



DATA.FI GUIDANCE DOCUMENT

# OVC Electronic Case Management System (eCMS)

## Implementation Guidance

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# Abbreviations

AGYW	adolescent girls and young women
APR	annual program results
ART	antiretroviral therapy
CBO	community-based organization
CRVS	civil registration and vital statistics
DATIM	Data for Accountability, Transparency, and Impact
DREAMS	Determined, Resilient, Empowered, AIDS-free, Mentored, and Safe public private partnership (under USAID PEPFAR)
eCMS	electronic case management system
ICT	information and communication technology
IP	implementing partner
M&E	monitoring and evaluation
MER	monitoring, evaluation, and reporting (indicators)
MIS	management information system
OU	operating unit
OVC	orphans and vulnerable children
PEPFAR	President's Emergency Plan for AIDS Relief
QA	quality assurance
SAPR	semi-annual program results
SNOMED	Systematized Nomenclature for Medicine
SOP	standard operating procedure
TWG	technical working group
UAT	user acceptance testing
UID	unique identifier
USAID	United States Agency for International Development

# Introduction

## 1.1. WHY THIS GUIDANCE?

The United States Agency for International Development (USAID) works in countries around the world to improve the lives of the world's most vulnerable children. In particular, programs supported under the President's Emergency Plan for AIDS Relief (PEPFAR) aim to improve the health and well-being of orphans and vulnerable children (OVC) infected with and/or affected by HIV.

In 2020, USAID, through PEPFAR, published key considerations for an electronic case management system (eCMS). That document is intended as a tool for countries and implementing partners (IPs) to use when developing an electronic case management (information) system, not as official guidance. This document builds on USAID's 2020 "Electronic Case Management System: Key Considerations" and offers implementation guidance not contained in the "Key Considerations" document.<sup>1</sup> This document is also guided by the nine digital principles for development to help integrate best practices into technology-enabled programs.<sup>2</sup>

The effectiveness and success of PEPFAR-supported OVC programs depend on the ability to monitor and evaluate progress, and to ensure IP accountability in achieving outputs, outcomes, and impact, as outlined in the monitoring and evaluation (M&E) frameworks for each program. PEPFAR has developed a set of standard indicators on which each program must report, including indicators tailored for OVC programs—specifically, OVC\_SERV and OVC\_HIVSTAT. The ability to collect, manage, analyze, and use accurate, reliable, and comprehensive data for each indicator is integral to ensuring the effectiveness of interventions and learning what is needed to further increase their effectiveness. The term "MEL," referring to monitoring, evaluation, and learning, is increasingly used to acknowledge the importance of applying learning derived from the M&E process to improve a project.<sup>3</sup>

Accordingly, having systems and tools to facilitate the collection of data is vital. Paper-only systems for collecting performance data and reporting on indicators are prone to data errors and inefficiencies regarding accuracy, aggregation, management, among others. Electronic-based systems can address these challenges that can typically only occur with paper-only systems. For example, electronic systems can efficiently include multiple data sources and can improve access to these data.

## 1.2. IDENTIFY THE GOAL(S) AND OBJECTIVE(S) OF THE ECMS

The first essential task when planning and developing any eCMS is clearly identifying its goal (or goals). This requires some background (formative) research and landscape analysis, following a process for the collection of essential information that will inform the design and development of the eCMS.

A management information system (MIS) collects and manages data to inform and facilitate decision making and is generally used to coordinate, control, analyze, and visualize information. It is important to understand what "case management" is and what constitutes a case management system. An electronic

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<sup>1</sup>Haile, S., Kohler, J., Volle, J., Mendenhall, M., & Bjornholm, S. A. (2020, November). *Electronic case management system: Key considerations*. USAID. Retrieved from <https://ovcsupport.org/resource/electronic-case-management-system-key-considerations-document/>.

<sup>2</sup> Principles for digital development. Retrieved from <https://digitalprinciples.org/about/>.

<sup>3</sup> See also Aqil, A., Silvestre, E., Hotchkiss, D., & Maniscalco, L. *Health systems strengthening: monitoring, evaluation, and learning guide*. (2017). Chapel Hill, NC, USA: MEASURE Evaluation, University of North Carolina. Retrieved from <https://www.measureevaluation.org/resources/publications/tr-17-167c/>; MEASURE Evaluation. (2019). *Using the indicator matrix for monitoring and evaluating programs serving orphans and vulnerable children: Guidance*. Chapel Hill, NC, USA: MEASURE Evaluation, University of North Carolina.

MIS functions as eCMS for children if it collects and stores data in a way that enables users to access and use them while ensuring children's health, safety, and welfare.

The goal of the eCMS can be broken down into three objectives:

### 1.2.1. PEPFAR Reporting

The primary purpose of the eCMS is to support PEPFAR IPs to develop the best possible system for monitoring and reporting on the OVC PEPFAR program—that is, an effective reporting system on PEPFAR indicators relating to OVC and related activities.

PEPFAR-supported projects must submit performance reports on OVC-related indicators which are outlined in PEPFAR's Monitoring, Evaluation and Reporting (MER) Indicator Reference Guide. The MER Indicator Reference Guide includes both OVC-specific indicators and those related to other components of PEPFAR-supported programs. Some of these performance-related data will be input into PEPFAR's Data for Accountability, Transparency, and Impact (DATIM) system, a PEPFAR-specific version of DHIS2 that collects data at all necessary levels of granularity for:

- Facility and community-based site-level reporting
- Sub-national and national aggregations

PEPFAR and other funding agencies and IPs need quality program data to make evidence-based program decisions, such as how to allocate resources. The data collected through PEPFAR reporting are a critical component of PEPFAR's progress toward epidemic control of HIV, and in understanding the primary benchmarks of HIV control: testing and treatment. Quality data collected through PEPFAR reporting provides crucial information such as how many people are being reached by HIV services, what their treatment entails or how effective it is, and where there are gaps in testing, care, and treatment that the PEPFAR program needs to address.<sup>4</sup>

### 1.2.2. Performance Monitoring

The eCMS should be used to collect data to guide program implementers and policy makers in making evidence-based program decisions. While reporting on PEPFAR-prescribed OVC indicators is a primary functions of the eCMS, it also should be able to facilitate and monitor various performance activities and provide indicators not required under PEPFAR but useful to other relevant stakeholders such as national ministries, IPs, or others. See Table 1 under "eCMS Functions" for examples.

### 1.2.3. Case Management

In addition to reporting and performance monitoring, a system can be designed to effectively manage cases of OVC. When an MIS serves this function, it is also considered an electronic "case management" system (eCMS). Users of the data collected on OVC beneficiaries would include not only IPs, community-based organizations (CBOs), and funders, but also on-the-ground case managers and service providers. Case management for OVC is a collaborative process to identify child and family beneficiaries vulnerable to certain risks, assess their needs and strengths to ensure that their rights are being met, set goals together with the child beneficiaries, provide them with direct or referral services and follow-up, evaluate

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<sup>4</sup> PEPFAR. (2019, September). *PEPFAR analytics training: Intro to DATIM*.

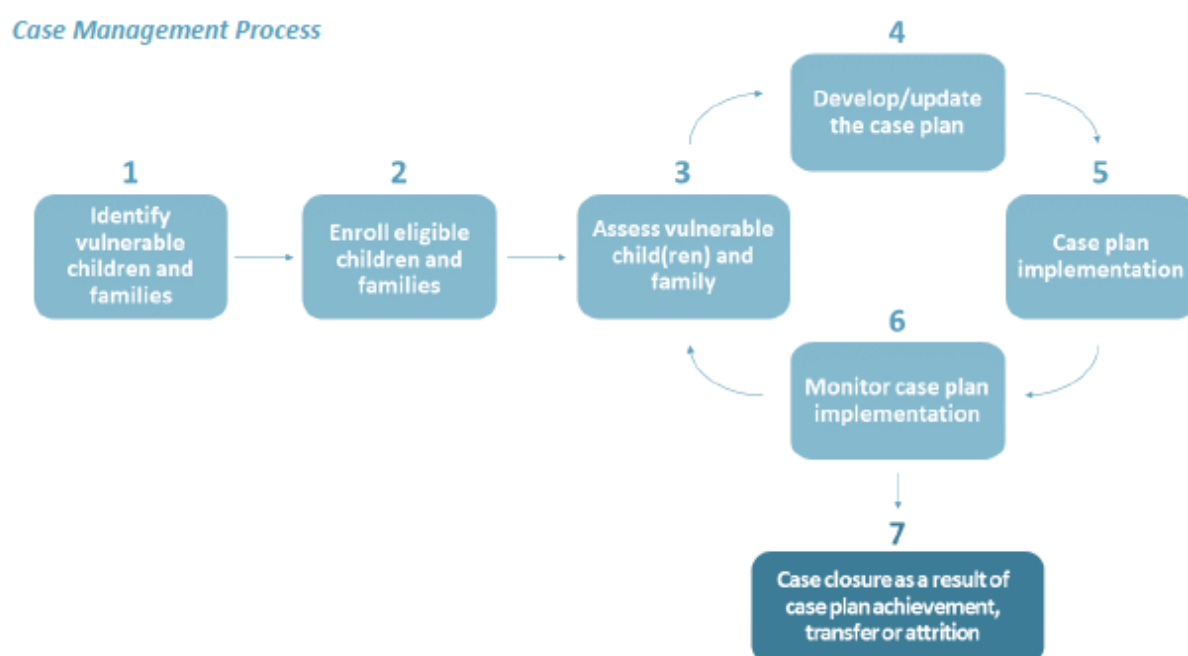


progress, and terminate the case when it has been determined that the family and child beneficiaries no longer need program support.

A case management system goes beyond simply collecting and managing data. An eCMS provides information on the client (in this case, OVC and their family) that allows case managers and other stakeholders to assess the beneficiary's needs and make informed decisions to benefit the beneficiary. Ideally, the case management system provides pertinent information about the beneficiary; facilitates referrals to other service providers for continuity of care; allows users, such as the case managers, to automatically track and follow up on whether the OVC beneficiary accessed essential services; allows case workers to create customized plans for beneficiaries; and allows supervisors to oversee the case managers' performance and beneficiary outcomes.

Although eCMS may be ideal for ensuring the most effective and comprehensive case management of beneficiaries, they also may be costly to design, implement, and manage. Not all the potential functions of an eCMS (identified below in the section, "Review the functions of what an effective eCMS could do") are necessarily required.

**Figure 1. Standard operating procedures for case management<sup>5</sup>**



Source: Catholic Relief Services. (2019). *Standard operating procedures for case management*.

Services for OVC are increasingly provided in a holistic manner, with services from different sectors (e.g., health, nutrition, education, social welfare, birth registration, and others) being tracked, managed, and

<sup>5</sup> For detailed guidance on the case management process, see Catholic Relief Services. (2019). *Standard operating procedures for case management*. Baltimore, MD, USA: Catholic Relief Services. Retrieved from <https://www.crs.org/our-work-overseas/research-publications/standard-operating-procedures-case-management>.

coordinated with each other; in some cases, they complement each other. Ideally, services for a child are not provided without reference to or consideration of other services the child may be receiving. However, coordinating services with different technical sectors—or even within the same sector—can be challenging. Accordingly, there are efforts to look at how eCMS can help expeditiously manage the delivery of services from multiple sectors to children.

### 1.3. CONDUCT BACKGROUND RESEARCH AND LANDSCAPE ANALYSIS

To design a successful, effective, and sustainable electronic eCMS, it will be important to identify and understand all the environmental circumstances (sometimes referred to as the “enabling environment”) that will affect the system, either positively or negatively, and account for those circumstances in the system’s design.

Typical elements of the enabling environment that need to be identified and assessed include but are not necessarily limited to the following:

#### 1.3.1. Laws and policies

The existing laws and regulations in a country will affect how the eCMS is implemented. Therefore, it is important to identify any relevant national policies, laws, and regulations addressing the use of information and communication technologies (ICT), particularly regarding handling of personal identifiable information and health information. Consider from the perspective of all in-country stakeholders (including clients/beneficiaries) and for the range of potential use-cases (including use of data for purposes that may be construed as Human Subjects’ Research according to U.S. or other laws).

Ensuring identification of all relevant policies (including those that may not be specific to digital platforms or health data) involves asking the following questions:

- Are there any relevant **eHealth-specific policies or laws** (e.g., eHealth/mHealth policies) that should be considered?
- Are there national laws and policies regarding **privacy, security, and confidential data**, particularly regarding health data and or any data collected related to vulnerable populations? If so, such provisions may be part of eHealth laws, but they may also be separate policies.
- Are there any policies on **data sovereignty and/or ownership** of the data collected under an eCMS (i.e., who owns the data)? Do national laws and policies specify permitted types of storage for data collected in the country (e.g., are there any limitations on data that may/may not sit on a server outside of the country or in the “cloud”?)
- What laws and policies address **national unique identifier (UID)** systems/policies, including biometrics? This question includes identifying any civil registration and vital statistics (CRVS) system that is in place.<sup>6</sup>

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<sup>6</sup> UNICEF Eastern and Southern Africa. (2020). *Synthesis report: Review of civil registration and vital statistics innovations in Eastern and Southern Africa Region: Digitalization, processes, and strategies*. New York, NY, USA: UNICEF. Retrieved from <https://www.unicef.org/esa/media/6571/file/Review%20of%20Civil%20Registration%20and%20Vital%20Statistics>; Suthar, A. B., Khalifa, A., Yin, S., Wenz, K., Ma Fat, D., et al. (2019). Evaluation of approaches to strengthen civil registration and vital statistics systems: A systematic review and synthesis of policies in 25 countries. *PLOS Medicine* 16 (9): e1002929. Retrieved from <https://doi.org/10.1371/journal.pmed.1002929>; Sahay, S. (2013). *Systematic review of eCRVS and mCRVS interventions in low- and middle-income countries*. Geneva, Switzerland: World Health Organization, p. 24. Retrieved from [https://www.who.int/healthinfo/civil\\_registration/crvs\\_report\\_ecrvs\\_mcrvs\\_2013.pdf?ua=1](https://www.who.int/healthinfo/civil_registration/crvs_report_ecrvs_mcrvs_2013.pdf?ua=1).

- Are there any **research policies or regulations** (including guidelines governing utilization ethics committees or institutional review boards) for data analysis or use that may be defined as research (including, but not limited to analysis of performance monitoring data or granular data to produce generalizable results)?
- Are there policies regarding **consenting procedures** (from clients/beneficiaries) prior to data collection and/or for any previously **unintended use(s)** after collection?
- Are there other policies or national plans, including **OVC national plans and OVC M&E plans** or social protection frameworks, specifically addressing OVC and/or children such as a minimum or essential package of services? How are OVC defined within these national policies and plans?

### 1.3.2. M&E Frameworks, indicators, and reporting requirements

M&E frameworks, indicators, reporting requirements, and other relevant data need to be reviewed and considered to identify how they may inform the development of the eCMS.

- Are there any existing M&E frameworks/reporting obligations that need to be incorporated? (Consider review of host government guidance on integration with relevant M&E frameworks and/or platforms.)
- Have the PEPFAR-required indicators (see MER Guidance) been appropriately incorporated into the M&E framework? Are there other relevant indicators that need to be incorporated, such as graduation benchmark achievements?
- Do beneficiary needs assessments or other survey-related data of beneficiaries exist that can be stored and used for analysis in this eCMS?

### 1.3.3. Stakeholders

Stakeholders may include both eCMS users and those who benefit from it, such as the following:

- Ministries at national and sub-national levels are key stakeholders because they are responsible for ensuring that any programs delivered to these vulnerable populations are effective; as are ministries that work in any area that could impact children, such as health, education, social welfare, etc. It is important to understand what information systems they currently maintain and if memoranda of understanding are in place to facilitate bidirectional referrals and information sharing. The eCMS should provide them with key data for decision making.
- The PEPFAR operating unit (OU) provides country-level oversight of the PEPFAR program for that specific country. The PEPFAR OUs, as stakeholders in the eCMS, house the data to be reported to PEPFAR, and these data can be used in resource allocation decisions and program guidance.
- Implementing partners include all partners working in the country with OVC, adolescent girls and young women (AGYW), or other vulnerable populations. These IPs provide essential PEPFAR services and need the eCMS to monitor their beneficiary population and the implementation of their services.
- Local CBOs include any local organizations implementing or facilitating the implementation of OVC project activities. They are key stakeholders in any eCMS as they are responsible for ensuring their data are entered into the system and they need to use the system to help track their beneficiaries and organizations' performance.

- Caseworker cadres include any and all personnel (most likely with a CBO) working directly with OVC to ensure that OVC receive quality services. They are key contributors to, and users of, the data that are entered into the eCMS. Caseworkers should understand why they are collecting information, and how the data they collect will be used to ensure a sustainable eCMS, and how to use the data within the system to best track their beneficiaries' and households' well-being.
- OVCs, their caregivers, and household members are also stakeholders of the eCMS, as the system can help ensure that they receive essential PEPFAR services to meet their needs.
- Other donor stakeholders include any other organizations and entities providing financial and other types of support to OVC beneficiaries. They are key stakeholders in the eCMS, as the system can help them understand the characteristics of the beneficiaries and the services they are receiving to better design their programs.

#### 1.3.4. Services

What are the different services being provided as they relate to HIV and OVC well-being? It is important to look at all levels of the geographic and political hierarchy—national, provincial, district, village, etc. Who are the service providers, and have they been mapped out to identify who delivers which types of services? Likewise, is there documented information on the capacity of these service providers? These service sectors could include the following:<sup>7</sup>

- HIV clinical services (access to testing, including index testing and prevention of mother-to-child transmission, treatment, adherence counseling, viral load testing, tuberculosis screening and treatment, etc.)
- Birth registration and other types of CRVS
- General health services (illness management, vaccinations, etc.)
- Psycho-social support (counseling)
- Social protection—cash transfers, economic strengthening interventions (livelihoods) and labor market programs, social and other types of insurance, vouchers, in-kind transfers (e.g., school feeding), public works programs, fee waivers, social care services
- Education (including early childhood development)—support to improve literacy among target beneficiaries (reading and using technologies), support for access to education such as fees, uniforms, resources, and direct services such as tutoring and academic support
- Food security/nutrition—routine access, either through direct distribution of or referral to sources of adequate food support to avoid hunger and undernutrition
- Water, sanitation, and hygiene (WASH)—access to safe water, soap, and disposal of refuse
- AGYW-specific services—HIV prevention education, gender-based violence support services, economic strengthening interventions, sexual and reproductive services, etc.

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<sup>7</sup> See also See PEPFAR. (2020, September). *Monitoring, evaluation, and reporting indicator reference guide*, MER 2.0 (Version 2.5). OVC\_SERV Guidance, pp. 57-64; Appendix E- "Illustrative Eligible Services for Active Beneficiaries (Children and Caregivers)", pp. 237-239. Retrieved from <https://www.state.gov/wp-content/uploads/2021/01/FY21-MER-2.5-Indicator-Reference-Guide.pdf>.

- Child protection and social welfare—prevention and response to child abuse, neglect, and exploitation

### 1.3.5. Existing MIS Systems

Existing infrastructure may include a mix of host-government platforms, donor-funded project platforms, and organization-specific platforms.

Per the USAID vision of leveraging global goods, the emergence of a new “digital health agenda”—a global consensus that a more coordinated and country-led approach to investments in digital health technologies is necessary—finds support in several reports published by development, industry, and government entities. To this end, rather than starting from scratch, instead evaluate whether local and/or global electronic MIS platforms are already available which are suitable and feasibly adaptable for the planned eCMS. Local electronic MIS platforms could include those supporting social cash transfers, CVRS, and individual electronic medical records. How can investments in these systems be leveraged rather than duplicated? To ensure the former, it is necessary to do the following:<sup>8</sup>

- Engage with the open-source community and local partners to identify existing or planned systems, products, standards, metadata, and data that may be reused, harmonized, interoperable (exchange information without any additional configuration or middleware), or integrated to achieve your goals.
- Assess the ease with which the technology used by the identified system(s) can be adapted to your local context and needs.

### 1.3.6. Infrastructure and ICT Skills

Understanding the ecosystem involves gathering data on the infrastructure where the eCMS will be used and on the skill sets of the intended users. The outcome of this exercise should inform planning of the supporting hardware and software and any capacity-building to be undertaken.

Consider the environment of the people who will be using the information system. How will users enter data? Will they need handheld devices or laptops or desktops? Are reliable electricity and Internet available, particularly in rural areas? Do users have places to safely store the equipment they use to access the system? How is the mobile phone coverage in the targeted areas? These factors affect the confidentiality, integrity, and availability of information systems and the data they hold.

Identify whether there exists the necessary skills in-country to support, maintain, and adapt the technology. This can be done by conducting a capacity assessment to identify the training and technology literacy of intended implementers and users, and then design the eCMS for and with intended users to ensure their context does not compromise data security and privacy.

### 1.3.7. Gap Analysis

Has a gap (or bottleneck) analysis of the current or anticipated challenges in implementing the PEPFAR OVC project been performed (and is it available)?

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<sup>8</sup> USAID. *A vision for action in digital health 2020-2024: Accelerating the journey to self-reliance through systematic investments in digital technologies*. Retrieved from [https://www.usaid.gov/sites/default/files/documents/USAID-A-Digital-Health-Vision-for-Action-v10.28\\_FINAL\\_508.pdf](https://www.usaid.gov/sites/default/files/documents/USAID-A-Digital-Health-Vision-for-Action-v10.28_FINAL_508.pdf).

If not done already, identify and evaluate gaps, challenges, and obstacles (sometimes referred to as “bottlenecks”) in the project that will be the primary user of the eCMS related to access and the delivery of quality services to OVC which the case management functions of an eCMS can potentially address. Examples might include a lack of awareness within the community of what types of services exist, how they can be accessed, and referral information related to those services. Ideally, the gap analysis can inform the requirements of an eCMS. Program specialists working collaboratively with eCMS technology specialists can design the eCMS to best address the issues identified. However, remember that technology is only an enabler; it will not substitute for or remedy an inherent flaw in program design.

## 2. Planning

Planning should be conducted as a participatory exercise for all stakeholders, including beneficiaries.

### 2.1. REVIEW THE FUNCTIONS OF AN EFFECTIVE ECMS

The types of activities an eCMS can perform are sometimes broken down into generic “functions.” They can range from simple data collection and management to more sophisticated functions, such as decision-support algorithms for caseworkers. Although the term “case management” can be interpreted in many ways and include different functions, experience with case management in the fields of health (including HIV and AIDS) and child protection has informed the identification of some characteristics of a high-quality eCMS.

Figure 2 visualizes potential eCMS functions with their corresponding system objectives. Determining which functions should be incorporated into the eCMS will depend on its goals and requirements, and all stakeholders should take part to identify these. Selection of functions for an eCMS could also depend upon who will be the intended users, PEPFAR OVC reporting requirements, and the nature of its goals (for example, if they include performance monitoring and more complex case management functions; see below). These different goals can sometimes appear to be incompatible (for example, an individual-level case management system used by caseworkers is not always easily aggregated for PEPFAR reporting purposes); however, effective planning can resolve these issues in the design process. The scope of the functions selected depends on the availability of financial and human resources (for design, implementation, and management).



**Figure 2. eCMS functions with corresponding system objectives**



### PEPFAR reporting



### Case management



### Performance monitoring

- Captures OVC and household identification information
- Registers and enrolls beneficiary households
- Captures beneficiary assets, strengths, needs, and goals from a vulnerability assessment or similar
- Captures data from the HIV risk assessment
- Groups beneficiary households at the district level
- Captures direct service delivery to beneficiary households
- Captures referrals and referral completion for beneficiary households
- Allows for interoperability with other information systems, including clinical health/HIV systems
- Captures progression of beneficiary households on meeting the minimum required benchmarks for graduation
- Captures beneficiary exits from the program
- Ensures nonactive beneficiaries are excluded from MER indicator calculations



### Case management

- Maps the locations of local OVC services, including the availability and capacities of nongovernmental organizations and service providers
- Helps match OVC beneficiary households with needed services
- Captures household and beneficiary goals, and actions needed to meet those goals in a case plan
- Tracks information on who (name of caseworker, etc.) provided direct services to OVC beneficiaries
- Monitors all steps in the referral process; tracks all services for which referrals were made and all services accessed due to a referral, including which organizations provided specific services and when
- Schedules appointments between OVC beneficiaries and others (e.g., case workers or service providers, etc.)
- Sends reminders to OVC beneficiaries and case workers about appointments and services that need follow up
- Includes caseworker decision support tools and job aids
- Maps the locations of beneficiary households at the sub-district level (e.g., ward, local government area, or village)



### Performance monitoring

- Tracks performance against targets displayed in graphs and disaggregated by organization or caseworker (including tracking of caseworker caseload)
- Generates line listings of beneficiaries requiring services (monitoring visits, HIV referral completion, intervention following incident report)
- Enables feedback mechanisms for tracking client satisfaction
- Allows community monitoring of program quality
- Maps the locations of beneficiary households at the sub-district level (e.g., ward, local government area, or village)



## 2.2. PLAN FOR PRIVACY, CONFIDENTIALITY, AND SECURITY NEEDS

A plan to safeguard the data security, privacy, and confidentiality should be prepared before starting the eCMS development.<sup>9</sup> It can also be adapted as the eCMS is being developed and adjusted once the system is ready for use to work with any changes in the original plan. It is important to keep the data safeguarding system up to date. “Security” refers to the technology infrastructure that protects sensitive information; “privacy” refers to the beneficiary’s right to control what data are collected, used, and shared about them; and “confidentiality” refers to the obligation to keep sensitive information private. Account for the following factors when developing this plan:

### 2.2.1. Governance

The eCMS collects personal data, and several compliance regulations govern the management of personal data regardless of the type or volume. Based on the landscape analysis of global best practices and in-country laws and regulations that govern data security and data privacy (if any), identify the requirements for data storage, sharing, access, transmission, and disposal. Identify enforcement, sanctions, and consent procedures for collection and use of personal information. Develop a mechanism to monitor how these requirements are implemented at the conceptual, implementation, and post-implementation stages, and to build the capacity of all stakeholders on these requirements.

### 2.2.2. Technology

Technology, including hardware, software, databases, and networks, comes in many shapes and forms and protects data from a growing number of threats. The technologies used for the eCMS should focus on safeguarding its data from intentional or accidental destruction, modification, or disclosure. To achieve this, draft a detailed security protocol specifying which data are captured and stored, the encryption algorithms used during storage and transfer (symmetric database encryption that uses a private key to make data unreadable before decryption, or asymmetric database encryption that incorporates both a private and public key), backup procedures, who will have access to which data, and disposal procedures for sensitive data. Plan how UIDs will be stored/managed. If biometrics play a role, determine how they will be secured.

### 2.2.3. Infrastructure and Data Storage

A solid data security strategy requires a balance between the functionality and security of the operating systems (computer and mobile). Decide whether mobile devices used with the eCMS will be personal or project-owned; list the common security risks to the devices, where the data will be stored (on a device, server, or the cloud), and what measures will be needed to secure the network for data transfer.

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<sup>9</sup> See, e.g., Spigel, L., Wambugu, S., & Villella, C. (2018, January). *MHealth data security, privacy, and confidentiality: Guidelines for program implementers and policymakers*. Chapel Hill, NC, USA: MEASURE Evaluation and USAID. Retrieved from <https://www.measureevaluation.org/resources/publications/ms-17-125a.html>.

## 2.3. STAKEHOLDER ANALYSIS AND MAPPING

At each phase of development, proactively engage stakeholders identified during the landscape analysis. Determine how the stakeholders will be engaged and governed (including considerations for different owners of the system—government vs. donor/IP). Be sure to identify and include all stakeholders who will be using the eCMS to let them participate in the conception and design of the system. Including them will ensure a truly participatory exercise and instill a sense of ownership in the process. Determine a process—detailing the steps—on exactly when and how each relevant stakeholder can provide input into development of the eCMS, including ensuring transparent processes and considering multiple stakeholder meetings and signoffs on specific steps in the development process.

Identify the dynamics among stakeholders (interests, knowledge, positions, alliances, resources, power, importance) and the roles and responsibilities of stakeholders, including access to confidential OVC case information.<sup>10</sup>

### 2.3.1. Establish an OVC Data Systems technical working group

A technical working group (TWG) of representatives from selected stakeholders can help achieve greater impact by coordinating efforts, systems, and resources, with the goal of steering the eCMS governance and sustainability. The TWG can then establish subcommittees to handle different aspects of the system, such as M&E, capacity building, ICT, and data use, among others.

To form an effective TWG, take the following steps:

- **Define the scope.** Define a clear scope for the group, including the deliverables to be produced. Explain why a collaborative approach will increase the impact. Break down the scope in the roles each sub-committee will undertake.
- **Identify existing groups.** Drawing from the stakeholders, consult existing forums and assess their purpose, membership, and activities. Adopt a group or groups aligned with the eCMS. Alternatively, form a new group if no relevant groups exist.
- **Identify members.** Ensure you select individuals with a shared vision of success for the working group. The individuals need to have different, complementary, and relevant skill sets and be available to actively participate in the group. The group membership should represent a matrix of all key stakeholders.
- **Define roles and responsibilities.** From the stakeholder profiles, develop a stakeholder responsibility matrix. The matrix defines their roles—who is responsible, who is to be informed, who is to be consulted, and who is accountable—and the resources required. The group should have both legislative and administrative roles.
- **Develop a schedule.** The schedule should contain the agenda for the meetings, documentation, and progress monitoring.

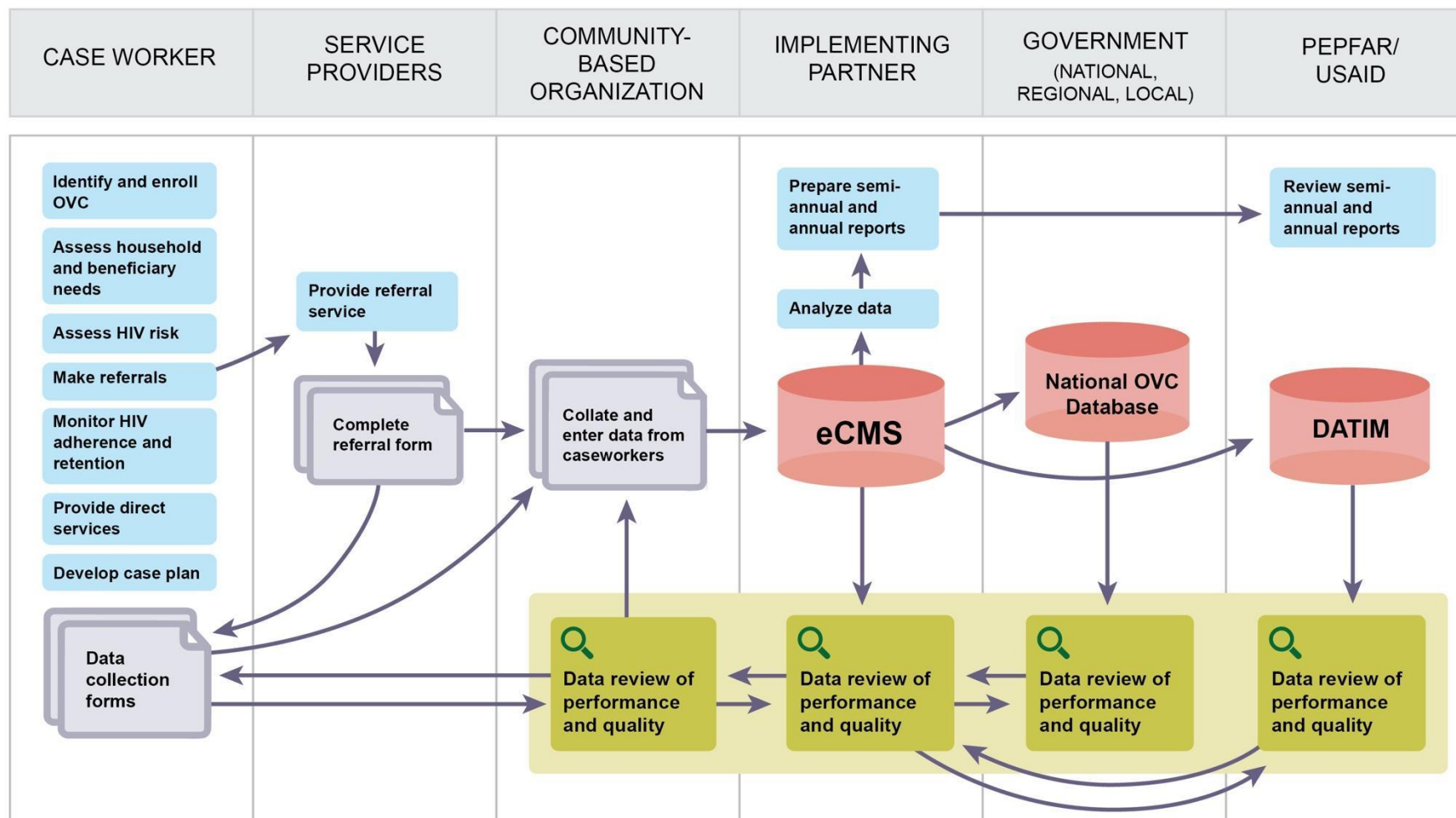
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<sup>10</sup> See, for example, Spigel, L., Wambugu, S., & Villella, C. (2018, January). *MHealth data security, privacy, and confidentiality: Guidelines for program implementers and policymakers*. Chapel Hill, NC, USA: MEASURE Evaluation and USAID. Retrieved from <https://www.measureevaluation.org/resources/publications/ms-17-125a.html>.

## **2.4. CONSTRUCT A “BUSINESS PROCESS” INFORMATION AND WORKFLOW DIAGRAM WITH THE STAKEHOLDERS IN A PARTICIPATORY EXERCISE**

As part of this process, it is important to develop an information workflow diagram with the participation of the key stakeholders outlining the flow of information from caseworkers all the way to PEPFAR. It is necessary to determine how the reporting requirements and data collection tools previously identified in the planning phase will be incorporated into the eCMS, and how the eCMS will support efficient data collection, collation, and reporting and assist in decision-making. See Figure 3 for an example of an information workflow diagram for an illustrative PEPFAR OVC program using paper data collection forms and a program-managed eCMS.

Figure 3. Example information workflow diagram



## 2.5. DEFINE COSTS ASSOCIATED WITH DEVELOPING AND SUSTAINING AN ECMS

Many ICT solutions, including eCMS, often fail even after an initially successful launch because there is no implementable sustainability plan. To help ensure the long-term sustainability of the eCMS, calculate and plan for technology costs beyond the initial deployment.

A plan should be developed that outlines the long-term costs and how those costs will be covered. Reliance on one or more donors to cover long-term costs is not a feasible option. Costs are not limited to financing, but also include human costs, such as personnel salaries and training of data collectors, data analysts, and other personnel, to maintain the system. Cost breakdowns generally cover the following categories (which should include both financial costs directly associated with the eCMS and staff level of effort) and are included in Table 1 below.

**Table 1. Costs associated with developing and sustaining an eCMS**

Phase	Costs
Planning	<ul style="list-style-type: none"><li>• Background research and mapping business requirements</li><li>• Stakeholder workshop to assess workflows</li></ul>
Development & pilot	<ul style="list-style-type: none"><li>• Design and development</li><li>• Configuration and testing</li><li>• Pilot (and updates to configuration)</li></ul>
Procurement	<ul style="list-style-type: none"><li>• Procurement of hardware, including mobile devices if needed.</li><li>• Server hosting and data storage</li><li>• Software license(s) if any</li></ul>
Training	<ul style="list-style-type: none"><li>• Development and dissemination of training materials</li><li>• Training workshops.</li><li>• Training of new staff</li><li>• Refresher trainings</li></ul>
Launch & rollout	<ul style="list-style-type: none"><li>• Launch event/workshop</li><li>• Rollout implementation</li></ul>
Maintenance	<ul style="list-style-type: none"><li>• Technical support and maintenance.</li><li>• Continuous updates to configuration in response to program changes or server/platform upgrades,</li><li>• Continued software license(s) if any</li></ul>
Transitioning	<ul style="list-style-type: none"><li>• Creation/handover of governance structures</li></ul>

## 2.6. REQUIREMENTS (FUNCTIONAL AND NONFUNCTIONAL)

### 2.6.1. Develop the eCMS requirements specifications

Software requirements are detailed descriptions of business and user needs as functional and nonfunctional requirements. Functional requirements define what the system does or must not do, whereas nonfunctional requirements define design constraints as well as quality attributes that the system will need to meet, such as performance, security, installation, availability, safety, and usability.

The eCMS functions in Figure 2 provide a guide on the requirements of a standard eCMS. The next step is to build on these functions to elicit, analyze, specify, and validate the requirements of the eCMS. This can be done by following the guidance below. As part of developing the requirements it is necessary to follow four processes: elicitation, analysis, specification, and validation. In *elicitation*, identify the sources of requirements—the stakeholders identified during planning—and solicit requirements from them. Solicitation can be done through desk reviews of their operations, workshops, key informant interviews, focus group discussions, direct observations, surveys and review of existing documents, and data collection tools. Undertake *analysis* with the stakeholders on the trade-offs among requirements to establish their relative importance, which will inform the priorities allocated to requirements. *Specification* involves differentiating and documenting the functional and nonfunctional requirements in a specific order so the development team can understand them. Undertake *validation* with the stakeholders to ensure the specifications satisfy their needs.

In the context of eCMS, **functional requirements** might include the following:

- The eCMS must be able to generate monthly reports that include each of the relevant PEPFAR OVC-related indicators, including but not limited to the numbers of OVC served and the types of services provided to them.
- The eCMS must include an authentication feature that permits only previously authenticated users.
- The eCMS must have an audit tracking feature that tracks users and user time spent accessing the eCMS.

**Non-functional requirements** can be classified into:

- **Performance and scalability.** Defines how fast the system returns results and how much this performance will change with higher workloads.
- **Portability and compatibility.** Defines which hardware, operating systems, browsers, and their versions the software runs on. It also defines how other applications and processes running in these environments will be affected.
- **Reliability, availability, maintainability.** Defines what are critical failures and how often the system experiences these failures. It also defines how much time it is available to users when downtimes occur.
- **Security.** Defines how the system, and its data, is protected against attacks.
- **Localization.** Defines how the system matches local specifics like language, date, and time stamps, etc.
- **Usability.** Defines the easy of using the system.

Examples of **non-functional requirements** might include the following:

- Report data should be presented in a table with four columns, labeled with the headings X, Y, and Z, and using Arial font.
- Authentication to enter the eCMS should require typing in a unique username and password.
- The audit tracking feature should run automatically once a week.
- The system should have a scheduled auto-backup feature.
- The system should be accessible from different screen sizes, such as mobile devices and laptop and desktop computers.
- The system should have built-in self-help features.

### 2.6.2. Define interoperability requirements and standards

Interoperability is the ability of a system to allow different software applications to exchange data via a common set of business procedures, and to read and write the same file formats and use the same protocols.

To define your interoperability requirements, identify all related systems, including any health/clinical-related electronic medical records (e.g., DHIS2, Open MRS, etc.), education, social welfare, nutrition, CVRS, DATIM, or other systems that need to exchange data with the MIS. Multiple technical sectors need to be involved in determining the requirements and standards, and this will require specialists and ministries from each of the technical areas.

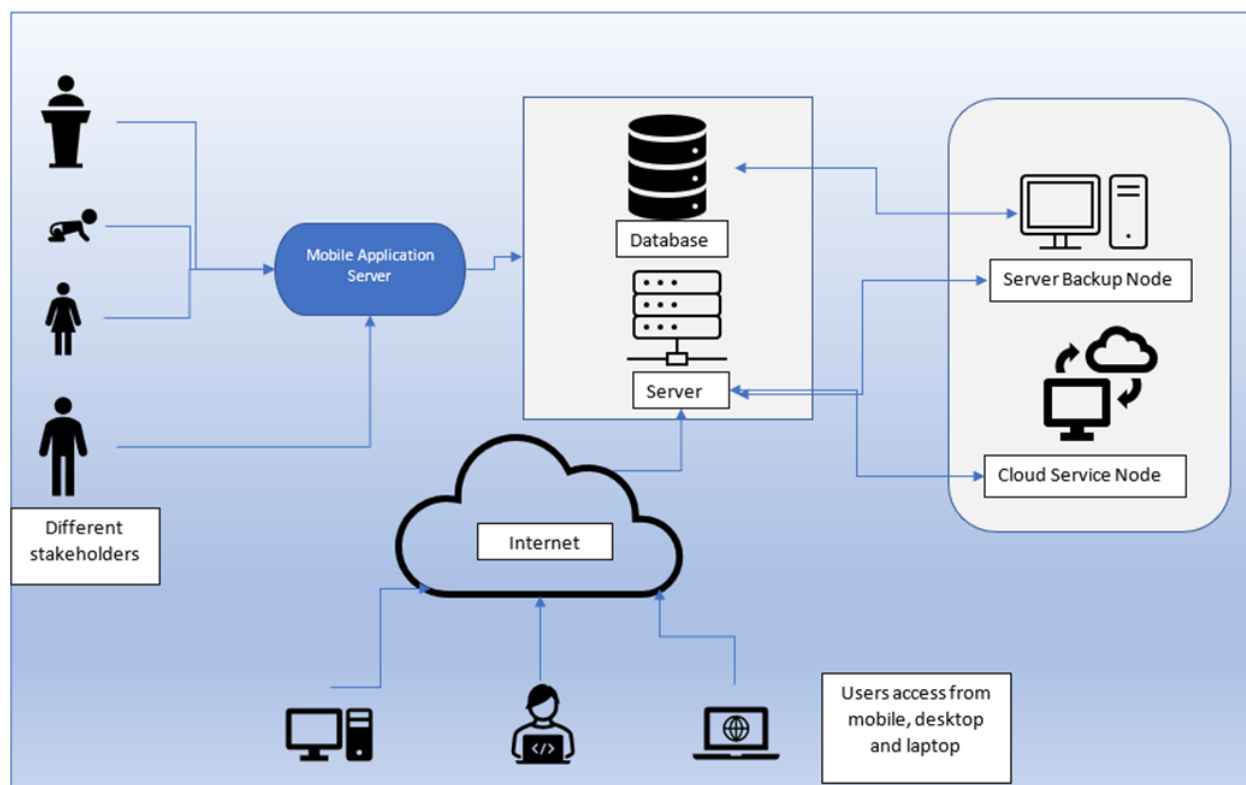
## 3. System Design

Based on evidence and best practices, USAID, the World Bank, UNICEF, and a number of other stakeholder organizations involved with the delivery of services to OVC (and others) have agreed on several fundamental principles<sup>11</sup> that should be incorporated into any technology design.

### 3.1. DEFINE SYSTEM ARCHITECTURE

System architecture defines where specific software components are placed, depending on the speed and reliability needed. Because the eCMS is intended for multiple stakeholders who may need access to it from different locations with varying infrastructure, a client-server architecture—with the three layers of interface, processing, and data—is recommended. In this architecture, the **interface**, also called presentation layer, constitutes the front end of the application which end users interact with. The **processing** or application layer controls the core functionality of the system by performing the detailed business logic. The **data** layer houses the database servers where information is stored and retrieved. Figure 4 shows what a system architecture could look like. In the figure, stakeholders can access the eCMS through mobile, desktop, or laptop via the Internet. The system resides in a server that has both a database and web server. This can be located in either the cloud, or at the ministry of social development etc. in a country or IP servers.

Figure 4. Example of system architecture



<sup>11</sup> Principles for digital development. Retrieved from <https://digitalprinciples.org/about/>.



## 3.2. DESIGN FOR REPORTING INDICATORS

### 3.2.1. Indicator development for PEPFAR MER reporting

The design of information systems should be guided by needs of end users, with the aim of ensuring they can track indicators for PEPFAR (MER) reporting, performance management, and/or case management, as appropriate. In particular, the development of MER indicators OVC\_SERV and OVC\_HIVSTAT require significant scripting logic. In addition, the MER indicator set is updated annually. Thus, the use of commercial, “off-the-shelf” case management software is not possible if the system is to be used for reporting to PEPFAR, given both the complexity of indicators as well as the frequency of substantive updates. Below we discuss configuration recommendations for OVC\_SERV and OVC\_HIVSTAT.

#### OVC\_SERV configuration recommendations

To calculate OVC\_SERV, the eCMS will need to capture information on the type of beneficiary: comprehensive, DREAMS only, or preventive only. Depending on how the eCMS is designed, beneficiaries should be differentiated between those who receive only one type of service and those who receive two or more services. For “comprehensive beneficiaries served by PEPFAR OVC programs for children and families affected by HIV” (which reports beneficiaries disaggregated into the following categories: active, graduated, transferred, and exited without graduation), several sub-indicators are needed to capture the complexities involved (See Annex 12.1).

*Sub-indicators needed for “Active”:* To identify the comprehensive beneficiaries meeting criteria for being considered “active,” a series of sub-indicators must be developed to identify those with current case plans, monitoring visits, and qualifying services. Moreover, these criteria vary between the < 18 population and 18+ caregivers. The resulting indicator “active,” when summed with beneficiaries who have graduated, serves as the denominator for the HIV-related indicators.

*Sub-indicators needed for “Exit without graduation”:* To identify beneficiaries as “exit without graduation,” scripted logic will be needed to identify those beneficiaries not meeting the criteria for active status. This indicator can be composed of sub-indicators, including those who declare they are exiting the program for a specific reason (withdrawal, relocation, death), those who do not receive appropriate qualifying services in the age band 18–20 years and therefore age out, those who age out of the program at 21+ years, and those determined to be inactive because they do not meet the criteria for active status.

*Time dimensions of OVC\_SERV:* OVC\_SERV can be composed of sub-indicators that have different time dimensions; some are “point in time,” whereas others are cumulative. “Active status” is a point-in-time indicator because it measures whether someone was active on the last day of the reporting period for each of the two quarters contained inside the semester. “Graduated status” is a cumulative indicator because it can occur at any point during the reporting period and is definitive; thus, graduated beneficiaries can be summed across time periods.

*Age disaggregates:* When beneficiaries are registered, their birth date is entered. This allows beneficiaries to be grouped into fine age/sex disaggregates (< 1 F/M, 1-4 F/M, 5-9 F/M, 10-14 F/M, 15-17 F/M, 18-20 F/M, Caregiver 18+ F/M). These fine age/sex disaggregates can then be grouped into OVC< 18 yrs, OVC 18-20 yrs, Caregivers 18+ years, Beneficiaries < 18 years, and Beneficiaries 18+ years.

*Graduation benchmarks:* Minimum graduation benchmark data ideally will be included in the eCMS, which can be done by configuring the tracking of graduation benchmarks at the level of the household. As

such, it is important to use the denominator of the households assessed to measure how many of these households meet the household level graduation benchmarks. With these data, the eCMS could populate scorecards to show progress of households against benchmarks by geographic region (district) or partner. This could help to better identify pockets of program strengths and weaknesses, for example revealing regions that are not meeting economic stability benchmarks, or partners who may be more skilled in linking OVC to clinical resources and are therefore attaining viral suppression benchmarks better than others. Tracking against individuals in the eCMS is not recommended because the denominator of each household would be different. However, programs can use household-level data to identify households needing more support to meet the graduation benchmarks.

## OVC\_HIVSTAT

OVC\_HIVSTAT is the “Percentage of orphans and vulnerable children (< 18 years old) enrolled in the OVC comprehensive program with HIV status reported to implementing partner.” It reports beneficiaries disaggregated into the following categories: positive on antiretroviral therapy (ART), positive not on ART or ART status unknown, negative, and test not required or unknown. To calculate OVC\_HIVSTAT, several sub-indicators are needed to capture its complexities (See Annex 12.1).

*Sub-indicators needed for calculation of results for active and graduated beneficiaries:* To report HIV status for beneficiaries who are < 18 years of age, and who meet the criteria for either active or graduated, it is necessary to script and apply multiple filters (both for age and active status) before determining HIV status.

*Sub-indicators needed for calculation of semester results:* To report HIV status for beneficiaries, <18, who are either active or graduated at semi-annual program results (SAPR) and annual program results (APR), it is necessary to create sub-indicators to measure quarterly results. These quarterly results can also be used to monitor performance at shorter intervals.

*Identification of HIV status at SAPR and APR:* HIV status for beneficiaries <18 may be collected at enrollment, or this information may be provided on an HIV risk assessment form or other data collection form. For example, it is possible for a beneficiary to be enrolled with an unknown HIV status, subsequently determined to be at risk, tested, and then reported as HIV positive, all within one semester. OVC\_HIVSTAT must pull the HIV status at the end of the reporting period from the most recent date recorded on any of the forms in the example. In another example, it is possible that a beneficiary may report an HIV negative test result during enrollment, then report HIV unknown on a risk assessment form if the beneficiary’s risk profile changes significantly during the reporting period. Consequently, the forms (enrollment, HIV risk assessment, etc.) cannot be described according to a hierarchy; rather, a beneficiary may move with fluidity among the different forms. The indicator must pull the most recent HIV status from any one of the three forms that have been filled out.

*Age disaggregates:* While MER 2.5 indicator OVC\_HIVSTAT disaggregates included only beneficiaries < 18 years of age and 18+ years of age, the update to this indicator in MER 2.6 will require further disaggregation by age and sex band.

### 3.3. DEVELOP A DATA MANAGEMENT PLAN

A data management plan for an OVC eCMS should address the following:

- Define in the data dictionary the structure of data elements, data types, and meta-data. Doing so will allow for interoperability and enable different stakeholders to determine the relevance of the data to their interests.
- Define a data migration strategy when a new system is being developed to replace an existing one. The strategy should incorporate any enhancements in the legacy system, the allowable data loss and/or functionality after migration, the maximum period allowable for service disruption during the migration and any assumptions made regarding the data, the data being left behind and their usefulness, and data elements present in the new system but not available in the legacy system.
- Define data sharing agreements. Ensure ethical and legal compliance to prevent data fabrication or falsification, plagiarism, and other scientifically unacceptable practices during all analytical procedures. Questions to be asked include the following: Is there already interagency data sharing between or among implementers? Are there national protocols for the development of UICs that would allow beneficiaries to be matched across systems? Are there coordination mechanisms between or among funding agencies?
- Define the archiving and preservation of data to meet any required data retention and destruction requirements.

### 3.4. INTEROPERABILITY DESIGN

Interoperability supports the electronic exchange of information among the eCMS and other existing systems, such as an electronic health record system that tracks the HIV clinical cascade, including testing, initiation on treatment, adherence support, and viral suppression. It is important to design the information system so it can exchange information and use the information that has been received. Structure the system for data exchange and standards so the receiving information technology systems can interpret the data.

For holistic and longitudinal management of beneficiaries' health, an OVC MIS should exchange data with health information systems. Integration of an OVC eCMS with a health information system provides several benefits, such as a comprehensive view of health and HIV services provided to OVC, better collaboration among stakeholders, increased efficiencies and reduced costs, improved service delivery quality, and better health outcomes. Interoperability, as defined previously, is the extent to which systems and devices can exchange data and interpret those shared data. For two systems to be interoperable, they must be able to exchange and subsequently present those data so they can be understood by a user. To achieve this goal, data exchange standards are required. These standards comprise agreed-upon ways in which the data will be presented, stored, and transmitted.

#### 3.4.1. Unique identifiers

To enable interoperability, unique identifiers for individuals are needed to unambiguously link services rendered to a beneficiary to other services rendered to the same beneficiary in a clinical health system; the OVC eCMS must be designed with unique identifiers. The identifier should use non-name codes derived from the person's attributes, such as gender, age, date of birth, or social security number, to help

ensure confidentiality. The unique identifier should be practical and cost-effective to implement<sup>12</sup>. In selection of a unique identifier, the following should be considered:

- Every individual should have an identifier that applies only to that individual and that does not change over time.
- An identifier or identifier system must be practical to implement and meet the requirements of administrative simplification.
- The costs of implementation and use of the identifier must be within an acceptable range.

### 3.4.2. Adopt existing standards

Health information systems have universal standards that facilitate interoperability, and these standards should be incorporated into the design of the eCMS. An eCMS can interoperate with clinical health systems for such types of data as registration of individuals, drug prescription (and regimens) and dispensing, lab orders and results, and diagnoses, among others. Such data exchange uses such standards as:

- Health Level Seven (HL7)<sup>13</sup>—defines standards for the exchange, integration, sharing, and retrieval of electronic health information.
- Systematized Nomenclature for Medicine (SNOMED)<sup>14</sup> for clinical data and the logical observation identifier names and codes<sup>15</sup> for laboratory test names
- WHO International Classification of Diseases (ICD)<sup>16</sup> coding system for diagnosis vocabularies to achieve semantic interoperability.

## 3.5. CHANGE MANAGEMENT PLAN

Develop a change management plan for your solution to create room for unexpected occurrences and change. This plan should outline the process of creating a request for change, a review and assessment of change, implementation for the change, testing and rollout, and closure of the issue.

The system must incorporate feedback mechanisms and consider the reason for the change, its risks and impacts, any alternatives, required resources, and its relation to other changes.

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<sup>12</sup> U.S. Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation (ASPE). (2012). *White paper on unique health identifier for individuals*. Washington, DC: ASPE. Retrieved from <https://aspe.hhs.gov/white-paper-unique-health-identifier-individuals>.

<sup>13</sup> Health Level 7 International. Retrieved from <https://www.hl7.org/> - Health Level Seven International (HL7), v2.

<sup>14</sup> SNOMED International. Retrieved from <https://www.snomed.org/> - Systemized Nomenclature of Medicine, Version: July 2021. Release Date: July 30, 2021. SNOMED CT.

<sup>15</sup> LOINC. *Logical Observation Identifiers Names and Codes*, Version 2.71. (2021). LOINC. Retrieved from <https://loinc.org/>.

<sup>16</sup> <https://www.who.int/standards/classifications/classification-of-diseases>.

## 4. Development and Testing

To more quickly develop an eCMS of better quality, it is important to adopt agile development practices. This methodology provides continuous iteration of development and testing throughout the software development lifecycle of the program, as it is designed for flexibility and adaptability.

### 4.1. PHASES OF AGILE DEVELOPMENT OF ECMS

This phase is informed by a review of the existing information system during the landscape analysis and planning. If a suitable and feasibly adaptable information system was identified, it can be enhanced to meet the specific requirements of the eCMS. Before adopting the identified system, the following must be done:

- Map the existing features of the system against the requirements. This will help identify the requirements that the system meets, those that need enhancements, and those that are missing.
- Prioritize the requirements that need enhancements to ensure the system is stabilized early enough for users to engage with it and provide feedback.

Whether enhancing an existing system or building a new one, the requirements that have been developed must be broken down into small system components. The breakdown should be informed by priorities and the schedule of requirements as agreed with the stakeholders. Each component is then developed and tested with users. If something is not working well or as expected, or if the effort reveals an issue that previously had not been considered, developers must adapt the effort to get back on track quickly, or even change tracks if needed. Agile development lets each team member contribute to the solution and requires that each member takes personal responsibility for their work.

#### 4.1.1. Inception

To use the agile software development cycle, use the document requirements and create a timeline, which outlines the various responsibilities of the teams and clearly defines when work is expected to be completed for each sprint. A “sprint” is a set period during which specific work must be completed and ready for review.

#### 4.1.2. Iteration

This phase is user-centered; the teams start creating the information system based on the requirements and continuous feedback from the end users. The iterations are single development cycles that build on each other into the next step of the overall development process until the program is completed. Each iteration should have a set completion date, but the general timeframe is two to four weeks. At the end of each iteration, a working product should be ready for end users to review.

Typically, each iteration should consist of the product backlog—the selected requirements—and stakeholder feedback from the previous iteration, development of the software based on the set of requirements, and quality assurance (QA) testing by internal and external teams. The product iteration then must be integrated into the larger system. Finally, feedback on the iteration should be gathered from users and stakeholders to define new requirements for the next sprint.

### 4.1.3. Release to production

This phase involves final QA testing, resolution of any remaining defects, finalization of the system and user documentation, and, at the end, release of the final iteration into production. The development team must keep the software running smoothly while also teaching users exactly how to use it. The production phase continues until the support has ended or the eCMS is planned for retirement.

## 4.2. QUALITY ASSURANCE AND TESTING

### 4.2.1. Test planning

To ensure the quality of the eCMS, plan the testing and QA processes by doing the following:

- **Create a well-planned, defined, and documented plan.** The plan should define quality management to demonstrate the acceptable level of product quality and how that quality will be measured. To measure quality, ensure the plan outlines all testing objectives and deliverables. The plan should also define the test strategy to be used to achieve the quality management plan's objectives. The scope of testing and test plans should outline how to test, when to test, and who will do the test. The plan should be brief, specific, and updated as development progresses. For the test cases, define each set of input values, execution preconditions, and expected results for each test condition.
- **Employ test-oriented software development.** Test early and often throughout the test-driven development when tests are written before any implementation of the code: Write test->write code->improve design->repeat/iterate. Every new feature should begin by writing a test. The developer writes code and tests, and no new feature is approved until the test case is passed. After this step, code is refactored until all tests are passed.
- **Security testing.** Ensure beneficiary information is not accessible by those without permissions. Ensure that beneficiaries cannot be identified as part of a particular program or as being HIV positive from unique identifiers, colors on file, colors on screen, different formats of software, etc.
- **Test automation.** Expedite and improve the testing process by automating the tests. Test automation will help reduce costly and time-consuming manual testing, improve productivity, and thus ensure early time to market, provide effective testing, and reduce test efforts. Test automation helps track changes in the environment, such as new patches and service packs, and keeps pace with development activities.
- **Ensure a suitable work environment for QA team.** Clearly define QA roles, as testing consists of various activities performed by different specialists. To organize a smooth testing process, specify roles at the planning stage of a test plan. Build collaboration between testers and developers by training them on business logics. Ensure that their skills match their roles. Testers must have coding skills to test code. Also, encourage continuous communication.
- **Pilot testing.** In this process, an application is deployed to a specific geographic area for testing before a larger-scale rollout.

### 4.2.2. User Acceptance Testing and Sign Off

User acceptance testing (UAT) is the process of ensuring that the user accepts and signs off on the eCMS or a feature of the eCMS as having been completed. Define appropriate acceptance and success

criteria at the start of the design of the feature that will be used in UAT. These success criteria define what processes the users will undertake to confirm that their requirements have been met.

UAT involves a team selection and test execution process. To undertake the UAT, find appropriate users; they should be subject matter experts. The team should have a diversity of stakeholders, including data entry clerks, mid-level managers responsible for interpreting indicators, and informatics specialists. They should be involved early in the development. User-centered design will help ensure users are involved early enough in the process. Train the testers on the system and testing requirements.

Typically, an eCMS UAT might look at the following test cases:

- Are the data entry forms designed to align with the existing paper tools?
- Is the system enforcing OVC PEPFAR reporting business rules? For example, a 16-year-old beneficiary may be a primary caregiver but should be registered as an OVC according to PEPFAR reporting requirements.
- Are the reports populating as expected, e.g., PEPFAR indicators such as OVC\_SERV and OVC\_HIVSTAT?
- If data have been migrated from a legacy system, compare reports from that system and the new one. If there are discrepancies, is an explanation provided?

Document the users' feedback, review, and address the issues raised in UAT, and provide a test environment similar to that in which the application will be used.

After the UAT has been conducted and feedback addressed, an acceptance decision (go/no go) should be made and documented.

## 5. Capacity-Building Strategy: Cascaded Team Training Approach

To achieve the objectives of the MIS, stakeholders and end users require capacity in data collection, data entry, accessing data, data analysis, data use, and data security, depending on their roles and responsibilities. They may also require training in mobile technologies if those are being utilized by the system.

**Table 2. Areas of training required by key stakeholder**

	Data collection	Data Entry	Accessing data	Data analysis	Data Utilization	Data Security
Caseworker	X	X	X		X	X
Service provider	X	X			X	X
CBO	X	X	X	X	X	X
Prime Partner	X	X	X	X	X	X
Government (National, Regional, and Local)				X	X	X
PEPFAR/USAID				X	X	X

A cascaded team training approach<sup>17</sup> aims to enable managers at the subnational levels to improve eCMS performance by identifying and mobilizing appropriate staff to work as a team; enhancing the team's performance through the application of effective capacity-building techniques; and engaging the team to take on expanded responsibilities for eCMS management and information use to enhance OVC programs. eCMS training is first conducted at the central or regional level for national or implementing partners, working either individually or as a team; training is then cascaded to end users, such as staff and case workers at the community level.

Why use the cascaded team approach? Assigning eCMS training responsibilities to a team reduces eCMS vulnerability to staff shortages, inadequate capacity, or frequent employee transfers; and mitigates the risk of overdependence on specific people by making health information system management more system and organization oriented.

The team approach also promotes team spirit, allowing all team members to contribute, learn, and lead, and enables staff to go beyond simple data collection and reporting. Using this approach, the team is trained to understand why the data is collected and how the reports are used to inform and support decisions.

To increase access to capacity building opportunities, provide multiple training formats that users can employ in the most effective way possible. Use interactive demonstrations (including simulations), and gamification to teach practical applications (tied to incentives), and videos as microlearning resources when users might need learning aids in the future.

<sup>17</sup> MEASURE Evaluation. *Guide to a team approach to building capacity for health information management*. Chapel Hill, NC, USA: MEASURE Evaluation, University of North Carolina. Retrieved from <https://www.measureevaluation.org/resources/publications/wp-17-199>.



## 6. Release/Deployment Management

Release management is the process for planning, scheduling, and controlling the building, testing, and deployment of product releases. Release management ensures that a new and enhanced system is delivered while protecting the integrity of the existing system and functionalities.

### 6.1. RELEASE PLANNING THROUGH THE TWG

Through the TWG established during the planning phase, adopt a predictable release cycle aligned to the workplan, consisting of major and minor versions, and patches in a predefined calendar. All stakeholders should be notified of upcoming releases. Releases should contain software upgrade files, release notes, and revised user guides.

### 6.2. RELEASE VERSIONING

A standard versioning scheme that identifies the major version, minor version, and the patch should be adopted from the beginning. A major release is anchored to a major feature(s) or module(s) of the MIS. It also contains cumulative minor releases and patches after the previous major release. A major release should be followed by focused capacity building activities for stakeholders and end users. A minor release is anchored to cumulative patches and priority enhancements arising from gap analysis, user feedback, and technical system improvements. A patch/hotfix is meant to address priority bugs and ad hoc requests.

A communication plan for the release should be well-defined. The plan should list the release type, frequency, and mode of communication. The frequency can be quarterly, monthly, or on demand, depending on the release type. The mode of communication can be via email, wiki, webinar, or a meeting.

Roles and responsibilities should be defined clearly. They should outline the release sign-off, documentation of the release, release of the package, communication to stakeholders, capacity building, and monitoring.

### 6.3. RELEASE MONITORING

The performance and impact of the release should be monitored over time. Documentation should cover non-functional requirements; infrastructure performance metrics, such as central processing unit (CPU), memory, disk usage, and network activity; and application performance metrics such as the server load of services and processes. Security performance metrics also should be documented, such as the logs generated by servers; applications; security devices to identify events that could result in unauthorized access, which in turn could result in the loss of sensitive data; or any improper changes that could cause data breach and compliance failure. Additionally, the number of issues reported by end users after a release should be monitored. This monitoring should inform whether the release has addressed the reported issues or introduced new bugs.

## 7. Support, Maintenance, and Monitoring

A standard operating procedure (SOP) should be developed that supports, maintains, and monitors eCMS implementation to ensure it remains highly available and reliable, and stays relevant to current business needs. Continuous monitoring of the eCMS promotes the fulfilment of responsibilities and identifies required corrective measures in cases of insufficient performance. Such monitoring increases the chances for the long-term success of the eCMS.

The SOP should consider the following:

- Set up a help desk

Set up a help desk or service desk to support users and to provide internal escalation protocols for issue resolution and escalation. The help desk should outline the issue resolution process. This process should indicate how interactions from users are received as logged, how the cause of an issue is investigated, how to search the knowledge base to find an answer/solution, and how to update the issue with relevant details. It should also define the process of communicating with the user and how the user will verify the solution and closure.

For issue escalation, the help desk should show how an issue is triaged and requirements determined. The issue can be escalated to business analysis to request change management, or to the development team for fixing the bug, resolving the issue, and communicating with the user.

- Develop a knowledge base

Through the community, develop a knowledge base. The knowledge base should be made up of frequently asked questions, known technical problems and how to resolve them, forums for users to post questions, and requests for enhancements.

Consider including a utility function within the system through which users can search the knowledge base to find an answer to a question or issue, monitor the status of previously reported interactions, and log new interactions/issues.

## 8. Role-based Access

Role-based access control is an approach to restricting system access based on specific roles. Each system should have a user access management plan that defines how individuals are identified and authenticated in the system; how roles are identified and assigned to individuals; and how individuals' roles are added, removed, and updated.

Access management seeks to limit the information users can view or change to minimize the chances of improper activity. The plan should define how changes in the data are tracked and logged for audit.

The purpose of this plan is to protect data within the system and secure the system itself, which can be achieved through the following:

- Plan roles and responsibilities early, building in thinking on early system requirements prior to configuration and implementation. This plan should inform the access levels and the process of vetting and approving requests for access.
- Use the principle of least privilege. Users should be set up to access only the system they need to perform their job functions. Minimum privileges should be assigned. On a need-to-know basis, new privileges can be added or removed.
- Limit super-user access to only those individuals who need it and build in other administrative or manager roles for those who may manage portions of the system. Super-user access privileges should be limited because of the potential for exposing the system to unnecessary risks. This privilege is likely only needed by a few (1–3) individuals for a very specific period and should be monitored and removed/deactivated after the need is addressed.
- Continuously review privileged user access. Analyze logins, tasks performed, and users' access behaviors to determine whether they are using the privileges assigned and information appropriately. Identify malicious activities and reconfigure users' access levels as needed.

## 9. Data Visualization, Review, and Use

### 9.1. DATA VISUALIZATION

Data visualization is the graphical representation of information and data, and it helps to identify patterns and trends. Most eCMS platforms should have data visualization functions. Another option would be purchasing a license for proven data visualization software, such as Tableau or Microsoft BI, or using an open-source platform such as Metabase. Good data visualization will transcend specific tools and products. It is important to consider how the selected tool affects sustainability because licenses may be expensive. Data visualizations aim to empower a specific audience and address its needs. Consider for whom the visualization is designed, what decisions they need to make, and what actions they need to take after gaining insights from the visualization. Once the use cases for visualizations are defined, a collaborative approach to collect and validate requirements, prototype, develop, test, and deploy new or enhanced visualizations is recommended. Finally, it is key to ensure that the dashboards and analytics within the eCMS are simple and specific and can be understood quickly by decision makers.

### 9.2. DATA REVIEW AND USE

For noticeable impact, and to reach PEPFAR targets, OVC programs should use their eCMS to become data-informed. Below are the key elements of a best practice intervention for improving data analysis and use:

- Include relevant stakeholders: Having the right people in the room—both those responsible for resource allocation and those providing services—encourages accountability for lines of action to address performance issues.
- Have regular, frequent discussions among stakeholders from different levels. Discussion builds understanding and strengthens multidirectional feedback mechanisms. Meetings also allow participants to identify gaps and triage solutions across IPs and regions.
- Use a participatory approach to capture a range of perspectives. This collaborative approach encourages and improves engagement among participants and amplifies contextual considerations on any performance issues that surface.
- Apply root cause analysis. Probe reasons for data issues and outliers. Implement “deep dives” to understand what the data are saying to identify actions to improve performance.
- Include discussions while reviewing dashboards in data review meetings. Using technology in this way enables timely access for participants who previously might not have had immediate access to performance data at the service delivery or community levels.
- Provide simple graphics and effective data visualizations. Present graphics of analyses pinpointing performance problems against established expectations (or targets). Graphics will allow meeting participants to examine contextual information during discussions.
- Standardize analyses. Let participants focus on key indicators by using standardized slide decks that are revised regularly; these tools allow for continuous learning. When poor performance is identified, implement course corrections, and monitor expected improvements in performance.

# 10. Transitioning the eCMS

In many cases, particularly efforts toward localization, data systems may be designed for eventual handover to a local organization, or the government. The eCMS described here is not explicitly designed for a government handover, although ideally it could feed data or be integrated into a government data system. Ultimately, a good system involves more than just a good reporting system; it is imperative that the underlying service delivery and beneficiary outcomes are maximized. Ensure that the following components are available to facilitate the eCMS transition:

- All source code and development artifacts, such as databases, external libraries, and other dependencies, licenses files, security keys, etc.
- Description of routines, activities, and tasks needed to keep the product usable/running
- Documentation of the eCMS dependencies like databases, data visualization software and their licensing model, including their end of life, renewal terms, contacts of communities of practices, and any associated security risks. The licensing agreements should contain provisions providing or assigning successors.
- All documentation for the product, such as technical requirements and specifications, communication/services with other applications, user guides, configuration guides, installation and upgrade guides, and operational guides outlining routine tasks such as regular backups.
- Documentation of any outstanding issues yet to be resolved; to do so, reference the release notes for the version.
- Documentation of capacity building curricula or materials connected with the training of any staff of the original eCMS platform (both software and hardware)
- Documentation of how the eCMS team will be transitioned to other projects, if any, or absorbed by the government or local partner who is taking up the eCMS.
- Documentation of lessons learned for future projects
- Documentation of any data sharing agreements, and provisions allowing or providing for assignment to successors
- Written documentation of acceptance by the client of eCMS

# 11. Conclusion

This document serves as guidance for developing and designing an eCMS that will capture key data related to OVC indicators required under PEPFAR MER guidance. It identifies the key areas, issues, and decisions to address when developing the eCMS. The enabling environment and other factors that contribute to the eCMS design and development vary from one context to another. There will be no “one size fits all” blueprint. However, this guidance document can serve as a practical resource for those tasked with developing an eCMS. Best practices have demonstrated that the ultimate success and utility of any eCMS requires the close collaboration of the technologists (ICT), subject matter specialists (i.e., child health and case management), and M&E experts.

# 12. Annexes

## 12.1. ANNEX 1. OVC\_SERV AND OVC\_HIVSTAT ILLUSTRATIVE CONFIGURATIONS

OVC\_SERV and OVC\_HIVSTAT illustrative configurations for comprehensive beneficiaries have been included in this guidance, as they are the most complex indicators that will require scripting. DREAMS (Determined, Resilient, Empowered, AIDS-free, Mentored, and Safe) and preventive beneficiaries requirements for being reported under OVC\_SERV are different. DREAMS and preventive beneficiaries do not report under OVC\_HIVSTAT.

### OVC\_SERV

OVC_SERV	Notes
<b>Active</b>	
Active comprehensive beneficiaries_Semester	For official reporting on MER indicators at SAPR and APR
Active comprehensive beneficiaries_Quarter	For use in calculation of OVC_SERV and internal monitoring
OVC with case plans_Quarter	For use in calculation of OVC_SERV and internal monitoring
OVC with monitoring visit_Quarter	For use in calculation of OVC_SERV and internal monitoring
OVC with qualifying service_Quarter	For use in calculation of OVC_SERV and internal monitoring
OVC 18-20 years with edu or econ service_Quarter	For calculating those who have aged out at 18-20 years
Enrolled in this quarter not yet active	For calculating active status for those recently enrolled
OVC_SERV (Active + graduated) _Semester	For calculating the denominator for OVC_HIVSTAT
OVC_SERV (Active + graduated) _Quarter	For use in calculation of OVC_SERV and internal monitoring
<b>Exit without graduation</b>	
Exit without graduation_Semester	For official reporting on MER indicators at SAPR and APR
Exit without graduation_Quarter	For use in calculation of OVC_SERV and internal monitoring
Enrolled but never active	For calculating the difference between enrolled, active, graduated, transferred, and exits
Exit age out 18-20 yrs _Quarter	For calculating exit without graduation
Exit age out 18-20 yrs _Semester	For calculating exit without graduation
Exit age out 18-20 yrs _Annual	For calculating exit without graduation
Exit age out 21 yrs _Quarter	For calculating exit without graduation
Exit age out 21 yrs _Semester	For calculating exit without graduation
Exit age out 21 yrs _Annual	For calculating exit without graduation

Exit with reason _Quarter	For calculating exit without graduation
Exit with reason _Semester	For calculating exit without graduation
Exit with reason _Annual	For calculating exit without graduation
Inactive beneficiaries _Quarter	For calculating exit without graduation
Inactive beneficiaries _Semester	For calculating exit without graduation
Inactive beneficiaries _Annual	For calculating exit without graduation
<b>Graduated and transferred</b>	
Graduated	For official reporting on MER indicators at SAPR and APR
Transferred to a PEPFAR supported partner	For official reporting on MER indicators at SAPR and APR
Transferred to a non-PEPFAR supported partner	For official reporting on MER indicators at SAPR and APR

#### OVC\_HIVSTAT

OVC_HIVSTAT (<18 years of age)	Notes
HIVSTAT_NEGATIVE (Semester   Active and Graduated)	For official reporting on MER indicators to PEPFAR at SAPR and APR
HIVSTAT_POSITIVE (Semester   Active and Graduated)	
HIVSTAT_POSITIVE_NOT ON ART OR UNKNOWN (Semester   Active/Graduated)	
HIVSTAT_POSITIVE_ON ART (Semester   Active and Graduated)	
HIVSTAT_TEST NOT REQUIRED (Semester   Active and Graduated)	
HIVSTAT_UNKNOWN (Semester   Active and Graduated)	
HIVSTAT_NEGATIVE (Quarter   Active and Graduated)	Quarterly results are sub-indicators needed to calculate semester results for official reporting on MER indicators to PEPFAR at SAPR and APR
HIVSTAT_POSITIVE (Quarter   Active and Graduated)	
HIVSTAT_POSITIVE_NOT ON ART OR UNKNOWN (Quarter   Active /Graduated)	
HIVSTAT_POSITIVE_ON ART (Quarter   Active and Graduated)	
HIVSTAT_TEST NOT REQUIRED (Quarter   Active and Graduated)	
HIVSTAT_UNKNOWN (Quarter   Active and Graduated)	
# Known HIV status proxy_Semester	Sum of negative, positive, test not required
# Known HIV status proxy_Quarter	
% Known HIV status proxy_Semester	Sum of negative, positive, test not required) / (Active + Graduated
% Known HIV status proxy_Quarter	



## 12.2. ANNEX 2. CASE STUDY

### Development of a Harmonized MIS for OVC in Zimbabwe

In FY20/21, Data.FI supported the USAID/Zimbabwe Mission in developing a harmonized MIS for use across six IPs serving the dual objectives of PEPFAR reporting and internal performance management. Data.FI, led by Palladium and a resource partner, BAO Systems, has supported the consolidation of individual systems into a DHIS2 Tracker instance to streamline reporting of Zimbabwe-specific indicators and PEPFAR reporting. With more than 250,000 beneficiaries served by six different IPs managing 15 local CBOs, there were several limitations to compiling data from the six different systems. Given that each IP MIS was developed and maintained separately, there was a possibility of slight variations in calculation of complex indicators, possibly diminishing data reliability. Data submitted by IPs to USAID in a monthly Excel reporting format meant a significant delay between service delivery and reporting. In addition, the costs of maintaining separate systems, each with its own system administrator, was not cost efficient.

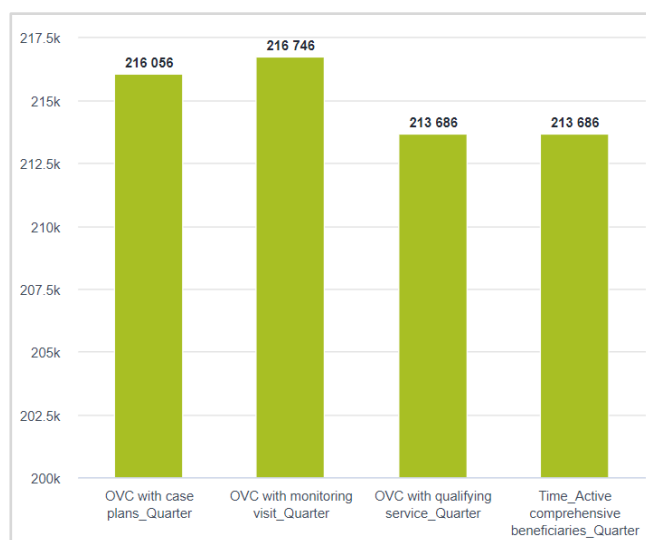
The DHIS2 Tracker module was selected as the software for the MIS because of its vibrant user community in Zimbabwe. Developers intended that local system administrators would sustain the MIS after development. Participatory requirements gathering with USAID and across the IPs occurred remotely through facilitated stakeholder meetings; analysis of 80+ individual data collection forms; and requirements for reporting to the Zimbabwe Mission, PEPFAR, and the Office of HIV/AIDS resulting in a detailed specifications documentation that took six months to complete. Configuration of meta-data, data elements, and aggregate, individual, and scripted indicators (three months) was followed by UAT (two months). Migration of legacy data from a six-month period (three months) entailed data cleaning, matching duplicate records, and verification of importation.

An initial training-of-trainers was conducted in August 2021 to review indicator calculations, data entry, and basic strategies for querying the data. Training of local system administrators and handover of system documentation was completed in September 2021 to review user administration, scripted indicators, and manipulation of point in time and cumulative indicators.

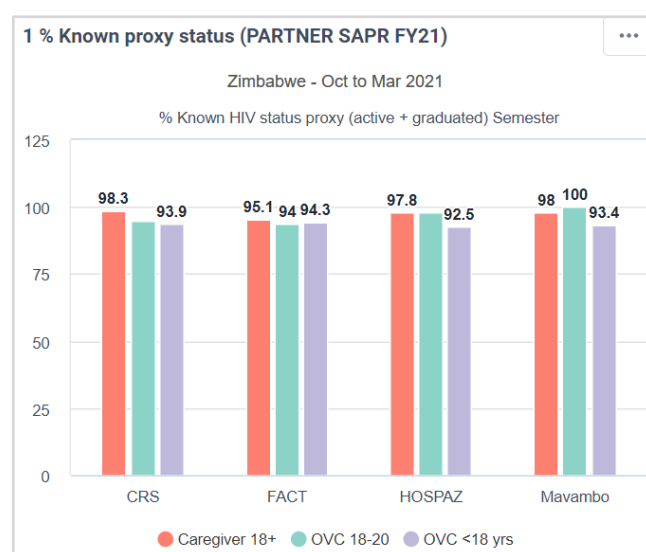
The system has been designed to collect vulnerabilities, referral and delivery of services, HIV status, and progress toward graduation for more than 250,000 individual beneficiaries. Indicators for reporting to PEPFAR on continuity of comprehensive case management (OVC\_SERV) and documentation of HIV status of all beneficiaries (OVC\_HIVSTAT), as well as indicators specific to the Zimbabwean context, resulted in multiple separate indicators displayed on six dashboards for OVC\_SERV, OVC\_HIVSTAT, PLHIV support, emergency services, service delivery, and graduation. The data are collected at the point of service by community case workers on paper data collection tools. Data entry clerks at the local CBO level then enter these data into the tracker module. Data will be presented for reporting to PEPFAR using fine age/sex disaggregates (M < 1, F < 1, M 1–5, F 1–5, etc.) at SAPR and APR, and visualized according to the CBO and IP on a monthly basis to promote accountability for performance.

A limitation of the DHIS2 tracker is that it was not natively possible to view aggregated numbers of beneficiaries filtered by any dimension other than the organizational hierarchy. Although indicators were readily analyzed according to regional, district, and sub-district levels, it was not possible to analyze indicators either by age/sex disaggregates or IPs/CBOs. Thus, we developed a tracker-aggregate integration solution that required 768 program and mapping indicators to be created for each of the 100 “top-level” indicators required. This solution allowed us to analyze and display the data in tables with fine age/sex disaggregations and in graphs with IP/CBO disaggregations.

## Examples of graphics displayed on the Harmonized OVC MIS



In this graph displaying sub-indicators needed for the calculation of active status, note that all three criteria must be met for beneficiaries to be deemed active. These results can be disaggregated further by IP/CBO. Supervisors can generate line listings of beneficiaries who require an updated case plan or need a quarterly monitoring visit or qualifying service to ensure all beneficiaries are maintained as active. The ability to view sub-indicators is a key function of an MIS intended for use in performance monitoring.



In this graph displaying percentage known HIV status proxy, we are able to view performance by the four IPs reporting to the harmonized OVC MIS, thereby allowing management to allocate resources (supportive supervision or enhanced training) to the IPs (or CBOs) most in need of support, or to the sub-population (i.e., OVC < 18 years, OVC 18–20 yrs, or caregivers 18 + years). The ability to view results by IP/CBO is a key function of an MIS intended for use in performance monitoring.

The benefits of developing a harmonized OVC MIS include the standardization of indicators, which contributes to improved data reliability and increased ease of data compilation and reporting. Furthermore, maintaining and enhancing the MIS via a national coordination mechanism will yield long-term cost savings. Nonetheless, when planning to develop an OVC MIS to meet both PEPFAR reporting requirements and internal performance monitoring, it is imperative to factor the expert configuration needed for extensive back-end scripting. The benefits of tracking data for individual beneficiaries across time provides real insights into how to meet the needs of vulnerable populations.

## 12.3. ANNEX 3. CASE STUDY

### Open-Source Case Management and Record-Keeping (OSCaR)<sup>18</sup>

OSCaR is a database developed under the Family Care First (FCF) project in Cambodia. It is designed for use by nongovernmental organizations that work directly with children, so that client work can accurately be reflected in reporting and M&E. OSCaR was originally developed by Children in Families (CIF) in 2015–16 with USAID funding via Development Innovations, under a grant for organizations using technology in innovative ways with vulnerable children. OSCaR is used by customers in Cambodia, Thailand, Myanmar, Uganda, Lesotho, Nepal, Haiti, and the Bahamas.<sup>19</sup> CIF decided to develop an original system with several goals in mind:

- To guide staff through good social work and case management practice, with an assessment that would allow tracking client well-being and outcomes over the long term
- To reduce double handling by allowing the database and reporting side of the system to draw information from the case management toolset automatically
- To better monitor outcomes so that programming decisions and reporting would both be to a higher standard
- To operate using both the English and Khmer languages
- To be open source so that other organizations could also use the system

Following the engagement of Rotati, a Cambodian development company, and the early design and development stage, the initial rollout of OSCaR to CIF staff was in mid-2016. Social workers in Cambodia played a key role in the planning and design of OSCaR. At approximately the same time as the initial rollout, Family Care First was seeking a case management system its partner organizations to use which would meet the needs of social workers in Cambodia. OSCaR, as a pre-existing, bilingual, open-source system, was chosen for extra funding. CIF was then funded from November 2016 to widen the consultation processes with other FCF partner organizations, broaden the feature-set of the system, and support organizations which wanted to integrate the system into their practice.

OSCaR's features include:

1. The Case Management Toolset
2. The Data Management/Reporting Toolset
3. The Customization Toolset
4. OSCaR-to-Primero interoperability<sup>20</sup>

### Case Management Toolset

This includes:

- Four record types: clients, families, partners, users
- 'Built-in' tools: assessment tool; case notes, task management
- Custom-built tools: forms, program streams, custom assessments
- Client search: includes "practice quality filters"

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<sup>18</sup> This case study was adapted directly from materials provided by CIF: CIF. (2020). *Promoting appropriate care*. Workshop on Case Management Information Systems. Chapel Hill, NC, USA: MEASURE Evaluation, University of North Carolina, with supported from the Displaced Children and Orphans Fund (DCOF) of USAID.

<sup>19</sup> OSCaR HQ Facebook page. Retrieved from [\(1\) OSCaR HQ | Facebook](#).

<sup>20</sup> Interoperability between Primero and OSCaR goes live. (2021). Retrieved from <https://www.unicef.org/cambodia/press-releases/interoperability-between-primero-and-oscar-goes-live>

OSCaR provides a built-in case management flow through the use of its integrated case management tools. This flow comprises an assessment tool, a task-management tool, and a case note tool. By default, OSCaR utilizes the Child Status Index (CSI) as its internal assessment tool, though organizations can develop customized assessment tools that follow the format of the CSI, as delivered through OSCaR. Completion of the CSI (or custom assessment) delivers a case plan and adds tasks for completion to a task list of the case worker. To interact with their task lists (mark tasks as complete, or add new ones), workers must use the case note form. In this way, the case management process, from assessment, to case-planning, to intervention, to record keeping, is kept streamlined and integrated.

Because organizations also have unique programming and service needs (and indicators), OSCaR also includes features for attaching custom-made forms to records, and for creating and using custom program streams (or service delivery streams). These allow organizations to track their service delivery and/or program enrollments (a matter of preferred language, as often as anything else) and to accurately record any manner of service they provide to their beneficiaries.

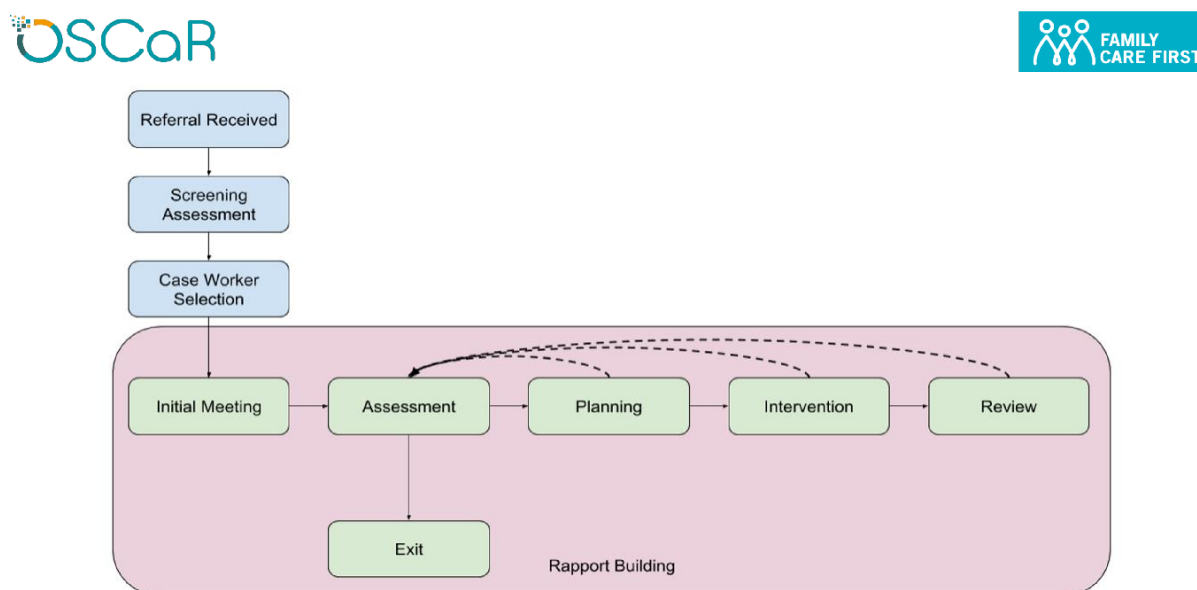
OSCaR supports four record types: client records, family records, partner records, and user records. These record types can be linked (to allow a household to be listed as caring for a particular child beneficiary, for example) and different levels of interaction are possible with each. The focus of OSCaR is on client records.

## Data Management/Reporting Toolset

Once case workers have entered information into OSCaR, either via the built-in toolset or custom forms organizations create for themselves, organizations can generate custom report tables reporting on beneficiary data (demographic, vulnerability, outcome, or other data types) for any combination of filters and conditions required. These tables can include and filter based on both in-built data types, indicators, and custom data as created by individual organizations.

OSCaR supports direct export to Excel and Google sheets for further analytics, as well as some basic graphing and visualization processes.

## Case Management Flow Chart



## Customization Toolset

The Customization Toolset gives organizations the ability to customize OSCaR to their needs. Organizations can create custom forms, assessment, and program streams to support and keep accurate records of their work with beneficiaries. In addition, a number of options are available to suit the needs of organizations (expected time between assessments and case notes, lists of donors, lists of departments in the organizations, etc.) so that records accurately reflect the organization's needs. This toolset is typically where organizations need the most technical support.

## OSCaR-to-Primer Interoperability

Interoperability and connection between OSCaR and Primer is live in Cambodia, strengthening Cambodia's child protection case management system. Primer launched by the Ministry of Social Affairs, Veteran and Youth Rehabilitation (MoSVY) as a digital child protection case management system, supported by UNICEF, is now interoperable with OSCaR which is used as a case management platform of NGOs and CSOs. Through an innovative interoperability platform called the Open Function integration platform (OpenFn), MoSVY social workers can send and receive referrals of cases of vulnerable children in an efficient and highly secure manner, and vice versa. Primer-to-OSCaR interoperability facilitates a systemic coordination across partners with confidential referrals leading to better quality and more timely services, enabling robust nationwide reporting of cases and reducing duplications of effort.



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