simprints
every person counts

Biometrics for patient identity management

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Duplicates

According to a study by UNAIDS of Brazil, **of an estimated 140 million records** in the national user database **only 100 million unique patients** were represented.

Source: [It's a puzzle, it's an algorithm, it's deduplication]

Unreliable data

In vaccine coverage, **the gaps** between administrative data and WHO surveys in Chad is **over 50%.**

Source: Gavi Chad Audit 2019

Biometrics can ensure unique patient records across digital health systems

Introduction to Biometrics

What are some examples of biometrics?

Face

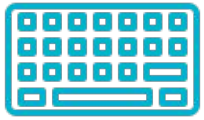
Fingerprint

Iris

Palm/Vein

Gait

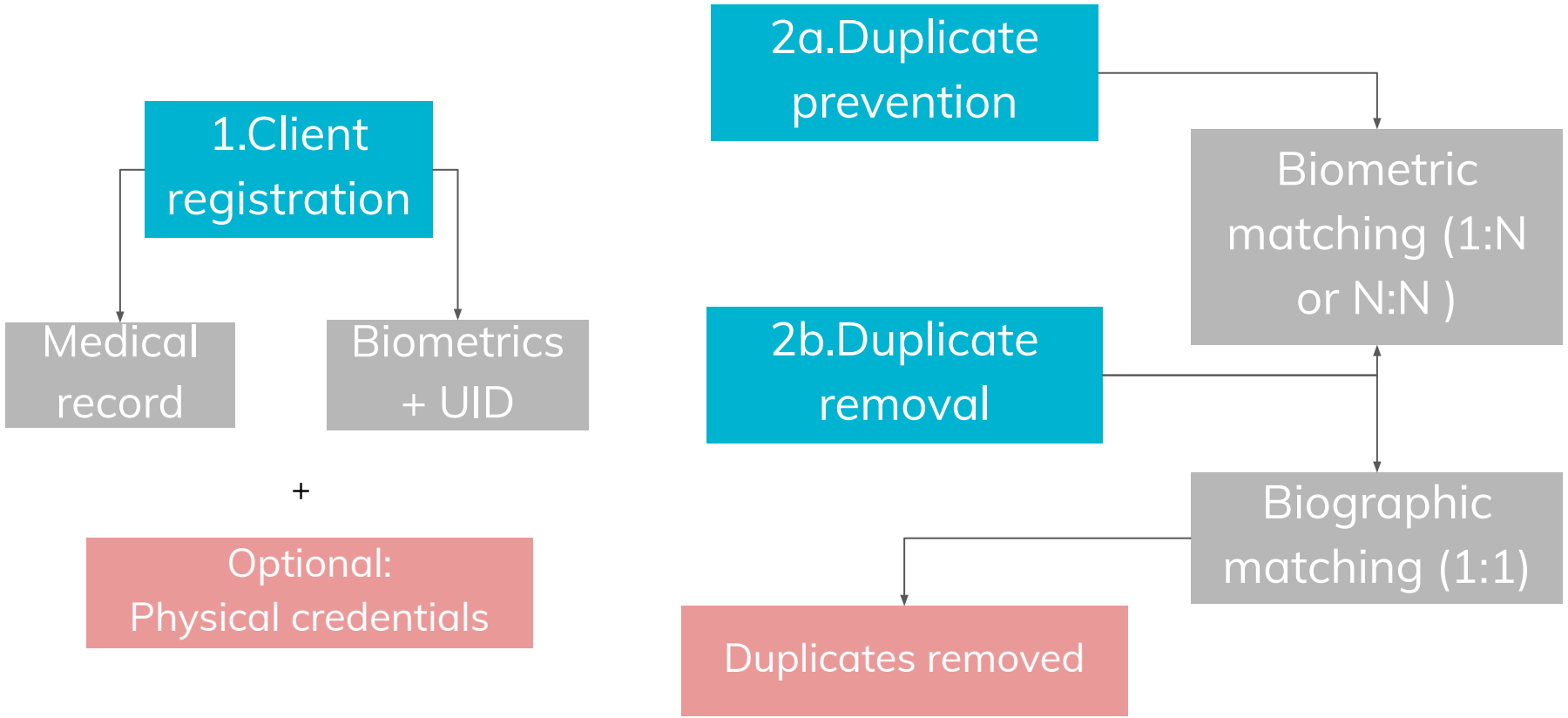
Signature



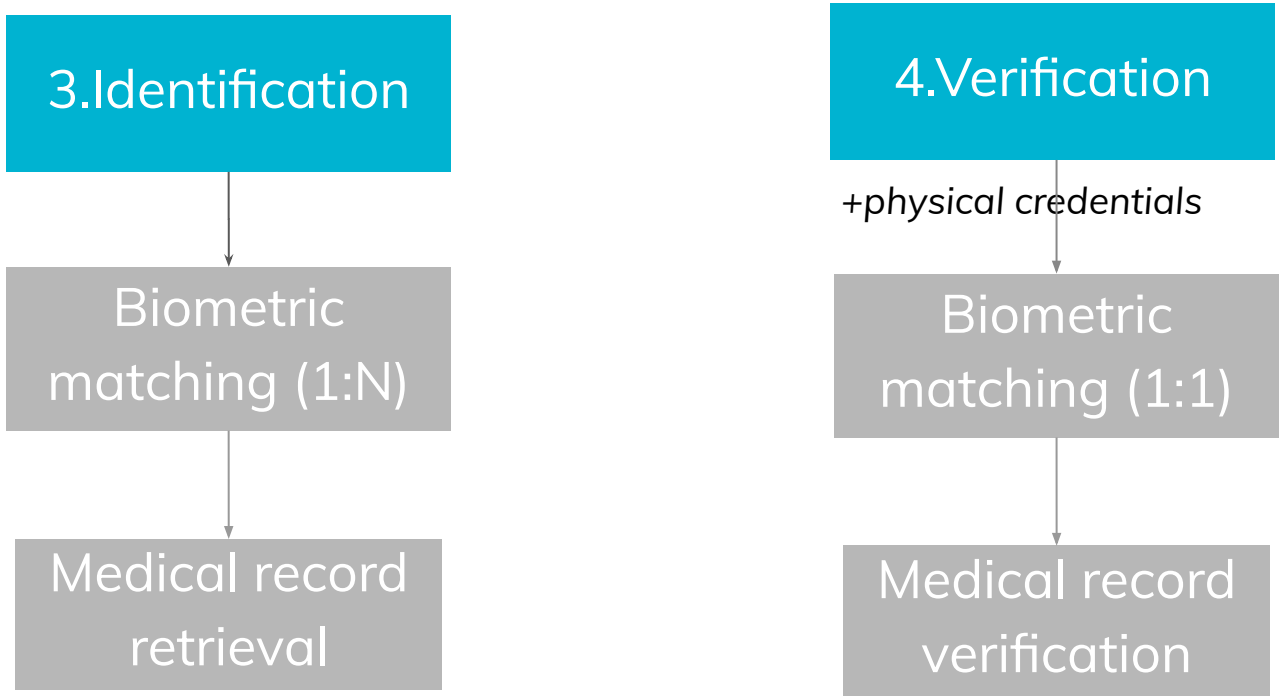
Keystroke

Voice

How are biometrics used?



Identification vs. verification



Biometrics system components

Image detection and feedback

Image capture errors

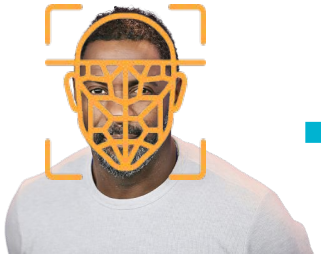
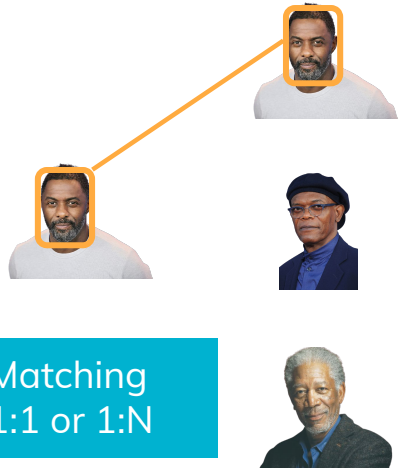


Image quality assessment

Image quality parameter

Feature extraction

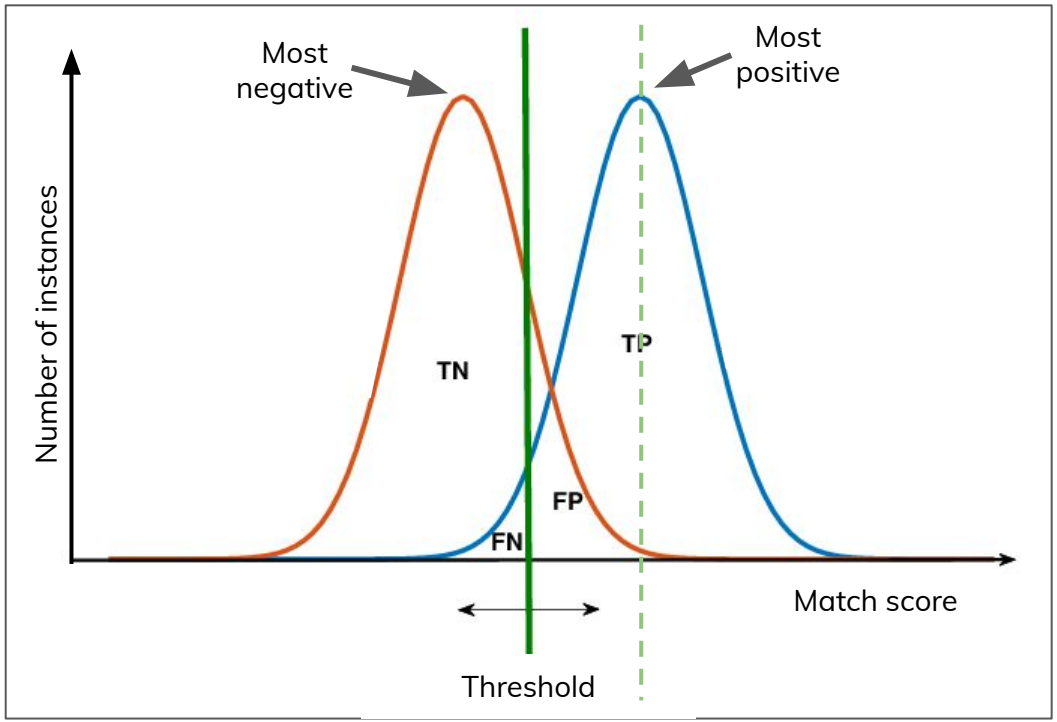
Template size & reversibility



Matching 1:1 or 1:N

Matching accuracy

How do we measure accuracy?



- Match score
  - similarity
- Threshold
  - match?

- TP = True Positive
  - should match
- TN = True Negative
  - should reject
- FP = False Positive
  - unintended match
- FN = False Negative
  - unintended reject

Five metrics to assess accuracy

FTE: Failure to Enroll

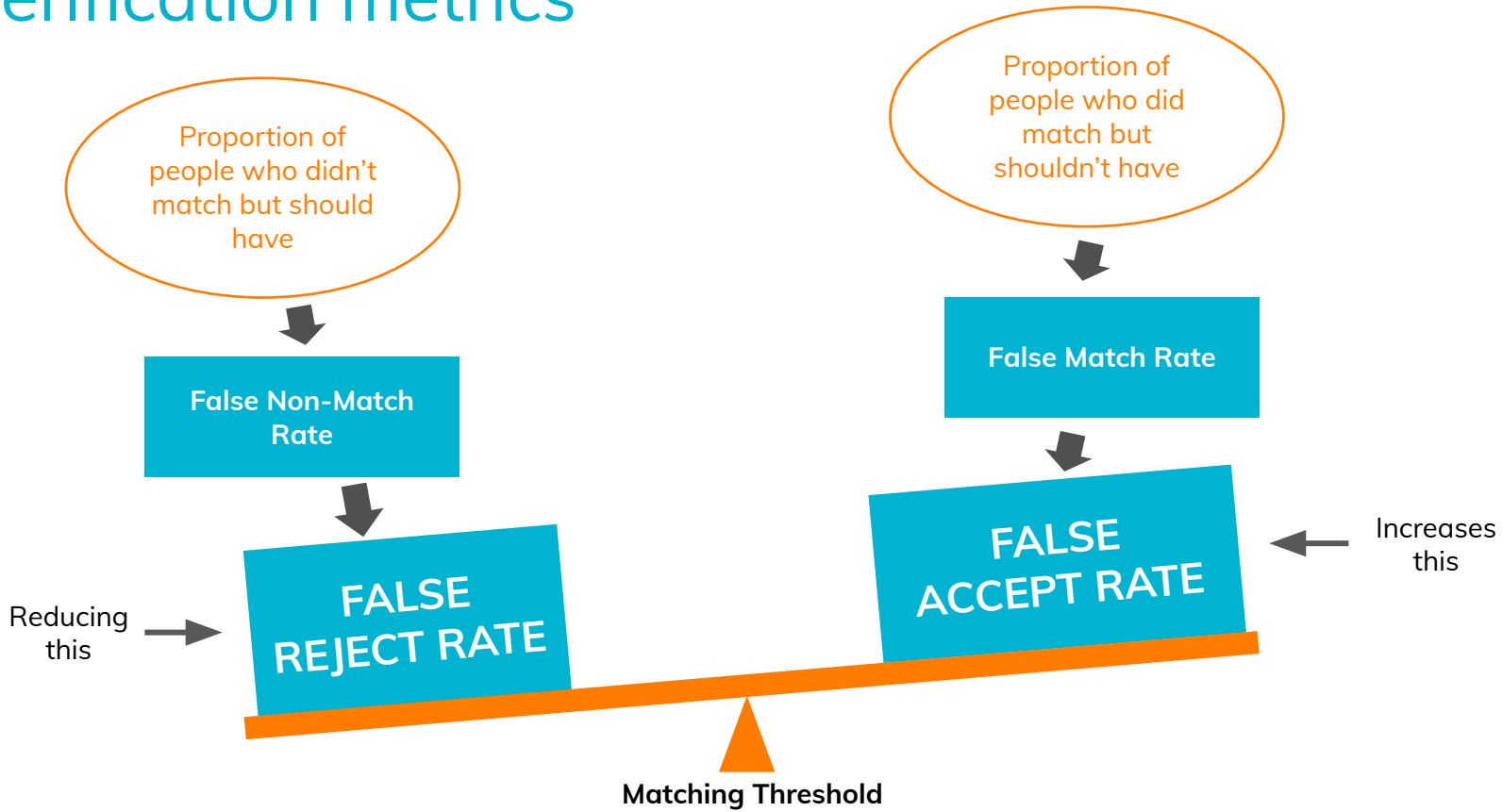
FAR: False Accept Rate

FTA: Failure to Acquire

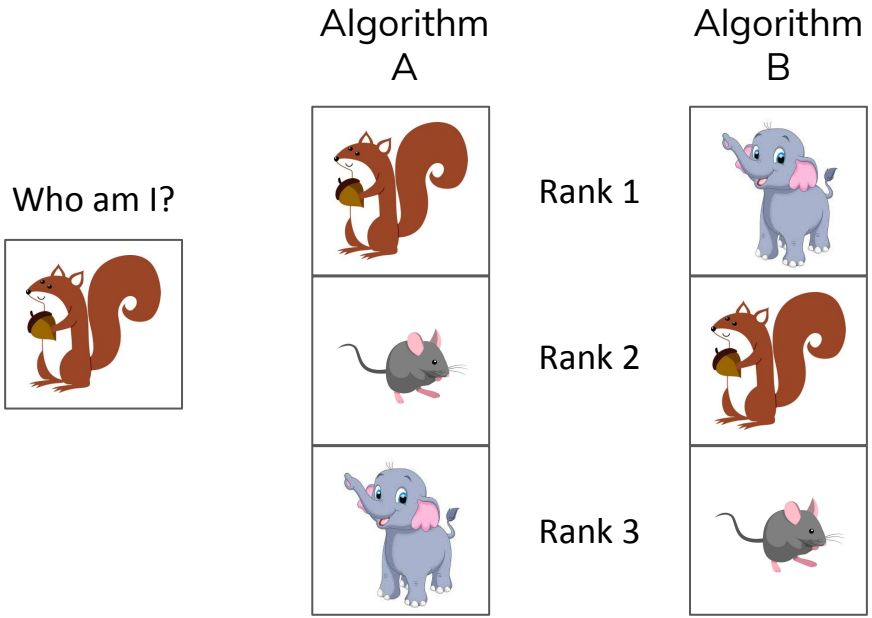
FRR: False Reject Rate

TPIR: True Positive Identification Rate

Verification metrics



Identification (search) metrics



True Positive Identification Rate

How often (%) an individual ranks on a particular level in their search results

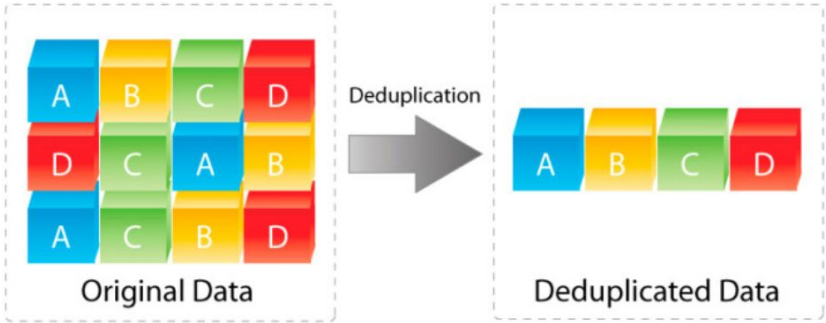
- TPIR 1 - 1st (95%)
- TPIR 2 - 2nd (97%)
- TPIR 3 - 3rd. (100%)
- etc.

Data validation and deduplication process

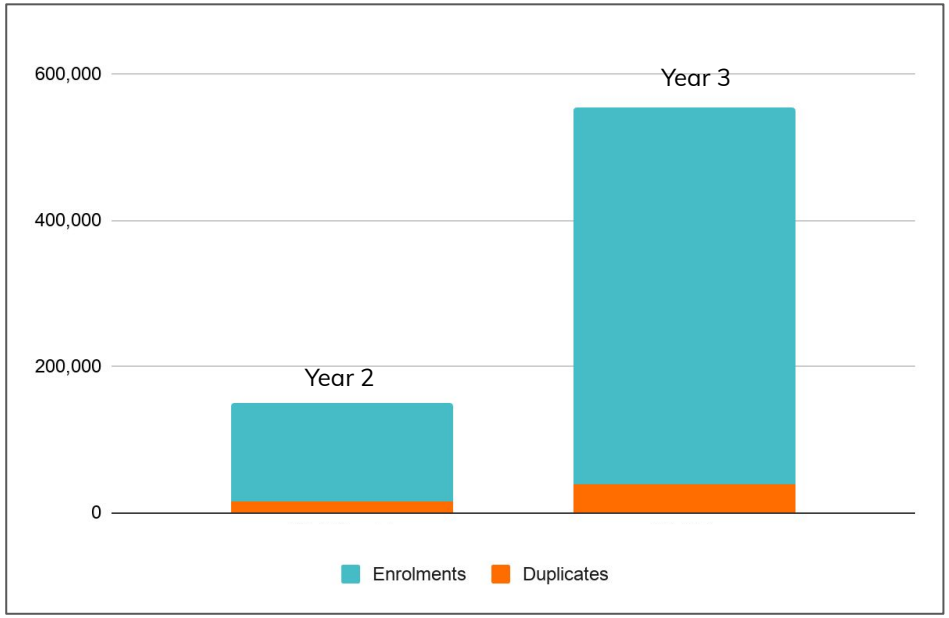
1. *Establish ground truths through well labeled data collection exercise
2. Biometric template matching
3. Clustering
4. Analysis and threshold setting
5. Outlier analyses with metadata
6. Record adjudication with biographics
7. Record reconciliation and deletion

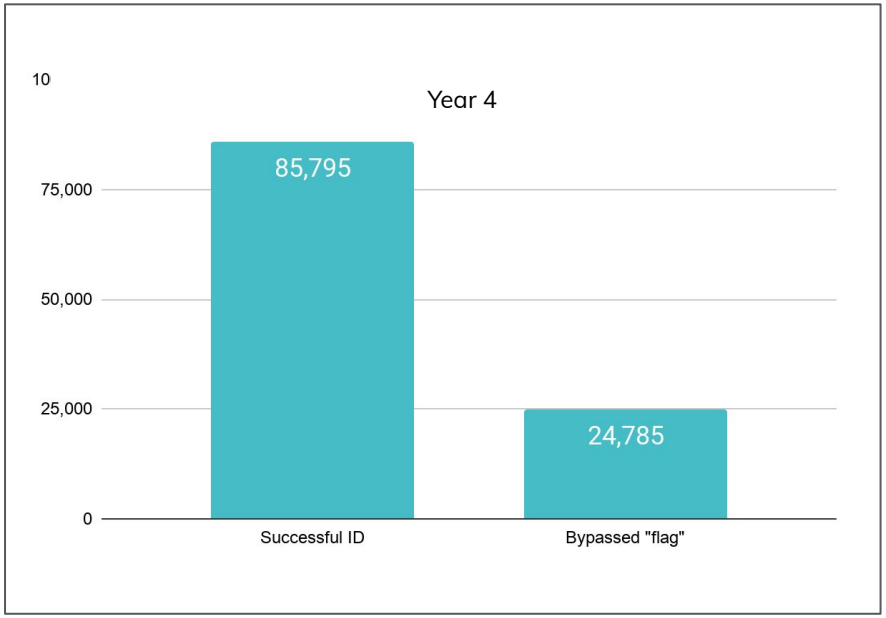
Biometric duplication analysis

*Ideal, but not required. Makes it possible to do #4 confidently.



Case-study 1 : Duplication volumes

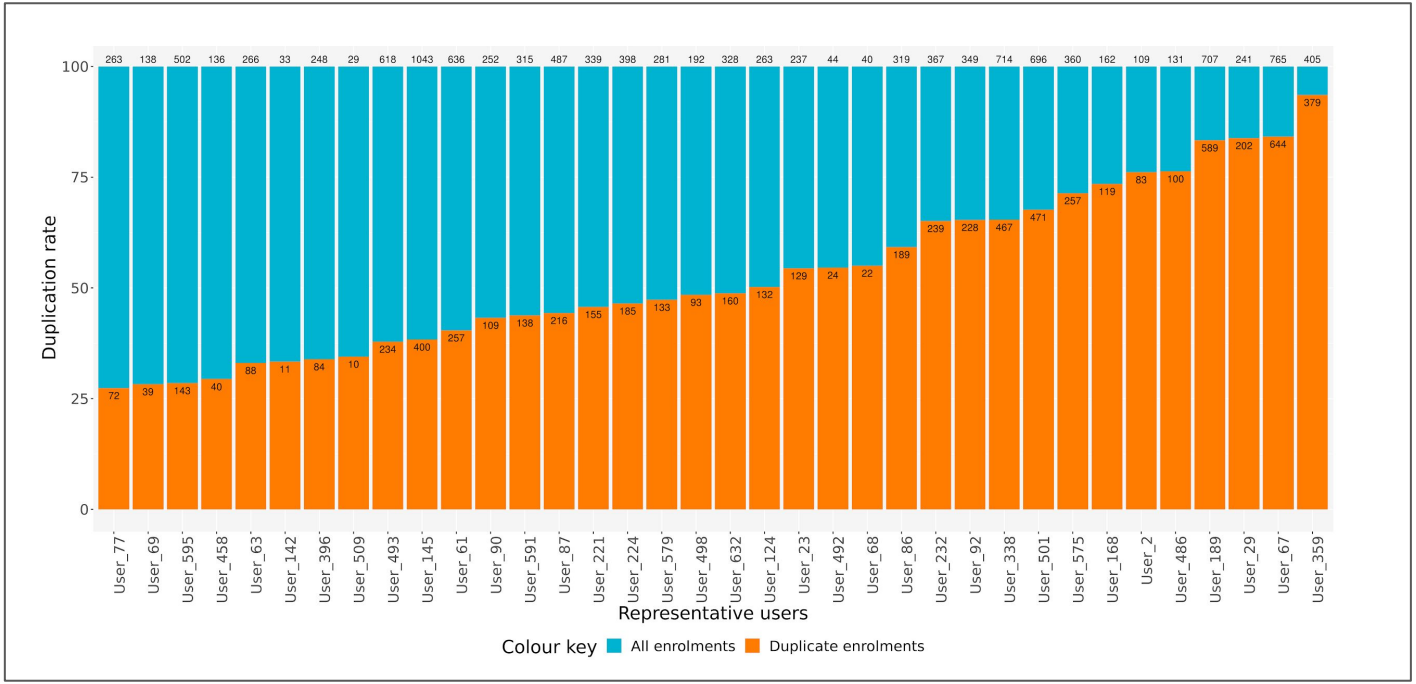




Found 6% duplication, acceptable in your project?

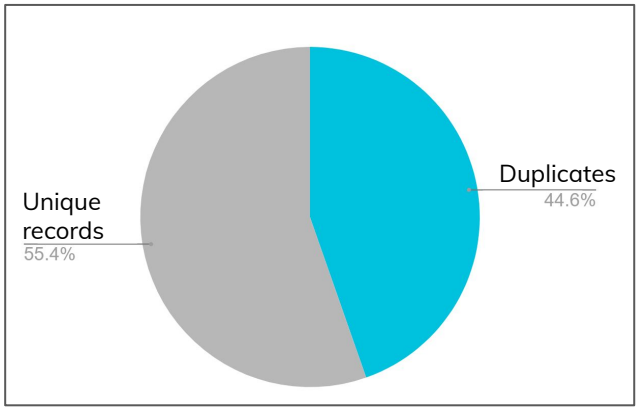
85,795 prevented through real time deduplication
24,785 preventable but not selected (mandatory?)
12,107 identified through offline deduplication

Case-study 1 : Duplication analysis



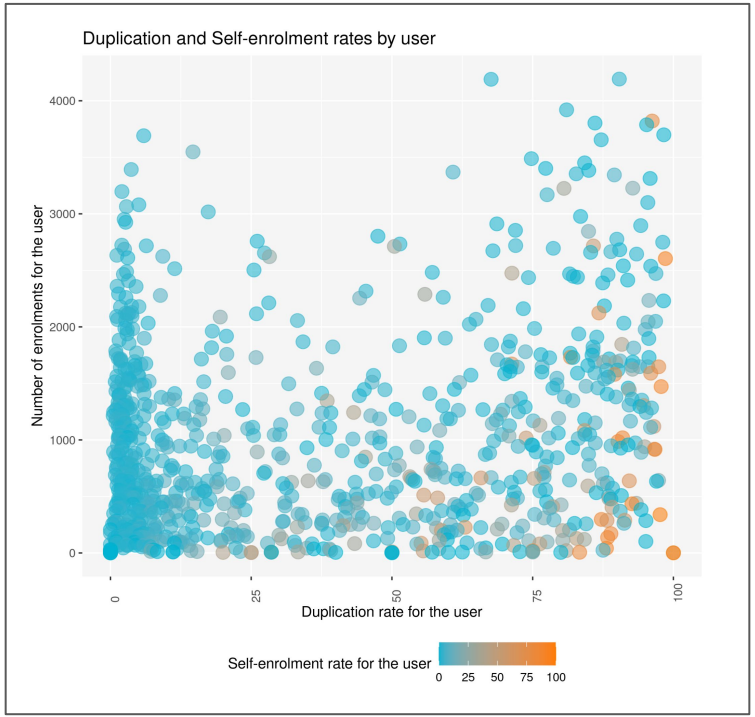
Many duplicates from few front line workers

Case-study 2 : Duplication types



- Total enrollments: **869,296**
- Total duplicates: **387,945**
  - Self-enrollments: **61,538**

- Systemic programme issues
- Work with management to understand why



As duplication rate increases so does self-enrolment rate

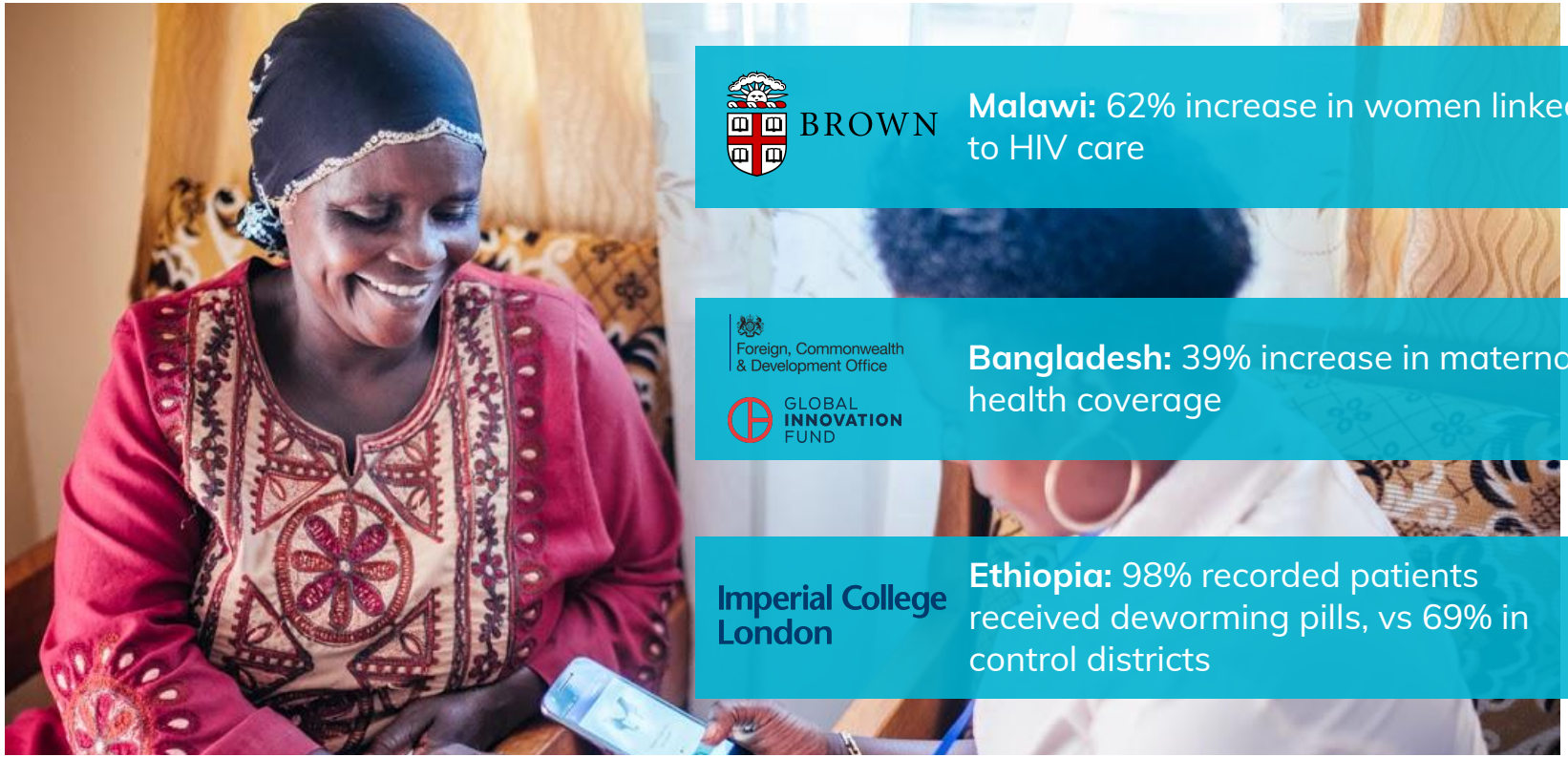
Ghana:
Vaccine Delivery

Ethiopia:
Health System strengthening

Malawi:
HIV tracking

2.5 mil people
enrolled

Verified data drives impact



BROWN

Malawi: 62% increase in women linked to HIV care

Foreign, Commonwealth & Development Office

GLOBAL INNOVATION FUND

Bangladesh: 39% increase in maternal health coverage

Imperial College London

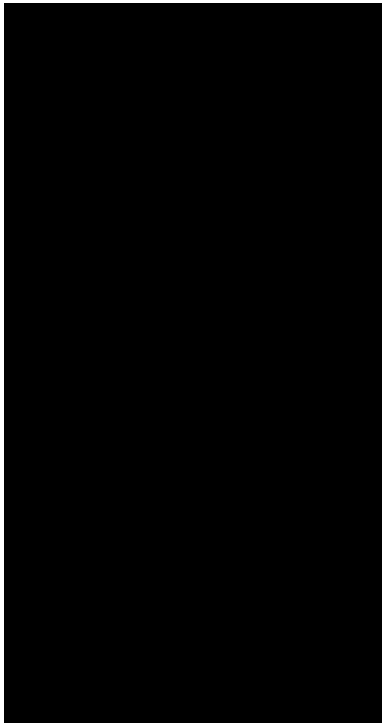
Ethiopia: 98% recorded patients received deworming pills, vs 69% in control districts

Implementation challenges

- Community acceptability
- Step-down training quality
- Operational vs. technical accuracy
- Supportive supervision
- Self-enrollments
- Duplicate flag by-pass
- Time-consuming record adjudication process and data reconciliation

Thank you!

Simprints face demo



Biometrics to improve immunisations

- Gavi-Simprints-NEC collaboration to develop under 5 fingerprint biometrics
- 5,000 children 0-5 in Bangladesh
  - 3 collections, 3 months apart
- Contact-based, commercialised scanner with 800-1000 ppi resolution
- Promising early results

d.tree Digital global health

Apotheker

JPG JAMES P. GRANT SCHOOL OF PUBLIC HEALTH

NEC

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