



New diagnostics to detect NTDs

Joseph Ndung'u

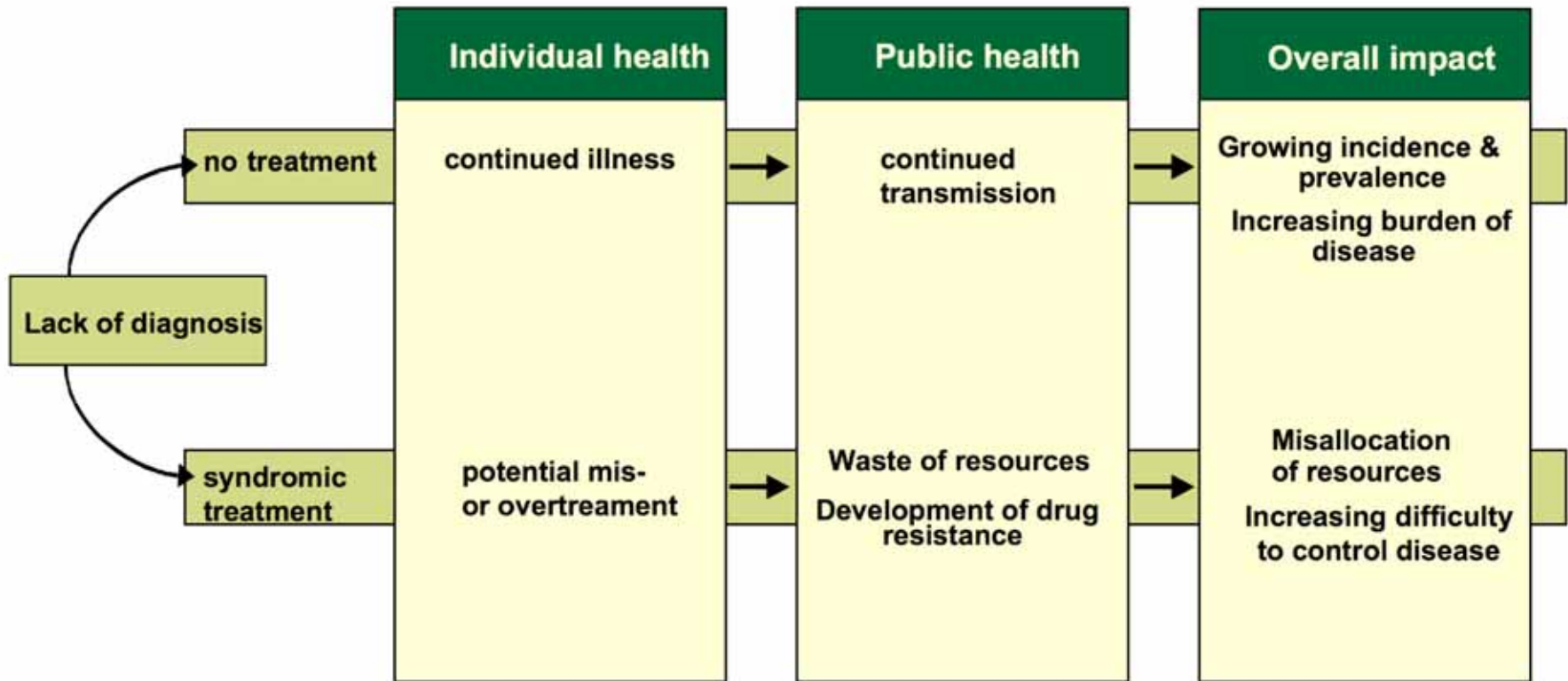
*Head, HAT & Other Neglected Diseases
Programme*

**ISID-NTD International Meeting on Neglected Tropical Diseases
Boston, Massachusetts, USA. July 8-10, 2011**

Partnering for better diagnosis for all

Importance of diagnostics

- Individual health
- Public health



- Disease surveillance in order to sustain elimination

Background on FIND



- A not-for-profit international organization established in 2003
- Headquarters in Geneva
 - Offices in Uganda & India

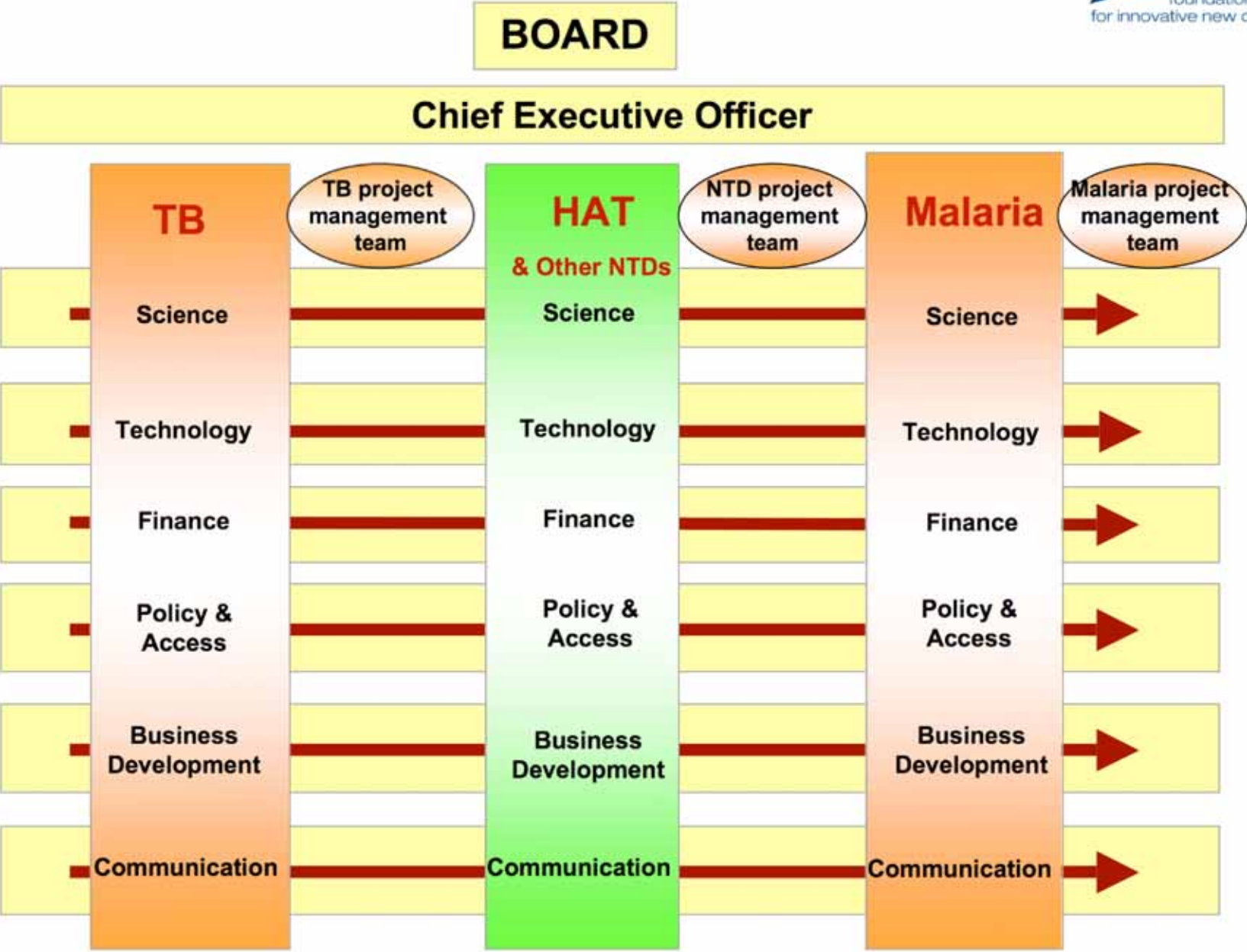
Vision

A world where everyone will have equitable access to high quality diagnosis

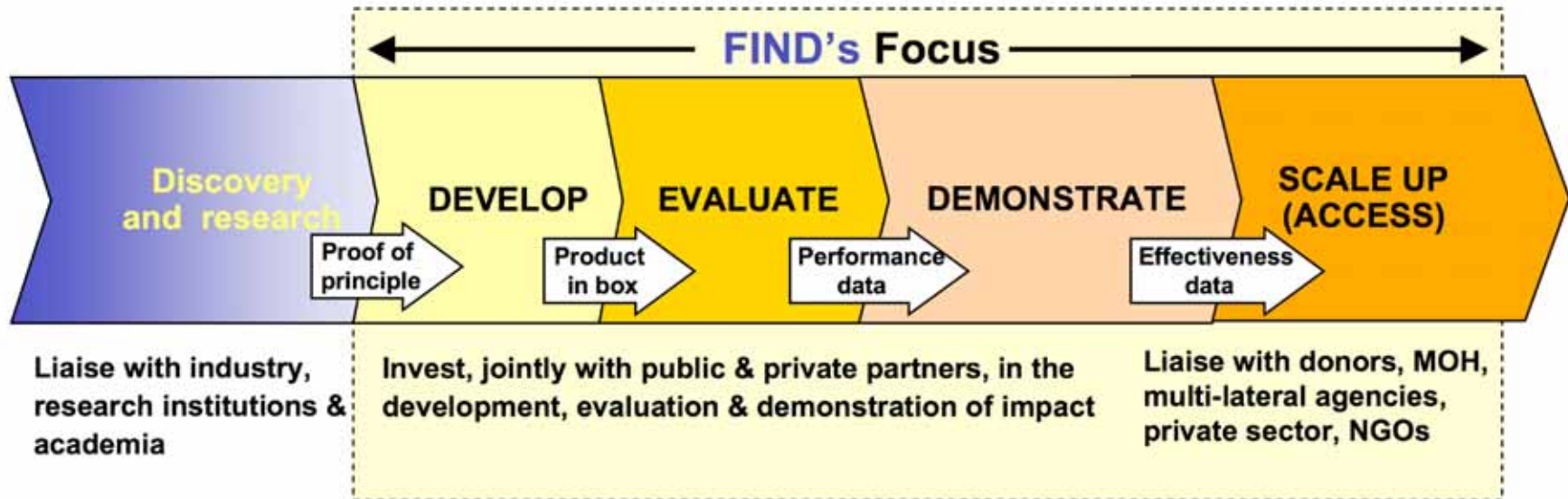
Mission

*To drive the development and implementation of **accurate and affordable** diagnostic tests that are appropriate to patient care in **low-resource settings***

Organizational chart

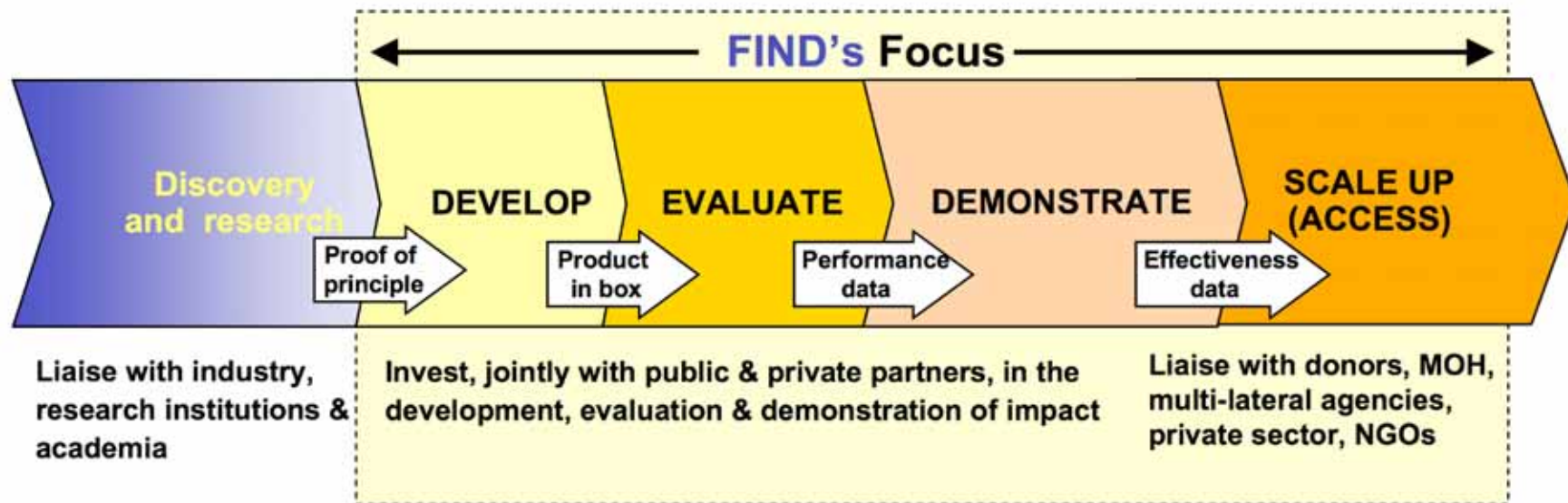


From concept to scale-up



FIND's product delivery pathway

From concept to scale-up

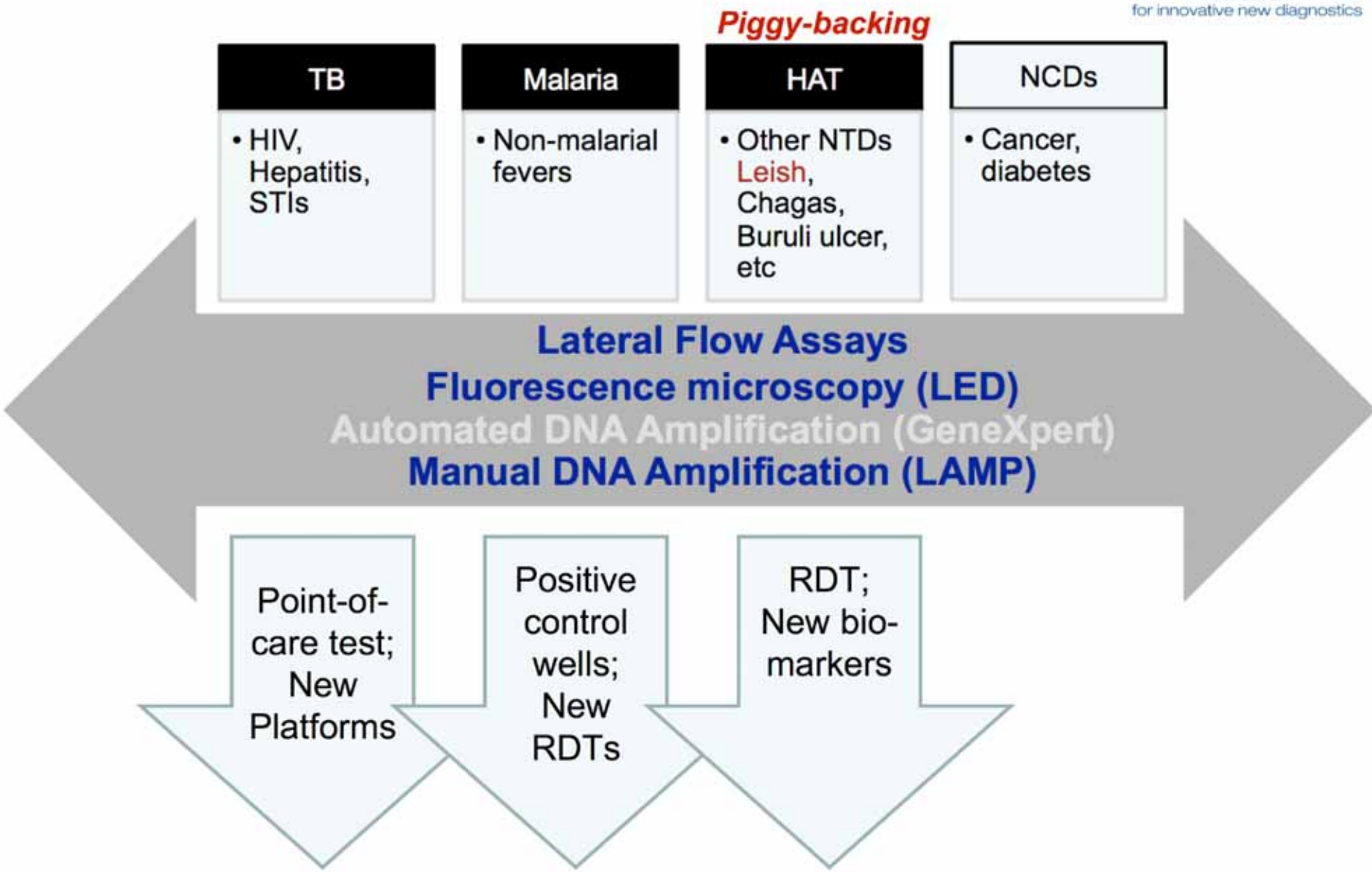


Partnership
Strategy

FIND

PARTNERS

Exploiting diagnostic platforms



Partnerships with industry have been initiated through TB or Malaria

HAT diagnostics as an example

Screening



A finger prick!



**Ab detection test:
CATT**

Suspect

HAT diagnostics as an example

Screening



A finger prick!



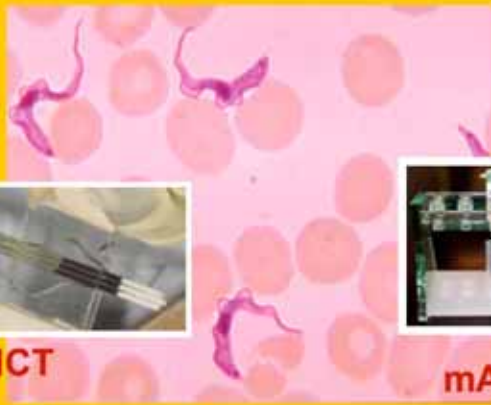
Ab detection test:
CATT

Suspect

Confirmation



Microscopy



HCT



mAECT

Patient

HAT diagnostics as an example

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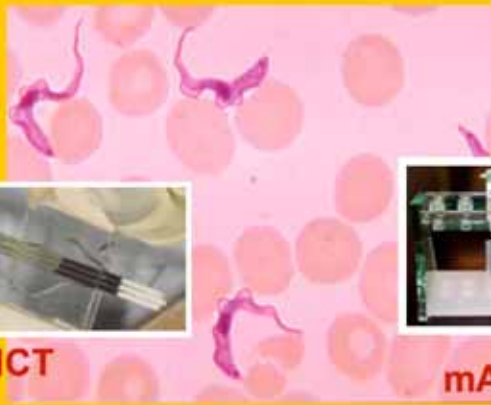
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Staging

Lumbar puncture



Choice of treatment and follow-up (every 6 months for 24 mns)

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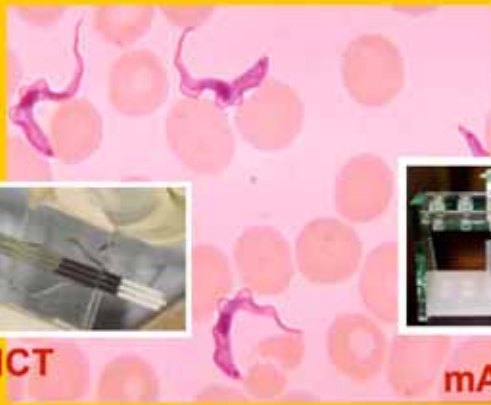
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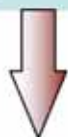
Replacement for CATT

Selection of antigens

STEP 1:

32 antigens

- Slot blot



STEP 2:

18 antigens

Slot blot and ELISA: 60 +ve and 57 -ve sera



Step 3:

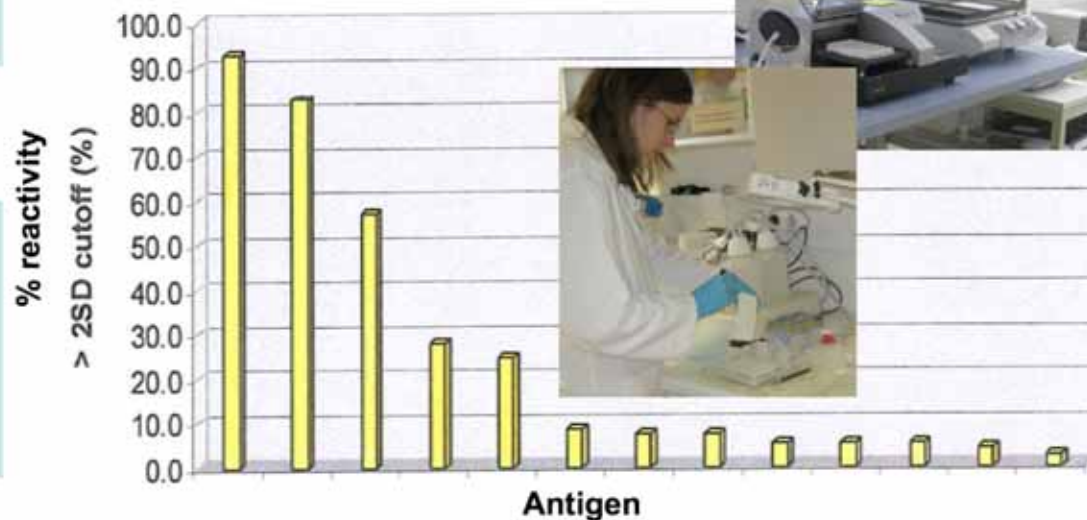
(Short-list of 13)

- Further feasibility
- 183+ve & 150 -ve sera
- Final round completed December 2009

Microcoat



Reactivity of patient serum on ELISA



Rapid diagnostic test for HAT

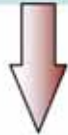
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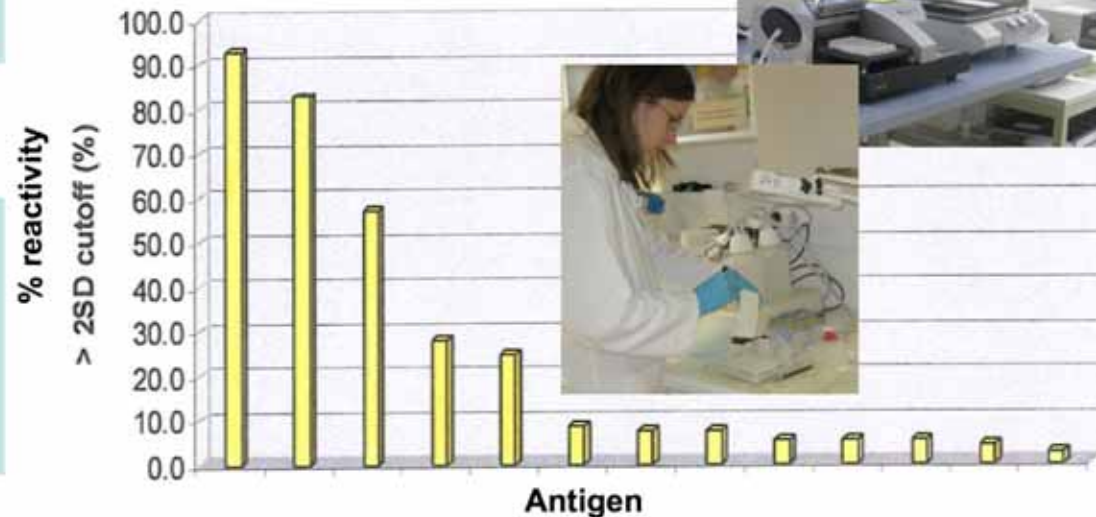


7 antigens

Microcoat



Reactivity of patient serum on ELISA



Standard Diagnostics



Development of a rapid test is in progress

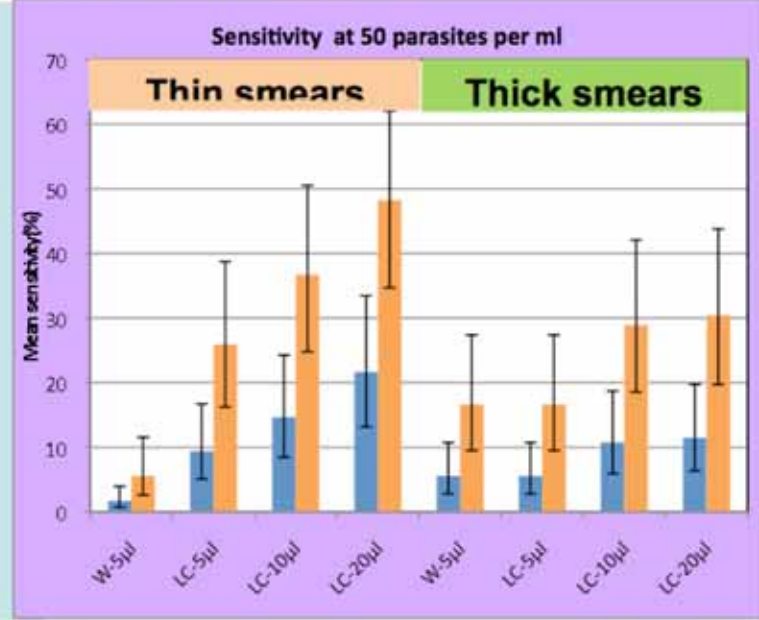
LED fluorescence microscopy

Combining LED microscopy with RBC lysis and concentration



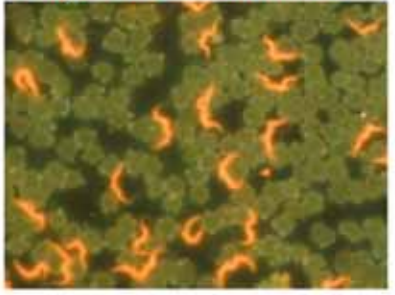
Advantages over conventional bright field microscopy

- ✓ More sensitive
- ✓ Easier to identify parasites
- ✓ Faster
- ✓ Can use solar power
- ✓ Does not need a dark room
- ✓ Is a platform for other diseases

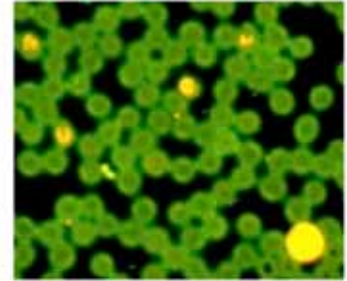


Demonstration studies going on in DRC and Uganda

Trypanosomes

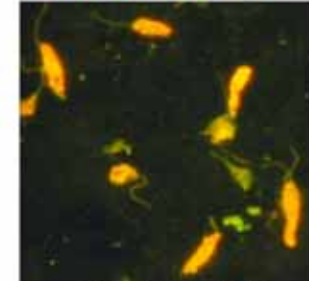


Plasmodium



Courtesy IPR

Leishmania



Courtesy IPR

M. tuberculosis



The iLED microscope was an investment by Carl Zeiss and FIND for TB, that could benefit NTDs

Transport box

Control of HAT involves active screening of the at-risk populations using the CATT test, and confirmation of suspects by microscopy

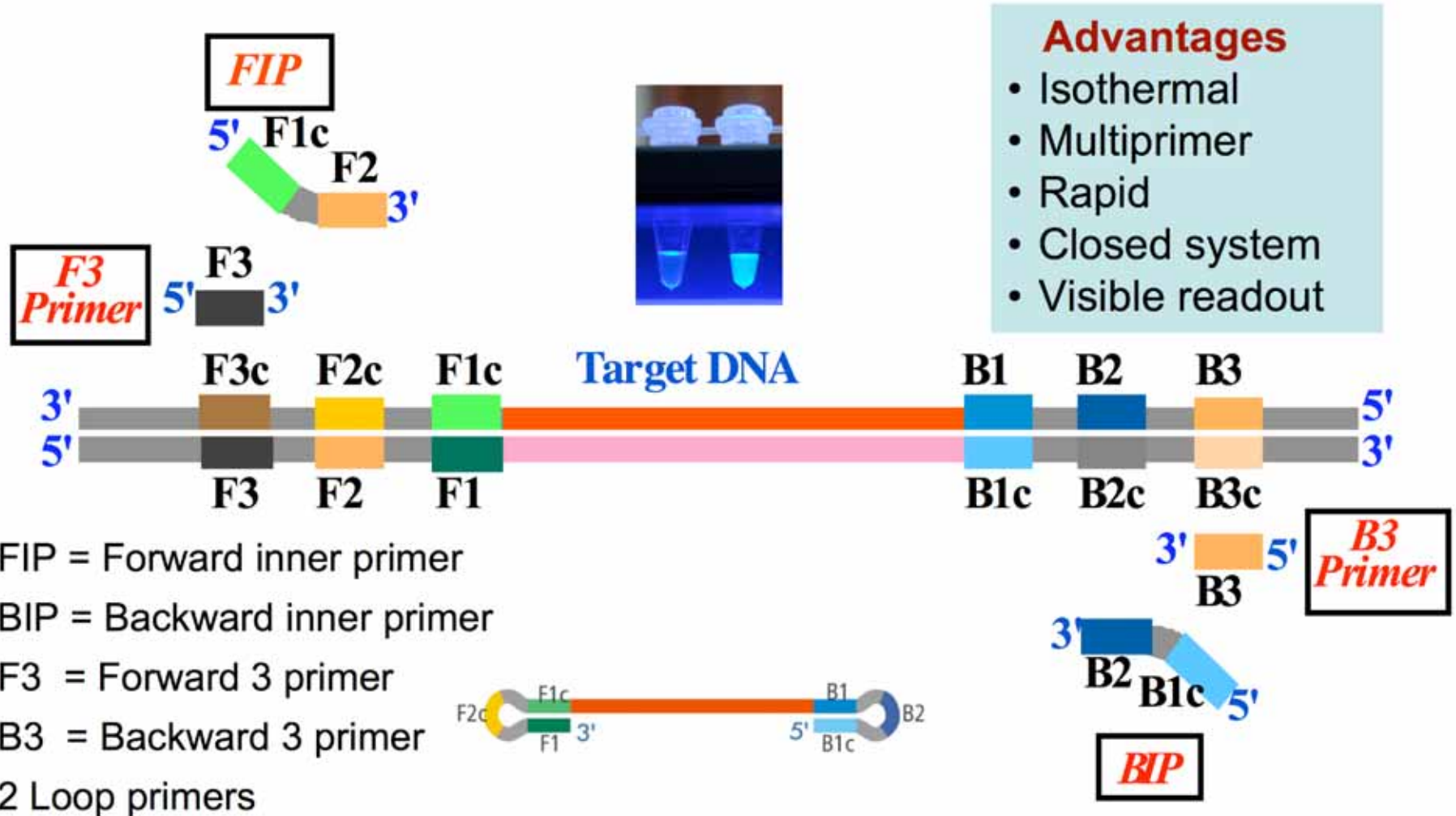


Ensures safe transportation of the iLED FM to the field

Manual Nucleic Acid Amplification Test

(Possible replacement for microscopy)

Loop-mediated isothermal amplification of DNA (LAMP)



Loop-mediated isothermal amplification (LAMP) of DNA

FINDs relationship with EIKEN Chemical Co. was established because of TB

TB



Sputum sample



Simplified processing



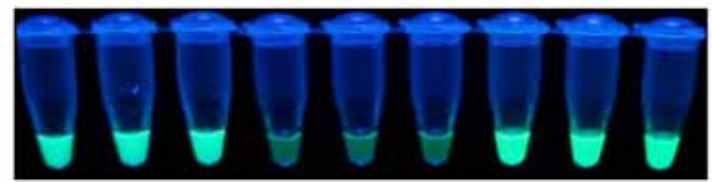
Lyophilized reagents



Isothermal amplification

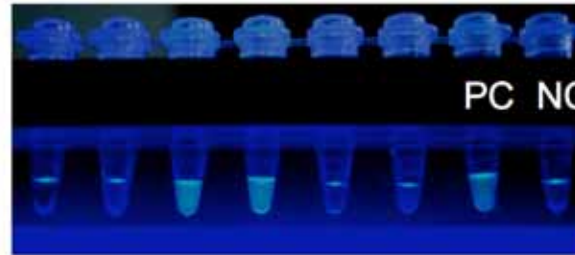


Visible result



LAMP test for HAT

Development of a *Trypanozoon*
LAMP has been completed at Eiken



Effective for:

T.b. gambiense, *T.b. rhodesiense*, *T.b. brucei*, *T. evansi*, *T. simiae* & *T. equiperdum*

At Makerere University (Uganda) & Institute of Primate Research (IPR – Nairobi)

Completed

SOPs for sample preparation before performing
LAMP:

- Directly on whole blood
- Blood after red cell lysis & concentration
- Plasma, serum & spinal fluid

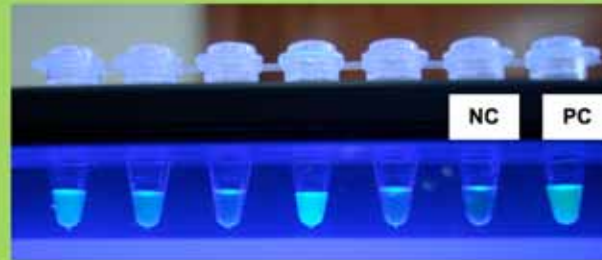
Ongoing

- Development of SOPs for field sample collection & storage before LAMP
-
- Clinical evaluation of the final product
- Determination of the feasibility of using LAMP as a test of cure

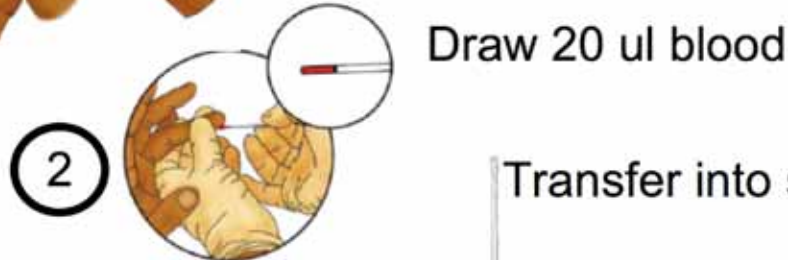


NTDs for which feasibility of LAMP has been demonstrated

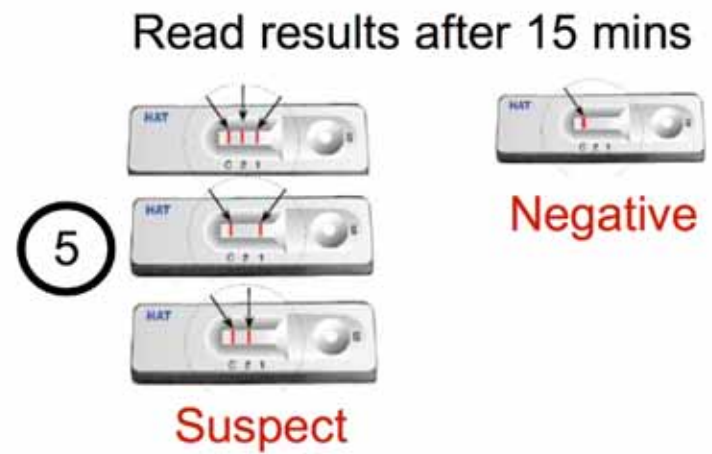
- **Leishmaniasis** – Eiken, KIT, IPR, DNDi & FIND have started development
- Chagas Disease
- Schistosomiasis
- Giardiasis
- Amoebiasis
- Buruli Ulcer
- Cholera
- Leptospirosis



Performing the SD test for HAT



Clinical trials are going on in Angola, DRC and CAR



Confirmation of suspects relies on demonstration of parasites by microscopy

Concluding remarks

- Effective partnerships throughout the entire development process are critical to guaranteeing eventual access to novel diagnostics
- Development of new diagnostics for NTDs can be accelerated, and commercial interest enhanced, when they are linked with the more popular diseases
- There is need to encourage expansion of diagnostic platforms that are already developed or in development for major diseases, to include NTDs

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Challenge

Sustainable access of new diagnostics by the communities that need them most

Partners/Acknowledgements

Staging of HAT

- Univ of Aberdeen - UK
- Univ of Geneva – Switz
- ITM – Belg
- **Makerere Univ – Uga**
- **ICCT - Angola**
- Univ. Limoges (INT) – Fr
- KIT - Neth



Specimens and test evaluation

- **Makerere Univ – Uga**
- **NaLIRRI – Uga**
- **NIMR – TZ**
- **TRC-KARI – Ken**
- **INRB – DRC**
- **UNIKIN – DRC**
- **CIRDES – Burkina Faso**
- **IPR - Ken**
- WHO – Switz
- DNDi - Switz
- VIB – Belg
- DUT– Ger
- ITM – Belg
- S-TPH - Switz
- Obihiro Univ – Jap
- Murdoch Univ – Aus
- Microcoat – Ger
- KIT – Neth

Antigen sources

- Univ of Glasgow UK
- Cambridge Univ – UK
- Leicester Univ – UK
- Univ of California – USA
- Univ of Texas – USA
- Inst of Cell Path – Belg
- ITM – Belg
- Univ of Geneva – Switz
- **ILRI – Ken**
- Univ of Bordeaux – France



Advocacy

- **AU-PATTEC**



Test development

- EIKEN Chemical Co. – LAMP
- ZEISS – iLED microscope
- Standard Diagnostics – LFT
- Kalon Biological – Leish Ag test

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Bill & Melinda Gates Foundation
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DFID
Dutch government
European Union – FP7

Thank you

