6% of the population) aged 16 and above had not enrolled for national identity cards until 2019[4].

In 2019, NIRA issued free national ID cards to all citizens. Additionally, Uganda's government is verifying the identities of refugees through biometrics with support from UNHCR[5] and the World Food Programme (WFP) to enhance humanitarian efforts.

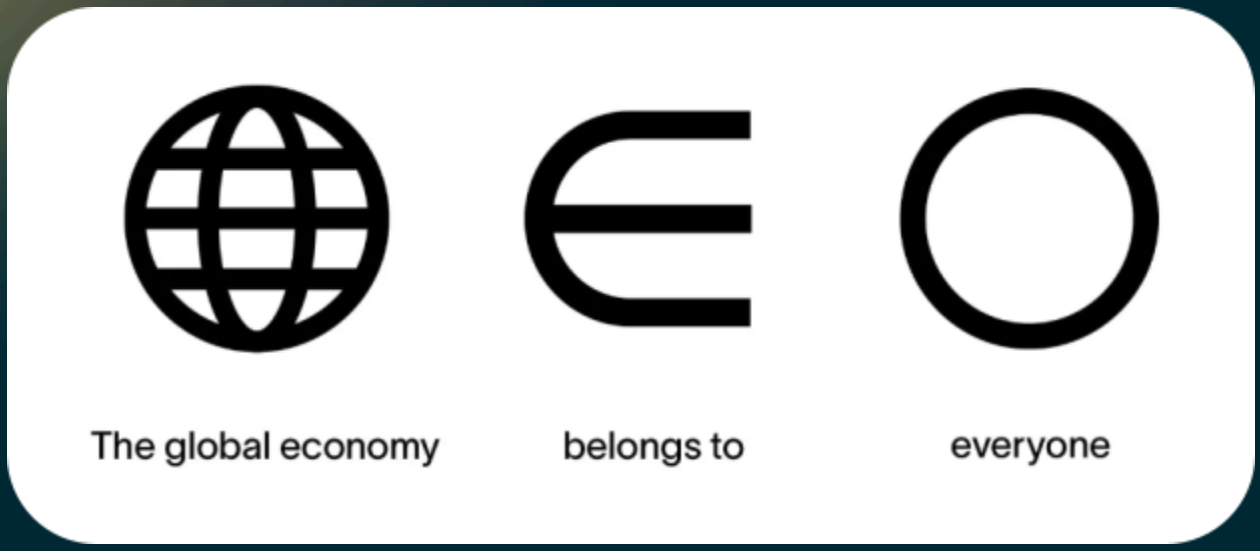
In September 2022, NIRA launched a campaign to add 17 million more citizens to the national ID system[6]. NIRA plans to organize a mass enrollment exercise for 17.2 million unregistered Ugandans[6]. However, there are concerns about the challenges of exclusionary digital ID systems raised by some private sector and civil society groups[7].

References:

(1) "Digital Identity in Uganda" by Research ICT Africa
(2) "Identity management and citizen scoring in Ghana Rwanda Tunisia Uganda Zimbabwe and China" by AlgorithmWatch
(3) "Reimagining identity ecosystems in Sub-Saharan Africa with mobile The case of Benin, Ghana, Kenya and Uganda" by GSMA
(4) 2.4 million Ugandans don't have national IDs | Monitor
(5) Uganda starts biometric verification of refugees | UNHCR
(6) Ugandan officials emphasize inclusive digital ID plan to enroll 17M unregistered citizens | Biometric Update
(7) Civil society coalition sues Ugandan government, alleging digital ID exclusion | Biometric Update

Photo: Chimpanzee in Uganda by Pixabay by Canva

Column. The Worldcoin Wave in Africa



Source: The story behind the new Worldcoin logo | Worldcoin

Worldcoin, a project co-founded by OpenAI's CEO Sam Altman, Alex Blania, and Max Novendstern, is a groundbreaking blockchain initiative with the aim of revolutionizing the global economy[1].

Worldcoin offers a privacy-focused digital identity known as the World ID, and, where allowed by law, a digital currency ($WLD) as a reward for human existence. To get started, download the World App, through which you can obtain a World ID via biometric verification using an Orb, a specialized biometric imaging device that scans the iris, allowing you to maintain your privacy while confirming your uniqueness online[2].

On July 24, 2023, Alex and Altman outlined the project's objectives upon the official launch of the final product after a three-year Beta phase:

"If successful, we believe Worldcoin could drastically increase economic opportunity, scale a reliable solution for distinguishing humans from AI online while preserving privacy, enable global democratic processes and eventually show a potential path to AI-funded UBI (Universal Basic Income)." - Alex Blania & Sam Altman on Introducing Worldcoin[2]

In Africa, Worldcoin has made significant strides. The project chose Kenya as the first African country to launch the platform due to the already booming tech space and

the more than four million Kenyans who are already trading in crypto[3]. Thousands of Kenyans had been queuing up at registration centers to get the currency worth about $49 (£39)[3].

Photo: Embu town, Kenya, taken by author

However, the Kenyan government ordered Worldcoin to stop signing up new users, citing data privacy concerns[3]. By the time the Kenyan government suspended the project on August 3, 2023, it had registered over 2 million users globally since it started registering users about two years ago[4] including over 350,000 Kenyans registered since the official launch[5].

Worldcoin has also held programs in other African countries, including Sudan and Ghana[6]. In these countries, there have been allegations that the project lacked transparency and deployed exploitative methods to aid its set-up in localities and harvest biometric data to feed its algorithm and train its AI[6].

Despite the controversies, Worldcoin continues to expand. It has distributed orbs to 34 countries in Africa, South America, North America, Europe, and Asia[7].

Source: Tweet on X
Note: TFH refers to Tools for Humanity, the parent organization of Worldcoin established in 2019.

Worldcoin is an ambitious project with a vision of creating a new global "identity and financial network". As it continues to expand, especially in Africa, it will be interesting to see how it navigates the challenges and how it impacts the global economy.

What do you think?

References:

(1) Worldcoin Crypto Explained: What Is It And How Does It Work? | Analytics Insight
(2) Introducing Worldcoin: A letter from Alex Blania and Sam Altman | Worldcoin
(3) Worldcoin suspended in Kenya as thousands queue for free money | BBC News
(4) WorldCoin suspended in Kenya | Techpoint.africa
(5) What personal data does Worldcoin collect from you? | Citizen Digital
(6) Worldcoin Officially Launches Amid Fears Of Foul Play In Africa | Weetracker.com
(7) Worldcoin website

Ch.3 Decentralized ID (DID) Solutions

3.1 What DID Means and How It Works

Identity Models[1]

Digital identities have a rich history, starting from the familiar centralized model, which includes government IDs and email addresses with usernames, domain names, and top-level domains. Over time, we have witnessed the emergence of more complex digital personas created on social media platforms like Facebook and X (Twitter). These digital personas often involve the utilization of user data for personalized advertising[2].

Recent scandals in these platforms that eroded trust, along with the development of technologies like blockchain and decentralized ledgers, have opened the door to the world of the Self-Sovereign Identity (SSI) model (decentralized IDs are designed to be self-sovereign, meaning that individuals have full control over their identity data). Below, we explain 3 identity models, along with examples and their pros and cons.

Photo by Pixabay by Canva

(a). Centralized Model

Examples: Government ID numbers, passport, email address, social media handles, cell phone or internet providers etc.

Credentials: Password accompanied by a username or email address

How It Works: ID is issued by a centralized authority such as a government or service provider. A user has to get permission to have an ID from the provider and has limited access to stored data.

Pros: It opened the door to the internet.

Cons: Because all of our data belongs to the company (or government) with their privacy and security policies, our ID could be controlled and deleted by them. Also, managing a lot of accounts with different credentials is bothersome.

(b). Federated Model

Examples: Identity Providers (IDPs) including Facebook, X (Twitter), Google, GitHub, Amazon, Instagram, LinkedIn, Microsoft etc.

Credentials: Single-Sign-On (SSO); password accompanied by a username or email address of the IDPs

How It Works: The user has an account with an IDP, and with those credentials, they can access other services. Sites that use the same IDP are called a federation.

Pros: Alleviate the burden to manage many accounts with different credentials.

Cons: Having numerous accounts with different IDPs to access each federation is still bothersome. The privacy and security levels are adjusted to the lowest common denominator in the federation. IDPs attract attackers since it has a pile of data. Because the data belongs to the IDP, data could be controlled and deleted by them.

(c). Self-Sovereign Identity (SSI) Model

Examples: Polygon ID, Fractal ID, Atala PRISM, ONTID etc.

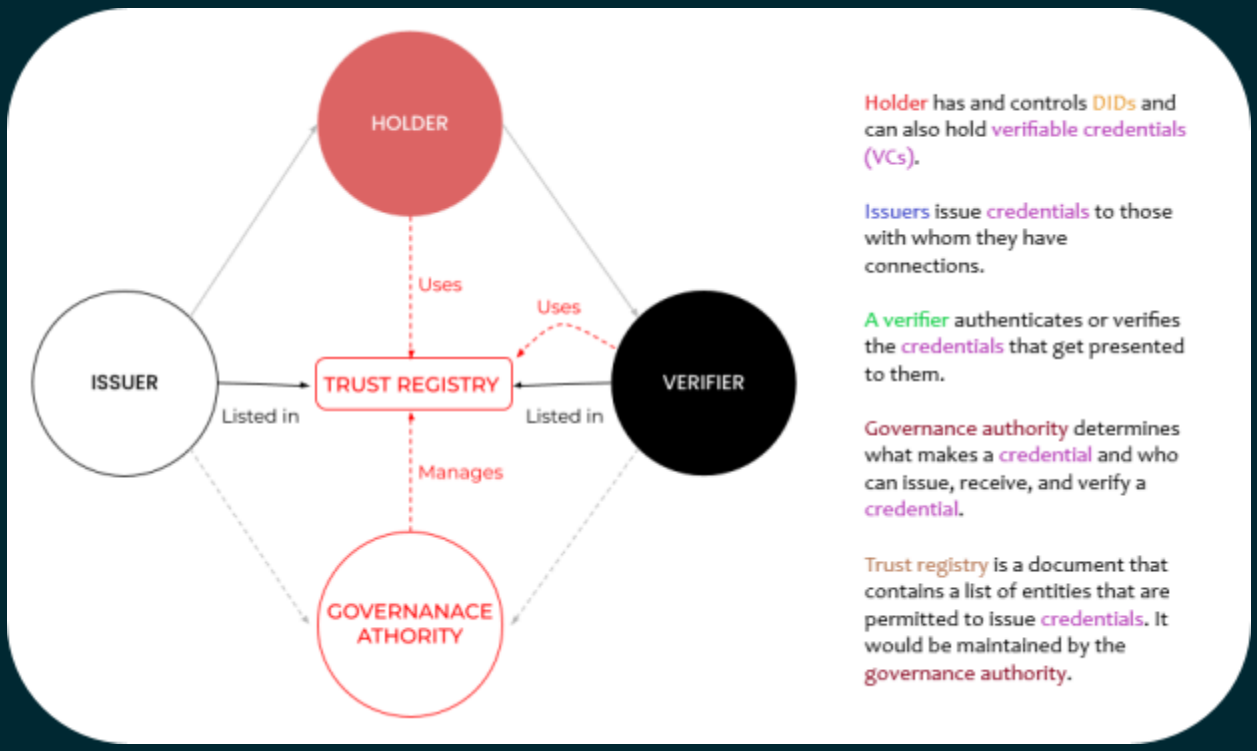
Credentials: Public key and private key (which is allowing digital signature by issuer)

How It Works: Decentralized Identifier (DID), a string of random characters generated through cryptography identifies us. When the issuer creates a credential, a hash is generated and the issuer can digitally sign on the credential by using a private key associated with DID. Zero-Knowledge Proof (ZKP), an algorithm to authorize the fact without sharing data, is used in case detailed data is not required to prove the fact (for example, date of birth is not required to prove whether the person is older than 20).

Pros: Data is not controlled by the centralized system but is decentralized and owned by a user, so it would not be controlled or erased by others. Secure (end-to-end encryption for all interactions) and high privacy protection.

Cons: Technology is complex and complicated. Hard to understand tech scares away a user base.

Figure 5. Trust Diamond Used by SSI Model



Source: "Atala PRISM FOUNDATIONS" by IOHK

Examples of SSI Model[1]

The table below shows the examples of SSI models. It presents what the verifiable credential (VC) is and who is the holder, issuer, and verifier of VC in each example.

Table 1. Verifiable Credential (VC), Holder, Issuer, and Verifier of SSI Examples

Example	Verifiable Credential (VC)	Holder	Issuer	Verifier
Government ID	Government ID	Resident	City government	Local School
University degree	Degree certificate	Student	University	Employer
Doctor's license	New license	Medical student	Local authority	Employer
Proof of employment	Proof of employment	Employee	Employer	Health insurance company
Health insurance	Beneficiary ID	Customer	Health insurance company	Hospital administrator
Telecom reward program	Certificate of meeting a requirement	Customer	Telecom company	Streaming service provider

Source: "Atala PRISM FOUNDATIONS" by IOHK

i. Government ID

A city government (issuer) provides a government ID (VC) to a resident (holder). This credential can be verified by a local school (verifier) when the holder enters the new school.

ii. University Degree

A university (issuer) provides a degree certificate (VC) to a student (holder). This credential can be verified by an employer (verifier) when the holder starts working for the new employer.

iii. Doctor's License

A local authority (issuer) issues a new license (VC) to a medical student (holder) who passed the national exam. This credential can be verified by an

employer (verifier) when the holder starts working for a hospital as a medical doctor.

iv. Proof of Employment

An employer (issuer) provides a proof of employment (VC) to an employee (holder). This credential can be verified by a health insurance company (verifier) when the holder applied for the new health insurance policy.

v. Health Insurance

A health insurance company (issuer) provides an insurance beneficiary ID (VC) to a customer (holder) who bought a new policy. This credential can be verified by a hospital administrator (verifier) when the holder receives a medical service at the hospital.

vi. Telecom Reward Program

A telecom company (issuer) issues a certificate of meeting the requirement for the reward of a free subscription to a streaming service (VC) to a customer (holder). This credential can be verified by the streaming service provider (verifier) when the holder applies for the subscription service.

References of Chapter 3.1:

(1) "Atala PRISM - Foundations" by IOHK
(2) What Is Decentralized Identity? | Coindesk

3.2 Examples of DID Solutions

Decentralized Identity (DID) solutions align themselves with well-established open standard, W3C, placing strong emphasis on interoperability and compatibility across different platforms. The pursuit of privacy and security stands as a top priority, with private networks offering enhanced data protection, albeit potentially introducing concerns related to centralized governance.

It is also worth mentioning that for users, what often matters most is the user experience (UI) and user interface (UX), as the intuitiveness and accessibility of these solutions frequently overshadow the intricate technical details. Below are the real-world examples of DID solutions. Here we define DID solutions as the decentralized IDs that operate on blockchain networks, whether they are public or private.

Note that the protocols listed below are selected by their presence in the decentralized identity space based on our own research. Other information is gathered from their websites and docs available online.

Microsoft Entra Verified ID

By Microsoft
On Bitcoin (ION) Blockchain
Doc, Npm package

Polygon ID

By Polygon
On Polygon Blockchain
Docs

Fractal ID

By Fractal
On Polkadot Blockchain
Chrome
Doc, Repos

Atala PRISM

By IOHK
On Cardano Blockchain
Pioneers Program

ONT ID

By Ontology
On Ontology Blockchain
iOS, Android, Chrome
Doc, Repos

iden3

By 0KIMS
On Ethereum Blockchain
Android
Doc, Repos

Magic Auth

By Magic
On Ethereum Blockchain
Docs

dizme

By InfoCert
On Algorand Blockchain
iOS, Android
API, DizmeID Foundation

identity.com

By Civic
On Solana Blockchain
White paper, Repos

SELFKEY

By Selfkey
On Ethereum Blockchain
iOS, Android, Windows, Mac, Linux
White paper, Doc, Repos

Blockchain identity

By IBM
On Hyperledger Blockchain
Blockchain Resources

Blockpass

By Blockpass
Doc, Repos

Interview 1: Exploring the Power of Decentralized ID with David Harding, General Manager of Atala PRISM at IOHK

We had the privilege of speaking with David Harding, General Manager of Atala PRISM at IOHK, to explore the potential of decentralized ID and its applications in various critical domains, including Africa.

David, an engineer turned CTO, boasts a wide-ranging career in aerospace, software development, entertainment, manufacturing, and electronic distribution. With a specialization in digital identity for over two decades, he has pioneered innovative solutions utilizing advanced biometrics such as facial recognition, fingerprinting, iris scanning, and DNA analysis. His leadership has propelled the delivery of world-class digital identity solutions, making him a prominent figure in the field.

Mayuko: Could you provide an overview of Atala PRISM's development progress and its applications?

David: Atala PRISM has evolved from version 1.4, used for an educational project in Ethiopia, to the current version 2, fully compliant with decentralized identity standards. It's a Self-Sovereign Identity (SSI) system built on top of Cardano blockchain. Now, SSI does not require the use of a blockchain. However, it is well purposed for working with blockchains. This next release, which is going to be released into the Linux Foundation's open source Hyperledger Labs, is really designed around people being able to build self sovereign identity applications or identity-aware apps.

We're expanding its use in enterprise, fintech and healthcare, offering identity services beyond SSI. This includes identity verification, orchestration, approximation, and authentication. We're also collaborating with centralized identity solutions for security and customer engagement. Additionally, we're exploring physical and logical access control, allowing versatile use of Verifiable Credentials. A key strength of SSI is the ability to present one's identity in various ways across different channels.

Mayuko: Could you explain how Atala PRISM version 2 differs from other DID solutions and if there are any unique benefits that set it apart?

David: Most SSI platforms, including those meeting W3C standards, share common features such as issuing, verifying, and managing Verifiable Credentials as well as trust frameworks. Atala PRISM aligns with these core principles. However, what sets Atala apart is its broader approach. While supporting pure Web 3 like others, we acknowledge that much of the digital identity world operates in a Web 2 environment.

Atala acts as a bridge, facilitating the gradual transition to Web 3. This allows established industries with centralized identity systems to harness the power of SSI and Verifiable Credentials while transitioning at their own pace. In essence, Atala PRISM caters to both the Web 3 SSI community and those integrating SSI into their existing identity infrastructure.

Mayuko: How does Atala PRISM manage conflicts between decentralization and existing centralization, regulatory compliance, and privacy concerns when integrating Web 2-based services like banks with Web 3-based Atala PRISM?

David: This is a valid concern. While Web 3 enthusiasts prioritize decentralization, we recognize that many industries, like finance, are subject to government regulations and require centralized identity management. We augment existing infrastructures with SSI capabilities, working within their rules.

Think of a bank using Atala PRISM to issue a Verifiable Credential. The bank already possesses centralized identity data due to their verification checks, including KYC, AML, and OFAC requirements. This existing identity information serves as the basis for issuing Verifiable Credentials using Atala PRISM. When I present my Verifiable Credential, I can selectively disclose specific information, adhering to SSI's principle of selective disclosure. While the bank already has this information, they can leverage our platform to issue and manage Verifiable Credentials, adding an extra layer of trust and security to the process.

For pure Web 3 enthusiasts, we offer Atala PRISM as a decentralized SSI platform. Simultaneously, our other brand integrates SSI into existing infrastructures, allowing a gradual transition to Web 3. Compromise exists for those who need it, while Web 3 developers can use Atala PRISM's native SSI capabilities as desired.

Photo by Pixabay by Canva

Mayuko: In low-income countries like Kenya, when providing IDs to those who've never had them before through Atala PRISM, how do you ensure the person receiving the ID is indeed the intended person?

David: That's an excellent question. It ultimately depends on the issuer of the Verifiable Credential. Atala PRISM serves as the platform, the plumbing, so to speak. Just having plumbing in a house doesn't guarantee water; you need a water source. In this case, the entity issuing the Verifiable Credential and identity is responsible for verifying that Mayuko is Mayuko, David is David, Muna is Muna. The platform facilitates verification, revocation, and selective disclosure, but the verification itself happens at the issuer's end.

Mayuko: Do you have any plans to further utilize decentralized ID in African countries, especially in low-income regions?

David: Absolutely, decentralized ID, specifically SSI, holds immense value for developing nations lacking robust identity infrastructure. It's a game-changer, making it easier to reach citizens who are gaining access to services and banking. SSI offers a cost-effective and user-friendly way to interact and build trust. Individuals gain ownership and control over their identities, allowing them to conduct transactions with traditional currency or cryptocurrency, fostering rapid trust creation.

Consider microloans; they can significantly impact economies, and SSI plays a pivotal role in enabling such transactions. This is what excites me about the potential of SSI, especially in countries where quick and impactful changes can occur, propelling them from emerging to strong economies. It's a foundational element upon which to build solid infrastructure, starting with identity—the cornerstone of any nation's development.

While identity is firmly established in countries like the United States, emerging economies have the unique advantage of starting with SSI, granting individuals control over their data across multiple channels. It sets a promising tone for citizenry growth and development.

Mayuko: From your perspective, where do you think mass adoption of decentralized IDs will begin in African countries? Will it primarily focus on areas like finance, providing IDs to those who've never had them, healthcare, or education?

David: It's likely to begin across various sectors, but historically, mass identity initiatives often start with the government. Personal identity for most people begins with government-issued documents. For example, a birth certificate submitted by a doctor is the first step in establishing identity. Then, one may acquire additional government-issued IDs like a Social Security card, driver's license, or passport. These government-based identities then branch into other areas like healthcare and banking.

However, it's essential to recognize that the same model may not apply to every African country. Some regions may develop identity from different starting points. For instance, a school could issue an initial digital identity to students, enabling them to build upon it as they progress through their education. Similarly, access to banking services or healthcare can be the entry point for identity. Each country may have its unique approach to identity growth, and innovation in these key sectors will drive adoption.

Ultimately, when identity becomes normalized and federated, individuals will use a single identity across multiple domains, much like using a government-issued ID for various purposes.

Mayuko: Thank you very much for the insightful talk!

Ch.4 Digital ID and DID Projects in Africa

4.1 Major Telecom Companies

Telecom companies play a pivotal role by facilitating SIM card registration processes, effectively creating digital identities for mobile users. These telecom giants, in partnership with government entities and financial institutions, champion the uptake of mobile-based identity verification solutions. Nonetheless, this method has limitations, as it may not offer the most secure form of identification, given the potential for shared mobile devices.

MTN

Largest Telecom Company in Africa

MTN is Africa's largest telecom company based on revenue ($10.0B in 2022)[1] and number of users (290 million in 2023 Q1)[2]. Nigeria has the largest number of subscribers, 77 million, followed by 36 million in South Africa, 27 million in Ghana, 18 million in Uganda, 17 million in Ivory Coast, 11 million in Cameroon, and 10 more African countries[2].

ID Use Cases

MTN's mobile money service, MoMo, serves as a platform for various partners (over 900) to offer services that enhance the lives of users[3]. In Rwanda, MTN partners with NCBA Bank to provide bundled digital financial services to farmers. MTN Rwanda handles Know Your Customer (KYC) verification, ensuring the legitimacy and security of users accessing these financial services[4].

aYo, owned by MTN, offers mobile-enabled insurance products. Users can purchase insurance through mobile money transactions, signifying the use of digital ID for customer authentication and policy management. The products provide hospital cash and life cover benefits, requiring secure identification[4].

UNHCR distributed Cash and Voucher Assistance to 8.5 million recipients across 100 countries in 2020. They have established digital payment programs in various countries, including those that utilize mobile money. In Cameroon, urban refugees

received one-time cash payments through MTN Mobile Money, indicating the use of digital ID for secure disbursement of funds[5].

Safaricom

Kenya's Ubiquitous Telecom Group

Safaricom holds the top spot and captures 90% of Kenya's telecommunications market share (revenue $2.1B in 2022-23 with its mobile money service, M-Pesa, accounting for $857M or 41.5%[6]; over 46.7 million subscribers in 2023 Q1[7]). In addition to Kenya, Safaricom has also expanded its services to Ethiopia in October 2022, and it has hit over 5 million subscribers in less than a year[8].

ID Use Cases

Safaricom's M-PESA digital ID is widely used for mobile money payments, with a 47% increase in merchants accepting it between September 2020 and June 2021[4]. They offer efficient remote onboarding for businesses, and over 18% of new merchants self-onboard[4].

M-PESA's consumer super app enhances user experience, providing fingerprint and facial recognition for authentication, spending tracking, and access to third-party services through mini apps. The app has over 4.2 million users, offering various services like public health insurance and transport, with 730,000 users in the 90 days running up to December 2021, showcasing its early success[4].

Additionally, the partnership between Visa and Safaricom M-Pesa introduced the M-PESA Global Pay Visa virtual card in June 2022, enabling global digital payments for millions of M-PESA users[9].

Orange Africa & ME

French Multinational Telecom Giant

As of 2023 Q1, Orange Africa and Middle East generated revenues of $11.1B, serving 144 million customers in 18 countries[10]. More than 80 million customers have an Orange Money account, which is a flagship mobile-based money transfer and financial services available in 17 countries[11]. It is said that 1 African in 10 is an Orange customer[11]. Orange

is one of the dominant telecom companies in countries like Botswana, Burkina Faso, Cameroon, CAR, DRC, Egypt, Equatorial Guinea, Guinea, Guinea-Bissau, Ivory Coast, Liberia, Madagascar, Mali, Senegal, and Sierra Leone[9].

ID Use Cases

Orange Money and MTN Mobile Money users in Cameroon can receive deposits from France and Belgium through Orange Bank from January 2022. This service leverages digital ID for secure and authenticated transactions, facilitating an average of 800 million CFA francs in monthly transactions[12].

In July 2022, Cameroon's Ministry of Finance granted Orange Cameroon permission to establish a dedicated financial services subsidiary, Orange Money Cameroon SA[13]. This subsidiary can now autonomously provide payment services such as deposits, transfers, withdrawals, bill payments, salary and tax payments, as well as international money transfers, all of which require secure digital ID verification.

Vodacom

South Africa's Telecom Powerhouse

Vodacom Group is a South African mobile communications firm, offering its services to 140 million customers (excluding its subsidiary, Safaricom) in 47 African countries[14]. Its revenue hit $6.1B for the year ended 31 March 2023[15]. It has the largest number of customers in Egypt, 46 million, followed by 44 million in South Africa, 21 million in DRC, 17 million in Tanzania, 11 million in Mozambique, and 2 million in Lesotho[14].

ID Use Cases

In 2020, Vodacom Tanzania launched the M-Kulima app, with support from the GSMA AgriTech Innovation Fund. This app collects essential farmer information like fingerprints, photos, and farm locations for verification and makes it easier for farmers to receive advice on farming and get paid digitally through Vodacom's mobile money service, M-PESA. It successfully digitized over 600,000 farmer profiles and processed more than 10,000 mobile money payments[9].

Additionally, Vodacom is testing a digital agriculture loan program with FINCA, using data from M-Kulima for credit assessments. The digital information gathered from digital crop transactions, mobile money use, and the M-Kulima app could open up

opportunities for farmers to access credit. Vodacom's future plans include expanding M-Kulima's services, tailoring it for livestock and horticulture, and exploring a software-as-a-service (SaaS) model to benefit even more farmers[9].

Airtel Africa

Pan-African Telecom Provider

Airtel Africa provides telecommunications and mobile money services to 140 million customers with 32 million Airtel Money customers in 14 countries across the continent, primarily in Nigeria, East Africa, and Francophone Africa, where Airtel Nigeria is the company's most profitable arm[16]. It hit $5.3B annual revenue in the 2022-2023 financial year with a growth rate of 17.6% in constant currency[16].

ID Use Cases

In today's dynamic cross-border financial landscape, digital ID verification plays a crucial role in bolstering security and expanding the reach of financial transactions.

In September 2021, Airtel partnered with WorldRemit to allow 400,000 Airtel Money users to receive money from 129 countries directly into their mobile wallets and make global in-app payments without charges. Key countries covered include the USA, UK, Saudi Arabia, South Africa, and Australia, aiming to boost Airtel's mobile money platform and compete with Safaricom's M-Pesa[17].

In August 2023, Airtel Africa and Mastercard expanded their partnership by launching a cross-border remittance service across 14 African markets, benefiting 100 million users. This service offers secure fund transfers and promotes economic growth in the continent, where $95.6 billion in remittances flow annually, connecting consumers to wallets in over 145 markets[18].

References of Chapter 4.1:

(1) "FY22 Annual Financial Results" by MTN Group
(2) MTN Group subscribers worldwide 2018-2023 | Statista
(3) MTN Mobile Money Opened APIs – Was It Worth It? | CGAP
(4) "State of the Industry Report on Mobile Money 2022" by GSMA
(5) UNHCR Cash Assistance and COVID-19: Emerging Field Practices II | UNHCR
(6) M-Pesa share in Safaricom mobile revenue deepens to 41.5pc | The East African
(7) Safaricom remains dominant with over 46M subscribers | People Daily

(8) Safaricom Ethiopia Hits 5 Million Subscribers | CIO Africa
(9) "State of the Industry Report on Mobile Money 2023" by GSMA
(10) Orange again points to Africa, Middle East for revenue gain | Developing Telecoms
(11) Orange Africa and Middle East | Orange
(12) Orange confirms Europe to Cameroon remittance in place | itweb.africa
(13) Orange Cameroon gets approval to launch mobile money subsidiary | Developing Telecoms
(14) Where we operate | Vodacom Group
(15) "Vodacom Group Ltd Preliminary Results 2023" by Vodacom Group
(16) "Airtel Africa Annual Report FY 2022-2023" by Airtel Africa
(17) Airtel subscribers to receive cash from 129 countries in WorldRemit deal | Business Daily
(18) Airtel Africa and Mastercard strengthens partnership | Mastercard Newsroom

4.2 Startup Companies

In a region characterized by diverse challenges, including limited access to traditional identification methods, startups are leveraging emerging technologies such as biometrics, mobile applications, and blockchain to provide secure and inclusive digital ID solutions.

Below is the list of African startup companies working on digital identification solutions. Note that the companies listed below are selected by their presence in the African digital identity space based on our own research. Tech & Service information is gathered from their websites and docs available online. Fund information is from publicly available data including Crunchbase.

BACE Group

Ghana

Founded in 2018

Tech & Service

No blockchain use. ID verification as a service through BACE API. Leveraging face recognition, liveness test etc., it provides onboarding, ID verification, ID validation, ID search, fraud detection, and data extraction services.

Fund

Raised $100k from Meltwater Entrepreneurial School of Technology (MEST) in their pre-seed round in 2018. Granted non-equity assistance from UNICEF StartUp Labs in 2021.

https://www.bacegroup.com/

DIDx

South Africa

Founded in 2019

Tech & Service

Self Sovereign Identity (SSI) on top of blockchain. Services include digital identity solution development, research and framework development, thought leadership, and workshops.

Fund

Raised $500k from Imvelo Ventures, OneVault and LSD capital in a pre-seed round in 2023.

https://www.didx.co.za/

Digified

Egypt

Founded in 2018

Tech & Service

No blockchain use. Digital identity verification technologies based on machine learning and authenticating data with government databases. Services include Arabic e-KYC, documents digitization, face matching and anti-spoofing etc.

Fund

Raised $28k from EFG EV Fintech in their pre-seed round in 2019.

https://digified.io/

FlexID

Zimbabwe

Founded in 2018

Tech & Service

Combination of Self Sovereign Identity (SSI), blockchain, and AI technologies. A platform and wallet for the issuance, storage, and sharing of verified digital identity credentials using Algorand blockchain.

Fund

Awarded grant from Algorand Foundation in 2022.

https://flexfintx.com/

identitypass

Nigeria

Founded in 2021

Tech & Service

No blockchain use. Data verification for government issued ID in Rwanda, Uganda, Nigeria, Ghana, Kenya, South Africa and Sierra Leone. Biometric authentication through fingerprint, facial, and iris recognitions. Service also includes activity monitoring and assessment of customers.

Fund

Raised $360k in their pre-seed round in 2021. Raised $2.9M from Y Combinator, MaC Venture Capital, and other investors in their seed round in 2022.

https://myidentitypass.com/

iiDENTIFii

South Africa

Founded in 2018

Tech & Service

No blockchain use. Advanced face authentication technology. iiDENTIFii is used by the largest pan-African banks, insurers and mining houses for both customer and employee authentication.

Fund

Raised $15M from African investment company Arise, growth-stage private equity firm Sanari Capital and veteran US tech entrepreneur Bill Spruill in their Series A round in 2022.

https://iidentifii.com/

Smile ID

Nigeria

Founded in 2017

Tech & Service

No blockchain use. Services include document verification, AML check, government check, and biometric authentication. Access 3 or more ID types in most African countries, and reliably verify users using any device in low-bandwidth environments.

Fund

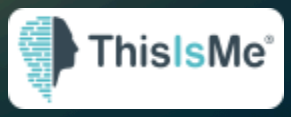
Funded by 500 Global etc. including a $100k grant by Catalyst Fund in their pre-seed round in 2017. Raised $4M from valU etc. in seed round in 2019. Followed by $7M of Series A from Costanoa Ventures, CRE Venture Capital and other investors in 2021. In 2023, smile ID successfully raised $20M from Costanoa Ventures, Norrsken22 and other investors in their Series B round.

https://usesmileid.com/

ThisisMe

South Africa

Founded in 2013



Tech & Service

No blockchain use. Services include e-KYC, automated digital onboarding, identity verification, facial biometric verification, risk assessment, information validation, and large data processing.

Fund

Raised $2.5M in their venture round in 2016.

https://thisisme.com/#Homepage

Uqudo

UK

Founded in 2018

Tech & Service

No blockchain Use. Digital identity company in the Middle East and Africa. Services cover digital KYC and verification including facial recognition, AML and sanction, KYB, legitimate and safe authentication through biometrics etc.

Fund

Granted non-equity assistance from Village Capital in 2023.

https://uqudo.com/

VerifyMe

Nigeria

Founded in 2013

Tech & Service

No blockchain Use. Use cases include customer onboarding, contactless account opening, employment verification, liveness detection, KYC, address verification, and guarantor verification. Engage-to-earn Verifyme agents build Africa's biggest last mile verification network.

Fund

Funded by Consonance Investment Managers in their Series A round in 2020.

https://verifyme.ng/

Youverify

Nigeria

Founded in 2017

Tech & Service

No blockchain use. Provide AI-powered risk intelligence solutions, Know Your Transaction (KYT), KYB, Know Your Employee (KYE), KYC, no-code workflow automation tool etc. Use cases span from finance, trading, marketplace, to gaming and casino.

Fund

Raised $350k from VilCap Investments etc. in their seed round in 2018. Followed by $1.5M from Orange Ventures and other investors in 2020. Most recently raised $1M from LoftyInc Capital Management, Orange Ventures and other investors in their seed round in 2022.

https://www.youverify.co/

4.3 International Organizations and NPOs

International organizations and NPOs in Africa play instrumental roles in fostering digital ID and decentralized ID adoption across the continent. They often collaborate with local governments and grassroots organizations to facilitate access to identity verification solutions, especially in underserved and marginalized communities. Their efforts help bridge the gap between technology adoption and social inclusion, thus contributing significantly to the digital transformation of Africa and enhancing access to essential services for its diverse population.

Identification for Development (ID4D)

Year: 2018-present, **Blockchain:** No, **Lead Organization:** World Bank, **Partners:** Bill & Melinda Gates Foundation, UK Government, French Government, Norwegian Agency for Development Cooperation (Norad), and Omidyar Network

Description: The ID4D project led by the World Bank is an initiative aimed at providing inclusive and trusted digital identification. This project is designed to unlock opportunities for the world's most vulnerable populations. In 2022, ID4D and Government-To-Person Payments (G2Px) advanced understanding and provided support for inclusive and trusted identification and digital G2P payment systems. They focused on meeting country needs, gathering evidence, and shaping digital public infrastructure agendas. They engaged with civil society and aided 57 countries in enhancing ID and civil registration ecosystems. G2Px also expanded digital G2P payment efforts in 38 countries.

Resources:

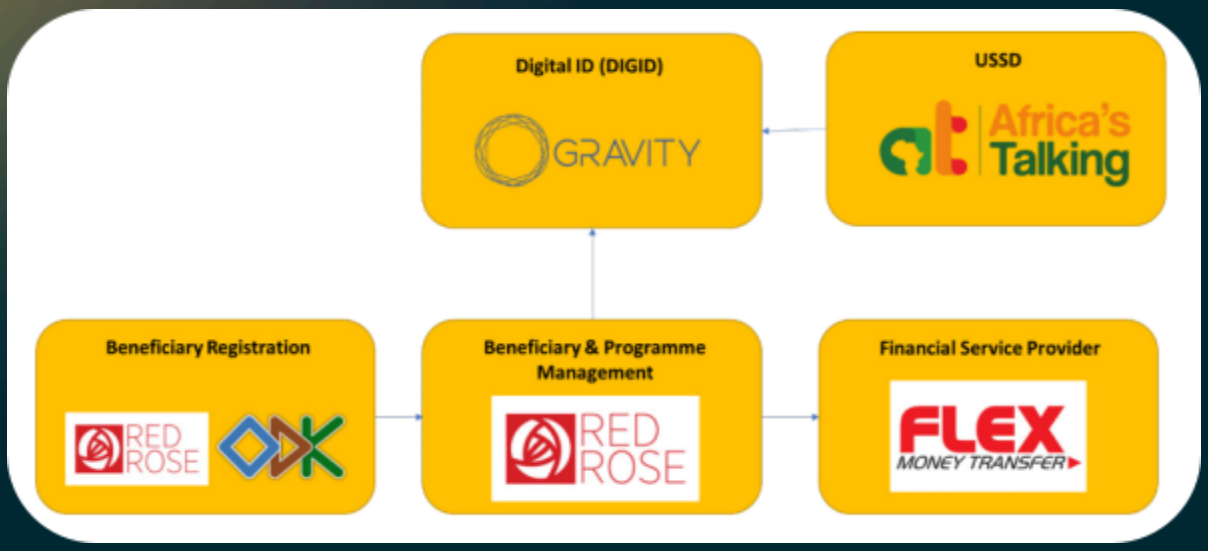
(1) World Bank ID4D Website
(2) "The 2022 ID4D and G2Px Annual Report" by World Bank
(3) ID4D Country and Regional Engagement | ID4D
(4) ID4D Global Dataset | ID4D

Dignified ID (DIGID)

Year: 2019-present, **Blockchain:** Yes, **Lead Organization:** Norwegian Red Cross, Norwegian Church Aid (NCA), Save the Children Norway, Norwegian Refugee Council (NRC), **Partners:** Innovation Norway, International Federation of Red Cross and Red Crescent Societies (IFRC), Kenya Red Cross Society, Uganda Red Cross Society, Save the Children Kenya

Description: The Dignified Identities in Cash Assistance (DIGID) project uses blockchain technology to help vulnerable people without official ID get cash aid. DIGID introduces self-sovereign identity, granting individuals control over their data, particularly in humanitarian contexts. To manage beneficiaries and programs, the project uses the RedRose system, which lets people register on their mobile phones. The system uploads data to RedRose, where it's checked and approved. After approval, the information goes to the DIGID system created by Gravity on top of Tezos blockchain. This system makes digital wallets and IDs for each beneficiary using details like name, location, age, and a photo.

Figure 6. Kenya Red Cross Society (KRCS) Systems Integration



Source: "Dignified Identities in Cash Assistance: Lessons Learnt from Kenya" by CashHub

Resources:

(1) DIGID Reports | Humanitarian Innovation Platform (HIP)
(2) Gravity's DID Protocol, Built on Tezos, To Power DIGID Project in Kenya | Gravity
(3) "Dignified Identities in Cash Assistance: Lessons Learnt from Kenya" by CashHub

Digital ID for Refugees in Uganda

MERCY CORPS VENTURES

Year: 2022-2023, **Blockchain:** Yes, **Lead Organization:** Mercy Corps Ventures, **Partners:** Coinbase Giving, CryptoSavannah

Description: In 2022, Mercy Corps Ventures and Coinbase have launched a pilot project in Uganda, aiming to assist 35,000 refugees, focusing on enhancing financial inclusion for refugees and host communities. It includes the creation of secure digital IDs using blockchain technology, providing a reliable means of identification, and enabling crypto transfers for aid distribution, granting refugees more autonomy and flexibility in managing their finances. This initiative builds on Mercy Corps' experience

in delivering cash assistance, aiming to empower historically underserved individuals in refugee contexts.

Resources:

(1) Blockchain enabled digital ID and crypto transfers for 35k refugees in Uganda | Mercy Corps Ventures
(2) Mercy Corps & Coinbase Uses Technology to Support 35,000 Ugandan Refugees | InsideCharity

Yoma Project

Year: 2022-2023, **Blockchain:** Yes, **Lead Organization:** UNICEF Eastern and Southern Africa Regional Office (ESARO) and Generation Unlimited (GenU), **Partners:** UNDP, GIZ, Generation Unlimited, RLabs, Fondation Botnar, Austrian Development Agency, Goodwall, atingi, African Coding Network, Umuzi, University of Geneva, DiDx

Description: The Yoma Project is a digital marketplace designed to empower African youth as they transition from learning to earning. It offers a self-directed learning journey for young people, with over 250,000 already benefiting in Nigeria and Burundi. The platform verifies their achievements and growth using blockchain, creating a digital CV that can be shared with peers and employers to improve employability. Youth earn digital tokens for engagement, which can be used for local services and accessing opportunities like mentorship. Yoma aims to reach 3 million young people.

Resources:

(1) Yoma Africa Website
(2) The Digital Marketplace Yoma | European Commission
(3) YOMA | Generation Unlimited

kiva Protocol

Year: 2018-2022, **Blockchain:** Yes, **Lead Organization:** Kiva, **Partners:** Rippleworks, Dell Foundation, Skoll Foundation, Cisco Foundation, Amazon Web Services, World Bank, CABEI, UNDP, UNHCR, UNCDF, IFC, ID2020, Digital Public Goods Alliance

Description: Launched by Kiva in 2018, the Kiva Protocol aimed to tackle financial sector challenges by providing an open-source platform for sharing identification and financial data. It played a crucial role in Sierra Leone, where the National Decentralized ID was developed on top of Hyperledger Indy, Aries, and Ursa blockchain. It served as a "digital public infrastructure" that allowed financial institutions, government agencies, and organizations to securely share verifiable data, reducing operational costs and improving access to services, especially for the unbanked. The protocol utilized a decentralized architecture, granting individuals digital wallets for holding their identification credentials. However, as of June 30, 2022, Kiva has discontinued the operations of the Kiva Protocol.

Resources:

(1) Kiva Protocol Website
(2) Kiva Protocol | Kiva
(3) Kiva sets up Sierra Leone blockchain ID system | Ledger Insight

Interview2: Lohan Spies, Founder and CEO of DIDx, Discusses the Empowerment Enabled by Decentralized ID and Its Impact in Africa

We had the honor of conversing with Lohan Spies, Founder & CEO of DIDx, to delve into the power of decentralized identity, especially the impacts and empowerments created by DID in low income countries.

Lohan Spies, the Founder & CEO of DIDx, a South African company specializing in self-sovereign identity (SSI), is a recognized thought leader in the field of decentralized identity with a strong connection to the African continent. DIDx serves as a founding steward of the Sovrin Network, and Lohan also plays a pivotal role as the technical lead for the Yoma Project, a UNICEF initiative leveraging SSI to empower African youth in their pursuit of learning, earning, and making a meaningful impact.

Mayuko: Could you explain the advantages of decentralized ID over traditional Digital ID? What are the unique aspects that decentralized identity offers?

Lohan: Digital ID, in many cases, operates under centralized control, limiting its global applicability, and making it specific to certain geographical and contextual environments. When we talk about decentralized identity, it goes beyond merely owning your data; it's more about control. In the future, decentralized identity data might reside in various locations, including your phone and the cloud. The significant advantage here is that you have control over your data and can decide with whom you share it.

It holds global applicability and can adapt to a multitude of use cases, with you, the user, at the center of every interaction. enables a level of empowerment not achievable with traditional Digital ID systems.

Mayuko: Could you share why you started focusing on Africa for decentralized identity initiatives?

Lohan: My involvement in the Yoma Project in South Africa, where we embraced SSI, sparked my passion for decentralized identity's application in Africa. I firmly believe that Africa is one of the regions where decentralized identity is most needed. In 1st world countries decentralized identity enhances existing systems and improves security. In Africa, it serves a different purpose.

Many African countries lack foundational identity systems, face low technical literacy rates, and have limited access to smartphones and data. Decentralized identity can be a catalyst for substantial economic growth in Africa, bringing people into the digital ecosystem and addressing various challenges. Financial inclusion is fostered and facilitated by establishing foundational digital identities; something especially critical in regions where existing systems tend to be exclusive.

In essence, decentralized identity has the potential to address significant problems in Africa more effectively than in developed nations.

Photo: Embu town, Kenya, taken by author

Mayuko: Considering that many people in low-income and rural areas, especially in African countries, don't have smartphones, how does DIDx address the challenge of including these individuals in decentralized identity systems? Is there a technical solution?

Lohan: Absolutely, we've been mindful of this challenge, especially in Africa, where we started with the Yoma project. To ensure inclusivity, we adopted a custodial model,

which involves a multi-tenant cloud-based wallet infrastructure. This approach allows us to serve nearly everyone, as long as there's a means for them to connect with this cloud wallet.

For individuals without smartphones, we've explored various options. They can interact with the wallet through SMS or USSD, bringing feature phone users into the ecosystem and ensuring their participation. This way, we bridge the gap and include people who would otherwise be excluded from the true SSI approach.

Additionally, we've contemplated an agent-based model, which could be particularly effective in rural communities. In this model, an individual with the necessary capabilities can act as an agent for others, thereby facilitating their interaction with the system. By allowing users to engage through these agents, the participants benefit from greater access to data and a mobile app, which in turn grows the ecosystem.

The offering of the custodial or cloud wallet, together with the agent model, can effectively serve marginalized communities. Furthermore, there are alternative methods, such as providing smart cards with Near Field Communication (NFC) capabilities that can also expand accessibility. Our aim is to ensure that decentralized identity is as inclusive as possible, even in areas with limited technological resources.

Mayuko: Could you tell us how decentralized identity can be applied to a cooperative savings group, which we call chama in Kenya, and what services are available or upcoming in this context?

Lohan: Chama in Kenya, or stokvel as we call it in South Africa, is quite prevalent, with billions of rands circulating within these informal savings communities. While some manage these groups with pen and paper, others use more technologically advanced methods provided by banks. Decentralized identities (DIDs) can play a significant role in the chama concept.

DIDs can help identify participants, track payments, and facilitate lending within a group. For instance, in South Africa, not having a bank account or credit history can hinder access to credit. By using DIDs, participants could potentially receive a credential indicating their savings capability, making them eligible for microcredit facilities, without having to withdraw money from the chama.

Another use case is in areas that lack credit bureaus. DIDs can enable marginalized individuals to accumulate verifiable receipts from retail shopping, which can be transformed into an alternative credit score, granting them access to microcredit facilities and enabling formal economic participation.

This technology also offers a promising use case for improving the voting process within informal communities like chama. Voting is a complex process, but DIDs can ensure that each identity casts only one vote, recording who voted, and who they voted for.

Photo: Market in Meru, Kenya, taken by author

Mayuko: What's the current status of decentralized ID usage in Africa, particularly in sectors like finance, education, and healthcare?

Lohan: There are some decentralized ID projects in Africa, like the Red Cross in Kenya, which uses decentralized identity to facilitate subsidy distribution. Various start-ups are beginning to discover the utility of this technology. Governments are aware of decentralized identity, but public sector endorsement towards widespread use takes time. In South Africa, we're working on a national digital identity initiative, leveraging decentralized identities to reduce fraud and improve onboarding & service access. Most African countries are exploring e-government capabilities, and the Gates Foundation recognizes decentralized identity as a fundamental requirement for these initiatives to scale.

Mayuko: Are public or private blockchains typically used in these projects? Can privacy, security, and decentralization all be fully achieved in decentralized identity technology, or is there a need for compromise?

Lohan: It's a mix of both. In the Yoma Project, we use Hyperledger Indy, a public permissioned blockchain. We are also considering public permissionless blockchains for token ecosystems. Privacy, security, and decentralization in decentralized identity (DIDs) depends on the use case. For marginalized communities, some decentralization compromise may be needed, but privacy and security can be maintained. True SSI can be fully decentralized, private, and secure, but with possible compromises in communities without smartphones.

Mayuko: Can decentralized identity be monetized, or is government funding the primary source for implementation in African nations?

Lohan: In my opinion, decentralized identity technology is on the path to becoming ubiquitous. We are seeing it being integrated into everyday devices like Apple and Google products. There are some emerging models, like Cheqd, which has a built-in monetization layer. In the short term I think one can expect some monetization through infrastructure, but ultimately we foresee the primary monetization of this technology revolving around value-added services. Monetizing decentralized identity is an area that still requires a lot of refinement and exploration, due to the unique nature of decentralized technologies and their emphasis on privacy, security, and decentralization.

Mayuko: Thank you very much for the very exciting talk!

Ch.5 EMURGO Africa Updates

5.1 About EMURGO Africa

EMURGO Africa invests and partners with Africa-focused enterprises, startups, and accelerators to **foster the development of socially impactful solutions on Cardano**'s third-generation and environmentally-sustainable blockchain.

Our Vision

> Turning Africa's challenges into opportunities, **leveraging the power of Cardano's blockchain to strengthen and develop economic resilience in nations and its citizens, and democratizing access to basic needs** through socially impactful Web3 solutions.

Our Mission

1. Support the **creation of blockchain solutions to promote businesses that solve social issues**.
2. **Promote Real-Fi, fusion of traditional finance and DeFi** (decentralized finance).
3. **Raise awareness of Cardano as a technological platform to build socially impactful solutions** and EMURGO's role in the Cardano ecosystem.

Cardano blockchain has the founding entities, **EMURGO**, **Input Output(IO)**, and **Cardano Foundation**. EMURGO Africa is a regional entity of EMURGO, focusing on Africa and the Middle East.

5.2 EMURGO Africa 2023 Q3 News

In Q3 2023, our company was actively engaged in the dynamic Web3 landscape, participating in events across Japan, Africa, and Singapore, demonstrating our commitment to innovation and market leadership. During this quarter, NODO proudly launched a significant product milestone. Additionally, Charles Hoskinson, Founder of Cardano Blockchain, delivered a keynote speech at the Adaverse Demo Day, underscoring the growing influence of Cardano blockchain and its leaders.

EMURGO Africa Event in Tokyo: Delving into the state of Web 3.0 in Africa

Tokyo, Japan, August 2nd, 2023

We shared the newly released State of Web 3.0 in Africa report with a diverse and influential audience of Web3 service companies, corporates, media, and more in Tokyo, Japan. The event provided a platform for prominent leaders and experts to share their experiences, insights, and perspectives on the exciting developments in the region.

READ MORE DETAILS FROM HERE

Osaka African Business Forum 2023 with EMURGO MEA

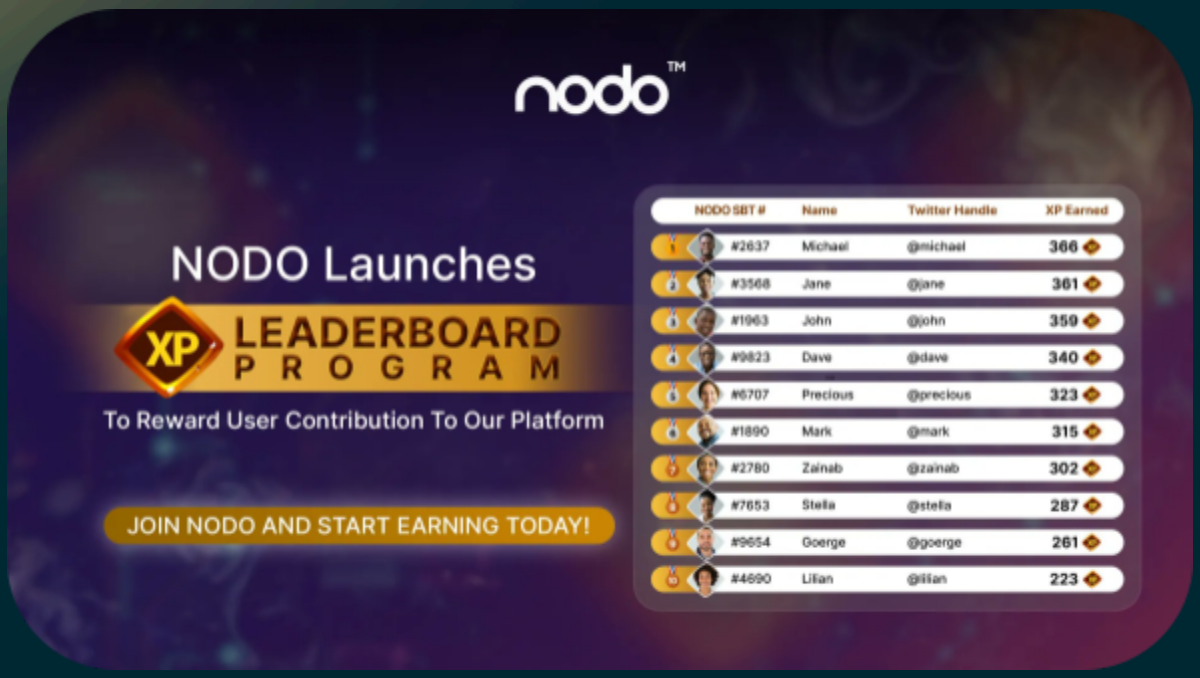
Osaka, Japan, September 1st, 2023

The Osaka Africa Business Forum is a two day event that provides a unique opportunity to explore, and connect with business opportunities in Africa and experience real Africa. EMURGO MEA Co-CEO, Yosuke Yoshida, spoke about technological innovation and startup investments in Africa.

LEARN MORE ABOUT THE EVENT FROM HERE

NODO XP Leaderboard Program Launched!

Nigeria, September 6th, 2023



NODO is excited to announce the launch of the NODO XP Leaderboard program to reward the contribution of users to the NODO platform. NODO Users will be able to upvote, comment and participate in features including quizzes, surveys, and posts contributed by NODO, NODO users will be able to earn NODO XP and rank on a weekly leaderboard with a 300 USDT prize pool. Start earning XP and join the NODO XP Leaderboard today: nodo.xyz

READ MORE DETAILS FROM HERE

EMURGO Africa at Digital Asset Summit ‘23

Abuja, Nigeria, September 6th&7th, 2023

EMURGO Africa was at the Digital Asset Summit 23, an event with an educational side for the Web3 ecosystem in Nigeria. At this event, regulators, policymakers, and tech stakeholders came together to discuss how to create a thriving ecosystem.

READ MORE ABOUT THE EVENT FROM HERE

Showcase EMURGO Africa's Commitment at Token 2049 in Singapore

Singapore, September 13th&14th, 2023

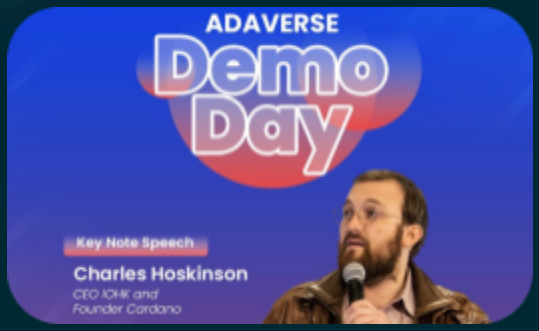
EMURGO Africa was part of the excitement at TOKEN2049 in Singapore. TOKEN2049 is one of the biggest annual crypto events in Asia, where founders and executives of the leading Web3 companies and projects share their view on the industry. Our team

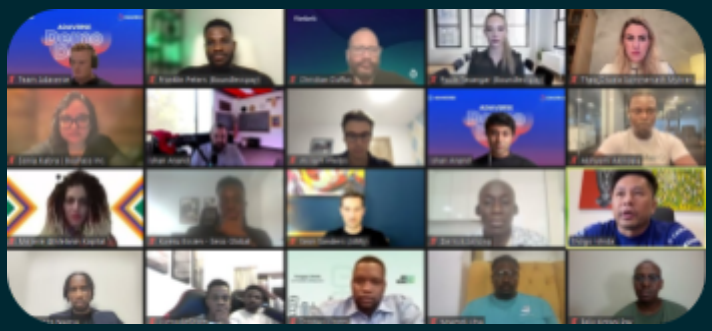
showcased EMURGO Africa's commitment to driving blockchain adoption and innovation across the continent.

READ MORE ABOUT THE EVENT FROM HERE

Charles Hoskinson, Founder of Cardano Blockchain, Spoke at Adaverse Demo Day

Online, September 29th, 2023





On Demo Day 2023, Adaverse's latest batch of startups presented to an invite-only audience of investors, market makers, exchanges, and media. Investors were invited based on their recent investment history and relation to our ecosystem. We also had a special guest, Charles Hoskinson, Founder of Cardano, Co-Founder of Ethereum, and CEO of Input Output, delivered a keynote speech at the demo day.

READ MORE ABOUT THE EVENT FROM HERE

5.3 EMURGO Africa Reports & Newsletters

Get access to our exclusive reports and newsletters, offering profound insights into Web 3.0 enterprises and technologies, and their ramifications on the advancement of African nations at the micro, meso, and macroeconomic level.

I. State of Web 3.0 in Africa: Kenya, Nigeria, and South Africa

This report was brought to you by **EMURGO Africa** and **PwC**. It showcases the **exponential growth and expansion of Web 3.0 technologies in Africa**, with the potential to bring transformative change to various industries such as **trade and industry**, **financial services and lending**, **supply chain management and logistics** and **healthcare provision and accessibility**. Investors are keen to fund blockchain startups and companies, having injected approximately USD 88.5 million in Kenya, Nigeria and South Africa in 2021.

DOWNLOAD THE REPORT FROM HERE

II. EMURGO Africa 2023 Q1 Report: Coin Market and Tokenized Projects

This report analyzed the **top 100 tokenized global projects (in terms of coin market capitalization)** as of April 8, 2023, focusing on categories and highlighting strong performers. The **token price growth and tokenization of 20 African tokenized projects** revealed the performances of African tokens in the market. **EMURGO Africa updates** include our new investments and the **launch of NODO and related products**.

DOWNLOAD THE REPORT FROM HERE

III. EMURGO Africa 2023 Q2 Report: Effect and Effort of Financial Inclusion

The report shows the **evidence of the effect of financial inclusion on development measures**, and it presents the **growth of digital finance in Africa, with lending being the most lucrative service**. Then, it explores **blockchain finance in Africa**: **DeFi often offers lower interest rates** but comes with additional costs. **EMURGO Africa's updates** include new investments and the **launch event of the "The State of Web3 in Africa" report with PwC** in Nairobi.

DOWNLOAD THE REPORT FROM HERE

IV. EMURGO Africa Newsletter: THE Web 3.0 Connect, Sep. '23

EMURGO Africa Web3 Newsletter brings the readers the **latest analysis about the African continent's Web3 landscape**. We aim to lead on this prong in a captivating and inclusive manner. **Our first edition** takes you through **Africa's Web3 lending landscape**.

READ THE NEWSLETTER FROM HERE

5.4 EMURGO Africa Portfolio

Nigeria

afriex · Afropolitan · awujo · Bitmama · BitSport · BoundlessPay · busha · CASSAVA · canza finance · chekkit · DIAGON · FanBants · houseafrica · nestcoin · Scalex · SESO GLOBAL · stakefair · versus

Kenya

arianion · amini · BuuPass · fonbnk · hustlesasa · Melanin Kapital · TalkSay

South Africa

Momint · Skrmlish · SIMULON

Cameroon

ejara

Ghana

MAZZUMA

Zimbabwe

AFRI BLOCKS · AFRIGUILD

Egypt

Provica

UAE

bitgrit · Credable · MidChains · tbtm

Switzerland

GOODWALL

USA

1. AfriBlocks
Zimbabwe
Founded in 2020

AfriBlocks is a **Global Pan-African Freelance Digital Marketplace**. Building the tech-infrastructure for Africa's future of work. AfriBlocks aims to create a diverse network of qualified & skilled African professionals; & to connect them with remote jobs from across the world.

https://www.afriblocks.com/

2. Afriex
Nigeria
Founded in 2019

Afriex is a **blockchain-based money transfer application** that is working to build a payment experience that's simple, delightful and fast.

https://www.afriexapp.com/

3. Afropolitan
USA/Nigeria
Founded in 2016

Afropolitan is creating a **Digital Nation to enable all Africans to build abundant lives**. Afropolitan is building a network comprising the best that Africa and the diaspora offer across art, finance, tech, health, energy, sports, and media.

https://www.afropolitan.io/

4. Amini
Kenya
Founded in 2022

Amini is a **climate tech business** that uses artificial intelligence and satellite technology to bridge **Africa's environmental data**.

https://www.amini.ai/

5. Awujo

Nigeria

Founded in 2021

Awujo is a **blockchain gaming guild-turned DAO** (decentralized autonomous organization) providing opportunities for Africans through gaming, education and community building. They started as a social gaming enterprise that ensures top-rated Web3 games are accessible and profitable for Africans.

https://www.awujo.co/

6. BellBank

Nigeria

Founded in 2022

BellBank is an agent and microfinance bank, which offers a variety of **digital payment solutions**, including convenient **point of service (POS)** machines and **QR code payment** systems, while utilizing the advantages of **both Mobile Money (MOMO) and agency banking**.

https://bellmfb.com/

7. Bitgrit

UAE/Japan

Founded in 2017

Bitgrit is a platform offering a **global network and community for data scientists** to interact with each other. They aim to establish an AI marketplace where transactions and interactions are based on smart contract and blockchain technologies.

https://bitgrit.net/

8. Bitmama

Nigeria

Founded in 2016

Bitmama is a highly-secured and fast-growing **crypto platform to buy, sell or trade Bitcoin, Ethereum, Ripple, Celo and other cryptocurrencies** at the best rates. Individuals can trade and manage cryptocurrencies, and digital assets conveniently on its platform.

https://bitmama.io/

9. BitSport
Nigeria/USA
Founded in 2016

BitSport is a **blockchain driven, competitive gaming ecosystem** reinventing the Gaming, eSport, & NFT space by creating mass market adoption via incentivisation & onboarding of traditional gamers playing their favorite games to the MetaVerse.

https://bitsport.gg/

10. Bit2Me
Spain
Founded in 2015

Bit2Me is a **financial services** company offering B2C and B2B services tailored to consumers and businesses, including a **centralized crypto exchange**. It is registered by the Bank of Spain as a cryptocurrency exchange and has also achieved AML/KYC compliance through its partnership with Jumio.

https://bit2me.com/

11. BoundlessPay
Nigeria
Founded in 2021

Boundlesspay is a secure application that turns your cell-phone into a **mobile bank**. Its pre-installed digital wallet and debit card enables **storing and spending of digital currencies across merchants globally**.

https://www.boundlesspay.com/

12. Busha
Nigeria
Founded in 2018

Busha is a trusted platform that helps to **buy, sell, and manage your cryptocurrency portfolio** in the simplest, safest, and most reliable way.

https://www.busha.co/

13. BuuPass

Kenya
Founded in 2016

BuuPass is a **digital marketplace for urban travelers to book their travel tickets**. It provides solutions to both operators and end users in the mobility ecosystem, thus playing a key role in the digitisation of the mobility space with its technology across Africa.

https://buupass.com/

14. Canza Finance

Nigeria
Founded in 2020

Canza Finance is providing access to **financial services** to the financially underserved masses in Africa and around the world through the use of Cryptocurrencies, Blockchains, and services such as DEX, DAPPS, and DeFi.

https://canza.io/

15. Cassava Network

Nigeria
Founded in 2021

Cassava Network is a **blockchain infrastructure** that **connects developers and users to Web3**. Through its native token CSV, Cassava transforms any web application into a crypto-enabled app that can reward contributors and end-users alike.

https://www.cassava.network/

16. Changeblock

Canada
Founded in 2021

Changeblock is an **environmental market technology provider and certification platform** that enables tokenization and trading of environmental attributes. It provides spot trading of environmental assets on exchanges and ESG services for clean technology developers (environmental token sellers).

https://www.changeblock.com/

17. Chekkit

Nigeria

Founded in 2018

Chekkit Technologies develops the **fabric for end-2-end traceability for the food and drug supply chain tracking**, leveraging the blockchain.

https://chekkitapp.com/

18. Credable

UAE

Founded in 2021

Credable is a **Digital Banking Platform** enabling **digital banking products for businesses** and connecting them to financial institutions to better serve the underbanked populations with products they need.

https://www.credable.io/

19. Diagon Studios

Nigeria

Founded in 2019

Diagon is a **play-to-earn gaming platform** that allows **users to earn money while having the best gaming experience** possible. They are developing a crypto-powered Casual Gaming, Utility, and NFT platform that will benefit a global mass audience in the long run.

https://www.diagon.io/

20. Ejara

Cameroon

Founded in 2019

Ejara is a **platform for French-speaking Africa to access various affordable investment** offerings: fractional shares, crypto and more.

https://www.ejara.io/

21. FanBants

Nigeria
Founded in 2022

FanBants is a **fantasy football game** where players pick a team of 11 players and earn points based on how their players perform in real life. The platform aims to build the ultimate fan destination, therefore connecting Africans through competition and community.

https://www.fanbants.com/

22. Fonbnk

Kenya/USA
Founded in 2019

Fonbnk is a new distributed finance company enabling a **frictionless, financial onramp for emerging markets**. Currently available to users across eight African countries (Kenya, Nigeria, South Africa, Ethiopia, Uganda, Ghana, Tanzania, and Mozambique), as well as those in India, the Philippines, Jamaica, and Ukraine.

https://fonbnk.com/

23. Goodwall

Switzerland
Founded in 2014

Goodwall is a **social development platform for young people to connect over shared interests and discover opportunities**. Young people can interact on Goodwall's social development platform to find opportunities and exchange interests.

https://www.goodwall.io/

24. HouseAfrica

Nigeria
Founded in 2019

House Africa is leveraging blockchain technology to **build trust in property transactions across Africa**.

https://houseafrica.io/

25. Hustle Sasa
Kenya
Founded in 2021

Hustle Sasa is a **mobile app for creators to sell directly to their fans**. The app makes it easy to create storefronts, manage orders, accept payments, and handle delivery. There are no set-up costs or monthly fees.

https://hustlesasa.com/

26. KabuK Style
UAE
Founded in 2019

KabuK provides a **new value proposition, "Save Now, Buy Later," through a travel subscription service** that offers an easy booking experience. This enables one to enjoy a more economical experience without the hassle of price fluctuations.

https://kabuk.com/

27. Kotani Pay
Kenya
Founded in 2020

Kotani Pay is a tech stack that **enables connectivity to last-mile payment solutions (especially mobile money) in Africa, with Stablecoin and Fiat on/off-ramp services** at its core, operated through both API and USSD.

https://kotanipay.com/

28. Mazzuma
Ghana
Founded in 2015

Mazzuma is utilizes secure infrastructure and cryptocurrency to enable seamless payments. The company focuses on the **global remittances market through last mile distribution into local mobile money accounts** and is regulated by the Bank of Ghana.

https://mazzuma.com/

29. Melanin Capital

Kenya

Founded in 2020

Melanin Kapital is a **collaborative financial platform connecting social impact projects in Africa with international investors**. In 2021, Melanin Kapital started disbursing **loans to SMEs, using M-Pesa statements to generate credit scores** for these companies.

https://www.melaninkapital.com/

30. Midchains

UAE

Founded in 2017

MidChains is an **institutional cryptocurrency asset trading platform** based in the Abu Dhabi Global Market (ADGM) and regulated by the FRSA.The platform aims to offer one of the first completely supervised and regulated ecosystem infrastructures in the world for trading and investing in digital assets.

https://www.midchains.com/

31. Momint

South Africa

Founded in 2021

Momint is a **South African online marketplace** which allows artists to **auction, sell, trade, and display their art as non-fungible tokens (NFTs)**.

https://www.momint.so/

32. Nestcoin

Nigeria

Founded in 2021

Nestcoin is a **web3 application company** that builds, operates, and invests in crypto-native products.

https://nestcoin.com/

33. Nuzo

USA

Founded in 2022

Nuzo is a **blockchain-powered e-commerce platform tailored to the African market**, which can reward both buyers and sellers on the platform through loyalty points called Nuzo coins.

https://nuzo.co/

34. Pravica

Egypt

Founded in 2019

Pravica is a **unified secure digital communication suite** that meets Web 3.0 standards and uses blockchain to empower user privacy and security. Pravica enables businesses and people to create their own **cryptographically sealed identities and preserve their own data** without the need for third parties to retain it.

https://pravica.io/

35. Revix

South Africa/UK

Founded in 2018

Revix is an **investment platform** offering a range of **alternative financial products (including split and tokenized real estate and VC funds)** with a focus on a group of digital assets.

https://revix.com/

36. Scalex

Nigeria

Founded in 2021

Scalex through blockchain technology has built financial solutions that **use cryptocurrencies to facilitate financial transactions**. It has 2 Products: **a secure P2P platform to facilitate remittance** and **transfer of value through cryptocurrencies across borders.**

https://www.scalex.africa/

37. Seso Global

Nigeria/USA

Founded in 2019

Seso Global is an **all-inclusive proptech platform**. It is based on blockchain technology, which provides a marketplace that supports secure and risk-free **digital land transactions between property owners, buyers, land agencies, financial institutions, and professional**s that service the real estate value chain.

https://app.seso.global/properties/home

38. Simulon

South Africa

Founded in 2019

Simulon is the **first 3D platform to bring studio-quality VFX content creation to mobile**. It offers a seamless experience using 3D assets and environments with cloud rendering and stable diffusion.

https://www.simulon.com/

39. Skrmiish

South Africa

Founded in 2018

Skrmiish is a **mobile "play-to-earn" app** that enables **gamers of every level to earn cash in every match** they play across the AAA+ games through MoneyMatch, a feature created by Skrmiish.

https://www.skrmiish.gg/

40. Snowstorm

USA

Founded in 2022

Snowstorm offers a VPN that will disrupt conventional VPNs. At its core, it offers **a VPN that can never be broken by decentralizing servers and allowing everyone to contribute to the VPN network**.

https://snowstorm.net/

41. StakeFair
Nigeria
Founded in 2021

Stakefair is an ecosystem of blockchain, crypto and DeFi products. StakeFair aims to build **staking infrastructure** for the new web.

https://www.stakefair.io/

42. Talksay
Kenya/USA
Founded in 2021

TalkSay is a **networking application that allows users to make friends and host live sessions in one's local language**.

https://www.talksay.io/

43. TBTM
UAE
Founded in 2015

TBTM (Take Back the Mic) Studios has built the **world's first blockchain-based Media Fintech**, turning Culture into Currency by rewarding fans and compensating creators for building communities around great content.

https://tbtm.app/

44. Versus Africa
Nigeria
Founded in 2018

Versus is a tool that combines **online and offline consumer data** to **give brands actionable and competitive insight for the African market**.

https://versus.africa/