Delivering a toolbox of disruptive vector control innovations for malaria eradication.

Nick Hamon | VCWG | April 2021

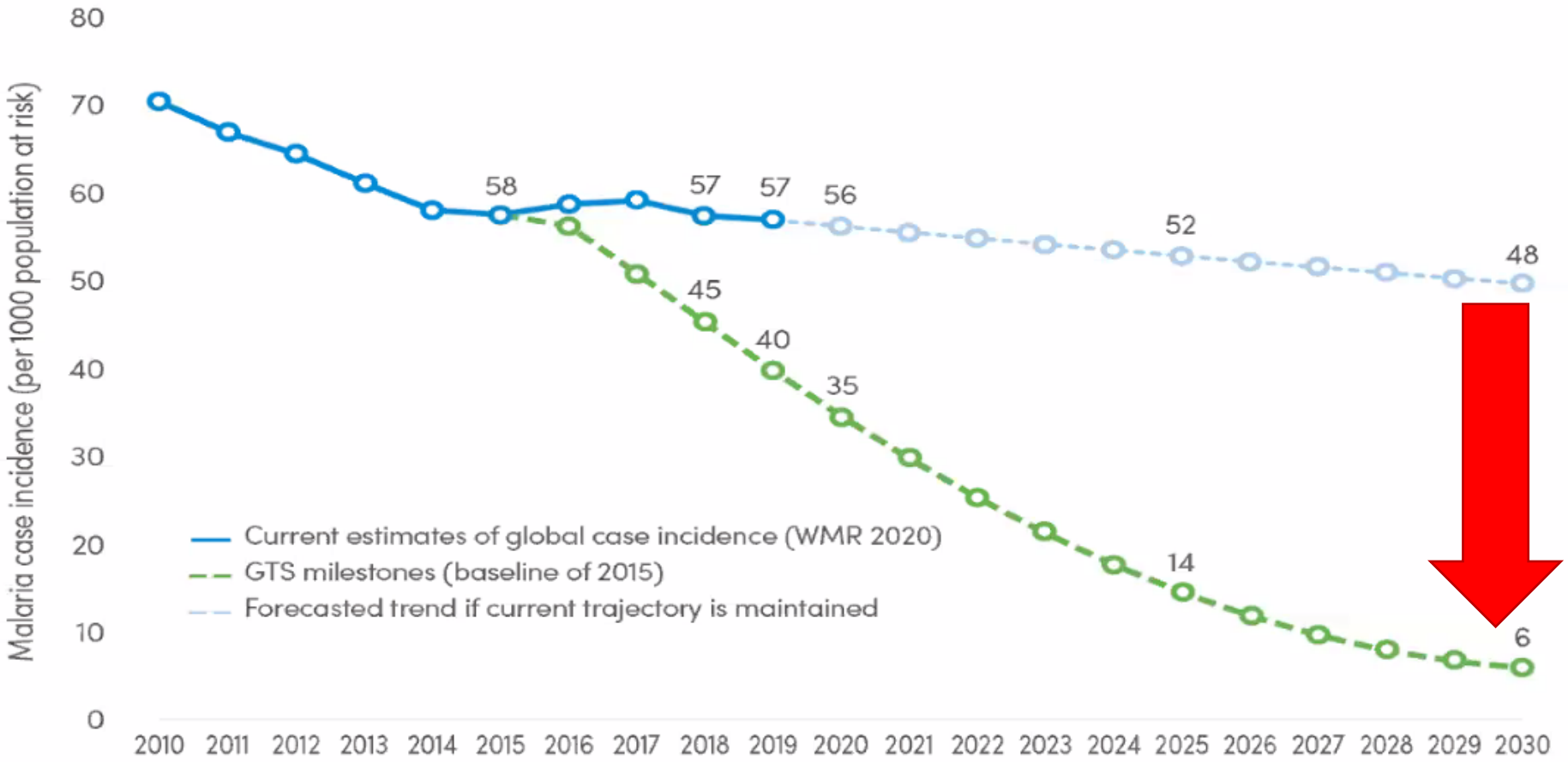
Recording

Global progress toward the 2020 GTS milestones, from 2015 baseline

Comparison of global progress in malaria case incidence, considering two scenarios: current trajectory maintained (**blue**) and GTS targets achieved (**green**)

IVCC's role is to 'shift the curve' with novel vector control tools

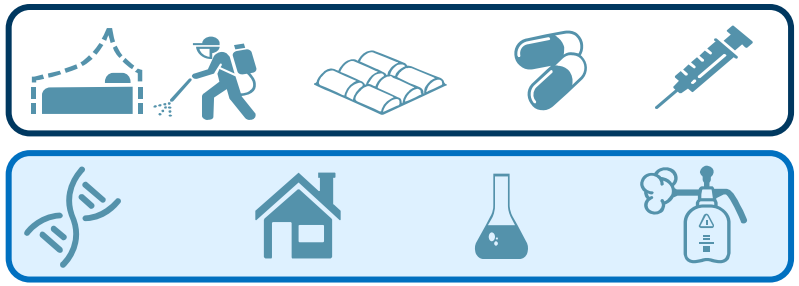
What can we learn from Covid-19, Ebola, Zika…and our experience as a PDP that can shift the curve faster?



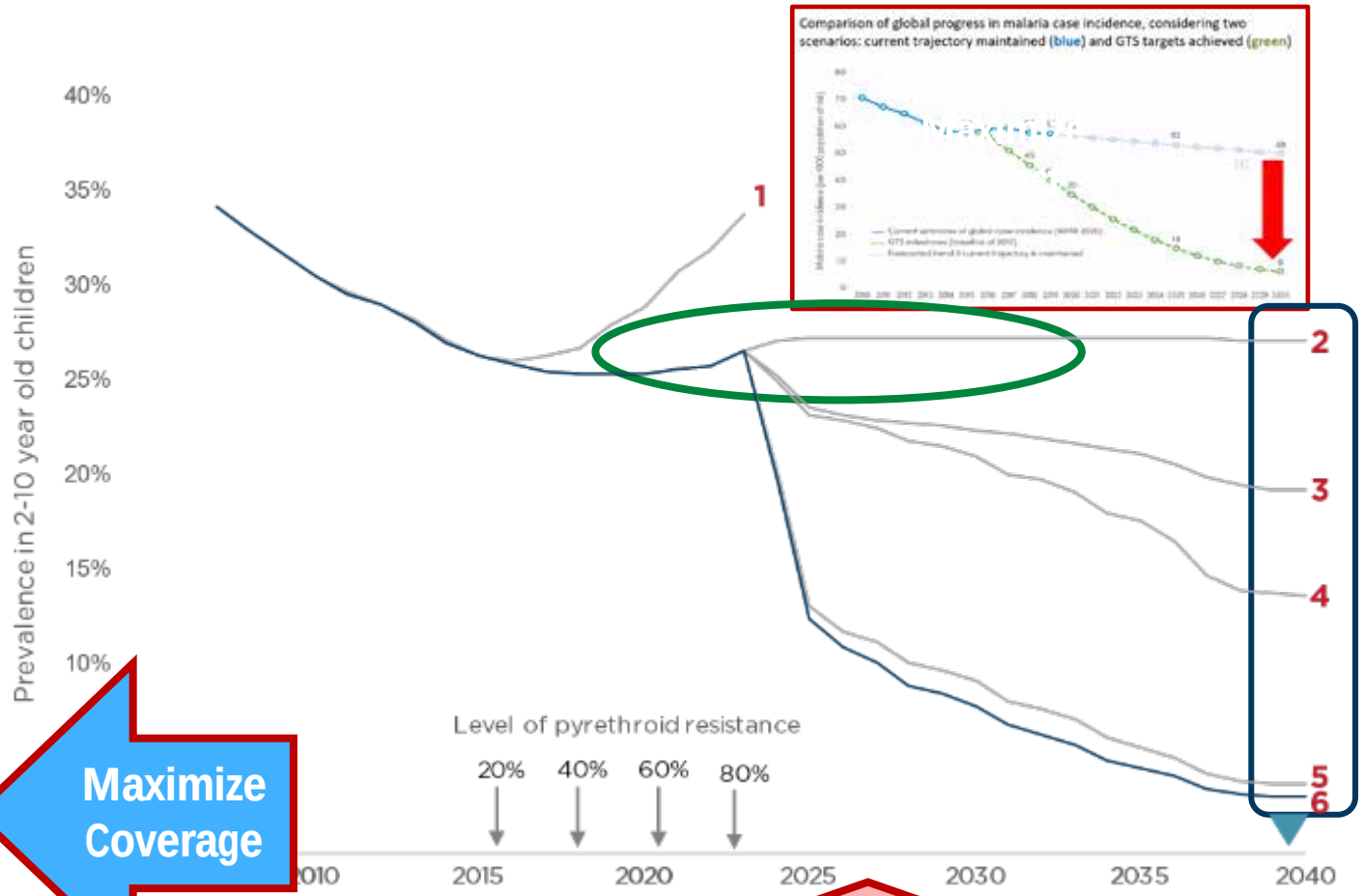
Source: WHO estimates

Modelling Intervention Impact in Africa

The role of vector control is critical in reaching our goal of eradication, supported by wider solutions across vaccines, drugs and gene drives.



Effective Tools + IRM



Maximize Coverage

Remove Barriers

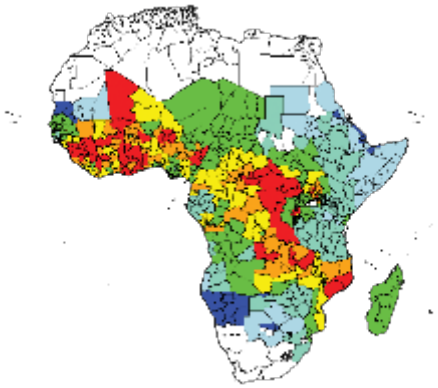
'Mind The Gap' Tools

Modelling demonstrates that new or modified vector control tools could be transformational in the fight to eradicate malaria

Prevalence in children under the age of 10 (%) in 2040
Imperial College London modelling scenarios: 2019

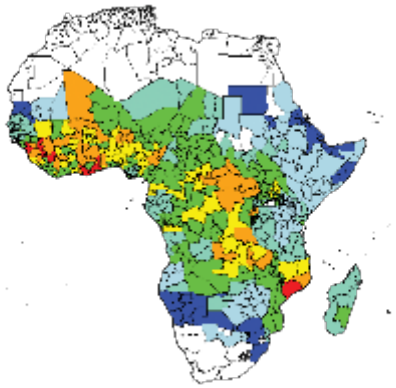
Starting point:

Scenario 1



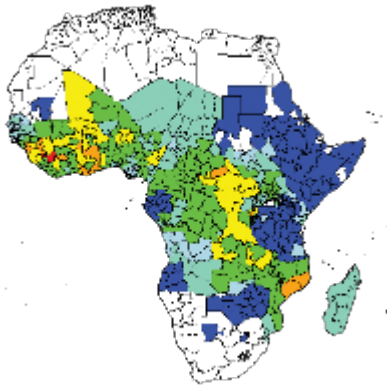
Counterfactual, no mitigation for pyrethroid resistance

Scenario 2



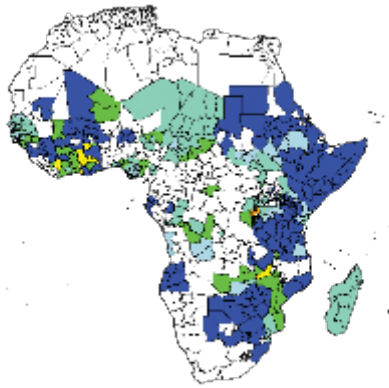
Mitigation with already available nets (PBO-synergist nets) and LLIRS (non-pyrethroid) maintaining 2016 usage levels

Scenario 3



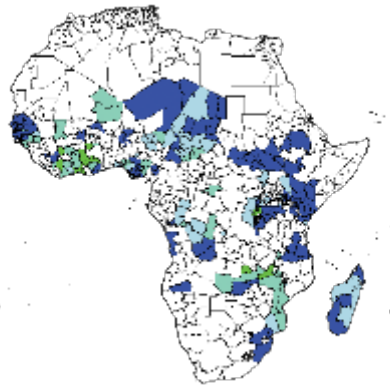
Mitigation with next-generation nets where usage is above 75% everywhere and LLIRS (non-pyrethroid) is maintained at 2016 coverage levels

Scenario 4



Mitigation with next-generation nets + XLLIRS in the 30% of regions with highest malaria levels, with coverage in these areas increasing to 100%

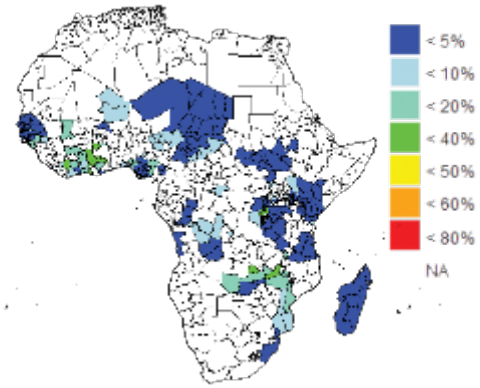
Scenario 5



Mitigation with next-generation nets. XLLIRS + ATSB everywhere (NOTE: efficacy against mosquitoes taken from single trial in one location, generalisability not yet known)

The goal:

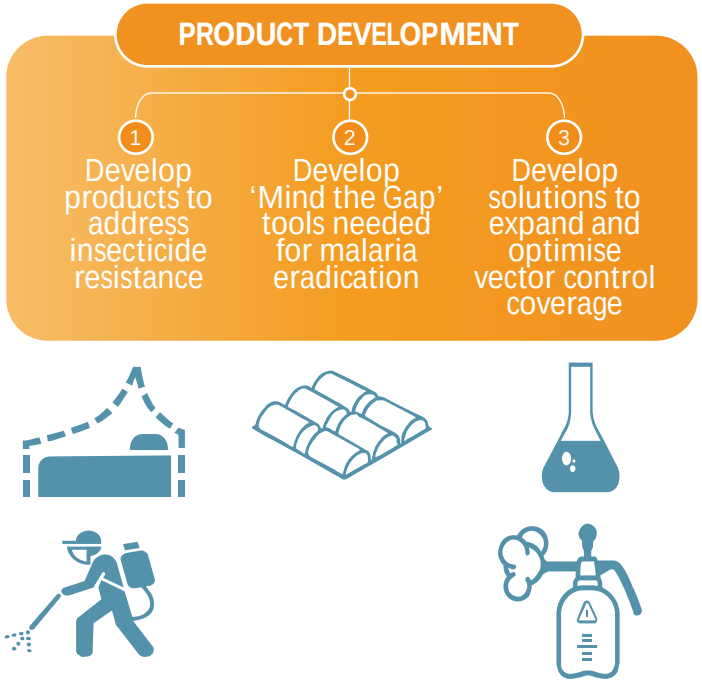
Scenario 6

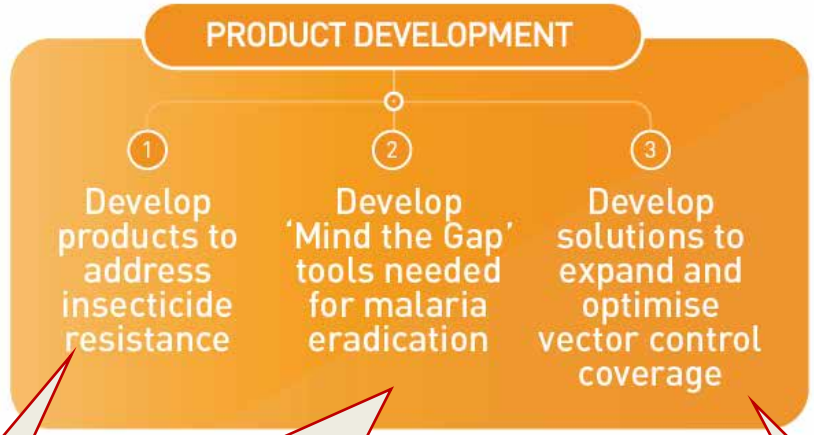


Maximal vector control + first-line treatment of clinical cases + seasonal malaria chemoprevention in the Sahel region + vaccine in high malaria burden regions

- **The right tools in the vector control Toolbox (LLIN+IRS+ATSB+…)**
- **The right layering of interventions by geography (vector control + drugs + vaccines + diagnostics)**
- **A ‘Smart Coverage’ (reduced intervention costs, market shaping, surveillance, modelling, IRM…)**

IVCC's Purpose is to Create and Deliver the Vector Control Toolbox (and insure impact/PHV)



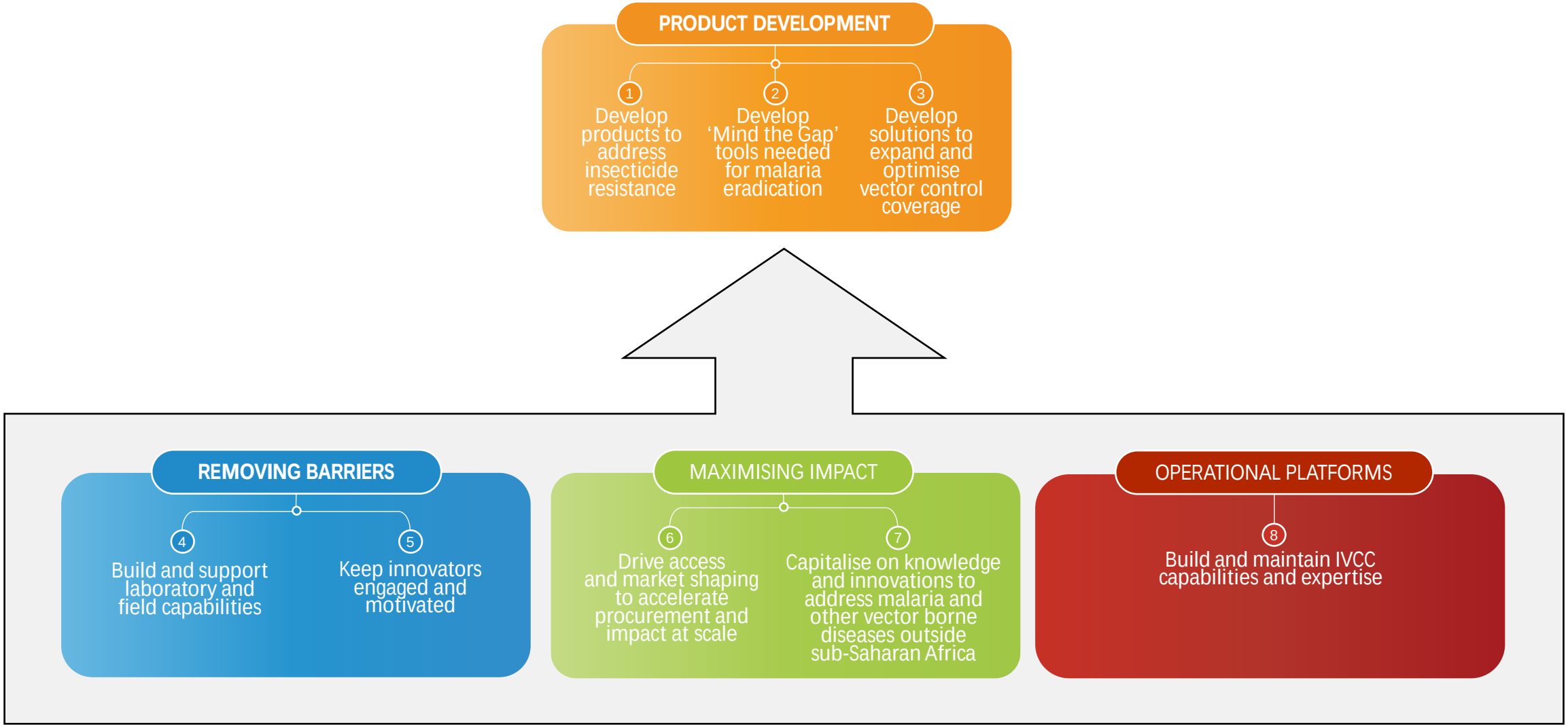


- Complete the development of novel active ingredients (AIs) for established product classes (LLINs and IRS)
- Develop and bring to market LLINs and IRS that are effective against insecticide resistant mosquitoes
- Evaluate mixtures for dual insecticide LLINs to support IRM principles and best practices
- Screen existing and newly developed insecticides for potential public health use

- Demonstrate Attractive Targeted Sugar Bait (ATSB) public health value to prevent outdoor malaria transmission
- Identify complementary tools and delivery methods required to achieve malaria eradication
- Evaluate additional solutions to address outdoor / residual malaria transmission

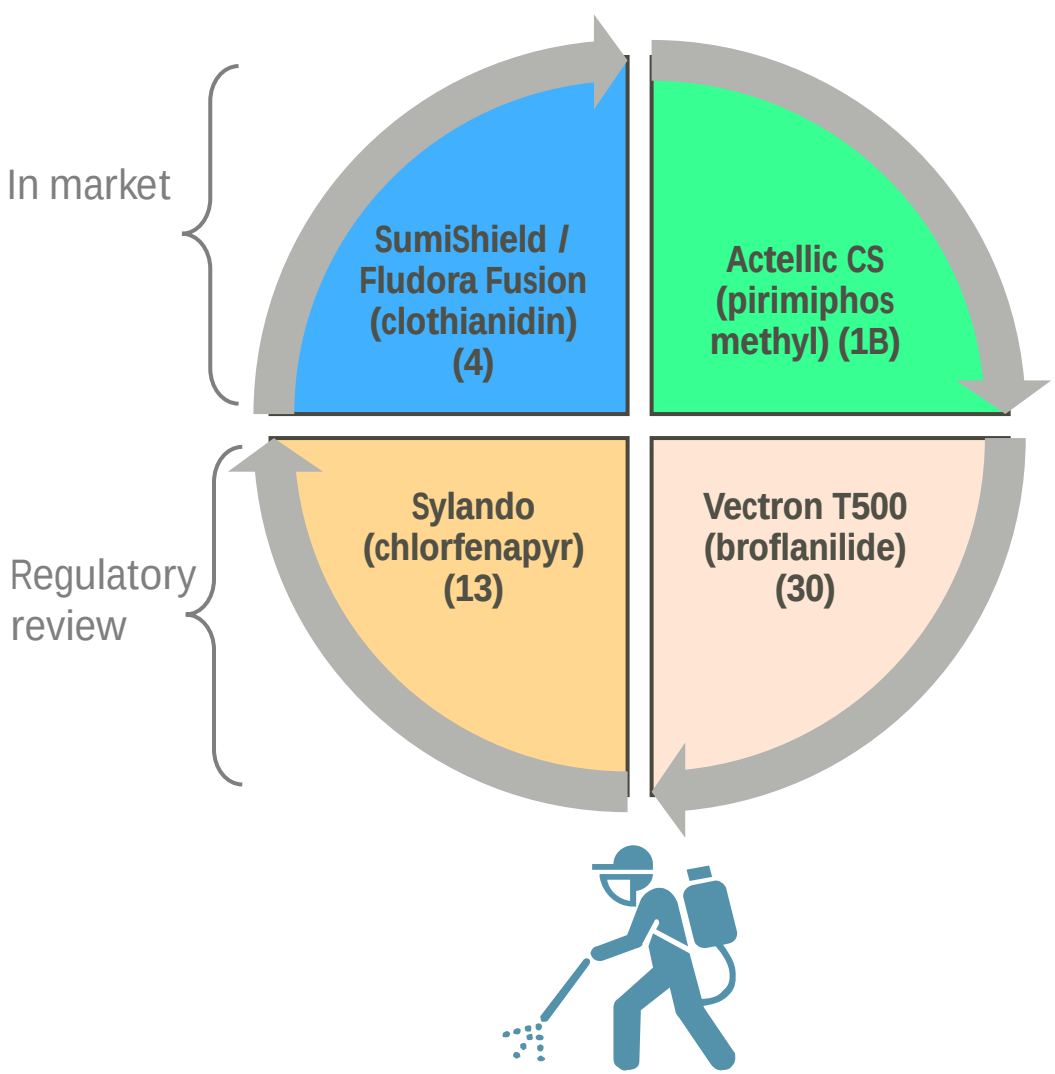
- Increase the impact of IRS by reducing costs and improving performance
- Improve the impact and performance of LLINs
- Extend the use of ATSB beyond outdoor transmission prevention
- Support surveillance and monitoring to enhance data-driven decision-making

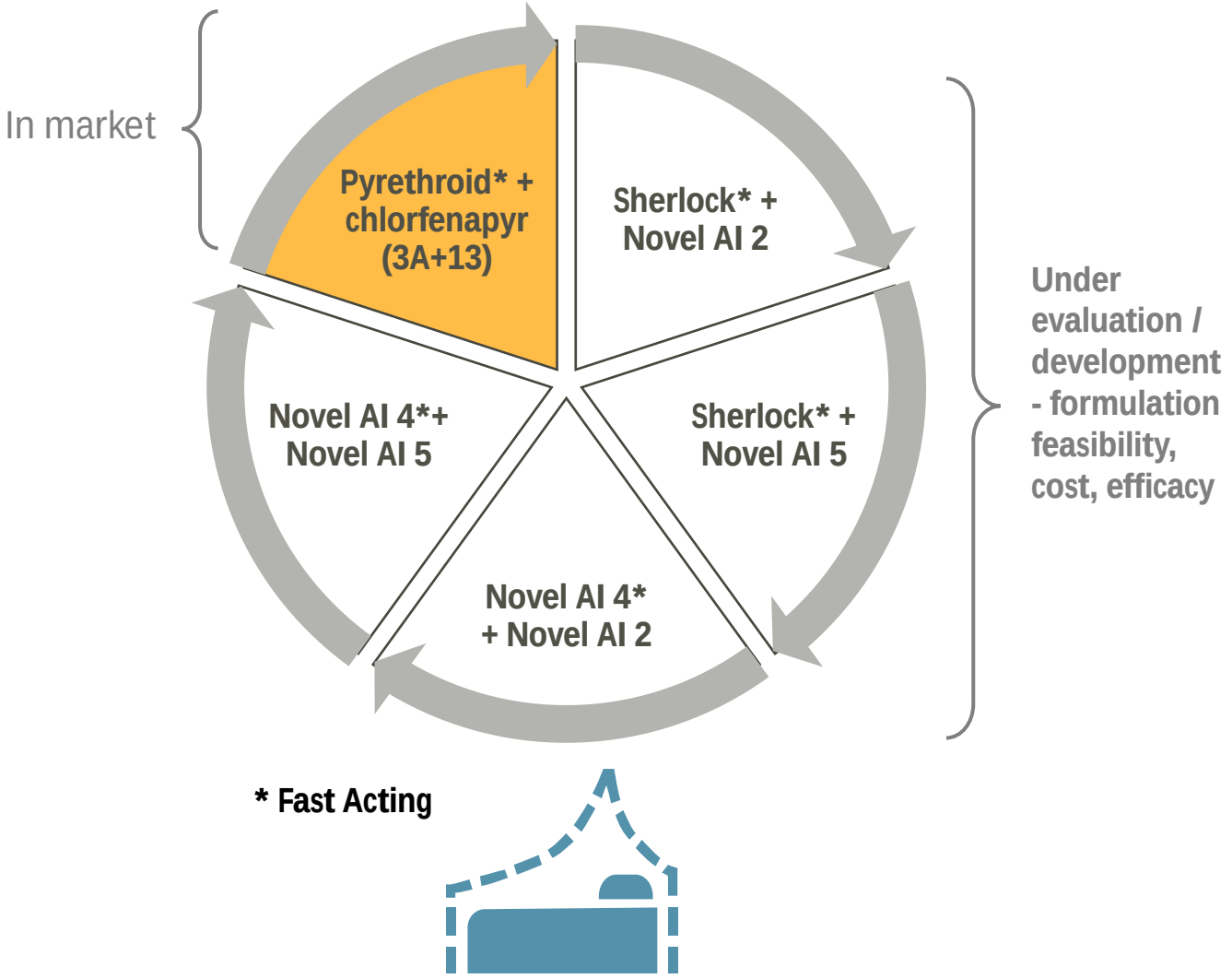
IVCC's Purpose is to Create and Deliver the Vector Control Toolbox (and insure impact/PHV)



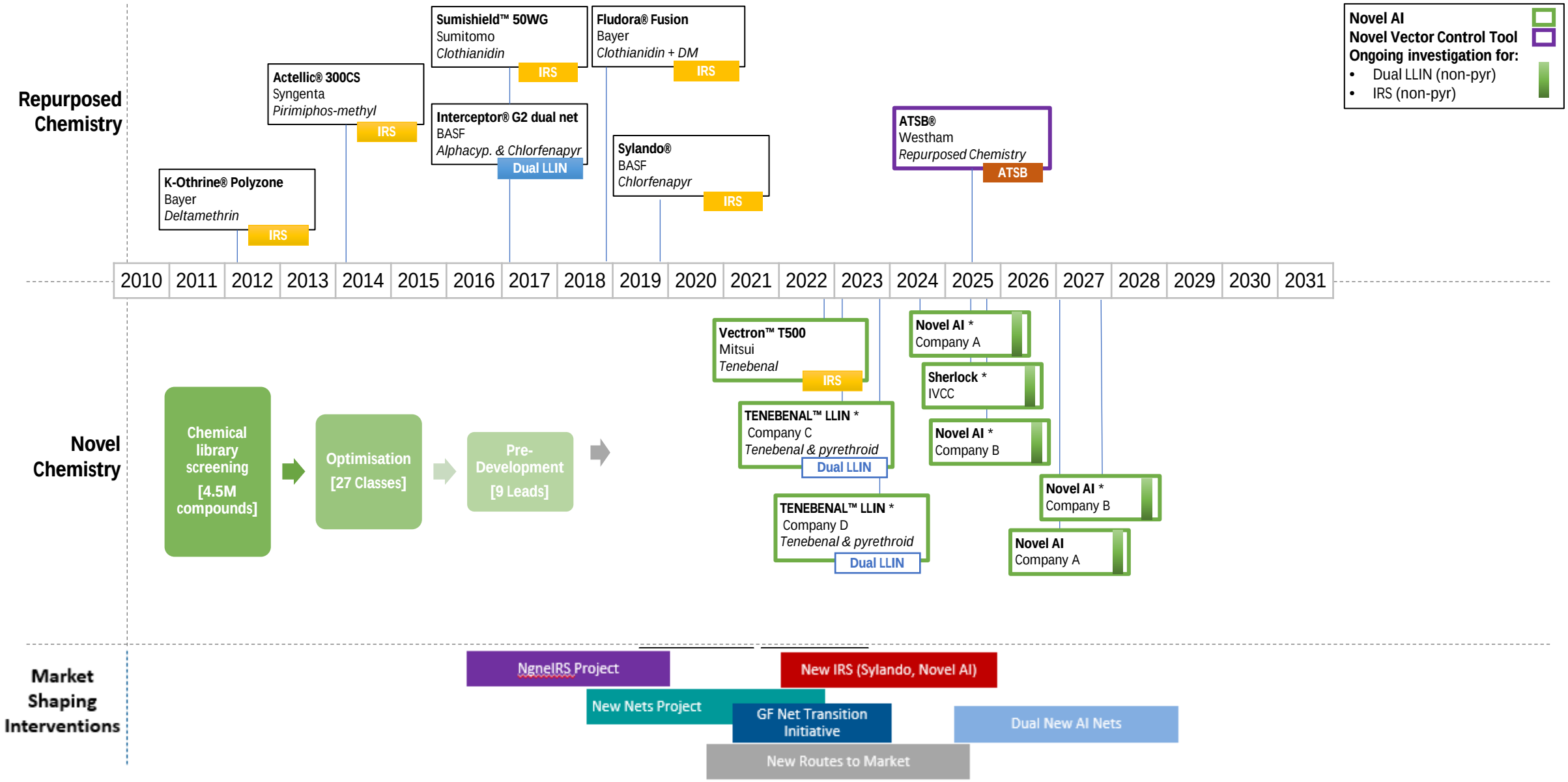
All IVCC Activities Designed to Support Creation of the Toolbox

Best practice IRM/IVM approach to using the toolbox

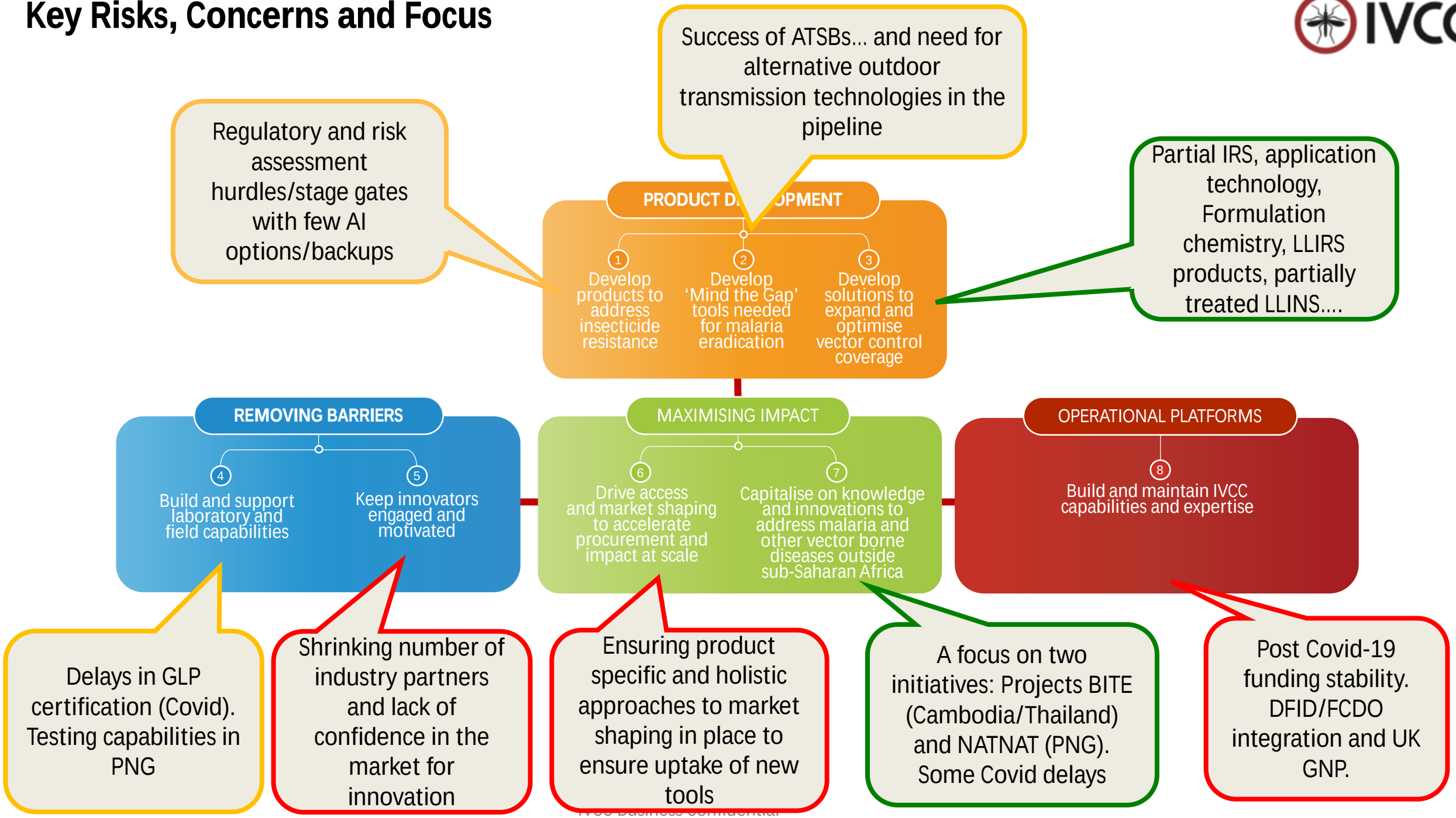




Summary of IVCC Partner Products in Market and in Development



Key Risks, Concerns and Focus



Lessons from Covid-19

- Time to develop and deliver a vaccine 1-2 years
- Covid-19 declared a Public Health Emergency of International Concern (PHEIC)
- Unprecedented efforts by the scientific community, along with almost unlimited global funding
- All mandatory clinical trial stages
- Pre-purchase agreements with manufacturers
- Low and middle-income countries relying on contributions from COVAX, a joint fund for equitable distribution of vaccines, being co-led by Gavi, the Vaccine Alliance, the Coalition for Epidemic Preparedness Innovations and WHO.
- Vaccines not created from scratch. Scientists had begun making vaccines for SARS and MERS, which belong to the Corona Virus family,

10-12 years for a novel insecticide

When does 400,000 malaria deaths a year constitute a Public Health Emergency?

Low to modest vector control funding and focus

No compromises in safety / risk assessment

Global access agreements and market shaping initiatives needed now to attract innovators (NgenIRS / NNP / MedAccess – volume guarantees)

PMI, Unitaid, Global fund…others? Can countries and private sector take more of a lead?

Repurposed chemistry / chemical archive access and a Risk 21 approach for known chemistry

Lessons from Covid-19

- Normally, vaccines go through multiple phases before approval. For Covid-19 vaccines some of those phases were combined:
  - Phase I: The experimental vaccine is given to a small number of humans to test its safety, dosage and stimulation of the immune system. While this process typically takes one to two years, for Covid-19 trials, it was done in about three months.
  - Phase II: Several hundred individuals, split into groups age groups dosed in a randomized, double blind, placebo-controlled study. This process usually takes about three years but for Covid-19 vaccines, it was completed in 2-3 months.
  - Phase III: The vaccine candidate is given to thousands of people, and can typically take two to four years. However, most of the vaccine makers combined this with Phase II to expedite the process.
- Regulatory review: After Phase III, vaccine developer submits a license application to the regulatory authority in their respective country, and final approval may take months or years. However, in emergency situations, authorities granted emergency-use authorisation (EUA) in a matter of weeks.
- Accepted that the first generation of vaccines is likely to be imperfect and improvements would be made through time
- Gaps in the supply chain had to be plugged through investments in infrastructure and storage facilities, especially ultracold freezing capabilities.

Entomological and epidemiological studies in parallel along with experiment use licenses to collect data at scale….or entomological indicators only

Expedited Regulatory Review…can we start now?

Allow for improvements through time/in parallel with scale-up

Plan now for innovative distribution models for novel nets and IRS built around IRM/IVM principles….complex but not impossible….and cost more than pyrethroid nets