## UPANZI PROJECT SUMMARIES

## Smishing

SMS phishing (Smishing) has been on the rise in Africa with the increased proliferation and use of mobile phones. While there has been some work done on smishing detection, these have been based on extensive languages like English. There are no data sets for local dialects in Africa. In this project, we intend to deploy an infrastructure for collecting SMS datasets in low resource languages. The collected data will be used to train a machine learning model for detecting smishing messages on mobile devices. The smishing detection model will include URL link analysis.

## Automatic signature authentication using machine learning

The main goal of this project is to make online signature verification more reliable, and usable in resource-constrained environments by developing a mobile application to collect dynamic

signature characteristics such as pressure, speed, and signature coordinates. We will use the pool of data to train a machine learning model to identify a genuine from a forged signature.

## Rural connectivity

There is still a huge digital divide between people living in rural areas and those living in urban areas. With some of the barriers being those related to technological infrastructure, underserved communities may be excluded from various services such as those offered by government and other institutions. The aim of this project is to deploy an opportunistic connectivity network that could provide communication opportunities to areas that are under-served by operators or areas with no existing communication infrastructure. We aim to ensure that this can be delivered at a low cost and requiring little or no downtime to limit frequent interventions of service providers.

## Building a digital model for malaria screening

Lack of malaria data in African countries leaves the continent in a state where it is struggling to timely and accurately diagnose malaria, making treatment difficult, and leading to high morbidity and mortality. In this project we aim to digitize the malaria screening process by building a digital system model for malaria monitoring to improve the detection and identification of malaria parasites. We will utilize a special camera mounted on a light microscope to collect blood samples images and employ machine learning classification methods to classify the malaria parasites. This process will also contribute to providing a public data repository that can allow various stakeholders to access and visualize malaria data.

## Measuring internet resilience in Africa

The internet has become an integral part of the lives of individuals, companies, and many other entities. Ensuring that all the components that work together to make the internet function with minimal disruption is critical. One of these components is the domain name system (DNS), whose resilience has been threatened with the increasing internet attacks. The goal of this project is to quantify the resilience of DNS attacks in Africa and to provide solutions to strengthen its infrastructure. In achieving this goal, we will also examine the hosting and reliability of African country code top-level domain (ccTLDs) and all global DNS services with presence in Africa.

## Vulnerability assessment and penetration testing of digital financial applications in Africa

In a bid to achieve financial inclusion, organizations and individuals have developed various innovative financial solutions such as web applications and mobile applications. However, these applications collect and store sensitive client information. If an attacker compromises those systems, personal information will be disclosed putting the organization and individuals at risk.

In this project, we will adopt black-box testing investigate how much security is built into these applications and the level and class of permissions requested by mobile applications.

## Investigating MOSIP deployability and security

MOSIP is an open-source foundational digital ID system that allows users to enroll and get authenticated using their biometric credentials. While MOSIP as a DPG has the potential to deliver value to the digitalization of Africa, very few countries have successfully implemented it. The low adoption may be associated with the lack of publicly available MOSIP deployment guides, the difficulty in maintaining a MOSIP deployment and the deficiencies of the official documentation. The aim of this project is to identify and document MOSIP implementation challenges through an internal deployment, and to use our experiences to improve the publicly available MOSIP implementation resources.

## Developing a framework for the interoperability of Digital Public Goods

Digital public goods (DPGs) are being developed across different sectors and for different user groups and populations. However, there is little interaction between DPGs, and this introduces the risk of having DPGs developed in silos thus underutilizing the benefits of interoperability. In this project, we are working to develop and test middleware that supports interoperability. This will be accomplished by developing and testing the interoperability between MOSIP (an open-source foundational digital ID system that allows users to enroll and get authenticated using their biometric credentials) and DPGs like OpenMRS and DHIS2. We aim to develop software that can facilitate the two platforms to seamlessly utilize the MOSIP platform as a source of digital biometric identity and authentication.

## Exploring use cases for livestock identification and biometrics

Strict collateral requirements by formal financial institutions means that rural, poor, and marginalized residents, who typically store wealth in the form livestock cannot easily access formal credit. We propose to develop a system for the unique identification and tracking of livestock, linked with national ID and disease surveillance systems. This will enable livestock farmers to prove identity, health, and ownership of their livestock, and explore the uses of such possibilities for needs such as credit access, inter-regional trade and livestock disease/health tracking and surveillance.