Optimization
Recap and definitions

Optimization and prioritization serve different purposes: the former shapes the future vaccine pipeline, while the latter strengthens today's portfolio

Improving the use of **already introduced vaccines** by adjusting products, schedules, presentations, or target groups to maximize the impact, efficiency, and coverage

Examples

Decision to switch from PCV 13 to PCV 10 in the context of the new PCV product tender in 2024

Sequencing decisions on **not yet introduced vaccines**, determining which to introduce first or delay based on impact, feasibility, and resources

2025 recommendation by a NITAG to introduce hexavalent, followed by rubella, M5CV and RSV

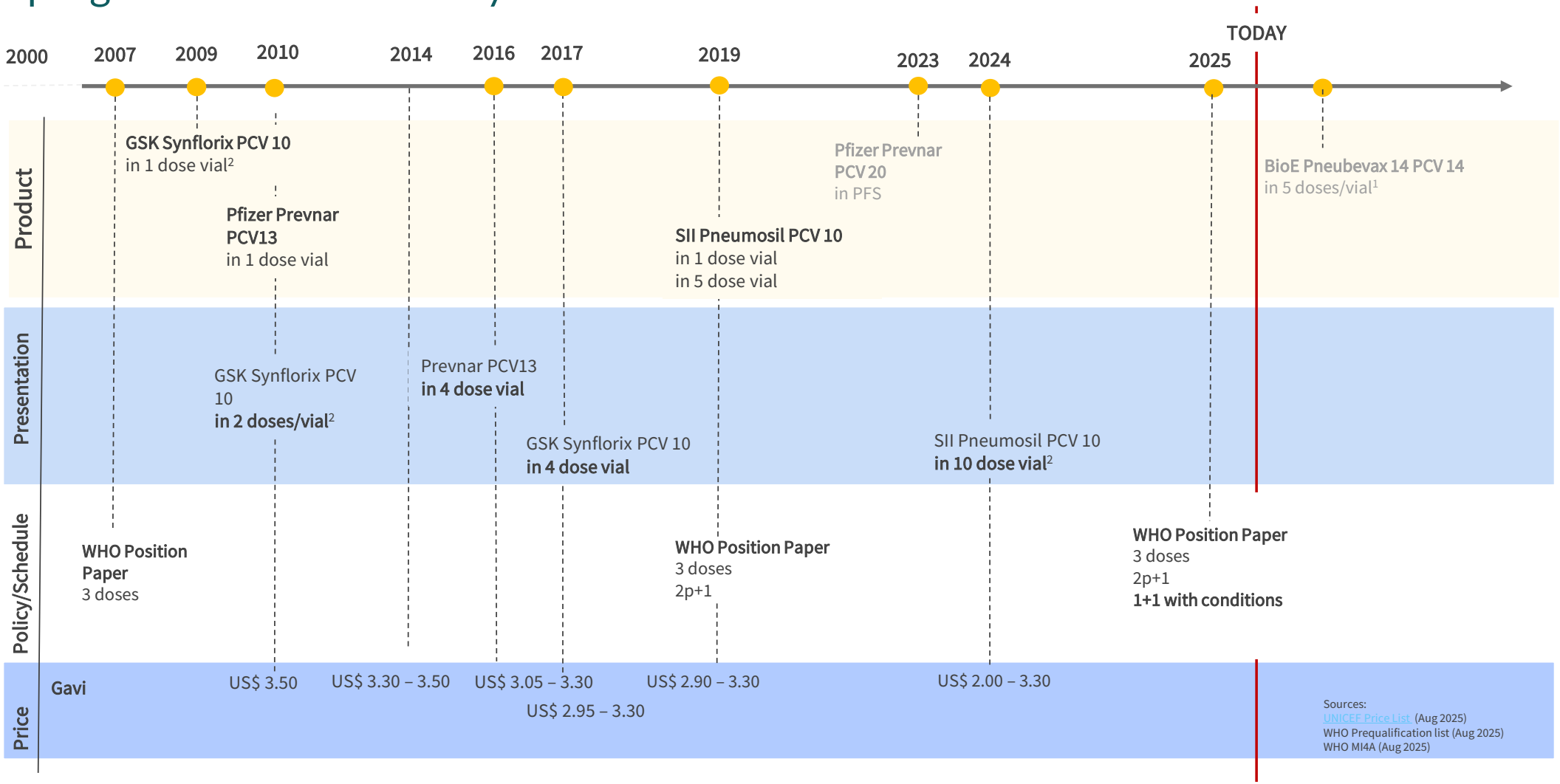
Examples of policy questions

Example of policy questions	Prioritization	Optimization	Why?
Should the country switch from PCV13 to PCV10? When?		✓	Reducing valency to reduce cost on an ***already introduced vaccine***
Should we switch from measles only to measles-rubella (MR) vaccine? When?	✓		Adding a ***new vaccine and antigen***, simply combined with a preexisting one
Should we introduce typhoid conjugate vaccine (TCV) in place of the polysaccharide vaccine used during outbreaks? When?	✓		Introduction of a new antigen ***in the routine calendar***
Should we replace the current DTP+IPV vaccines with a hexavalent vaccine? When?		✓	Combining ***already introduced vaccines*** into the same vaccine
Should we move from 10-dose MCV vials to 5-dose vials? When?		✓	Changing presentation to ***an already introduced vaccine*** to achieve higher coverage
Should we add booster doses of DTP-containing vaccines? When?		✓	Adding a dose to an ***already introduced vaccine*** to achieve better disease control
Should we introduce the malaria vaccine as part of the routine EPI schedule in 2026?	✓		Introducing a ***new vaccine in the routine*** schedule
Should the country introduce multivalent meningitis conjugate vaccine (MMCV / Men5CV)? When?	✓	✓	Prioritization if ***no Men vaccine*** in program, optimization if ***MenA already*** introduced

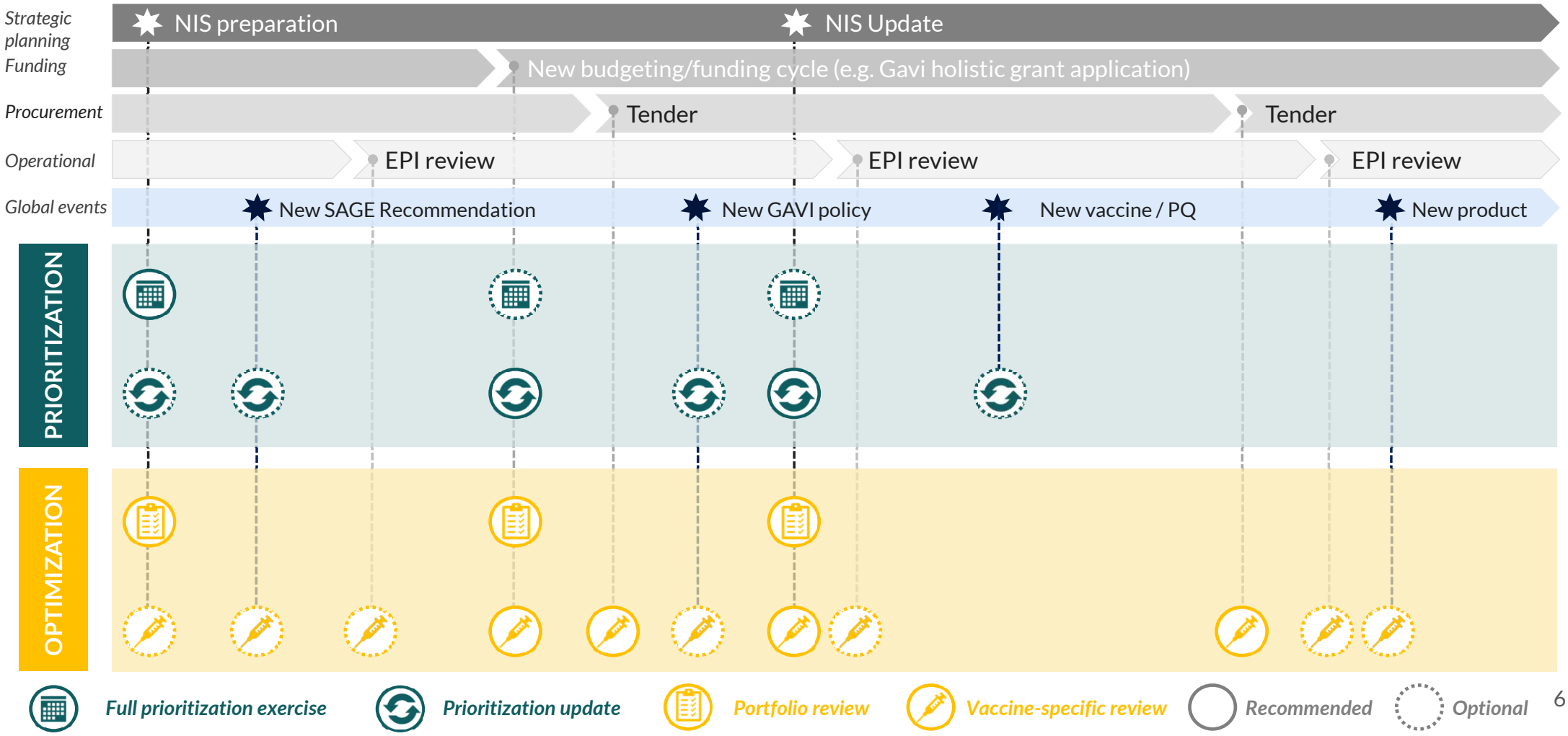
In practice, prioritization and optimization both involve the EPI and the NITAG, with both processes complementing each other

	OPTIMIZATION	PRIORITIZATION
What does it cover?	• Reviewing products, schedule, targets, presentation, use/administration, serogroup coverage	• Prioritizing and sequencing vaccines (antigens) to be added to the routine immunization schedule
What is **not** included?	• Trade-offs of delivery modes (campaign vs. routine)	• Campaign-only vaccine introductions
What are the expected benefits?	• Programmatic improvement (coverage, vaccine wastage, cold chain, patient/HR experience) • Program cost aligned with fiscal space and optimized value for money (allowing for potential reinvestment) • Inform strategic planning • Secured and sustainable access to vaccine • Better disease control	• Adequation of immunization program to country context, priorities and national goals • Maximized health impact • Improved planning and coordination (realistic introduction pace) • Early alignment on financial and supply implications to guarantee feasibility
Who should do it?	• EPI & NITAG depending on national context	• EPI & NITAG depending on national context
What is the time horizon considered?	• Short to medium term (1 to 5 years)	• Medium to long term (5 to 10 years)

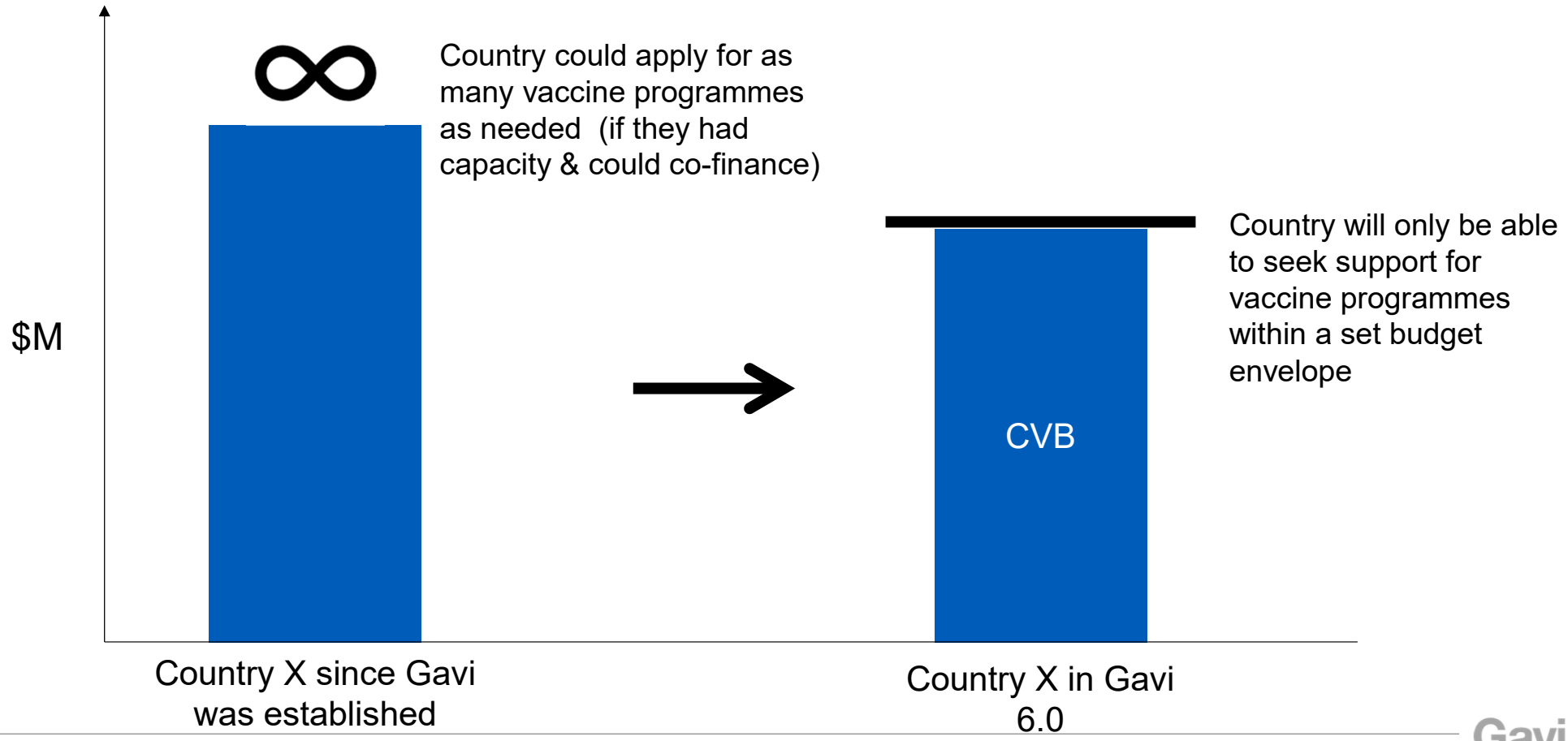
Understanding the opportunity lets look at the evolution of the PCV programme in the last 20 years



There are potential triggers can lead countries to launch optimization or prioritization work



Gavi 6.0: From unlimited to capped vaccine budgets



CVB are budget allocations provided to Gavi-eligible countries for their vaccine procurement support

What are CVB?	Set budget allocations provided to Gavi-eligible countries for their vaccine procurement support in Gavi 6.0.
What do they apply to?	All existing commitments for routine programmes, new vaccine introductions (including new VIS vaccines), and preventive campaigns (eg M/MR follow up and catch-up campaigns).
What do they NOT apply to?	Outbreak response vaccines (e.g. ICG stockpiles) and other cross-country vaccine procurement cost. Separate funds have been set aside for this

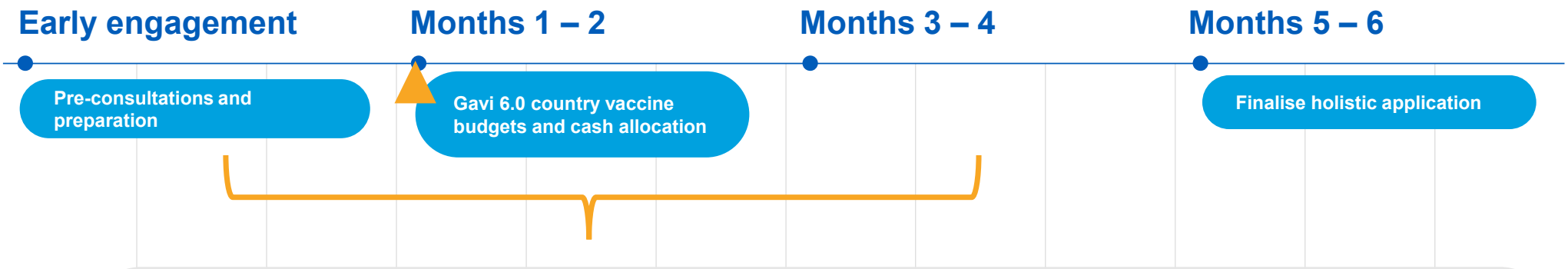
Guaranteed programmes prioritise highest value for money and global relevance

Rationale for guaranteed programmes:
Prioritisation of programmes with the highest value for money (health impact and cost per life saved) and global relevance (e.g. polio agenda).

Guaranteed programmes*	Discretionary programmes
Pentavalent	Malaria
Pneumococcal Conjugate (PCV) + Catch up	Yellow fever campaigns
Rotavirus	Japanese Encephalitis (JE) + catch up campaigns
Measles/ Measles Rubella (M/MR) + Catch up, follow up	Typhoid (TCV) + catch up campaigns
Human papillomavirus (HPV) + MACs	Cholera (OCV) campaigns
Inactivated Polio (IPV)	Meningococcal (Men A/MMCV) + catch up campaigns
Hexavalent	Rabies
Yellow Fever routine only	DTP-containing boosters
Hepatitis B Birth dose	Respiratory Syncytial Virus (RSV)

* Dengue/ TB/ GBS are VIS 2024 vaccines where vaccines are yet to be PQ'd
* Outbreaks and diagnostics are out of scope for CVB

Vaccine Portfolio Optimisation and Prioritisation (VPOP) – enabler of CVB and input to holistic application



VPOP objectives:

- Country-led and evidence-based
- Facilitates trade-offs within limited funding envelopes

VPOP approach:

- Cross-Alliance coordination to provide tools, guidance, technical assistance, and capacity strengthening at country level

Stakeholders: Ministry of Health (inc. EPI team), National Immunisation Technical Advisory Groups (NITAGs), Ministry of Finance, Alliance partners

VPOP Toolkit - the Optimisation tool is now available on the NITAG Resource Centre, building on the NVI PST

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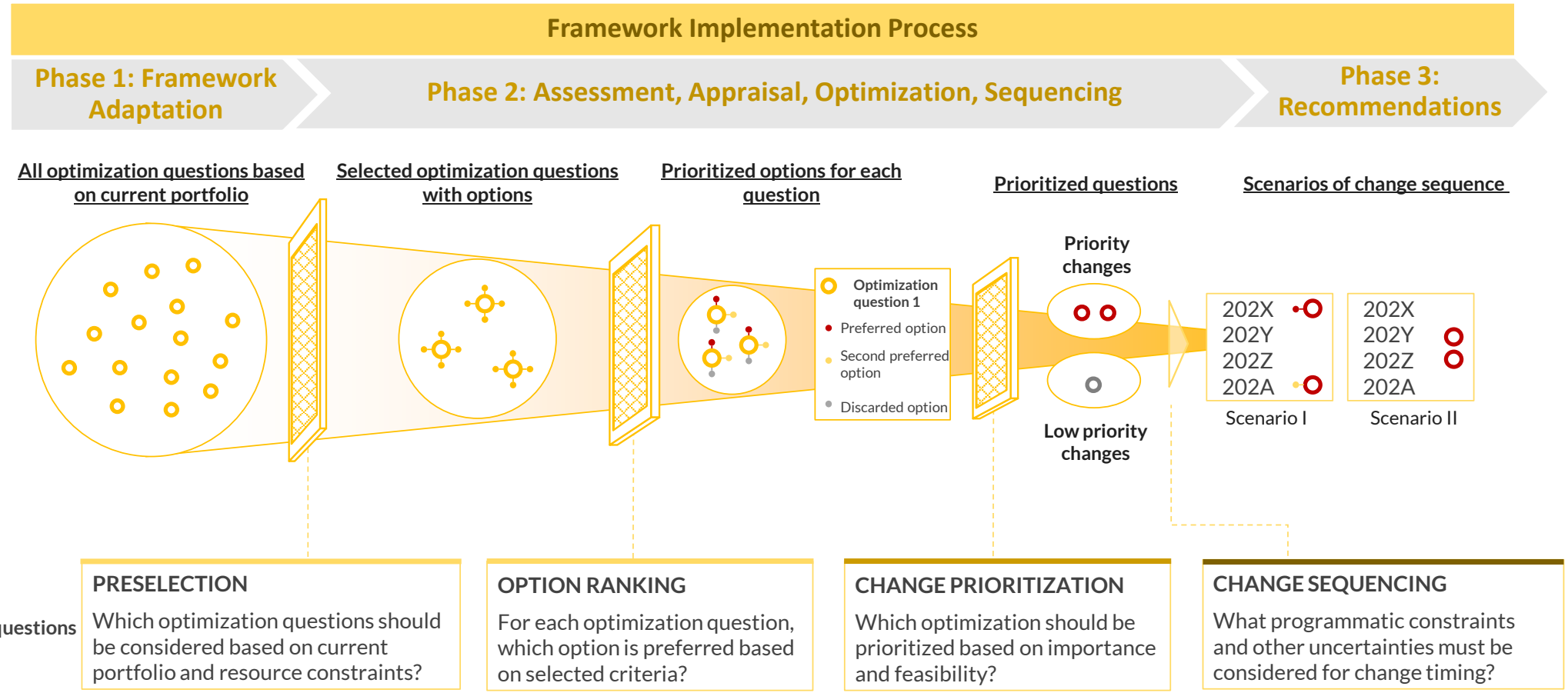
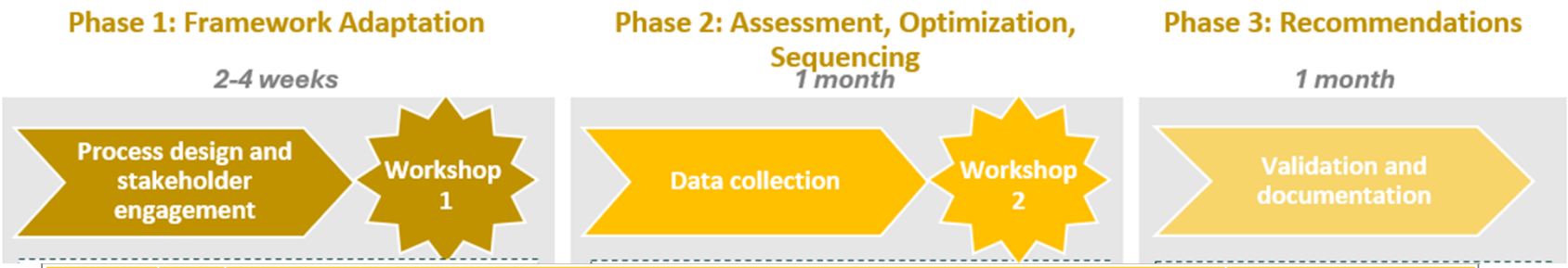
The consolidated VPOP toolkit will be updated and available by Q2 2026 building on learnings from early adopters

Deep dive on the optimization process

The optimization framework relies on a series of assessments and decisions based on a sub-set of pre-selected criteria – aligned with the NVI PST



The Process is aligned with the NVI PST and includes a series of 10 steps



Phase	Step	What	Related activity
Phase 1	1	**Review portfolio and potential optimization questions** (preselect up to 10 questions)	Before and during online session
Phase 1	2	**Select up to 3 optimization questions to address** (voting through an online questionnaire can help) and clearly define **options**	Workshop 1
	3	For each question: **Review and select up 10 out of 55 proposed and assign weight to criteria**	
	4	For each criterion: **Define measurable indicators**	
Phase 2	5	For each criterion: **Collect indicator data and prepare content to allow for easy comparison of options**	Data collection
Phase 2	6	For each question: **Rank options on all criteria**	Workshop 2
	7	For each question: Based on average ranking and discussions, **chose preferred/parked/discarded options**	
	8	Compare optimization questions, discussing importance and feasibility and **defining priority level (high/low) for each question**	
	9	**Define programmatic, budget and vaccine-specific constraints**	
	10	**Draft scenarios based on preferred options, priority level and constraints**	

The output should be a list of preferred options for each optimization question, backed by strong evidence for each option

EXAMPLE

Main outputs of the process

- **Consolidated list of optimization questions** that were considered for each vaccine already in the portfolio
- **Prioritized ranking of options** for each question
- **Feasibility assessment** of potential switches/changes: distinguishing between high-impact, immediately implementable changes and those requiring further monitoring, resources, or evidence
- **Proposed sequence** (and potential timing) of changes to be implemented to inform strategic documents[1]

Evidence supporting decision

- **List of criteria** selected for each optimization question (e.g. market availability, cost of each option), with their relative weight
- **Evidence for each criteria** X option matrix element
  - ***When relevant, financial and budget impact analysis***
- **Summarized statement** for each option, highlighting benefits and requirement of each ranked option
- **Option ranking voting results** for each criteria, and overall computed option scores/rank

Examples

Q1: Change PCV product	Q2: Change RVV schedule
Preferred option #1	*Preferred option #1*
Pneumosil10, 5-dose	2 doses (1+1)
Preferred option #2	*Preferred option #2*
Prevenar 13, 4-dose	2 doses (2+0)
Preferred option #3	
Pneumosil10, 1-dose	

- **Example of a summarized statement for Q1, Option1:**
- "Recent studies confirm that Pneumosil 10 (5-dose) achieves ~65% efficacy (95% CI: 55–75%) against invasive pneumococcal disease, comparable to PCV13 in similar settings. At ~USD 2 per dose, switching would lower the total vaccine program cost by nearly 40% compared to PCV13. The 5-dose vial format reduces cold chain volume by 30%, easing storage and transport bottlenecks. Observed wastage rates remain below 5% even in low-session sites. With proven immunogenicity across the 10 targeted serotypes (prevalent in [Country X]), Pneumosil-5 is a cost-saving, high-performance option for sustainable immunization."

1. If the country decides to work on both optimization and prioritization, the proposed sequenced will also include potential new vaccine introductions

The process should begin with a comprehensive review of the existing immunization schedule

1 Start from current portfolio

List all vaccines currently in use

- Note formulations (valency, presentation, schedule, target group)

Perform fiscal / budget space analysis

- Assess holistic budget constraints
- Evaluate current global and relative value of vaccination programs

2 Use the List of Optimization questions as benchmark

Go vaccine by vaccine

- For each, check the list of possible optimization questions
- Also review expected benefits and feasibility considerations for each question

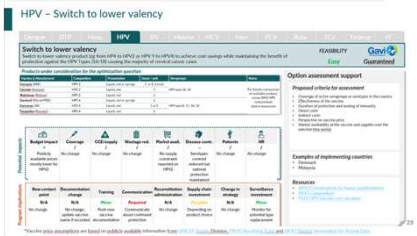
Use the List of optimization questions

3 Filter for relevance

For optimization questions, filter, before Workshop 1:

- Which questions apply to your portfolio? (for GAVI countries, which are recommended)
- Which correspond to strategic priorities (Budget impact, coverage, etc.)?
- Which are most feasible?

Filter to prepare a short (8-10 max) list of questions



Use the optimization questions factsheets

4 Select optimization questions

Select a limited number of optimization questions

- Propose the filtered list of questions to the joint NITAG + EPI audience
- Present key / summarized aspects of each optimization question
- **Best practice** Organize a vote on optimization questions to support discussions

Collectively select a maximum of 3 questions for further assessment, together with criteria

5 Select criteria

For each optimization question, select ~10 criteria

- Consult the list of criteria from the joint NVI-PST – Optimization guidance
- Clarify objectives of the optimization
- Select criteria as to align with stated objectives, potential impacts and program implications
- **Best practice** Organize a vote on criteria to select for each question

Illustrative example – Start by looking at the vaccines already introduced

Vaccines introduced	Vial size	# doses	Schedule	Manufacturer
BCG	20	1	Birth dose	Serum Institue India
bOPV	20	4	Birth dose	Bharat Biotech India
Cervical cancer – HPV4	1	2	9 yrs	MSD - Merck Sharp & Dohme International Services B.V. Netherlands
Cholera - (OCV) preventive - 2 doses	1	1	SIA	Eubiologics Co Korea
DTP-HepB-Hib-10	10	3	2mo, 3mo, 4mo	Serum Institue India and Biological E Limited India (BioE)
Vacina - IPV	5	2	6mo, 7mo, 9mo, 18mo	Bilthoven Bioloigiucals (Netherlands) and AJ Vaccines (Denmark)
Malaria malaria (R21)	10	4		Serum Institue India
Measles Rubella MR	10	2	9 mo and 18 mo	Serum Institue India and Biological E Limited
PCV -13- pneumococcal conjugate	4	3	2mo, 4mo, 9 mo	Pfizer
Rotavirus	1	2	2 mo and 3 mo	GlaxoSmithKline (GSK)

Deep dive - Optimization questions by vaccine

Vaccines / *Type of switch*	Dengue	DTP-containing	Hexavalent	HPV	IPV	Malaria	MCV	Meningitis	PCV	Rotavirus	TCV	Tetanus	YF
Composition change		✓	✓									✓	
Serotype composition change				✓				✓	✓	✓			
Presentation change		✓			✓		✓			✓			✓
Administration change					✓								✓
Schedule change		✓	✓	✓	✓			✓	✓	✓	✓		
Target population change				✓	✓								
Other product changes	✓	✓		✓	✓	✓			✓				

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PCV -13- pneumococcal conjugate	4	3	2mo, 4mo, 9 mo	Pfizer
Rotavirus	1	2	2 mo and 3 mo	GlaxoSmithKline (GSK)

Potential HPV-related optimization questions

Dengue | DTP | Hexa | **HPV** | IPV | Malaria | MCV | Men | PCV | Rota | TCV | Tetanus | YF

Type of question	**Serotype composition**	**Serotype composition**	**Schedule**	**Schedule**	**Target population**	**Target population**	**Product**
Details	Switch to higher valency (4 or 9)	Switch to lower valency (2 or 4)	Change from 2 doses to 1 dose	Add booster doses	Change from girls only to girls and boys	Extend eligibility to older age group	Change product
Switch Implementation	**Easy**	**Easy**	**Average**	**Complex**	**More complex**	**More complex**	**Very easy**
Case studies	Yes	Yes	Yes	Yes	Yes	Yes	No
GAVI programme type	**Discretionary**	**Guaranteed**	**Guaranteed**	**Discretionary**	**Discretionary**	**Discretionary**	**Guaranteed**
Expected benefits							
Budget impact		✓	✓				✓
Coverage & equity			✓		✓	✓	
CCE/supply			✓				✓
Wastage reduct.				*Minor*	*Minor*		
Market availability		✓	✓				✓
Disease control	✓			✓	✓	✓	
Patient experience			✓				
HR experience			✓				

HPV – Switch to lower valency product

Switch to lower valency product

Switch to lower-valency product (eg from HP4 to HPV2 or HPV 9 to HPV4) to achieve cost-savings while maintaining the benefit of protection against the HPV Types (16/18) causing the majority of cervical cancer cases

FEASIBILITY

Easy

Guaranteed

Products under consideration for the optimization question

Vaccine & Manufacturer	Composition	Presentation	Doses / unit	Serogroups	Notes
Cervarix (GSK)	HPV 2	Liquid, vial or syringe	1- or 2-d (vial)		
Cecolin (Innovax)	HPV 2	Liquid, vial	1	HPV type 16, 18	For details comparison of available product, review WHO HPV compendium (*link in resources*)
Walrinvax (Walvax)	HPV 2	Liquid, vial	1		
Gardasil (Merck/MSD)	HPV 4	Liquid, vial or syringe	1		
Cervavac (SII)	HPV 4	Liquid, vial	1 or 2	HPV type 6, 11, 16, 18	
Tsegardex (Nanolel)	HPV 4	Liquid, vial	1		

Potential impacts

Budget impact	Coverage	CCE/supply	Wastage red.	Market avail.	Disease contr.	Patients	HR
+	/	/	/	/	–	/	/
Publicly available prices mostly lower for HPV2	*No change*	*No change*	*No change*	No supply constraint reported on HPV2	Serotypes covered reduced but optimal protection maintained	*No change*	*No change*

Program implications

New contact point	Documentation change	Training	Communication	Reconstitution administration	Supply chain investment	Change in strategy	Surveillance investment
N/A	N/A	***Minor***	***Required***	N/A	***Possible***	N/A	***Minor***
No change	No change, update vaccine name if recorded	Push new vaccine documentation	Communicate about continued protection	*No change*	Depending on product choice	*No change*	Monitor for potential type replacement

Option assessment support

Proposed criteria for assessment

- *Coverage of active serogroups or serotypes in the country*
- *Effectiveness of the vaccine*
- *Duration of protection and waning of immunity*
- *Direct costs*
- *Indirect costs*
- *Perspective on vaccine price*
- *Market availability of the vaccine and supplies over the selected time period*

Examples of implementing countries

- Denmark
- Malaysia

Resources

- *WHO Considerations for human papillomavirus*
- *WHO Compendium*
- *PATH HPV Vaccine cost calculator*

*Vaccine price assumptions are based on publicly available information from UNICEF Supply Division, PAHO Revolving Fund and WHO Market Information for Access Data

HPV – Change from 2 doses to 1 dose schedule

Change from 2 doses to 1 dose schedule

Change to a 1-dose regimen that achieves comparable protection to two doses (as noted by WHO's SAGE in 2022) in order to lower vaccine and delivery costs and expanding programmatic options, that can contribute to increased coverage.

FEASIBILITY

Average

Guaranteed

Products under consideration for the optimization question

Vaccine & Manufacturer	Composition	Presentation	Doses / unit	Serogroups	Notes
Cervarix (GSK)	HPV 2	Liquid, vial or syringe	1- or 2-d (vial)		
Cecolin (Innovax)	HPV 2	Liquid, vial	1	HPV type 16, 18	
Walrinvax (Walvax)	HPV 2	Liquid, vial	1		For details comparison of available product, review WHO HPV compendium (*link in resources)*
Gardasil (Merck/MSD)	HPV 4	Liquid, vial or syringe	1		
Cervavac (SII)	HPV 4	Liquid, vial	1 or 2	HPV type 6, 11, 16, 18	
Tsegardex (Nanolel)	HPV 4	Liquid, vial	1		
Gardasil9 (Merck/MSD)	HPV 9	Liquid, vial or syringe	1- or 2-d (vial)	HPV type 6, 11, 16, 18, 31, 33, 45, 52, 58	
Cecolin 9 (Innovax)	HPV 9	Liquid, vial	1		

Potential impacts

Budget impact	Coverage	CCE/supply	Wastage red.	Market avail.	Disease contr.	Patients	HR
+ + +	+	+ + +	+	+ + +	/	+ + +	+ + +
Half the doses	Opportunity to integrate with campaigns	Reduced volume	Lower systemic wastage	Half the doses	Non-inferior efficacy shown	Fewer injections (-50%)	Simpler schedule, less workload

Program implications

New contact point	Documentation change	Training	Communication	Reconstitution administration	Supply chain investment	Change in strategy	Surveillance investment
N/A	***Required***	***Required***	***Required***	**N/A**	***N/A***	***Possible***	***Minor***
No (removes a visit)	Cards and registers updated	Retraining on new schedule	Communication about 1 dose protection	No change	Lower cold-chain volume	Change in delivery (esp. school-based)	To confirm duration of protection

Option assessment support

Proposed criteria for assessment

- *Acceptability of schedule*
- *Coverage of active serogroups or serotypes in the country*
- *Effectiveness of the vaccine*
- *Herd immunity / protection*
- *Direct costs*
- *Indirect costs*
- *Availability of adequate cold chain equipment at all levels or ability to procure CCE required to store the vaccine*
- *Market availability of the vaccine and supplies over the selected time period*
- *Expected impact of the introduction on the human resources*

Examples of implementing countries

- 81 countries have switched to a 1-dose regimen

Resources

- *2022 SAGE Position Paper*
- *WHO Considerations for human papillomavirus*
- *WHO Compendium on HPV*
- *HPV Vaccine schedule optimization guide*

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