

# Developing A Biometric Based Unique Personal Identifier: the Stone HMIS<sup>®</sup> Experience

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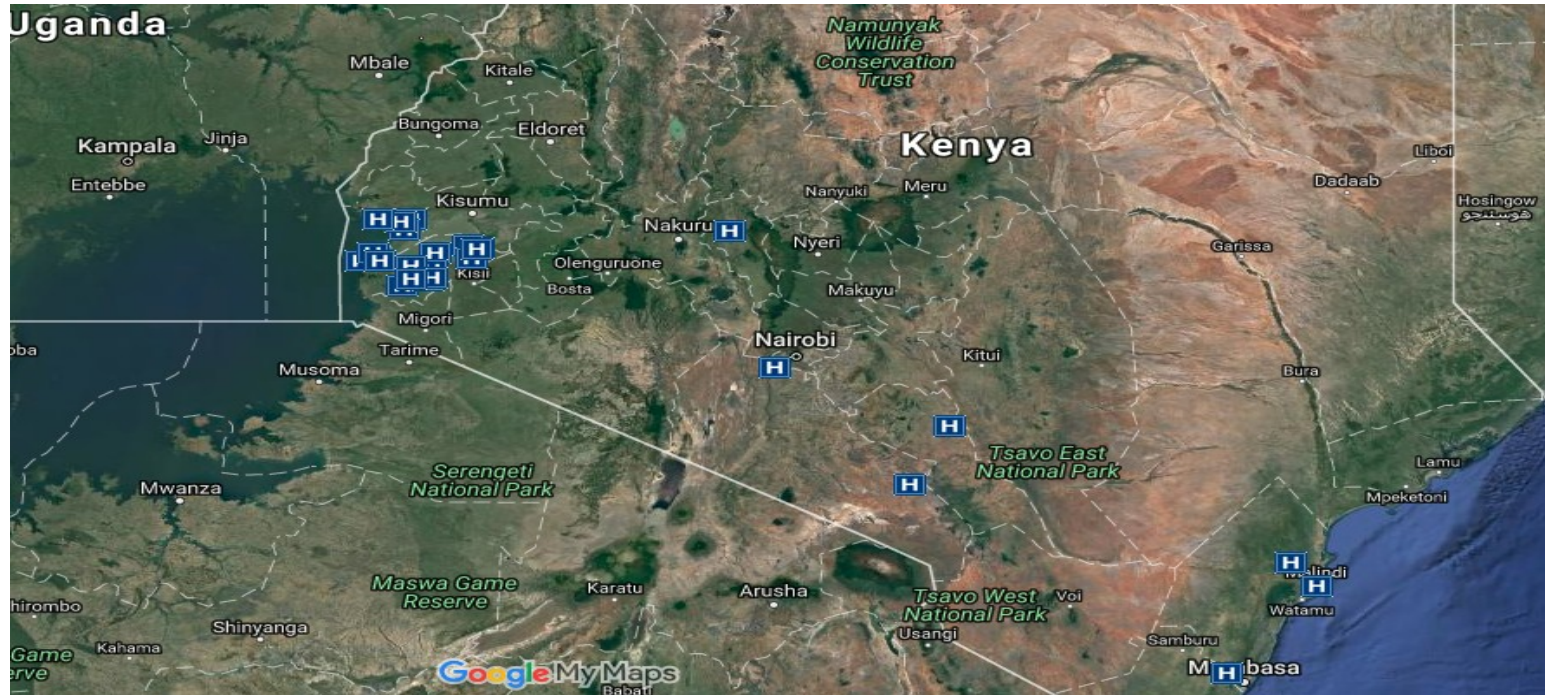
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# Overview

- About Afya Research Africa (ARA)
- About Stone HMIS®
- Our Identity need
- The solution and its implementation
- Early results and emerging lessons
- Summary

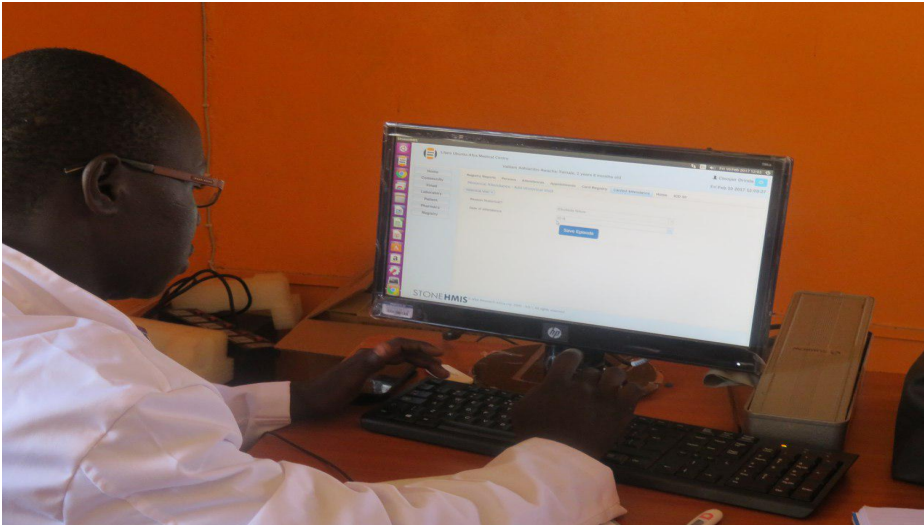
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# About Afya Research Africa: Ubuntu Afya Clinics



STONE**HMIS**

# About Afya Research Africa: Stone HMIS<sup>®</sup>



*We provide affordable, appropriate and integrated electronic health record technology tools that empower health workers assist communities to attain high quality essential healthcare*

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## Health Records

### Poor Client Health Records

#### Client Record:

- Unlinked
- Untraceable
- Lost



#### Client Healthcare:

- Disjointed
- Inconsistent

#### StoneHMIS©:

- ✓ Point of care
- ✓ Community level
- ✓ Links records

### Poor Aggregate Health Records

#### Source Data:

- Inaccurate
- Incomplete
- Untimely



#### Decision Making

- Poor planning
- Stock out
- No co-ordination

#### StoneHMIS©:

- ✓ Integrates
- ✓ Aggregates
- ✓ Transmits

## Health Outcomes

### Poor Individual and Overall Health Outcomes

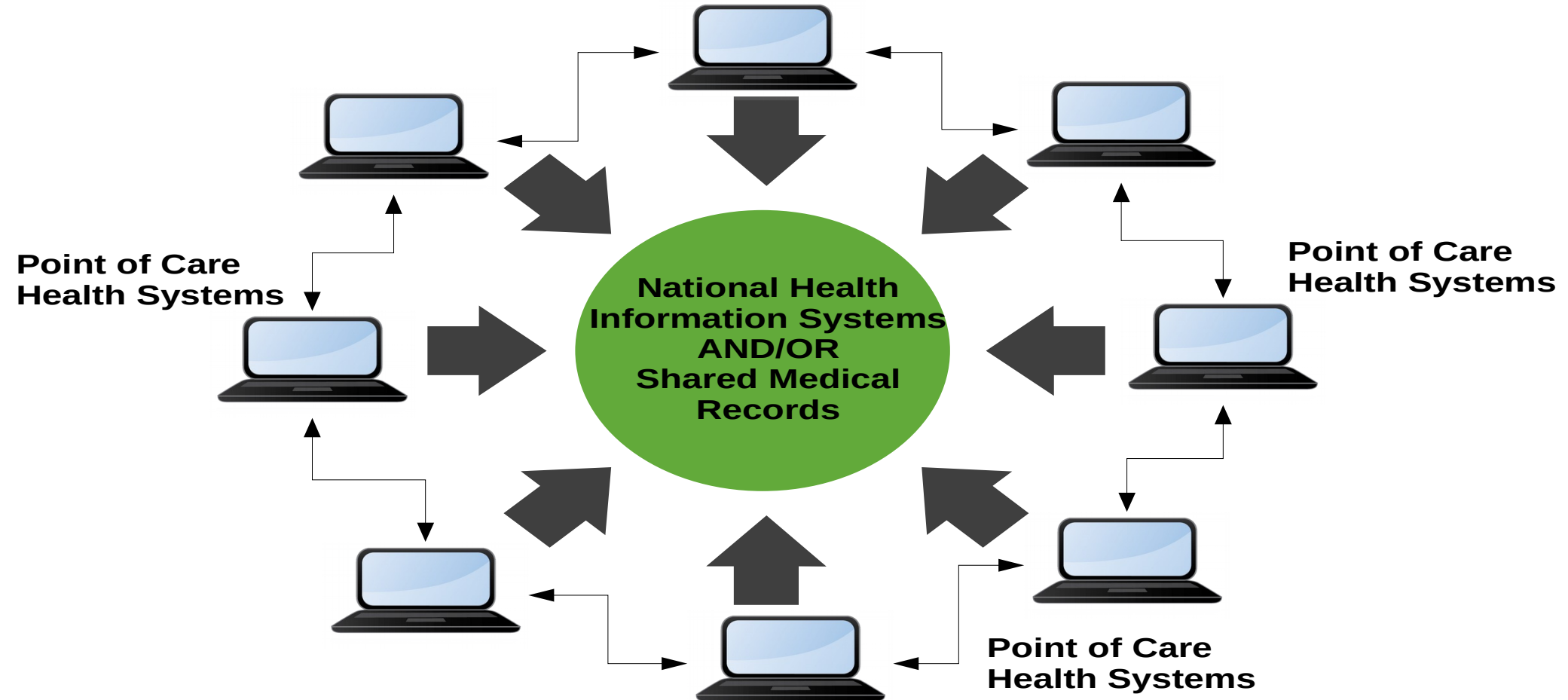
- Low quality
- Inefficient
- Poor safety
- Disparities

#### StoneHMIS©:

- ✓ Track care processes
- ✓ Track outcomes
- ✓ Quick feedback

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**Our Identity Need:  
A Unique and Universal Identifier for Linkage of Health Records**





# Why rediscover the wheel?

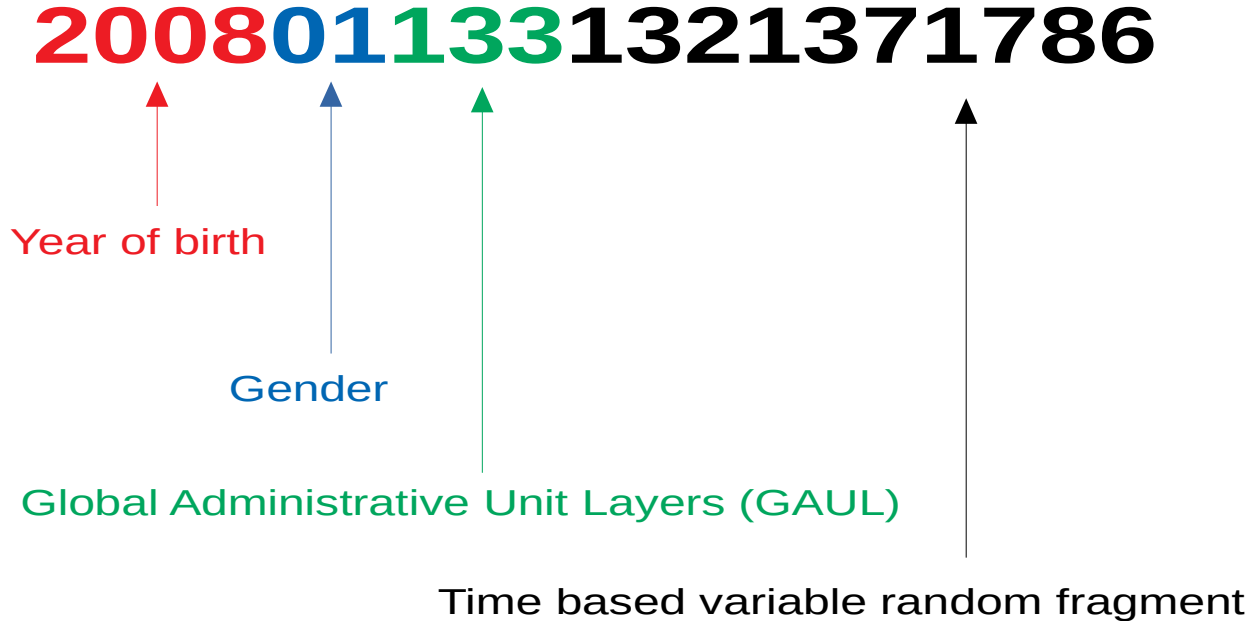
- **Existing identity systems:**
  - National identity
  - National Hospital Insurance Fund Identifier
  - Revenue Authority Taxation PIN & other organization level identifiers
  - Proposed National Unique Person Identifier (NUPI)
- **Limitation for our use case:**
  - Loss, forgetfulness, dubious authenticity & duplication
  - Restricted acquisition by age, citizenship status, tedious and slow, etc
  - Implied legal and administrative consequences
  - Delayed implementation of NUPI
  - Proprietary and restricted organization level identification systems that may not scale

# Private Universal Unique Person Identifier (PUUPID)

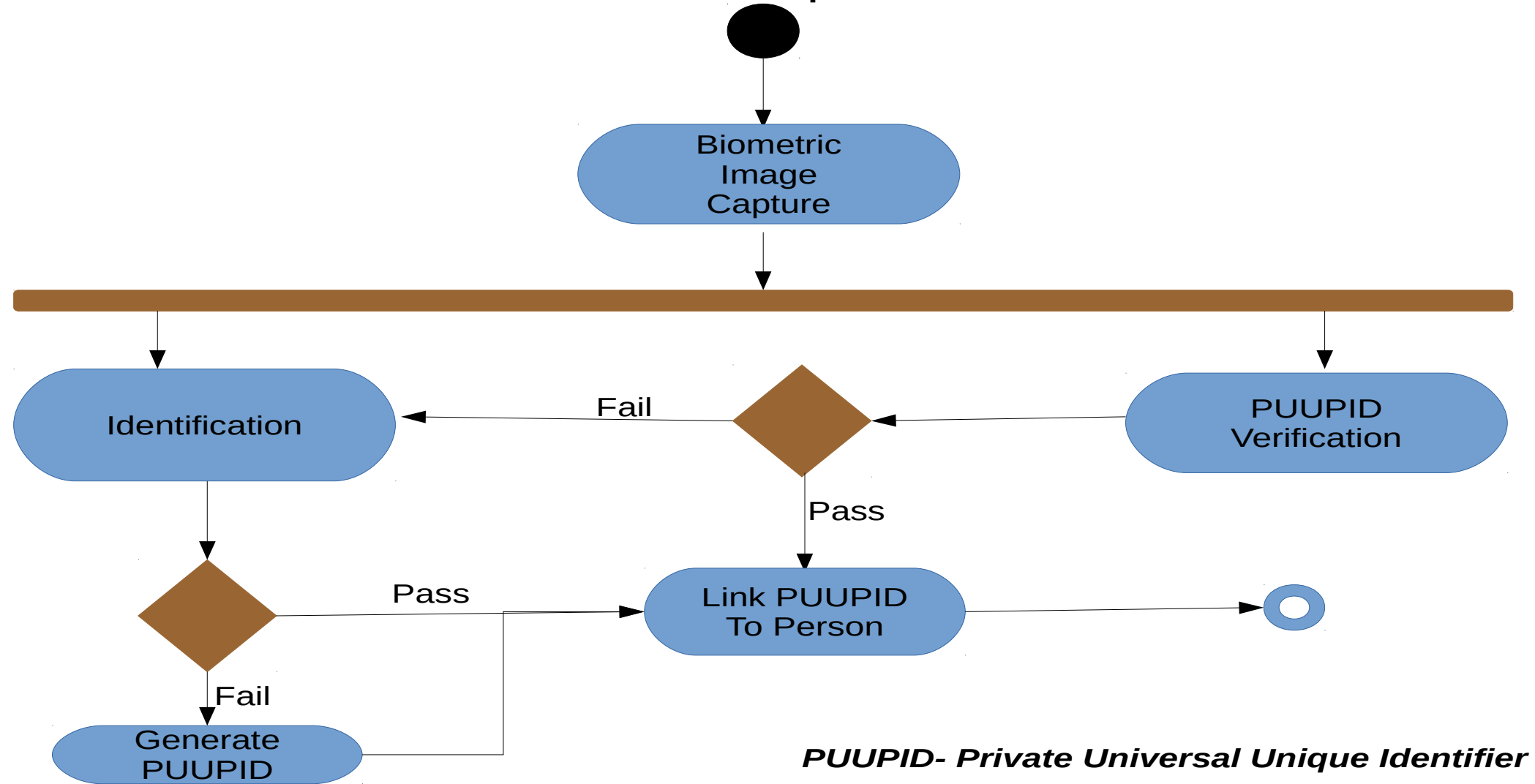
- Numeric Identifier
- **Private**
  - No personally identifiable information held
  - Devoid of implied legal and administrative consequences
  - Linkage to identifiable information is left to local use case implementations
  - A single copy of the original raw record held only in one central location
- **Universal**
  - No restriction to generation, acquisition or use,
  - Can be put into as many use case as need
- **Unique**
  - Based automatic identification of unique biometric features
  - Currently based on automated fingerprint identification
  - Can be attached to other unique biometric features as they become available



# Private Universal Unique Person Identifier (PUUPID) Structure



# PUUPID Conceptual Model



## Typical PUUPID Infrastructure & Implementation

**Local/Wide Area Network**

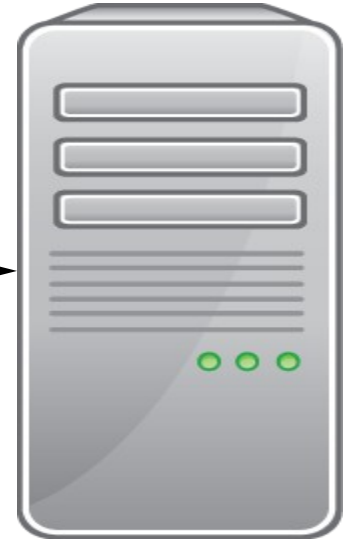
**Cloud Computing**



**Puupid Desktop Client (pdc)**



**Puupid Client Server (pcl)**



**Puupid Central Server (pcs)**

# Typical Software Requirements

- **Puupid Desktop Client (pdc)**
  - A platform that supports Unix/Linux shell scripting, typically Ubuntu
  - Web browser
- **Puupid Client Server (pcls)**
  - A platform that supports Unix/Linux shell scripting, typically Ubuntu
  - Database server software, typically mysql
  - Web server software, typically Apache 2
  - National Institute of Science and Technology Biometric Imaging Software (NBIS) Release 5.0.0
  - Internet connectivity
- **Puupid Central Server (pces)**
  - As above for Puupid Client Server

# Ubuntu Digital Collaboration: PUUPID Pilot Project



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# Using PUUPID for Unique Identity In Community Health Work



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# Using PUUPID for Unique Identification at Health Facilities



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# Using PUUPID for Unique Identification at Health Facilities



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# PUUPID Linked Records


Tasia Ubuntu Afya


Moses Ndiritu

Sat Mar 31 2018 14:21:06

Home

Community

Finad

Laboratory

Patient

Pharmacy

Registry

Sync

System

Registry Reports

Persons

Attendance Registry

Appointments

Card Registry

DHIS2

Home

ICD 10

Registry of Persons - List Person

Registry Menu

PID	PUUPID	Name	Sex	Date of Birth	Nationality	Registrar
10286	2008011331321371786	Ndirangu Ndiritu Biko	Male	29.09.2006	Kenya	Moses Ndiritu
10273	2008011331321371786	Biko Ndirangu Ndiritu	Male	30.09.2008	Kenya	Moses Ndiritu
10285	2007001331321472796	Wanjiru Ndiritu Olivia	Female	14.01.2006	Kenya	Moses Ndiritu
10284	2007001331321472796	Olivia Wanjiru Ndiritu	Female	14.01.2007	Kenya	Moses Ndiritu
10289	1974011331324771783	Ndirangu Ndiritu Moses	Male	06.01.1975	Kenya	Moses Ndiritu
10216	1974011331324771783	Moses Ndiritu Ndirangu	Male	06.01.1974	Kenya	Moses Ndiritu
10246	1945011331327674620	Paul Must Now work	Male	01.09.1945	Kenya	Moses Ndiritu
10282		Paul Ekabonyo Ekeno	Male	12.04.1992	Kenya	Moses Ndiritu
10281		Enock Oloo	Male	01.05.1994	Kenya	Moses Ndiritu
10280		Sharon Kanini Mallo	Female	18.04.1995	Kenya	Moses Ndiritu

Total: 200

1 2 3 ... 20

10 | 25 | 50 | All

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# Results

- During Feb 2018, nearly 4,000 persons were enrolled for PUUPID identification at community health work level
- In March 2018, health facility level identification commenced
- Linkage of episodes possible:
  - health facilities and community health units
  - Health facilities
  - Community health units
  - Geographically and temporally dispersed locations using puupid

# Emerging Lessons

- Thresholds proposed for Automated fingerprint matching and pattern classification may need to be revised appropriately depending on resolution of scanning devices to cater for structurally smaller fingerprints or for closely related persons
- Because of integration into distributed EMRs, PUUPID is a viable solution for unique identification in front-line health care settings
- Difficult in acquisition of fingerprint among children below 2 years may preclude use of automated fingerprint identification systems to generate a unique identifier for this group

# Summary

- A unique numeric identity based on a single and/or multiple unique biometric identifiers is possible
- There is affordable hardware and open source software to construct an Automated fingerprint identification system (AFIS) as the basis for a universal unique identification
- Initial challenges of cost, software programming skills, and limitation of AFIS in the extreme of ages must be considered when setting up such a system
- A functional system has minimal maintenance cost, can be used by any computer literate person and is a viable for resource constrained settings

# Acknowledgement

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