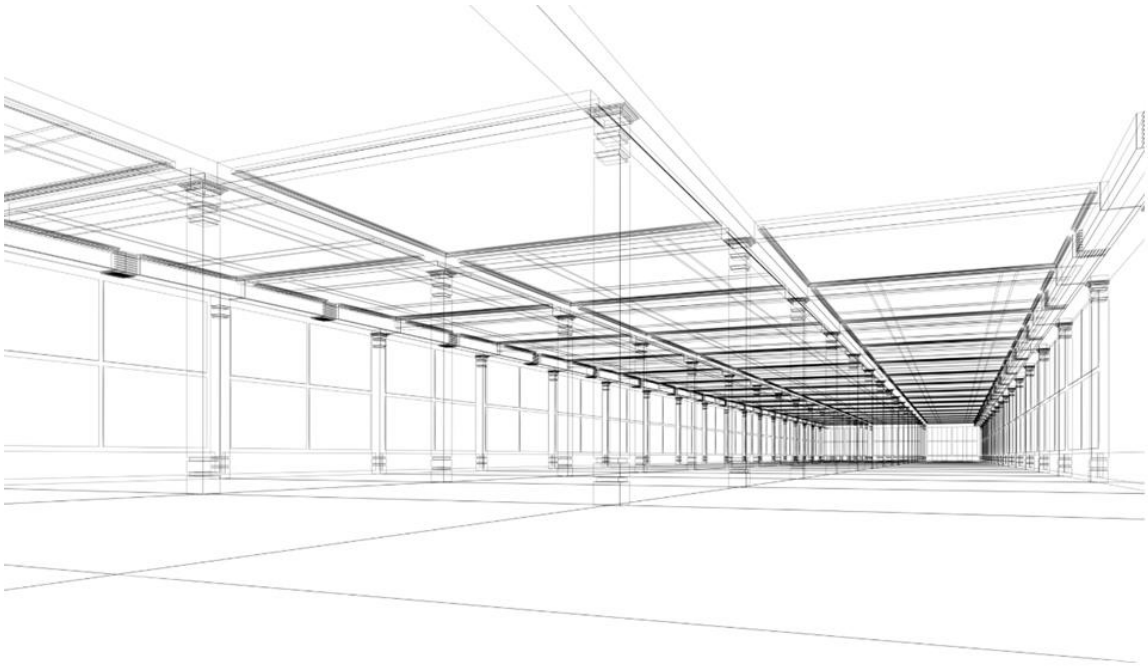
*Architectural Thinking Workshop*

# Model Answer - Requirements Specification



Version: 7

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# 1 Introduction

## 1.1 Purpose of this document

This document provides a system requirements baseline for the new Bolumbia's Electronic Census System (ECS) that is the subject of the Architectural Thinking Workshop course. It is a model answer provided to students at the end of the Requirements exercise to be used as a consistent basis for the solution to be developed throughout the rest of the course.

The following topics are covered:

- We define the User Groups that interact with the ECS and the roles they play. That is, we define the Actors, including human and system actors.
- We provide a System Context showing the Actors that interact with our system. This is shown from a functional point of view showing the functional Exchanges between actors and the target ECS.
- We provide a comprehensive Use Case model and define the key use cases in detail.

Non-Functional requirements are defined at the high level. In real engagements further and more comprehensive non-functional requirements analysis would be required.

## 1.2 Reading Guide

This document should be read in conjunction with the Case Study Background document [1] which provides the client and project background, business goals and business requirements. Together, these two documents should be sufficient to define a viable solution for the new ECS system.

## 1.3 References

**Table 1. References**

| No | ID | Document Title |
|---|---|---|
| [1] | AT_CS00 | Case Study Background |

# 2 System Context

## 2.1 Actors

The following table shows the list of human and system actors that interact with the ECS.

**Table 2 - Actors**

| *Actor* | *Type* | *How many* | *Nature of their system usage* | *Location and environment* |
|---|---|---|---|---|
| Respondent | Human (interacting with a personal computer or mobile device) | Up to 23M | The main interaction with the system is to register, complete and submit the Census and view personal information. | Anywhere in Bolumbia |
| Census Help Desk user | Human | 35 | Receives calls from the general public and troubleshoots reported incidents. | DoS Offices (Capital City) |
| DoS Electronic Census Processing | System | 1 | Receives and processes respondent data, collector notifications and reports. | In the DoS data center (Capital City) |

## 2.2 System context

The following diagram is the System Context for ECS showing ECS as a *black box*, the external actors that interact with ECS and what they do. Note that the use case section provides more detail about the nature of the interaction between the actors and ECS.

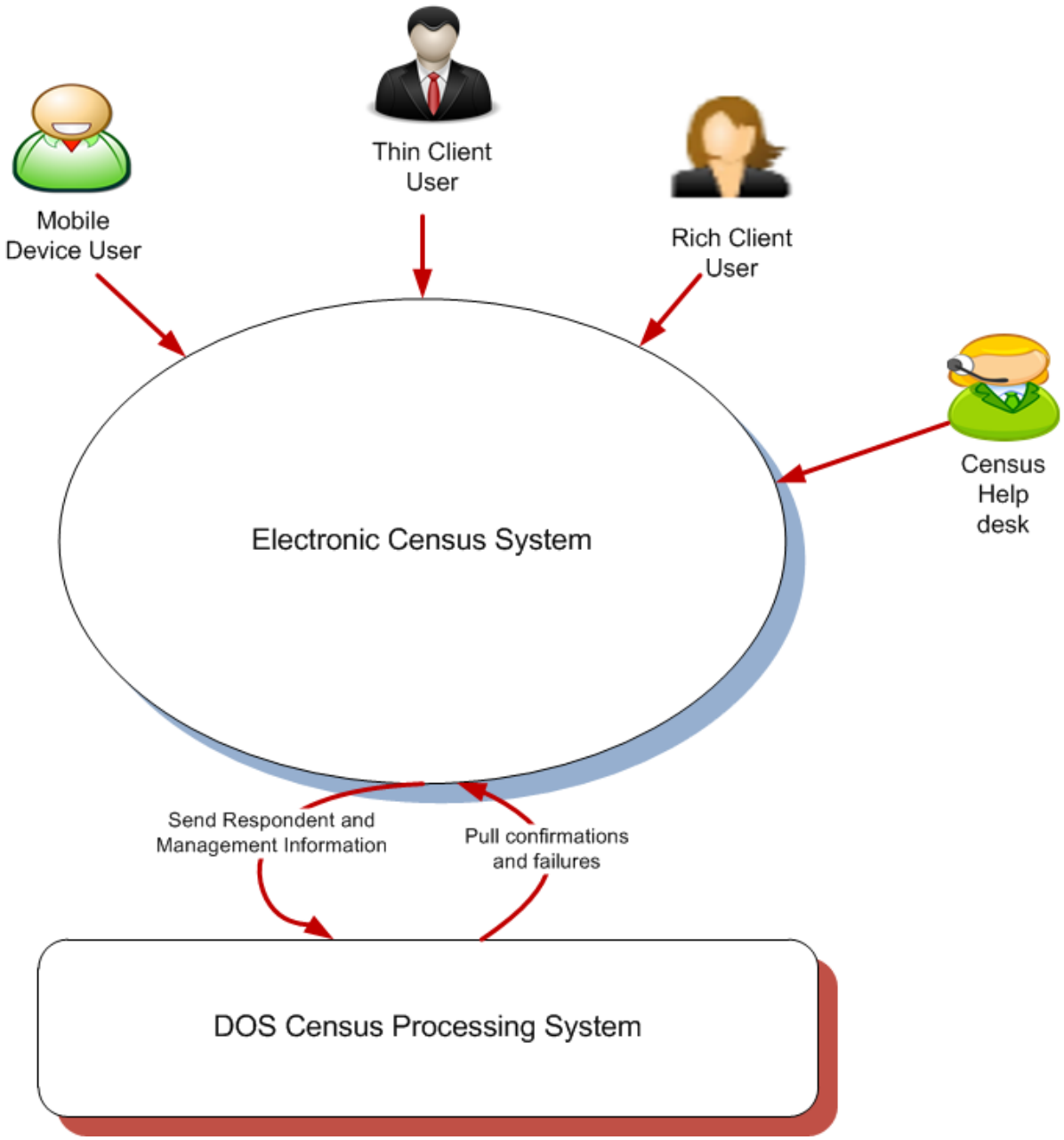


Figure 1 - System Context

It should be noted that the diagram depicts three distinct types of respondents as follows:

- Respondents using mobile devices to fill in their census forms (in either connected or disconnected mode);
- Respondents using their browser to fill in their census forms (most respondents in this category will be using rich client version of the UI as it is one intended to be commonly used);

Small population of the respondents with disabilities will be using a thin client (HTML only) version of the UI.

# 3 Use Cases

## 3.1 Use Case Model

The following diagram and associated table provide an overview of the system functionality required.

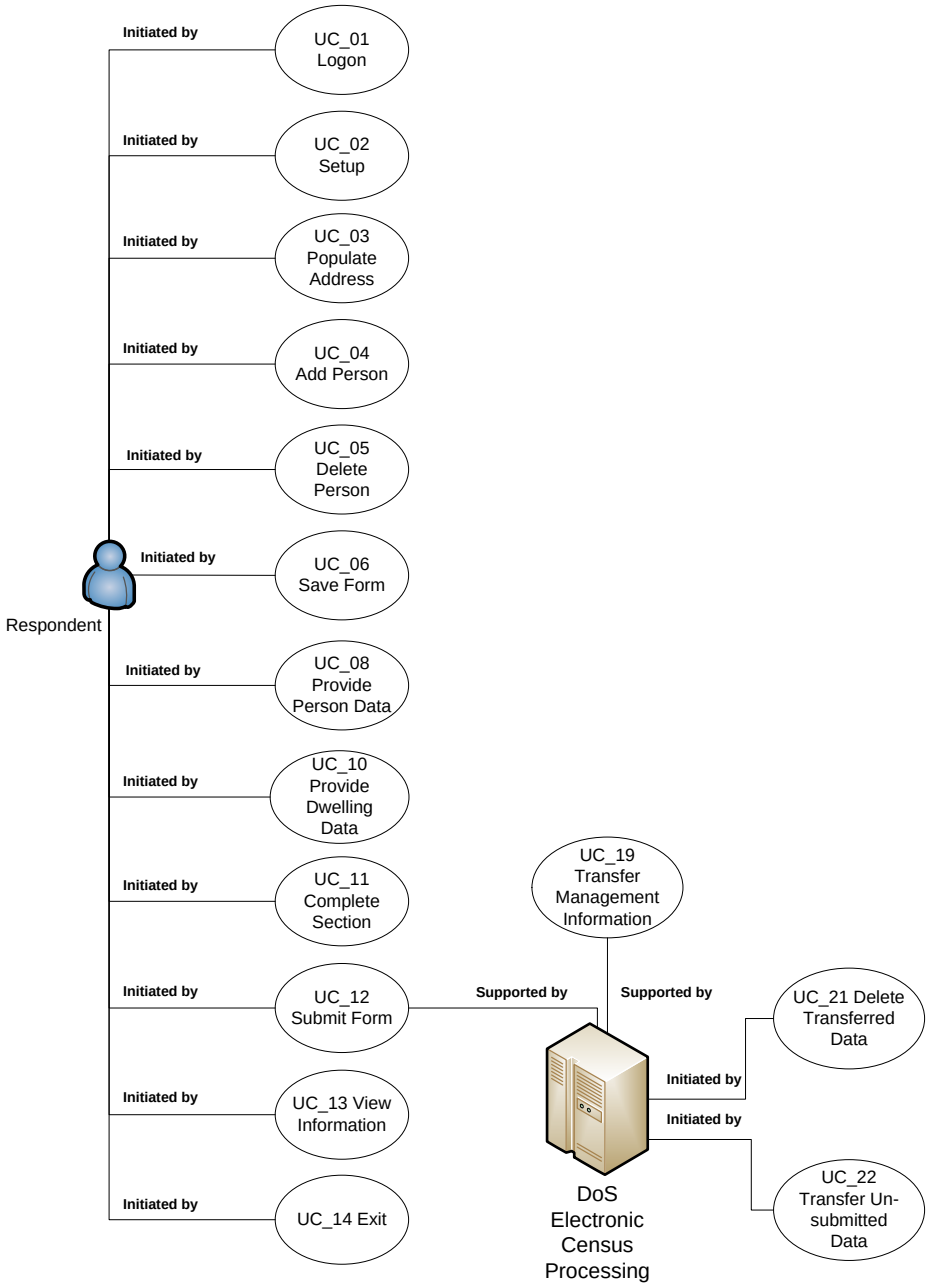


Figure 2 - Use Case Model Diagram

Table 3 - Use Case Overview

| *User Case ID* | *Use case name* | *Description* |
|---|---|---|

| *User Case ID* | *Use case name* | *Description* |
|---|---|---|
| UC_01 | Logon | The Respondent logs onto the System using a Census Form Number (CFN) and Electronic Census Number (ECN) which constitute logon credentials.<br>Following successful logon, the Respondent is presented with the ECS Census Form. |
| UC_02 | Setup | The Census Form can contain a list of up to 10 people residing in the dwelling on Census night. Setup is used to capture the number of persons present on Census night to configure the person section. |
| UC_03 | Populate Address | Addresses must be completed for all dwellings. |
| UC_04 | Add Person | The Respondent must be able to add, and modify a person at any time prior to submission. For those persons added, where the Respondent indicates that they are to be included in the Census, a new person record is also created for them. |
| UC_05 | Delete Person | The Respondent must be able to delete a person at any time prior to submission. |
| UC_06 | Save Form | A Save of Census data may be requested at the completion of a page, section, on exit or at submission whilst logged onto the System with a current session. The data is stored for later retrieval by the Respondent. |
| UC_08 | Provide Person Data | The Respondent provides answers to the questions contained in the person section. |
| UC_10 | Provide Dwelling Data | The Respondent provides answers to the questions contained in the dwelling section. |
| UC_11 | Complete Section | The Respondent may request completion of a Census section once mandatory questions have been answered. The completion process entails an implicit save initiated by the System. When all sections have a status of complete, the Respondent may request submission of their data to the DoS. |
| UC_12 | Submit Form | The Respondent may submit their Census data only once to the DoS, after completing all sections. After successful submission, the System issues the Respondent with a receipt number. Any subsequent access to the System will provide the Respondent with their receipt number. Respondent is prevented from making changes or resubmitting their Census form. |
| UC_13 | View Information | The Respondent may at any point request a viewing of extra information. This includes links such as Copyright, Conditions of Use, Privacy and Security and Contextual Help. |
| UC_14 | Exit | The Respondent may exit the System at any time with or without saving their Census data. If the Respondent exits without first saving any changes, the System provides the opportunity to save before exiting. The Respondent may decline this opportunity, which results in unsaved data being discarded. |
| UC_19 | Transfer Management Information | The System transfers management information data to the DoS. |
| UC_21 | Delete Transferred Data | The System receives confirmation from the DoS of Respondent Census data that can be deleted, identified by ECN. For each ECN received, the System deletes the corresponding Respondent data. |

| *User Case ID* | *Use case name* | *Description* |
|---|---|---|
| UC_22 | Transfer Un-submitted Data | The System transfers un-submitted Respondent data to the DoS on request. |

## 3.2 Use Case descriptions

### 3.2.1 UC_01 Logon

| *User Case ID & Name* | *UC_01 Logon* |
|---|---|
| Brief Description | The Respondent logs onto the System using a Census Form Number (CFN) and Electronic Census Number (ECN) which constitute logon credentials.<br><br>Following successful logon, the Respondent is presented with the first section of the ECS Census Form. |
| Goal | The Respondent is provided with the ECS Census Form. |
| Primary Actor | Respondent |
| Secondary Actor(s) | None |
| Preconditions | 1. CFN & ECN held by respondent.<br>2. Internet access available to respondent.<br>3. Within enumeration period.<br>4. Application available. |
| Basic Flow of Events | 1. Respondent accesses welcome page containing information about ECS, minimum system requirements and accessibility.<br>2. Respondent requests logon to System.<br>3. System records session start time for management information.<br>4. System records type and version of Respondent operating system for management information.<br>5. System records type and version of Respondent browser for management information.<br>6. System provides logon input request.<br>7. Respondent enters CFN CWL.<br>8. Respondent enters CFN CWL check digit.<br>9. Respondent enters CFN RNO.<br>10. Respondent enters CFN RNO check digit.<br>11. Respondent enters ECN.<br>12. Respondent requests access to System.<br>13. System confirms that CFN is valid.<br>14. System confirms that ECN is valid.<br>15. System confirms that ECN is not currently locked due to in excess of 5 failed logon attempts and time delay.<br>16. System confirms that CFN has not been subject to a large quantity of CFN activity (10 logins).<br>17. System confirms that submission has not occurred for the ECN entered.<br>18. System confirms that the ECN entered is not bound to a CFN.<br>19. System records the binding of the entered CFN and ECN combination.<br>20. System requests encryption of the ECN with the DoS public key from the Security System.<br>21. System records successful logon for management information.<br>22. System records data status change for Respondent to "logged on but no data saved" for management information.<br>23. System provides the Respondent with the first section of the form. |

| Alternative Flows | |
|---|---|
| Alternative Path 1: Respondent enters invalid CFN with a valid ECN. | a. At step 13: System determines that CFN is not valid.<br>b. At step 14: System determines that ECN is valid.<br>c. System initiates Respondent time delay lockout.<br>d. System provides Respondent with error message: code 920. Refer to Section 5 for wording.<br>e. System records generation of error message for management information.<br>f. System records failed logon attempt for management information.<br>g. Repeat step 6. |
| Alternative Path 2: Respondent re-enters invalid CFN with a valid ECN. | a. Continue from Use Case 01, alternate path 1, Step g.<br>b. At step 13: System determines that CFN is not valid<br>c. System determines that re-entered CFN is the same as that originally entered, then it is likely the respondent has entered the CFN as it appears on their form<br>d. At step 14: System determines that ECN is valid<br>e. Continue at step 15. |
| Alternative Path 3: Respondent enters invalid ECN with a valid CFN. | a. At step 13: System determines that CFN is valid.<br>b. At step 14: System determines that ECN is not valid.<br>c. System initiates Respondent time delay lockout.<br>d. System provides Respondent with error message: code 830. Refer to Section 5 for wording.<br>e. System records generation of error message for management information.<br>f. System records failed logon attempt for management information.<br>g. Repeat step 6. |
| Alternative Path 4: Respondent enters invalid ECN and invalid CFN. | a. At step 13: System determines that CFN is not valid.<br>b. At step 14: System determines that ECN is not valid.<br>c. System initiates Respondent time delay lockout.<br>d. System provides Respondent with error message: code 450. Refer to Section 5 for wording.<br>e. System records generation of error message for management information.<br>f. System records failed logon attempt for management information.<br>g. Repeat step 6. |
| Alternative Path 5: System determines respondent is temporarily locked out. | h. At step 15: System determines that ECN has is temporary locked due to in excess of 5 failed logon attempts.<br>i. System provides Respondent with error message: code 550. Refer to Section 5 for wording.<br>j. System records generation of error message for management information.<br>k. System records failed logon attempt for management information.<br>l. Repeat step 6. |
| Alternative Path 6: System detects "large" quantity of CFN logon activity. | a. At step 16: System determines that logons with CFN provided has exceeded limit (10 logins).<br>b. System flags data associated with CFN as suspect.<br>c. System initiates CFN lockout.<br>d. System provides Respondent with error message: code 540. Refer to Section 5 for wording.<br>e. System records generation of error message for management information.<br>f. System records failed logon attempt for management information.<br>g. Repeat step 6. |

| | |
|---|---|
| Alternative Path 7: System determines submission has occurred for ECN. | a. At step 17: System determines that submission has occurred for the ECN entered.<br>b. System provides Respondent with thank you page which also displays the receipt number.<br>c. System records failed logon attempt for management information.<br>d. Repeat step 6. |
| Alternative Path 8: Respondent logs back in. | a. At step 18: System determines that the ECN entered is bound to a CFN.<br>b. System determines that the ECN is bound to the CFN entered.<br>c. System displays section and page where form was left off during previous session.<br>d. Use case ends. |
| Alternative Path 9: ECN bound to another CFN. | a. At step 18: System determines that the ECN entered is bound to a CFN.<br>b. System determines that the ECN is bound to a CFN that differs to that entered.<br>c. System provides Respondent with error message: code 740. Refer to Section 5 for wording.<br>d. System records generation of error message for management information.<br>e. System records failed logon attempt for management information.<br>f. Repeat step 6. |
| Special Requirements | None. |

### 3.2.2 UC_02 Setup

| ***User Case ID & Name*** | ***UC_02 Setup*** |
|---|---|
| Brief Description | The Census Form can contain a list of up to 10 people residing in the dwelling on Census night. Setup is used to capture the number of persons present on Census night to configure the person section. |
| Goal | The Respondent sets up the number of person sections. |
| Primary Actor | Respondent |
| Secondary Actor(s) | None |
| Preconditions | 1. Respondent logged into System.<br>2. Respondent's session is current (not timed out).<br>3. Application available. |
| Basic Flow of Events | 1. Respondent updates the number of persons present on setup form.<br>2. System verifies number of persons present.<br>3. System configures the person section to support the number of persons present. |
| Alternative Flows | |
| Alternative Path 1: Number of persons present not updated. | a. At step 1: Respondent does not provide the number of persons present (i.e. leaves field blank) and attempts to continue.<br>b. At step 2: System provides Respondent with error message: 1010. Refer to Section 5 for wording.<br>c. End use case. |
| Alternative Path 2: Respondent enters 0 for persons present. | a. At step 1: Respondent enters '0' as the number of Persons Present.<br>b. At step 2: System informs Respondent that they have indicated no one is present in the household and they are not required to complete the Census Form, message code: 1080. Refer to Section 5 for wording.<br>c. End use case. |
| Alternative Path 3: Respondent enters more than 10 persons present. | a. At step 1: Respondent enters 'number greater than 10 as the number of Persons Present.<br>b. At step 2: System advises Respondent 'that they will need to complete two Census forms, message code: 1037. Refer to Section 5 for wording.<br>c. Respondent chooses to continue<br>d. System created the maximum six person form<br>e. End use case. |

| *User Case ID & Name* | *UC_02 Setup* |
|---|---|
| Special Requirements | None. |

### 3.2.3 UC_03 Populate Address

| *User Case ID & Name* | *UC_03 Populate Address* |
|---|---|
| Brief Description | Address must be completed for all dwellings. |
| Goal | The Respondent populates the Address section. |
| Primary Actor | Respondent |
| Secondary Actor(s) | None |
| Preconditions | 1. Respondent logged into System.<br>2. Respondent's session is current (not timed out).<br>3. Application available.<br>4. Respondent has updated the number of persons present on setup form. |
| Basic Flow of Events | 1. Respondent enters dwelling data for question 1.<br>2. System prompts respondent to complete section.<br>3. Go to use case Complete Section. |
| Alternative Flows | |
| Alternative Path 1: Respondent navigates to setup page. | a. At step 2: Respondent navigates to Setup Page.<br>b. System provides Respondent with error message: code 1206. Refer to Section 5 for wording.<br>c. End Use Case |
| Special Requirements | None. |

### 3.2.4 UC_04 Add Person

| *User Case ID & Name* | *UC_04 Add Person* |
|---|---|
| Brief Description | The Respondent must be able to add, and modify a person at any time prior to submission. For those persons added, where the Respondent indicates that they are to be included in the Census, a new person record is also created for them. |
| Goal | The Respondent adds a person record. |
| Primary Actor | Respondent |
| Secondary Actor(s) | None |
| Preconditions | 1. Respondent logged into System.<br>2. Respondent's session is current (not timed out).<br>3. Application available. |
| Basic Flow of Events | 1. Respondent requests addition of new person.<br>2. System generates a person form.<br>3. System maintains respondent current form location (i.e. they are not presented with the new person form). |

| Alternative Flows | |
|---|---|
| Alternative Path 1:<br>Add person maximum reached. | a. At step 1: System Identifies Maximum persons reached<br>b. System Informs respondent that maximum 10 persons is reached, message code: 1037. Refer to Section 5 for wording.<br>c. End use case. |
| Special Requirements | None. |

### 3.2.5 UC_05 Delete Person

| ***User Case ID & Name*** | ***UC_05 Delete Person*** |
|---|---|
| Brief Description | The Respondent must be able to delete a person at any time prior to submission. |
| Goal | The Respondent deletes a person record. |
| Primary Actor | Respondent |
| Secondary Actor(s) | None |
| Preconditions | 1. Respondent logged into System.<br>2. Respondent's session is current (not timed out).<br>3. Application available.<br>4. ECN type is PD.<br>5. There are more than three people on Form. |
| Basic Flow of Events | 1. Respondent nominates person record to delete.<br>2. Respondent has requested the deletion of person 2.<br>3. System identifies Person 3 onwards has answered relationship questions therefore the relationship question is re-asked.<br>4. Respondent provides new response to answered relationship question for each person<br>5. System requests confirmation of deletion from Respondent<br>6. Respondent confirms deletion<br>7. System removes the selected person record.<br>8. System updates person number data for remaining person records. (E.g. Person 2 is deleted the system will move the respondents up for the relationship data i.e.: Person 3 become person 2, person 4 become person 3 etc.).<br>9. System provides respondent with PD Address section.<br>10. End use case. |
| Alternative Flows | |
| Alternative Path 1:<br>Delete person when person section not selected. | a. At step 1: Respondent requests deletion of person when not on person form.<br>b. System advises Respondent that they must select a person first, then request delete, message: code 1090. Refer to Section 5 for wording.<br>c. End use case |
| Alternative Path 2:<br>Delete person 1. | a. At step 2: Respondent nominates person 1 record for deletion. (Note: When the first person is deleted the second person (now becoming the first person) will automatically be included on the form, this is because the first person must be on the form).<br>b. Continue at Step 3 |
| Alternative Path 3:<br>Respondent declines person record deletion. | a. At step 6: Respondent declines deletion of person record and the system returns the respondent to where they came from (Previous Page).<br>b. End use case. |

| ***User Case ID & Name*** | ***UC_05 Delete Person*** |
|---|---|
| Alternative Path 4: Delete person 1 when only 1 person on form. | a. At Step 2: Respondent has requested the deletion of Person 1 when only 1 Person on Form.<br>b. Continue at step 5<br>c. At Step 8: System identifies that no other persons are remaining on the form.<br>d. System presents respondent with Address form.<br>e. System informs Respondent that they have indicated no one is present in the household and they are not required to complete the Census Form, message code: 1080. Refer to Section 5 for wording.<br>f. End use case. |
| Alternative Path 5: Request to delete person 3 onwards. | a. At step 2: Respondent has requested person 3 onwards for deletion. System does not need to re-ask relationship questions as the relationship questions always refers to person 1 and 2, and in this alternate the respondent is not deleting person 1 or 2. Continue at Step 5.<br>b. End use case. |
| Alternative Path 6: Relationship questions required. | a. At step 4: Respondent does not provide new responses to relationship questions<br>b. Respondent confirm deletion<br>c. System informs Respondent that Relationship Questions must be answered to confirm deletion message: code 1010. Refer to Section 5 for wording.<br>d. Continue at Step 5. |
| Alternative Path 7: Relationship questions not answered. | a. At step 3: System identifies Person 3 onwards has not answered relationship questions. The system does not require the relationship question answered as the respondent will get the opportunity to answer this question when completing the person section.<br>b. Continue Step 5. |
| Special Requirements | None. |

### 3.2.6 UC_06 Save Form

| ***User Case ID & Name*** | ***UC_06 Save Form*** |
|---|---|
| Brief Description | A Save of Census data may be requested at the completion of a page, section, on exit or at submission whilst logged onto the System with a current session. The data is stored for later retrieval by the Respondent. |
| Goal | The Respondent's current Census data is stored. |
| Primary Actor | Respondent |
| Secondary Actor(s) | None. |
| Preconditions | 1. Respondent logged into System.<br>2. Respondent's session is current (not timed out).<br>3. Application available.<br>4. Respondent has requested a section completion, exit and save or submit. |

| ***User Case ID & Name*** | ***UC_06 Save Form*** |
|---|---|
| Basic Flow of Events | 1. Census data requested to be saved by Respondent<br>2. System determines that data has changed since last save form.<br>3. System records request to save for management information.<br>4. Sequenced out data cleared in preparation for Save.<br>5. System performs logical data validation on the Respondent's Census data to be saved.<br>6. System stores Respondent Census data.<br>7. System determines that the save process finished successfully.<br>8. System sets section status to "partially complete" from its initial "incomplete" status.<br>9. System confirms that no other forms have been completed for Respondent.<br>10. System records data status change for Respondent to "some data saved but none complete" for management information.<br>11. System advises Respondent that the save process finished successfully. |
| Alternative Flows | |
| Alternative Path 1:<br>No change to data. | a. At step 2: System determines that no data has changed since last save.<br>b. End use case. |
| Alternative Path 2:<br>Logical validation failure. | a. At step 5: Logical data validation fails.<br>b. System provides Respondent with an appropriate error message. (see 5 Appendix 1: Error messages)<br>c. End use case. |
| Alternative Path 3:<br>Save failure. | a. At step 7: System determines that the save process failed.<br>b. The System records the failure.<br>c. End use case. |
| Alternative Path 4:<br>Respondent has completed sections. | a. At step 9: System determines that other section completed by this Respondent have a "completed" status.<br>b. System records data status change for Respondent to "some data saved and some complete" for management information.<br>c. Continue at step 10. |
| Special Requirements | Questions will need to be dynamically changed base on answers to previous questions. For example, if the answer to Q12: “Country of birth”, is Bolumbia then the next question Q13: “Years of arrival in Bolumbia”, should be changed to read: “Based on your response to question 12, you are not required to answer this question.”<br>Answers to questions should be dynamically populated based on answers. For example, if the respondent answers “the same as the previous address” the address is populated automatically from the previous data.<br>The definitive list of questions, validation and dynamic behavior will be defined during detailed design. |

### 3.2.7 UC_08 Provide Person Data

| ***User Case ID & Name*** | ***UC_08 Provide Person Data*** |
|---|---|
| Brief Description | The Respondent provides answers to the questions contained in the person section. |
| Goal | The Respondent enters all mandatory and optional person data. |
| Primary Actor | Respondent |
| Secondary Actor(s) | None. |
| Preconditions | 1. Respondent logged into System.<br>2. Respondent's session is current (not timed out).<br>3. Application available.<br>4. Respondent has provided the number of persons present on setup (see Setup Use Case). |
| Basic Flow of Events | 1. System displays page with person questions.<br>2. Respondent answers questions.<br>3. Respondent requests next page.<br>4. System detects there are more pages to be displayed.<br>5. System displays the next page.<br>6. Use case continues from step 2. |
| Alternative Flows | |
| Alternative Path 1: System detects last page | a. System detects this is the last page on step 4.<br>b. System prompts respondent to complete section.<br>c. Go to use case Complete Section. |
| Alternative Path 2: Respondent navigates to another section. | a. Respondent requests navigation to another section without completing the Person section.<br>b. System data will be captured with the user's session.<br>c. System navigates Respondent to requested section.<br>d. End use case. |
| Special Requirements | Questions will need to be dynamically changed base on answers to previous questions. For example, if the answer to Q12: “Country of birth”, is Bolumbia then the next question Q13: “Years of arrival in Bolumbia”, should be changed to read: “Based on your response to question 12, you are not required to answer this question.”<br>Answers to questions should be dynamically populated based on answers. For example, if the respondent answers “the same as the previous address” the address is populated automatically from the previous data.<br>The list of questions can be found in Ref [1] Case Study Background. |

### 3.2.8 UC_10 Provide Dwelling Data

| *User Case ID & Name* | *UC_10 Provide Dwelling Data* |
|---|---|
| Brief Description | The Respondent provides answers to the questions contained in the dwelling section. |
| Goal | The Respondent enters all mandatory and optional dwelling data. |
| Primary Actor | Respondent |
| Secondary Actor(s) | None. |
| Preconditions | 1. Respondent logged into System.<br>2. Respondent's session is current (not timed out).<br>3. Application available. |
| Basic Flow of Events | 1. System displays first page of dwelling questions<br>2. Respondent answers questions Q52 to Q54<br>3. System displays second page of dwelling questions<br>4. Respondent answers questions Q55 to Q61<br>5. System prompts respondent to complete section<br>6. Complete Section use case invoked<br>7. Use case ends |
| Alternative Flows | |
| Alternative Path 1: Respondent navigates to another section. | a. Respondent requests navigation to another section without completing the Person Form<br>b. System data will be captured with the user's session.<br>c. System navigates Respondent to requested form.<br>d. End use case. |
| Special Requirements | The list of questions can be found in Ref [1] Case Study Background. |

### 3.2.9 UC_11 Complete Section

| *User Case ID & Name* | *UC_11 Complete Section* |
|---|---|
| Brief Description | The Respondent may request completion of a Census section once mandatory questions have been answered. The completion process entails an implicit save initiated by the System. When all sections have a status of complete, the Respondent may request submission of their data to the DoS. |
| Goal | The Respondent's current section data is stored and the section status is set to complete. |
| Primary Actor | Respondent |
| Secondary Actor(s) | None. |
| Preconditions | 1. Respondent logged into System.<br>2. Respondent's session is current (not timed out).<br>3. Application available. |
| Basic Flow of Events | 1. Respondent requests section completion.<br>2. System records request to complete for management information.<br>3. System confirms that mandatory questions have been answered.<br>4. System performs business rules validation on the section data.<br>5. System performs steps 3 to 6 of the UC_06 Save Form use case to force an implicit auto save.<br>6. System determines that the complete process finished successfully.<br>7. System sets section status to "complete".<br>8. System records data status change for Respondent to "some data saved and some complete" for management information.<br>9. System advises Respondent that section completion finished successfully. |
| Alternative Flows | |

| *User Case ID & Name* | *UC_11 Complete Section* |
|---|---|
| Alternative Path 1: Mandatory question not answered. | a. At step 3: System determines that not all mandatory questions have responses.<br>b. System provides Respondent with error message. Please refer to 5 Appendix 1: Error messages, for the error messages to be provided.<br>c. End use case. |
| Alternative Path 2: Completion fails. | a. At step 6: The System determines that the completion process failed.<br>b. System logs the failure.<br>c. End use case. |
| Alternative Path 3: Section is already complete. | a. At step 2: Section is already complete and no changes have been made<br>b. Continue step 8. |
| Alternative Path 4: All sections completed. | a. At step 8: All sections are completed<br>b. System records data status change for Respondent to "all data saved and completed" for management information.<br>c. Continue step 9. |
| Special Requirements | None. |

### 3.2.10 UC_12 Submit Form

| *User Case ID & Name* | *UC_12 Submit Form* |
|---|---|
| Brief Description | The Respondent may submit their Census data only once to the DoS, after completing all sections. After successful submission, the System issues the Respondent with a receipt number. Any subsequent access to the System will provide the Respondent with their receipt number, they will be unable to make change or resubmit their Census. |
| Goal | The Respondent's Census is stored. The Respondent's ECN is permanently locked. The Respondent is provided with a receipt number. |
| Primary Actor | Respondent |
| Secondary Actor(s) | None. |
| Preconditions | 1. Respondent logged into System.<br>2. Respondent's session is current (not timed out).<br>3. Application available. |

| ***User Case ID & Name*** | ***UC_12 Submit Form*** |
|---|---|
| Basic Flow of Events | 1. Respondent requests Census submission page.<br>2. System provides Census submission page prompting the Respondent to verify contents and confirm as true and correct.<br>3. Respondent provides confirmation that contents are true and correct.<br>4. Respondent requests submission of Census.<br>5. System records request to submit for management information.<br>6. System verifies that the Respondent has confirmed that the contents are true and correct.<br>7. System verifies that a person section has been completed for all persons present.<br>8. System verifies that Address section has been completed.<br>9. System verifies that the dwelling section has been completed.<br>10. System determines that all data has been previously saved.<br>11. System generates 12 digit unique random receipt number.<br>12. System records receipt number, CFN, ECN, submission timestamp, Respondent address and CFN completion status for collector notification information.<br>13. System sends submitted forms to DoS Electronic Census Processing system including the completion status for collector notification information.<br>14. DoS Electronic Census Processing system acknowledges receipt<br>15. System registers submission of Census data for this ECN.<br>16. System increments submission count for management information.<br>17. System determines that the submission process completed successfully.<br>18. System records data status change for Respondent to "submitted" for management information.<br>19. System provides respondent with thank you page which contains their receipt number.<br>20. System requests Respondent to provide ECS feedback.<br>21. Respondent provides ECS feedback, check box responses and comments.<br>22. Respondent directed to Information Page. |
| Alternative Flows | |
| Alternative Path 1: Respondent declines confirmation and proceeds with submission. | a. At step 3: Respondent declines confirmation that contents are true and correct.<br>b. Continue step 4.<br>c. At step 6: System determines that the confirmation of data being true and correct has not been provided.<br>d. System provides Respondent with Submit (Confirm) Page.<br>e. The Respondent selects "Yes" to confirm that submission is to proceed.<br>f. Continue step 7. |
| Alternative Path 2: Respondent declines confirmation and cancels submission. | a. At step 3: Respondent declines confirmation that contents are true and correct.<br>b. Continue step 4.<br>c. At step 6: System determines that the confirmation of data being true and correct has not been provided.<br>d. System provides Respondent with Submit (Confirm) Page.<br>e. The Respondent selects "Back" to confirm that submission is to be cancelled.<br>f. End use case. |
| Alternative Path 3: Person section incomplete. | a. At step 7: System determines that a person section does not have a status of complete.<br>b. System provides Respondent with error message: System provides Respondent with error message: code 1060. Refer to Section 5 for wording.<br>c. End use case. |

| *User Case ID & Name* | *UC_12 Submit Form* |
|---|---|
| Alternative Path 4: Address section incomplete. | a. At step 8: System determines that the Address section does not have a status of complete.<br>b. System provides Respondent with error message: System provides Respondent with error message: code 1060. Refer to Section 5 for wording.<br>c. End use case. |
| Alternative Path 5: Dwelling section incomplete. | a. At step 9: System determines that the dwelling section does not have a status of complete.<br>b. System provides Respondent with error message: System provides Respondent with error message: code 1060. Refer to Section 5 for wording.<br>c. End use case. |
| Alternative Path 6: Sending forms and completion status to DoS fails (e.g. DoS systems unavailable) | a. At step 13: System determines that the send process failed.<br>b. The System records the failure.<br>c. The System provides the Respondent with an error message System provides Respondent with error message: code 1046. Refer to Section 5 for wording.<br>d. The System provides the Respondent with the submission page.<br>e. End use case. |
| Alternative Path 7: DoS Electronic Census Processing system does not acknowledge receipt | a. At step 14: System does not get send acknowledgement from DoS.<br>b. The System records the failure.<br>c. The System provides the Respondent with an error message System provides Respondent with error message: code 1046. Refer to Section 5 for wording.<br>d. The System provides the Respondent with the submission page.<br>e. End use case. |
| Alternative Path 8: Respondent declines to provide feedback. | a. At step 21: The Respondent declines the offer to provide ECS feedback.<br>b. Continue to step 22. |
| Special Requirements | None. |

### 3.2.11 UC_13 View Information

| *User Case ID & Name* | *UC_13 View Information* |
|---|---|
| Brief Description | The Respondent may at any point request the viewing of extra information. This includes links such as Copyright, Conditions of Use, Privacy and Security and Contextual Help. |
| Goal | The Respondent is provided with requested information. |
| Primary Actor | Respondent |
| Secondary Actor(s) | None. |
| Preconditions | 1. Respondent logged into System.<br>2. Respondent's session is current (not timed out).<br>3. Application available. |
| Basic Flow of Events | 1. Respondent requests contextual help.<br>2. System records request for contextual help for management information.<br>3. System determines the task that the Respondent is currently completing.<br>4. System provides contextual help content appropriate for the task determined in step 3. |
| Alternative Flows | |
| None | |
| Special Requirements | The Respondent can view any of the following information:<br>• Conditions of Use statement<br>• Privacy statement |

| *User Case ID & Name* | *UC_13 View Information* |
|---|---|
| | • Copyright statement<br>• User Guide, FAQ's, Login Help, Technical Help, Privacy & Security or Contact Us |

### 3.2.12 UC_14 Exit

| *User Case ID & Name* | *UC_14 Exit* |
|---|---|
| Brief Description | The Respondent may exit the System at any time with or without saving their Census data. If the Respondent exits without first saving any changes, the System provides the opportunity to save before exiting. The Respondent may decline this opportunity, which results in unsaved data being dismissed. |
| Goal | The Respondent is logged off the System. |
| Primary Actor | Respondent |
| Secondary Actor(s) | None. |
| Preconditions | 1. Respondent logged into System.<br>2. Respondent's session is current (not timed out).<br>3. Application available. |
| Basic Flow of Events | 1. Respondent requests to exit the System.<br>2. System records request to exit for management information.<br>3. System confirms that no changes have been made to Census data since last saved.<br>4. System logs off the Respondent.<br>5. System records session end time for management information.<br>6. Respondent directed to Welcome Page. |
| Alternative Flows | |
| Alternative Path 1: Respondent census data changed since last saved. | a. At step 3: System determines that the Respondent's Census data has changed since last saved.<br>b. System requests Respondent to confirm saving of Census data prior to exiting.<br>c. Respondent confirms saving of Census data.<br>d. Steps 3 to 6 of the Save Form use case.<br>e. System continues at step 4 or informs Respondent failure to save. System provides Respondent with error message: code 1041. Refer to Section 5 for wording. |
| Alternative Path 2: Respondent declines saving of census data. | a. At step 3: System determines that the Respondent's Census data has changed since last saved.<br>b. System requests Respondent to confirm saving of Census data prior to exiting.<br>c. Respondent declines saving of Census data.<br>d. Continue at step 4. |
| Special Requirements | None. |

### 3.2.13 UC_19 Transfer Management Information

| ***User Case ID & Name*** | ***UC_19 Transfer Management Information*** |
|---|---|
| Brief Description | The System transfers management information data to the DoS. |
| Goal | The System successfully transfers management information data to DoS. |
| Primary Actor | Triggered by the system [ECS] |
| Secondary Actor(s) | DoS Electronic Census Processing |
| Preconditions | 1. Application available.<br>2. DoS Electronic Census Processing system is accessible. |
| Basic Flow of Events | 1. System will be triggered to transfer Management Information data daily.<br>2. System formats Management Information data.<br>3. System transfers data to the DoS Electronic Census Processing system.<br>4. DoS Electronic Census Processing system acknowledges receipt.<br>5. System marks management data as sent. |
| Alternative Flows | |
| Alternative Path 1:<br>Data transfer fails | a. At step 3: Data transfer fails.<br>b. System will attempt again at next trigger event.<br>c. End use case. |
| Alternative Path 2:<br>DoS does not acknowledge | a. At step 4: DoS Electronic Census Processing system does not send acknowledgement.<br>b. System will attempt again at next trigger event.<br>c. End use case. |
| Special Requirements | Management records have a unique key including a date/time stamp, CFN and ECS. The DoS Electronic Census Processing system will discard duplicate records. For example, if DoS receives the records but the acknowledgement does not reach ECS. In this case ECS will re-send these records and the DoS Electronic Census Processing system will acknowledge but discard them as duplicates. |

### 3.2.14 UC_21 Delete Transferred Data

| ***User Case ID & Name*** | ***UC_21 Delete Transferred Data*** |
|---|---|
| Brief Description | The System receives confirmation from the DoS of Respondent Census data that can be deleted, identified by ECN. For each ECN received, the System deletes the corresponding Respondent data. |
| Goal | The System deletes respondent Census data for each ECN that has been confirmed as being processed by the DoS. |
| Primary Actor | DoS Electronic Census Processing |
| Secondary Actor(s) | None |
| Preconditions | 1. Application available.<br>2. DoS available. |
| Basic Flow of Events | 1. System receives data processing confirmation record from DoS.<br>2. System updates the current status to “Processing confirmed” for each ECN found in the confirmation record.<br>3. System deletes Respondent data for each ECN found in the confirmation record. |
| Alternative Flows | |
| None | |
| Special Requirements | None. |

### 3.2.15 UC_22 Transfer Un-submitted Data

| ***User Case ID & Name*** | ***UC_22 Transfer Un-submitted Data*** |
|---|---|
| Brief Description | The System transfers un-submitted Respondent data to the DoS on request. |
| Goal | The System transfers un-submitted Census data to DoS. |
| Primary Actor | DoS Electronic Census Processing |
| Secondary Actor(s) | None |
| Preconditions | 1. Application available.<br>2. DoS available. |
| Basic Flow of Events | 1. System will be triggered to transfer data once post enumeration.<br>2. System acknowledges that enumeration period has ended.<br>3. System transfers data to DoS Electronic Census Processing system.<br>4. System receives confirmation of data receipt from DoS Electronic Census Processing system. |
| Alternative Flows | |
| None. | |
| Special Requirements | This is a once off use case to send any un-submitted respondent data once the census enumeration period ends. |

# 4 Non-Functional requirements

This section captures the non-functional requirements for the Electronic Census System (ECS). Non-Functional requirements of an IT system are quality requirements or constraints of the system that must be satisfied.

## 4.1 Volumetric information

### 4.1.1 Static Volumetric

The ECS must have the capacity to support up to 9.5 Million households during the census enumeration period, while meeting the performance and availability requirements specified in this section.

The population of Bolumbia is approximately 23 Million people; therefore there will be a need to hold that many person records.

### 4.1.2 Dynamic Volumetric

The peak system load is expected to be experienced during *Census Night as* the questions must be answered for the situation in the dwelling on Census night (first Tuesday of August, 3 years from now). We assume that 90% of households will complete the online forms on the census night within the period between 17:00 to 23:30.

## 4.2 Performance

Performance characteristics such as overall response time, represents the end user response time. i.e., from the time of submitting a request to completely receiving a response for that request and the presentation of the response page in the case of a browser. Actual overall user response time may vary based on their individual network connections.

This overall response time is broken down into 2 parts:

1. Time required for the processing of transactions from Web Server through the back end systems (ECS has control).

2. Time required for the download and rendering of pages between the Web Server and the browser (ECS does not have control).

The transaction processing time (under ECS control) should be under 3 seconds on average.

The target overall response time should be less than 10 seconds on average. However, it is understood that this response time cannot be guaranteed over the Internet as a great deal depends on the current traffic load on the web, the particular access path of the user (ISP, etc.), the bandwidth available to the user through this path, the end system of the user, and the amount of simultaneous work the end user is doing.

The expected performance characteristics of the application are as follows:

1. The ECS must provide a user response time of less than 10 seconds on average for all pages. Response times are measured from the activation of a button or link until the resulting page is fully rendered and able to be used by the respondent.

2. The above response time requirements shall be met with the respondent using a 1 Megabit per second connection to the Internet.

3. It is desirable that the ECS supports up to 10 persons per ECN, if it does not impact on performance of the application.

## 4.3 Availability

Respondents must be able to logon, complete and submit census responses 24 hours a day during every day of the enumeration period. That is, the ESC hours of operation are 24x7 during every day of the enumeration period.

The ECS must be available 98% of the time during the hours of operation.

The ECS is deemed available if respondents are able to perform all functions within the parameters specified by the other non-functional requirements (e.g. performance).

## 4.4 Security

The ECS as a whole must provide end-to-end security of Census data. It must be secure during its transmission, processing, and storage from the time of submission by the Respondent until it is received by the DoS. The end-to-end security of Census data is of vital importance to the DoS. All security requirements apply to all data provided by Respondents, including the Electronic Census Number, during any stage of the project.

The specific security requirements are as follows.

1. It is mandatory that the Census form, or Electronic Census System, cannot be modified by any party or modified and publicly distributed, without prior approval of the DoS.

2. The ECS must provide protection of Respondent data so that no data remains to be accessed by another person using the same computer, after the Respondent has either exited the ECS or has submitted their data. After submission or at the end of the Enumeration Period, data must only be accessible by the DoS.

3. Due to issues of security and privacy, the cloud hosting service and any other associated infrastructure must be located within Bolumbia. Servers and any associated infrastructure must be secure to the satisfaction of the Customer, with strictly controlled physical and logical access.

4. The ECS must be based on a suitable security architecture which addresses and mitigates potential security and any attempt to breach the security and integrity of the ECS. The solution must incorporate the ability to detect and recover from security breaches.

5. Audit trails must be provided as part of the security arrangements for the solution.

6. The ECS is required to authenticate the Respondent at the time of login. The authentication method that is implemented is required to be approved by the DoS. All authentication algorithms and cryptography must be made available to the DoS. The DoS has the right to have all algorithms and cryptography reviewed by other agencies.

7. It is proposed that the ECS uses a two part key, comprising the reference number provided on the front of the paper form delivered to each household, and a 12 digit numeric key delivered in a sealed envelope with the paper form. This key is generated using a self-authenticating algorithm. Alternative methods for user authentication can be proposed if such an alternative presents a superior operational or security alternative.

8. Once the complete set of submitted data has been delivered to the DoS, receipt of the data has been confirmed and the data successfully read and processed by the DoS, all Respondent data must be immediately deleted from ECS systems and any third party systems. The DoS intends to verify that this has occurred to its satisfaction. The DoS may require that any components that permanently store data when disconnected from the power may need to be destroyed or retained by the DoS.

9. The DoS must be built to current industry best practice to prevent attack against the application, hosting infrastructure or Respondent's computer. The DoS has the right to review the application source code, or employ a third party to review the application source code on DoS' behalf.

10. DoS require monthly security audit reports.

11. DoS require weekly security reports.

12. The mobile app must be downloaded from the Bolumbia government mobile app site.

## 4.5 Service Levels

The DoS requires the final service level agreements to be supported during the enumeration period and any prior user testing and piloting.

## 4.6 Respondent environment constraints

The following characteristics apply to respondent's environment:

- Browsers must support 128 bit SSL. The following table is indicative of operating system and browser combinations that will need to be tested and supported:

| Browser | Operating Systems | | |
|---|---|---|---|
| | Windows | Mac | Linux |
| Chrome | 55 or later | 55 or later | 55 or later |
| Firefox | 30 or later | 30 or later | 30 or later |
| Internet Explorer | 11 or later | - | - |

Table 4: Desktop browser and OS system support

| Android devices | iOS devices | Windows devices |
|---|---|---|
| Android 4.3 (or later) | iOS9.0 or later | Microsoft Surface RT |

Table 5: Mobile operating systems

- Minimum screen resolution will be 800x600
- 1 Megabit per second internet connection speed or above

## 4.7 Cloud Hosting Constraints

The following characteristics apply to the cloud provider:

- As stated in the Security constraints, the cloud hosting site(s) must reside in Bolumbia
- Similarly, the cloud provider must provide a fail over site in Bolumbia
- The ECS solution must be contained within its own subnet and isolated from other non ECS solutions and hosted on dedicated hardware
- Network connectivity between the cloud provider and DoS's premises hosting the DoS Census Processing system must not be dependent on a single telecommunications provider.

# 5 Appendix 1: Error messages

The following table provides the description for the list of error message codes.

| *Error code* | *Error message* |
|---|---|
| 450 | Logon failed (code 450). Please check that you have entered the correct numbers and try again. If you continue to receive this message, please call the Census Inquiry Service on 555 776, open 8:30 am - 8.00 pm, 7 days a week and quote error message number 450 to the Customer Service Representative. |
| 540 | Logon failed (code 540). Please check that you have entered the correct numbers and try again. If you continue to receive this message, please call the Census Inquiry Service on 555 776, open 8:30 am - 8.00 pm, 7 days a week and quote error message number 540 to the Customer Service Representative. |
| 550 | Logon failed (code 550). Please wait 20 minutes and try again. If you continue to receive this message, please call the Census Inquiry Service on 555 776, open 8:30 am - 8.00 pm, 7 days a week and quote error message number 550 to the Customer Service Representative. |
| 740 | Logon failed (code 740). Please check that you have entered the correct numbers and try again. If you continue to receive this message, please call the Census Inquiry Service on 555 776, open 8:30 am - 8.00 pm, 7 days a week and quote error message number 740 to the Customer Service Representative. |
| 830 | Logon failed (code 830). Please check that you have entered the correct numbers and try again. If you continue to receive this message, please call the Census Inquiry Service on 555 776, open 8:30 am - 8.00 pm, 7 days a week and quote error message number 830 to the Customer Service Representative. |
| 920 | Logon failed (code 920). Please check that you have entered the correct numbers and try again. If you continue to receive this message, please call the Census Inquiry Service on 555 776, open 8:30 am - 8.00 pm, 7 days a week and quote error message number 920 to the Customer Service Representative. |
| 1010 | Please provide a valid response to the <QUESTION> question. |
| 1037 | You have indicated that more than ten (10) people will be present in the household on Census Night. If more than ten (10) people wish to be included on the electronic census, please call the Census Inquiry Service on 555 776, open 8:30 am - 8.00 pm, 7 days a week for a second Electronic Census Number (ECN). For instructions on how to complete the electronic Census Forms, please click on the link to FAQs. |
| 1037 | You have indicated that more than ten (10) people will be present in the household on Census Night, Tuesday 9 August 2011. If more than ten (10) people wish to be included on the electronic census, please call the Census Inquiry Service on 555 776, open 8:30 am - 8.00 pm, 7 days a week for a second Electronic Census Number. For instructions on how to complete the electronic census sections, please click on the link to FAQs. |

| *Error code* | *Error message* |
|---|---|
| 1041 | The electronic census failed to save. If you continue to receive this message, please call the Census Inquiry Service on 555 776, open 8:30 am - 8.00 pm, 7 days a week. |
| 1046 | Submission failed. Please try again. If you continue to receive this message, please call the Census Inquiry Service on 555 776, open 8:30 am - 8.00 pm, 7 days a week. |
| 1060 | Please complete the <SECTION> section before submitting your Census Form. |
| 1080 | You have indicated that no-one is present in the household on Census Night. You are not required to complete a Census section for this dwelling. Please advise the Census Inquiry Service, by calling 555 776, open 8:30 am - 8.00 pm, 7 days a week who will notify the Census Collector in your area. |
| 1090 | Please select the Person you wish to delete before clicking on the 'Delete this person' link. |
| 1206 | You have already indicated the number of people who spent census night in this dwelling. To add or delete people, please select 'Add another person' or 'Delete this person' from the left navigation menu on the next page. |
| 1206 | You have already indicated the number of people who spent Census night in this dwelling. To add or delete people, please select 'Add another person' or 'Delete this person' from the left navigation menu on the next page. |

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