

Malaria control and elimination: Surveillance-response approaches

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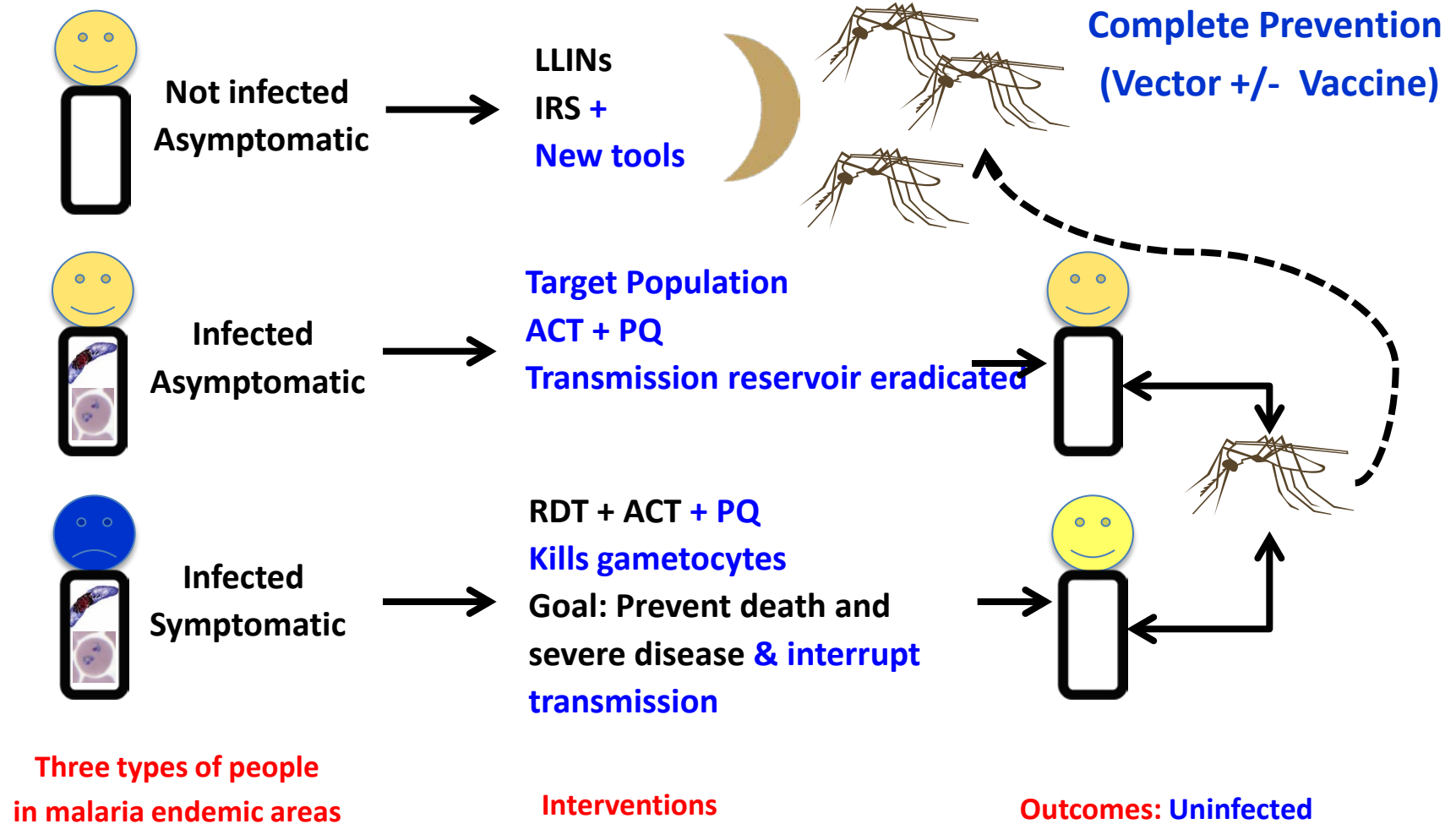
Basel, 9 Dezember 2016



Content

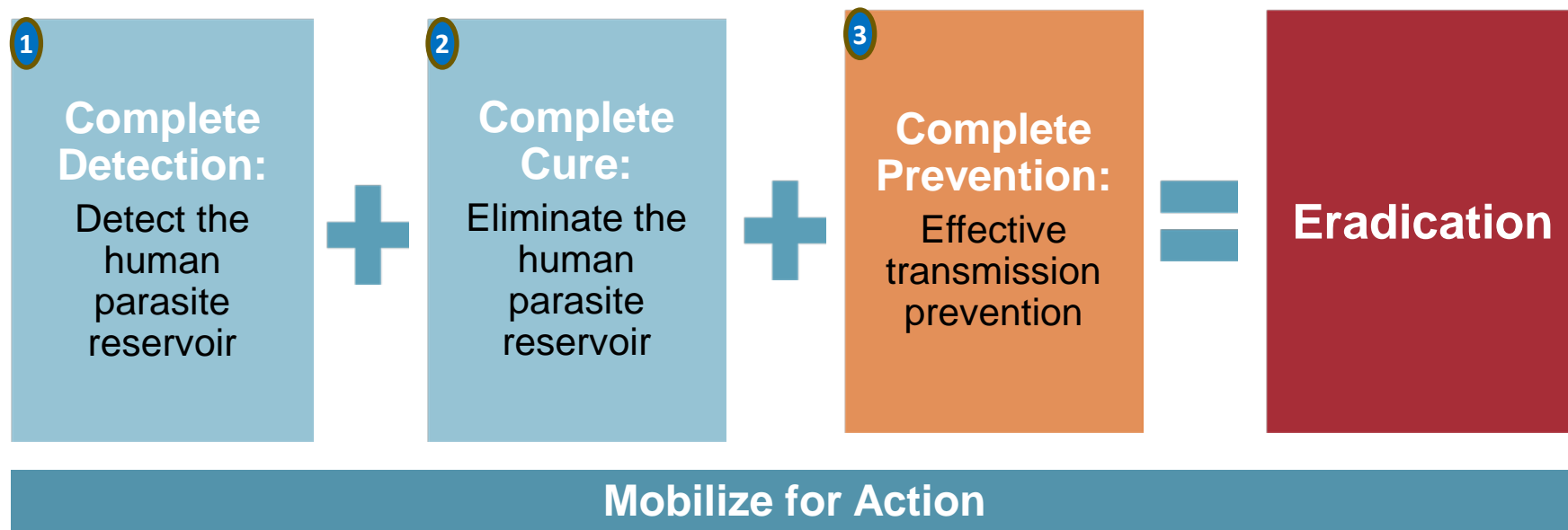
- The concept of surveillance as intervention and how this leads to tailored surveillance response-approaches/systems in different transmission/elimination settings
- Encourage research and R&D

FUTURE *P. FALCIPARUM* ERADICATION PARADIGM



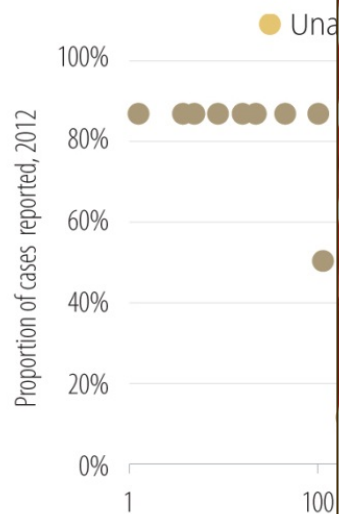
ACCELERATE TO ZERO

We can accelerate the trajectory to malaria eradication by **concurrently** achieving three goals: 1) Identifying the human reservoir of infection in asymptomatic persons + 2) Eliminating the human reservoir + 3) combined with geographically and temporally targeted transmission prevention and strengthened surveillance and response

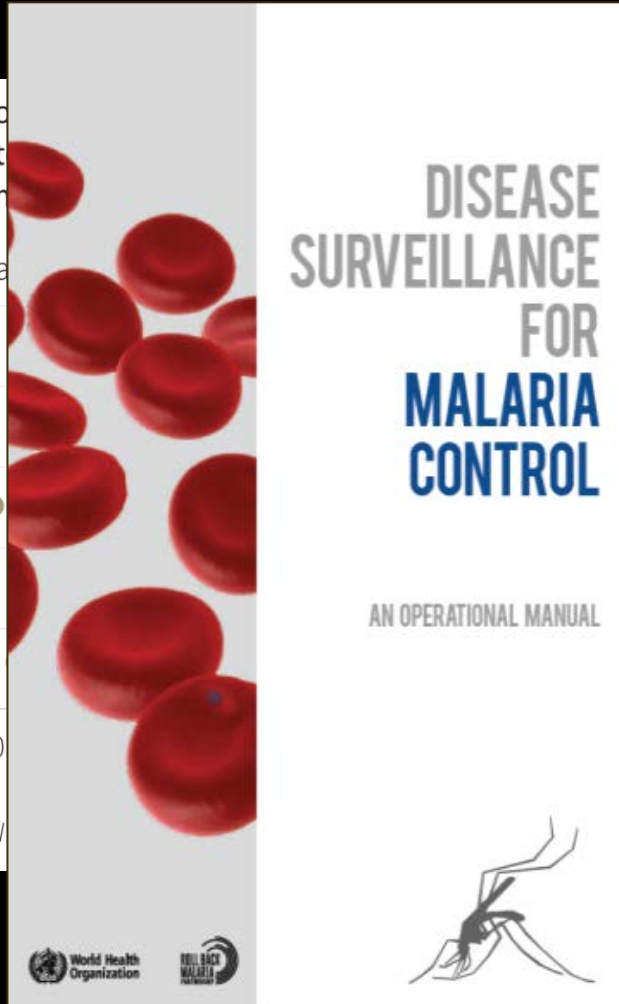


Strengthening surveillance systems: surveillance systems weakest in places with highest malaria burden

Figure 7.1 Proportion of surveillance systems, in relation to whether trends over time



Source: National malaria control



- In 2012, surveillance systems detected 14% of estimated malaria cases globally; increase from 3% in 2000 and 11% in 2010
- Case detection lower in countries with higher estimated cases
- For 2013 WMR, 58/99 countries globally and 26/44 countries in the African Region reported case information from district level

Needs in Health Planning

Minimal Essential Information

➤ From Users and Providers

Best if established participatory

Timely

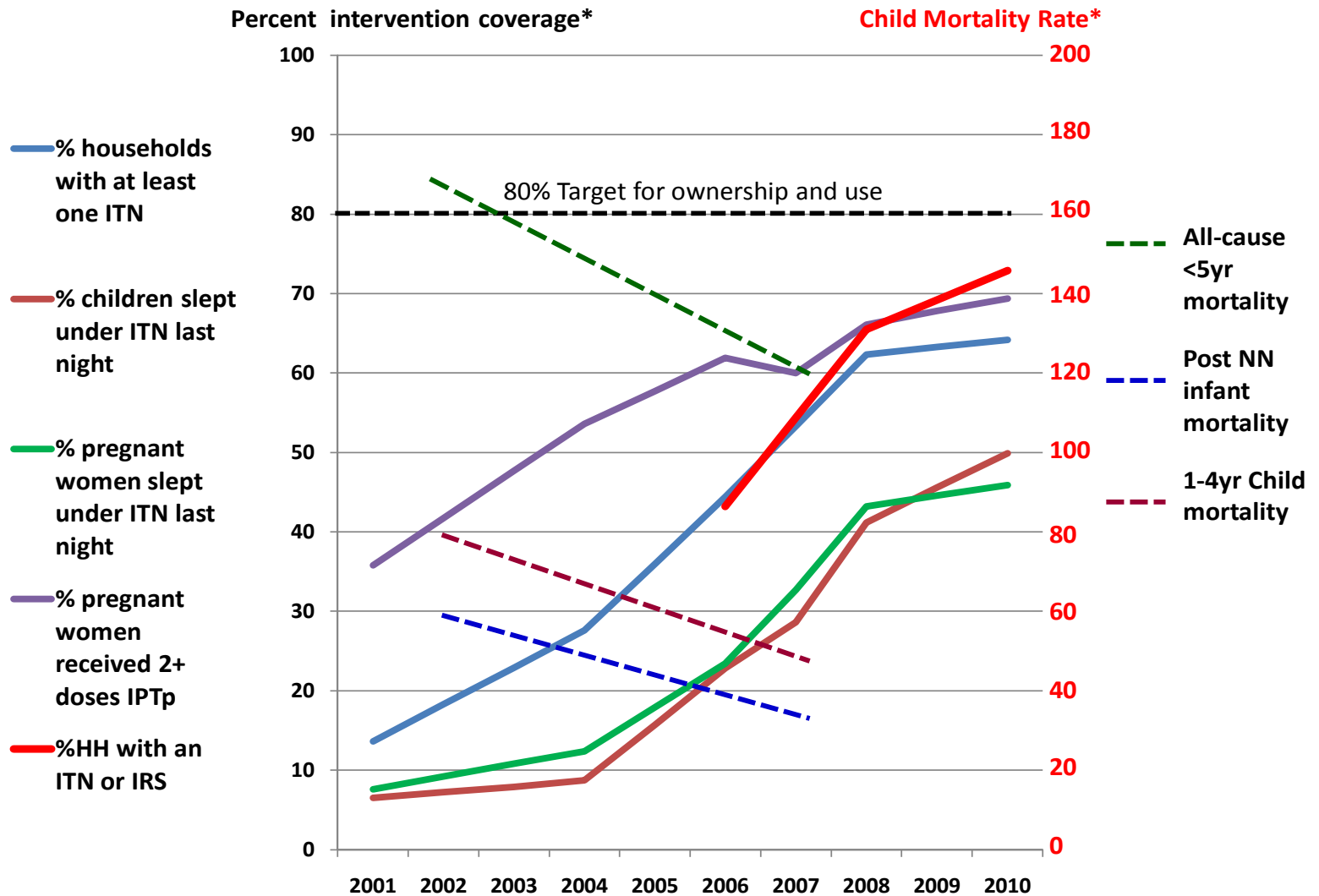
Adequate

Precise

Applicable - immediately

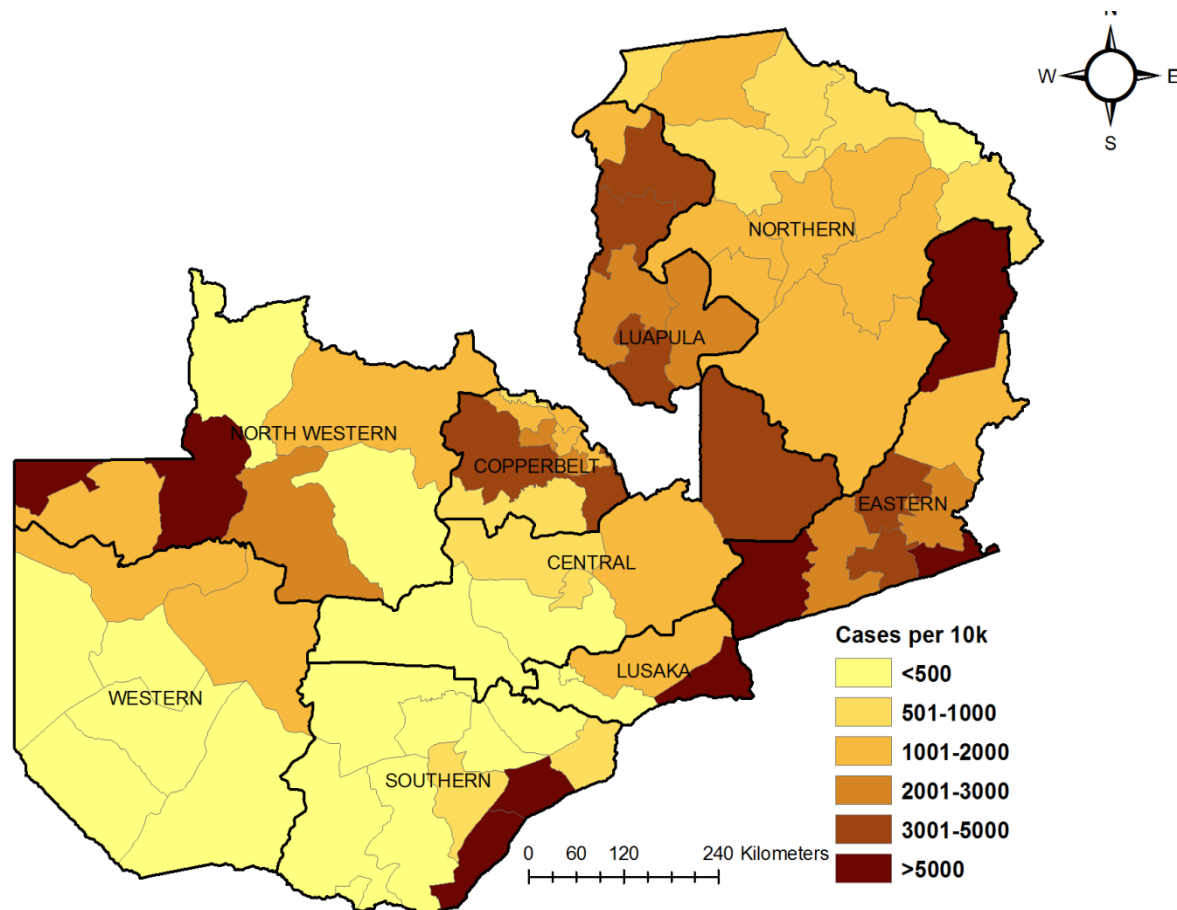
Zambia: Malaria intervention coverage increases and child mortality declines 2001-2010

(slide courtesy of MoH/NMCP Zambia/MACEPA)



* Measured percent coverage per DHS and MIS; Child mortality rates per DHS 2001-2 and DHS 2007

Malaria reported case rates (all ages) by district 2011



- **Classical definition of surveillance:** Ongoing systematic collection, analysis, and interpretation of data, usually incidence of cases of disease
- **WHO GMEP definition:** “....surveillance is .. aimed at **discovery, investigation, and elimination** of continuing **transmission**, the **prevention and cure of infection** and final substantiation of claimed eradication”
- **M&E and surveillance:** critical activities to measure program performance, impact and achievement of goals: **Maximally possible versus minimal essential**
- **Surveillance–resonse** (“surveillance as intervention”) to reduce transmission to achieve elimination

Some consequences...

1. As countries consider elimination, monitoring, evaluation (M&E), and surveillance activities will need to shift from measuring morbidity and mortality to **detecting infections / pockets of transmission and measuring transmission**
2. **Higher need for diagnostic tools and strategies;** particularly feasible, field-ready tools for the detection of asymptomatic infection and possibly DNA-based and/or serological biomarkers for malaria infection and transmission),
3. New/more effective **approaches tracking population dynamics**
4. Effective **field based mapping** linked to data bases
5. **Improved measurements of transmission**
6. Improve the feasibility, efficiency, and cost-effectiveness of new **health information systems**



Some consequences... From M&E and BAD to MED

GMEP:

- Based on Best Available Data (BAD) – surveillance, surveillance...

Malaria Control Programs – GFATM


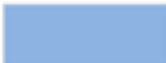

- M&E – neglect on surveillance
- Collect maximally possible data – „flood of indicators“
- Challenge of timely evaluation to allow adjustments / actions

Today when moving towards elimination / eradication

- Move from M&E to „surveillance-response“
- Move towards Rapid assessment Procedures
 - Minimal essential data in space and time
 - Data generated, evaluated and fed into decision-making
 - Public health action – response packages - to follow swiftly
 - Less about techniques more about approaches (e- / m-health), but a lot about validation
 - Leads to re-thinking HMIS – elimination of one disease can spearhead process

Figure 3. Potential application of different active surveillance and mass drug administration approaches to reduce transmission.

Setting		Active surveillance		Presumptive treatment	
		PACD	RACD	MDA	tMDA
Transmission setting	Moderate	Very suitable	Less suitable	Very suitable	Less suitable
	Low	Could be considered	Very suitable	Could be considered	Very suitable
	Elimination	Could be considered	Very suitable	Could be considered	Very suitable
Spatial/demographic risk	Defined	Very suitable	Could be considered	Very suitable	Could be considered
	Undefined	Less suitable	Very suitable	Less suitable	Very suitable
Proportion infections asymptomatic	High	Very suitable	Very suitable	Very suitable	Very suitable
	Low	Less suitable	Could be considered	Less suitable	Could be considered
Proportion infections subpatent	High	Less suitable	Less suitable	Very suitable	Very suitable
	Low	Very suitable	Very suitable	Less suitable	Less suitable

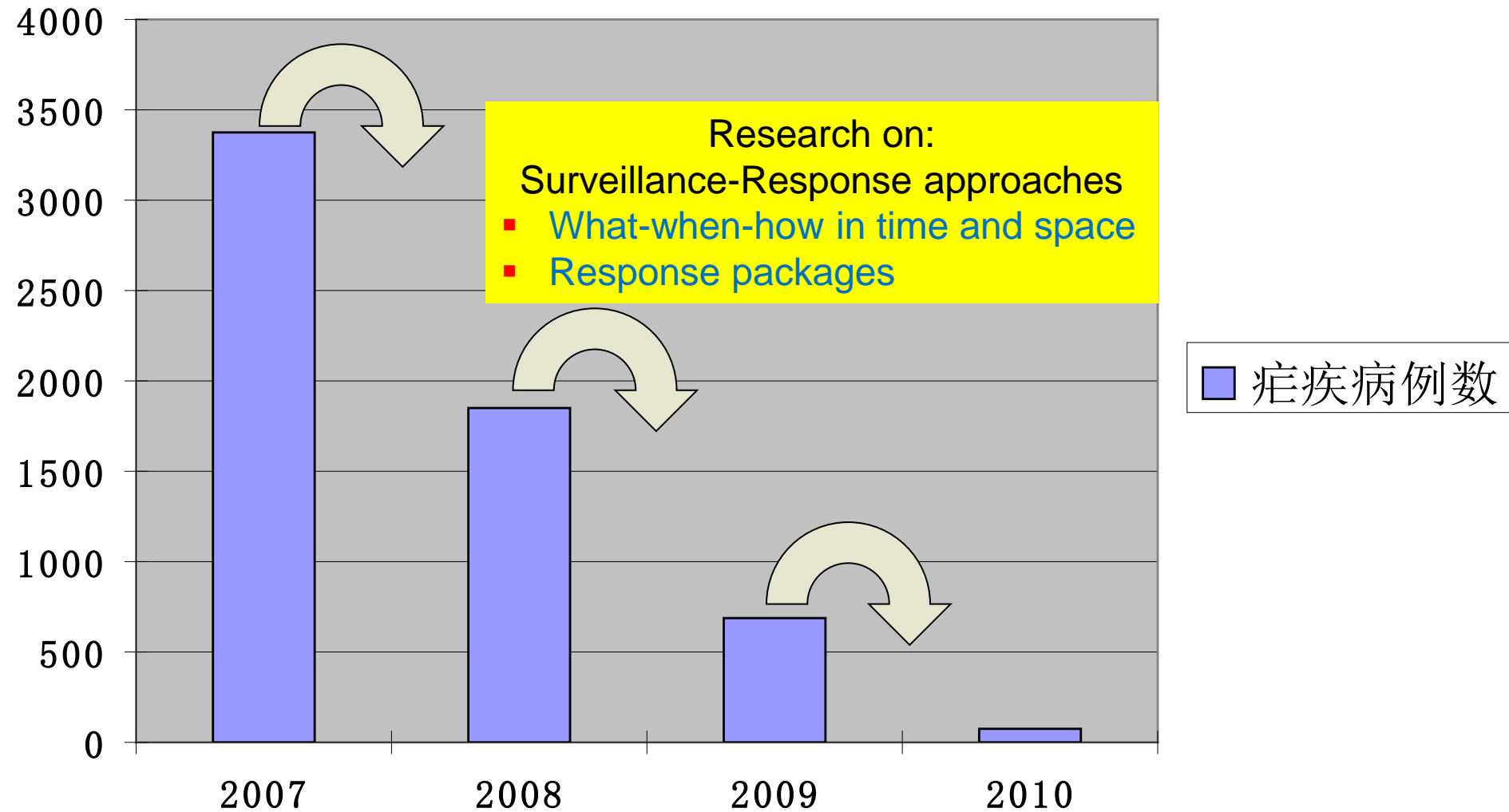
 Very suitable
  Could be considered
  Less suitable

PACD – Proactive case detection, RACD – reactive case detection, MDA – mass drug administration, tMDA – targeted mass drug administration. MDA refers to presumptive treatment of pre-defined populations, whereas tMDA involves presumptively treating individuals living in close proximity, or with shared risk factors, to passively or actively detected cases.

Sturrock HJW, Hsiang MS, Cohen JM, Smith DL, Greenhouse B, et al. (2013) Targeting Asymptomatic Malaria Infections: Active Surveillance in Control and Elimination. PLoS Med 10(6): e1001467. doi:10.1371/journal.pmed.1001467
<http://127.0.0.1:8081/plosmedicine/article?id=info:doi/10.1371/journal.pmed.1001467>



The number of malaria cases in 2007–2010



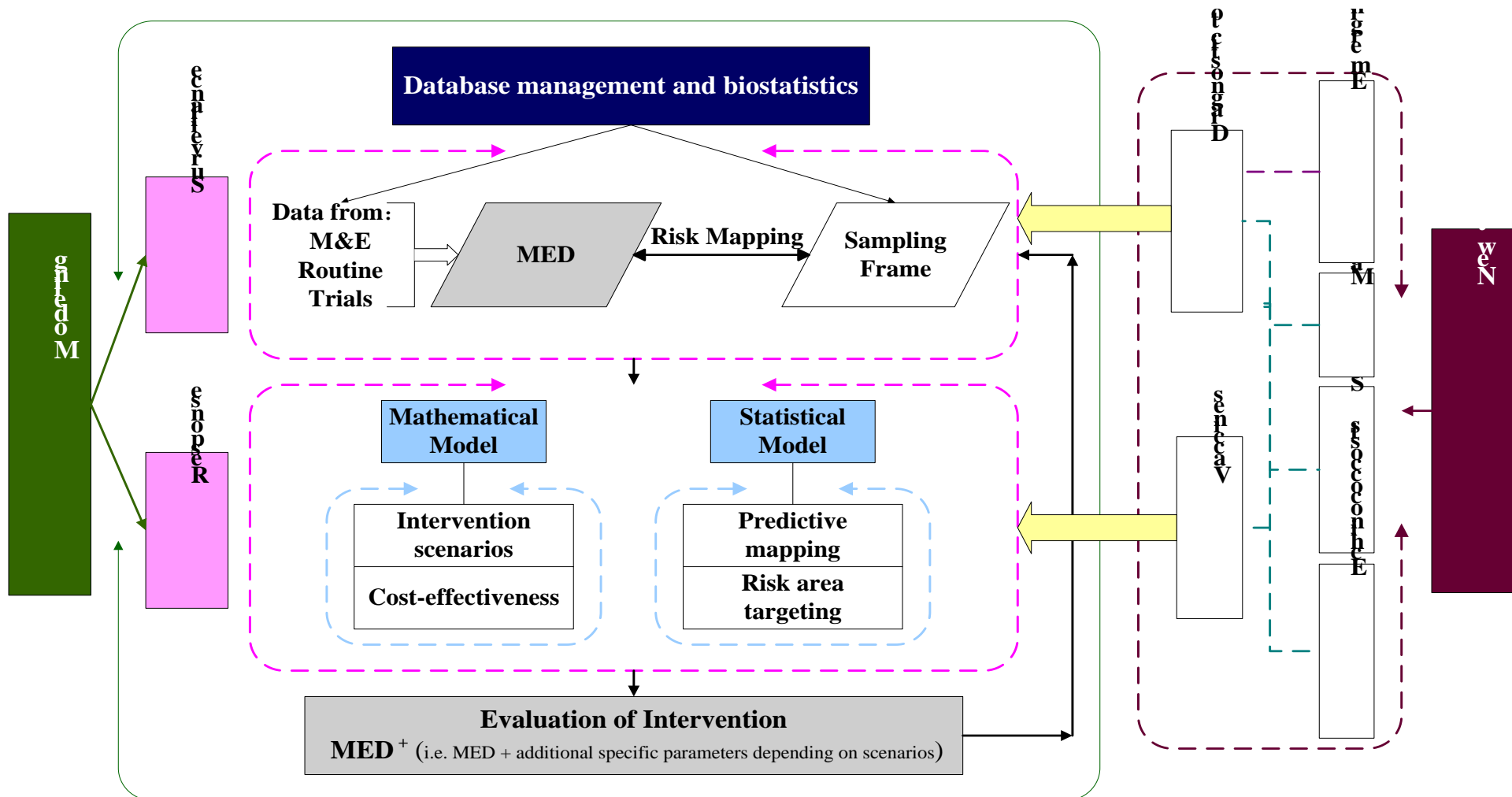
Box 1. The 1-3-7 Strategy Designed to Guide and Monitor Malaria Surveillance and Response in China

1: Case reporting within one day. Any confirmed and suspected malaria cases by law must be reported to the web-based health information system within 24 hours of diagnosis by the local health-care provider.

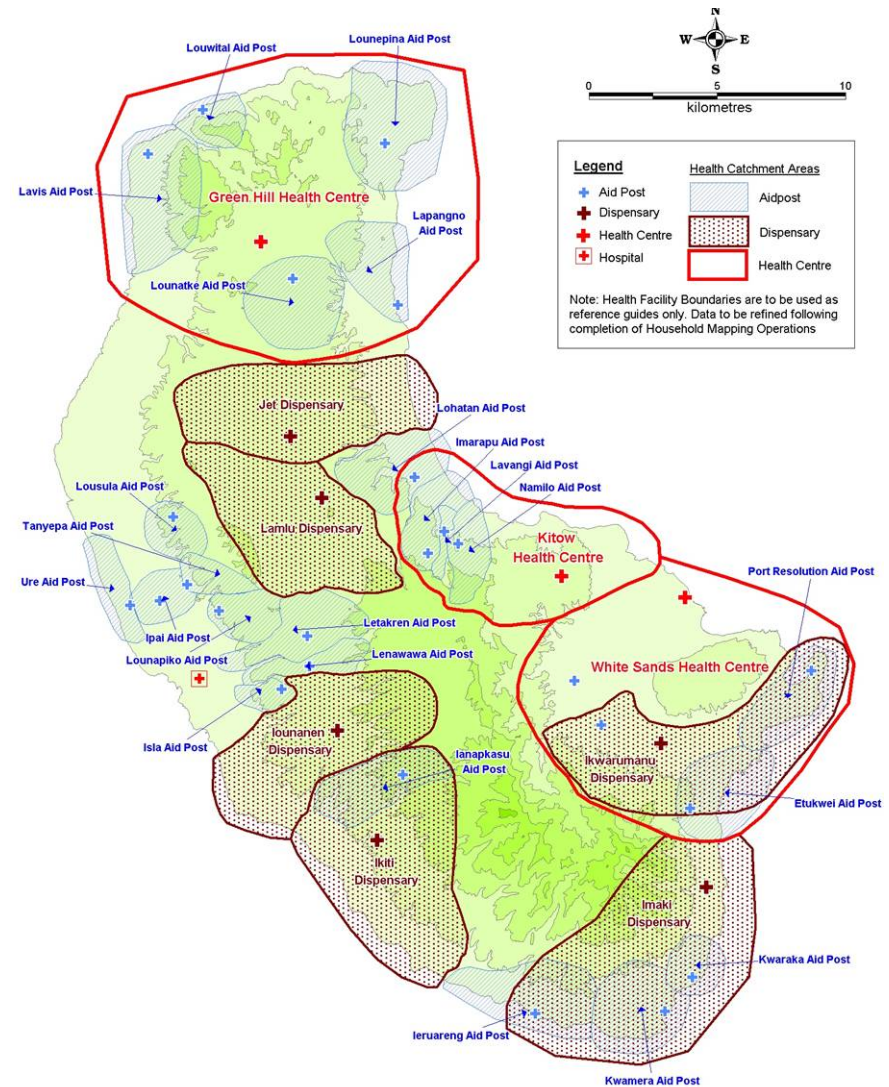
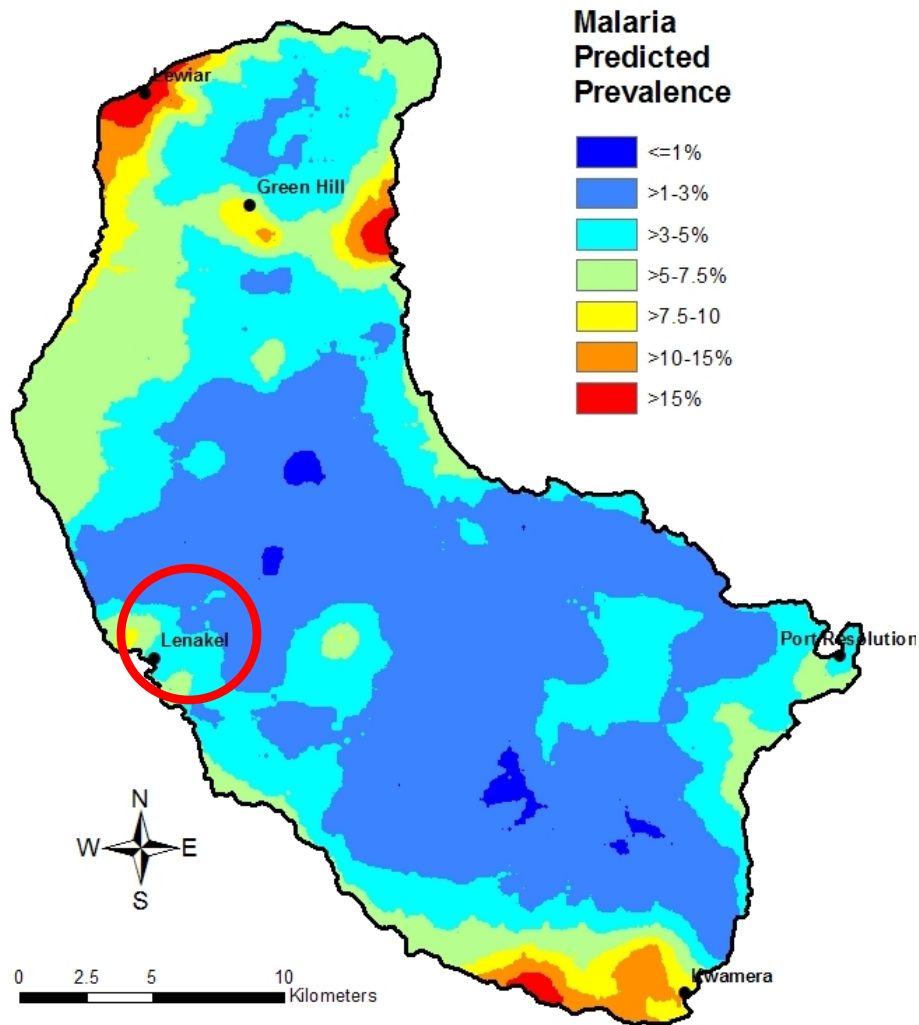
3: Case investigation within three days. All malaria cases should be confirmed and visited by the county-level China CDC, where the case is reported within three days, to determine where the case originated (local or imported).

7: Focus investigation and action within seven days. The focus investigation should be conducted as soon as possible. If local transmission is possible or confirmed, targeted action to seek out other infections and reduce the chance of onward transmission is completed within seven days by the county-level China CDC of the county where the patient resides and/or works.

Surveillance-response system: conceptual framework



Strategies of PCD and ACD linked to predictive mapping and towards decision support systems



SPRAY OPERATION AREA 2B
MUD MAP 4

From M&E and BAD to MED Science ?

- MED – use M&E (GFATM...)
- Modeling /Sensitivity analyses
- Validation

Application / Product ?

- Spatial decision support system

Combine:

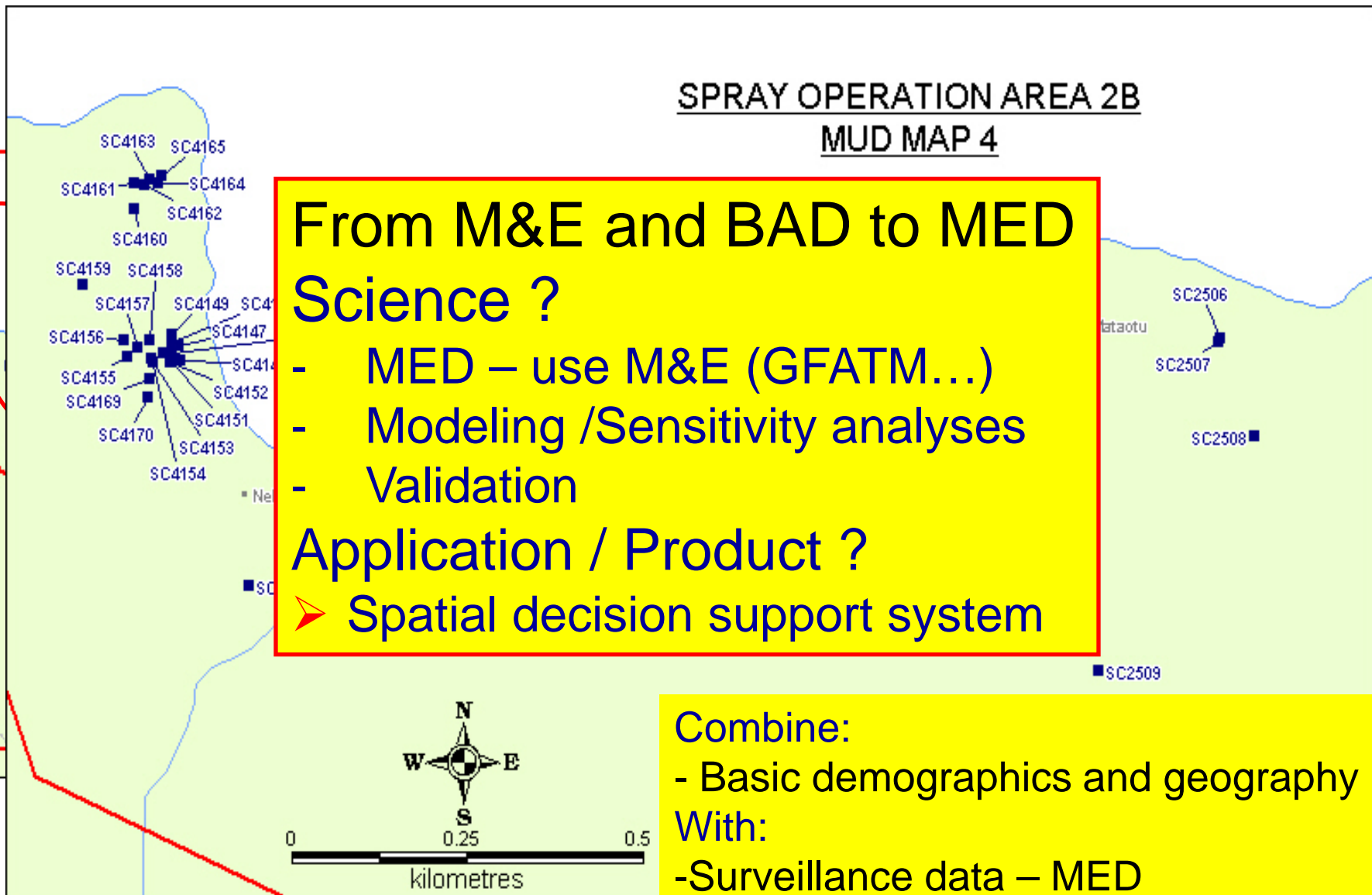
- Basic demographics and geography

With:

- Surveillance data – MED

Using:

- GIS/RS - predictive mapping
- m-Health / e-Health



Breeding places: *An farauti*

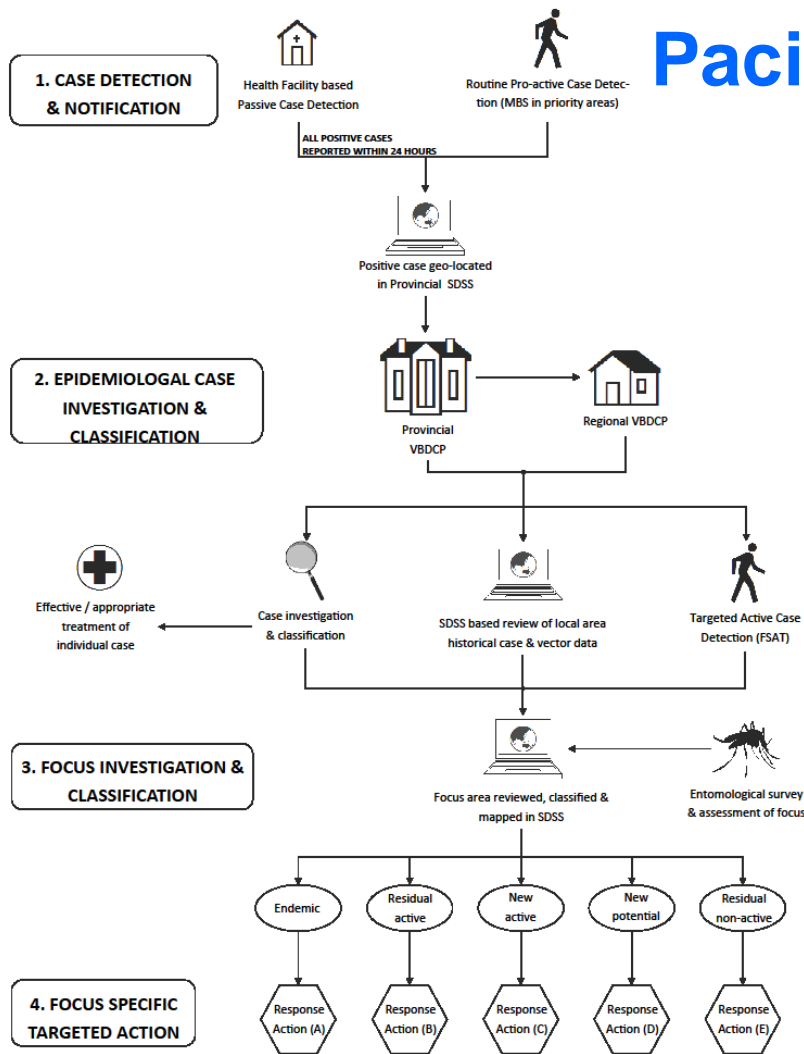


Community surveillance

- Breeding sites
- Immigrants
- «Snowball...»

Isabel Province Malaria Elimination

Surveillance - Response Conceptual Framework



KEY: FSAT—Focal Screening and Treatment; MBS—Mass Blood Survey; SDSS—Spatial Decision Support System; VBDCP—Vector Borne Diseases Control Programme

Pacific: Surveillance - Response

SOPs for:
Surveillance - Response

after Kelly et al. 2012

Real time mHealth monitoring of ACT supply chains..



We have good drugs for malaria!

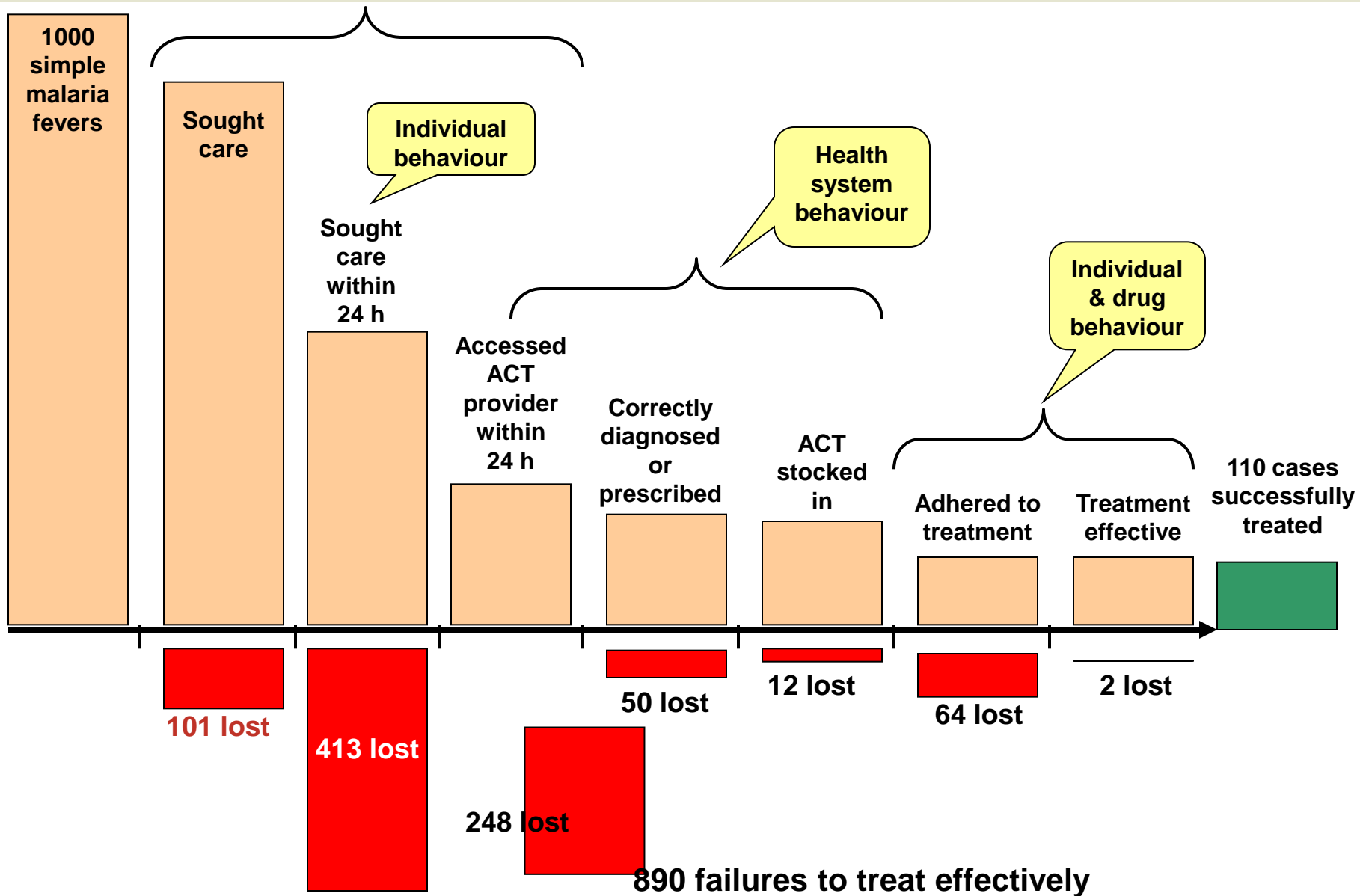
But a continuing challenge of global, national and local responses to antimalarial drug procurement and supply chain system realities.

Current situation in 5,126 public health facilities in Tanzania on Oct 5th, 2012

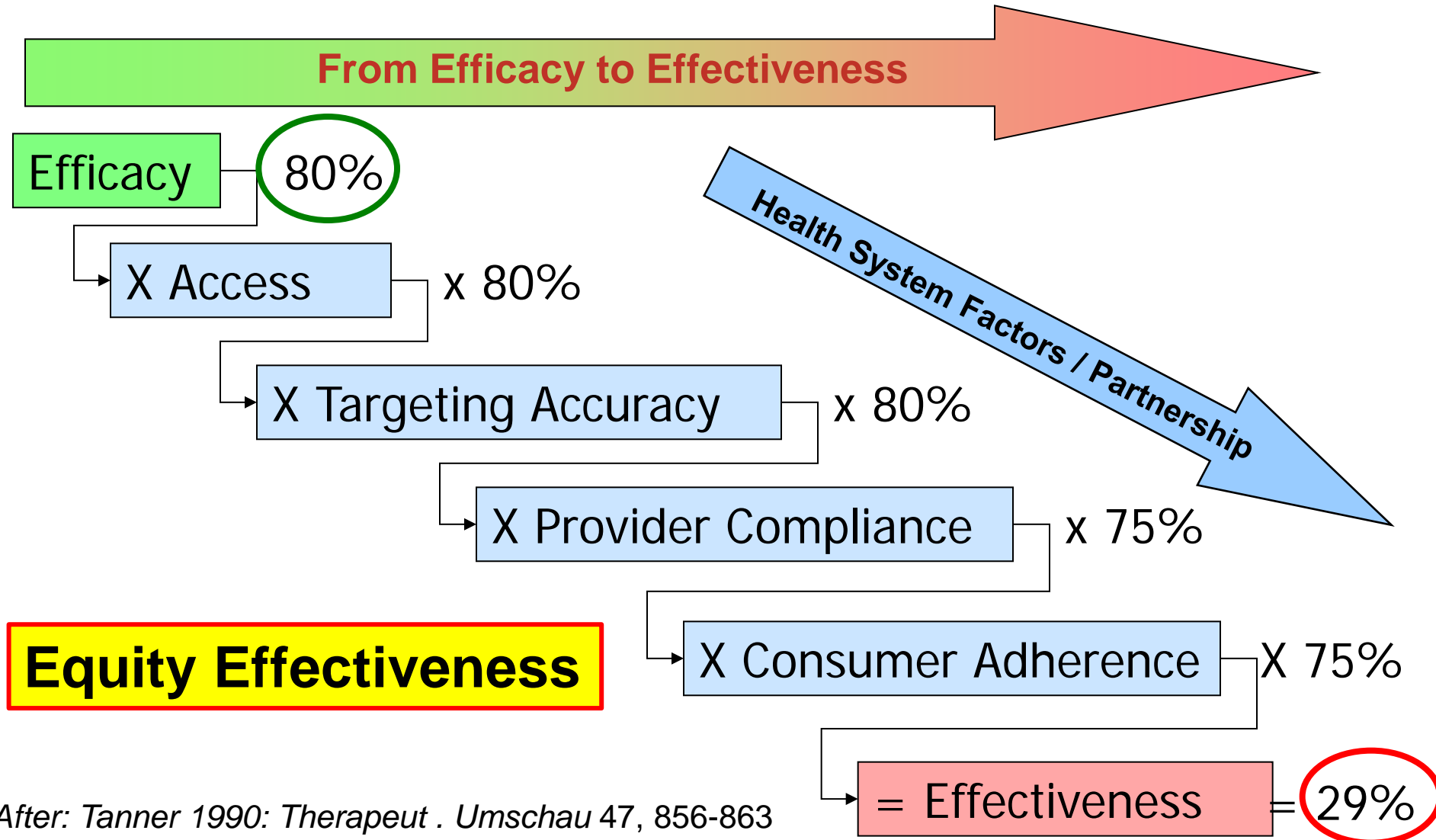
Red if a stock out this week

Green if in stock this week

System effectiveness of ALU in Rufiji Tanzania



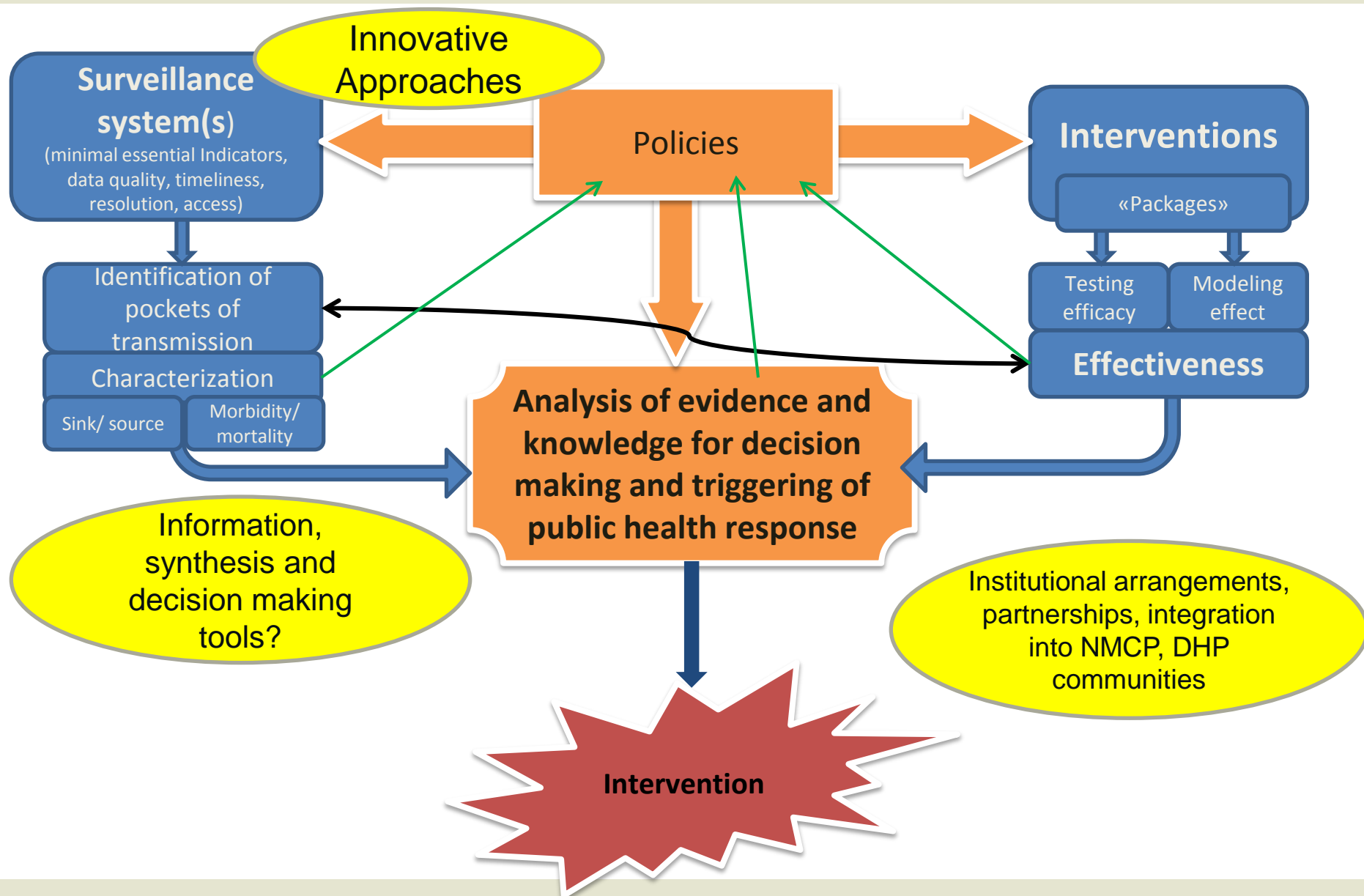
The systems context



Research Priorities: Surveillance - Response Systems (SRS)

- Dynamic mapping of „pockets“ of transmission and/or reintroduction
- Capturing **population dynamics**
- Analyses of M&E data and modeling to optimize SRS
 - **MED: Parasite – Man – Vectors**
 - **Sampling in space and time**
- Design and **validate** with use of (i) evidence from programs and (ii) modeling (intervention mixes) **effective response packages tailored** to different transmission settings and levels
- Use of **new technologies** (m/e-health, diagnostics)
- Validation, validation, validation...alongside with programs

Surveillance - Response Approaches





Thank you very much...