Guidance on
Dashboards for Immunization Supply Chains

November 2015

Table of content:

Introduction

As immunization programmes expand, they are increasingly constrained by inadequate infrastructure and suboptimal supply chain systems. Recognizing this, Gavi, the Vaccine Alliance developed a global immunization supply chain strategy to respond to critical bottlenecks hampering the availability of quality vaccines. The strategy aims to strengthen immunization supply chain systems through improvements in five fundamental areas: leadership, continuous improvement plans, data for management, cold chain equipment and system design. This guidance focuses on using dashboards to strengthen data for management.

Supply chain dashboards have long been used to improve performance in both the private and public sectors by visualizing – or making visible representations of – different measures of performance, placing them in context and drawing management attention to areas where intervention is needed. Such visuals enable managers to make informed operational and strategic decisions and to take corrective actions, contributing to a continuous improvement process.

By 2020, immunization supply chains will be required to manage twice the number and four times the volume of vaccine products and devices as in 2010, and the overall cost of a fully immunized child is expected to increase fivefold.

The use of dashboards is already improving supply chains in several countries. In Nigeria, for example, monitoring vaccine stock availability via dashboards increased the percentage of stores with adequate amounts of stock from 34 per cent to 81 per cent. Similarly, in four provinces of Mozambique, the generation of dashboards, alerts and reports led to a reduction in vaccine stock-outs from approximately 35 per cent to below 3 per cent, and increased cold chain uptime from around 40 per cent to above 90 per cent. In India's Karnataka State, the introduction of simple supply chain dashboards and a feedback 'bulletin board' resulted in a better than 62 per cent reduction in the time needed to resolve vaccine stock-outs and minimum stock issues, contributing to a marked increase in vaccine availability.[1]

[1]See Country Case Studies for further information on dashboard use in these three countries.

Guidance objectives, structure and target audience

In immunization supply chains, data too often are collected but not used for action. This guide aims to help in-country managers and staff make sense of the large amount of data they collect and help them prioritize and present critical data in more actionable ways through the use of supply chain dashboards.

Specifically, this guide:

1. Provides guidance on why and how to use dashboards to improve the visibility and performance of in-country immunization supply chains
2. Promotes the use of supply chain data to improve the availability of vaccine products and immunization supplies, their potency and safety, and the efficiency of immunization supply chains
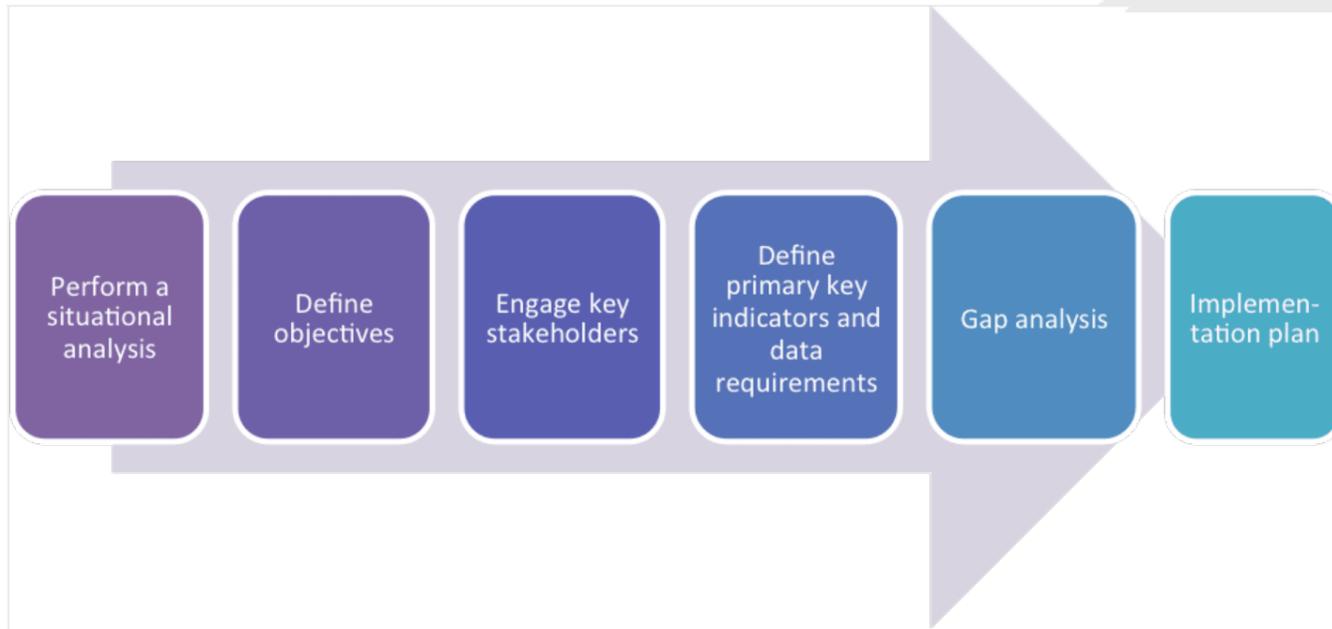3. Establishes primary indicators for monitoring immunization supply chains

To present this information, the guidance first defines dashboards and discusses their utility in the context of national immunization programmes. It then lays out some practical steps to be taken while planning and implementing dashboards in country-specific contexts and explains the process of continuously improving dashboards once they are in use. It also details several primary key indicators whose standardization leads to a common understanding that allows performance to be compared both nationally and internationally. Throughout, case studies illustrate how different countries have handled the introduction of dashboards.

The target audience of the guidance includes representatives of governments, implementing partners and software development companies, and the instruction it offers is meant to be directional rather than prescriptive. It should provide its users with the flexibility to choose the indicators and implementation options appropriate to their particular needs, making it applicable across diverse country contexts and supply chain systems.

How to design and plan for a supply chain dashboard

There is no one-size-fits-all solution when it comes to dashboards. Rather, dashboards should address the needs and priorities peculiar to a particular programme, while taking into account the constraints and limitations of its context. The six steps outlined below can help you plan for using dashboards, but they aim to be merely indicative; additional tailoring is needed in each country to decide the who, what, how and which outputs to produce.

figure 6

| Perform a situational analysis | Define objectives | Engage key stakeholders | Define primary key indicators and data requirements | Gap analysis | Implementation plan |

Supply chain dashboard design and planning process

Step 1: Perform a situational analysis

Before designing a dashboard or assessing how dashboards can benefit a supply chain system, it is useful to take stock of the existing situation first:

1. What are the strong and the weak points of the supply chain? What problems need to be solved? Are there problems with availability, quality or efficiency?
2. What are the strong and the weak points of the existing supply chain management information systems? Assess practices relevant to collection, availability, reporting and use of supply chain data, and remember that meaningful dashboards can often be designed using data already available at different levels.

A situational analysis of the strengths, weaknesses, opportunities and threats (SWOT analysis) should address the information systems as well as the following four key functions in supply chain management:

- Distribution and transportation
- Forecasting and demand planning
- Stock management
- Cold chain management

Information for this analysis can be obtained through a review of the existing information system tools and national supply chain databases (if available), through semi-structured interviews with supply chain managers and other users at various levels of the health system, as well as through a desk review of existing assessments such as:

- Most recent Service Availability and Readiness Assessment (SARA)
- Most recent Effective Vaccine Management (EVM) assessment
- Most recent Extended Programme on Immunization (EPI) or New Vaccine Post-Introduction Evaluation (PIE) review
- Any other reports on immunization supply chain management in country

Step 1 in summary

Who: National-level supply chain manager and information systems focal point at Ministry of Health (at EPI or another body that manages the immunization supply chain); supply chain managers at lower levels. External partner or consultant if necessary.

What: Carry out a desk review and informal interviews with supply chain managers.

How: Obtain and review LMIS tools and data, plus the results of recent assessments listed above. Gather responses to questions about supply chain system SWOT from managers at various health system levels and geographic regions. Synthesize the desk review and interview data to carry out a comprehensive SWOT analysis.

Output: SWOT analysis chart for the supply chain system (overall and by the four key functions) and for the management information system.

Step 2: Define objectives

Once you have better understood the strengths and weaknesses of the supply chain and the existing information system, it is important to prioritize key functions and clearly define the objectives and desired outcomes, that is, how using a dashboard will improve the performance of each function, the immunization supply chain and the overall EPI programme. One approach to prioritizing key functions would be to consider which would contribute most significantly to achieving such immunization programme goals as increased coverage and reduced inequity in access to vaccinations. Alternatively, decision makers may choose to focus the dashboard on what the SWOT analysis reveals to be the lowest performing functions.

Common examples of outcomes from using a dashboard include:

- Lower wastage caused by temperature exposure through better performing cold chain equipment and shorter storage cycles at lower levels
- Higher availability of vaccines at service delivery level through better visibility of stocks and corresponding improvement in stock management
- Fewer temperature alarms of cold chain equipment through better temperature monitoring and timely maintenance and repair of poorly functioning equipment

Note that the outcomes do not have to have specific, quantified targets at this stage; rather, a general indication of how the poor performance can be best addressed through the use of dashboards can suffice.

Step 2 in summary

Who: National-level supply chain manager and information systems focal point at Ministry of Health.
What: Define desired outcomes for prioritized key function(s).
How: Prioritize key functions based on impact on overall EPI programme goals or SWOT analysis. Based on the key weaknesses, opportunities and threats in those areas, draft corresponding outcomes desired from using a dashboard.
Output: Prioritized key functions and corresponding desired outcomes.

Step 3: Engage key stakeholders

Ensuring that key stakeholders are in agreement with the objectives and outcomes expected from using a dashboard is essential for its successful planning, implementation and use. Key stakeholders include end-users at the health facility or district offices and those at the central level who have a role to play in providing financial, technical, political or staff resources to the development and use of dashboards.

- Health workers
- Health facility and service point level staff
- Sub-national health programme managers (e.g., district health officers and local health board members)
- National Logistics Working Group (if applicable)
- Supply chain/logistics department
- Expanded Programme on Immunization programme
- Ministry of Health leadership
- The key stakeholders to involve depend on the context; they commonly include (but are not limited to):
- National-level Ministry of Health programmes and departments
- Health information system department
- Central medical (or vaccine) store
- Sub-national Ministry of Health staff and managers
- Sub-national immunization supply chain focal points (e.g., sub-national cold chain and store managers)
- Health facility managers
- Technical partners from supply chain and immunization-focused international or local organizations present in the country (including United Nations agencies)

The first step in engaging with stakeholders is to obtain their political approval to implement a dashboard and validate the results of the previous steps. This may be done through face-to-face meetings during which the findings of the situational analysis of Step 1 and the objectives and desired outcomes of Step 2

are presented. Once approval has been obtained, key roles and responsibilities can be assigned to relevant stakeholders. These roles can be either unique or repeating. Unique roles are those that relate to the implementation and continued management of the dashboards; they mainly occur at only one, or the central, level, such as the roles of the lead coordinator and members of the technical working group and steering committee. Repeating roles are those required to continuously generate and act on the dashboards; they exist at every level of the health system. Once the dashboards have been fully implemented and their use is considered part of the health workers' day-to-day duties, the unique role responsibilities decrease while the repeating roles remain the same or even increase.

Table 2 lays out some of the most common roles and responsibilities, and the corresponding personnel for each.

	Role	Specific responsibilties	Commonly responsible personnel
Unique	Dashboard planning end implementation lead coordinator	Spearhead dashboard planning, implementation and sustainability, coordinating and keeping all relevant partners and stakeholders accountable	MOH supply chain manager and/or information systems focal point
	Technical working group	Define primary key indicators, work with or improve the existing information system for dashboard implementation and advise steering committee. During implementation, spearhead periodic dashboard review meetings to gather feedback, document issues and revise procedures accordingly	Ministry of Health and partner supply chain managers from all levels
	Steering committee	Make decisions and resolve matters around political, financial and administrative aspects of dashboard planning and implementation	Stakeholders with political or financial interests and partner organizations
Repeating	Data collector	Collect primary key indicator data from identified data sources	Health facility workers
	Data manager	Send data upstream, aggregate data, create dashboards (automatic or manual) and continuously update at the agreed frequency	Data manager at every level
	Supervisor	Provide feedback to peripheral levels and sperhead periodic review meetings to identify poorly performing indicators and take corrective actions	Supervisors and programme managers at every level

Dashboard roles and responsibilities   Click the image to enlarge

[2] This can also be an external consultant or partner leading the effort in partnership with the MOH, depending on the country context.
[3] The specific job title for personnel managing the data at every level varies by country.

To ensure seamless coordination, it is important to identify and provide terms of reference for each member with a unique role. For those with repeating roles, it is enough at this stage to identify the specific job posts that will be affected by dashboards; later, in the implementation phase, detailed training will equip them to properly carry out their responsibilities.

Step 3 in summary

Who: National-level supply chain manager and information systems focal point at Ministry of Health; relevant stakeholders.
What: Identify and engage key stakeholders.
How: Use the above bulleted list as a guide to the most commonly engaged stakeholders, but any other relevant partners should also be involved. Engage them face-to-face (if possible) or by teleconference, presenting the findings of the situational analysis and the outcomes desired from using the dashboard in order to win their political approval. Form a technical working group and steering committee with clear roles and responsibilities.
Output: Political approval, including a specified budget available for dashboard implementation. Terms of reference for the technical working group and steering committee and their individual members.

Step 4: Define primary key indicators and data requirements

After stakeholder approval and validation of the objectives and desired outcomes has been obtained, it is necessary to select indicators, the critical data that will allow managers to use the dashboard to measure performance and take corrective action if necessary. While there are many possible indicators, of varying complexity, it is important to weigh the costs of collecting the data necessary to use them. Accordingly, selection of indicators must strike a balance between level of detail and the feasibility of implementation in terms of both cost and time.

This guidance presents seven primary key indicators (see Table 3) that, if used together, provide a comprehensive overview of the performance of the four key functions of supply chain management (forecasting and demand planning, stock management, distribution and transportation, and cold chain management). A dashboard need not employ all seven indicators: It may focus on one or more of the supply chain functions and use only the indicators pertinent to those areas. A country's specific needs and context will determine whether additional indicators should be used and how dashboards can be tailored to various supply chain levels and users.

table 3

Indicator name	Definition	Purpose
Closed Vial Wastage	Percentage of spoiled closed vial vaccine (due to expiry, freezing, heat exposure, breakage, loss of the accompanying diluent, etc.) in a store or health facility in a particular period compared to the total number of doses managed during the same period.	Measures avoidable wastage related to storage or distribution. Closed vial wastage can reveal practices that need to be addressed.
Forecasted Demand Ratio	Ratio of actual consumption by product during a particular period compared to the consumption forecasted for the same period. Includes vials opened or administered and closed vial wastage.	Used to validate and improve forecasting practices and assumptions (e.g., target population, coverage, wastage) to increase forecasting accuracy.
Full Stock Availability	Percentage of storage points with full availability of all or a selected set of tracer vaccines and immunization supplies over a resupply period. Full availability is defined as no stock-out in the store or health facility at any point during the time period.	Measures the availability of immunization products. Low stock availability can indicate system problems that need to be addressed.
Functional Status of Cold Chain Equipment	Proportion of the overall number of commissioned cold chain equipment (CCE) devices in a particular area operable for storing vaccines at a point in time or over a particular period. CCE is defined as all refrigerators, freezers, passive storage devices, and walk-in cold rooms and freezer rooms designated for storing vaccines.	Measures operational cold chain equipment to identify where maintenance is needed for maintaining vaccine quality. Used for operational purposes, such as updating the maintenance plan, and for strategic purposes, such as to plan for replacement.
On-Time and In-Full Delivery	Percentage of deliveries delivered on-time and in-full (OTIF) with OTIF defined as order fulfilled (store can fill the complete order); on time (order is delivered when expected); and accurate (the correct products are delivered in the correct quantities).	Used to ensure a store's ability to meet the needs of lower level stores, as well as the timeliness and reliability of order deliveries. The indicator can be used to monitor incoming shipments and in-country distribution by the national store or outsourced distributors.
Stocked According to Plan	Percentage of the overall number of health facilities or stores in an area maintaining appropriate levels of vaccine or immunization product stock during a particular time. Stocked according to plan (SATP) is defined as levels between set minimums and maximums.	Used to monitor and manage immunization products and as a warning to avoid stock-outs or wastage. Diversions from the planned stock levels can signal risk of stock-outs or closed vial wastage.
Temperature Alarm Rate	Number of times the temperature inside cold chain equipment exceeds or drops below a reference range. The indicator is applicable where vaccines are stored and during transportation.	Used as a proxy for measuring vaccine potency and safety. Exposure to temperatures outside the reference range indicates a risk of heat or freeze damage to sensitive vaccines.

Alphabetical overview of the primary key indicators   Click the image to enlarge

The calculations and visualizations relevant to each indicator apply differently on the dashboard at each supply chain level, as demonstrated by the case study from Pakistan *(see below)*. A more detailed set of visualization options and potential corrective action to take for poorly performing indicators is presented in the Indicator Reference Sheets published in conjunction with this Guidance.

Planning for immunization supply chain dashboards in Pakistan.

Immunization supply chain dashboards are still in the planning stage in Pakistan, but once they are implemented, monthly data reporting will be turned into multi-level dashboards based on primary key indicators whose selection involved a number of consultations with provincial EPI programmes to identify the data needed to inform decision-making. The critical factor during this process was customizing dashboards to each province according to its priorities, which, in turn, depended on differing challenges and the maturity of the supply chain. Here are some examples of the provincial variations in EPI priorities:

- Khyber Pakhtunkhwa Province: vaccine stock versus utilization
- Punjab Province: stock positions (i.e., full stock availability or stocked according to plan) in service delivery stores (immunization centres) and wastage rates in district stores (Union Council).
- Sindh Province: reporting rate and identification of non-reporting stores, and target versus achieved vaccinations (i.e., forecasted demand ratio)
- National and provincial stores: cold chain capacity versus storage, distribution of antigens and VVM stage status of stock in different cold chain assets

The dashboard will evolve over time as supply chains mature and users advance in their own capacity to digest and analyse data. Therefore, dashboards, and the underlying technology, must be agile enough to evolve. The immunization supply chain dashboards are still to be implemented in Pakistan, but from other commodity groups it is evident that managers and policymakers with access to dashboards make better decisions regarding stock availability, transportation, financing, storage and human resource capacity.

Some considerations for adapting the indicators to individual settings are listed below:

- **Using tracer products or all products:** Indicator performance can be measured for all vaccines and supplies managed by the immunization programme or through a subset of 'tracer' products. Similarly, all stores and facilities or a sample of them can provide data for calculating indicators.
- **Data collection and reporting frequencies:** The appropriate frequency for data collection, reporting and analysis depends on a number of contextual factors, such as the burden of collecting data, how often and how quickly corrective actions can be taken and the frequency of interpreting the dashboards.
- **Target performance:** The visualizations in the Indicator Reference Sheets occasionally state thresholds for good performance. These do not represent recommended thresholds; instead, countries are encouraged to set their own thresholds based on local immunization supply chain performance targets.

Once the primary key indicators have been chosen, the data requirements to visualize them can be documented. The Indicator Reference Sheets include the data requirements and data sources for all seven of the indicators listed in Table 3 above.

Step 4 in summary

Who: Technical working group, including information systems focal point.
What: Define primary key indicators and data requirements.
How: Refer to the Indicator Reference Sheets for detailed descriptions of seven potential primary key indicators, their purpose, system requirements, data requirements and data sources. Examine the indicators that correspond to the previously prioritized key function(s) and revise according to the country context if needed. If necessary, additional indicators can be added to adequately track performance in that area. For each indicator, determine the target figures and data requirements.
Output: List of chosen and revised indicators with specified target figures, as well as data requirements including reporting frequency and data sources.

Step 5: Gap analysis

Having defined the data requirements for the chosen indicators, the country must ensure that the proper tools, records, and data collection and reporting processes exist to satisfy the requirements. Thus, it is necessary to return to the results of the situational analysis undertaken in Step 1 and re-examine the existing supply chain information systems.

In Nigeria, a separate – phone-based – reporting system was introduced in addition to the existing LMIS to provide data for the Stocked According to Plan indicator.

In the United Republic of Tanzania, the development of a new electronic Vaccine Information Management System incorporates data requirements for calculation of supply chain indicators.

Within these systems, both recording and reporting functions need to be carefully mapped out to help identify gaps and processes that can be put in place to acquire the necessary data. Once the gaps have been identified, the difficulty of addressing them with the available resources and any additional burden new procedures might place on health workers must be considered, as demonstrated in the following table:

table 4

		New data collection and reporting processes to address gaps are	
		difficult to implement	easy to implement
Data gaps in the information system are	significant	Reduce the number of indicators or revise them significantly to visualize only the data currently available; plan to address data gaps in the long-term	Reduce the number of indicators or revise them significantly to visualize only the data currently available, or implement new data collection mechanisms and indicators simultaneously; plan to address data gaps and update dashboard whenever possible
	negligible	Revise indicators moderately to visualize only the data currently available; plan to address data gaps when possible	Keep chosen indicators and design dashboard based on the existing information system

Data gaps in the information system   Click the image to enlarge

As shown above, if there is any data gap for the chosen indicators, it is generally recommended that indicators be revised to visualize only the data currently available, and that the data gaps be addressed through more long-term plans. One exception might occur if some of the data gaps are easy to address with the country's available resources and existing processes, in which case implementing both new data collection mechanisms and dashboard indicators simultaneously *(see Nigeria example in box above)* is also possible. Note that introducing new data collection mechanisms does not necessarily entail introducing electronic technology: They can be new paper-based tools.

At the end of this step, the technical working group should choose whether to revise the indicators, and how, as well as a plan to address the data gaps, where necessary.

Step 5 in summary

Who: Technical working group, including information systems focal point.
What: Carry out a gap analysis of missing data sources, revise chosen indicators according to available data, and plan for an implementation of new data collection and reporting processes if necessary.
How: Map out the current information system and compare the data available for the indicators with the data required. Given the amount of missing data and the difficulty of implementing new data collection mechanisms, revise indicators to fit the data currently available and plan for addressing the data gaps in an appropriate time frame.
Output: A list of data sources required for the indicators but not available, a set of revised indicators that could be visualized with the current information systems, and a proposal to institute new mechanisms for obtaining data, if applicable. Any required changes should have a costed plan.

Step 6: Implementation plan

The implementation plan details the activities, tasks, budget and training required to implement the dashboard. There can be two implementation phases, depending on a country's course of action in response to the previous steps:

1. Implementation plan for a dashboard using the existing information systems
2. Implementation plan for new mechanisms (e.g., data collection and reporting processes) necessary to obtain missing data

In both phases, it is important to:

- People, process and technology: Ensure not only that the new tools and technologies are well developed, but that adequate training for the health personnel who will use them is provided for and that efficient processes to integrate them in the existing systems are in place.
- Build on the existing information systems: Make sure key information system personnel are involved, and build on the existing system in an integrated way that adds value and does not create parallel workflow. This may or may not involve personnel from the health ministry's health management information system (HMIS), depending on whether EPI manages its data separately from the larger HMIS.
- Start small, think big: When changes to the processes, tools and workflow are necessary, they need to be developed and piloted first. Because new systems can have heavy resource requirements, pilot them only at certain supply chain levels, and at a small sample of sites, before scaling them up. However, always plan the pilot with the feasibility of scaling up in consideration.
- Monitoring: It is always important to monitor or assess the impact of new systems. Implement proper monitoring not only of primary key indicators but also of process indicators to ensure that usage of new information systems (if applicable) and dashboard is tracked.

Because this guidance is primarily concerned with planning, implementing and using dashboards, more specific guidelines on how to plan for new data collection and reporting mechanisms is not covered here. For this, the information and communications (ICT) guidance 'Planning an Information Systems Project: A toolkit for public health managers[4] may be helpful.

Including dashboard implementation plans in overall EPI programme goals and strategic documents ensures that dashboard implementation remains on the policy agenda, which makes it easier to fully implement a long-term plan for optimized dashboard use as part of an overall supply chain information system improvement plan.

[4]Available at <www.path.org/publications/files/TS_opt_ict_toolkit.pdf>.

Step 6 in summary

Who: Technical working group and steering committee.

What: Develop an implementation plan.

How: Based on the indicators finalized in Steps 4 and 5, draft a plan for implementation of a dashboard as well as for new data collection and reporting mechanisms, if applicable. Aim to pilot dashboards at selected sites and ensure that training and processes around generating and using dashboards are adequate. Consult the steering committee and political leadership for revision and approval.

Output: An implementation plan with objectives, deliverables, specific tasks, milestones and timeline, as well as a budget.

How to implement a dashboard

Implementing a dashboard often involves three phases: **pilot, scale, sustain**.

Step 1: Pilot

The pilot serves as a 'test' of the implementation processes and the dashboard tool undertaken on a small scale or within a limited geographic area. The lessons learned from a pilot can inform key stakeholders when the time comes to scale up the use of the dashboard.

> *Approaches to improve reporting rates*
>
> *In **Nigeria**, local government areas (LGAs) sent health facilities reminders and follow-ups and reached a reporting rate of around 90 per cent.*
>
> *In **Karnataka State in India**, a televised 'bulletin board' showing the performance of different health facilities improved the reporting rate.*
>
> *In **Mozambique**, inconsistent reporting rate led to a shift in reporting responsibility from health facility to field coordinators using tablets for electronic data entry.*

In the pilot phase, it is important to track:

1. Are the processes in place to generate and use the dashboards appropriately?
2. Are facilities or stores reporting in a timely and complete manner?
3. Are the health workers and supply chain professionals adequately performing their tasks?
4. Does the use of dashboards result in performance changes?

The lead coordinator and the dashboard steering committee should review each of the above four areas on a regular basis. Monitoring of these areas should inform changes to the implementation plan, both for the pilot and scaling up.

The specific key tasks in the pilot phase are:

1. **Communicate the detailed workplan** to all stakeholders. The lead coordinator 'owns' the workplan and is responsible for making sure its key milestones are achieved and for identifying potential problems that should be referred to the relevant manager or committee.
2. **Conduct a baseline assessment** to measure the pre-dashboard 'before' state, so that it can be compared with the 'after' state. It is important to measure both the selected primary key indicators (e.g., time taken to respond to a stock-out, full stock availability, etc.) and process indicators related to adoption and use of the dashboards (e.g., reporting rates, percentage of facilities using dashboards, etc.).
3. **Train staff** in using and creating dashboards. Training should focus on the dashboard users (e.g., supervisors and managers), data collectors (e.g., health facility staff or warehouse managers) and data managers at each level. Tailoring training material to the context-specific workflow can improve the usefulness of the training (see How do dashboards support your immunization programme?).
4. **Hold regular dashboard review meetings** with the relevant committees or working groups. It is important to integrate dashboard reviews with the existing structures for management of the supply chain. The review can focus on supply chain performance progress and dashboard use, processes and design. The technical working group should spearhead this effort using key forums or points of entry for dashboard discussions such as:
   - Regular (monthly or quarterly) Expanded Programme on Immunization (EPI) management meetings at national, sub-national or district levels
   - National logistics working groups[5] or sub-national logistics working groups (such as state, provincial or district groups)
   - Regular (monthly or more frequent) health facility meetings

Visualizing data and providing feedback to the data collectors through a dashboard may itself increase the likelihood of reporting, as data collectors see the importance of the reporting and supervisors can focus support to the low reporting sites. It may be desirable to specifically visualize data completeness and/or timeliness on a dashboard, particularly if reporting rates are low or are being targeted for improvement.

[5]Alternate names include Vaccine Management Committee, Cold Chain Working Group, Supply Chain Technical Working Group, etc.

Step 2: Scale

Upon conclusion of the pilot, there should be a decision to scale it up, continue it or stop dashboard implementation. If the decision is to scale the dashboards, it is important to focus not only on their adoption and use but also on

institutionalizing them, so that using them becomes a natural part of health workers' responsibilities – ideally with Ministry of Health policies in place describing how dashboards are to be used by everyone working within the immunization supply chain.

> **Nigeria's Vaccine Stock Performance Management dashboard: 'Pilot' to 'Sustain'**
>
> **Pilot:** Kano and Lagos States were selected for the pilot stage. Weekly dashboards including three indicators were used over an 8–9 month period.
>
> **Scale:** The scale-up stage took 4 months and used a training cascade – from national training of trainers to training of health workers in state stores and then LGA stores – to train staff in data reporting and using the dashboards.
>
> **Sustain:** To reduce manual aggregation, there are efforts to integrate dashboards in the automated warehouse management system. This would reduce the time health workers spend providing data to the dashboards and make it possible to extend the dashboard from

The scale-up phase includes many of the same activities as the pilot, but extends them in terms of geography or of supply chain levels. For example, a dashboard piloted at all supply chain levels in a given district may be scaled to more districts and eventually to an entire country. Or dashboard use may begin at the national level and scale down to extra districts and health facilities.

The key tasks in the scale step are:

- **Continue pilot activities**: It is important to conduct baseline assessments, training and monitoring of reporting rates and performance in all new implementation sites, just as in the pilot phase. Dashboard users from the pilot phase can help to train the new users.
- **Adapt or revise dashboards**: Experience acquired during the pilot phase may prompt changes to the content or the processes surrounding the use of dashboards. Remember to communicate changes to all health workers affected. Additional training might be necessary if changes are extensive.
- **Integration into management systems**: Dashboards should not be viewed as a stand-alone tool but as part of the existing management systems and structures. Integrating dashboards into the existing supervision and management processes is especially critical at the scale-up phase, as the lack of integration leads to parallel workflow and an additional burden on health-care workers at the extended scale (district, provincial, state or national).

Scale can occur over a short or long time frame depending on the complexity of the change and its feasibility (e.g., having the right people, processes, technology and policies in place).

Step 3: Sustain

Once scale has been achieved, the processes surrounding the creation and use of dashboards have been normalized and dashboard use has become part of regular management and oversight procedures. The third step, sustain, focuses on monitoring both how well the dashboards are being utilized and their impact on the wider programme. Areas needing improvement should be identified and addressed continuously. In addition to some of the short-term solutions, long-term improvements to dashboard use and the overall information system can include addressing:

- Data quality and timeliness, assessed through data audits and improved through 1) revision of data collection tools and simplification of data collection, reporting and aggregation processes, and 2) supportive supervision and training to emphasize the importance of data quality.
- The burden of data collection and reporting at the health facility level, which will require identifying and limiting redundant processes through extensive revision of the immunization supply chain recording and reporting forms

Another important way to improve dashboard use in the long-term is to set up feedback loops to communicate performance progress to the health workers who collect the dashboard data. The more they understand how the data they provide are used at higher supply chain levels, the more they can appreciate the importance of their data collector role, which can spark their interest in reporting data of the highest quality. The result is to make data more reliable and actions at each supply chain level more appropriate to the actual situation at lower supply chain levels.

Where possible, automation can support and reduce the burden of data collection, reporting and analysis. It is important to note, however, that technological solutions do not solve dashboard reporting quality, rate and timeliness problems independently. A good principle to follow when considering implementation of technologies is the principle of 'Make it great, then automate'. Once processes and analysis are being routinely followed in the paper-based system, then consider technological adaptations to automatically collect, update or analyse data.

Continuous improvement and sharing experiences

When dashboards are implemented, they are likely to be used initially in challenging and imperfect systems, where their introduction alone will not bring about change. But the use of dashboards can drive a process of identifying problems and supporting change. The dashboard life cycle *(see Figure 7)* illustrates this process of continuous improvement in which change is reinforced and results in new supply chain management behaviours.

figure 7
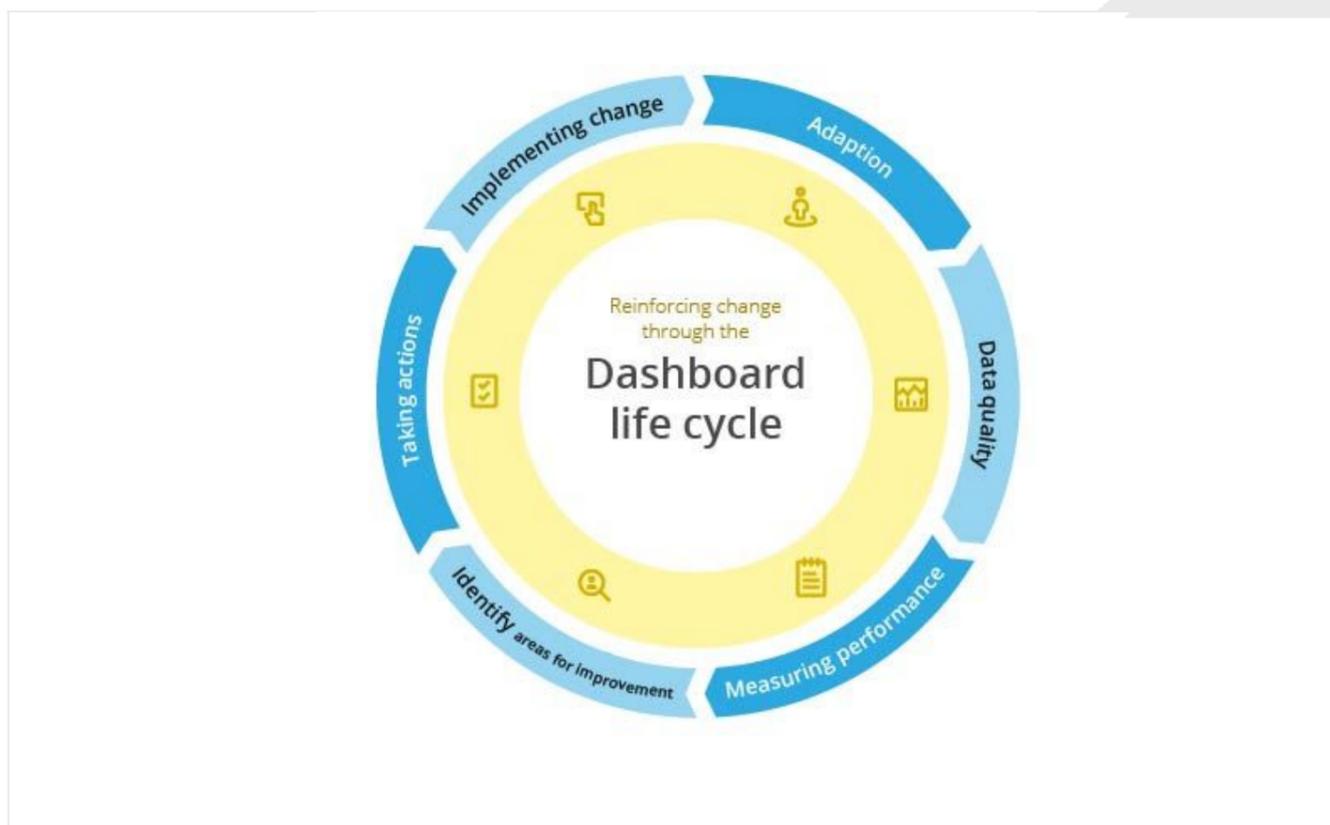
Reinforcing change through the dashboard life cycle   Click the image to enlarge

Because using dashboards for immunization supply chain management is a developing field, many new initiatives are taking place in a variety of countries.

In Karnataka State, the team assessed the number of transactions (indication of adoption and use of new LMIS), vaccine availability (indication of how the supply chain system performed) and log-in to the web dashboard (indication of use of data) When the assessment showed that the expected outcome had not been achieved, a bulletin board was introduced, which led to an increase in the transaction volume and to improved availability. Only the monitoring of the dashboard use highlighted the adaptation problems.

Those piloting such technologies are highly encouraged not only to refer to the publications and websites mentioned in Additional Resources for further reading, but also to share their experiences through knowledge-sharing platforms such as TechNet-21 (available online at www.technet-21.org). On this platform dedicated to the community of immunization professionals, a specific user group has been created to allow for posting discussions, sharing documents and collecting feedback from other colleagues regarding the use of supply chain dashboards.

Conclusion

There is clear potential for countries to use dashboards to improve the functioning of their immunization supply chain systems. The foregoing sections lay out some practical steps country managers can take in planning for and implementing dashboards, and the Indicator Reference Sheets contain valuable information that can help managers obtain a comprehensive understanding of their supply chain system performance. While the content here aims to serve as general guidance, country-specific factors will, and must, tailor the general guidelines to specifics that are more appropriate for local contexts.

Countries interested in implementing dashboards are encouraged to collaborate with relevant partners such as WHO and UNICEF for technical support if necessary. It is hoped that collaborations and partnerships undertaken to improve supply chain management through the use of dashboards will allow all health workers, regardless of location, to readily administer quality vaccines to every eligible child.