



# Functional Specification of Unit Cost Estimation Model Tool (UCEM)

(Annex 2)

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## 1. Introduction

### 1.1 Definitions

The **Unit Cost Estimation Model (UCEM)** is meant to serve as a facility based tool for producing unit HIV cost estimation in countries, facilitate collection of data, data management and analysis. The scope of this document is to define an overview over the features of the UCEM. This will include operations allowed in each module, conditions, etc.

The UCEM allows countries to estimate unit costs of aspects of HIV service provision thereby enabling these to feed into costing models to calculate the costs of services and programs involved in their response to HIV. The application tries to capture the range of all HIV related costs in one or more service centres or sites within country or part of the country within a given period of time.

The UCEM methodology, definitions and list of standardized classifications are posted at:

A) Manual for costing HIV facilities and services

[http://www.unaids.org/en/media/unaids/contentassets/documents/document/2011/20110523\\_manual\\_costing\\_HIV\\_facilities\\_en.pdf](http://www.unaids.org/en/media/unaids/contentassets/documents/document/2011/20110523_manual_costing_HIV_facilities_en.pdf)

B) Workbook for the collection of cost information on HIV facilities and services

[http://www.unaids.org/en/media/unaids/contentassets/documents/document/2011/20110523\\_workbook\\_cost\\_info\\_en.pdf](http://www.unaids.org/en/media/unaids/contentassets/documents/document/2011/20110523_workbook_cost_info_en.pdf)

This application should follow the methodology described in the documents above, and we will refer some section to this documents whenever is possible. We expect that potential bidder will carefully read and systematically analyse these two documents.

## 2. UCEM modules

This section explains application complexity and functional specification of the required modules. More detailed functional specification of modules is provided in Section 3.

### 2.1 Application complexity

	<b>Modules</b>
1	Administrative module and basic configuration
2	Registration of facilities
3	Registration of project costing assessment
4	Registration of outputs, inputs and costs per inputs
5	Costing transaction
6	UCEM member's account management and user roles

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7	Export of UCEM data
8	Import of UCEM data
9	Source file link
10	Lookup table's management
11	Multiuser support
12	Backup/restore data
13	Built-in reports
14	Database manager configuration
15	UCEM database layout
16	Testing (unit tests and functional testing of application)
17	Release management (milestones management)
18	Deploy to production

## 2.2 Description of modules

Module	Description
<b>Administration and basic configuration</b>	This module will handle the basic settings used inside the application such as: users and their roles, UCEM data management (export/import, etc) and multiuser settings, database and lookup table's management, etc.
<b>Registration of facilities involved in costing assessment (site, service centre, care centre, support centre, external centre, etc.)</b>	This module will cover the registration of basic information related to facilities which are involved in costing assessment (service centre, care centre, support centre, external centre, etc.) The information can be inserted, edited or deleted (the record is marked as inactive, no

	information will be deleted from the database). Change history is not required.
<b>Registration of project costing assessment</b>	<p>In this module user will be able to define the scope of costing assessment. This feature represents the creation of a new costing exercise based on a service site which is the main target for costing assessment, facility or facilities involved in the service site with their links (service chain) and time period of exercise. The operations will be insert, edit and delete (information marked as inactive, no record will be deleted from the database). The name of service site and time period is a unique combination and will be read-only.</p> <p>In addition, user should be able to define links between sites according to used external services.</p>
<b>Registration of outputs, inputs and costs per inputs</b>	In this module user defines outputs, inputs and cost of inputs. Each costing assessment will have one or more outputs, one output will have one or more inputs and one input will have just one cost. A list of inputs and outputs will be provided by UNAIDS/HQ but user will be able to add facility specific outputs and inputs that are not listed in the predefined classifications.
<b>Costing transactions, allocation and unit cost estimates</b>	This feature will cover main costing transactions, where user defines: i) the quantity of each output in which case application needs to calculate total cost per output and ii) total costs per output where application needs to calculate the quantity of each output.
<b>UCEM member's account management and user roles</b>	This feature will cover the information about UCEM team members who are involved in costing assessment and can perform actions in the system. Each member will use a username and a password to login into the system. Their data will cover the full name, email address, phone number and position in the organization, employer name and address. These data can be inserted, edited and deleted (the record is marked as inactive, no information will be deleted from the database). The username is unique value in the system. No blank passwords are allowed. Change history is not required.

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<b>Export of UCEM data</b>	This module will allow high-level users, Administrator and Project Leader to export UCEM data to an external file. The file should contain all transactions, and version of lookup tables used at the run-time. This file will allow users on other sites to import the data.
<b>Import of UCEM data</b>	This module will allow users to import UCEM data entered in other facility. The imported data does not affect the existing lookup table and all other data used in day to day activity.
<b>Source file link</b>	This feature will allow users to link an external file and archive it in the application. The external file is a main data source used to create costing assessment. The file can be Excel, Word, Adobe PDF, images or text files, etc. External file is linked with costing assessment and users will be able to see the file associated with the assessment. The files will be opened in their own container, meaning that there will be no viewer coded to see these files. For example, if the source link file is name.pdf, the corresponding viewer for the 'pdf' extension will be used when users try to view the file.
<b>Lookup table's management</b>	The list of standardized UCEM classifications (outputs, inputs and other classifications (country and currency name) may be changed and updated periodically. This module will cover the management of the classifications used in UCEM application.
<b>Multi user</b>	This feature will allow multiple users to use the application and store the data in a central repository on local site.
<b>Backup/restore data</b>	This feature will allow the administrator account to perform a backup/restore of the entire database.
<b>Built-in reports</b>	This feature generates the built-in reports based on data entered in the system. All of the built-in reports must be exported to Adobe PDF or Word and Microsoft Excel (xls or csv).

### 3. Software Architecture Document

An extended overview of each module feature from Section 2 is provided below:

#### 3.1 Administration and basic configuration module

This module will handle the basic settings used inside the application:

- Manage users
- Manage lookup tables
- Export UCEM data
- Import UCEM data
- Manage database backup/restore

#### 3.2 Registration of facilities involved in costing assessment (service centre, care centre, support centre, external centre, etc.)


One of the initial steps in the UCEM assessment is to identify and register all facilities (service centre, care centre, support centre, external centre, etc.) which are part of service site involved in costing assessment. Therefore, information related to these facilities should be the first information that is available for registration. The objective of this phase is to register basic information related to facilities.

*\*Reference: Workbook for the collection of cost information on HIV facilities and services (Worksheets 2)*



## Registration - Service site- Service centre

Country, Country Tag/ Part	Gabon	Project	
Currency	USAS	Currency Unit	1000
		Year	2012

Service site: Hospital Gabon  Hospital Sant John, Street....., Contact Person

Service center	Acronym	Address	Contact Person	Phone
Outpatient department	OD			
Surgery	SU			
Laboratory	LAB			
Maternity	MAT			
Pediatrics	PD			
AIDS/HIV Treatment Center	AIDSTCent			
Dental Clinic	DentCI			
Adult Medicine	AdMed			
Pediatrics	PED			
Eye Surgery Clinic	EyeSUCI			

Save

Close

**Registration - Service site- Service centre**

Country, Country Tag/ Part:  Project:

Currency:  Currency Unit:  Year:

Service site:  Hospital Sant John, Street....., Contact Person

Service centre	Acronym	Address	Contact Person	Phone
Outpatient				
Surgery				
Laboratory				
Maternity				
Pediatrics				
AIDS/HIV				
Dental Clinic				
Adult Medicine				
Pediatrics				
Eye Surgery				

Service Centre Name:

Comment :

Address:

Contact Person:

Phone:

Email:

● Care  
● Support

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Functions:

- Save: will save the information to the database, adding a new record if this is the new facility to be registered or it will update the record for the exiting facilities

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- *Close*: will close the form without any operation performed upon the record;

Special remarks:

- The registration of facilities can take place at any time
- Once registered the name of the facilities cannot be changed
- All other settings can be updated at any time
- A history of changes is not required
- A privileged user should have the ability to delete registered facilities only if facility has not been included in any costing assessment
- User should have possibility to merge more costing assessments in one project

### **3.3 Registration of project costing assessment**

The project costing assessment is an estimate of unit costs of services and programs involved in their response to HIV in a given one or many facilities within one or more service sites. The application tries to capture the range of all HIV related costs in one or many facilities including its service chain flow over a given period of time.

The project costing assessment is defined by the service site where the costing assessment is conducted and the time period of the assessment. The operations within this module will be: insert, edit and delete (information marked as inactive, no record will be deleted from the database) where a history of changes is not required. User first needs to register basic information related to all facilities involved in costing assessment (3.2) and after that to assign the registered facilities from drop down list through this module to project costing assessment.

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In addition, the user should have one report where all registered facilities are presented with relations between the registered facilities through parent child relation (service chain flow). The data related to service chain flow should be exported together with other data.

This module will cover the initial settings of the application such as measurement unit. Measurement unit defines the main costing unit that will be used in UCEM exercise. Due to a high exchange rate, the amount of funds associated with spending within UCEM assessment can reach up to 15 numbers in local currency. In order to facilitate the data processing, measurement unit can be expressed in: Units (1), Thousands ( $10^3$ ), and Millions ( $10^6$ ). For example: \$3,000 can be expressed as: i) \$3,000 if the measurement unit is set to “Units” or ii) \$3,000,000 if the measurement unit is set to “Thousands” or iii) \$3,000,000,000 (if the measurement unit is set to “Millions”).

The above variables must be stored within a local dataset in order to provide the application with the type of data for use over its entire lifetime. Once the measurement unit is defined it cannot be changed. The definition of measurement unit will be provided by UNAIDS. When a project costing assessment is created the Measurement unit should be saved inside the settings in order to allow import/export of data.

*\*Reference: Manual for costing HIV facilities and services (1.13. and 1.14); Workbook for the collection of cost information on HIV facilities and services (Worksheets 1)*

### **3.4 Registration of outputs, inputs and costs per input**

Using this module user will be able to register each output, input and cost of each input related to facility (service centre, care centre, support centre, external centre, etc.) included in the cost assessment. One costing assessment may have one or more outputs, one output may have one or more inputs and one input must have just one cost. The predefined classifications of outputs and inputs will be obtained from UNAIDS but also user should have an option to define the output and input that are not included in the predefined classifications using option “Other”. In this stage user needs to define the outputs from facility, corresponding inputs and quantity of each input that correspond to one output and cost per each input.

*\*Reference: Manual for costing HIV facilities and services (2.0); Workbook for the collection of cost information on HIV facilities and services (Worksheets 3-13)*

## Project - Data Entry

Country, Country Tag/ Part	Gabon	Project	
Currency	USAS	Currency Unit	1000
		Year	2012

Service site	Hospital Gabon	Hospital Sant John, Street....., Contact Person
--------------	----------------	---

Service centre	Laboratory	Laboratory No.6, ....., Contact Person
----------------	------------	--

Data Entry	Laboratory and procedure site-specific costs
------------	--

A Input type: staff grade, equipment type, consumable name, etc	B Amount of input used	C No. of full-time equivalent input units used	D Cost of one full-time equivalent item	Input unit cost $E=C \times D$

Save	Close
------	-------

### 3.5 Costing transactions, allocation and unit cost estimates

Following the registration of the facilities involved in costing assessment, service chain flow, project costing assessment scope, outputs, inputs and cost per each input, the collection of costing transaction starts. The main objective of this step is to collect and consolidate the costing data from different sources within service site.

**Registration of outputs, inputs and costs per inputs**

Country, Country Tag/ Part  Project

Currency  Currency Unit  Year

**Money**  **Patient**

- an inpatient day
- a day ward visit
- an outpatient or clinic visit
- the drugs dispensed by the pharmacy
- the tests performed in laboratories
- medical and surgical procedures performed
- support services within and external to the facility that support these activities

Close

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In this stage user needs to define quantity of outputs and application should calculate the total costs for particular UCEM project. In addition we can face situation where user knows total output costs, but not number of outputs (quantity), therefore application should calculate the number of outputs.

The cost of one output (CO) is defined as sum of products of quantity of each inputs (QI) and cost per input (CI).

$$CO = \sum_{i=1}^n QI_i * CI_i$$

The costing assessment (CA) is defined as sum of products of quantity of each output (QO) and cost of each output (CO)

$$CA = \sum_{i=1}^n QO_i * CO_i$$

*\*Reference: Manual for costing HIV facilities and services (2.8)*

### 3.6 UCEM member's account management and user role

The UCEM team is the group of people that conduct the costing assessment in a given facility or facilities within one service site. The members of the team may be the staff from facility, government body or external consultants. The registration of the team members can take place at any time before, during or after the cost assessment. One cost assessment may have one or many team members.

In addition, one or many registered team members can be privileged to access the cost assessment with a user name and password. The privileged team members need to be identified with defined roles and assigned to just one of the following user groups: administrator or project leader or data entry.

The privileged user should have the option to edit the registered information related to the team at any time before, during or after cost assessment, with the exception of the "Name" and "Username". A history of changes is not required, as only the latest data entered will be used for processing. Privileged users should have the option to delete team members that are no longer involved and linked with any cost assessment.

PPIA 1211 The registration of the UCEM resource tracking team member in this stage should include the following variables:

Variable Name	Description of variable	Format	Editable	Content	
1*	Name	Full name of the team member	String	No	User defined

Team Member list			
Name	Username	Position	
Administrator	Admin		
Geena David	amntra	TeamLeader	
Gloria Bames	glbames	DataEntry	
Jean-Michael Pappin	jhndoe	TeamLeader	
Jeff Ranta	jfranta	TeamLeader	

2*	Username	Unique name to login	String	No	User defined
3*	Password	User password	String	Yes	User defined
5	Position	Position of the team member within it's organization	String	Yes	User defined
6	Telephone	Phone number	String	Yes	User defined
7	Email	Team member's email address	String	Yes	User defined
8	Employer Name	Name of employer	String	Yes	User defined
9	Employer Address	Address of employer	String	Yes	User defined

Note: all \* fields are mandatory

Additional views for team members:

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- *Add member*: generates an empty form to register team member
- *Edit member*: generates registered team member form filled with associated data for selected entry
- *Delete member*: puts a flag on the user record indicating that the account is not active anymore. Confirmation required on this action

**Register Team Member**

Name:

Username:

Password:

Position:

Telephone:

Email:

Employer Name:

Employer Address:

Save Delete Cancel

In addition, this module should be a part of administration of the application and based on the settings made within this module the users will be able to perform defined action in the application.

These roles and user groups (administrator, project leader, etc) are built-in and read only, meaning that no other roles and user groups will be created, or existing one can not be edited or removed from the system. One user can be a part just of one user group in one moment. Also one user can change the user group from time to time. A history of changes is not required.

Descriptions of the actions related to the roles:

Role	Description	Administrator	Project Leader	Data Entry

Manage classifications	This feature allows editing of defined classifications (lookup tables). This include: insert, edit, delete, move and export a new classifications.	x	x	x
Import classifications	This feature will allow the import of a new version of classifications.		x	
Manage team members	This feature will allow creation, editing and removing of team members and their roles.	x	x	-
Registration of facilities and costing project	This feature will allow creation, editing and removing of institutions involved in the HIV response.		x	x
Registration of outputs, inputs and costs per inputs	This feature will allow registration of a new costing project in order to collect data used in HIV response.		x	x
Costing transactions	This feature will allow user to execute costing transactions		x	x
Import/export	This feature allows users to create export files containing data and classifications	x	x	-
Manage run-time data and back and restore	This feature allows users to define assessment currency, regional and country classifications, and any other parameters	x	-	-

Team Member list			
Name	Username	Position	
Administrator	Admin		
Geena David	amntra	TeamLeader	
Gloria Bames	glbames	DataEntry	
Jean-Michael Pappin	jhndoe	TeamLeader	
Jeff Ranta	jfranta	TeamLeader	

The administrator and project leader account will be responsible to assign defined roles to users once costing assessment is registered.

In addition, we need to have a form where administrator can list all team members registered in UCEM member's account management and assign team members to one hardcoded user group.

Functionalities supported by application are controlled by user's roles (registration of facility, registration of costing project and UCEM members, merge and export /import of data and look up tables, etc). This feature will allow the Administrator account to view defined user's roles and the operational rights/actions that they can have within the UCEM application. This feature is read-only (hard coded) so no new user roles or user groups

(administrator, project leader, etc) can be created.

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### 3.7 Export of data

This module will allow the project leader to export the data. By this function all data associated with a costing assessment will be exported into an external file, Data file\*\*, covering the UCEM definitions, transactions, lookup tables with all additions/deletion of data and all source file links.

This option will create an archive of all data using the following naming convention (proposed):

CountryCode\_YEAR\_Date\_CountryName\_CountryPart.exp

The worksheets within the Data file will follow this pattern:

- 'Worksheet ': all cost transactions identified by codes;

When creating an export data file the user will be asked if the archive will include any external source file associated with the transactions defined in a costing exercise. At developer choice: the files included in transactions can be stored as they are or can be compressed.

\*\* Data file can be defined by the developer. It can be any format that can be easily imported in external databases: xml for example and Excel file.

### 3.8 Import of data

This module will allow project leader to import external costing assessment from other facility in the service chain. The user can choose a file to import from the source and the application will recreate the costing assessment as it was created in its main location. The archive contains the Data\*\* file with costing data and an archive of external source files.

As described in Export UCEM data the worksheets within the Data file will follow this pattern:

- 'Worksheet ': all cost transactions identified by codes;

The archive can contain all the external source links, if any, leaving this option for importing at user choice.

Importing an existing costing assessment will erase the old data, for example if the user imports a version of a costing assessment and receives later another updated version of the same costing assessment, the system will keep only the data from last version of costing assessment.

During the data exchange between the users, when one or more costing projects are merged into one costing project user needs to have a choice to import these data.

\*\* Data file can be defined by the developer. It can be any format that can easily be imported in external databases: for example xml and Excel.

### 3.9 Source file link

By this feature the users will be able to add external file to the system which is the main source of costing information containing the aggregation of data and used to construct costing assessment. This file can be stored inside the main database or in a subfolder of the application. In order to allow other users to see the data when is exported the suggested files should be common Office files, Adobe PDF files or common JPEG files. Use of unknown applications can aggravate viewing of data by other users after export. The external source file is linked with costing assessment, where one costing assessment may be defined by one or many external source files.

Since it is almost impossible to interfere with the file system of the machine where the application reside it is recommended to ask the user to check the file when a difference is noticed between the saved file and the new source file.

External files will be opened in their own container, meaning that no viewer will be developed.

In order to avoid naming conflicts when import files the physical name of the file, if is stored outside the database, should follow a pattern to make it unique in a multi-computer world wide environment. The association between physical name and the real name should be kept in the database.

Proposed name for physical file = GUID.sfl

Where GUID is a globally unique identifier is a special type of identifier used in software applications to provide a unique reference number. The value is represented as a 32 character hexadecimal character string, such as 21EC2020-3AEA-1069-A2DD-08002B30309D

Example:

- Stored file name: Ministry\_of\_Health.xls
- Database record will look as follow:

ID	MainSource	PhysicalLocation
12	Ministry_of_Health.xls	098f2470-bae0-11cd-b579-08002b30bfeb.sfl

Opening the 098f2470-bae0-11cd-b579-08002b30bfeb.sfl will create a temporary file Ministry\_of\_Health.xls which will be opened using the installed viewer.

### 3.10 Lookup table's management

The list of classifications (look up tables) may be changed and updated periodically. The management of lookup tables will cover classification list of output, inputs, countries, assessment currency symbols, etc. Each costing exercise is linked with just one version of classification which means that one UCEM will start and finish with the same version of classifications.

This module will cover the following functions: viewing, creation, editing and deletion of content in look up tables (country names and assessment currency symbols)

The user should have possibility to export /import the look up tables related to outputs /inputs created from other facility. Import and export of lookup tables should be granted only to the Administrator or Project leader role.

*\*Reference: Manual for costing HIV facilities and services (2.0)*

### 3.11 Multiuser

This feature will allow multiple users to use the system at the same time. This option will need the implementation of a feature in Administrative menu in order to set the corresponding settings like database location and file sharing folder where the source file links will be stored in case that the solution for keeping this file is not to store them inside the database.

### 3.12 Backup/restore database

This module will allow the administrator of the application to run the full backup of the database and of the files associated with external source links, in case of not storing files inside the database. There should be a naming convention in order to allow restoration of the database to a 'last know working' database.

Name = CountryCode\_Date\_UCEM\_Project.bkp

The full backup can be used at any time to restore the data as was at the saving time (DATE part from the name). By restoring data all saved data from that time until the restore time will be lost. Users should be warned about this. Only administrator accounts are allowed to perform backup and restore of data.

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The application must provide the following built-in reports based on data collected within one costing exercise:

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- 1) 8 tables
- 2) 8 pie charts
- 3) 10 graphs

### **Optional module**

As described in the manual, the unit costing assessment is based on facility approach. This means that the scope of assessments is defined by facility (service centre, care centre, support centre, external centre, etc.). However, we may decide to do the costing of HIV service from different perspective for example we can implement community based approach. In this case we will have community based scope of costing assessments, but the relations between the entities which defines classifications (output, input, etc.) and costing methodology will remain the same. The only difference will be in the scope of costing assessment. This means that instead of service centre, care centre, support centre, external centre, etc. we will use different scope of assessment such as community city centre, community municipality center, etc. Thus the application should have possibility to handle the facility and community based approach. We expect from developer to propose the solution which will allow the user to choose the approach before the execution of costing assessment. This solution should be described in details and include in the price of the proposal.

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