



Temptime update to DCVMN

- VVM for COVID vaccines
- Digitization of temperature sensors
 - VVM
 - PTTI (Peak Threshold Temp Indicator)

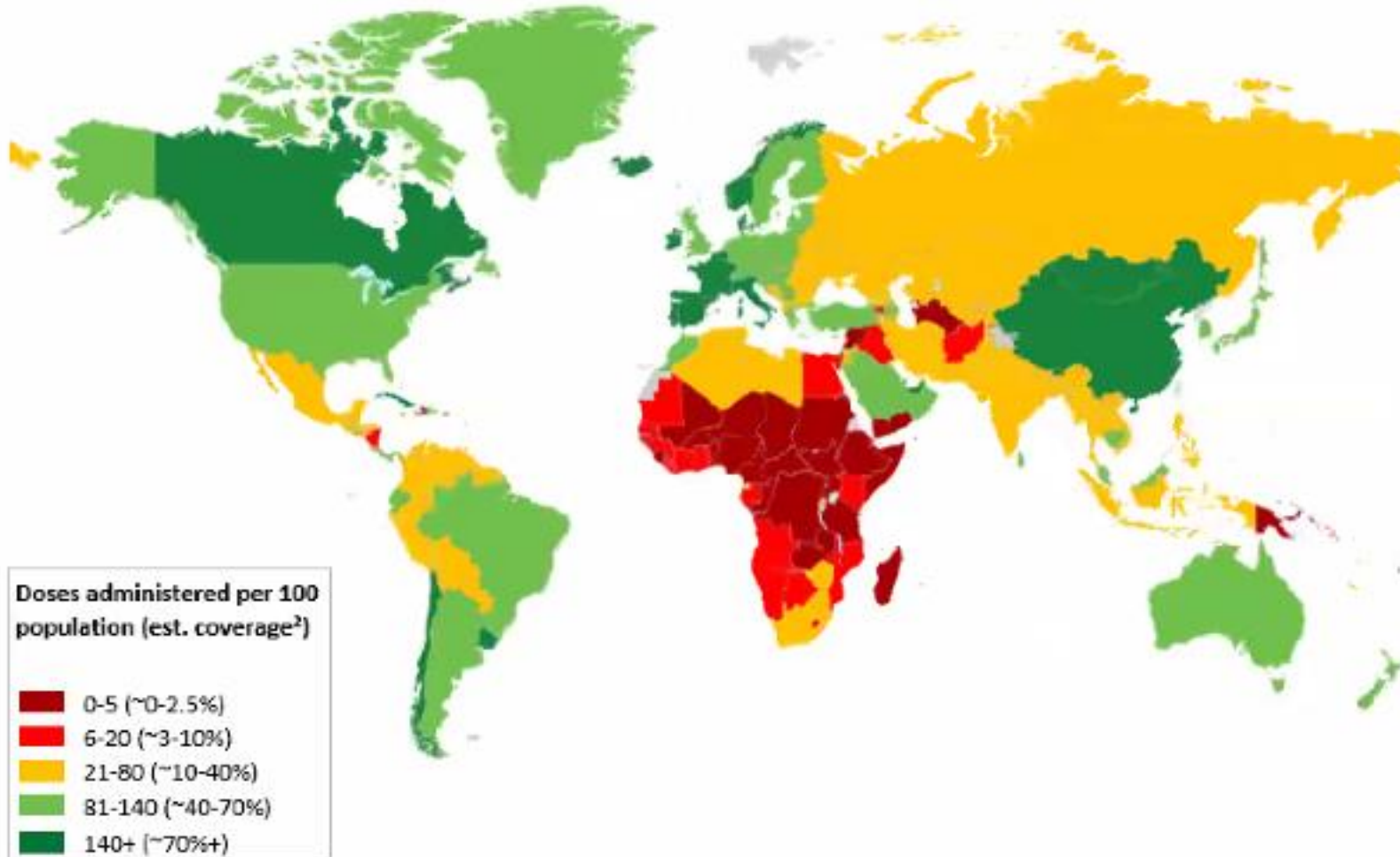
20 October 2021



- **VVM for COVID vaccines**
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Good vaccine coverage in HICs, LMICs have lower coverage AND challenges in their supply chain & cold chain

Total doses administered per 100 population

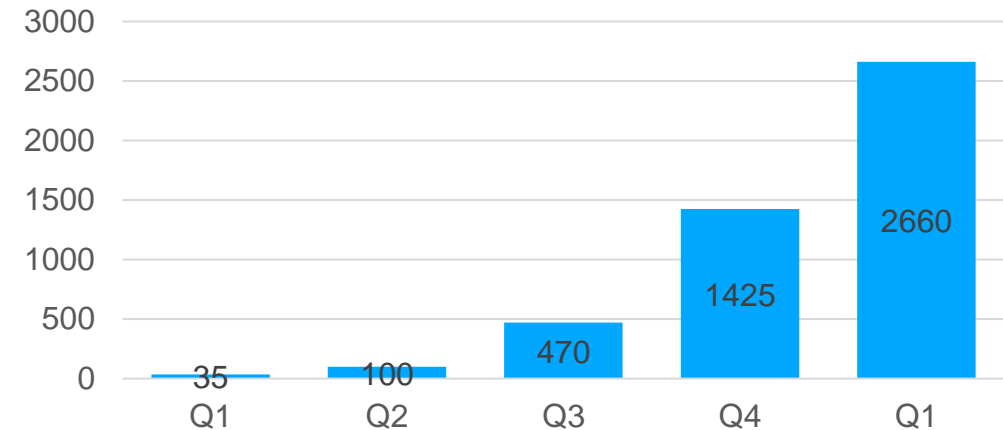


- Good coverage, in HICs ~40-70%.
- Supply issues mainly in Africa with less than 2.5% (dark red)
- Red countries also have challenges in supply chain

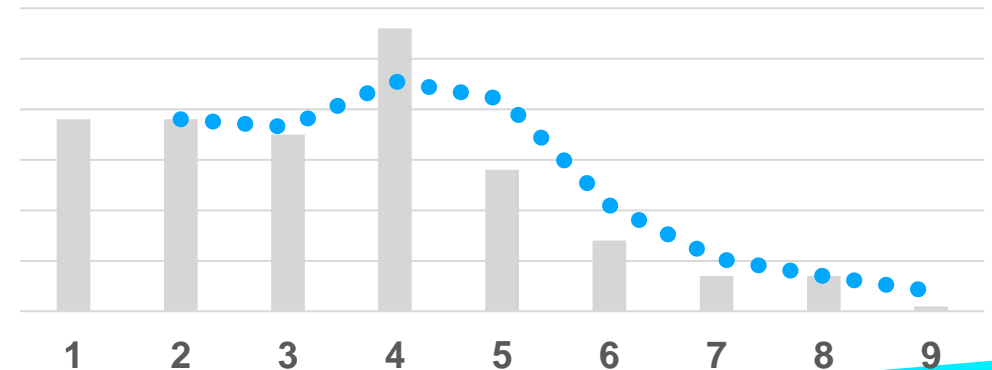
More, different vaccines pose challenges in distribution and handling

- Huge increase in COVAX shipments in Q4-21 and Q1-22
- Incremented with donations, African Union & bi-lateral contracts
- Multiple vaccines in country creates handling and administration challenges
- Average is already at 4 and increasing, the current max. is 9

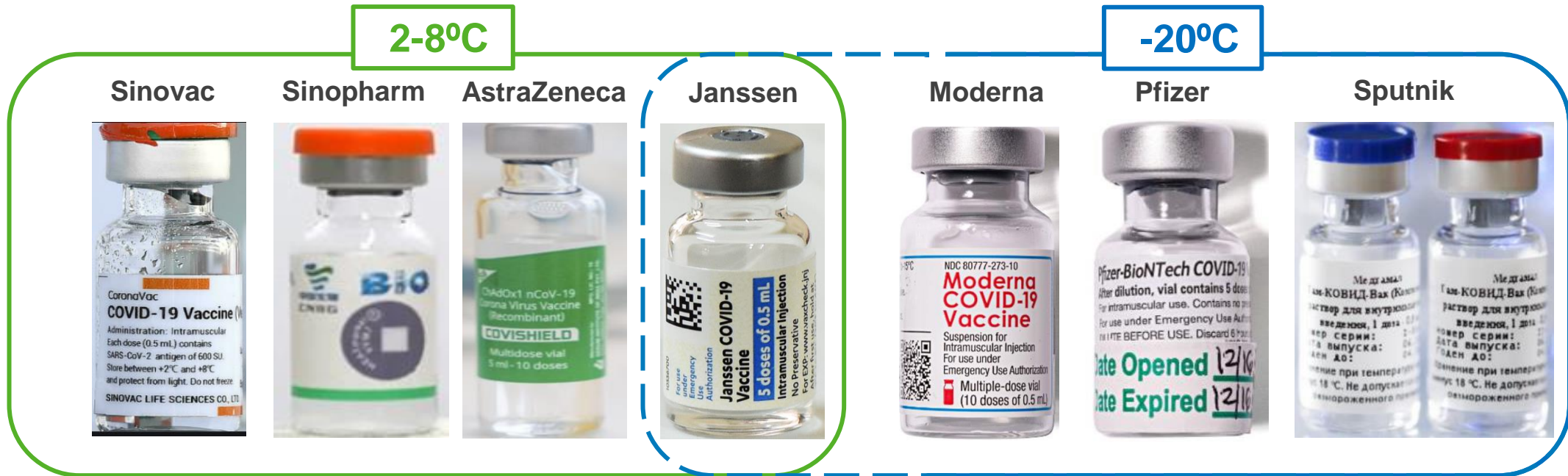
Cumulative Supply Forecast
doses millions



Number of vaccines being used in-country
average is 4, Max. to date of 9



Most countries handling 4 or more vaccines



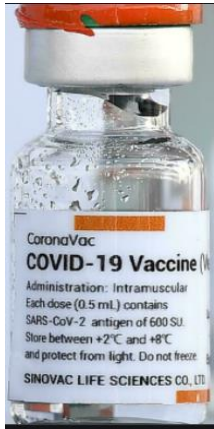
DIFFERENT HANDLING REQUIREMENTS = SIGNIFICANT COMPLEXITY

1. Frozen & ultra cold chain requirements (4)
2. Different thawing process at 2-8°C or room temp (4) re-freezing allowed (1)
3. Reconstitution step (1) dilution step (1)
4. A wide variety of storage times at 2-8°C (7)

Most countries handling 4 or more vaccines

2-8°C

Sinovac



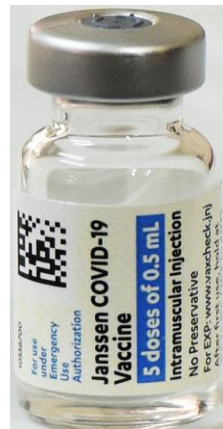
Sinopharm



AstraZeneca



Janssen



Moderna



Pfizer



Sputnik



2 years

1 year

6 months

4.5 months

30 days

31 days

2 hours

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4. A wide variety of storage times at 2-8°C (7)

No matter the different handling requirements



VVM shows cumulative heat exposure for each vial

Sinopharm COVID vaccine (Covilo) has VVM for LMIC supply

- Vaccine is currently arriving in multiple LMICs with VVM on single dose vial
- Helping the supply chain managers and Healthcare workers handle & administer the vaccines

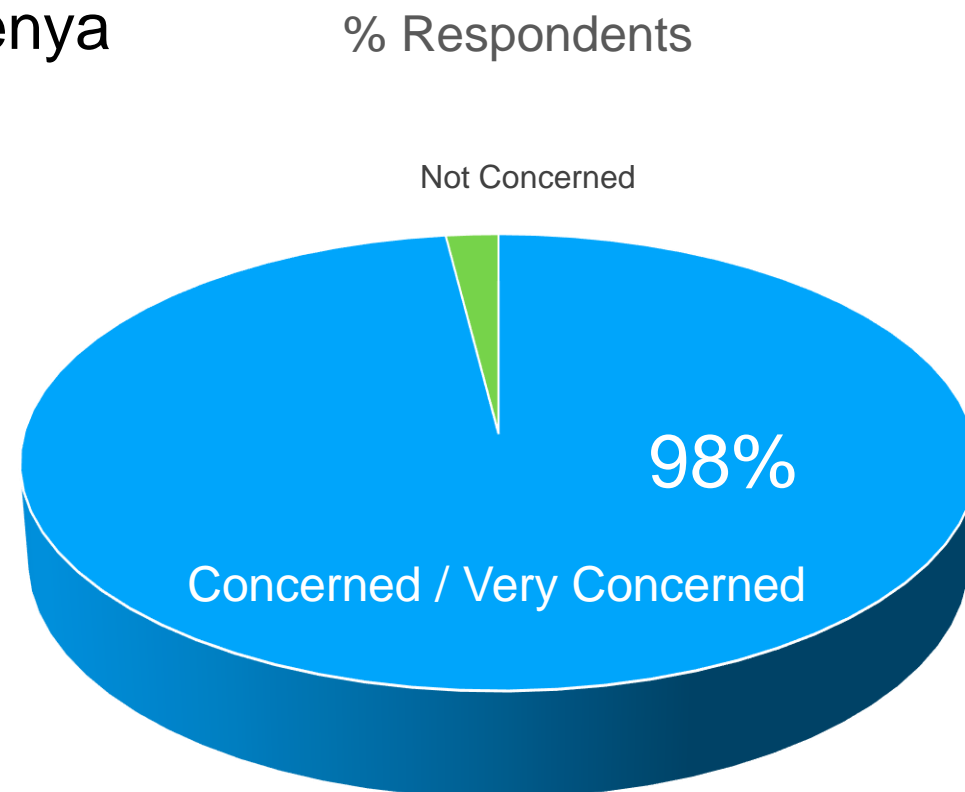


VVM fits existing SOPs, 98% of HCWs would prefer them

2 surveys: Ethiopia 2020-March, and Zambia/Kenya 2021-December

“.. VVM and expiry date must be included... to ensure that the potency and safety of the vaccine is assured”

“...having VVM is an important SOP ...don't want to go back to the old practices.”



[COVID-19 Vaccine Label: User Evaluation \(technet-21.org\)](https://technet-21.org)

VVM facilitates re-distribution

Dr. Seth Berkley: “When distribution problems... emerge ...move those vaccines to other countries

The New York Times

August 2021



VVM confirms that cold chain storage conditions have been maintained appropriately



VVM endorsed by US Pharmacopeia (USP)

Confronting Sub-standard (heat damage) and Falsified vaccines



VVM2

3 mins

VVM14

12 mins

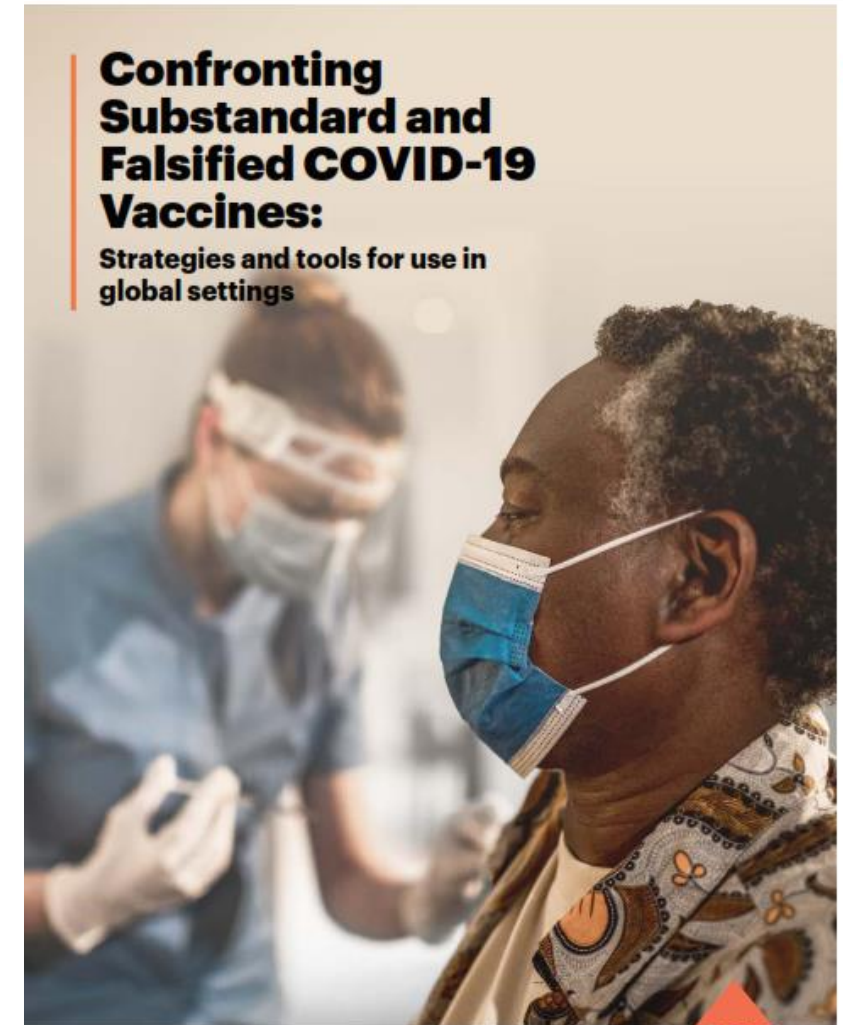


Boil an empty vial in water (in a plastic bag)

if the inner square (slowly) darkens...
...the vaccine is real

White paper published 8-2021

<https://www.usp.org/covid-19/vaccines>



August 2021

When you are considering VVM...

- VVM Production - Standard lead times

VVM Type	Full Label	VVM Dots
VVM 1 or 2	4 – 6 weeks	2 – 4 weeks
VVM 7	5 – 7 weeks	
VVM 11, 14	6 – 8 weeks	
VVM 30	8 – 10 weeks	



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Digital & mHealth innovations are gaining momentum

- Global Health Institutions (GHI) signaling the importance

- “technology helps to reduce inequities... instead of becoming another reason people are left behind”

Tedros Ghebreyesus, WHO

- “Need for phone-based solutions ... as well as track and trace of vaccines”

Seth Berkley, Gavi Alliance



- COVID pandemic has demonstrated the value & feasibility

- Multiple Apps, QR codes, vaccination certificates, health passes

- Logistics Management Information Systems (LMIS)

- Considerable progress & interest in implementation

Countries getting support on LMIS implementation

7 providers (short listed by Gavi/Global Fund)



India, Indonesia



Tanzania



Tanzania



Timor-Leste



Nepal



Burundi

Field Supply (FS)

Nigeria



DEPLOYING AN ELECTRONIC LMIS:
MAKING THE RIGHT CHOICE

A webinar series in association with the
COVID Digital Health Centre of Excellence (DICE)



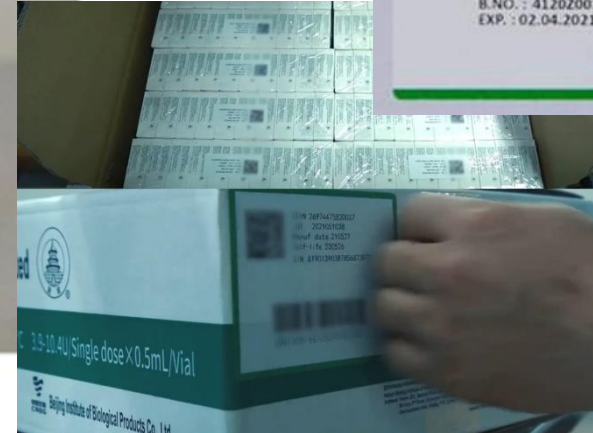
**LMIS pilots going to scale in
selected countries**

**Increasing use of Bar codes
potentially at all packaging levels**

Vitalliance is committed to maintaining OpenLMIS as an Open Source public good, as well as providing ongoing core support. Some feature expansion will be enabled through Vitalliance and its partners, so that OpenLMIS will continue to grow and respond to evolving user needs, and move away from its reliance on donor funding.

Manufacturers reacting to track and trace opportunity

- Examples of DCVMN using serialized bar codes on Tertiary, secondary and primary packaging e.g Biofarma, SII and Sinopharm on COVID and other vaccines



- UNICEF/GAVI announcement on secondary packaging bar code requirement by 31st December 2021

unicef | for every child



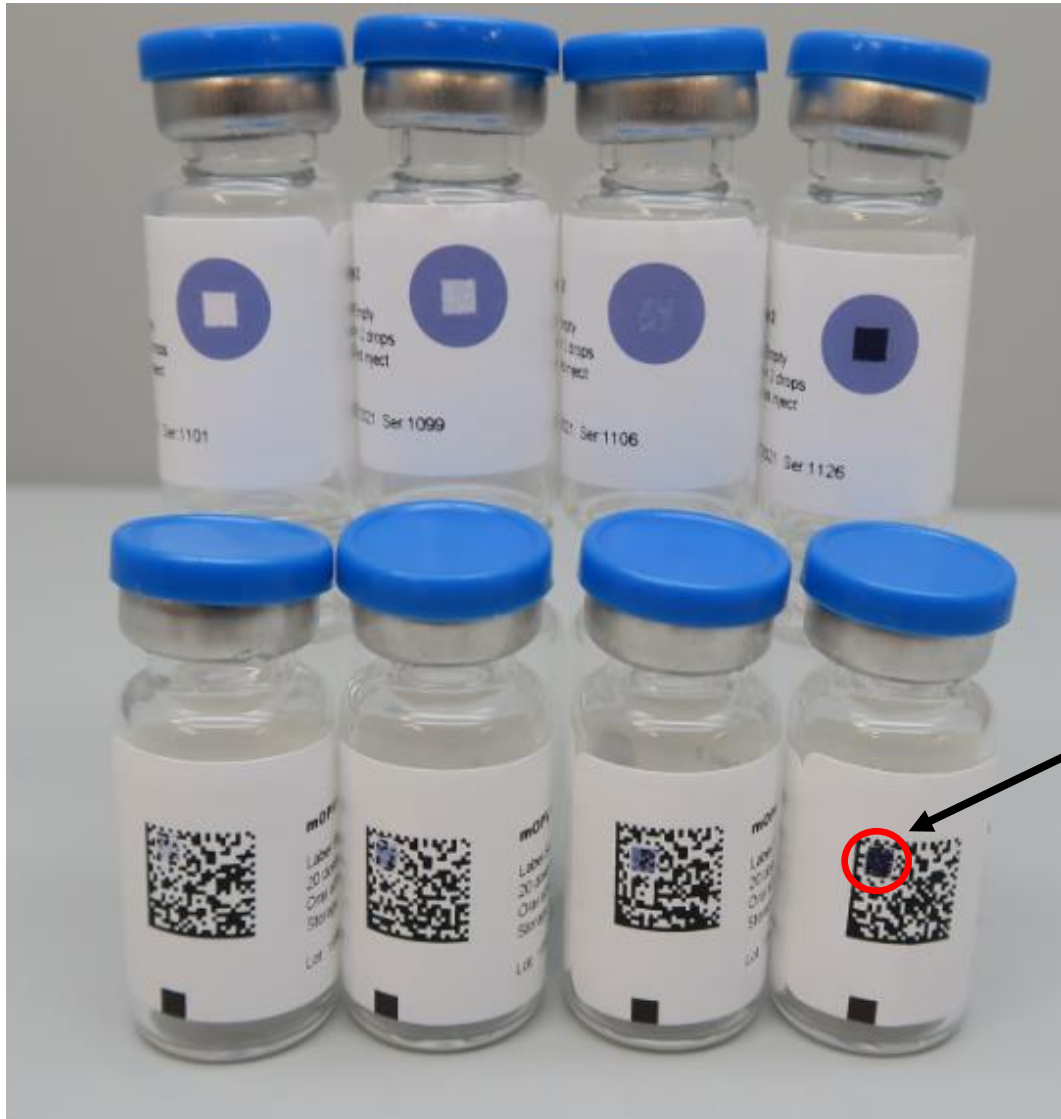
GAVI announcement: vaccine manufacturer GS1 compliance

Starting 1st October 2019, for vaccine tenders backed by Gavi financing and issued by UNICEF, GS1 barcoding on the secondary packaging will be a requirement by latest 31st December 2021.

Gavi, the Vaccine Alliance is supporting countries to improve vaccine visibility and traceability from manufacturer to beneficiary, contributing to our efforts to secure quality assured vaccines delivered to the right place, in the right quantities, at the right time to all children and adolescents.

https://www.unicef.org/supply/index_103734.html

Digitized Temperature Sensor – VVM or “eVVM”



Vaccine will continue to have a classic VVM, visually read by user, will remain on vial

Anticipating a GS1 compliant 2D DataMatrix Bar code scanned by user

Embedded VVM chemistry – a mini VVM, reacts to heat as usual, VVM status is automatically captured

Rapid Diagnostic Test (RDT) – with PEAK THRESHOLD INDICATOR



2D DataMatrix

Embedded chemistry – reacts to heat $\geq 40^{\circ}\text{C}$, is also automatically captured in scan

5 out of 11 different RDTs degrade after 10 minutes at 37°C

<https://www.sciencedirect.com/science/article/pii/S1386653221000639>

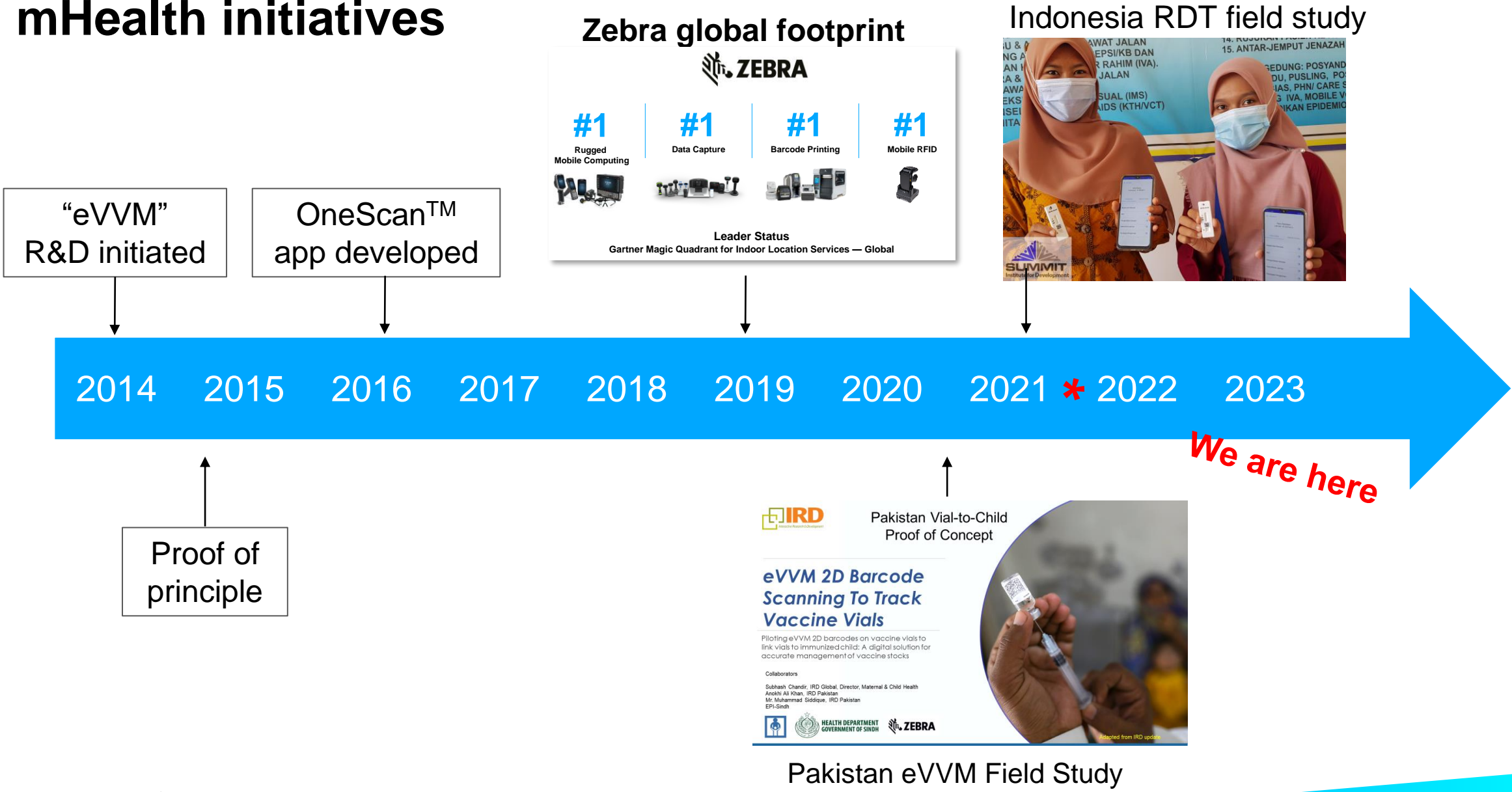
Temptime's Dynamic Sensor Barcode Value Proposition

Digitized temperature sensors will provide the following features

- *temperature assurance*
- *linkage to LMIS / HMIS and big data*
- *product authentication*
- *serialized supply chain tracking*
- *additional layer of anti-counterfeiting*



Zebra/Temptime expertise in barcodes and sensors supporting mHealth initiatives



Thank You

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