

Using the Encrypted Unique Client Identifier (eUCI) Application

Ryan White Services Report (RSR) and ADAP Data Report (ADR)

Health Resources and Service Administration
HIV/AIDS Bureau

Technical Assistance Contact: Data.TA@CAIglobal.org

You don't need the eUCI Application if you use one of these systems to generate your RSR or ADR XML file (They create eUCIs for you!):

RSR-Ready Systems

- AIRS
- ARIES
- CAREWare
- Casewatch Millennium
- CHAMP
- eClinicalWorks
- eCOMPA
- eShare
- LabTracker
- Provide Enterprise
- Sage Intergu CHC
- SCOUT
- SuccessEHS

ADR-Ready Systems*

- CAREWare

XML-Generating Tools

- T-REX for the RSR
- Rx-REX for the ADR**

**Stay tuned for upcoming ADR- Ready Systems.*

***In development- Coming soon!*

Table of Contents

1. eUCI Overview	1
From Client Data to UCI	1
Encryption	2
De-duplication.....	2
2. eUCI Application	4
Generating the eUCI from Data Elements	4
Generating the eUCI from the UCI.....	6
Avoiding Common Errors	7
3. Steps for Developers: Creating the eUCI within a Data System.....	10

Table of Figures

Figure 1: Input File with Data Elements.....	4
Figure 2: Interface of the EUCI Creator CmdLine.exe File (from Data Elements)	5
Figure 3: Output File with eUCIs (from Data Elements)	5
Figure 4: Input File with UCIs	6
Figure 5: Interface of the EUCI Creator CmdLine.exe File (from UCIs)	6
Figure 6: Output File with eUCIs (from UCIs).....	7

1. eUCI Overview

The Ryan White Services Report (RSR) and ADAP Data Report (ADR) client-level data XML files must include an encrypted Unique Client Identifier (eUCI) for each client. This eUCI will allow HAB to link data that belong to the same client across multiple grantees/providers, while also protecting the client’s identity. This section explains how the eUCI is constructed.

From Client Data to UCI

The UCI, or Unique Client Identifier, is the first step in developing the eUCI. It is composed of the following data elements:

- **First and third characters of first name**
- **First and third characters of last name**
- **Full date of birth: MMDDYY**
- **Gender code: 1=Male, 2=Female, 3=Transgender, 9=Unknown**

For example, the UCI for Joe Smith, born December 20, 1968 is constructed as follows:

Name: Joe Smith Gender: Male Birthdate: 12/20/1968



J E S I 12 20 68 1

The UCI cannot be created from invalid or missing data. For UCI consistency, all grantees/providers must use the same coding rules for first and last name. If you are creating your own UCI, you must use the same rules applied by the eUCI Application, shown in the table below.

Issue	Rule	Example										
Name less than 3 characters	Third character of the UCI is 9.	First Name: TJ Surname: Leising DOB: 06/11/87 Gender: Male UCI: <u>T9</u> LI0611871										
Spaces	Replaced with 9.	First Name: Sam Surname: De Young DOB: 08/24/1990 Gender: Male UCI: SMD <u>9</u> 0824901										
Apostrophes and hyphens	Replaced with a 9. However, a name that <i>starts</i> with an apostrophe or hyphen, or any other non-letter character, is assumed to be an error, and the eUCI will be invalid.	<table border="0"> <tr> <td>First Name: 'Rei</td> <td>First Name: Luke</td> </tr> <tr> <td>Last Name: Smith</td> <td>Last Name: Fu-Smith</td> </tr> <tr> <td>DOB: 04/23/75</td> <td>DOB: 05/11/49</td> </tr> <tr> <td>Gender: Male</td> <td>Gender: Male</td> </tr> <tr> <td>UCI: Invalid, no UCI created</td> <td>UCI: LKF<u>9</u>0511491</td> </tr> </table>	First Name: 'Rei	First Name: Luke	Last Name: Smith	Last Name: Fu-Smith	DOB: 04/23/75	DOB: 05/11/49	Gender: Male	Gender: Male	UCI: Invalid, no UCI created	UCI: LKF <u>9</u> 0511491
First Name: 'Rei	First Name: Luke											
Last Name: Smith	Last Name: Fu-Smith											
DOB: 04/23/75	DOB: 05/11/49											
Gender: Male	Gender: Male											
UCI: Invalid, no UCI created	UCI: LKF <u>9</u> 0511491											
Accented letters	Accented letters are replaced with non-accented letters	First Name: Raúl Last Name: Grünwald DOB: 09/22/1983 Gender: Male UCI: <u>RUGU</u> 0922931										

Some Ryan White grantee data management systems refer to the RSR/ADR UCI as the Unique Record Number (URN).

Encryption

The 11-character UCI is then encrypted with the SHA-1 hashing algorithm to create a 40-character string of letters and numbers. The SHA-1 is a trap door algorithm, meaning that the original UCI is unrecoverable from the eUCI. The SHA-1 algorithm meets the highest privacy and security standards.

J E S I 12 20 68 1



68090FD02975E2135B624A1DC6AA114C0984BDF7U

De-duplication

It is possible that different clients have identical 40-digit eUCIs. Therefore, grantees/providers must add a 41st character at the end of the eUCI to distinguish these clients. If only one client within a grantee/provider data system has a given UCI, the suffix should be "U" for unique. If more than one client has the same UCI, the final character of the first client's eUCI needs to be "A," the final character of the second client's eUCI needs to be "B," and so on. The suffix prevents multiple clients from having the same eUCI.

Grantees/providers *must assign the final character* by determining whether two records with the same UCI actually belong to the same client. This can be done through the review of other data elements. If the duplicate records with the same UCI are, in fact, the same client, the client data elements must be merged and reported under one record. If the records represent different clients, the 41st character of the eUCI must be manually assigned based on other information in the system as "A", "B", "C", etc. Through this process, different clients within the same provider system should not have the same eUCI. **HAB expects providers to eliminate duplicates at the provider level; the client-level data file will result in an error upon upload if multiple records share the same eUCI.**

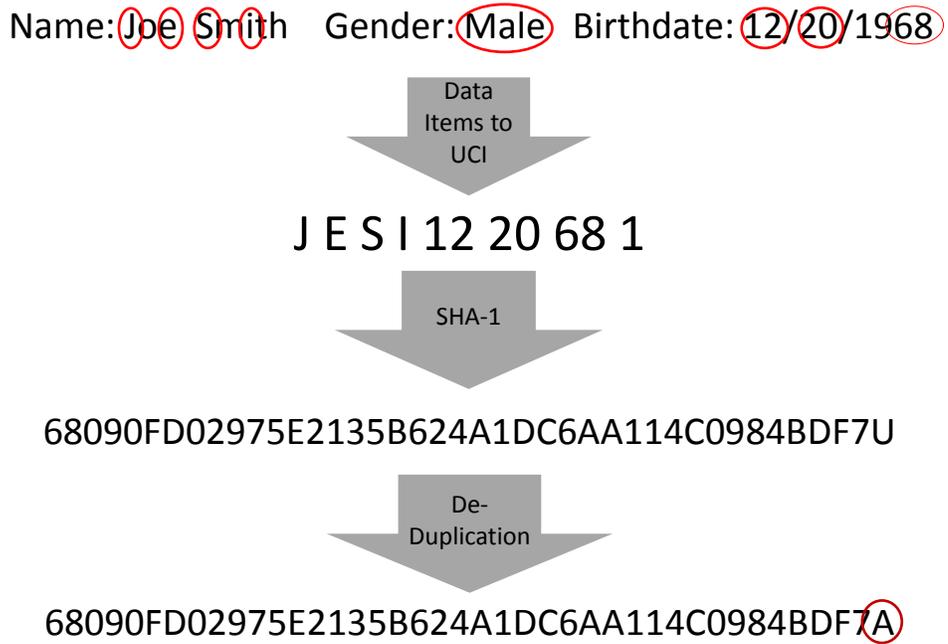
68090FD02975E2135B624A1DC6AA114C0984BDF7U



68090FD02975E2135B624A1DC6AA114C0984BDF7A

In summary, a client's demographic data are used to generate the UCI. The UCI is encrypted via a SHA-1 hashing algorithm to ensure the client cannot be identified from the UCI. The eUCIs are then de-duplicated so that each client has his or her own unique identifier.

The figure below demonstrates the eUCI creation process:



2. eUCI Application

The eUCI Application allows grantees/providers to generate eUCIs from data elements or from pre-existing UCIs. If your system does not already create UCIs, follow the instructions for Option 1. If your system already creates UCIs, skip to Option 2.

Option 1: Generating the eUCI from Data Elements

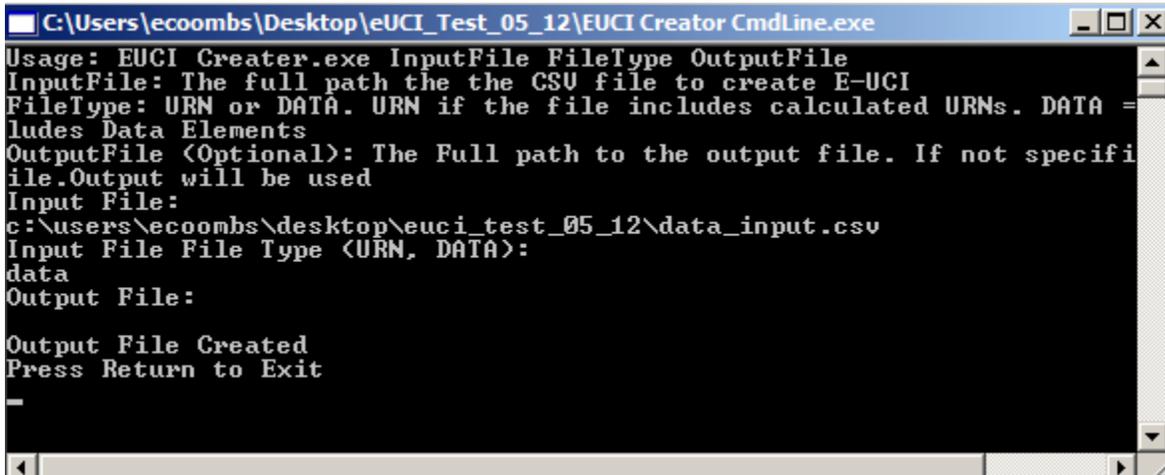
1. Go to: <https://careacttarget.org/library/using-encrypted-unique-client-identifier-euci-application-user-guide>. Download the [eUCI Generator EXE.zip](#). Save the eUCI Application zip file on your computer.
2. Extract all files from the eUCI_Generator_EXE zip file. **Save all files in the same local directory.**
3. Create an input file in the Comma-Separated Values (CSV) format, which may be created in spreadsheet programs, such as Excel, and saved as a .CSV. **Save the input file in the same directory as the files extracted from the eUCI_Generator_EXE zip.** Here are some important points about the format of your input file:
 - Data elements must be in the same order as depicted in Figure 1 or eUCIs will be inaccurate or invalid. For example, the first column of the input file should contain your local client ID (e.g. medical record, sequential number).
 - Column names should always be placed in the first, header row.
 - Note that date of birth should have one of the following formats: MM/DD/YY or MM/DD/YYYY.

Figure 1: Input File with Data Elements

	A	B	C	D	E
1	ClientID	First Name	Last Name	DOB	Gender
2	573926183	Carol	Bright	11/18/1974	2
3	584726395	Sean	Smith	7/23/1969	1
4	916294058	Shane	Swift	7/23/1969	1
5					

4. Open the EUCI Creator CmdLine.exe file by double clicking on the icon or by using this command prompt (start>run>"cmd">"directory\EUCI Creator CmdLine.exe") (Figure 2). The benefit of using a command prompt is that you can paste directories into the application by using the right click>paste mouse option.

Figure 2: Interface of the EUCI Creator CmdLine.exe File (from Data Elements)



5. Specify the location of the input file. **Make sure the directory name is exact!** Specify that the Input File type is “DATA.”
6. Specify the location of the output file containing the eUCIs. If the output file location is not specified, the output file will be located in the same directory as the input file and will be named the same as the input file but with “output” appended.
7. **De-duplicate your eUCIs.** Figure 3 demonstrates the output file. Note that the 41st character defaults to “U”. If multiple records have the same eUCI, you must return to your original data, merge all records that belong to the same client, and run the eUCI Application again. If you get identical eUCIs that belong to *different* clients, you must change the final digit of the eUCI as a separate process after using the eUCI Application.

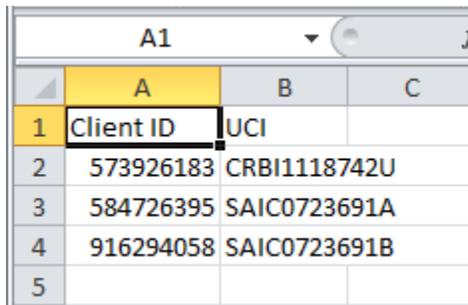
Figure 3: Output File with eUCIs (from Data Elements)

A1		ClientID				
	A	B	C	D	E	F
1	ClientID	UCI				
2	573926183	E1E6C2B93D45F2AA492776C3CF4AFF74BF00CD24U				
3	584726395	5DA53D5589A7BA3A662638AF81535CAA78664140U				
4	916294058	5DA53D5589A7BA3A662638AF81535CAA78664140U				
5						

Option 2: Generating the eUCI from the UCI

1. Go to: <https://careacttarget.org/library/using-encrypted-unique-client-identifier-euci-application-user-guide>. Download the [eUCI Generator EXE.zip](#). Save the eUCI Application zip file on your computer.
2. Extract all files from the eUCI_Generator_EXE zip file. **Save all files in the same local directory.**
3. Create an input file in the Comma-Separated Values (CSV) format, which may be created in spreadsheet programs, such as Excel, and saved as a .CSV. **Save the input file in the same directory as the files extracted from the eUCI_Generator_EXE zip.** Here are some important points about the format of your input file, as depicted in Figure 4:
 - The first column of the input file should contain your local client ID (e.g. medical record, sequential number).
 - Column names should always be placed in the first, header row.
 - You should de-duplicate your data now if your system has not already done it for you by adding a 12th character on the UCI. This 12th character becomes the 41st character of the eUCI. If you have multiple clients with the same UCI, you should add “A”, “B”, or “C” to distinguish clients. This letter change will then carry over into the eUCI and you won’t have to do the de-duplication step later!

Figure 4: Input File with UCIs



	A	B	C
1	Client ID	UCI	
2	573926183	CRBI1118742U	
3	584726395	SAIC0723691A	
4	916294058	SAIC0723691B	
5			

4. Open the EUCI Creator CmdLine.exe file by double clicking on the icon or by using this command prompt (start>run>”cmd”>”directory\EUCI Creator CmdLine.exe”) (Figure 5). The benefit of using this command prompt is that you can paste directories into the application by using the right click>paste mouse option.

Figure 5: Interface of the EUCI Creator CmdLine.exe File (from UCIs)

```

C:\Users\ecoombs\Desktop\euCI_Test_05_12\EUCI Creator CmdLine.exe
Usage: EUCI Creator.exe InputFile FileType OutputFile
InputFile: The full path the the CSU file to create E-UCI
FileType: URN or DATA. URN if the file includes calculated URNs. DATA = File inc
ludes Data Elements
OutputFile <Optional>: The Full path to the output file. If not specified InputF
ile.Output will be used
Input File:
c:\users\ecoombs\desktop\euCI_test_05_12\uci_input.csv
Input File File Type <URN, DATA>:
urn
Output File:

Output File Created
Press Return to Exit

```

- Specify the location of the input file. **Make sure the directory name is exact!** Specify that the Input File type is "URN."
- Specify the location of the output file containing the eUCIs. If the output file location is not specified, the output file will be located in the same directory as the input file and will be named the same as the input file but with "output" appended. Figure 6 demonstrates the output file.

Figure 6: Output File with eUCIs (from UCIs)

A1		Client ID				
	A	B	C	D	E	F
1	Client ID	UCI				
2	573926183	E1E6C2B93D45F2AA492776C3CF4AFF74BF00CD24U				
3	584726395	7674D69DAA991B35935C3CBE45676EE6D92DDE47A				
4	916294058	7674D69DAA991B35935C3CBE45676EE6D92DDE47B				
5						

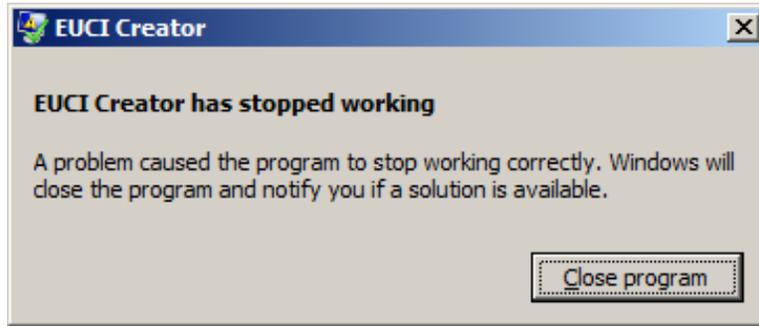
Notes:

- The output file does not retain the data elements from the input file.
- The 41st letter of the eUCI is the same as the 12th letter of the original UCI inputs.

Avoiding Common Errors

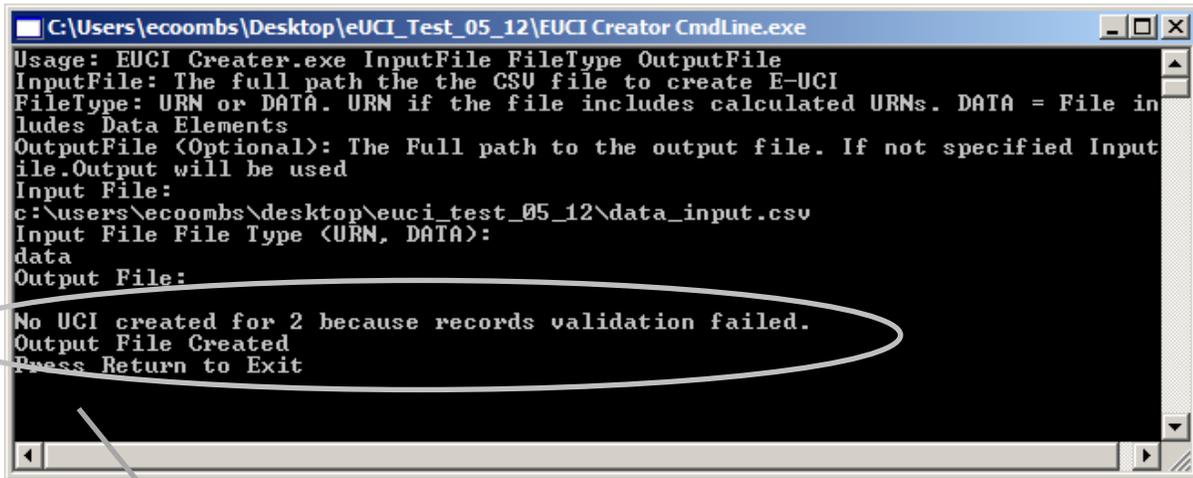
If you receive an error message, you may have made a common mistake. Below, we present common error messages and potential causes.

Error Message 1: eUCI Application Stops Working, No File Created



- The DLL (UCI_Generator.dll) and the executable file (EUCI Creator CmdLine.exe) are in different directories.
- The input file is not in the same directory as the DLL and executable files.
- You made a typo in the directory name of your input file.
- Your input file is not in the CSV format.
- Your input file is open.

Error Message 2: A File is Created with Missing eUCIs



```
C:\Users\ecoombms\Desktop\eUCI_Test_05_12\EUCI Creator CmdLine.exe
Usage: EUCI Creator.exe InputFile FileType OutputFile
InputFile: The full path the the CSU file to create E-UCI
FileType: URN or DATA. URN if the file includes calculated URNs. DATA = File in
ludes Data Elements
OutputFile <Optional>: The Full path to the output file. If not specified Input
ile.Output will be used
Input File:
c:\users\ecoombms\desktop\euci_test_05_12\data_input.csv
Input File File Type <URN, DATA>:
data
Output File:
No UCI created for 2 because records validation failed.
Output File Created
Press Return to Exit
```

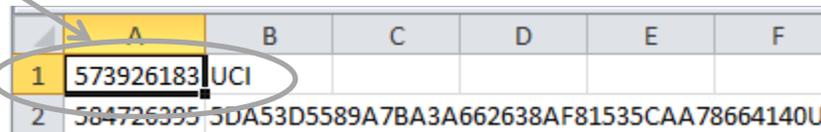
Resulting
output file

	A	B	C	D	E	F
1	ClientID	UCI				
2	573926183					
3	584726395	5DA53D5589A7BA3A662638AF81535CAA78664140U				
4	916294058					

- Your input file is missing data elements.
- Data elements in the input file are in an invalid format.

Some errors can only be detected by reviewing the output file. For example, the below figure demonstrates an output file where the input file has no header row. The first record is not assigned an eUCI.

Error Message 3: An eUCI is Not Assigned to the First Row



	A	B	C	D	E	F
1	573926183	UCI				
2	584726395	5DA53D5589A7BA3A662638AF81535CAA78664140U				

Other errors cannot immediately be detected at all. For example, if you switch the order of the first and last name, eUCIs will be created, but they will be incorrect. To ensure that you are creating eUCIs correctly with the eUCI Application, you can send some test eUCIs to Data.TA@CAIglobal.org for verification.

3. Steps for Developers: Creating the eUCI within a Data System

Attention programmers! Developers of RSR-Ready Systems and ADR-Ready Systems or grantees/providers with large data systems may want to embed the eUCI generation function within their systems. The instructions for this process are below.

1. Go to: <https://careacttarget.org/library/using-encrypted-unique-client-identifier-euci-application-user-guide>. Download the [eUCI Generator DLL.zip](#). Save the eUCI Application zip file on your computer.
2. Extract the eUCI Generator.dll from the eUCI_Generator_DLL zip file.
3. Open the source code to your data system. Input the code needed to run the UCI Generator.dll (in grey text below) into the source code. Comments noting the function of each line of code are in bolded text.

To call a UCI object, using a pre-created UCI:

```
Dim ClientInfo As New URN(sURN)
```

OR

To create the UCI with data elements:

```
Dim ClientInfo As New URN(FirstName, LastName, DOB, GenderCode, sURN)
```

To prepare the UCI for encryption:

```
Dim URN As String = ClientInfo.BaseURN & ClientInfo.URNSuffix
```

Note: The final character will not be encrypted with the other characters of the URN. It will be attached as the 41st character.

To instantiate the eUCI Generator:

```
Dim eUCIMaker As New GenerateUCI
```

To encrypt the UCI and store the eUCI:

```
Dim eUCI As String = eUCIMaker.GetUCI(URN)
```