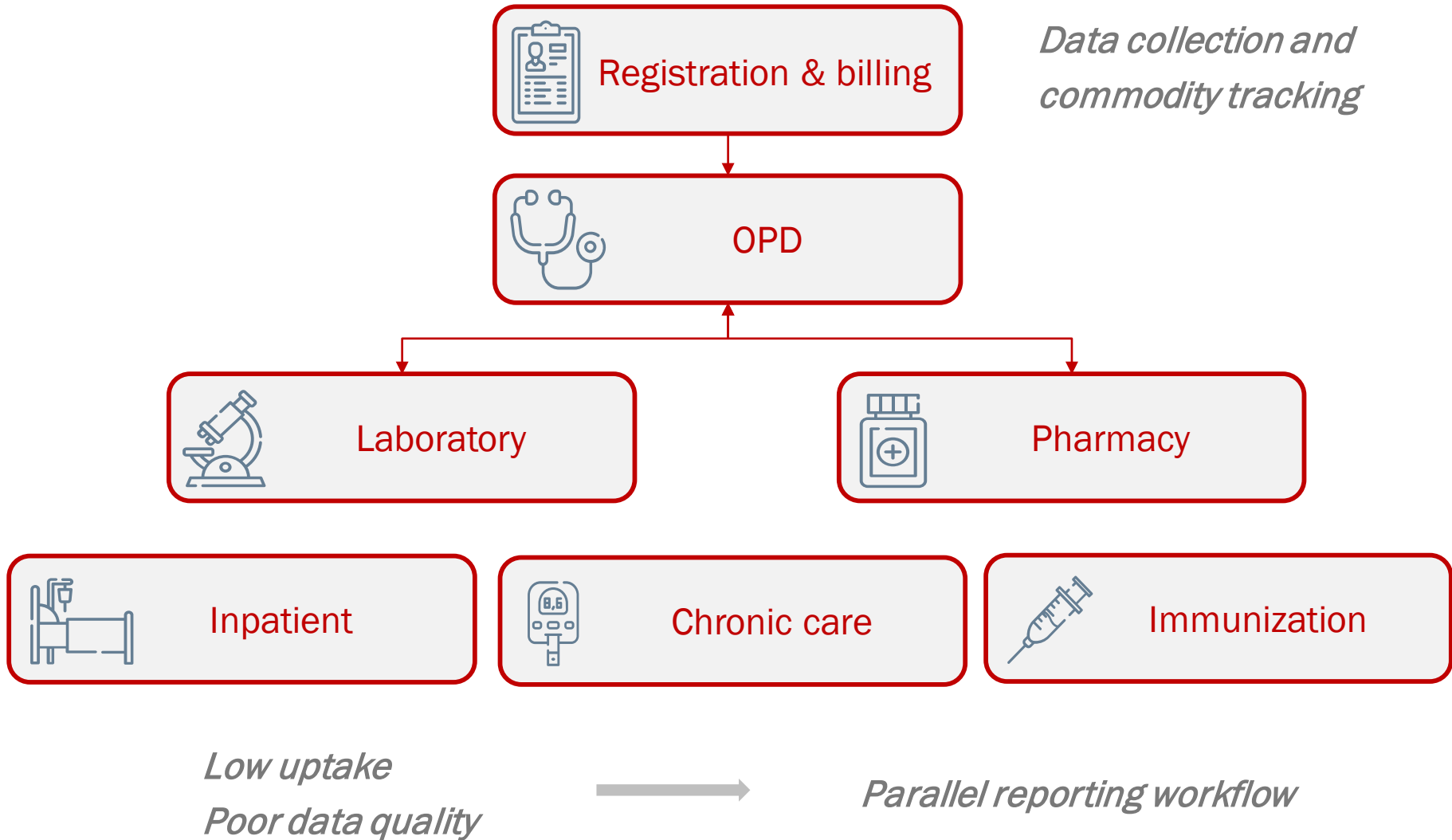# multitude of digital health solutions
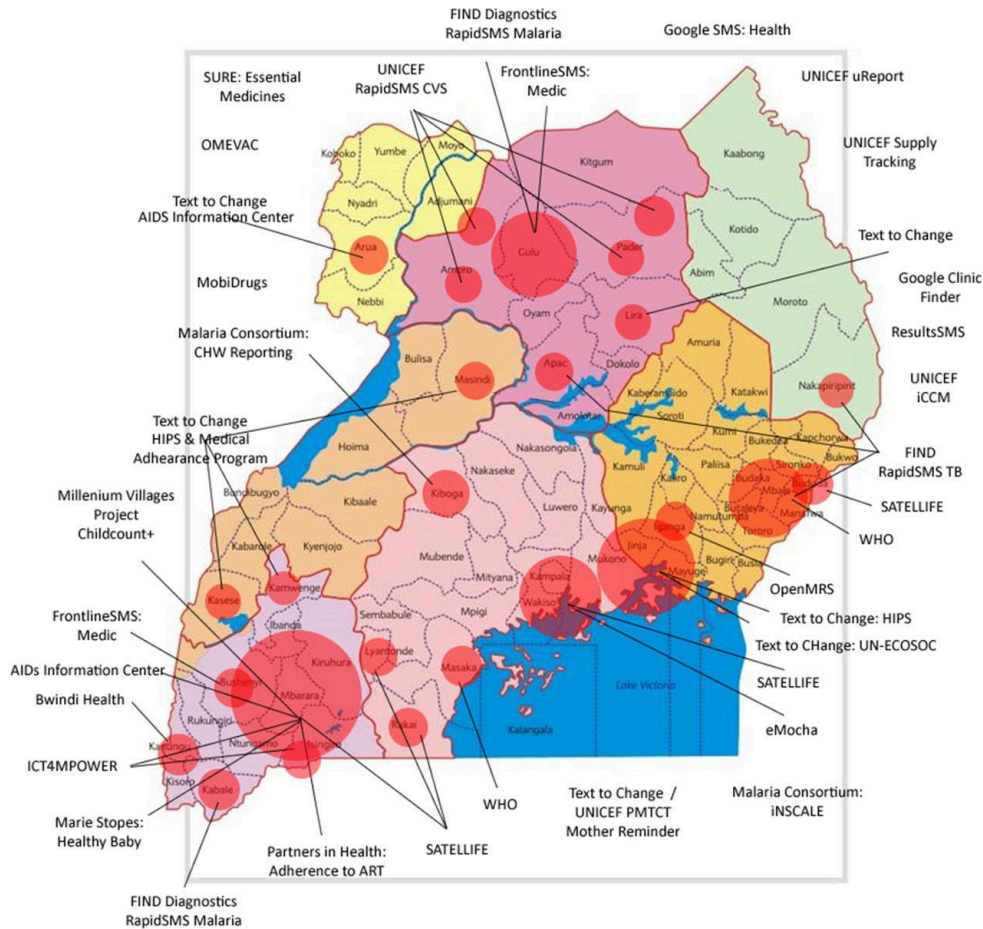
> *"Lightly-funded, often well-intended innovation projects operating in siloes, addressing single health problems in a vertical way, without making lasting contributions to the overall health system."*

Sources: *Labrique, A.B., Wadhwani, C., Williams, K.A. et al. Best practices in scaling digital health in low and middle income countries. Global Health 14, 103 (2018). https://doi.org/10.1186/s12992-018-0424-z; Labrique A, Vasudevan L, Weiss W, Wilson K. Establishing standards to evaluate the impact of integrating digital health into health systems. Glob Health Sci Pract. 2018;6(suppl 1):S5-S17. https://doi.org/10.9745/GHSP-D-18-00230.*

national health information systems

HF1 FACILITY MORBIDITY												REFERRALS			
GENDER/AGE GROUP		0 - 28 D		1 - 11 M		12 - 59 M		5 - 14 Y		15+ Y		0 - 4 Y		5+ Y	
DISEASE		M	F	M	F	M	F	M	F	M	F	M	F	M	F
No. of Fever cases (suspected Malaria)		7	10	59	48	61	61	41	55	220	582	0	1	1	4
No. of Fever cases tested for Malaria (RDT)	Pos	4	3	13	12	23	19	20	29	49	137	0	0	1	3
	Neg	3	7	46	35	38	42	21	26	171	445	0	1	0	1
No. of Fever cases tested for Malaria (Microscopy)	Pos	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Neg	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malaria treated at Facility with ACT	<24hrs	3	2	8	11	19	9	40	18	29	82	0	0	1	2
	>24hrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malaria treated at Facility without ACT	<24hrs	0	0	0	1	1	2	0	0	0	1	0	0	0	0

dhis2 — DHIS 2 Demo - Sierra Leone — Apps

Data Entry

Ngelehun CHC - December 2014 - No

- Sierra Leone
  - Bo
    - Badjia
      - Ngelehun CHC
      - Njandama MCHP
    - Baoma
    - Bargbe
    - Bargbo
    - Bumpe Ngao
    - Gbo
    - Jaiama Bongor
    - Kakua
    - Komboya
    - Lugbu
    - Niawa Lenga
    - Selenga
    - Tikonko
    - Valunia
    - Wonde
  - Bombali
  - Bonthe
  - Kailahun
  - Kambia
  - Kenema
  - Koinadugu

Organisation Unit: Ngelehun CHC
Data Set: Mortality < 5 years
Period: December 2014 — Prev year — Next year

default

Filter in section	Value
Accute Flaccid Paralysis (Deaths < 5 yrs)	
Animal Bites - Rabid (Deaths < 5 yrs)	
Cholera (Deaths < 5 yrs)	
Dysentery (Deaths < 5 yrs)	
Louse Borne Typhus - Relapsing fever (Deaths < 5 yrs)	
Malaria (Deaths < 5 yrs)	
Measles (Deaths < 5 yrs)	
Meningitis (Deaths < 5 yrs)	
Plague (Deaths < 5 yrs)	
Rabies (Deaths < 5 yrs)	
Tetanus Neonatal (Deaths < 5 yrs)	
Tetanus Other (Deaths < 5 yrs)	
Typhoid (Deaths < 5 yrs)	
Yellow Fever (Deaths < 5 yrs)	

Complete — Incomplete — Run validation

Hernia	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Hydrocele	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HIV/AIDS	0	0	1	0	0	0	0	0	13	39	0	0	0	1
Tumour/cancer	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yaws	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Adverse drug rxn	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Other	14	20	112	97	76	76	53	65	364	742	0	2	1	4

rise of the EMR in primary care

opportunities for EMR in primary care

"A frequently neglected opportunity within digital programme design for scale is the capture and utilisation of real-time data... This can improve outcomes by empowering users to track their own performance, motivating health workers by peer comparisons or distance-from-targets, or by making the incentivisation process transparent."
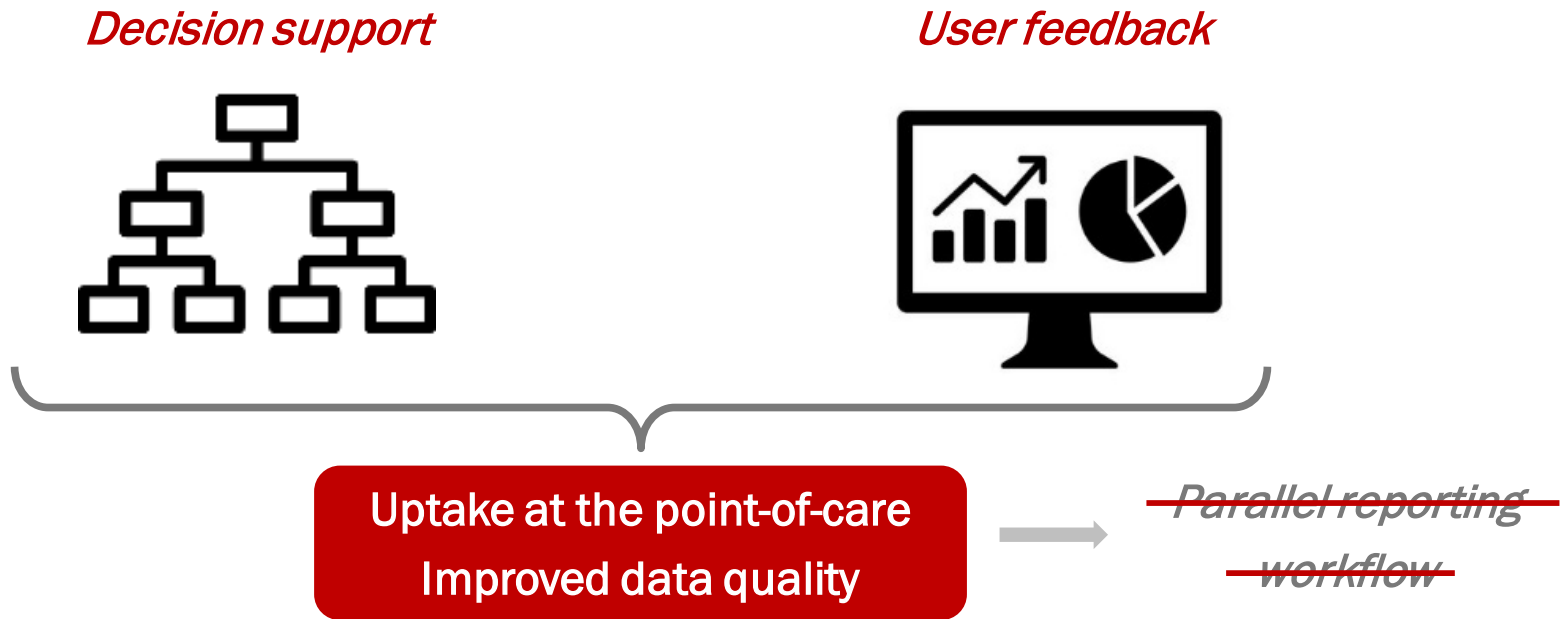
Decision support

User feedback

Uptake at the point-of-care
Improved data quality

→ *Parallel reporting workflow*

Sources: *Labrique, A.B., Wadhwani, C., Williams, K.A. et al. Best practices in scaling digital health in low and middle income countries. Global Health 14, 103 (2018). https://doi.org/10.1186/s12992-018-0424-z; Hamade N, Terry A, Malvankar-Mehta M. Interventions to improve the use of EMRs in primary health care: a systematic review and meta-analysis. BMJ Health Care Inform. 2019 May;26(1):0. doi: 10.1136/bmjhci-2019-000023. PMID: 31142493; PMCID: PMC7062324.*

strategic focus on CDSS, EMR, data exchange

"… and the exchange of data and sharing of relevant information across the health ecosystem creating a continuum of care, have proven potential to enhance health outcomes by improving medical diagnosis, data-based treatment decisions …"

WHO Global Strategy on Digital Health

"… maintain highly effective, reliable, secure and innovative information systems to support clinical decision making, patient management, education …"

Rwanda National eHealth Strategic Plan

"… synchronize all HIS and link them with EMR to improve patient management and data use for decision making…"

Rwanda Health Sector Strategic Plan

"… calls for enhancement for the PHC digital systems to ensure incorporation of user recommendations, vertical program needs, clinical decision support features, and recommended data standards and guidelines …"

Tanzania Primary Health Care Roadmap

"… digitalization should focus on supporting high-quality care and adherence to guidelines and best practices, continuity of care over time and across different points of service, integrated services across vertical programs… improvement in the efficiency of health services and management of resources at the point of care…"

Tanzania Digital Health Strategy

software limitations

Designed for data capture
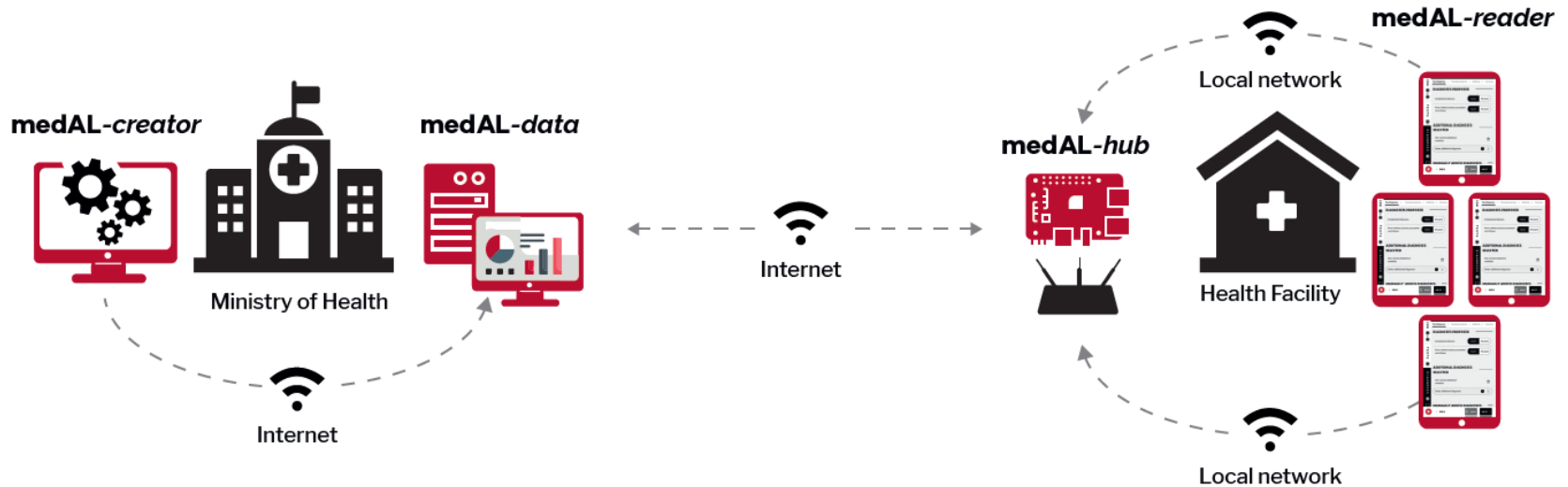

Code complexity

Decision logic transparency

Time consuming

Error-prone

medAL software suite

medAL-*creator*
- Web-based drag-and-drop human-readable algorithm interface
- Automatically codes to JSON
- Supports algorithm versioning and translation

medAL-*data*
- Deploys algorithms, collects and manages data
- Manages health facilities, users, and electronic devices
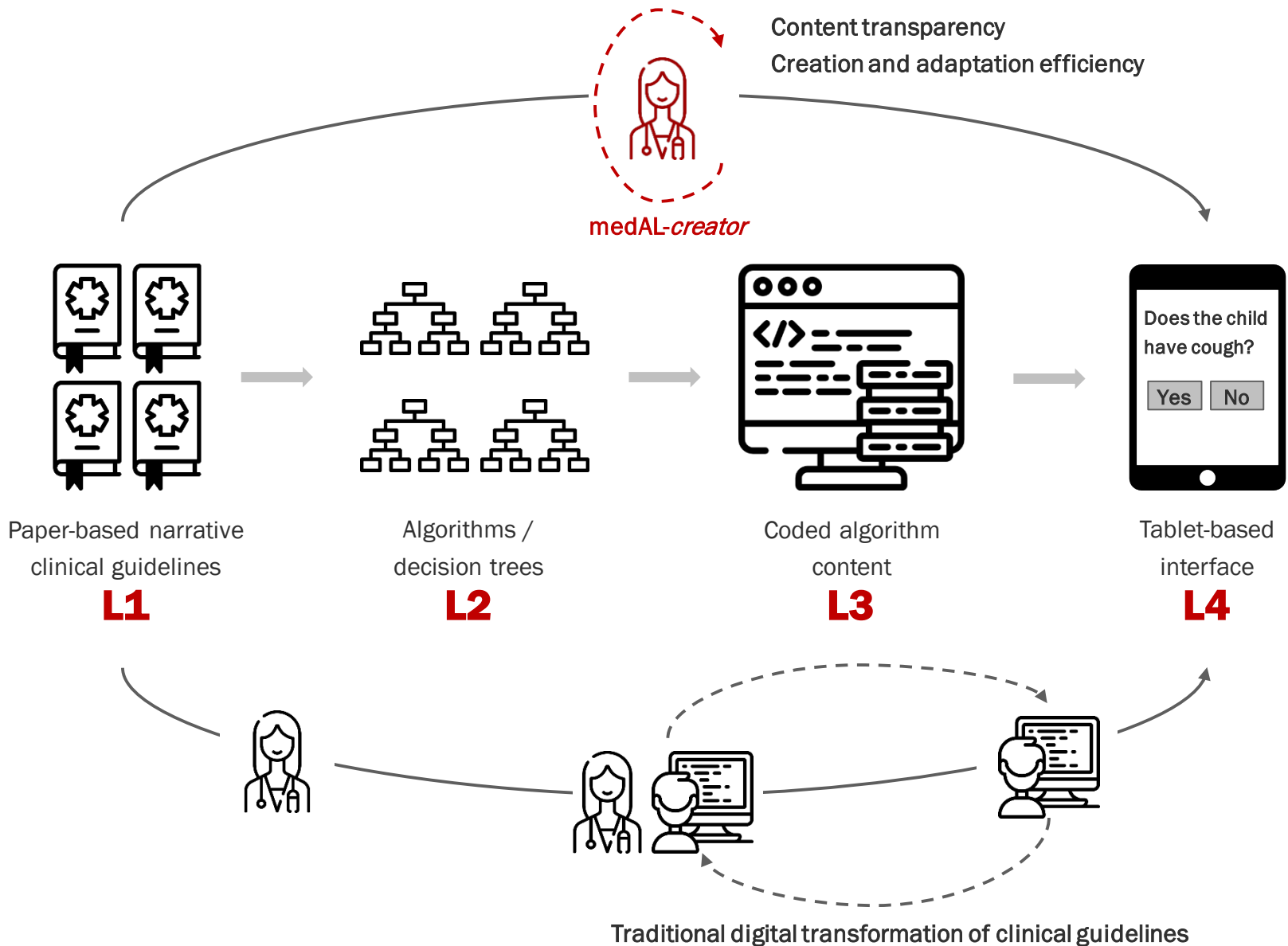- Monitors IT system and data sync status

medAL-*hub*
- Enables case sharing among users via a local network
- Maintains local database without overloading tablet storage
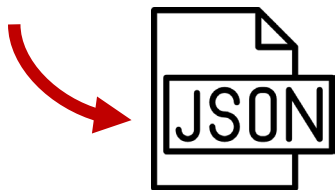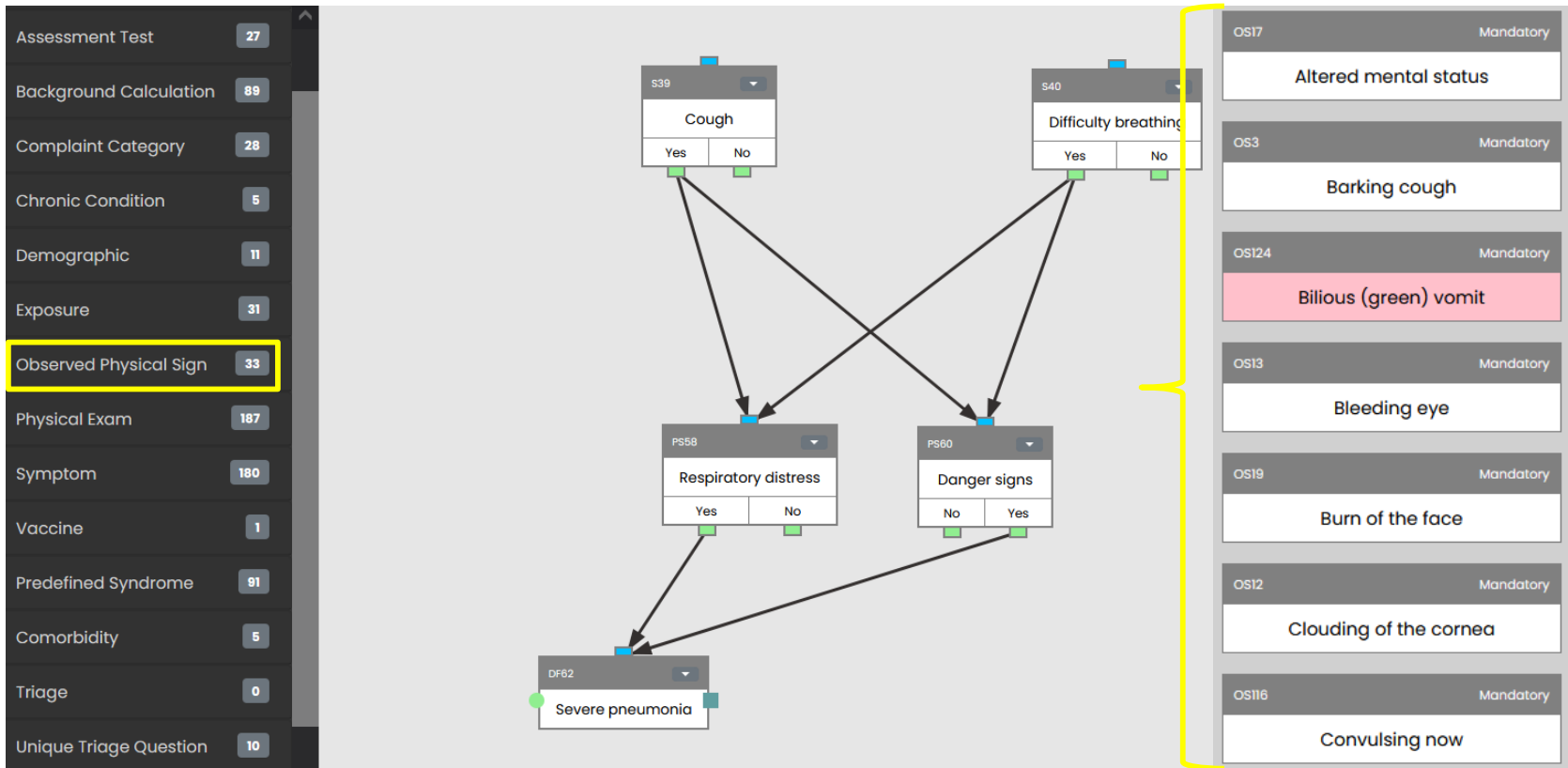- Syncs data to medAL-data via intermittent internet

medAL-*reader*
- Implements algorithm logic in a typical consultation workflow
- Enables pausing of consultations at any stage
- Viewing of learning content

medAL-*creator*

Content transparency
Creation and adaptation efficiency

medAL-*creator*

Paper-based narrative
clinical guidelines
L1

Algorithms /
decision trees
L2

Coded algorithm
content
L3

Tablet-based
interface
L4

Does the child
have cough?
Yes   No
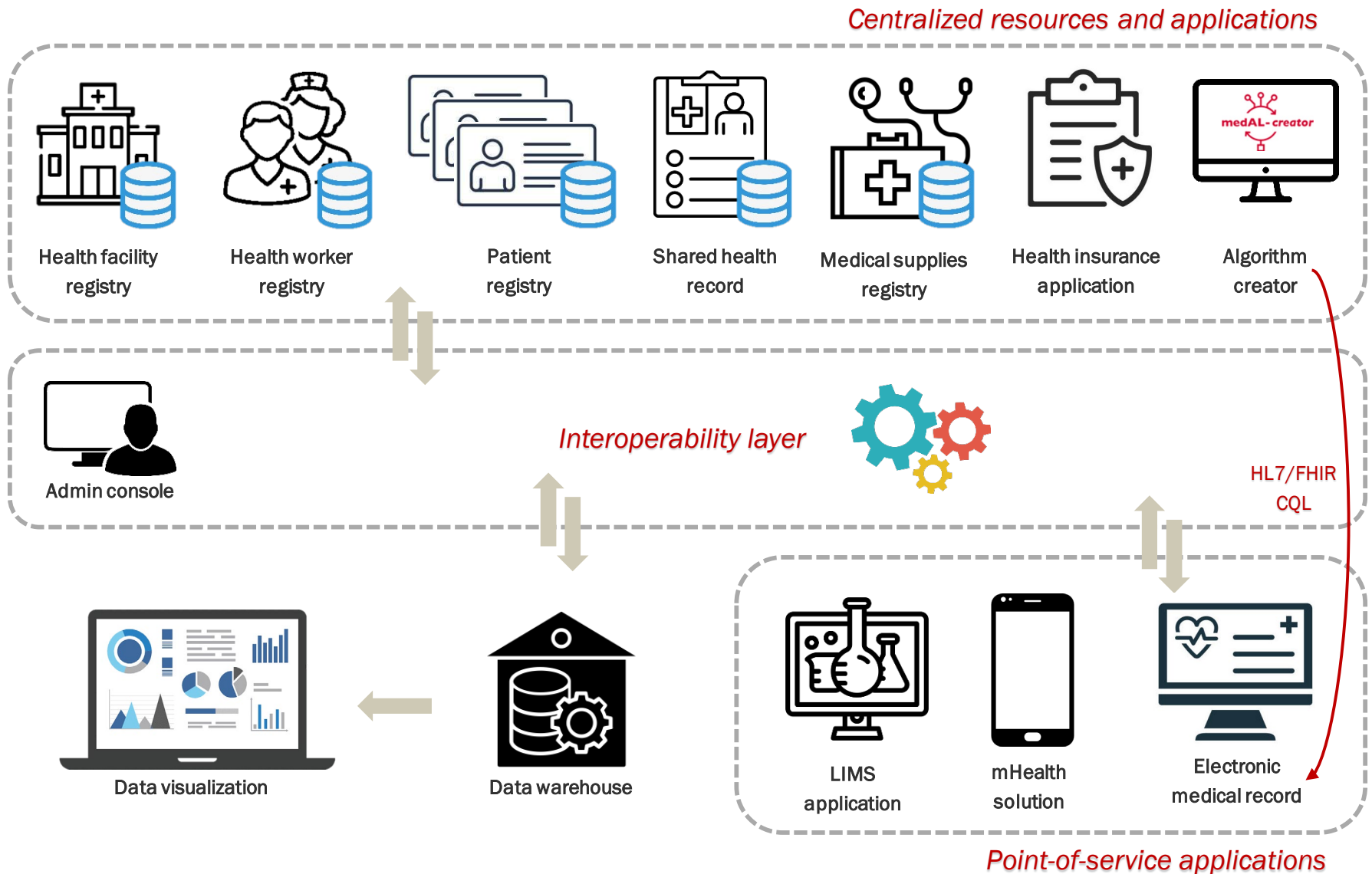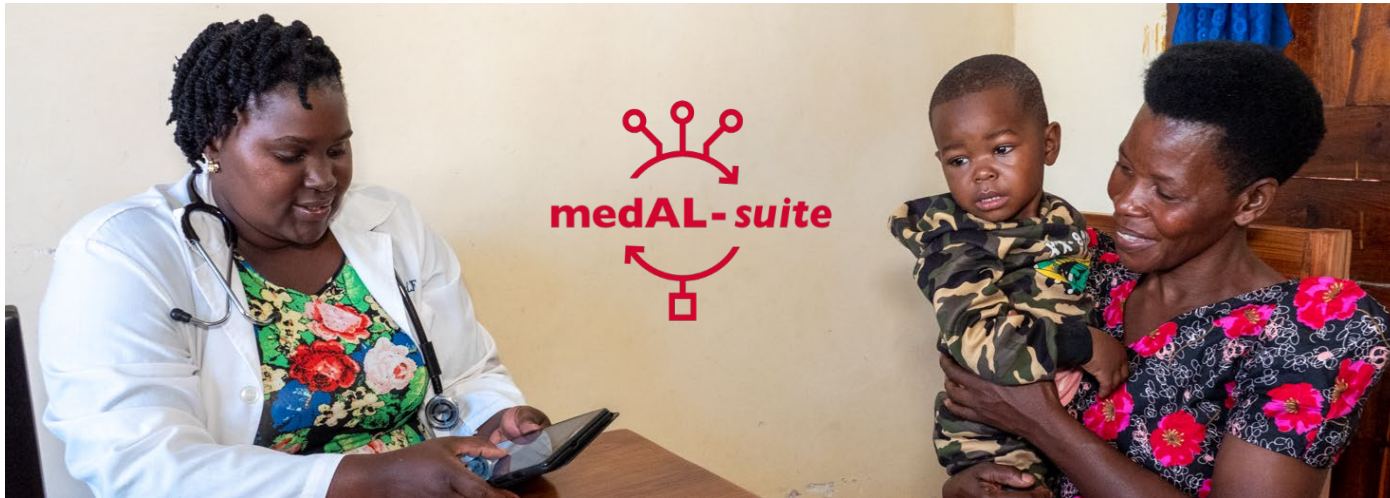
Traditional digital transformation of clinical guidelines

concept

OpenMRS
GoT-HoMIS
Etc.

Reusable content library
Flexible workflow engine
Interoperability standards

architecture

Centralized resources and applications

Health facility registry

Health worker registry

Patient registry

Shared health record

Medical supplies registry

Health insurance application

Algorithm creator

Interoperability layer

Admin console

HL7/FHIR
CQL

Data visualization

Data warehouse

LIMS application

mHealth solution

Electronic medical record

Point-of-service applications

Thank you

alexandra.kulinkina@swisstph.ch

On behalf of the Dynamic team and colleagues at Rwanda and Tanzania Ministry of Health and PORALG