




Cold Chain Optimisation Platform Application for September 2016 (only)

This application is prepared for countries applying for the Gavi CCE optimisation platform ('the Platform') support in September 2016.

In filling this application form, countries are expected to consult the following documents and resources:


	Application Guidelines for countries wishing to request HSS support is available here: www.gavi.org/support/apply
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	Application Instructions for countries wishing to request CCE optimisation platform support is available here: www.gavi.org/support/apply
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	Technology guide for equipment selection for counties wishing to request CCE optimisation platform support is available here: http://www.gavi.org/support/hss/cold-chain-equipment-optimisation-platform/
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	Extensive technical resources relating to vaccine cold chain equipment management are available on TechNet-21: http://www.technet-21.org/en/resources/cold-chain-equipment-management
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Additionally:

	This signals important information that is provided within this application form
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1. APPLICANT INFORMATION

Country	PAKISTAN	
Date	September 5, 2016	
Contact name	Dr. Syed Saqlain Ahmed Gilani	
Email address	zain_asg2@hotmail.com	
Phone number	+92 5192 55101	
Total funding requested from CCE optimisation platform (US \$)	<p><i>This should correspond exactly to the budget requested in the embedded template.</i></p> <p>Total - <u>US\$ 50,107,676</u></p> <p>Gavi – <u>US\$ 25,053,888</u></p> <p>Government – <u>US\$ 25,053,888</u></p>	
Does your country have an approved Gavi HSS support on-going?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Indicate the anticipated final year of the HSS:(2018)	
Proposed CCE optimisation platform support start date:	Indicate the month and year of the planned start date of the support, based on the strategic deployment plan: April 2017	
Proposed CCE optimisation platform support end date:	Indicate the month and year of the planned end date of the support, based on the strategic deployment plan: March 2021	
<p>Signatures</p> <p><i>Include signed (and official) CCE optimisation platform application endorsement by:</i></p> <p>a) <i>Minister of Health and Minister of Finance(or delegated authorities)</i></p> <p>b) <i>Members of the HSCC/ICC or equivalent committee and signed minutes of meetings where the application was endorsed</i></p> <p><i>In case of HSS and CCE optimisation platform requests, minutes must reflect that both were discussed and endorsed.</i></p>	<p><i>We the undersigned, affirm the objectives and activities of the Gavi CCE optimisation platform proposal are fully aligned with the national health strategic plan (or equivalent) and that the funds for implementing all activities, including domestic funds and any needed joint investment, will be included in the annual budget of the Ministry of Health:</i></p> <p>Minister of Health (or delegated authority) Minister of Finance (or delegated authority)</p> <p>Name: _____ Name: _____</p> <p>Signature: _____ Signature: _____</p> <p>Date: _____ Date: _____</p>	

2. NATIONAL STRATEGIES AND PLANS RELEVANT TO SUPPLY CHAIN AND REQUESTED SUPPORT

How do the following national strategies, country plans and documents inform plans to strengthen the country's supply chain, and how do they inform the request for CCE optimisation platform support. These documents are **mandatory**, must be **attached** to your application, and they must be **final and dated**.

No	Strategy / Plan / Document <i>*All documents are mandatory. Only complete applications will be assessed.</i>	Attached Yes/No	Final version (dated)	Duration	Comments
1	Signature sheet for the Minister of Health and Minister of Finance, or their delegates	Yes	September 2016	4 years	Attached
2	Signature sheet for HSCC/ICC or equivalent committee endorsement and minutes of meetings	Yes	September 2016	5 years	
3	National Health Sector Development Plan	Yes	2016	2016-2025	NATIONAL VISION 2016-2025
4	cMYP	Yes	2014	2014 -2018	Another cMYP is expected from 2019 and beyond
5	EVM Assessment	Yes	2014		
6	EVM Improvement Plan	Yes	2015	3 years	
7	EVM Annual Work plan AND Progress Report on EVM Improvement Plan¹	Yes	2016	2016	
8	CCE Inventory Report² AND Facilities Segmentation Plan	Yes	June, 2016		
9	Cold Chain Rehabilitation and Expansion Plan, AND Equipment Selection and Strategic Deployment Plan	Yes	Yes		<ul style="list-style-type: none"> Operational deployment plan would be developed after application approval in consultation with UNICEF SD. Strategic deployment plan attached
10	Maintenance Plan with financing	Yes	June 2016	5 years	The costed cEVM plans incorporated maintenance plans.
11	Proof of status for CCE tariff exemptions waiver	Yes	2001	Ongoing	Exemption document (PCT Code 9913 & 9914)
12	OTHER RELEVANT DOCUMENTS 1. <i>Pakistan General Financial Rules</i>	Yes	Dec, 2012	Ongoing	Page 72.

13. How do the above strategies, plans and documents inform the CCE optimisation platform support request ('initial support' and 'scale-up support')? Countries are encouraged to reference relevant sections of the above documents as much as possible.

¹The EVM IP and annual work plan progress report must have been updated within three (3) months of applying for Platform support.

²The CCE Inventory must have been updated within no more than one (1) year of applying for Platform support.

Provide approximately 1 page

Input to CCE OP application is guided by information from the country's policy and strategic documents on immunization service delivery. The country multi-year plan (cMYP), is the key document aiming at providing essential, safe and effective immunization to all eligible target in a manner that is effective, efficient and safe³. It has outlined the objectives, milestones and set out strategies to meet its goal of efficient immunization service delivery, increased coverage, addressing equity challenges through a long and short term goals and programme priorities.

The foundation to achieve the main objective of increased immunization coverage and new vaccine introduction is a robust immunization supply chain management (iSCM) structure which necessitated the EVM assessment conducted in 2014. The EVMA specifically looks at all levels of the iSC against set standards and evaluates accordingly. The outcome of this evaluation is detailed in an EVM outlining the overall efficiency and bottlenecks in the iSCM in the country including recommendations to address the identified challenges. The EVM assessment report is an outcome of some of the processes aimed at realising the objectives set out in the cMYP. Some of the highlights from the EVM report were inadequate CCE capacities, poor temperature monitoring procedure, human resources gap to manage the system efficiently, lack of maintenance planning process to keep equipment functioning, long equipment down-time, and poor quality data management at all levels among others. Following the identification of these bottlenecks, the comprehensive EVM improvement plan was developed to mitigate the key challenges. The sets of recommendations from the EVM report were further developed into 4 strategic goals⁴ and defined activities with timelines and budget for implementation over a 4 years period for the improvement process of the iSC and documented as the costed EVM-IP reports. The key objective relating to cold chain capacity was captured under the strategic goal 3.

The EVM-IP and the costed cEVM-IP activities were further developed into achievable annual plans for implementation at all levels. The implementation of the activities would be monitored and evaluated to measure progress to ensure that plans are on track.

To address these challenges, as identified in the EVM, a cold chain inventory analysis to ascertain the exact situation of cold chain capacity across all levels in the country was conducted in 2015. The result from the updated inventory revealed capacity gaps at all levels. Efforts are being made to address the cold chain gaps at all levels by government and partners. In spite of these efforts, the cold chain inventory updated in July 2016 still showed considerable gaps in facilities' projected storage capacity up till 2020 requirements, therefore the CCEOP application becomes necessary to augment efforts in ensuring adequate capacity for vaccine storage. Furthermore, the bundling of the equipment with temperature monitoring devices will assure vaccine quality and promote the use of the 30-dayTMDs or RTMs in managing vaccines thereby addressing a key bottleneck identified from the EVMA. The provision of spares bundled with the CCE and for other PQS equipment that would be in the system will address the challenges of spare availability for maintenance and repairs.

It is believed that the application when approved will enhance the vision set out by government in the cMYP to reach more children with quality vaccine, address equity by expansion of service to underserved communities and ultimately contribute to the reduction of VPDs in Pakistan.

3. APPLICATION DETAILS



Please review *Section 6* of the Platform *Application Instructions* for complete information on phased support and application requirements.

3.1 Application requirements overview

Aligning with the Gavi HSS support, the CCE optimisation platform will provide phased support (for a maximum duration of 5 years) which includes: 'initial support' (Approximately years 1-2) to address country's most urgent CCE needs; and 'scale-up support' (Approximately years 3) to address additional CCE needs as part of transforming the supply chain to support sustainable achievements of coverage and equity targets.

- **Countries must make a single application to the CCE optimisation platform, requesting support for both the 'initial' and 'scale-up' phases.**

³cMYP report pages 4 & 5.

⁴National EVMIP pages 11-14

- Sufficient, well-functioning cold chain equipment is one “fundamental” prerequisite for an effective immunisation supply chain, complementing the other “fundamentals” comprised of: supply chain managers; data for management; optimised & efficient design of the distribution system; and a continuous improvement process over time. **Support from the CCE optimisation platform should be demonstrated to complement investments from other sources in these fundamentals**
- **Countries should also demonstrate, in their application, how the Platform support will contribute to sustainable improvements in immunisation coverage and equity, consistent with country targets.**

4. APPLICATION REQUEST

This section gives an overview of the types of information the IRC will anticipate from countries in their application for CCE optimisation platform support.

4.1. Situation analysis and requested support

This section must be filled with appropriate reference to the country documents listed in Section 2. Countries are required to provide a narrative in response to the following questions.

1: Situation analysis of country’s supply chain and CCE (number, distribution, functionalities etc.) *Provide 3 pages*

1. How is the country’s immunisation supply chain administered?

Pakistan operate as a federating unit with 4 levels of immunization supply chain (iSCM) structure comprising of the following levels:

- **National (PR):** The Federal EPI or the primary (PR) level is responsible for policy formulation, development of guidelines and coordinating the iSCM in the country. The five Federating Areas are working under the umbrella of the Federal EPI, these Areas are made up of a number of districts that report to the Area EPI administrative structure.
- **Provinces- SN (4):** The provinces is the next level in the Federal structure and comprises of a number of districts. The provinces are responsible for coordination of immunization activities in the districts under them. The Provinces and Areas make up the sub-nation level in the iSCM structure.
- **Districts (LD):** The district also referred to as the lowest distribution (LD) point in the iSCM structure is the third tier in the Federal structure totalling 169⁵ in the country including all the districts and towns of Karachi. The provinces are responsibilities for the immunization supply chain management (iSCM) and perform oversight function of same for the districts within its territory.
- **Health Facilities (SP):** The health facility is the last tier in the iSCM structure and regarded as service delivery points (SP). All the data/ reports are generated at facility level to its districts/towns on all immunization related matter and other health intervention activities.

The total number of storage points identified across these levels are 7,558. The breakdown as shown in figure 1 by storage points are P – 1, SN – 6, LD – 158 and SP – 7,393.

Table 1: Number of storage points by level

Province/ Areas	Storage points per supply chain level	Total storage
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⁵Calculations are made by adding newly created districts in Provinces/Areas

	P	SN	LD	SP	
AJK ⁶			10	369	379
Balochistan		1	30	512	543
FATA ⁶		1	9	174	184
Gbaltistan ⁶		1	7	222	230
ICT/CDA ⁶	1		2	39	42
KP		1	26	1241	1268
Punjab		1	35	3451	3487
Sindh		1	39	1385	1425
Total	1	6	158	7393	7558

2. What weaknesses have been identified in the country's supply chain?

EVM Assessment report, 2014 on each criteria (E1-E9) for all level highlighted the key bottlenecks in the iSCM. Subsequently, a comprehensive EVM Improvement plan⁷ was developed in 2015 clearly outlining the challenges in the country's supply chain structure as follows:

1. Distribution system (E7) is a common weakness across all levels
2. Temperature Monitoring Control (E2), Stock Management (E6) and Vaccine Management (E8) are also weak areas across all levels
3. Storage Capacity (E3), Maintenance System (E5), Data System and HR Management (E9) are challenges at lower levels (SN, LD and SP).
4. Insufficient infrastructure for cold/dry storage and vehicles was found as a bottleneck in criteria E4 (Infrastructure)

For further details please see the EVMA report attached.

3. Through what interventions are these weaknesses currently being addressed?

The 2015 comprehensive EVM Improvement plan has outlined priorities to improve and sustain uninterrupted supply of vaccines and immunization service delivery', bolstered by an EVM indicator in the cMYP that tracks '% of districts with average EVM score above 80%'.⁸

To achieve this vision, four Strategic Goals (SG) were identified:

- ✓ SG 1: Scaling up LMIS to ensure reliable and timely data to effectively manage the immunization supply chain
- ✓ SG 2: Strengthening human resources for logistics at all levels to ensure compliance with effective vaccine and cold chain management policies and practices
- ✓ SG 3: Ensure sufficient storage infrastructure for the new vaccines by equipping storage points with the CCE suitable for the environmental condition together with continuous temperature monitoring and sustainable maintenance system
- ✓ SG 4: Implement a pull-based (demand driven) distribution system for vaccines and cold chain with reliable transportation system with efficient network design and route planning

Government of Pakistan is committed to achieve the strategic goals. Sustainability of vLMIS is ensured through the allocation of **US\$5.617m** funds for Federal and Federating Areas PC-1. In addition to this, the provinces have also made provision in their PC-1⁸ for vLMIS operation.

Efforts are being made to address Human Resource deficiency at Federal EPI. The recruitment of refrigeration Engineer (1), Assistant refrigeration Engineers (2) and supporting staff is in final stage. The provinces have made different plans for its HR improvement as detailed in its cEVM-IP.

⁶ Area

⁷ cEVM-IP page 5

⁸ Project Cycle document 1 (PC-1). Proforma for Development Projects (social Sector). This document contains objectives, implementation strategies, period of implementation, monitoring, outcomes and cost of the project and evaluation plan at end of cycle. PC-1 document is funded through Development funds of government and is approved by Executive Committee National Economic Council (ECNEC) chaired by the Prime Minister of Pakistan.

Furthermore, 10 new CR (40m³) will be installed at Federal warehouse by the end of 2016 funded by GAVI-VIG rotavirus grant. Two new divisional /regional warehouses have been constructed in Lahore and Multan districts of Punjab province. 5 new warehouses constructed in Balochistan and three warehouses renovated at the district level. Similarly, 6 warehouses were constructed in KP province and 2 in Gilgit Baltistan at the district level. The construction of warehouses for vaccines and dry logistics in the remote and hard to reach district where no such facility was previously present also addresses the equity issues in terms of supply chain thereby ensuring that potent vaccine reaches the most marginalized and vulnerable child.

There is increased ownership of the provincial government on the immunization supply chain agenda as reflected by the fund allocation by the Government of KP in their integrated PC-I for strengthening of cold chain infrastructure. Similarly, the Government of Balochistan has allocated **US\$2.2m** for cold chain strengthening as additional resources outside their PC-1. These are two examples of the provincial commitment, the others have allocated varying amount of funds to improve its supply chain infrastructure and management.

Several partners are involved in a number of SC-related interventions in Pakistan to achieve the above objectives:

- i JSI- Deliver supported the implementation of vLMIS at the Federal, Province (4), Areas (2) and 83 selected districts, DFID is supporting Punjab province in remaining 23 districts and GAVI unspent funds would be utilized for scale-up of vLMIS in remaining districts. The sustainability of vLMIS is ensured through Federal NISP and respective provincial PC -1.
- ii UNICEF under GAVI-VIG support have provided 15 units – 40m³ CRs, 16 units – 10m³ CRs, and 294 ILRs of different capacities to 4 provinces and 4 Areas in 50 districts. In addition GAVI fund are being utilized to support EVM Coordinators till government support is available.
- iii DFID donated 400 units of TCW 2000 AC refrigerator/freezer to districts in Punjab to bridge the cold chain gap for rotavirus vaccine introduction in September 2016
- iv JICA supported KP for 75 Solar Direct Drive (SDD) ILRs.
- v USAID supported 78 SDD for southern districts of KP.

Further weaknesses identified during the EVMA, have been developed into costed activities in EVM-IP for implementation over the next 4 years. Federal and provincial EVM Secretariats are being established to support the implementation of the EVM-IP and further strengthening of vaccine management committees at respective locations.

4. Describe challenges that are hindering the implementation of these interventions.

- Human Resource:
 - Slow recruitment processes, lack of technical capacity, high staff turnover are main challenges.
 - All available positions are not filled timely; those which are filled require capacity enhancement.
 - Specific technical positions for iSCM functions are not present in the Programme structure.
- Financial Resources:
 - Fund release: Delays in release of funds hamper the fulfilment of activity plans.
 - Fund utilization: The procedures required to complete the procurement process are lengthy thus affect the pace of accomplishment of various tasks.
- Monitoring & Accountability:
 - Monitoring: Monitoring activities focusing on programmatic progress/ indicators are in practise however a structured M&E framework does not exist in the country resultant in inadequate monitoring and supervision at all levels.
 - Accountability mechanisms: The existing accountability mechanism neither do reward innovations and hard work nor penalizes poor performance.
 - There are no well-defined job descriptions

The National Immunization Support Program (NISP) will provide funding to all levels to adequately hire staff and to implement the costed EVM Improvement plans. NISP PC-1 of Federal EPI was approved by ECNEC on 8 March, 2016. The provincial PC-1s are in the process of approval.

5. Describe lessons learnt from recent supply chain related support that inform the current request for CCE optimisation platform support.

Some of the lessons learnt in previous support are mentioned as below:

- i Limited technical skill and financial resources for installation

- ii Availability of spare parts for maintenance
- iii Lack of standardisation in terms of models and capacity (various models and types of CCE exist in programme which often doesn't meet the environmental conditions and pose maintenance challenges).
- iv Non PQS equipment were provided, the recent donation of 47 non-PQS equipment by government of China is a reference point
- v Previously the support for strengthening of CCE was without any need assessment and consideration of required capacity, electricity availability in the choice of equipment provided was not taken into account.

The current platform application would assist in reducing these bottlenecks.

6. What percentage of facilities have reliable access to grid electricity for up to or more than 8 hours per day?

This figure on national grid power availability, showed the proportion of national grid electricity distribution for different national grid power availability ranges for vaccine storage locations nationally.

The power availability by location in each province indicates that FATA, Balochistan and KP provinces have a very large proportion of facilities with <8hrs per day representing 74%, 54 and 39% respectively. See details in Table 2.

The information above will be significant in determining the type of CCE selected either to fill gap or as a replacement, particularly for SDD.

Table 2: Breakdown of the proportion of facilities with national grid power supply and availability

Province	< 8hrs		>8hrs	
AJK	103	27%	272	73%
BALOCHISTAN	273	54%	234	46%
FATA	167	74%	59	26%
GBALTISTAN	24	16%	129	84%
ISLAMABAD	14	33%	28	67%
KP	430	39%	684	61%
PUNJAB	722	21%	2,764	79%
SINDH	296	21%	1,129	79%
Total	2,029	28%	5,299	72%

7. Please give the quantity and percent of current CCE that is: a) functional; b) PQS-approved; c) non-PQS-approved; and/or d) obsolete?

The table below summarizes the available CCE in the inventory by total, functional, and PIS/PQS quantities available as well as number of non-approved equipment for vaccine storage. Out of 12,584 equipment, 9,411 (75%) are PIS/PQS approved. A large number of these equipment are old technology, while over 5,100 would be obsolete in the next 5 years. See table 3.

Table 3: # of PIS/PQS CCE that would become obsolete by provinces and year

Province	2016	2017	2018	2019	2020	Total
AJK	204	50	25	17	19	315
Balochistan	369	54	67	34	64	588
FATA	130	23	19	14	22	208
Gbaltistan	49	11	20	7	7	94
Islamabad	10		2	4	2	18
KP	557	65	122	115	125	984
Punjab	1,231	242	231	157	147	2,008

Sindh	577	64	54	48	55	798
Total	3,127	509	540	396	441	5,013

The non-functional rate is very high, 28% which is a measure of the efficiency of the maintenance system in place. The detailed breakdown of the breakdown of the obsolete CCE is in the cold chain inventory report.

Note that table 4 does not contain information relating to the 157 WICR/FR on the database.

Table 4 Current Cold Chain Status

Province	Total (Refr/Fzer)	Functional	PIS/PQS	Domestic
AJK	628	454 72%	418 67%	210 33%
Balochistan	915	619 68%	811 89%	104 11%
FATA	373	218 58%	289 77%	84 23%
GB	331	254 77%	229 69%	102 31%
Islamabad	76	67 88%	44 58%	32 42%
KP	2,048	1,579 77%	1,580 77%	468 23%
Punjab	6,054	4,316 71%	4,886 81%	1,168 19%
Sindh	2,159	1,547 72%	1,154 53%	1,005 47%
Total	12,584	9,054 72%	9,411 75%	3,173 25%

8. What percent of the birth cohort is served by effectively functioning, PQS-approved CCE currently?

There are a total of 5,697 functioning PIS/PQS CCE in different health facilities across the country. These health facilities provide services to 84% of the annual birth cohort. However this number of CCE is inadequate to address the need of this population.

9. What are the bottlenecks that CCE can address in the current supply chain set-up (for example, capacity and technology constraints)?

In spite of government and partners efforts to improve the CC situation across the country, the major challenge remain the lack of a robust maintenance structure at provincial and lower levels to sustain functionality of the equipment. This account for about 28% of non-functionality of CCE in the country.

Lack of standardization of equipment with about 59 different models in the system also poses lots of challenges for maintenance and repairs in addition to large number of old technology (over 5,000 CCE would be obsolete in the next 5 years). The Non PQS equipment represents 25% of the total CCE in the system. It is expected that the existing 59 different models of CCE would be reduced to 19 after the CCEOP application implementation.

With increasing population and introduction of new vaccines the storage capacities at various level became inadequate. Furthermore the use of frozen ice packs with potential risk of freezing of freeze-sensitive vaccines is also a big challenge that has necessitated in deciding to do away with freezers and to use cool packs instead of frozen ice packs for vaccine transportation and administration at lower levels (districts and facilities). In estimating for capacities therefor, the consideration for cooling icepacks was considered in the selection of type of CCE and capacity required.

In the selection of SDDs several factors were considered which includes:

- The CCEOP technology guide with specific SDDs recommendation
- The total cost of ownership (TCO). The TCO of all SDDs in the technology guide with 60ltrs capacity and above ranged from US\$8,976 to US\$10,502. After due consideration, the Zero (Sure Chill), ZLF 100DC SDD with a TCO of US\$9,240 was selected for locations that would require SDDs. Other considerations for selecting this model include;
 - The storage capacity
 - The dual shelving that would enable vaccine and cool packs to be kept in different compartment
 - Ease of use and maintenance from previous experience
 - Pakistan's experience with some other SDDs that have been installed in the past
 - Harmonization of CCE models in Pakistan for maintenance purposes and spares availability

10. Describe any other supply chain challenges that CCE optimisation platform support will assist in mitigating?

Part of efforts to address the capacity to sustain CCE functionality is developing a maintenance and cold chain management SOP for the country exploring varying options to be adopted for maintenance management. Some of these options include, outsourcing part of the maintenance through third party arrangement, developing the capacity within the government system to effectively manage maintenance or a combination of the 2.

The specific cold chain funding in the NISP is about **US\$ 34m** which is grossly inadequate for the overall cold chain needs of the country estimated at **US\$ 50,107,676** the additional funding requirement would be covered by the CCEO platform. A successful CCE OP application will directly support country to scale-up and implement the EVM-IP SG 3 and facilitate implementation of other SGs and EVM-IP priorities such as

- Establishing an effective maintenance structure for planning and implementation
- Scaling up the use of vLMIS to all districts to ensure reliable and timely data to effectively manage iSC and incorporating regular update of cold chain equipment inventory.
- Institutionalizing an effective temperature monitoring system at all levels of iSCM for vaccine quality assurance.

11. What are the overall CCE needs?

Having analysed the updated cold chain inventory and taken into consideration the target population for each facility, the prioritization of facilities discussed in Q12, the available storage capacity requirement for current and new vaccine introduction, the age of equipment, number of existing non-PIS/PQS equipment and country priorities; a total of 15,418 cold chain equipment in 4 classifications would be required over 4 years for optimal cold chain operation in Pakistan.

Though the CCE estimation is for a 5-year period, the CCEOP application would be expected to cover the needs within 4 years. The source of funding for the CCEOP application is the NISP⁹ (a multi-donor fund for immunization activity) which would be expiring by 2020, hence the need to align the funding of the application to 4 years, by 2020.

These requests are summarized in the table 5;

Table 5. Total CCE required & summary of annual procurement plan

Total CCE required & summary of annual procurement plan						
Year	Ice-lined refrigerators (ILRs)				Total CCE	# RTMs required
	<50ltrs	50-100ltrs	>100ltrs	SDD		
1	2,763	372	2,615	1,305	7,055	5,431
2	1,938	315	2,572	1,232	6,057	4,317
3	592	50	470	270	1,382	1,082
4	494	37	163	230	924	856
Total	5,787	774	5,820	3,037	15,418	11,686

Table 4 is showing the summary of the cold chain required by provinces and classification of the capacity of equipment. A total of 15,418 CCE and 11,686 RTMs would be required. Provision is made for 5% failure rate for the RTMs estimation. Though the failure rate is between 1-5%, the upper limit was used for estimation. The annual breakdown is indicated on the table.

Table 6: Total CCE by provincial requirements

Province	# of facilities	Ice-lined refrigerators (ILRs)				Total CCE	RTM ¹⁰ required
		<50ltrs	50-100ltrs	>100ltrs	SDDs		
AJK	419	255	52	256	151	714	552
BALUCHISTAN	656	302	20	391	372	1,085	874
FATA	865	532	6	163	362	1,063	1,121
GBALTISTAN	179	129	17	131	27	304	243

⁹ NISP - National Immunization Support Fund

¹⁰ ColdTrace 5 RTM from Nextleaf

ISLAMABAD	49	18	10	53	20	101	66
KP	1,192	760	69	811	660	2,300	1,609
PUNJAB	3,419	2,645	368	2,160	932	6,105	4,599
SINDH	1,931	1,146	232	1,855	513	3,746	2,628
Total	8,710	5,787	774	5,820	3,037	15,418	11,686

Table 6 showed the total CCE requirement for CCEOP support. This CCE will cover a total of 8,710 facilities including 2,090 facilities that the provinces plan to construct (1,138) and existing ones to expand routine immunization services (952) over the next 5 years.

2: Country's urgent and scale-up CCE needs (number, distribution, functionalities etc.) Provide 1 page

12. Which of the CCE needs identified in the situation analysis are urgent, and why, and therefore should be addressed in the urgent scale-up phase? (E.g. type of equipment, model, capacity, number etc.)?

The CCE needs have been prioritized based on the following situational analysis:

- Equip health facilities with cold chain gaps in 65 district including the 11 polio tier-1 reservoir districts (out of total 169 districts) with large number of unimmunized children. The total birth cohort for these districts and the number of unimmunized children for Penta3 using the 2015 administrative coverage data is summarised below

Table 7 Proportion of Immunized Children in Priority 1 districts

Province	# of districts	Birth cohort	Unimmunized (UI)	% UI children
AJK	5	61,287	6,508	11%
BALUCHISTAN	13	128,700	72,702	56%
FATA	5	58,429	42,668	73%
KP	7	240,040	85,548	36%
PUNJAB	4	201,329	24,176	12%
SINDH	31	958,260	268,781	28%
Total	65	3,296,090	1,000,769	30%

Table 6 showed 30% of the total birth cohort in these districts as unimmunized. The highest proportion in FATA, Balochistan, KP and Sindh respectively. Two districts in FATA have coverage as low as 2 and 7% for penta3.

These 65 districts have 859 facilities with cold chain gaps for current and new vaccine introduction, see table 8. Inclusive of this number are 133 health facilities identified in the CCEM with no CCE.

These 65 district are classified as follows;

- RED/REC approach funded by UNICEF to scale-up RI activities in to reach more children in 33 low immunization coverage districts across 4 provinces require CC strengthening for sustainability.
- Strengthening RI activities utilizing PEI structures in 11 polio reservoir districts of KP, Sindh, Balochistan and FATA.
- The remaining 21 poor performing districts (with Penta3 coverage less than 65% and cold chain gap identified) would be strengthened utilization of the CCEO Platform.

Table 8: Priority 1 (a) CCE requirements by type and number

Province	# of districts	# of facilities	Ice-lined Refrigerators				Total
			<50ltrs	50-100ltrs	>100ltrs	SDDs	
AJK	5	7	3		2	3	8
BALUCHISTAN	13	88	33	3	4	52	92

FATA	5	10				10	10
KP	7	132	75	4	4	52	135
PUNJAB	4	243	185	7	76	72	340
SINDH	31	379	201	76	102	67	446
Total	65	859	497	90	188	256	1,031

- b. The 488 identified facilities with cold chain gaps (including 61 with no CCE) in addition to the above mentioned districts of Balochistan, KP and FATA will also be considered under this priority. These Provinces/Area have the highest number of districts with coverage for Penta3 less than 80%, Balochistan have 13 of 30, FATA; 11 of 14 and KP; 19 of 25 districts with less than 80% coverage for Penta3. See *table 9*.

Table 9: Priority 1 (b) CCE requirement by number

Province	# of districts	# of facility	<50ltrs	50-100ltrs	>100ltrs	SDDs	Total
BALUCHISTAN	13	43	22	3		18	43
FATA	11	66	13	1	4	51	69
KP	19	379	233	4	9	142	388
Total	43	488	268	8	13	211	500

The provision of CCE in these districts (a and b) as a first priority would sustain RI services in the polio reservoir districts after the polio end game as well as harness the huge investment on immunization therein for both the RED/REC and Polio reservoir districts. Health facilities of low performing district would be equipped by filling the CCE gap and provision of CCE in the non-equipped facilities would contribute to enhance immunization services and coverage.

- c. Diarrhoea is one of the leading cause of death among children under 5 in Pakistan and most common causative agent is rotavirus, based on the fact government decided to introduce rotavirus vaccine in phased manner from year 2016. It has been identified from the cold chain gap analysis that a number of facilities do not have adequate capacity to accommodate the present vaccine in the schedule and the requirement would further increase with the introduction of rotavirus vaccine into the system. The analysis showed that 3,526 health facilities including 318 that were identified as having no cold chain equipment would not have the capacity to store rotavirus vaccine when introduced. This number is about 37% of the total facilities (9,609) analysed. The breakdown of these facilities by provinces and Areas is shown below:

Table 10: Total number of facilities with cold chain gap per province

Provinces/Areas	# of facility
AJK	66
BALUCHISTAN	131
FATA	76
GB	26
ISLAMABAD	12
KP	514
PUNJAB	2,103
SINDH	598
Total	3,526

Although a total of 1,347 facilities of the total 3,526 recognized as having capacity gaps in 108 districts have been addressed in the priority districts described in (a) and (b) above, 2,097 health facilities in other districts across the country would still be requiring upgrade of their storage facility to accommodate present scheduled RI and rotavirus vaccine. Consequently, the country is categorizing these facilities under the first and urgent priority needs. As it is believed that the objective of introducing rotavirus vaccines into the routine immunization schedule would be defeated if

quality assurance procedures relating to storage that guarantee vaccine potency is compromised in a substantial number of health facilities.

The type of equipment and models selected are dependent on the availability of power supply in such facility while the capacity chosen was dependent on its target population coverage determined using the WHO immunization sizing tool.

The objective for this priority is to expand equitable coverage and improve vaccine potency.

Table 11: Priority 1 (c) CCE requirement by provinces

Row Labels	# of districts	# of facility	Ice-lined Refrigerators (ILRs)				SDDs	Total
			<50ltrs	50-100ltrs	>100ltrs	SDDs		
AJK	10	59	40	1	2	17	60	
GBALTISTAN	7	26	22		4	3	29	
ISLAMABAD	2	11	6	4	4	1	15	
PUNJAB	35	1,784	1,366	46	377	339	2,128	
SINDH	13	217	162	3	40	42	247	
Total	67	2,097	1,596	54	427	402	2,479	

Following the complete gap analysis of the 3,526 facilities under these priorities (a-c) above, the cold chain equipment detailed in the table 12 would be adequate to fill identified gaps in year 1.

Additional 473 facilities that the provinces of Balochistan, KP and FATA planned to extend RI services to in the first year are also considered for year 1 prioritization. This additional facilities will further boost RI coverage in these low coverage provinces.

Considering that the CCE the 5 years capacity gap requirements would be covered through the platform in 4 years, it become necessary to align and bring forward the provision of some non-urgent priority equipment like the replacement of obsolete and domestic CCE to years 1 and 2. This alignment is essential due to the expiration of NISP, the funding source for this application by 2020, while the CCE needs cycle being considered would end by 2021. Therefore, some of the third priority equipment described would be covered together with priorities 1 and 2 equipment.

Table 12: Year 1 priority and CCE required during the period

Description	No of facilities	ILRs			SDD	Remarks
		<50ltrs)	50 – 100ltrs	>100ltrs		
Underserved facilities population gap requirement in 65 districts	859	497	90	188	256	Including 113 identified in the CCEM with no storage facility.*
Quantity to bridge identified gaps for existing vaccine schedule & rotavirus introduction in Balochistan, FATA & KP Provinces	488	268	8	13	211	Including 69 facilities identified in CCEM with not storage facility.*
Quantity to bridge identified existing capacity gap for existing & new vaccine introduction in Sindh, Punjab, GB, AJK & ICT/CDA provinces/areas	2,097	1,596	54	427	402	2,097 health facilities with gaps for present and rotavirus vaccine when introduced.*
Extend RI services to existing	473	292			181	The 3 low coverage

health facilities in Balochistan, KP and FATA to conduct RI through provision of CCE.						provinces plan to extend RI services to existing 473 facilities in year 1.*
Replace domestic CCE (older than 5 years)	1,123	110	220	1987	255	Priority 3
Total	5,040	2,763	372	2,615	1,305	Total CCE = 7,055

* Priority 1.

About one third of all the UCs in Pakistan do not have any health facility. Outreach and mobile services that are often not implemented due to logistics reasons are the strategies to reach the population in these UCs. To ensure equitable coverage, Provinces and Areas have planned the construction of a number of health facilities for improved access to immunization services over the next 5 years. The Provincial and Area plan for facility expansion indicates the completion of 504 facilities by the end of 2017 while other existing 479 facility not presently equipped with CCE is also part of the provincial plans within the same period.

These 983 facilities would be urgently prioritized for cold chain expansion for increased access to immunization services. These prioritized facility would be covered in the second year (priority 2) to enable other logistics and HR required to make these facilities functional be put in place.

The summary of equipment for this group of facilities is as below:

Table 13: Priority 2 and other CCE that would be covered in year 2.

Description	# of facilities	ILRs			SDD	Remarks
		<50ltrs)	50-100ltrs	>100ltrs		
Extend RI services to existing HFs by provision of CCE by provincial plans	479	363			116	Priority 2 Will serve the 983 HFs.
Provision of RI services to newly constructed HFs by end of 2017 as per Provincial plans	504	374			130	
Replace domestic CCE (less than 5 years)	579	76	97	1,000	242	Priority 3
Replace old technology CCE (PIS/PQS equipment that would be obsolete	2,153	1,125	218	1,572	744	
Total	3,715	1,938	315	2,572	1,232	Total = 6,057

13. What percent of the birth cohort will be served by effectively functioning CCE when the Platform equipment is deployed?

About 90% of the birth cohort are expected to be covered effectively by functional equipment when the platform of CCE are completely deployed. The birth cohort for the national and provinces are indicated in table 14.

Table 14: Pakistan National & province population data from cMYP.

Year	National	AJK	Balochistan	FATA	Gbaltistan	Islamabad	KP	Punjab	Sindh
	2016	2016	2016	2016	2016	2016	2016	2016	2016
Population	190,735,949	4,571,706	8,902,235	4,691,124	1,408,499	1,493,892	28,901,905	98,666,436	42,100,152
Births	6,675,758	160,010	311,578	164,189	49,297	52,286	1,011,567	3,453,325	1,473,505
Surviving Infants	6,205,265	148,169	288,521	152,039	45,896	48,417	959,977	3,197,779	1,364,466
Pregnant women	6,809,273	163,210	317,810	167,473	50,283	53,332	1,031,798	3,522,392	1,502,975
Child Bearing Age Women	41,961,909	1,005,775	1,958,492	1,032,047	309,870	328,656	6,358,419	21,706,616	9,262,033

14. Explain how these urgent needs relate to the current bottlenecks (as outlined in the preceding section)?

CCE OP support is expected to increase the storage space for life saving vaccines and thereby improve vaccine availability and potency and possibly contribute to the increase in equitable immunisation coverage. Provision of CCE have been prioritized based on the urgent needs to operationalize the existing health facilities with no CCE and expand services to newly constructed facilities within the first 2 years of the platform support.

3: Expected immunisation coverage, equity and sustainability results *Provide 2 pages*

- *How will the requested Platform support concretely contribute to addressing identified geographic and socio-economic inequities and gender barriers to sustainable improvements in coverage and equity of immunisation? Examples may include (not exhaustive):*

Pakistan the sixth most populous country of the world with a total population of 194.4 million and surviving infants of 6.8m. In 2012, the WHO/UNICEF estimates indicated that Pakistan had achieved 81 per cent DPT3 coverage and based on this, there are a total of 817,190 unimmunized children in the country. Different surveys carried out in last five years demonstrate inequities in vaccination across different provinces and districts.

Pakistan has the fifth largest number of unimmunized children in the world, and provinces like Baluchistan and Federally Administered Tribal Areas (FATA) have much lower coverage rates than the rest of the country. Only 16% of the children are fully immunized in Baluchistan compared to 66% in Punjab.

Analysis of the national surveys PDHS and PSLM revealed no significant difference across gender. However, evidence shows consistent geographic and socioeconomic inequities which are in line with the findings of third party surveys. According to, PSLM 2013-14, 70% children aged 12-23 months are more likely to be immunized in urban areas compared to only 53% in the rural areas. Similarly, immunization coverage rates among children from households in the highest wealth quintile are 60% more likely to be vaccinated in urban areas compared to 43% in rural areas; children in the lowest wealth quintile are more likely to miss out vaccination compared to children in the highest wealth quintile in both urban as well as rural areas according to PSLM 2013-14. It also shows that poverty is the main underlying factor, with children in the poorest household having immunization coverage rates that are one third of their counterparts in wealthier households but cultural and ethnic affiliation also influence child's access to immunization services. Children in these communities are at "high risk", because not only are vaccine preventable disease burden disproportionately concentrates, also levels of hygiene, access to medical care and education tends to be lower in these communities. Immunization coverage thus becomes a clear indicator highlighting existing inequities among children within the country, and can show the way to overcome these hurdles in order to address the inequities in immunization coverage.

Therefore, the requested Platform support is planned to contribute to reducing the above identified inequities in CCE and immunisation coverage by focusing on the low performing districts in Balochistan, KP, Punjab and Sindh Provinces and FATA region, The CCE OP application will further reduce the gaps in equity, socio economic and geographical discrepancies.

- *Geographically remote districts or those with low coverage*

The first priority 65 districts will be equipped with cold chain equipment on the basis of low performing districts due to many reasons including hard to reach areas, poor socio economic conditions and poor health system. These 65 districts are mainly situated in Balochistan, FATA, KP, Punjab and Sindh provinces. Districts like Loralai, Nasirabad, Gawadar, Matiari, Ghotki, Tharparkar, Torghar, Tank and Shangla are very scattered and having problem of access to health and EPI services. FATA in general is an area of conflict, poor socio economic condition, poor access to the health and EPI services leading to low vaccination coverage.

Considering the coverage and the number of unimmunized children for these provinces and districts as highlighted in Q.12, the provision of cold chain equipment to these areas will contribute to equitable RI coverage by increasing potent vaccine availability and access to the communities.

- *Poorer communities (e.g. in the poorest 10% of the population)*

Poor communities will get access to EPI services in their communities, these communities are scattered all over the country, even within the districts of better socio economic condition and in cities like Karachi, Lahore and

Peshawar. The provinces have prioritized this category of communities for facility expansion. By providing appropriate cold chain equipment to these newly constructed facilities and making EPI services accessible to them vaccination equitable coverage will be improved.

According to PDHS 2012-13, children from households in the highest wealth quintile (75 percent) are much more likely to be fully immunized than those from households in the lowest quintile (23 percent). EPI Policy states that poor communities will get access to EPI services in their communities. The platform will focus on addressing gaps within these districts where the poorer communities are located and will contribute to addressing the social economic inequity'

The Provincial governments of Punjab and Sindh are determined reach the urban slums by strategizing RI service delivery through involvement of the CSOs. The Platform investment will complement these Provincial investments.

- *Communities where gender barriers are significant and/or where low levels of female education is common (as this is often associated with lower coverage)*

Analysis of the national surveys PDHS and PSLM revealed no significant difference across gender. There are marked differences in immunization coverage between children of women with no education (40 percent) and children of women at the middle, secondary, and higher educational levels (74 percent and above). The provincial/area governments are cognizant of the fact and their respective PC-1s are focused on opening new EPI centres in slums where the uneducated and poor communities reside. Through prioritizing cold chain in these new EPI centres, slum areas, CCE (and immunisation) coverage is expected to improve.'

- *What analyses¹¹ have been made, or what plans are underway, to optimise the design of the supply chain distribution system¹² in order to improve the efficiency of the supply chain and contribute to achieving coverage and equity goals?*

The entry point for all vaccine and devices into the country for immunization services is Federal EPI, Islamabad. The distribution strategy currently operational in Pakistan is the pull system where the provinces collect their supplies on a quarterly basis from the Federal store as per their allocation. The vaccine are distributed to provincial stores and further distributed to districts based on their demand. As stated in the national EPI policy, the Federal EPI keeps stock of at least 3 months and buffer stock for 3 months, Provincial stores keep 3 months stock, the district and facility maintains one month stock. However the ICT, CDA and AJK collect vaccine from Federal EPI on monthly basis because there are no provincial stores in these areas. The Federal EPI has planned to construct store at each level for better stock management.

Plans are underway to review the supply chain distribution system for better efficiency through modelling and using the outcome of the study to redesign and realign distribution network for improved efficiency and delivery of potent vaccines at the same time addressing equity issues that may arise from the study. UNICEF is working in close coordination with government of Pakistan and other partners to conduct this modelling exercise.

- *How have these system design considerations impacted the choice of CCE to be supported by the Platform?*

System design activities are being planned with the EPI in Pakistan. A supply chain model is already being constructed from the CCEM data and this will provide a strong foundation to begin analysing various system design alternatives. The evidence based decision making process on system design will take some time before they are piloted, evaluated and costed for roll-out (generally 2-4 years). However, the cold chain needs are already clearly articulated in the proposal and many of these cold chain needs remain unaffected by system design (e.g. to install equipment in facilities with broken / no-equipment). In addition the application already took into account many considerations: 1) the adoption of the use of cool packs rather than ice packs for vaccine transportation and administration, 2) the available energy source, 3) capacity requirement (present and future vaccine requirement), 4) holdover time and 5) past equipment performance based on total cost of ownership analysis. Other consideration was the need to harmonize the CCE models for ease of maintenance and repairs (presently over 55 models exists in the system).

¹¹These plans can vary from desk reviews to complex modelling of the country's supply chain system and distribution that identify ways to increase supply chain efficiencies, to deliver potent vaccines.

¹² NOTE: Activities to optimise the design of supply chain distribution systems are NOT funded by Platform-support.

It is therefore expected that the outcomes of the system design process will significantly improve the CCE procurement for later cycles because it will help Pakistan to build a more robust, dynamic supply chain system based on evidence and pilots and this data can be used to proactively refine later procurement cycles.

In redesigning the system for better efficiency, new technology that are adaptable to the country's weather conditions are being considered to replace the current obsolete and old technology and fill capacity gaps for current and future needs..

- *Concretely, how will Platform support help improve the sustainability of the supply chain system?*

Some the ways the platform support will help in improving the sustainability of the supply chain system are enumerated in section 4 below and other relevant sections in the application. It is envisaged that when some of the processes described therein are properly implemented, a system will be established that can take care of itself after the withdrawal of GAVI support especially in the following areas:

- Institutionalizing CCE maintenance planning process
- Help in catalysing the establishment of an efficient maintenance system
- Appropriate and adequate HR for cold chain maintenance and management in place
- Better forecasting and planning of spare parts management
- Improved procurement system
- CCE with new and more efficient technology into the system
- Facilitate the introduction, usage and monitoring of RTMs and 30TMDs for vaccine management
- Improve the monitoring mechanism for equipment and regular update of CCI through integration with vLMIS.
- New equipment will require less maintenance and optimize the capacity in coming years.
- Provide a platform for more advocacy and resource mobilization to government and partners for strengthening of ISCM infrastructure

All these anticipated inputs via the platform support would contribute greatly to sustaining the efficient operation of the supply chain system.

4: Maintenance plan (and its source of funding) and equipment disposal *Provide 2 pages*

15. How will the country ensure that aspects of maintaining the cold chain are addressed (e.g. preventive and corrective maintenance, monitoring functionality, technicians, financing for maintenance, etc.)?

The average E5 criteria score for all levels from the 2014 EVMA is 51%, indicating a weak maintenance system especially at lower levels. However, E5 scored 99% at Federal EPI but lower level scores ranged from 53%, 51% and 50% for provinces, districts and health facilities respectively.

The major challenges identified for this low score at lower level is the human resource capacity. The available HR resource for maintenance exist in different forms and classification depending on the supply chain level. The federal EPI outsource bulk of its maintenance and repair tasks but have an engineer who is responsible for routine and minor maintenance activities. Plan are ongoing to strengthen this area of operation by recruiting more skilled manpower to carry out the maintenance accordingly. The provinces have a mixed method of undertaking its maintenance activity. Some provinces have mapped their districts into zones/division with a trained technician responsible for the repair of CCE in each division. Others have trained technicians at the province capital who the districts/facility contact whenever required. Outsourcing some aspects of repairs to private entities is also being practiced by every districts.

Pakistan being a federating system do not have a unified maintenance structure. Each federating unit, developed its maintenance structure to suit its purpose and budget, though the overall objective is the same. Consequently, each province/area including the federal EPI have developed its improvement plan and costed each activity referred to as costed EVM-IP (cEVM-IP). Each cEVM-IP clearly outlined its maintenance plans and strategy for cold chain sustainability, improving existing HR, recruitment plans for additional HR where capacity gaps have been identified and capacity building activities to strengthen its capacity for effective service delivery including maintenance.

In addition to outlining its maintenance strategy, the cEVM-IP have made provision for procurement of spare parts for

rehabilitating repairable , identified types of training required for its HR in the iSC among others. Budgetary provision and timelines have been made for all the activities outlined in the cEVM-IP in the PC-1 till 2021.¹³ (See cEVM-IP for the federal EPI and each province/area for detailed maintenance plans).

The identified maintenance strategies by federal EPI/Province/Area adopted falls within the 3 categories below.

- Capacity building by reinforcing the capacity of in-country technical expertise to manage CCE, provide maintenance and troubleshooting of equipment malfunctions. This would emphasize on the training and retraining of existing and new technician and provision of tools for effective undertaking of required tasks.
- Outsourcing part or whole maintenance of CCE to a third party
- Identify a third party that would periodically perform inspection and preventive maintenance as well as curative maintenance whenever necessary.

One common trend in all the provinces is the lack of planned preventive maintenance activities, only react to equipment repair when non-functionality is reported.

Strengthening human resource capacity for CCE maintenance and monitoring functionality

Human resource development is fundamental to the effectiveness and efficiency of any system achieving its objectives. Therefore, for any efficient maintenance system to be in place, appropriate and trained human resources must be available and in the right number to cover various supply change level appropriately.

i Human resource requirement for maintenance sustainability

Presently, the exact number of CCE technicians or other HR in the provinces and districts responsible for equipment maintenance cannot be ascertained. However, it known that certain number of districts do not have appropriate number, others are not adequately trained and some of those trained do not have appropriate tools to carry out maintenance functions. Strengthening and sustaining CCE maintenance would require adequate number of trained personnel/technicians) including relevant EPI staff on key cold chain maintenance user's tasks. To this end, the provinces/areas would be encouraged to profile all cold chain HR available against needs to ascertain if the provisions made in the PC-1 would be adequate in establishing a sustainable preventive maintenance system. Information from these exercises would guide the provinces/areas EPI program to plan for effective human resource capacity for cold chain infrastructure maintenance depending each province maintenance style.

Province/districts EPI officers are key to the daily usage of cold chain equipment and need to have the requisite knowledge to basic routine maintenance of CCE. This group of staff would focus on carrying out preventive maintenance tasks with the support of technicians whenever required. They would be responsible for hands-on training of HFs staff on user maintenance tasks, through hands-on training during supportive supervision, districts review meetings or an organized classroom training. In addition, the district VMO will be trained and be responsible for developing the district's maintenance plan and specifically focusing on IPM planning including following-up to ensure that the plans are implemented. They would be supported by other districts EPI Officers, Province EVM Coordinator, UNICEF/WHO focal person responsible for supply chain/EPI activities, national level officers from partners and government.

ii Capacity building

The provinces/areas have highlighted the extent to which they want to strengthen HR capacity in their costed EVM- IP. Some of these include outsourcing of maintenance and other services, technical assistance needs, provision of spares parts, operations, maintenance cost among others. These province plans is for a period of 5½ years beginning from the second part of 2016 to 2021¹⁴. The budget to implement these plans are included in the PC-1 awaiting final stage of approval.

Following that most of the maintenance training planned by the provinces are focusing on technicians for curative maintenance, UNICEF in collaborations with the provinces are making plans to build capacity of users to enable them carry out preventive maintenance appropriately. Participants in this training will be drawn from the government focal persons for EPI responsible for CCE management in the provinces and districts. A total of 369 personnel would be trained in 14 batches (each batch of 25-30 participants) UNICEF is planning to cover the cost of training from its GAVI HSS2 fund.

Other partners like JAICA are focusing on KP province with a series of training for technicians on cold chain maintenance. Other ongoing activities include strengthen capacity of health workers for data collection and inventory update.

¹³ Refer to relevant sections of maintenance activities in the costed EVMIP for the Provinces and Areas detailed maintenance plans.

¹⁴ Detailed provincial plans in the attached cEVM-IP

The additional steps towards addressing these challenges would be the development of maintenance and cold chain management system SOPs for the country to guide every level on approach and procedures as well as harmonizing the different maintenance structure being adopted by provinces. This guideline would explore varying approaches for preventive and corrective maintenance. Discussions are ongoing between UNICEF and JAICA on the adoption and customization of relevant available job aids and posters for Pakistani use including translation into local languages highlighting different management techniques and frequency of maintenance tasks.

iii Monitoring functionality plan

While government are working with partners to institutionalize an effective reporting system through the expansion of the vLMIS to all districts, other options are being explored as a stop-gap for the immediate that could also be integrated into whatever government monitoring dashboard structure that government will put in place in the future.

One of this option is taking advantage of the CCEOP application window to introduce the remote temperature monitoring (RTM) system, the '*Nexleaf ColdTrace 5*' in monitoring the cold chain performance and reporting. Some advantages that using this will bring include:

- i It is a wireless temperature monitoring system for CCE (including refrigerators/freezers)
- ii It transmits data and provides real-time temperature alerts through audio alarm, SMS (text message) and email. Higher level officers can receive emails summarizing CCE performance upon which action can be taken.
- iii Non performing CCE would be identified remotely at higher lever and attended to by technician
- iv Dashboard features include equipment performance and power availability summary reports on any device. Quality of vaccines and status of CCE can be monitored remotely
- v Multiple users can access the dashboard without any software installation. Making it possible for higher level officers to have information on CCE even without reliant on primary equipment user, which is the major reporting challenge in Pakistan, thereby elimination a major bottleneck.
- vi One unit can monitor up to 5 CCE and the audible alarm provision will attract user's attention immediately to equipment that require attention.
- vii Interpretation of parameters and outcomes are not entirely based on primary equipment users.
- viii Reports from the '*ColdTrace 5*'; can directly be integrated into any dashboard or vLMIS system.
- ix Cold chain equipment can be updated on the dashboard by technicians or provincial/district managers when CCE replacement takes place
- x Can generate total numbers hours each equipment have electricity per day.

For more optimal performance and improvement to be visible, the supply chain levels would be encouraged to work on the following reporting areas:

One of the proposed strategy for monitoring preventive and curative maintenance is to encourage every province and district to keep an inventory of its quarterly updated CCI and uploaded into the provincial vLMIS. The *ColdTrace 5* would be a veritable tool to achieve this real-time CCI management. Consequently, provinces/districts will identify responsible and accountable personnel for cold chain management (probably dedicating the VMO to this tasks), that will manage the inventory, develop and monitor implementation of preventive maintenance plans.

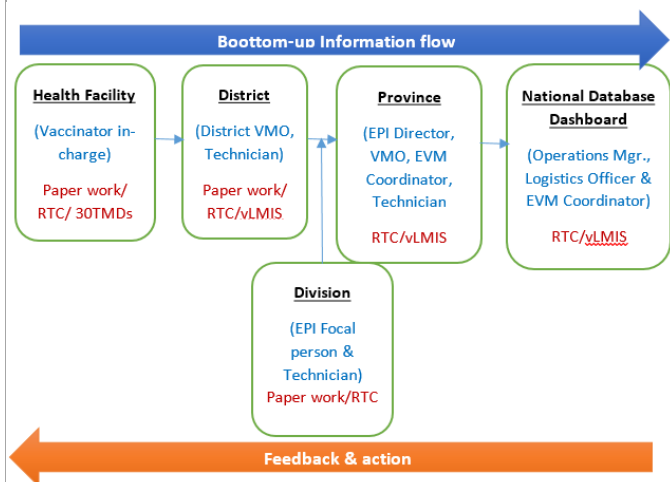
These CCI data and maintenance plan shall be used to monitor the following indicators:

- The proportion of functional CCE at each level (Province and District)
- Proportion of equipped facility with functional CCE
- Proportion of planned new facilities that now have a functional CCE
- Proportion of provinces/districts that have uploaded its updated CC inventory into the provincial vLMIS quarterly and timely.
- A future indicator for temperature monitoring number of alarms recorded for each equipment. This would be implemented when the RTM or 30TMDs are operational in all CCE and a central equipment maintenance database is established.

Emphasis would be put on empowering equipment users at each health facility with basic preventive maintenance and monitoring skills to ensure timely problem identification to prevent vaccine exposure to extreme temperature excursions. This could be done by:

- Conducting user training for facility staff with CCE
- Institutionalize an effective supportive supervision mechanism and mentorship
- Improve bottom-up information flow for prompt timely intervention when required.

Figure 1: Information flow, reporting and feedback chat



While it is pertinent to analyze how data would be transmitted using the bottom-up approach, it is desirable to make the reporting line very clear which is what the figure 1 attempts to do.

Figure 1 is showing the information flow pattern from both ends. Data are to be generated from the facility up through the level to the national. The supply chain data generation points are underlined, responsible persons (blue colour) and means of data generation and transmission (red colour).

Note that the division is not an administrative supply chain levels, but some provinces have clustered district into division for ease of maintenance management purposes and due to lack of personnel to cover each district.

It is also expected that the higher level will feedback as appropriated or initiate actions to be taken as necessary to

lower level on any observed infractions.

Unicef and other partners have conducted capacity building at various time to provinces/districts technicians and other personnel on maintenance. The key challenge here is the high rate of attrition and even when trainings are conducted, unskilled or untrainable persons are sent who cannot translate whatever skills they acquire into practical use.

Availability and usage of reporting forms at all vaccine storage facilities, especially at the facilities and summary data sheet at the districts both for CCE and temperature monitoring. Though provisions for printing and training of users have been made in the cEVP-IP and budgeted for, continuous follow-up by partner would continue to ensure this is prioritized and brought to fruition. This would be necessary because presently less than 5% of CCE in the country are equipped with 30TMDs and as stem or dial thermometers are largely in use.

In addition to the above listed activities, the federal EPI and provinces/areas will continue working with partners to establish a functional vLMIS in the country integrating all EPI key vaccine management indicators, components of immunization supply chain and logistics management.

Outside the government PC-1, additional financial provisions from HSS Objective 4 for maintenance of infrastructure and other partners support are available and would contribute to strengthening the maintenance planning mechanism and implementation.

a. What is the frequency of preventative and corrective maintenance that the country commits to (supported by partners)?

The country is committed to supporting all planned preventive and corrective maintenance initiatives that would be developed to sustain cold chain equipment functionality at all times. However, the frequency of maintenance (preventive and curative) are usually planned as daily, weekly, monthly, quarterly, bi-annual and annual activities. This will be done in conjunction with partners support. Some of the partner's plans to support the different forms of maintenance were discussed in the previous section.

Preventive maintenance being set of activities carried out on an equipment for continuous operation could be carried out by equipment user, other employee of MoH, an external person or a combination of either of them. The tasks under this category are usually routine in nature and carried out periodically as described above. The task that relate to operations like cleaning, defrosting of freezer compartments are mainly the responsibility of the equipment user while other more complex tasks are done by trained personnel/technician. Manufacturers' manual accompanying equipment usual have recommended frequencies for certain maintenance tasks on the equipment. Production of key SOPs messages on procedures and techniques are being planned for production in local languages.

Irrespective of how efficient a preventive maintenance system is implemented, equipment would eventually break down. Activities carried out after the breakdown of CCE to make it function is termed curative maintenance. This required specialized skills and tools and therefore can only be done by trained personnel. Availability of spares is fundamental to an effective curative maintenance system. The spare part challenge would however be ameliorated by the CCEOP application in addition to the plans laid out for spares procurement in the cEVM-IP for each provinces/areas. This class of maintenance is not necessarily periodic but as soon as the equipment breakdown. An effective curative maintenance

system should reduce equipment downtime to between 2-3 weeks.

Current Gavi HSS2 grant will support strengthening of cold chain and supply system, evidence based planning through expansion of vLMIS and capacity building on planned preventive maintenance at all levels for CCE management.

b. What technical support is anticipated for maintenance?

A technical support would be required to undertake the following maintenance activities:

- Develop a maintenance management SOP for CCE
- Develop and implement capacity building mechanism to help establish a robust maintenance management system and mentoring key supply chain personnel at all operational level
- In addition to the general TA described above, the costed EVM-IP for each province/area have identified the specific TA needed for its improvement process. (See attached province/areas cEVM-IP for details).

16. How will the country monitor the completion of preventive and corrective maintenance

Though some of the monitoring mechanism was discussed in Q 15, it is key to emphasize that each level would develop its preventive and corrective maintenance plan which can be monitored using the following indicators from quarterly reports:

The flow of information will be from Health facility level to the district and from district to Provincial level. At provincial level the Provincial logistic officer will ensure that plans have been implemented at District level, District vaccine supervisor (DSV) will be responsible while at facility level EPI technician will be responsible for reporting on the following monitoring indicators for maintenance

- Proportion of preventive maintenance plans that are implemented during the reporting period.
- Number of reports for CCE attention that was received and the proportion that were attended to within 2 weeks.
- Proportion of CCE that required attention that are now functional (quarterly reports summary)
- Number of facilities with sufficient storage facility
- Proportion of province/districts that have an established maintenance register; briefly describing situation, action taken, outcome and updated regularly.

Institutionalizing and implementation an effective supportive supervision mechanism for all levels of personnel in the iSCM with a standardized checklist integrating monitoring, maintenance, repair completion indicators and using data for action would be fundamental to sustaining the operational CCE continuous functionality. This is the vision the envisaged sustainable maintenance and monitoring plans aim to achieve.

a. Which source(s) of funding will be used for maintenance, and to what extent are they assured?

Provisions have been made in the PC-1s at the national and province levels to hire additional human resource for maintenance and spares. This government funding source is guaranteed for the 5-year cycle of the PC-1s when approved in addition to HSS funds earmarked for maintenance and infrastructure that is available till 2018.

17. How will the country dispose of obsolete and irreparable equipment replaced by CCE optimisation platform equipment?

One way of disposing of the obsolete and irreparable CCE is to recover spares that could be used to maintain existing CCE.

For equipment whose parts could not be used as spares the government policies for such procedures would be followed. These procedures are explicitly enumerated in the 'Pakistan General Financial Rules', page 72. This document is a high level plan of action that guides all government departments and agencies on the disposal of equipment including refrigerators and freezers.

How will the country facilitate the manufacturer's or representative's role in equipment purchase, distribution and installation?

Pakistan has chosen to rationalize its CCE by selecting few models in order to facilitate management, training of users, monitoring and maintenance. To achieve this, the country will identify specific CCE to be purchased and share locations for installations based on the identified gaps. The provincial/district teams shall work with the manufacturer's representative in ensuring that CCE are installed at the appropriate locations. The in-country logistics for equipment distribution and installations would be planned with the manufacturer or representatives for all levels by the national, provinces and districts.

The country shall liaise with Unicef-SD on the quantification of periodic supply needs based on secured funding for CCE. This quantification document shall guide Unicef-SD on the frequency and type of equipment that would be required per time. A detailed line list of the location for equipment will be shared with the equipment manufacture working with each province/district to develop itinerary for installation. The attached strategic deployment plan will be a guiding document and be used to develop a detailed operational plan with timeline when the application is approved.

18. What is the source of the joint investment? Is the country's joint investment secured?

An amount of US\$ 34 million is available through MDTF for procurement of the cold chain out of which US\$ 24.1 Million is reflected in NISP PC-1 along with provincial share see below table.

S/N	Name of Provinces/Federating Areas	Provincial/Federating Areas Share for the Procurement of CCE in US\$
1	Federating Areas (6%)	1,449,464.00
2	Punjab Share (53.2%)	12,851,929
3	Sindh (22.7%)	5,483,811
4	KPK (13.3%)	3,212,982
5	Baluchistan (4.8%)	1,159,572
Total		24,157,758

Moreover the remaining funding would be available under the Technical Assistance including the procurement of the cold chain and adjustments can be made accordingly from the funds available in provincial PC-1s and MDTF.

19. Has the country secured import tariff exemptions for CCE? If yes, attach proof.

The country has a secured import tariff exemption for CCE and document is attached as described in section 2.

4.2 Initial support phase

This initial support is designed to address urgent CCE needs through years 1 and 2.

Provide maximum 3 pages, comprising:

- **2 to 4 prioritised URGENT CCE needs** as identified in the 'CCE rehabilitation and expansion plan, equipment selection and strategic deployment plan requirements'(see Annex 3 of the Application Instructions),
- **Description** of planned or ongoing activities related to other supply chain "fundamentals".

4.2.1 Prioritised URGENT CCE needs



Budgets not inclusive of operational cost

(Operational costs to be financed by Ministry of Health or other partners)

Prioritised (URGENT)
CCE need 1:

1. The need

Please include: Type of activity (e.g. replace obsolete CCE, extend CCE

<p><i>(Required information)</i></p>	<p><i>to unequipped facilities, etc.); specific CCE site (facility); type of equipment required; quantity of equipment items.</i></p> <p>This first priority need is to equip the unequipped 859 facilities in the most underserved facilities in 65 districts across the country, filling capacity gaps of existing facilities in the provinces (KP, Balochistan & FATA) with least coverage for present and future needs</p> <p>The type of equipment considered for this category of needs are:</p> <ul style="list-style-type: none"> • <50ltrs (VLS 200A) – 497 number • 50-100ltrs (VLS300A) – 90 number • >100ltrs (VLS400A) – 188 number • SDD (ZLF 100DC) – 256 number • RTMs <p>2. Justification <i>Please include: Reasons for urgent need (e.g. low CCE and/or immunisation (Penta3) coverage area, gender barriers, mobile population, etc.); current CCE and immunisation (Penta3) coverage in the population area.</i></p> <p>The facilities under consideration are located in areas with large number of unreached population and Penta3 coverage of less than 50%.The provision of cold chain equipment to these facilities will also complements other ongoing interventions to increase vaccine availability in good quality, improve access to underserved communities and ultimately boost immunization coverage in these locations.</p> <p>3. Expected outcome <i>Please include: Anticipated increase in CCE and immunisation coverage (Penta3); anticipated progress against identified inequity (describe, in alignment with country Performance framework).</i></p> <p>It is expected that CCEOP support will contribute to enhance coverage (Penta3) by 5% in the affected districts every year progressively for the next 5 years and beyond.(Reference Q13 answer)</p>
<p>Total CCE Budget:</p>	<p><i>'Total budget' includes Gavi and country joint investment share: \$(XX)</i></p> <p>The total budget for this first priority needs is US\$ 3,261,178. Government and country share being 50:50, that is, government US\$1,630,589 and Gavi US\$1,630,589 respectively.</p>
<p><i>Prioritised (URGENT) CCE need 2:</i></p>	<p><i>The need; Justification; Expected outcome</i> <i>(See guidance as per prioritised need 1, above)</i></p> <p>The objective of this first priority and urgent need is to assure adequate cold chain capacity and vaccine potency.</p> <p>2,585 health facilities in all provinces/Areas that do not have adequate capacity for the present vaccine schedule and rotavirus vaccine introduction. The country have already secured the approval for the introduction of this vaccine, the large number of health facilities outside the key priority provinces would compromise the administration of this vaccine and negate the objective of the introduction. The provision of adequate cold chain equipment to mitigate this capacity gap, assure availability, quality of vaccine and build confidence in the system.</p> <p>The expected outcome for this need is to improve immunization access to underserved communities and contribute to minimum of 5% increase in coverage in the affected districts, provinces and areas.</p> <p>The capacity, model, and number of CCE considered for this needs are:</p> <ul style="list-style-type: none"> • <50ltrs (VLS 200A) - 1,864units • 50 – 100ltrs (VLS 300A) –62 units • >100ltrs (VLS 400A) – 440 units • SDD (ZLF 100 DC) –613 units
<p>Total CCE Budget:</p>	<p>Total required budget is US\$ 8,842,467. Government contribution US\$</p>

	4,421,233.50 and GAVI US\$ 4,421,233.50 .
<i>Prioritised (URGENT) CCE need 3:</i>	<p><i>The need; Justification; Expected outcome</i> <i>(See guidance as per prioritised need 1, above)</i></p> <p>Expansion of RI services to existing health facilities and new facilities whose construction would be completed by end of 2017 as part of provincial plans to increase access to immunization service delivery. More communities would be accessed by these equipped 983 newly equipped and constructed facilities.</p> <p>It is expected that outcome is immunization coverage increase by 3-5% annually in the affected district after provision of equipment.</p> <p>The equipment required to address this priority are as shown:</p> <ul style="list-style-type: none"> • <50ltrs (VLS 200A) – 1,029 units • SDD (ZLF 100 DC) – 427 units
Total CCE Budget:	The budget to cover this need is US\$ 4,743,935 . Government funding US\$ 2,371,967.50 and GAVI US\$ 2,373,967.50
<i>Prioritised (URGENT) CCE need 4:</i>	<p><i>The need; Justification; Expected outcome</i> <i>(See guidance as per prioritised need 1, above)</i></p> <p>Although this category of CCE are in the third priority, they are included in the number in the first 2 years, aligning the 5 years requirement plan to accommodate the remaining 4 years that NISP will expire. For logistics reason bulk of the procurement is planned for the first 2 years.</p> <p>It's been identified that 25% of the cold chain equipment available in the country is a non PQS domestic equipment that affect quality of vaccine stored in them.</p> <p>This priority needs is aimed at replacing some domestic and obsolete equipment in the system with newer and more efficient technology. This would guarantee vaccine quality assurance, contribute to system sustainability, reduction in equipment failures and standardization of CCE and ease of maintenance planning procedure and implementation.</p> <p>The replacement of domestic CCE and introduction of new technology based CCE may not have direct impact on RI coverage but would increase the number of birth cohort with access to quality vaccines This replacement goal would 'sustain' coverage. Therefore, that in itself is beneficial. This is aside ensuring the potency of vaccines and preventing risks associated with temperature excursions</p> <p>The required CCE to replace the domestic and obsolete CCE are summarized below:</p> <ul style="list-style-type: none"> • <50ltrs (VLS 200A) – 1,311 units • 50 – 100ltrs (VLS 300A) – 535 units • >100ltrs (VLS 400A) – 4,559 units • SDD (ZLF 100 DC) – 1,241 units
Total CCE Budget:	Total US\$ 22,736,413. Gavi – US\$ 11,368,206.50 & Government - US\$ 11,368,206.50
GRAND TOTAL CCE BUDGET: 'Initial support' (Years 1 and 2)	<i>Includes Gavi and joint investment share</i> Total US\$ 40,982,026 Gavi (US\$ 20,491,013) and Government (US\$ 20,491,012).

4.2.2 Ongoing or planned activities around other supply chain fundamentals in the initial support phase

In this section, linkages must be drawn between requested CCE Optimisation Platform support, on-going Gavi investments (especially through the Health Systems Strengthening support) and other partner supply chain support.

Describe planned or ongoing activities related to other supply chain “fundamentals” (see section 3 of the Application Instructions) during the initial support phase, including their sources of funding. Responses to this section should be linked to the EVM Improvement Plan.

Supply chain managers

Provide description of all planned or ongoing activities related to improving the availability and performance of supply chain managers, their sources of funding, and partner support.

One of the key recommendations of EVM IP was the establishment of EVM Secretariat embedded within Government system that will provides a platform for the management of entire immunization supply chain agenda. So far five EVM Secretariats have been established in the government systems with the technical assistance of UNICEF. This includes Balochistan, Sindh, KPK, FATA and AJK. Coordinators are being recruited by the respective provincial governments, Similarly, establishment of the EVM Secretariats at Federal level, Punjab and GB is in progress. EVM Secretariat will ensure effective and timely implementation of the cEVM Improvement Plan (cIP) by:

- Monitoring implementation progress against defined programmatic indicators and milestones.
- Communicating and reporting implementation progress to the, National Ministry of Health, National and provincial EPI Program Managers, WHO and Alliance partners
- Drafting a detailed program of activity to implement the ISCL improvement plan with defined milestones.
- Oversight of the implementation of the EVM improvement plan.
- Plan and supervise inputs from short term international and national consultants
- Monitor and report Implementation progress, (EVM/LMIS Dashboard)
- Collaboration with Partners on improving supply chain infrastructure
- Report regularly to the EPI Management, Task Force and Steering Committee
- Provide budgetary oversight.
- Build capacity within EPI to progressively assume management of EVM Improvement plan and plan an exit strategy (36 months).

All levels of Pakistan supply chain management structure do not have defined supply chain managers. The responsibility of supply chain is currently being shared by a combination of personnel within the government system.

The initial source of funding is UNICEF but to be transferred to government system and to be funded through the PC-1s.

Data for supply chain management

Provide description of all planned or ongoing activities related to data for management, their sources of funding, and partner support. In particular, please provide information explaining how improvements to the functionality of logistics management systems will improve the visibility of up-to-date and accurate vaccine stock records at each level of the vaccine supply chain.

One of the major gaps identified to be addressed in the cEVM-IP recommendations was the inadequate data for management system together with human resources. One of the key options identified for ameliorating these challenges were the strengthening of the vLMIS channel for accurate and up-to-date reporting of required information.

The vLMIS is already in operation at the national, 4 provinces, 3 Areas and 83 districts. Plans are on-going to ensure scale-up of vLMIS services to all provinces/districts in the country.

One of the expected outcome of the usage of the vLMIS is the regular updated of cold chain inventory data

and vaccine management information. The cold chain inventory update segment of the vLMIS have not been fully implemented in the current province/districts where it is being operated. Varying reasons have been given why the optimal benefits required from its use have not been derived. Chemonics the new partner responsible for managing the system have been mandated by government to draw up budget and plans to train personnel at the 3 levels of vLMIS operation for rapid scale-up and effective utilization of the tool. Other challenges relating to the vLMIS usage would also be addressed.

The full implementation of the vLMIS would enhance ease of data sharing and availability including information relating to vaccine stock records for prompt attention whenever required and regular and updated cold chain inventory. The real-time availability of data would enable all supervisory levels to intervene or use data for actions to address emerging challenges in good time.

The funding for this scale-up related activities would be financed from the HSS unspent funds.

The planned introduction and use of RTMs for equipment with its advantages will help in improving monitoring mechanism until the use of the vLMIS is optimal

Optimised, efficient design of distribution system

Provide description of all planned or ongoing activities related to distribution system design optimisation, their sources of funding, and partner support.

Pakistan is planning to conduct a temperature monitoring study before the end of 2016 along selected vaccine distribution, transport and storage routes to ascertain quality assurance and take remedial action wherever necessary.

A modelling protocol is currently being designed to be applied to the country's distribution network to determine the most efficient distribution mechanism for implementation. This will be done through a system optimization design process that would model the current system and suggest ways of improving for better efficiency.

Continuous improvement process

Provide description of all planned or ongoing activities related to continuous improvement processes, their sources of funding, and partner support.

The supply chain improvement processes are usually not a one-off activity but continuous observation, review and application of recommendations for system strengthening.

One of such process was the EVMA assessment of 2014 which have resulted in the development of a comprehensive EVM improvement plan for system optimization. The activities recommended to improve the iSCM structure in Pakistan have been costed and part implementation have started with partners support pending when the PC-1s for the provinces would be approved for full scale implementation of key recommendations. The Federal EPI PC-1 Have been approved since March, 2016.

Part of the main recommendation from the cEVM-IP is the establishment of an EVM Secretariat headed by a Coordinator to support existing vaccine management committees to carry out their functions in addition to tracking, monitoring and following up progress on the cEVM-IP implementation as defined in the plan.

Pakistan has been one of the first countries to introduce comprehensive approach to EVM (cEVM) - calling upon the need for blending standard management approaches with continuous improvement processes.

In the context of Pakistan, cEVM means

- Pulling all relevant evidence together into a comprehensive bottleneck / situational analysis
- Assess supply chain
- Developing a comprehensive improvement plan beyond addressing the 9 vaccine management criteria
- Developing multi-year supply chain improvement plan
- Combining "fixing the basics" with planning for the future include with "new ideas" and "new vaccines"
- Taking into account the existing and future challenges
- Aligning to Gavi supply chain strategy
- Improvements funded through HSS
- Supporting for implementation and lastly
- WHO/UNICEF Supply Chain Hub including helping put in place Supply Chain fundamentals

In Pakistan, collaborative engagement of district-level, provincial and national EPI officials in situation analysis, visioning and strategic action planning for developing the EVM IP led to better planning of IPs.

EVM assessment revealed that some vaccines (Penta, PCV-10) could be damaged if frozen during storage and transportation. Pakistan uses frozen icepacks in cold boxes/vaccine carriers to transport vaccines. Using chilled water packs (coolant packs) rather than frozen ice packs eliminate the risk of damage to vaccines in cold boxes and vaccine carriers from freezing.

4.3 Reviewing implementation of initial support activities

Support for approximately years 3 onwards will be contingent on reporting and performance of activities implemented during the initial support phase.

4.4 Scale-up support phase

This second phase of Gavi CCE optimisation platform support will be provided for approximately year 3 onwards.

Provide maximum 3 pages, comprising:

- **2 to 4 prioritised ADDITIONAL CCE needs** as identified in the 'CCE rehabilitation and expansion plan, equipment selection and strategic deployment plan requirements'(see Annex 3 of the Application Instructions),
- **Description** of planned activities related to other supply chain "fundamentals".

4.4.1 Prioritised ADDITIONAL CCE needs

<p>i Items not inclusive of operational cost (Operational costs to be financed by Ministry of Health or other partners)</p>	
<p>Prioritised (ADDITIONAL) CCE need 1: (Required information)</p>	<p>1. The need Please include: Type of activity (e.g. replace obsolete CCE, extend CCE to unequipped facilities, etc.); specific CCE site (facility); type of equipment required; quantity of equipment items. This priority would address cold chain capacity required in health facilities that would be constructed between 2018 and 2020. According to the provincial plans, 634 new facilities would be constructed during this period.</p> <p>2. Justification Please include: Reasons for additional CCE need (e.g. low CCE and/or immunisation (Penta3) coverage area, gender barriers, mobile population, etc.); current CCE and immunisation (Penta3) coverage in the population area. The objective is to achieve equitable coverage in immunization by bringing more facilities closer to the underserved communities.</p> <p>The CCE needs to meet this priority are:</p> <ul style="list-style-type: none"> • <50ltrs (VLS 200A) – 460 units • SDD (ZLF 100 DC) – 174 units <p>3. Expected outcome Please include: Anticipated increase in CCE and immunisation coverage (Penta3); anticipated progress against identified inequity (describe, <u>in alignment with country Performance framework</u>).</p> <p>The provision of CCE in these facilities would sustain the availability of vaccines, create more access to RI services, contribute to building</p>

	confidence in the health system and encourage utilization. The increase in access to RI could contribute to increase in coverage in the affected districts by 2-4% after the provision of equipment.
Total CCE Budget¹⁵:	<i>'Total budget' includes Gavi and country joint investment share:\$(XX)</i> The total budget required to meet this targeted needs is US\$2,018,002 . Government counterpart – US\$ 1,009,001 and Gavi – US\$ 1,009,001
<i>Prioritised (ADDITIONAL) CCE need 2:</i>	<i>The need; Justification; Expected outcome</i> <i>(See guidance as per prioritised need 1, above)</i> It's been identified that 25% of the cold chain equipment available in the country is a non PQS domestic equipment that affect quality of vaccine stored in them. This priority needs is aimed at replacing domestic equipment in the system with newer and more efficient technology. This would guarantee vaccine quality assurance, contribute to system sustainability, reduction in equipment failures and standardization of CCE and ease of maintenance planning procedure and implementation. The replacement of domestic CCE may not have direct impact on RI coverage but would increase the number of birth cohort with access to quality vaccines The required CCE to replace the domestic ones are summarized below: <ul style="list-style-type: none"> • <50ltrs (VLS 200A) – 626 units • 50 – 100ltrs (VLS 300A) – 87 units • >100ltrs (VLS 400A) – 633 units • SDD (ZLF 100 DC) – 326 units
Total CCE Budget:	The total budget for this class of intervention is US\$ 5,046,666 Government counterpart contribution of US\$ 2,523,333 Gavi contribution of US\$ 2,523,333
<i>Prioritised (ADDITIONAL) CCE need 3:</i>	<i>The need; Justification; Expected outcome</i> <i>(See guidance as per prioritised need 1, above)</i>
Total CCE Budget:	\$(XX)
<i>Prioritised (ADDITIONAL) CCE need 4:</i>	<i>The need; Justification; Expected outcome</i> <i>(See guidance as per prioritised need 1, above)</i>
Total CCE Budget:	\$(XX)
GRAND TOTAL CCE BUDGET: 'Scale-up support' (Year 3, 4)	Total cost for scale-up support for (Year 3,4) is US\$ 9,125,650 <i>Includes Gavi and joint investment share.</i> The sharing for government and Gavi would therefore be US\$ 4,562,825 respectively.

4.4.2 Planned activities around other supply chain fundamentals in the scale-up

In this section, linkages must be drawn between requested CCE Optimisation Platform support, on-going Gavi investments (especially through the Health Systems Strengthening support) and other partner supply chain support.

¹⁵Budget not inclusive of operational cost to be financed by Ministry of Health and other partners

support phase

Describe planned activities related to other supply chain “fundamentals”(see section 3 of the Application Instructions)during the scale-up support phase, including their sources of funding. Responses to this section should be linked to the EVM Improvement Plan.

Supply chain managers

Provide description of all planned activities related to improving the availability and performance of supply chain managers, their sources of funding, and partner support.

In addition to the activities described in section 4.2.2, continuous assessment of the supply chain would continue as a priority with a view to re-training supply chain managers for better and efficient service delivery.

Implementation of the EVM-IP would be reviewed periodically and all related activities required to strengthen the supply chain managers would be implemented.

Data for supply chain management

Provide description of all planned activities related to data for management, their sources of funding, and partner support. In particular, please provide information explaining how improvements to the functionality of logistics management systems will improve the visibility of up-to-date and accurate vaccine stock records at each level of the vaccine supply chain.

Review the impact and challenges of the use of the vLMIS for reporting for possible upgrade if necessary.

While emphasizing the use of the vLMIS for data management up to the district level, the mechanism and tools for generating the primary data from the facility upward would be focused while strengthening the feedback apparatus for better efficiency.

Optimised, efficient design of distribution system

Provide description of all planned activities related to distribution system design optimisation, their sources of funding, and partner support.

Review of distribution system after new equipment installation and use the outcome modelling of the supply chain to continue improving the system. The result of the modelling of the current supply chain system redesign will further contribute to the distribution of equipment requested in Section 4.4.1. In addition to the continuous implementation of the recommendations from the temperature study.

The source of funding for implementing this activities would be as described in section 4.2.2 and partners.

Continuous improvement process

Provide description of all planned activities related to continuous improvement processes, their sources of funding, and partner support.

The supply chain improvement process would be continuous through periodic review of equipment maintenance system to identify possible streamlining/enhancements, status the implementation of the EVM-IP and modify activities as required for optimum result.



The use of the vLMIS for feedback and action would be emphasised and outcome used to improve the reporting system.

5. BUDGET TEMPLATES

This section details the number of requested equipment items and equivalent budget. A maximum investment amount (and indicative number of equipment items) corresponding to the phased support request will be considered for recommendation of approval by the IRC and subsequent decision by Gavi.

However, in consultation with the Secretariat and in-country partners, the number of equipment items may be modified when the detailed operational plan is developed subsequent to the Platform proposal and the support may vary within the limit of the approved maximum amount.

Budgets must be completed in the embedded budget template, and with reference to the [CCE optimisation platform Application Instructions](#), [Gavi CCE optimisation platform Technology Guide](#) and [CCE planning prices and TCO analysis tool](#).

<div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; border-radius: 50%; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin-right: 10px;">i</div> <div> <p>Important information: selection of budget template</p> <ul style="list-style-type: none"> • Countries can fill <u>one of two</u> CCE optimisation platform Budget Templates: <ul style="list-style-type: none"> ○ Either budget template number 01; ○ Or budget template number 02 </div> </div>	
<p>CCE optimisation platform-Budget Template 01 (strongly encouraged)</p>	
<p><i>To be filled by countries that have selected generic equipment categories that best suit their CCE needs (e.g. 'ILR 90L' i.e. Not specific model or make).</i></p> <p><i>Planning price ranges are provided in this template.</i></p>	 <p>Budget Template 01 Generic CCE.xlsx</p>
<p>CCE optimisation platform -Budget Template 02</p>	
<p><i>To be filled by countries that have selected specific equipment that best suit their CCE needs (e.g. specific model and make).</i></p> <p><i>Countries will plan with indicative PQS prices and corresponding service bundle estimates (depending on equipment being on/off-grid and estimated costs of service bundle).</i></p> <p><i>Planning price ranges are provided in this template.</i></p>	 <p>Budget Template 02 Specific CCE.xlsx</p>

6. PERFORMANCE FRAMEWORK

Countries must include CCE Optimisation Platform indicators into the Performance Framework for the current and/or proposed Gavi HSS support, after Platform proposal approval.

According to their specific context, countries are required to consider the most appropriate data sources to report on programme implementation and progress against the targets set. This should be discussed with partners (which may provide technical assistance) and the Gavi Secretariat.

Programmatic reporting updates, as well as targets and indicator updates, will be made as part of the Gavi performance framework and annual Joint Appraisal process. Countries are expected to consider relevant smart indicators to be monitored and reported against, in terms of intermediate results or outcomes/impact.

Data sources

The following data sources are examples that countries may want to choose from when establishing performance framework indicators and targets:

- DHIS2
- DVDMT
- HMIS
- WHO/UNICEF joint reporting form (JRF)
- Health facility assessments that include cold chain
- Vaccine stock ledgers
- Wastage reporting tools
- Cold chain equipment inventories
- On-site assessments of equipment functioning
- Routine monitoring with continuous temperature monitoring devices

Indicator monitoring and reporting requirements

As a **minimum**, countries need to monitor and report on:

- **3MANDATORY intermediate results indicators; and**
- **1 to 3ADDITIONAL intermediate results indicator(s)**

MANDATORY intermediate results indicators (must include baseline, data source, targets and frequency of reporting):

The indicators selected are the following:

1. Number of equipped facilities replacing CCE with (any) platform-eligible ILR, SDD or long-term passive devices, and irrespective of their funding source; *the baseline indicator for this is nil as the application platform have not been approved.*
2. Number of facilities previously without equipment, newly equipped with platform-eligible equipment (i.e. ILRs, SDDs or long-term passive devices); *nil baseline indicator.*
3. Proportion of equipped facilities that have functional cold chain equipment (that is, no breakdown, no temperature excursions and preventive maintenance plan up-to-date) *Baseline indicator for this indicator is nil.*

These indicators will be included in the country's performance framework.

ADDITIONAL intermediate results indicator(s): *Countries are required to suggest 1 to 3 intermediate results indicators to track performance of rehabilitation, expansion, maintenance and/or other supply chain fundamentals (include baseline, data source, targets and frequency of reporting):*

Examples of additional intermediate results indicators options are:

The 3 intermediate indicators selected by Pakistan are the following:

1. Functional status of cold chain equipment: Ratio of functional CCE and ratio of districts with at least **90% functional equipment**;
2. Temperature alarms: Frequency and magnitude of heat and cold alarms per monitoring period (i.e., temperature excursion) and number of CCE devices with more than a certain level of temperature excursion. *The baseline information for this indicator is zero as no temperature in reporting is currently being undertaken in all province and district level. Manual temperature recording using stem and dial thermometers are in operation.*
3. Proportion of provinces/districts that have uploaded its updated CC inventory into the vLMIS on a quarterly basis and timely (before end of first month in each quarter). *Presently, no district or province have an updated CCI data in the vLMIS.*

These indicators will be included in the performance framework. These data would be generated and reported as described in *figure 1, section 4.*