



FUNCTIONAL REQUIREMENTS

Community Based Surveillance

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Introduction

This document defines the functional requirements for Community Based Surveillance (CBS).

The document can be used as the basis for the following activities:

- Onboarding of new developers
- Creating solution designs
- Developing test plans, test scripts, and test cases
- Determining project completion
- Assessing project success

CBS project introduction

Community based surveillance (CBS) is the systematic detection and reporting of events of public health significance within a community by community members. The Red Cross Community Based Surveillance platform allows for people to report on health risks in their communities. By monitoring real-time data from community volunteers, we can collect, analyze and interpret information on local health risks to prevent, identify and respond to disease outbreaks. As early warning of health risks leads to early action and lives saved, community based surveillance can stop disease outbreaks from turning into large scale epidemics and pandemics.

High-level requirements

High-level functional requirements

The CBS system should be an integrated and active part of CBS projects through interaction with stakeholders and a robust data collection strategy that lays the foundation for analysis, usage and reporting of the ingested data. More specifically, the CBS system shall support the following requirements:

- Enable better decision making by providing situational intelligence of all ongoing activities, trends and events in areas of interest.
- Quality assure CBS projects through standardization and integrated quality assurance of content
- Engage and keep stakeholders informed through a number of event-triggered, scheduled and manually triggered feedback loops by SMS.
- Streamline response and data collection with system supported workflows in the event of alerts.
- Report historic and ongoing events and trends shareable with health authorities and other relevant third parties.
- Provide modernized and user-friendly interfaces for data collection and configuration.
- Develop an extensible and future-proof platform.

User role descriptions

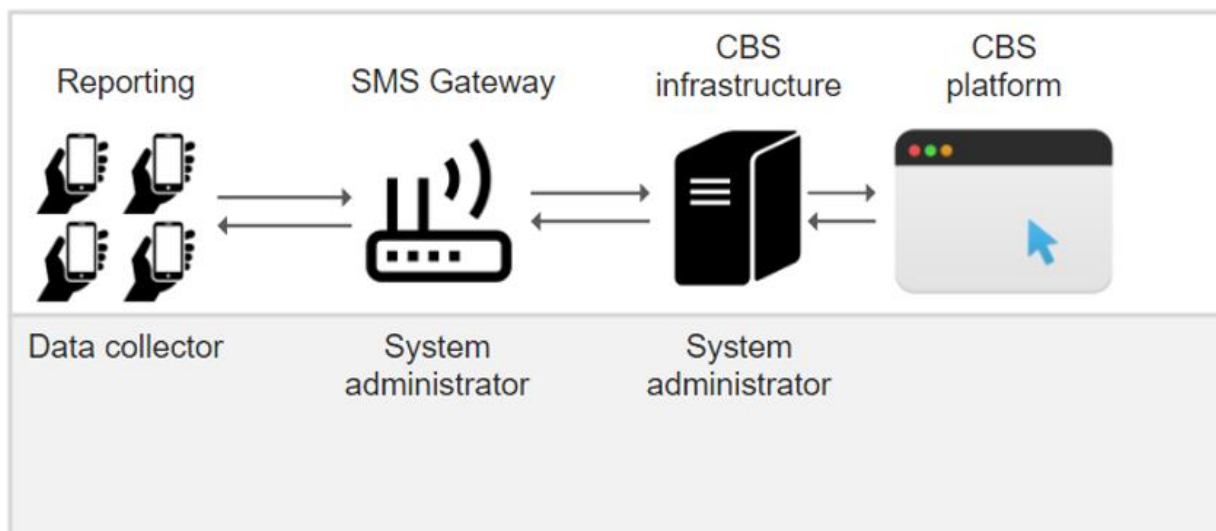
Any user of the CBS system must be assigned a user role. The user role determines what permissions the user has, and what user information is required. The following user roles are defined in the system:

- **Data collector**
 - Their function in the CBS system is to send SMS reports
 - Technically not a user of the system (but may become redefined a user when application-based data collection is enabled)
 - The data collector cannot log into the platform and does not require such credentials
 - The data collectors have received training and are supported by their supervisors to undertake their tasks as data collector for CBS.

- Profile: The data collector is a local Red Cross/Red Crescent Volunteer. He/she lives in a community in a rural area, is trusted in their community and is trained to detect health risks and provide first. They might seek out the people themselves or the community might contact them for support. The community has provided consent for the data collector to report health risks they may observe. The data collector could be educated or uneducated and may be illiterate.
- **Supervisor**
 - The Supervisor is responsible for reviewing and verifying aggregated data from data collectors in their area.
 - Supervisors are responsible to train, support and supervise a subset of data collectors, typically within a geographical area.
 - If SMS reports from a data collector(s) exceed the set threshold for a health risk, the Supervisor will receive an alert, and must assess the situation; support the data collector; and decide whether the alert should be escalated.
 - Profile: The Supervisor lives in a city or small town and has some education, and a background in health. The Supervisor is a volunteer or a Red Cross/Red Crescent staff member, or from another agency affiliated with the Red Cross (e.g. ministry of health or another NGO). They might have the responsibility for 10-50 data collectors, and will not know all of them personally. The Supervisor may be multilingual and therefore might translate between the data collector and data owner, where local language is different from that spoken in the NS head office.
 - There can be one or two levels of Supervisors in a national society data repository. A level 1 Supervisor can escalate an alert to a level 2 Supervisor. All levels of Supervisors will be assigned the same role (Supervisor) in the system, but the hierarchy (who reports to who) is defined in the system.
- **Data owner**
 - The data owner holds the overall responsibility for the data: which data is collected by whom and for what purpose, and how the data is stored, managed, analyzed and shared.
 - The data owner will define CBS reporting and sharing with data consumers, through defining and saving filters etc.
 - Profile: The Data Owner is employed at the National Society Head Office, is educated with some health background. The Data owner is a national citizen of the project country. The data owner is responsible for the project implementation, coordination with other stakeholders. Multilingual.
- **Data consumer**
 - The data consumer receives the CBS reports defined by the data owner for purposes of coordination and decision making (response).
 - The data consumer has read but not write access, and has limited access to non-sensitive data.
 - Examples of data consumers are; Agencies that get reports, National Ministry of Health, World Health Organization, Centers for Disease Control and Prevention and Red Cross Staff (without a role in the project).

- **Technical advisor**
 - The Technical advisor holds the same access/edit rights as a data owner, but for multiple countries/data repositories (as defined by “Which CBS National societies are you following?” in user registration)
 - Their role is to offer technical/programmatic support to the data owner.
 - They cannot be a data owner of a national society data repository.
- **Global coordinator**
 - Global coordinators are responsible for verifying the data owners and granting the data owners access to their first national society data repository.
 - Global coordinators can add new languages, health risk, and case definitions
- **System administrator**
 - System administrators are responsible for the technical backbone of the application. This includes making sure the systems operate normally, configuring SMS gateway, administer backup routines, diagnostics and technical support.
 - System administrators can be Red Cross staff or someone from a third party actor (support provider).

High level data flow and functional areas



Admin

The Admin part of the system is where the system is configured. There is a global/default setup that new countries are initially set up with (like definition of health risks, user registration messages, data collector feedback messages etc), then each country can customize to its local context with local language for example. Other things like populating geographical structure/hierarchy with data must be done per country before the country can start using the system.

User Management

The User Management part of the system defines how new users are added to the system, what roles users can have and that there is a user role hierarchy that defines what different users can and cannot do or access.

Reporting

The Reporting part of the system defines and handles reports sent in by the Data collectors and also provides automatic and manual feedback messages to the Data collectors.

Alerts

The system will autonomously trigger alerts that initiates a pre-defined feedback-response loop to alert the responsible stakeholders and collect the outcome of their investigation. The workflow will support an escalation path from the Supervisors to the data owner. The system also provides an interface for assisting the Supervisors assessment of reports when talking to the Data collectors who sent the report, for example by dismissing the report if the symptoms observed don't match the health risk case definition.

Analytics

Analytics transform data into situational intelligence with historic analytical capabilities, grouping related case reports together with added context from data collected by Supervisors. It gives an overview of what is going on, trends over time etc.

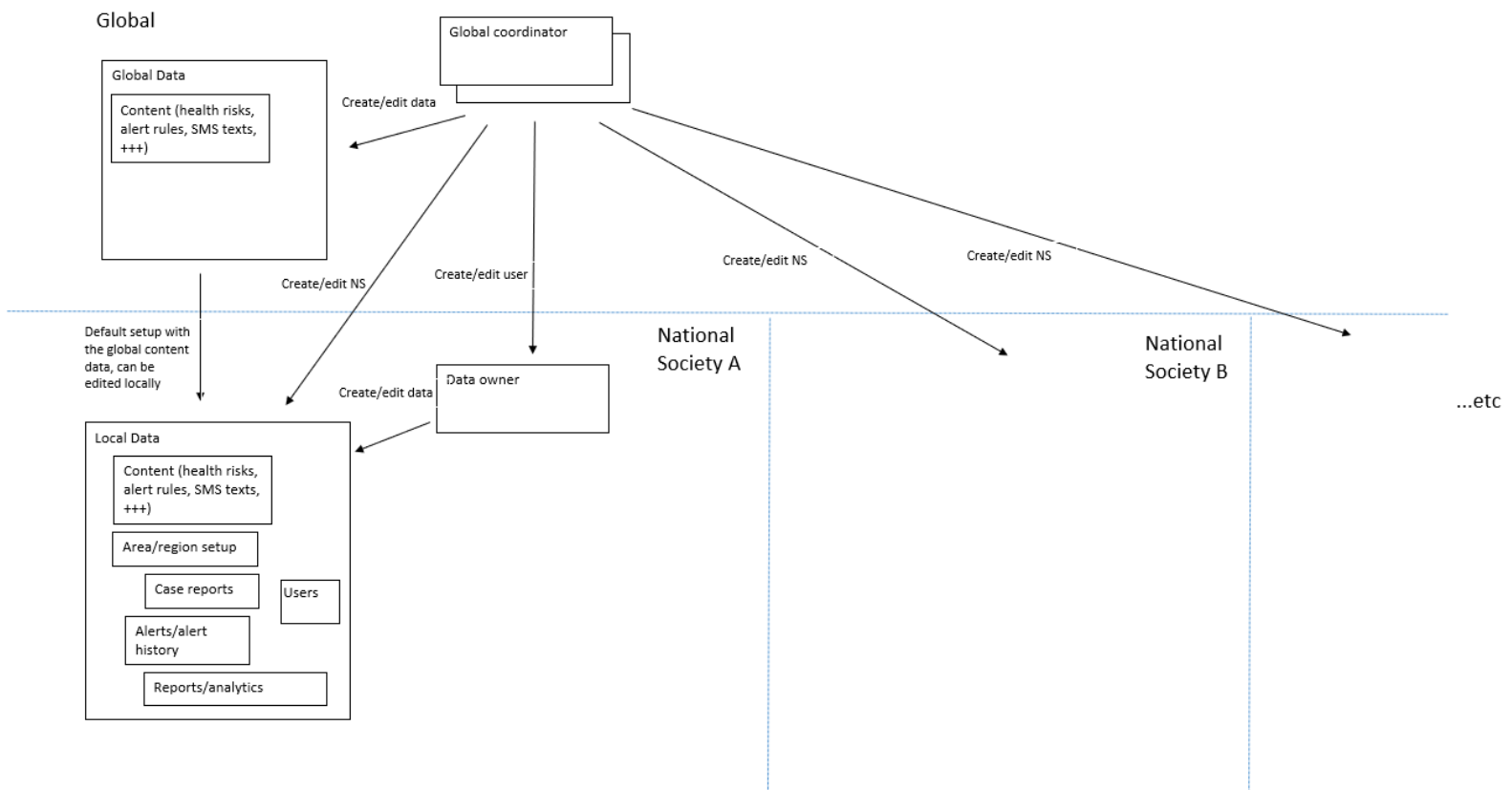
Functional requirements

This section outlines the functional requirements of the CBS system. The requirements are primarily based on user stories, of which the primary purpose is to capture the required system behavior from the perspective of the end-user in achieving one or more desired goals.

Admin

The Admin part of the system is where the system is configured. There is a global/default setup that new countries are initially set up with (like definition of health risks, user registration messages, data collector feedback messages etc), then each country can customize to its local context with local language for example. Other things like populating geographical structure/hierarchy with data must be done per country before the country can start using the system.

The below picture is a conceptual overview of the data and setup of the system. This doesn't show how the data is physically stored, but shows conceptually how each national society is set up with some global data that can be customized if needed in each national society. And that each national society control their own data and configuration.



Requirements table:

Req #	Role	Title	User Story	Acceptance criteria
Admin 1	Global coordinator	Add new National Society in CBS	As a Global coordinator I want to be able to add new National Societies in CBS So that new countries can start using CBS	<ul style="list-style-type: none"> - I can add new National Societies in CBS by providing some mandatory information about the new National Society to be created: <ul style="list-style-type: none"> National Society name (select from pre-defined list) Default language - I must assign a Data owner at creation. The data owner must be a CBS user within the selected National Society. The new Data owner gets the role Data owner and receives notification about the assignment - The National society is set up with a local copy of the global data for list of health risks, user registration messages, data collector feedback messages
Admin 2	Global coordinator Data owner	Re-assign Data owner on national Society	As a Global coordinator or Data owner I want to be able to change the Data owner on a National society	<ul style="list-style-type: none"> - I can change the Data owner. The new data owner must be a CBS user within the same National Society - Notification is sent to both old and new Data owner - The new Data owner gets the role Data owner - The role Data owner is removed from the previous Data owner - The supervisors under the previous Data owner is now under the new Data owner instead in the user role hierarchy
Admin 3	Global coordinator Data owner	Edit National Society settings in CBS	As a Global coordinator or Data owner I want to be able to edit National Society settings in CBS So that the National Society is set up correctly	<ul style="list-style-type: none"> - I can change default language, but not National Society name
Admin 4	Global coordinator Data owner	Populate geographical structure/hierarchy with data	As a Global coordinator or Data owner I want to be able to import data to define the regional structure of a National Society info in CBS So that the National Society is set up correctly	<ul style="list-style-type: none"> - The default geographical structure/hierarchy have 3 levels under Country/National society: <ul style="list-style-type: none"> Region District Village - Have an import function to mass populate Regions and Districts with actual Region/District names (Village is just free text)
Admin 5	Global coordinator Data owner	Edit geographical data (Region/District)	As a Global coordinator or Data owner I want to be able to edit data to define the regional structure of a National Society info in CBS So that the National Society is set up correctly	<ul style="list-style-type: none"> - I can add, edit and remove Region names and District names
Admin 6	Global coordinator Data owner	Re-define geographical structure/hierarchy	As a Global coordinator or Data owner I want to be able to re-define the regional structure of a National Society info in CBS So that the structure fits for my country	<ul style="list-style-type: none"> - I can rename Region, District and Village to what is actually used in my country - I can add an additional level to the geographical structure/hierarchy if the 3 default levels is not enough for my country
Admin 7	Global coordinator Data owner	Define number of Supervisor levels	As a Global coordinator or Data owner I want to be able to define how many levels of Supervisors So that the National Society is set up correctly	<ul style="list-style-type: none"> - I can define to have one or two levels of Supervisors in a national society
Admin 8	System administrator	Notification gateway setup	As a System administrator I want to be able to configure the technical system setup globally and locally	<ul style="list-style-type: none"> - I can define Notification gateway setup per National Society - System administrator shall have access to system setup only, not user data or user functions in the system.

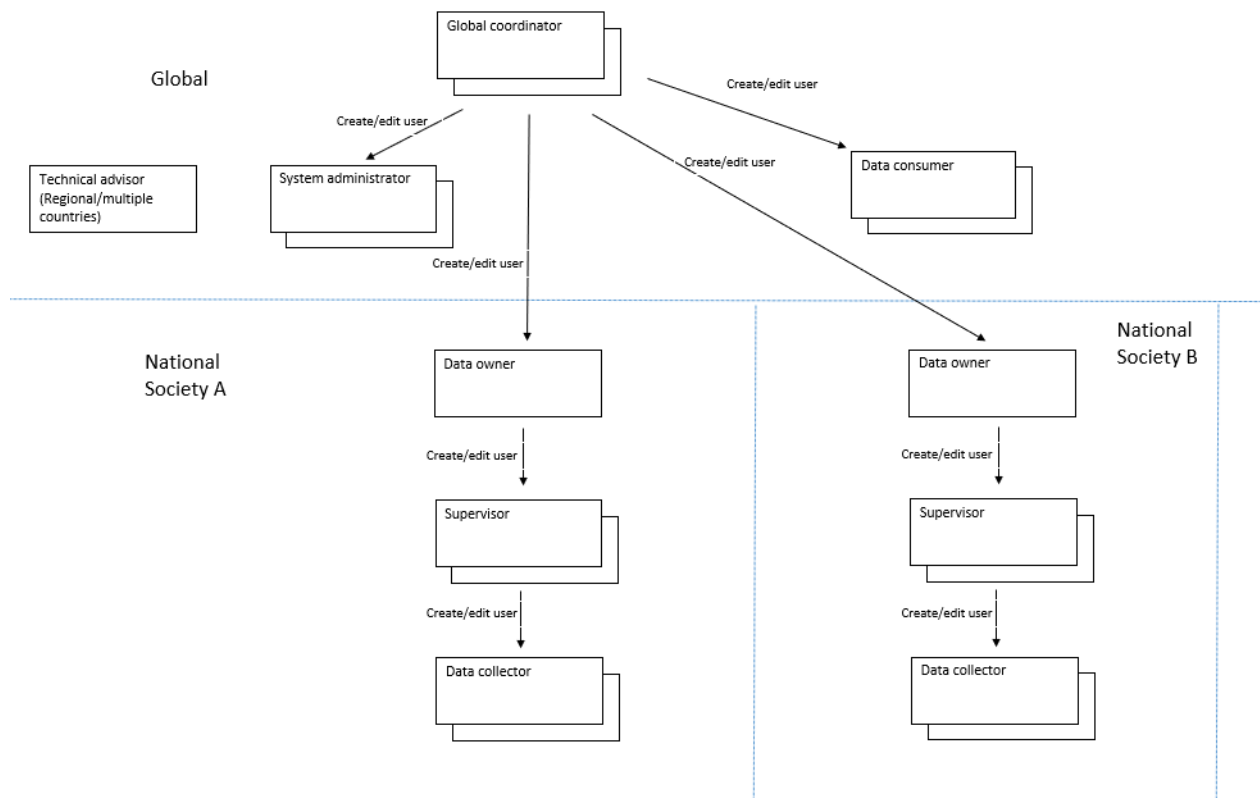
Admin 9	Global coordinator	Edit Health risks (globally)	As a Global coordinator I want to be able to create and edit globally defined health risks	<ul style="list-style-type: none"> - I can add new health risks, where for each health risk I can define the health risk number, name, type (human/non-human), alert rule, case definition, key message(s) and list of symptoms - I can edit all fields except health risk number on existing health risks - I can delete existing health risks
Admin 10	Global coordinator Data owner	Edit Health risks (locally)	As a Global coordinator or Data owner I want to be able to edit the defined health risks name and case descriptions So that we can adjust to local contexts	<ul style="list-style-type: none"> - My National Society is default set up with the globally defined health risks in the chosen language, but I can edit them for my National Society - I can not edit health risk numbers - I can not add new health risks - I can edit health risk name, type (human/non-human), alert rule, case definition, key message(s) and list of symptoms (localize language text) - I can revert my changes and get the globally defined health risk setup again
Admin 11	System Configurator	Define Alert rules (globally)	As a System configurator I want to be able to create and edit globally defined alert rules	<ul style="list-style-type: none"> - I can define an alert rule per health risk by specifying the alert rule parameters <ul style="list-style-type: none"> Number of cases (threshold) Timeframe for cases (number of days a case counts) Distance between cases (km)
Admin 12	System Configurator, Data Owner	Edit Alert rules (locally)	As a Data owner I want to be able to edit the defined alert rules So that we can adjust to local contexts	<ul style="list-style-type: none"> - My National Society is default set up with the globally defined alert rules for each health risk, but I can edit them for my National Society - I can also add additional escalation points (in addition to the normal escalation path defined by the user role hierarchy)
Admin 13	Global coordinator Data owner	Propagate new health risks from global to local data	As a Global coordinator or Data owner I want the local list of health risks to be updated when new health risks are added to the global list	<ul style="list-style-type: none"> - When a new health risk is added to the global list of health risks, it is populated to the local list of health risks in all National societies in CBS - Edit and delete from the global list does not update the local copies
Admin 14	Global coordinator	Edit user registration messages (globally)	As a Global coordinator I want to be able edit the messages sent to new users when the user is created	<ul style="list-style-type: none"> - Edit the messages in both/all supported default languages (En/Fr)
Admin 15	Data owner	Edit user registration messages (locally)	As a Data owner I want to be able edit the messages sent to new users when the user is created	<ul style="list-style-type: none"> - Edit the messages locally
Admin 16	Global coordinator	Edit feedback messages (globally)	As a Global coordinator I want to be able edit the automatic feedback messages sent to the Data collectors	<ul style="list-style-type: none"> - Edit the messages in both/all supported default languages (En/Fr)
Admin 17	Data owner	Edit feedback messages (locally)	As a Data owner I want to be able edit the automatic feedback messages sent to the Data collectors	<ul style="list-style-type: none"> - Edit the messages locally
Admin 18	Data owner	Create new Project	As a Data owner I want to be able to create new projects	<ul style="list-style-type: none"> - Add which health risk(s) are included in the project - Choose geographical area. Could be at either national, region or district level. Can only choose from the regions and districts that has been defined for the national society. - Set time period for the project - Can add users, including Data collectors.

Admin 19	Data owner	Edit Project	As a Data owner I want to be able to edit projects	<ul style="list-style-type: none"> - Add/remove health risks - Change geographical area - Change time period for the project - Add/remove users
Admin 20	Global coordinator	Archive National Society in CBS	As a Global coordinator I want to be able to close/archive National Societies in CBS So that the National Society is no longer in active use in case a country want to stop using the system	
Admin 21	System administrator	System monitoring	As a system administrator I want to know if some of the components have failed so that I can fix them	<ul style="list-style-type: none"> - Log system component status and system error messages - Show systems component status and error messages

User Management

The User Management part of the system defines how new users are added to the system, what roles users can have and that there is a user role hierarchy that defines what different users can and cannot do or access.

The below picture shows how the different roles relate to each other in the user role hierarchy.



See also Appendix A – User Management. Roles, examples and process flows

Requirements table:

Req #	Role	Title	User Story	Acceptance criteria
UM 1	CBS	User role hierarchy	As a CBS user I want CBS to have a user role hierarchy where all users can be assigned a person one level up in the user role hierarchy	<ul style="list-style-type: none"> - Have a user role hierarchy with the following user roles: Global coordinator, Data owner, Supervisor, Data collector - Can assign a person one level up in the user role hierarchy to all Data collector and Supervisor users, thereby creating a hierarchy to be used for alert escalation and more - Have also the user roles Technical advisor, System administrator and Data consumer in the CBS system
UM 2	All, except Data Collector	Self registration of new account	As a new CBS user I want to be able to register myself as a new user in CBS So that I can sign up myself	<ul style="list-style-type: none"> - I can sign up and create my own CBS account by choosing a globally unique username - I must choose the role that I should have in the system - Dependent on the selected role I must input some mandatory personal information about myself (see the Role-information requirement matrix in Appendix A, only O and M fields for the selected role is available) - Username, phone and email must be unique, else error msg - Given that I have provided all mandatory inputs then the system generates a one-time-password sent to me by SMS (and/or email) - Given that I have entered the correct one-time-password then I am logged in and I am registered as user in CBS, but without any user roles yet. I must change password at first login
UM 3	Global coordinator, Data owner	Register new account from admin	As a CBS user I want to be able to create new CBS users So that I can sign up other users by providing all needed inputs on behalf of the new user	<ul style="list-style-type: none"> - I can create new CBS users, but only new users with user roles from a lower level in the User role hierarchy than myself. - I must choose a globally unique username for the new user and select the new users role - Dependent on the selected role I must input some mandatory personal information about the new user (see the Role-information requirement matrix in Appendix A, only O and M fields for the selected role is available) - Username, phone and email must be unique, else error msg - Notification sent to the new user created. (with link to CBS, username and one time password) - The new user must change password at first login
UM 4	Global coordinator, Data owner, Supervisor	Register new Data collector	As a CBS user I want to be able to create new Data collectors	<ul style="list-style-type: none"> - Given that I have a user role myself above Data collector in the User role hierarchy then I must be able to register new Data collectors - I must input the mandatory personal information about the new Data collector (see the Role-information requirement matrix in Appendix A, only O and M fields for the selected role is displayed) - I must be able to specify the Data collector's Supervisor - The system sends a SMS to the new Data collector when the new user has been successfully created with confirmation and the contact details of the Supervisor

UM 5	All, except Data Collector	Self registration, select to sign up with HID account instead of a CBS account	As a new user I want to be able to register myself as a new user in CBS using a HID user account	<ul style="list-style-type: none"> - I can choose to sign up in CBS with a HID (humanitarian id) to sign in using my HID credentials - Given that I am signing in to CBS using my HID for the first time then I must choose the role that I should have in the CBS system and dependent on the selected role provide the mandatory personal information about myself (see the Role-information requirement matrix, only O and M fields for the selected role is displayed) - Given that I have provided all mandatory inputs then the system generates a one-time-password sent to me by SMS (and/or email) - Given that I have entered the correct one-time-pin code then I am logged in and I am registered as user in CBS, but without any user roles yet.
UM 6	Global coordinator, Data owner, Supervisor	User search, user list	As a CBS user I want to be able to see a list of users and/or search for other users at the same or lower lever than myself in the User role hierarchy	<ul style="list-style-type: none"> - I must be able to see a list of other users and/or search for other users, but only other users that has a role at the same(?) or lower lever than myself in the User role hierarchy - I must be able to see a list of other users and/or search for other users that has no user role assigned yet
UM 7	Global coordinator, Data owner, Higher level supervisor	Assign role to CBS user	As a Global coordinator or Data owner I want to be able to assign a user role to other CBS users	<ul style="list-style-type: none"> - See indication/notification that there are new users "pending approval - I must be able assign a role to other users that has no user role assigned yet, but only possible to assign a role at a lower level than myself in the User role hierarchy - I can change the role on other users, but only if the role I change to and from is below my own level in the User role hierarchy
UM 8	Data owner	Place Supervisors at the correct level in the user role hierarchy	As a Data owner I want to be able to assign Supervisors to the correct level in the user role hierarchy (if more than one level of supervisors is used)	<ul style="list-style-type: none"> - Can assign the Supervisor as a Level 1 or Level 2 supervisor depending on the number of supervisor levels defined in Admin
UM 9	Global coordinator, Data owner, Higher level supervisor	Edit other users profiles	As a CBS user I want to be able to edit the profile data on users, but only for users with roles below my own user role in the User role hierarchy	<ul style="list-style-type: none"> - I can change profile data according to the Role-information requirement matrix on other users below myself in the User role hierarchy (name etc, except National society) - Only a Global coordinator can change National society on a user, and only if no other user below them in the hierarchy is connected/related to this user <p>F.ex: Cannot change National Society on a Supervisor if one or more Data collectors have this user as its Supervisor. Similar for the relationship between Data Owner and Supervisor (see the User role hierarchy and Role-information requirement matrix)</p>
UM 10	All, except Data Collector	Edit own profile	As a CBS user I want to be able to edit my profile data	<ul style="list-style-type: none"> - I can edit the mandatory and optional user data fields on my own profile, except National society (which fields depends on the user role, only O and M in the Role-information requirement matrix) - I can change my own password
UM 11	All, except Data Collector	Forgot password	As a CBS user I want to be able to request a new password from CBS	<ul style="list-style-type: none"> - New system generated password sent by SMS (or email of no phone registered)
UM 12	All, except Data Collector	Autolock on wrong password	As a CBS user I want my user account to be locked for login for x mins after typing wrong password y times in a row	<ul style="list-style-type: none"> - If I type wrong password 3 times= locked and need to request new password.

UM 13	Global coordinator, Data owner, Supervisor	Delete users	As a CBS user I want to be able to delete other users that should no longer be CBS users So that we can clean out old user from the system	<ul style="list-style-type: none"> - I can only delete users with user roles below my own user role in the User role hierarchy - I can only delete users if no other user below them in the hierarchy is connected/related to this user - If deleting user, need to pop up "are you sure you want to delete this user" <p>F.ex: A Supervisor cannot be deleted if one or more Data collectors still have this user as its Supervisor. Similar for the relationship between Data Owner and Supervisor (see the User role hierarchy and Role-information requirement matrix)</p>
UM 14	All, except Data Collector	Log in	As a CBS user I can log in using either a CBS account or a HID account	<ul style="list-style-type: none"> - If I choose CBS login I can log in using my CBS username and password - If I choose HID login I can log in using my HID credentials (will require HID system integration)
UM 15	All, except Data Collector	Log out	As a CBS logged in user I can log out from CBS	<ul style="list-style-type: none"> - Logout myself - Automatically log out if not been active for 30 minutes
UM 16	Global coordinator, Data owner	User account history	As a CBS user I want to be able to see a change log/history on users	<ul style="list-style-type: none"> - Store change history on user accounts: Created by who/when, changed by who/when/what was changed
UM 17	Technical advisor	Technical advisor role	As a Technical advisor I want to be able to assist the Data owner in setting up and maintaining CBS in the national society	<ul style="list-style-type: none"> - Have a possibility for the Data owner to allow the Technical advisor access to the national society - Technical advisor have access to see and do all the same as the Data owner, but only after the Data owner has allowed the access. - Technical advisors may have access to multiple national societies
UM 18	Data consumer	Data consumer role	As a Data consumer I want to be able to see information/statistics about case reporting activities	<ul style="list-style-type: none"> - Have a possibility for the Data owner to allow the Data consumer access to the national society - Data consumer have access to some information in Analytics, see Analytics requirement for details, but only after the Data owner has allowed the access. - Data consumers may have access to multiple national societies

Reporting

The Reporting part of the system defines and handles reports sent in by the Data collectors and also provides automatic and manual feedback messages to the Data collectors.

Requirements table:

Req #	Role	Title	User Story	Acceptance criteria
Report 1	Data Collector	Send report for non-human health risks	As a data collector I want to send case reports for non-human health risks by sending a SMS with a single digit	<ul style="list-style-type: none"> - SMS format: Single digit for the health risk number. - Format is validated. Validation rule says if the message contains only one digit it is allowed only if the digit equals a number defined for a non-human health risk, else rejected. - Example SMS: 31 (means Animal die off)
Report 2	Data Collector	Send single report for human health risks	As a data collector I want to send single case reports to report each case by case	<ul style="list-style-type: none"> - SMS format: 3 digits separated by # or * Field 1: Health risk number Field 2: Sex of case can be either 1 (male) or 2 (female) Field 3: Age group can be either 1 (0-4 years) or 2 (5 years and up) - Format is validated. Validation rule: If Field 1 is a non-human health risk, we allow Field 2 and 3 to be 0. Otherwise they have to have the values 1 or 2. Negative numbers are not allowed in any field. - Digits separated by anything other than # or * is rejected. Allow only messages with 1, 3 or 5 fields when for * and # separated messages. - Example SMS: 3#1#2 (means Hepatitis A, Male, 5 years and up)
Report 3	Data Collector	Send aggregated report for human health risks	As a data collector I want to send aggregated case reports to report several cases in one report	<ul style="list-style-type: none"> - SMS format: 5 digits separated by # or * Field 1: Health risk number Field 2: Number of cases detected in males, from 0-4 years Field 3: Number of cases detected in males, from 5 years and up Field 4: Number of cases detected in females, from 0-4 years Field 5: Number of cases detected in females, from 5 years and up - Format is validated. Validation rule: If Field 1 is a non-human health risk, we allow all other fields to be 0. Otherwise, at least one must be a positive integer. Negative numbers are not allowed in any field. - Digits separated by anything other than # or * is rejected. Allow only messages with 1, 3 or 5 fields when for * and # separated messages. - Example SMS: 3#1#0#4#2 (means Hepatitis A, one case of male 0-4 years, no cases of male 5 years and up, four cases of female 0-4 years, and two cases of female 5 years and up)
Report 4	Data Collector	Receive automatic feedback on reported cases	As a data collector I want to receive feedback from the system when I send case reports So that I know if my report was registered correctly or not	<ul style="list-style-type: none"> - The Data collector gets a feedback SMS if the case report was validated ok - The Data collector gets a feedback SMS if the case report was NOT validated ok with message saying what the error was
Report 5	Data collector	Default training mode	As a Data collector I want my CBS user account to be automatically set in training mode after creation So that I can send case reports for training purpose without affecting real reports, alarms etc	<ul style="list-style-type: none"> - I can send case reports that doesn't count in reporting and alarm triggering when in training mode - New Data collector users are automatically set in training mode when the user is created - Training mode is automatically disabled for the Data collector 48 hours after the user was set in training mode

Report 6	Data owner, Supervisor	Manually set training mode	As a Data verifier or Data owner I want to be able to manually set Data collector users in training mode So that I can re-train Data collectors whenever needed	<ul style="list-style-type: none"> - I can manually enable/disable training mode for Data collectors - Training mode is automatically disabled for the Data collector 48 hours after the user was set in training mode
Report 7	Data owner, Supervisor	Register which health risks the Data collectors are trained for	As a Data verifier or Data owner I want to be able to manually register which health risks the Data collectors are trained for So that the system knows which reports to accept or not	<ul style="list-style-type: none"> - I can manually register which health risks the Data collectors are trained for - Reports from the Data collector with health risk number the Data collector was not trained for are rejected - Or, if simpler, just check against projects instead of per individual Data collector: If there are no projects with that health risk number, reject the report
Report 8	Data owner, Supervisor	Deactivate/activate Data collectors	As a Data verifier or Data owner I want to be able to manually deactivate Data collectors	<ul style="list-style-type: none"> - I can manually deactivate Data collectors - I can manually re-activate Data collectors again after they have been deactivated - Reports from deactive Data collectors are rejected, but Supervisor receives notification to follow up that a deactive Data collector has sent a report
Report 9	Data collector	Status change notification	As a Data collector I want to receive feedback that my status has been updated so that I can know if my update was successful	<ul style="list-style-type: none"> - Receive notification when deactivated and re-deactivated - Receive notification when moving between training mode and reporting status
Report 10	Data owner, Supervisor	Bulk message data collectors	As a Data owner or Supervisor I want to be able to manually send SMS' to Data collectors so that I can give them (custom) feedback or information of e.g. ongoing epidemics.	<ul style="list-style-type: none"> - I can filter Data collectors by Supervisor, location and name - I can enter manual text and send SMS' to the filtered data collectors
Report 11	Data collector	Reports sent by unknown numbers	As a Data owner or Supervisor I want to be able to follow up reports sent from unknown numbers	<ul style="list-style-type: none"> - Reports sent from unknown numbers are rejected in the sense that they are not included in alert threshold evaluation, not linked to alerts etc. - But the reports are saved and displayed for the Data owner and Supervisors so they can follow up - The person who sent the report should receive a message that the number is not registered and msg not accepted.
Report 12	Data collector	Activity reports	As a Supervisor I want the Data collectors to send regular activity reports So that I know that they are still active even if they haven't sent any case reports lately	<ul style="list-style-type: none"> - SMS format? - The Data collector gets a feedback SMS if the Activity report was validated ok(?)

Alerts

The system will autonomously trigger alerts that initiates a pre-defined feedback-response loop to alert the responsible stakeholders and collect the outcome of their investigation. The workflow will support an escalation path from the Supervisors to the data owner. The system also provides an interface for assisting the Supervisors assessment of reports when talking to the Data collectors who sent the report, for example by dismissing the report if the symptoms observed don't match the health risk case definition.

See also Appendix B – Alerts. Examples and alert workflow process view.

Requirements table:

Req #	Role	Title	User Story	Acceptance criteria
Alerts 1	CBS	Trigger new alert	As a CBS user I want CBS to trigger a new alert when an alert rule threshold is reached	<ul style="list-style-type: none"> - Whenever a new case report is received, CBS aggregates/sums the number of case reports per health risk and area within a defined time period/time window defined by the alert rule parameter "Timeframe for cases" - Area is defined by the Data collectors (gps)position and the radius defined by the alert rule parameter "Distance between cases" (so if the area defined by 2 case reports positions and radius overlap, they are counted as being in the same area, else they are in 2 different areas). See fig 1-3 for examples in Appendix B - Only case reports that has not yet been concluded and case reports that has been verified counts in computing the aggregated count and comparison against the threshold. Case reports that has been dismissed does not count - Given that the aggregated count equals or exceeds the defined alert rule threshold, then an open alert is created with a new alert id - The case reports that triggered the alert are linked to the alert
Alerts 2	Supervisor	Notification to the Supervisor(s) responsible for the alert assessment	As a Supervisor I want to receive a notification when an alert is triggered based on case reports from any of the Data collectors I supervise	<ul style="list-style-type: none"> - SMS with information on what kind of alert has been triggered and a direct link to view that alert in CBS - The SMS is sent to multiple Supervisors if Data collectors supervised by multiple Supervisors are involved
Alerts 3	Data collector	Alert notification to the case reporter(s)	As a Data collector I want to receive a notification when an alert is triggered based on case reports from me	<ul style="list-style-type: none"> - SMS with information on who the alert has been assigned to and a pre-defined message for the type of alert
Alerts 4	Supervisor	Choose to accept or reject alert assessment	As a Supervisor I want to accept or reject that I will perform the case report assessment when an alert is triggered	<ul style="list-style-type: none"> - In CBS, I must choose to accept or reject that I will perform case report assessment when an alert is triggered if any of the case reports linked to the alert is submitted by a Data collector I supervise. - Given that case reports linked to the alert is submitted by Data collectors supervised by several Supervisors, then each Supervisor involved must accept/reject - Given that I accept, then I can start to add assessment information to the individual case reports - Given that I reject, then a notification is sent one level up in the user role hierarchy to reassign the assessment
Alerts 5	Supervisor	Receive reminder to choose to accept or reject alert assessment	As a Supervisor I want to get a reminder to accept or reject that I will perform the case report assessment if I haven't responded	<ul style="list-style-type: none"> - Automatic reminder-SMS after 24 hours if no response to the alert
Alerts 6	Supervisor	When alert assessment was rejected or not responded to	As a Data owner or higher level Supervisor I want to get a notification if a Supervisor have rejected to perform the alert assessment or haven't responded	<ul style="list-style-type: none"> - Get SMS if a Supervisor under myself in the user role hierarchy haven't responded by accept/reject the case report assessment 12 hours after the remainder in Req Alerts 5 - Get SMS if a Supervisor under myself in the user role hierarchy have rejected to perform the alert assessment

Alerts 7	Supervisor	View alert overview/info	As a Supervisor I want to get an overview of the alert and all case reports linked to the alert id	<ul style="list-style-type: none"> - I can see alert id, alert status, health risk, alert threshold - I can see all case reports linked to the alert, both case reports from Data collectors I supervise and others - I can open a report assessment form for each report to keep or dismiss each individual case, see requirements below - I can only perform case assessment on case reports from Data collectors I supervise, so I must see which case reports that I am responsible for
Alerts 8	Supervisor	Case report assessment	As a Supervisor I want to get key information about each case report linked to the alert	<ul style="list-style-type: none"> - Reported by (name and phone number) - The case report (health risk, sex, age, location, timestamp) - The case definition
Alerts 9	Supervisor	Case report assessment	As a Supervisor I want to be able to dismiss a report if reported by error	<ul style="list-style-type: none"> - Dismiss the case report directly without further questions if "Is this report an error?" = yes. Include a "are you sure you want to delete" message, so it doesn't happen by mistake
Alerts 10	Supervisor	Case report assessment	As a Supervisor I want to be able select from list of symptoms which ones applies to this case report	<ul style="list-style-type: none"> - If the selected symptoms don't match the health risks in the project, then the case report is automatically dismissed with the reason for dismissal added to the case report - If the selected symptoms match the health risk, then the case report is automatically kept on the alert with the assessment information added to the case report. (So the result of the case report assessment is that a report is either kept or dismissed from an alert) - If the selected symptoms match another health risk than reported instead, then the case report is automatically changed to the health risk unusual event, and CBS evaluates the alert rule for unusual event to decide if a new alert is triggered
Alerts 11	Supervisor	Link new case reports to already open alert	As a CBS user I want CBS to link new case reports to open alerts if they overlap	<ul style="list-style-type: none"> - If a new case report overlap in health risk and area with an already open alert, then CBS links the new case report to the already open alert id. - If the new case report comes from a Data collector supervised by a Supervisor already involved in the alert assessment, then the Supervisor gets a notification about the new incoming case and the new case report is linked to the alert without any new accept/reject investigation dialog - If the new case report comes from a Data collector supervised by a Supervisor NOT already involved, the new case is linked to the alert and the Supervisor receives an alert notification and the accept/reject alert assessment dialog, see req 4 above

Alerts 12	Supervisor	Alert escalated based on kept cases	As a CBS user I want CBS to evaluate if the alert should be escalated whenever a case report linked to the alert is kept after report assessment	<ul style="list-style-type: none"> - Whenever a case report is kept from the assessment on an open alert, CBS evaluates the number of kept cases against the alert rule threshold. If the number of kept cases equals the threshold according to the alert rule, then the alert is automatically escalated - Escalation follows the user role hierarchy upwards and is escalated one level up in the hierarchy. CBS assigns the higher level Supervisor as the 'escalated to' on the alert. (Or the Data owner in the case of only one level of Supervisors in the hierarchy) - The alert must be escalated to more than one higher level Supervisor in parallel if the cases linked to the alert comes from areas under different higher level Supervisors, see the "Alert escalation example"
Alerts 13	Data owner, Higher level Supervisor	Notification when an alert is escalated	As a Data owner or higher level Supervisor I want to receive a notification when an alert is escalated to me	- SMS with information on what kind of alert has been triggered and from where, and a direct link to view that alert in CBS
Alerts 14	Data consumer	Additional Alert escalation notifications	As an additional alert escalation point I want to receive a notification when an alert is escalated	- Additional escalation points in the project receives info about the Alert by SMS. The info should be health risk, location and contact info of Supervisor
Alerts 15	Supervisor	Notification when an alert is escalated	As a Supervisor I want to receive a notification when an alert where I'm responsible is escalated	- SMS with information on who the alert is escalated to and predefined text on what to do next
Alerts 16	Data collector	Notification when an alert is escalated	As a Data collector I want to receive a notification when an alert is escalated if a case report from me is linked to the alert	- SMS with information on who the alert is escalated to and predefined text on what to do next
Alerts 17	Supervisor	Alert dismissed based on dismissed cases	As a CBS user I want CBS to evaluate if the alert should be dismissed whenever a case report linked to the alert is dismissed	<ul style="list-style-type: none"> - Whenever a case report is dismissed, CBS evaluates the number of remaining cases against the alert rule threshold. If the number of remaining cases now falls below the threshold according to the alert rule, then the alert is automatically dismissed. Else the alert stays open - Except if the alert had already been escalated: Escalated alerts stay open until manually closed
Alerts 18	Data collector	Notification when an alert is dismissed	As a Data collector I want to receive a notification when an alert is dismissed if a case report from me is linked to the alert	- SMS with information that the alert is dismissed ("The alert triggered by your [health risk] report has been dismissed")
Alerts 20	Higher level Supervisor	Further escalation	As a higher level Supervisor I want to be able to escalate the alert further	<ul style="list-style-type: none"> - If an alert was escalated to me, have an option to manually escalate alert further up in the role hierarchy - Escalation follows the user role hierarchy upwards and is always escalated one level up in the hierarchy.
Alerts 21	Higher level Supervisor or Data owner	Close escalated alert	As a higher level Supervisor or Data owner I want to be able to close the alert	- If an alert was escalated to me, have an option to manually close the alert. Provide a reason for closing (this reason is then included in the alert closed SMS notifications below?)
Alerts 22	Supervisor	Notification when an alert is closed	As a Supervisor I want to receive a notification when an alert where I'm responsible is closed	- SMS with information that the alert is closed and why (reason)
Alerts 23	Data collector	Notification when an alert is closed	As a Data collector I want to receive a notification when an alert is closed if a case report from me is linked to the alert	- SMS with information that the alert is closed and why (reason) ("The alert triggered by your [health risk] report has been closed, <reason>")

Alerts 24	All	Link new case reports to already escalated alert	As a CBS user I want CBS to link new case reports to escalated alerts if they overlap and notify all involved about new cases coming in	<ul style="list-style-type: none"> - If a new case report overlap in health risk and area with an already escalated alert, then CBS links the new case report to the already open alert id. - All involved in receiving the escalation notification will receive notification that more cases are reported from the same area, but without any new accept/reject investigation dialog. - Inform Supervisors that it should not be necessary to verify these cases, since already escalated - Data collector receives sms saying that his report is included in escalated alert
Alerts 25	Data owner Supervisor	Ignore cases for a specific health risk from a data collector	As a Data owner or Supervisor I want to be able to avoid triggering new alerts based on case reports from specific Data Collectors	<ul style="list-style-type: none"> - Can add Data collectors to "ignore case report list". Must be per health risk. Example: Outbreak is already ongoing. Volunteers manning ORPs. We expect high number of cases (daily aggregate reporting), and that shouldn't trigger an alert and the whole chain of actions, because it shouldn't be validated etc. Therefore in alert BC this data collector is "muted" for AWD alerts. However, he is not muted for e.g. fever+rash or unusual event, so if that report is sent it will trigger an alert for that (if alert rule is met/exceeded)) - Case reports from Data collectors do not trigger alert rule or notification to supervisor if that Data collector for that health risks is on the "ignore case report list". - Can remove Data collectors from "ignore case report list" again
Alerts 26	All	Send custom message to all involved in an alert	As a higher level Supervisor or Data owner I want to be able to send custom messages to all involved in an alert	<ul style="list-style-type: none"> - Send message to all from the alert
Alerts 27	Supervisor, Data owner	Alert history/log	As a Supervisor or Data owner I want to be able to see a log/history of everything that has happened on an alert	<ul style="list-style-type: none"> - See a log/history over when the alert was opened/escalated/closed, by who, cases added, cases verified/dismissed, custom messages sent

Analytics

Analytics transform data into situational intelligence with historic analytical capabilities, grouping related case reports together with added context from data collected by Supervisors. It gives an overview of what is going on, trends over time etc.

Requirements table:

Req #	Role	Title	User Story	Acceptance criteria
Analytics 1	Public	Public content, number of Data collectors	As a non-CBS user I want to see how many Data collectors have been trained and how many of them are actively reporting for the selected national society	<ul style="list-style-type: none"> - Display number of Data collectors trained in total (number of Data collectors currently in CBS for the national society) - Display how many Data collectors have been active last 7 days (active if case report or activity report was send by the user last 7 days) - Display how many Data collectors have been active last 30 days (active if case report or activity report was send by the user last 30 days) - Display the number of male/female Data collectors trained in total
Analytics 2	Public	Public content, regional coverage	As a non-CBS user I want to see an overview of which regions have Data collectors reporting for the selected national society	<ul style="list-style-type: none"> - For each region where Data collectors are trained, display the number of communities covered by Data collectors in that region - Map of the country with marks on regions where Data collectors are present. If hover over, can see number of communities where volunteers are trained
Analytics 3	Data owner, Supervisor, Data consumer	Country overview, all health risks	As a Data owner, Supervisor or Data consumer I want to see an overview of all case reports sent during the last time period (total number of reports over all health risks)	<ul style="list-style-type: none"> - Display in a table the number of case reports in the last 0-6, 7-13, 14-21, 22-27 days (columns) for each health risk (rows) for the whole country - Display the number of case reports per district over the last 7 days as bar charts. Display one bar chart per health risk, due to problems with scales. i.e. AWD++++ and Ebola=0 - Display each case report over the last 7 days on a map by marking the position on the map for the Data collector who sent the report, with different color for different health risks - Display the number of case reports per gender over the last 7 days. Total number over all health risks, whole country. Bar chart - Display the number of case reports per age group over the last 7 days (over/under 5 years old). Total number over all health risks, whole country. Bar chart.
Analytics 4	Data owner, Supervisor, Data consumer	Country overview per health risk	As a Data owner, Supervisor or Data consumer I want to see an overview of case reports sent during the last time period per health risk (one page per health risk)	<ul style="list-style-type: none"> - Daily epicurve for last week with different colors in the bars per community, but only up to 5 communities. If there are case reports from more than 5 communities last week, display per district instead or just have the total over all communities. - Weekly epicurve for last 8 weeks - Display each case report over the last 7 days on a map by marking the position on the map for the Data collector who sent the report, with different color for different health risks - Display the number of case reports per gender over the last 7 days (bar graph) - Display the number of case reports per age group over the last 7 days (over/under 5 years old) (bar graph)
Analytics 5	CBS user	Project page	As a CBS user added to one ore more CBS projects I want to see a dashboard per project with data (case reports) only for the health risks and area defined by the project	<ul style="list-style-type: none"> - Same as the Country overview page for all health risks, but only display case reports on health risk(s) and area defined in the project - Only display case reports from Data collectors added to the project

Analytics 6	Data owner	Generate country overview reports	As a Data owner I want to be able to generate reports with data from the Country overview pages	- Can generate PDFs from the Country overview, Country overview per health risk and Project pages where the PDFs have the same content as the web pages
Analytics 7	Data owner, Supervisor	Data collector performance, number of Data collectors	As a Data owner or Supervisor I want to see how many Data collectors have been trained and how many of them are actively reporting for the selected national society	In a table: - Display number of Data collectors trained in total (number of Data collectors currently in CBS for the national society) - Display how many Data collectors have been active last 7 days (active if case report or activity report was send by the user last 7 days) - Display how many Data collectors have been active last 30 days (active if case report or activity report was send by the user last 30 days) - Display the number of male/female Data collectors trained in total
Analytics 8	Data owner, Supervisor	Data collector performance, map of Data collectors	As a Data owner or Supervisor I want to see on a map where the Data collectors are	- Display each Data collectors GPS position (as registered on the Data collectors profile information) - Mark each Data collectors position on the map where the mark has different colors based on the Data collector status: - Blue if active and reporting without errors - Yellow if active and reporting, but x out of y last reports were in error or dismissed - Red if inactive (no case or activity reports sent for more than 7 days) - Click the Data collectors position on the map to see Data collector info (linked to the table below).
Analytics 9	Data owner, Supervisor	Data collector performance, list of Data collectors	As a Data owner or Supervisor I want to see on list of Data collectors and their status	- In a table, for each Data collector, display - Name - Location (Village, but call it Community) - Phone number - #days since last report (case or activity report) - Weekly status over the last 8 weeks. Have a color coded mark/indicator per week: - Blue if active and reporting without errors - Yellow if active and reporting, but one or more of the reports that week where in error or dismissed - Red if inactive (no case or activity reports sent that week) - Supervisors can only see Data collectors they supervise, not Data collectors supervised by other Supervisors. Data owner sees all
Analytics 10	Data owner, Supervisor	Data collector performance, overview of Data collectors reporting errors	As a Data owner or Supervisor I want to see if Data collectors are sending reports with errors So I can follow up and provide extra training	- Display a table with Data collectors often sending reports with errors: If 5 of the last 10 (?) reports from a Data collector had errors it's displayed in this table - Display a table with Data collectors often sending reports that are being dismissed: If 5 of the last 10 (?) reports from a Data collector were dismissed it's displayed in this table - Supervisors can only see Data collectors they supervise, not Data collectors supervised by other Supervisors. Data owner sees all

Analytics 11	Data owner, Supervisor	Alerts dashboard, overview	As a Data owner or Supervisor I want to see how many alerts have been triggered and an alert status overview for the whole country	<ul style="list-style-type: none"> - Display how many alerts have been triggered in total, how many was escalated and how many were dismissed - Display a weekly alert status per community, but only for communities who have had an alert in the last 8 (?) weeks. Each week (cell in the table) has a color to indicate status: <ul style="list-style-type: none"> - blue (no open/ongoing alert) - red (at least one open/ongoing alert) - black (zero open/ongoing alerts and >=1 closed alerts) - Can click on an alert and get to the alert detail for that alert, see the below requirement <p>So if fex an alert for community A was triggered in week 3 and closed in week 7, then week 1 and 2 is blue, 3-6 is red, 7 is black and 8 is blue again</p>
Analytics 12	Data owner, Supervisor	Alerts dashboard, detailed	As a Data owner or Supervisor I want to see the detail information per alert with status, all reports and outcome of the report assessments	<ul style="list-style-type: none"> - Can select an alert from the alert overview above and get the detail view for one alert - See the status and health risk for the alert. Status can be Open, Escalated, Dismissed or Closed. - See all reports linked to the alert. For each report, see <ul style="list-style-type: none"> - Date when the report was sent - Location (Village) - Data collector name/number - Supervisor of the Data collector who sent the report - Report assessment (Kept, Dismissed or Not assessed)

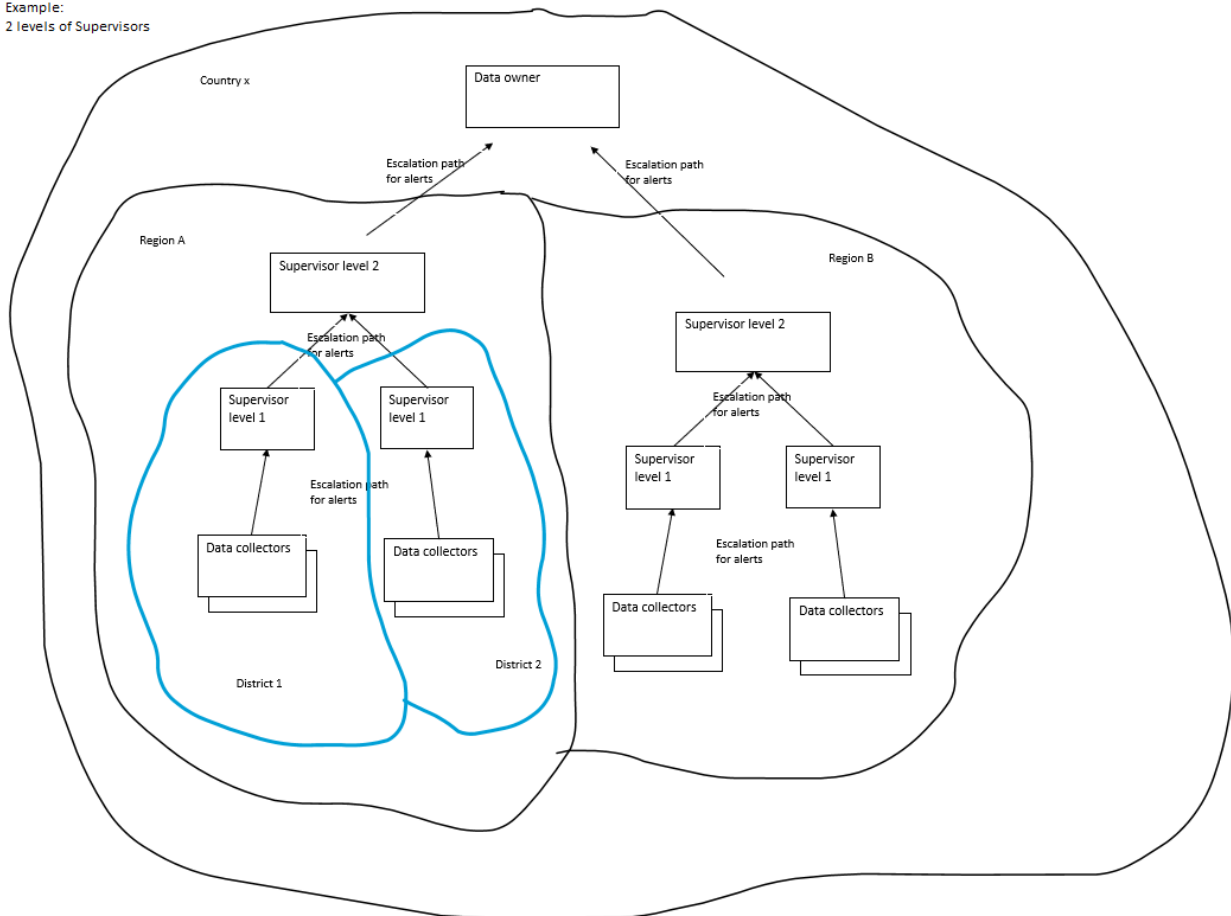
Appendix A – User Management. Roles, examples and process flows

Role-information requirement matrix

		Role-information requirement matrix							Input type
		System administrator	Global coordinator	Technical advisor	Data owner	Supervisor	Data consumer	Data collector	
M	Mandatory								
O	Optional								
A	Automatic								
AM	Automatic, with manual override								
Full name		M	M	M	M	M	M	M	Free text
Display name		M	M	M	M	M	M	M	Free text
Email address		M	M	M	M	M	M		Text with email format validation
Year of birth			M	M	M	M		M	Year (YYYY)
Sex (Male, female, other)			O	O	O	O		M	Radio button
National society/IFRC/ICRC			M	M	M	M			Drop down
Which CBS National societies are you following?			M	M	O	O	M		Drop down, multiple choice
Preferred language			M	M	M	M			Drop down - only languages confirmed by system configurator available
Mobile phone number(s)			M	M	M	M		M	Text with phone number format validation
Duty station (Head office, branch)					M	M			Radio button
- if branch: Please specify					O	O			Drop down
Location (GPS or area)						M	M	M	Radio button
- if GPS: Coordinates (Long-/latitude)						O	O	M	Number with coordinate validation
- if area: Please specify						O	O		Free text or drop down
Role (RC volunteer, RC staff, other)					M	M	M		Radio button
- if RC staff: Please specify job title						O	O		Free text
- if other: Please specify						O	O		Free text
Organisation/Affiliation (Nat. Soc. or other)						M	M		Radio button
- if other: Please specify						O	O		Free text
Mobile phone number confirmed			A	A	A	A		A	System generated
Registration date		A	A	A	A	A	A	A	System generated
Data verifier 1								AM	Automatically set to the user who registers the new user. Can be manually overwritten.
Data verifier 2						O			
Data verifier 3						O			
Data owner							AM		Automatically set to the user who registers the new user. Can be manually overwritten.

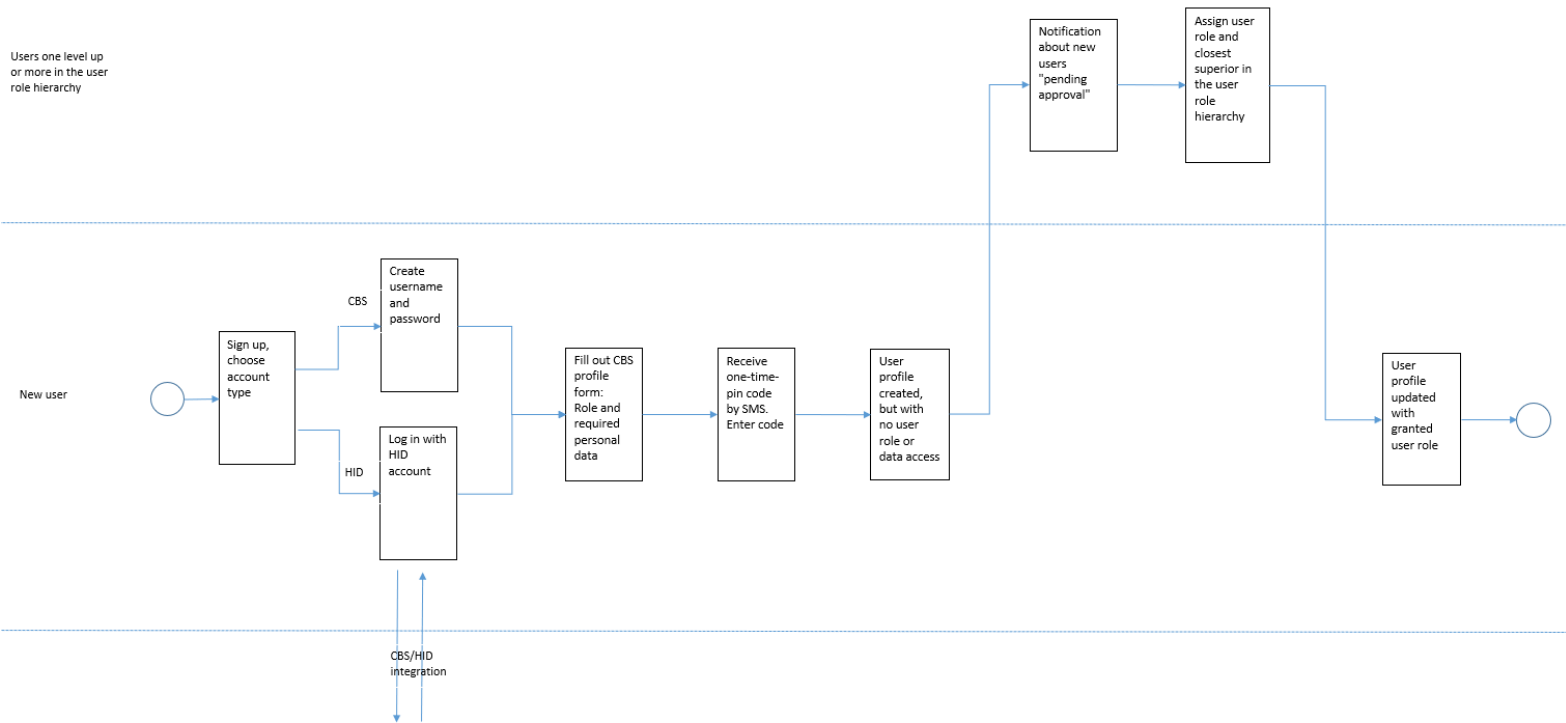
User role hierarchy example

Example:
2 levels of Supervisors

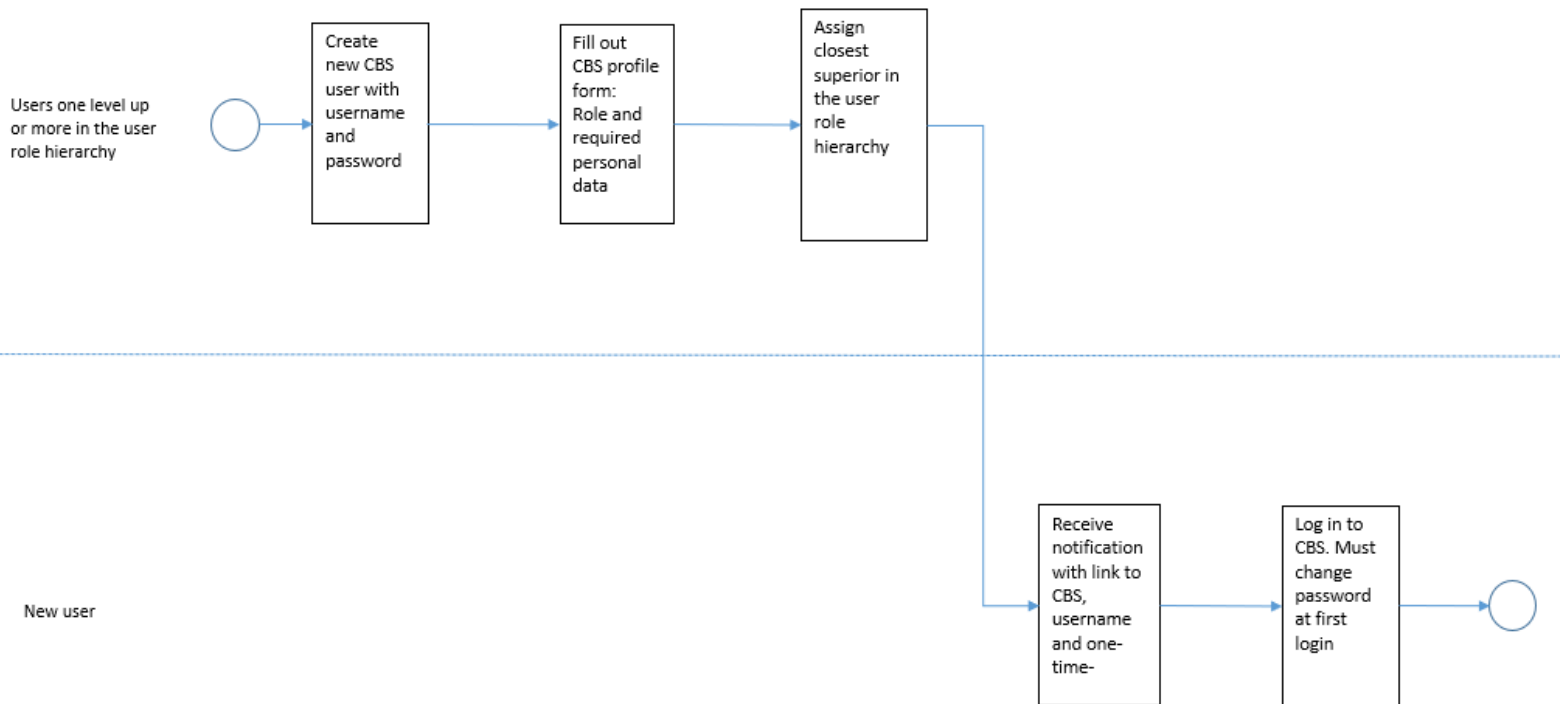


User self sign-up workflow

Users one level up
or more in the user
role hierarchy



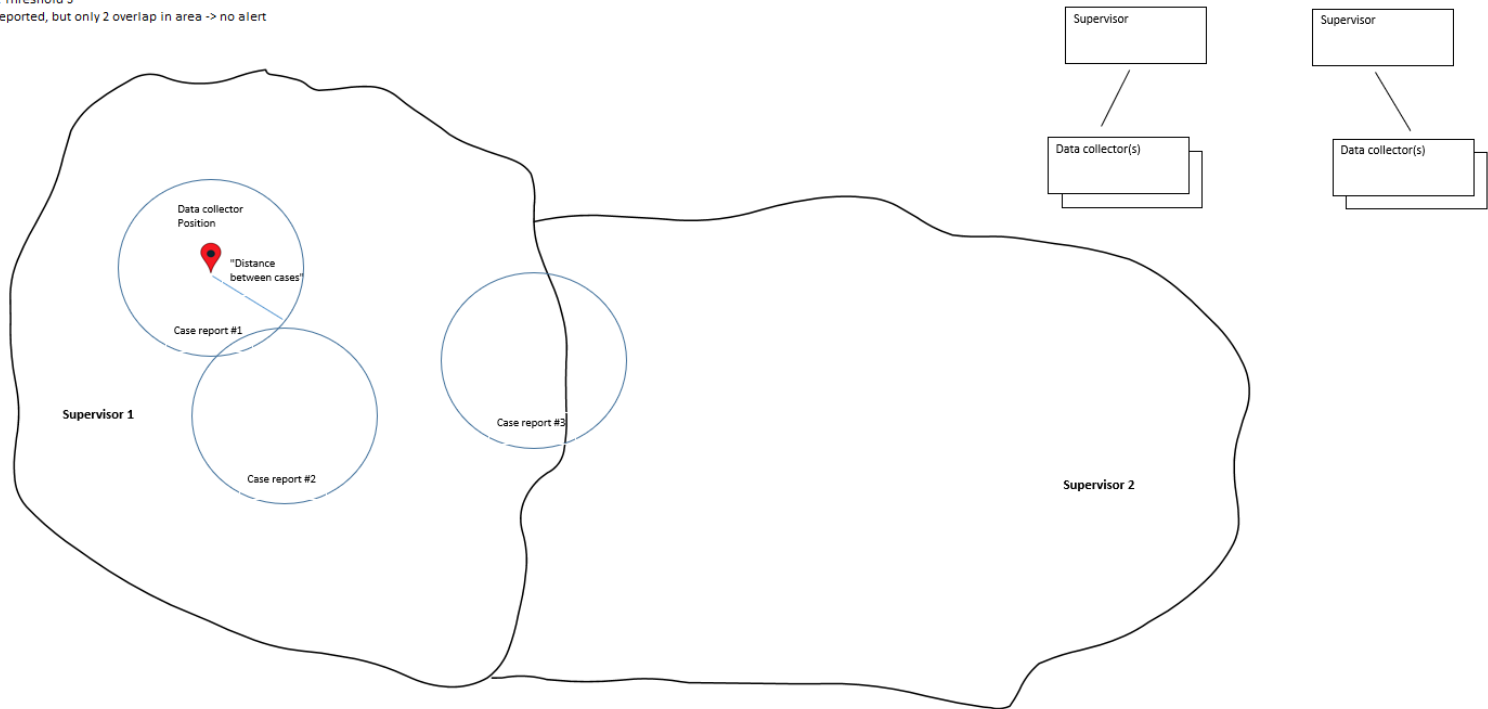
User registration workflow



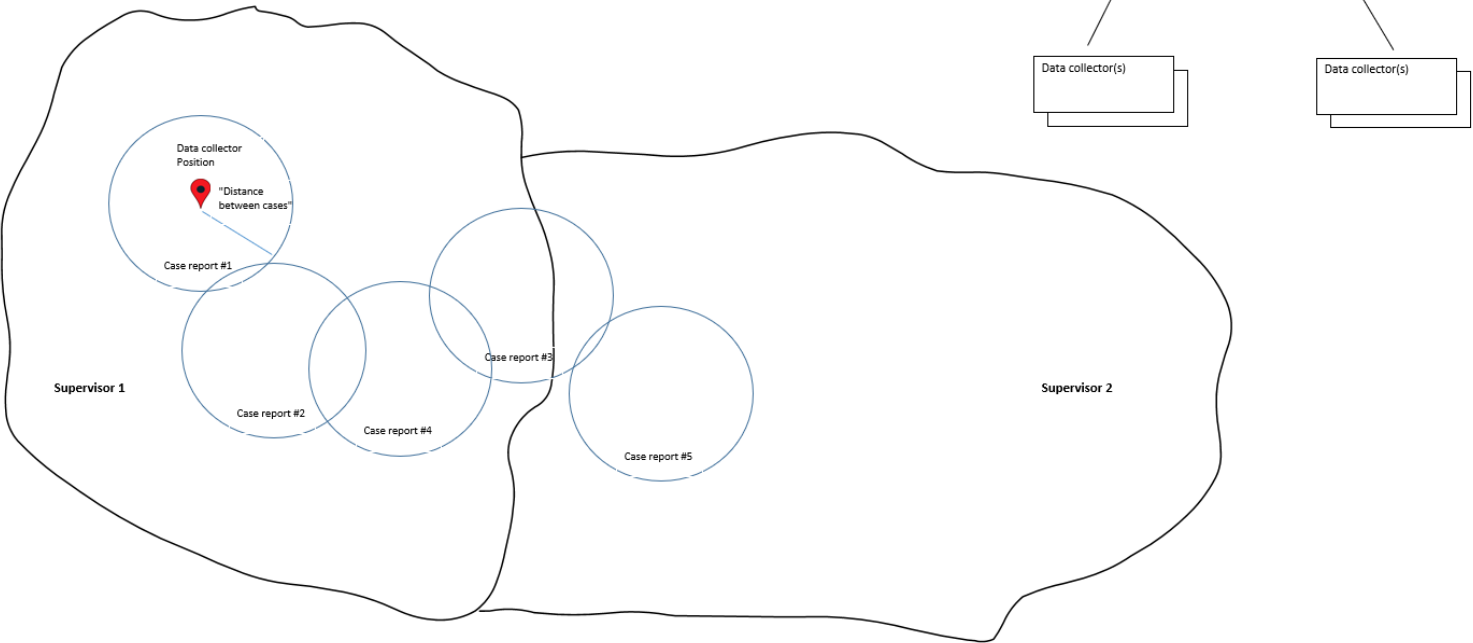
Appendix B – Alerts. Examples and alert workflow process view

Alert trigger example

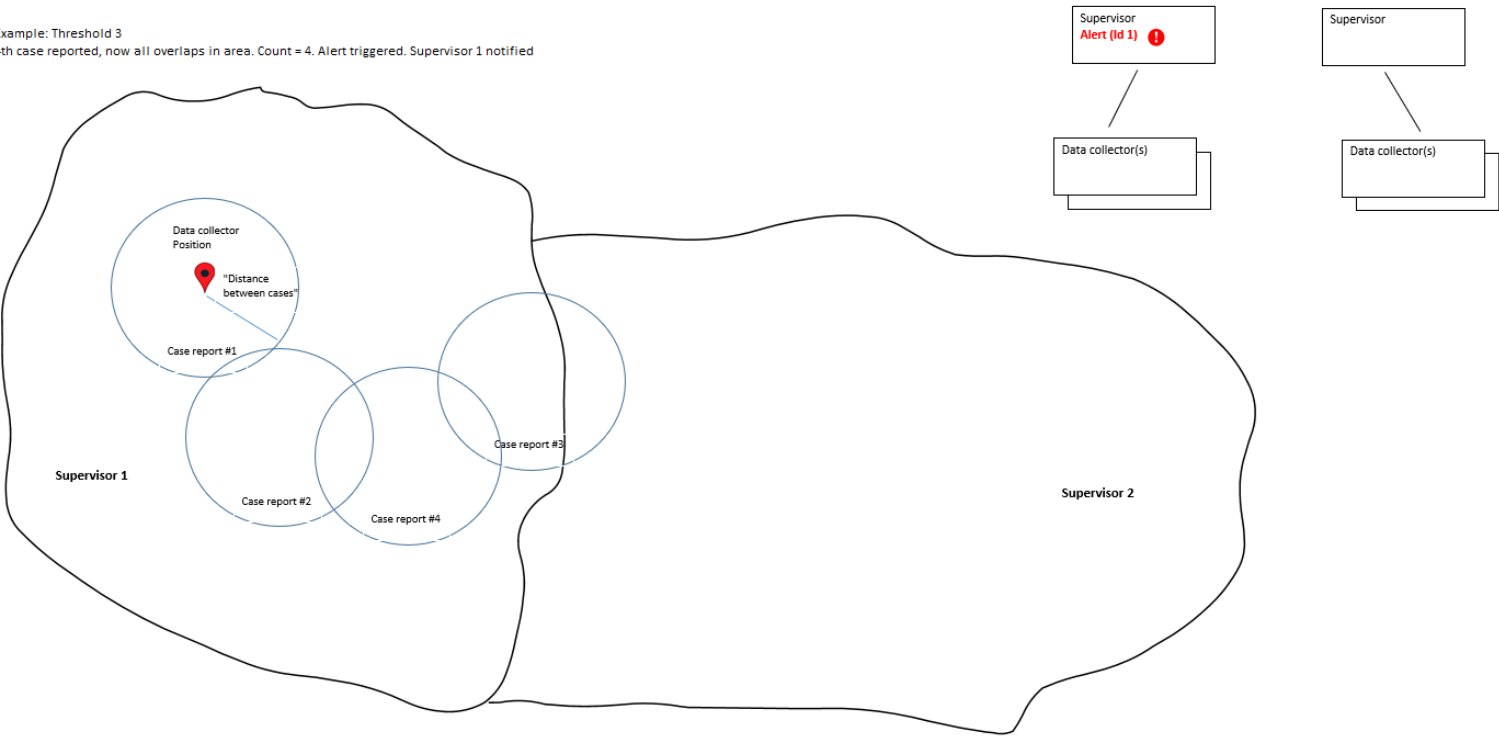
Example: Threshold 3
3 cases reported, but only 2 overlap in area -> no alert



Example: Threshold 3
5th case reported, overlaps in area with already open alert. Count = 5. Case #5 added to the alert and Supervisor 2 notified



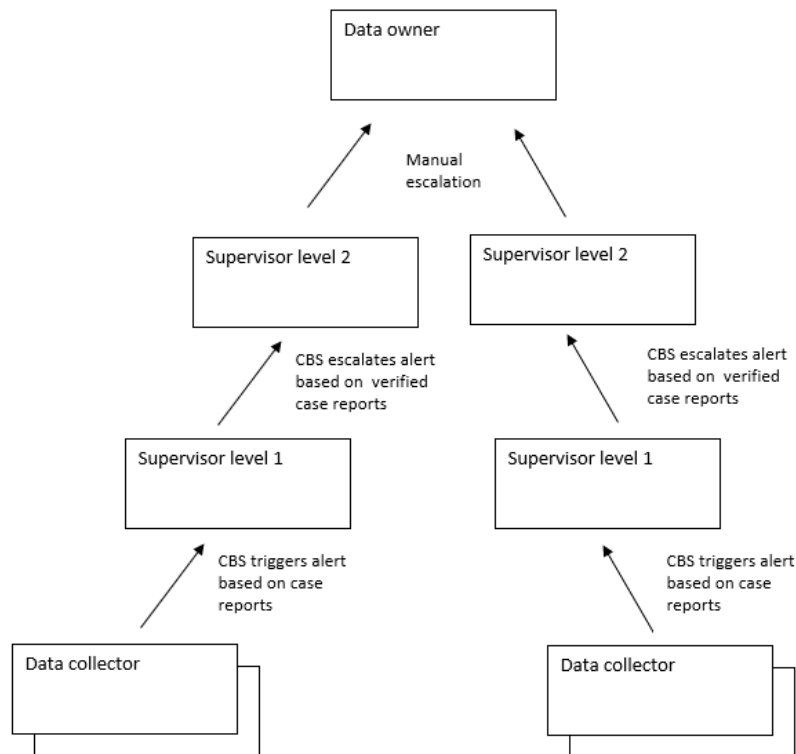
Example: Threshold 3
4th case reported, now all overlaps in area. Count = 4. Alert triggered. Supervisor 1 notified



Alert escalation example

Example:

1. Alert triggered: Case reports from Data collectors supervised by 2 different Supervisors triggers an alert (overlap in geographical area defined by alert rule, therefore same alert). Both Supervisors are notified
2. Alert escalated: Number of verified case reports reached threshold so the alert is escalated to the next level up in the role hierarchy.
In this case the two level 1 Supervisors are below two different level 2 Supervisors in the role hierarchy, so both level 2 Supervisors are notified.
3. Alert escalated further: One of the level 2 Supervisors escalates the alert further



Alert workflow

Alert workflow (notifications are not shown here to make the drawing simpler)

