SEVENTH FRAMEWORK PROGRAMME
ICT PPP
Future Internet

The Environmental Observation Web and its Service Applications within the Future Internet

FP7-284898

Collaborative project

Annex - ENVIROFI Use Case Requirements Report (WP4)

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1 Introduction

According to the ENVIROFI methodology of how to analyze and document user requirements, this report comprises the collection of use cases that were edited and agreed within the member team of the ENVIROFI work packages WP1, WP2, WP3 and WP4.

WP1 focuses on the use of Future Internet technology for survey, analysis, quality assurance, persistence and dissemination of biodiversity data.

WP2 focuses on the use of Future Internet technology to enhance Human to Environment interaction by creating a series of integrated tools that will comprise the backbone of the Personal Information System (PIS) for air pollutants and allergens as well as meteorological conditions affecting human well-being.

WP3 focuses on the exemplar ENVIROFI pilot scenario for the marine environmental sphere, dealing with e.g., current and emerging needs of marine related research and industrial sectors as well as the access and usage of the content of large marine environment data archives and in situ metocean sensor observation measurements, harvested from existing multi-modal sensor networks across the Irish and Norwegian coastal waters and basins respectively.

WP4 provides generic use cases as an abstraction of the WP1-3 use cases. Generic hereby means abstraction form the domain-specific aspects of WP1-3. It facilitates the identification and derivation of requirements and significantly reduces the number of backward references from requirements to use cases for the sake of readability.

According to the ENVIROFI methodology of how to analyze and document user requirements, this report comprises the collection of requirement for generic and specific enablers that were edited and agreed within the member team of the ENVIROFI work packages WP4 and WP5.

The report is automatically generated from the content of the ENVIROFI Use Case server accessible at http//envirofi.server.de.

The following tables provide a summary and overview description of the use cases as further documented in section 5.

Use Case	Name
UC-ENV4-dat-01-V01	Access semantic information
UC-ENV4-dat-02-V01	Store semantic information
UC-ENV4-dat-03-V01	Link observations to semantic data
UC-ENV4-fun-01-V01	Service performs algebraic and logical operation on observations
UC-ENV4-fun-02-V01	System sends alerts/notifications to users
UC-ENV4-fun-02.01-V01	Predictive alerts based upon user observations
UC-ENV4-fun-03-V01	User provides new observation(s) to the system
UC-ENV4-fun-03.01-V01	User provides new observation(s) to the system through mobile PIS
UC-ENV4-fun-03.02-V01	User provides new observation(s) to the system through web portal
UC-ENV4-fun-03.03-V01	User provides large number of new observations to the system at once
UC-ENV4-fun-03.04-V01	User links to observations in external repository
UC-ENV4-fun-04-V01	User alters existing observation(s)

cont...

Use Case	Name
UC-ENV4-fun-05-V01	User accesses existing observations
UC-ENV4-fun-05.01-V01	System presents user with information on his/her surroundings
UC-ENV4-fun-05.02-V01	User downloads observations set from the portal
UC-ENV4-fun-05.03-V01	User interactively explores the existing observations
UC-ENV4-fun-06-V01	System urges the user to provide observation(s)
UC-ENV4-fun-07-V01	Determine position of mobile device
UC-ENV4-fun-08-V01	Run simulations with observations as data input
UC-ENV4-kno-01-V01	System assesses the quality of observations
UC-ENV4-kno-02-V01	System identifies the observed phenomena / environmental state
UC-ENV4-not-01-V01	User subscribes for receiving alert notifications
UC-ENV4-not-02-V01	Configuration of Alert Types and Dissemination Channels
UC-ENV4-not-03-V01	System disseminates alert notifications
UC-ENV4-sec-01-V01	System uniquely identifies users
UC-ENV4-sec-01.01-V01	Register User
UC-ENV4-sec-01.02-V01	Authenticate User
UC-ENV4-sec-02-V01	Support user-specific application behaviour
UC-ENV4-sec-02.01-V01	Manage User Preferences
UC-ENV4-sec-02.02-V01	Manage access permissions
UC-ENV4-sec-02.03-V01	Define user roles and groups
UC-ENV4-sec-02.04-V01	Manage user profile
UC-ENV4-sec-02.05-V01	Define trust levels
UC-ENV4-sec-03-V01	Observation access requiring license approval
UC-ENV4-sec-04-V01	Configure observation or service access to require payment
UC-ENV4-sec-04.01-V01	Access observation data or service that requires payment
UC-ENV4-sec-05-V01	Support geospatially- dependent application behaviour
UC-ENV4-tru-01-V01	System provides information about observation uncertainty
UC-ENV4-xui-01-V01	Provide visualization of requested data

Table 1: List of Use Cases

Use Case	Description
UC-ENV4-dat-01-V01	Users can access semantic information.
UC-ENV4-dat-02-V01	Users can store and update semantic information.
UC-ENV4-dat-03-V01	Users can link an observation to semantic data to give meaning to the observation.

cont...

Use Case	Description
UC-ENV4-fun-01-V01	In many ENVIROFI Use cases, the users decision making process can be assisted by calculating a value of some algebraic or logical function of the available observations. Typically, the user may be interested in finding out (and visualizing) the regions where certain environmental conditions are met, or getting alerted in case certain conditions are met. Some examples: • Nice sailing weather: (FoI is a lake) and (wind is whithin certain limits) and (temperature is within certain limits) • drought alert: (FoI is my field) and (low humidity sensed) • trigger watering: (FoI is my field) and (low humidity sensed) and (no rain predicted in near future) • possible bacterial contamination: (FoI is a bay) and (favorable meteo conditions) and (some proxi measurements over tresholds)
UC-ENV4-fun-02-V01	In many ENVIROFI applications, the system should automatically alert user, thus triggering the further workflow. For example, the user may wish to be informed that certain conditions have been met, rather than having to regularly check the situation.
UC-ENV4-fun-02.01-V01	The system shall analyze observations reported by users (user input) in order to predict current or future attribute values of user-specific information (effect), possibly correlated to the user input. The user observations may comprise current medical observations of the user himself/herself but also environmental observations provided by the user. Examples are: • sneezing • itching eyes • mucus • coughing • observations of allergenic plants (e.g. ragweeds), mushrooms, etc. The effect information corresponds to the personal health conditions of the user. Examples are: • Headache (e.g. caused by air pressure differences) • UV exposure • Blood pressure/cardio vascular problems • rheumatism Assuming a correlation between the user input and the user-specific effect, the system shall aim at generating personalised alert information for the user.

cont...

Use Case	Description
UC-ENV4-fun-03-V01	The user contributes new observation(s); after some quality assurance steps (optional), the observations are stored on a server.
UC-ENV4-fun-03.01-V01	The user contributes new observation(s); after some QA steps (optional), the observations are stored on a server. Observations are provided through 'mobile Personal Information System'; position and possibly other information (sensor readings?) is added automatically
UC-ENV4-fun-03.02-V01	The user contributes new observation(s); after some QA steps (optional), the observations are stored on a server. Observations are entered one by one through web-portal.
UC-ENV4-fun-03.03-V01	The user contributes new observation(s); after some QA steps (optional), the observations are stored on a server. Large number of observations is provided by the user at once, e.g. by uploading a file to the server.
UC-ENV4-fun-03.04-V01	The user links to an external data set. After some QA steps (optional), the observations are available to all users.
UC-ENV4-fun-04-V01	Observation records may be incomplete, or contain errors. Users should therefore have a possibility to alter the information (and meta-information) associated with observation record. Depending on the scenario, one or more of the following actions need to be allowed by the server and supported by end-user (GUI) application(s): • Alter the quality-assurance related parameters, such as QA/trust level or Uncertainty associated with the observation • Alter the time/space parameters associated with the observation • Alter the observed value (e.g. because the photography associated with observation clearly shows a different taxa)
UC-ENV4-fun-05-V01	User requests the system to present part of the observations corresponding to a query. The system executes the query issued by the user and makes the results accessible for the user according to the requested delivery method. This can be repeated interactively and iteratively as needed.
UC-ENV4-fun-05.01-V01	User moves (walks? drives?...) arround; the system informs him/her of 'interesting things' in the surrounding. **Example:** User is interested in birds; the system informs him which birds could be seen in environment / which bird observations have been recently reported in environment

cont...

Use Case	Description
UC-ENV4-fun-05.02-V01	User requests the system to provide him/her with a part of the observations corresponding to a query; system performs the appropriate query and provides a result in a form suitable for offline use (e.g. an XML file)
UC-ENV4-fun-05.03-V01	User requests the system to present part of the observations corresponding to a query; system performs the appropriate query and visualizes the results. This can be interactively repeated as needed.
UC-ENV4-fun-06-V01	In addition to simply waiting for users to submit new information, system could actively solicit information from user(s). In this way, it would be possible to improve the quality of the data sets. This behaviour could be triggered by various mechanisms: • User submits observation, and system urges him/her to look for related occurences (e.g. along the food chain, or in order to estimate the geographic coverage...) - • User enters an area where a survey is currently conducted - in order to get higher density of observations • User is asked to perform the same type of observation another user recently performed at the same location - can be used for QA • User in in an area where some event occured (earthquake?) or is likely to occur (dry forest?)
UC-ENV4-fun-07-V01	A user needs a fast and accurate way to find his current location, even if aGPS is not available.
UC-ENV4-fun-08-V01	Simulations are an important tool in decision making. Some simulations require much computer power and time and can thus not be run directly on request but for instance daily or hourly. The system must allow for simulations to be run and the results to be published as predictive observations with associated uncertainty values. Multiple users can then view these results and use them in mashups as required.
UC-ENV4-kno-01-V01	The system compares the newly submitted observation with the known facts and estimates the plausibility of the report (e.g. probability of false report). Some possible tests: • Spatial probability (i.e. Does this observation fit into this region? Does it occur within the know distribution area?) • Temporal probability (i.e. Can it be observed at this time of the year?) • Comparison with common mis-identifications (i.e. Provide user with image of other types often confused with type identified - does the leaf of this species look like this?) • related occurrences (do observations in same time/space fit together?) • compatibility with environment (does observation fit into the geo/bio-physical characteristics of the area?) • quality of information previously submitted by this user • opinions of other users/experts

cont...

Use Case	Description
UC-ENV4-kno-02-V01	System analyses the multimedia, sensoric or subjective input provided as the part of observation record, identifies the observed phenomena/state and stores this additional information with the observation record. The knowledge about the possible observed phenomena/environmental states may be known to the system by means of an environmental ontology as an example.. Example: user submits a photography of a plant; the system recognises the plant and stores this information. Example: user reports sneezing; system inferes the existence of alergenes
UC-ENV4-not-01-V01	Information regarding the user's preferences for the alert dissemination are stored in the system.
UC-ENV4-not-02-V01	The administrator sets up in the Alert Notification Service the available alert types a user can subscribe to as well as the available dissemination channels that can be used in order to received the alert.
UC-ENV4-not-03-V01	Personalized alerts are disseminated to users/other systems based on the user preferences. The dissemination is started upon a human or automatic system decision after a set of conditions (observed parameters) have been evaluated.
UC-ENV4-sec-01-V01	The user is 'recognised' by ENVIROFI application, and able to perform actions on his/her own behalf.
UC-ENV4-sec-01.01-V01	A new user is made known to the system by defining • a unique user id and password • the user profile data
UC-ENV4-sec-01.02-V01	User inputs his credentials and logs into the system. System identifies user uniquely.
UC-ENV4-sec-02-V01	ENVIROFI applications should act differently for various users. For instance, the look and feel of the applications may change; system may generate different actions (e.g. send user-specific alerts); change the data shown to the user (e.g. based on his/her position or interests); or the user may be permitted to perform certain actions (e.g. view/edit/tag certai data or edit/view own profile). Also the level of trust in user-provided information may depend on the user.
UC-ENV4-sec-02.01-V01	An ENVIROFI application can store a user's GUI preferences (e.g. visualisation settings, notification settings, gui feature settings like table column width, sort order, etc.). Default values can be defined for an application which are taken if a user does not change the application's appearance.

cont...

Use Case	Description
UC-ENV4-sec-02.02-V01	Administrator manages which user resp. group od users can access which data. System grants data access according to these settings.
UC-ENV4-sec-02.03-V01	Administrator defines user groups and roles to grant data access permissions to users.
UC-ENV4-sec-02.04-V01	User profile contains information aubout the user: • identity information • trust level User profile is created during user registration; can be edited and modified by user
UC-ENV4-sec-02.05-V01	Starting from the user's self-assessment of his trust level, the system adjusts the trust level depending on the observations the user enters into the system. If the system decides that an observation ist correct or that the user's observations are matching observations of more trusted users, the trust level of this user will be adjusted.
UC-ENV4-sec-03-V01	An observation provider may associate a text document reporting the license associated to an observation or observation set. Upon a user request, the license will be provided to the user for explicit approval.
UC-ENV4-sec-04-V01	An observation provider may associate a mometary fee to the access of a observation or observation set.
UC-ENV4-sec-04.01-V01	A user can pay for access to an observation set or a service.
UC-ENV4-sec-05-V01	ENVIROFI applications should act differently, depending on the spatial parameters. • User may have different priviledges, depending on their own position, and on the position of the observations they are interested in. For instance, user may be allowed to annotate (e.g. estimate the validity of) observations in a certain area surrounding his/her place of living, but not the observations at the other side of the planet. • Furthermore, the system may allow, or even encourage/request the users to perform certain actions when they enter the area of interest.

cont...

Use Case	Description
UC-ENV4-tru-01-V01	Beside observation data, the system provides the associated uncertainty that can be provided/visualized in alternative or along with data. The uncertainty may depend either on data quality (e.g. precision and accuracy of a sensor), or on probabilistic results (e.g. from a model simulation). Examples: a) an user runs a Ecological Niche Model on different Climate Change scenarios to evaluate changes in species geographical distribution. The result isshown as an occurrence probability map. b) an user accesses information on air pollution coming from different sensors: a certified sensor network, and a network of low-quality home stations managed by citizen scientists. The user can visualize the data map and a layer showing the different trust degree.
UC-ENV4-xui-01-V01	The user can request data from several sources. These data are then presented visually in a useful way, for instance on a map.

Table 2: Summary of Use Cases

2 Use cases

2.1 WP4

2.1.1 Access semantic information

Use Case ID	UC-ENV4-dat-01-V01
Use Case Name	Access semantic information
Revision and Reference	V01;http://envirofi.server.de/servlet/is/8184/
Use Case Diagram	
Status	Planned
Priority of accomplishment	Must have
Goal	Provide access to semantic information
Summary	Users can access semantic information.
Category	Data Access
Actor	User, System
Primary Actor (initiates)	User
Stakeholder	
Requested Information Resources	Semantic information store
Preconditions	User is logged in, has proper rights
Main success scenario	The user receives the requested information in the desired format.
Extensions	
Alternative paths	
Post conditions	The user has received all required information
Non-functional requirements	

Validation statement	
Notes	
Author and date	HvdS-IOSB, 2011-11-22
Maps to Requirement	• WP5-SE-MED-6 - Connector - WFS • WP5-SE-MED-5 - Connector - WCS • WP5-SE-MED-8 - Connector - toolbox • WP5-SE-MED-10 - Mediator - Fusion toolbox • WP5-SE-MED-7 - Connector - WMS • WP5-SE-MED-4 - Connector - SOS • WP5-SE-TAG-8 - Uncertainty annotation of environmental data service

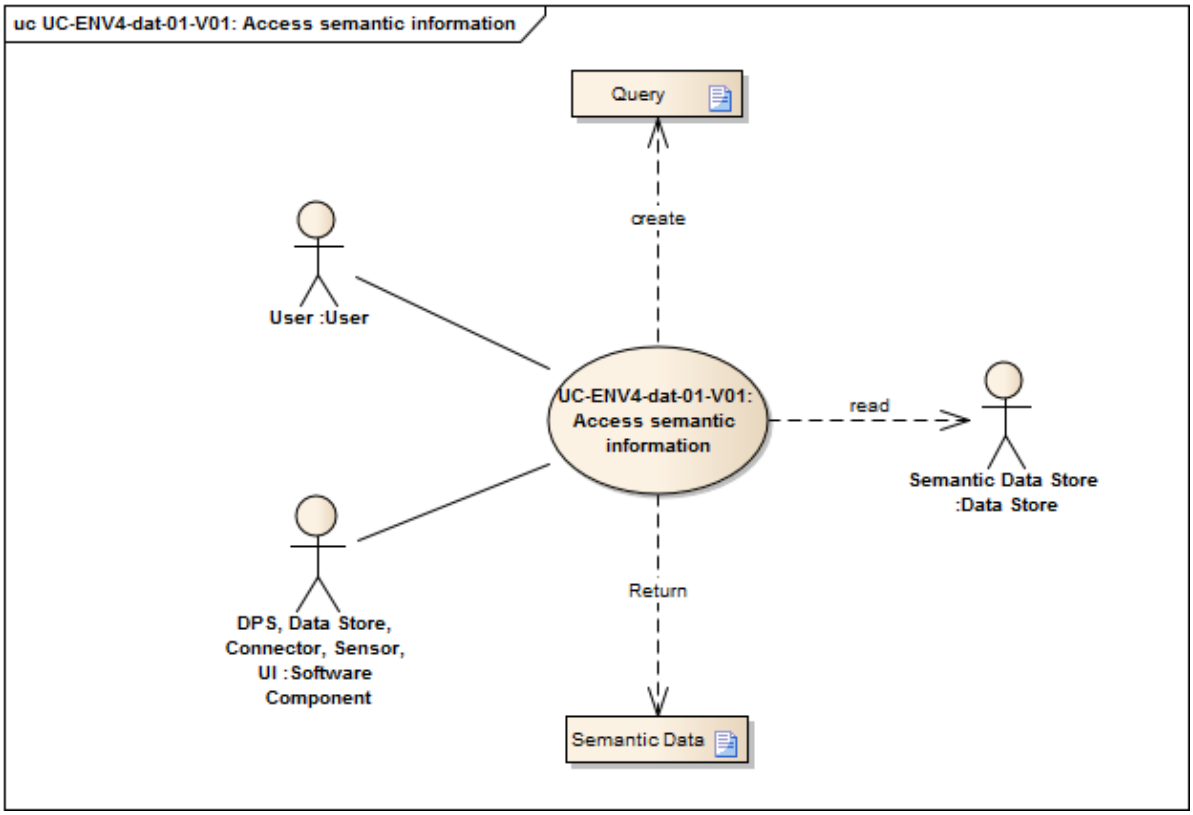

Figure 1: UC-ENV4-dat-01-V01 Access semantic information

2.1.2 Store semantic information

Use Case ID	UC-ENV4-dat-02-V01
Use Case Name	Store semantic information
Revision and Reference	V01;http://envirofi.server.de/servlet/is/8191/
Use Case Diagram	
Status	Planned
Priority of accomplishment	Must have
Goal	Allow new semantic information to be stored, adding new or updating existing information.
Summary	
Category	Data Input
Actor	User, System
Primary Actor (initiates)	User
Stakeholder	
Requested Information Resources	Semantic information store
Preconditions	User is logged in, has proper rights
Main success scenario	• User (or component) sends new (or updated) semantic information to the system. • Semantic information is stored in the system and available.
Extensions	
Alternative paths	
Post conditions	The new or updated semantic information is available.
Non-functional requirements	
Validation statement	
Notes	
Author and date	HvdS-IOSB, 2011-11-22
Maps to Requirement	• WP5-SE-TAG-8 - Uncertainty annotation of environmental data service

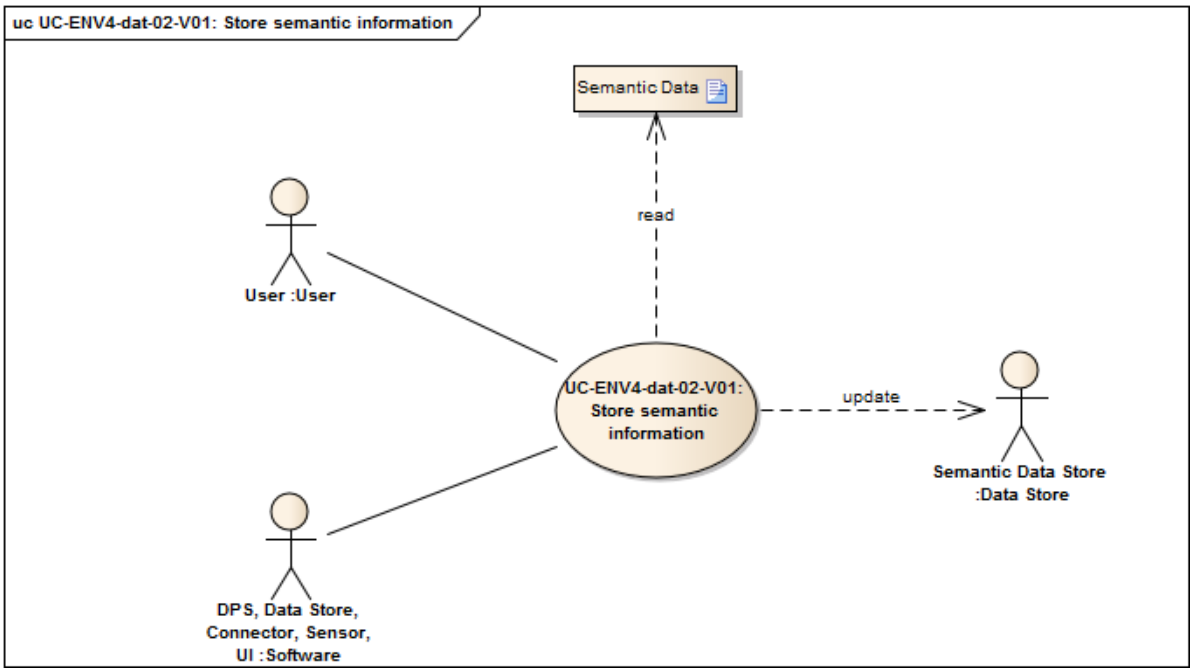

Figure 2: UC-ENV4-dat-02-V01 Store semantic information

2.1.3 Link observations to semantic data

Use Case ID	UC-ENV4-dat-03-V01
Use Case Name	Link observations to semantic data
Revision and Reference	V01; http://envirofi.server.de/servlet/is/8234/
Use Case Diagram	
Status	Planned
Priority of accomplishment	Must have
Goal	Allow the creation and modification of links from observation to semantic data.
Summary	Users can link an observation to semantic data to give meaning to the observation.
Category	Data Input
Actor	User, System
Primary Actor (initiates)	User
Stakeholder	
Requested Information Resources	• Observation store • Semantic information store
Preconditions	User is logged in, has proper rights, observation exists
Main success scenario	• User accesses observation • User provides links to relevant semantic data • Links to semantic data are stored with the observation
Extensions	
Alternative paths	
Post conditions	Observation has associated links to semantic data.
Non-functional requirements	
Validation statement	
Notes	
Author and date	HvdS-IOSB, 2011-11-23

Maps to Requirement	• WP5-SE-GEO-7 - Environmental geo-referenced image sample archive service • WP5-SE-TAG-8 - Uncertainty annotation of environmental data service • WP5-SE-FUSION-1 - Environmental spatial-temporal data fusion service • WP5-SE-FUSION-2 - Environmental image sample classification service • WP5-SE-FUSION-4 - Environmental asset analysis service for geo-referenced sample archives • WP5-SE-FUSION-5 - Areas Classification Service

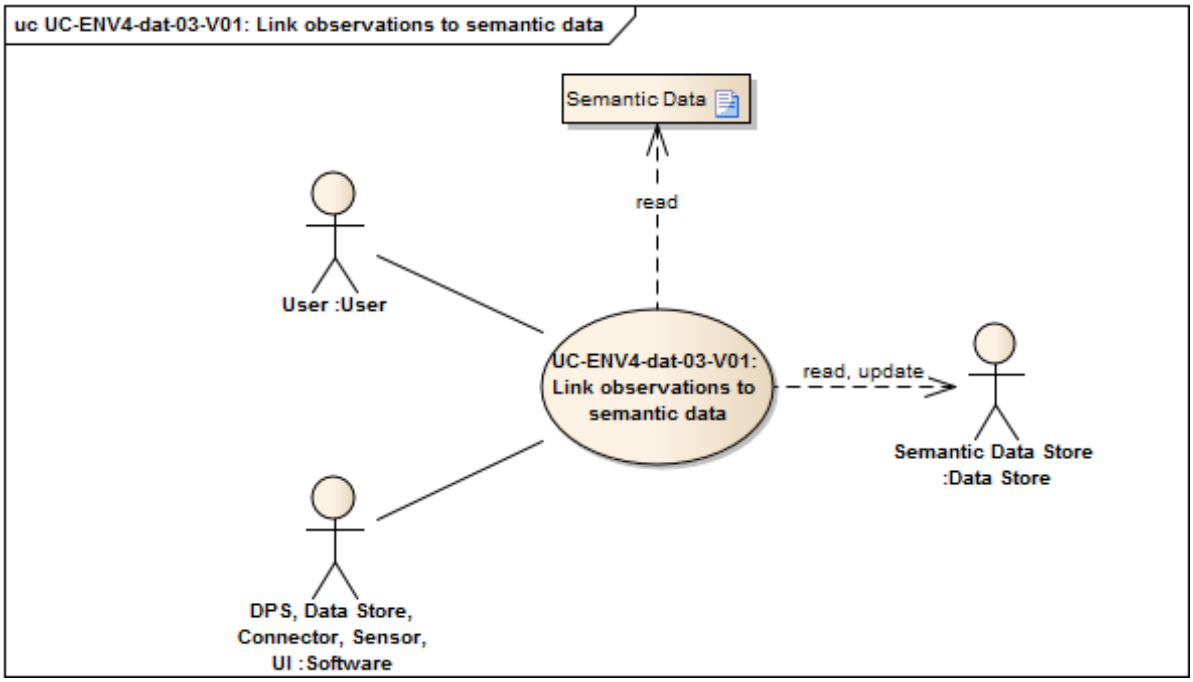

Figure 3: UC-ENV4-dat-03-V01 Link observations to semantic data

2.1.4 Service performs algebraic and logical operation on observations

Use Case ID	UC-ENV4-fun-01-V01
Use Case Name	Service performs algebraic and logical operation on observations
Revision and Reference	V01; http://envirofi.server.de/servlet/is/5332/
Use Case Diagram	
Status	In Progress
Priority of accomplishment	Must have
Goal	Support simple observations processing in ENVIROFI applications
Summary	In many ENVIROFI Use cases, the users decision making process can be assisted by calculating a value of some algebraic or logical function of the available observations. Typically, the user may be interested in finding out (and visualizing) the regions where certain environmental conditions are met, or getting alerted in case certain conditions are met. Some examples: • Nice sailing weather: (FoI is a lake) and (wind is whithin certain limits) and (temperature is within certain limits) • drought alert: (FoI is my field) and (low humidity sensed) • trigger watering: (FoI is my field) and (low humidity sensed) and (no rain predicted in near future) • possible bacterial contamination: (FoI is a bay) and (favorable meteo conditions) and (some proxi measurements over tresholds)
Category	Processing
Actor	User, SW Component
Primary Actor (initiates)	User
Stakeholder	
Requested Information Resources	• Observations (e.g. on SOS servers) • Processing configuration • Processing result • Alert (optional)
Preconditions	It is possible to access observations (online)
Main success scenario	• User requests the system to perform certain operations on observations. 1a. user choses the observations he/she is interested in; 1b. user configures the algebraic operations to be performed on these operations • system stores the configuration for later use • system performs the stored receipt as needed, producing new observations.

Extensions	• the results are visualized immediately/shown to user • the results are made available as new observations once • the system performs the stored operation from time to time (time-triggered or event-triggered) and makes the results available as new observations • system automatically discovers the appropriate input data based on user's request (e.g. air temperature from all available sources, not just from one server choosen by user)
Alternative paths	System notifies the user when new data is available (alerting)
Post conditions	Processing result is available.
Non-functional requirements	Assure that the response times are in a range acceptable for the user. • Order of magnitude = seconds if the service is used interactivly.
Validation statement	a service exists which can be easily configured to perform algebraic and logical/set operation on observations, producing new observation series on the output.
Notes	• the supported operations should include at least the basic mathematic operations (+, -, *, /), logical operations on observations, that is on spatio/temporal sets (and/intersection, or/union, ...) , comparison (>, • Typically the processing shall be triggered either by users request, by timer, or by avaliability of new observations. • **Observations are events** in SWE! • **Observations are result of processing** in SWE! • It is to clarify where to send the processing results, e.g. in case of alerts
Author and date	DHa - AIT, 2011-05-26
Includes UseCase	• UC-ENV4-fun-02-V01 - System sends alerts/notifications to users • UC-ENV4-not-03-V01 - System disseminates alert notifications
Maps to Requirement	• WP5-SE-MED-10 - Mediator - Fusion toolbox • WP5-SE-GEO-6 - Environmental geo-referenced observation operating service

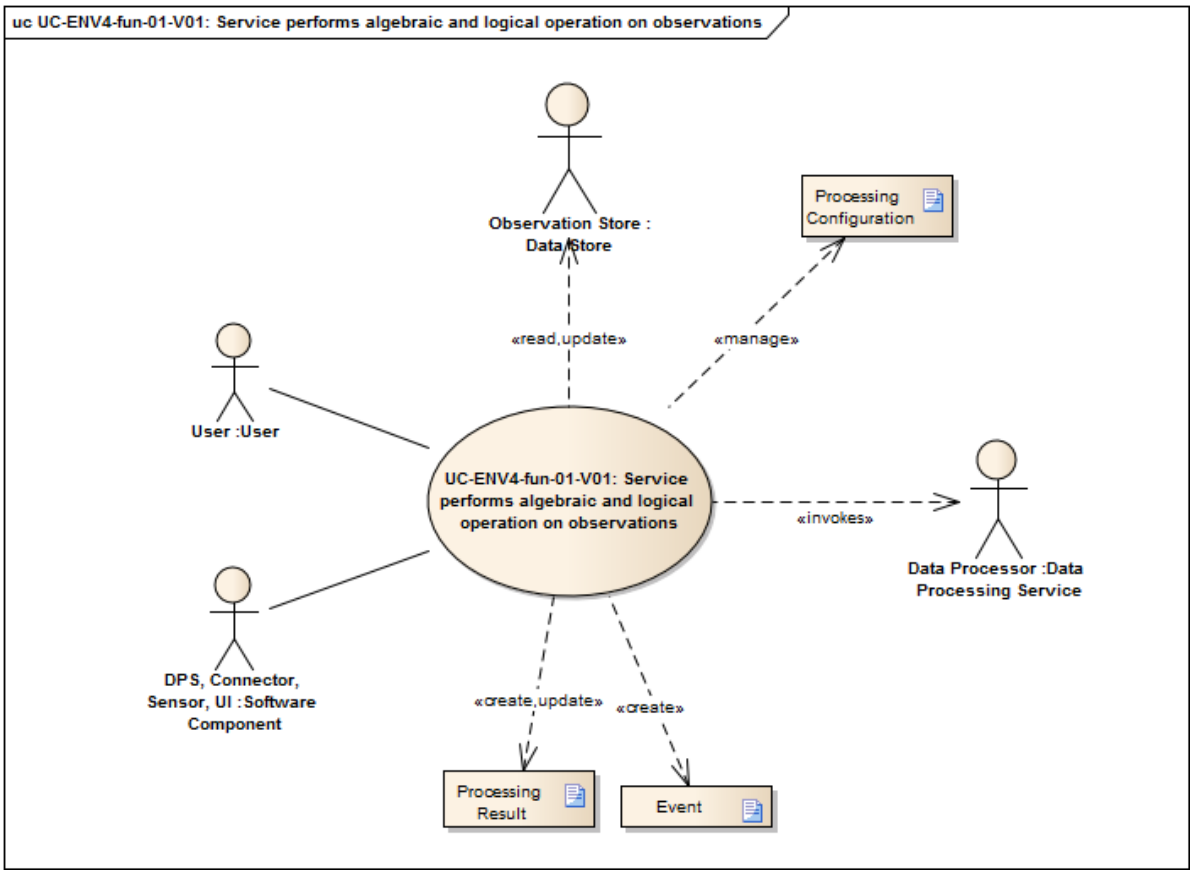

Figure 4: UC-ENV4-fun-01-V01 Service performs algebraic and logical operation on observations

2.1.5 System sends alerts/notifications to users

Use Case ID	UC-ENV4-fun-02-V01
Use Case Name	System sends alerts/notifications to users
Revision and Reference	V01;http://envirofi.server.de/servlet/is/5353/
Use Case Diagram	
Status	In Progress
Priority of accomplishment	Must have
Goal	System pushes information to users according to their subscription preferences
Summary	In many ENVIROFI applications, the system should automatically alert user, thus triggering the further workflow. For example, the user may wish to be informed that certain conditions have been met, rather than having to regularly check the situation.
Category	Event handling
Actor	SW component, user
Primary Actor (initiates)	SW component
Stakeholder	
Requested Information Resources	Test In order to receive alerts the user must specify: • what parameters have to be monitored (e.g., pollen concentration) • what are his geografical areas of interest (e.g., only information related to the city of Vienna) • what dissemination channels to be used (e.g., sms, email, ...) • language to be used In order to send alerts the system must specify: • the parameter(s) being monitored • the geographical area where to send the alert
Preconditions	existence of tailor-made observations; observation processing service
Main success scenario	• User subscribes in the system to receive alerts regarding certain events • System stores the configuration for later use • System receives a piece of information that must be notified to the subscribed users. • System evaluates the information with the user subscription preferences • If it matches, the system sends immediately the information to the user via the designated dissemination channel(s)
Extensions	• Alert is sent to a service, thus triggering further processing/automated response (e.g. watering of a field).

Alternative paths	
Post conditions	user is informed of new event
Non-functional requirements	• Assure the alert is received by user within acceptable time (how long is acceptable? Notice that SMTP, SMS delivery and many other transport protocols including TCP/IP have no support for guaranteed delivery times...) • Assure the user reacts to alert (is this needed? Some kind of workflow?)
Validation statement	• users can subscribe to events they are interested in. • users receive alerts/notifications that match their criteria.
Notes	In SWE, all observations are events, and therefore can be used to generate alerts/notifications. However, the user is generally not interested in receiving alert whenever a sensor reading occurs or even receive the swe-encoded observation. Therefore, the system needs to somehow process initial observations first, and produce a new set of events that occur only infrequently and/or tailor the message to be sent according to his preferences. UC-ENV3.8-NOT-06-V02 specifies that the user receiving the alert must acknowledge the alert but it must be noted that depending on the dissemination channel used this is not always possible (e.g., a user may receive an alert in his email inbox but he must be aware of it in order to send the acknowledgement).
Author and date	MAE, 2012-07-18
Includes UseCase	• UC-ENV4-not-01-V01 - User subscribes for receiving alert notifications • UC-ENV3.8-NOT-05-V02 - System Notifies Relevant Personnel • UC-ENV4-not-02-V01 - Configuration of Alert Types and Dissemination Channels • UC-ENV4-not-03-V01 - System disseminates alert notifications
Maps to Requirement	• WP5-SE-NOT-1 - Alert Notification Service • WP5-SE-GEO-11 - Environmental geo-referenced observation app • WP5-SE-NOT-5 - Sensor Event Service

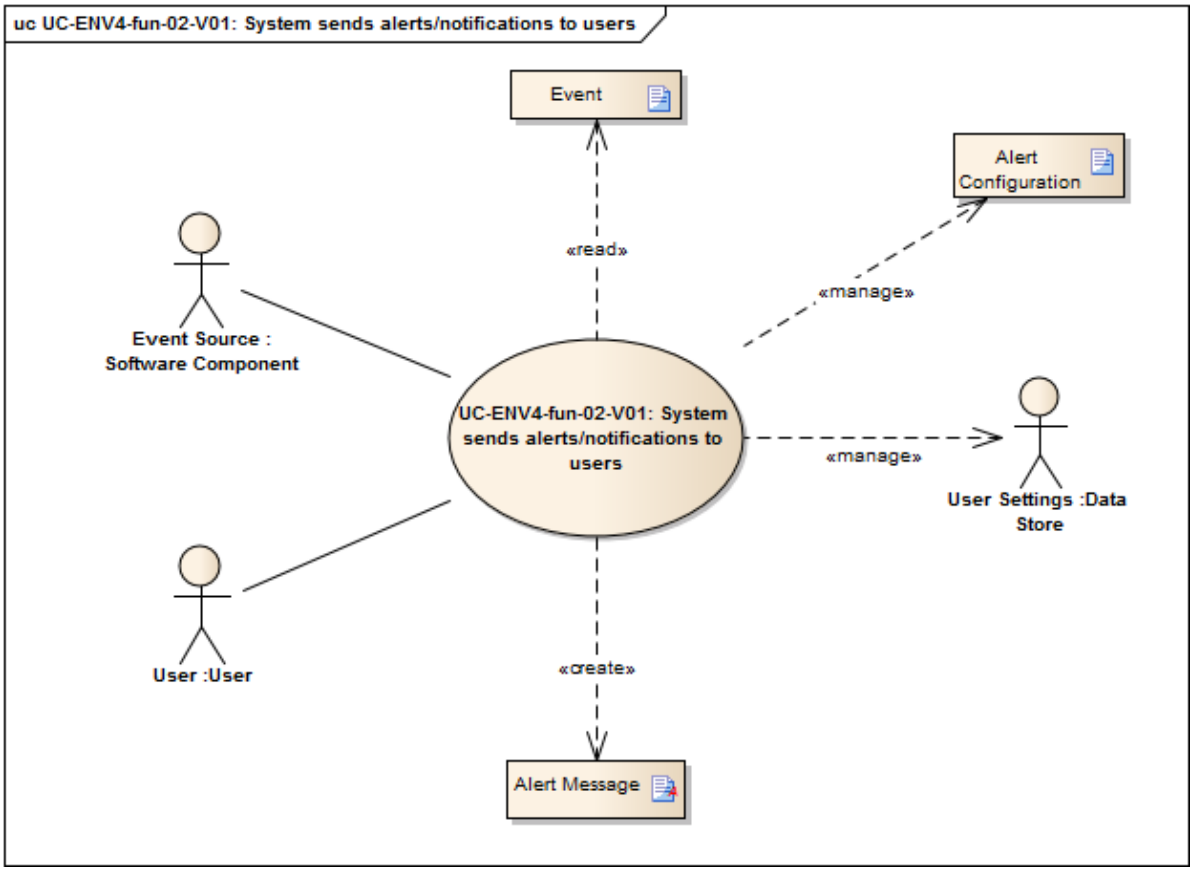

Figure 5: UC-ENV4-fun-02-V01 System sends alerts/notifications to users

2.1.6 Predictive alerts based upon user observations

Use Case ID	UC-ENV4-fun-02.01-V01
Use Case Name	Predictive alerts based upon user observations
Revision and Reference	V01; http://envirofi.server.de/servlet/is/4900/
Use Case Diagram	
Status	Planned
Priority of accomplishment	Must have
Goal	System generates alerts based on user observations
Summary	The system shall analyze observations reported by users (user input) in order to predict current or future attribute values of user-specific information (effect), possibly correlated to the user input. The user observations may comprise current medical observations of the user himself/herself but also environmental observations provided by the user. Examples are: • sneezing • itching eyes • mucus • coughing • observations of allergenic plants (e.g. ragweeds), mushrooms, etc. The effect information corresponds to the personal health conditions of the user. Examples are: • Headache (e.g. caused by air pressure differences) • UV exposure • Blood pressure/cardio vascular problems • rheumatism Assuming a correlation between the user input and the user-specific effect, the system shall aim at generating personalised alert information for the user.
Category	
Actor	User
Primary Actor (initiates)	
Stakeholder	
Requested Information Resources	• user observation (read) • user-specific effect (read, update) • alert (create, read, update)
Preconditions	existence of user-specific effect object
Main success scenario	
Extensions	
Alternative paths	

Post conditions	• user-specific effect object updated • alert object created
Non-functional requirements	• reliable generation of alert • controlled access to user-specific effect object
Validation statement	
Notes	
Author and date	
Includes UseCase	• UC-ENV4-fun-01-V01 - Service performs algebraic and logical operation on observations • UC-ENV4-fun-02-V01 - System sends alerts/notifications to users
Refines UseCase	• UC-ENV4-fun-01-V01 - Service performs algebraic and logical operation on observations • UC-ENV4-fun-02-V01 - System sends alerts/notifications to users
Maps to Requirement	• WP5-SE-NOT-1 - Alert Notification Service • WP5-SE-GEO-11 - Environmental geo-referenced observation app • WP5-SE-NOT-5 - Sensor Event Service

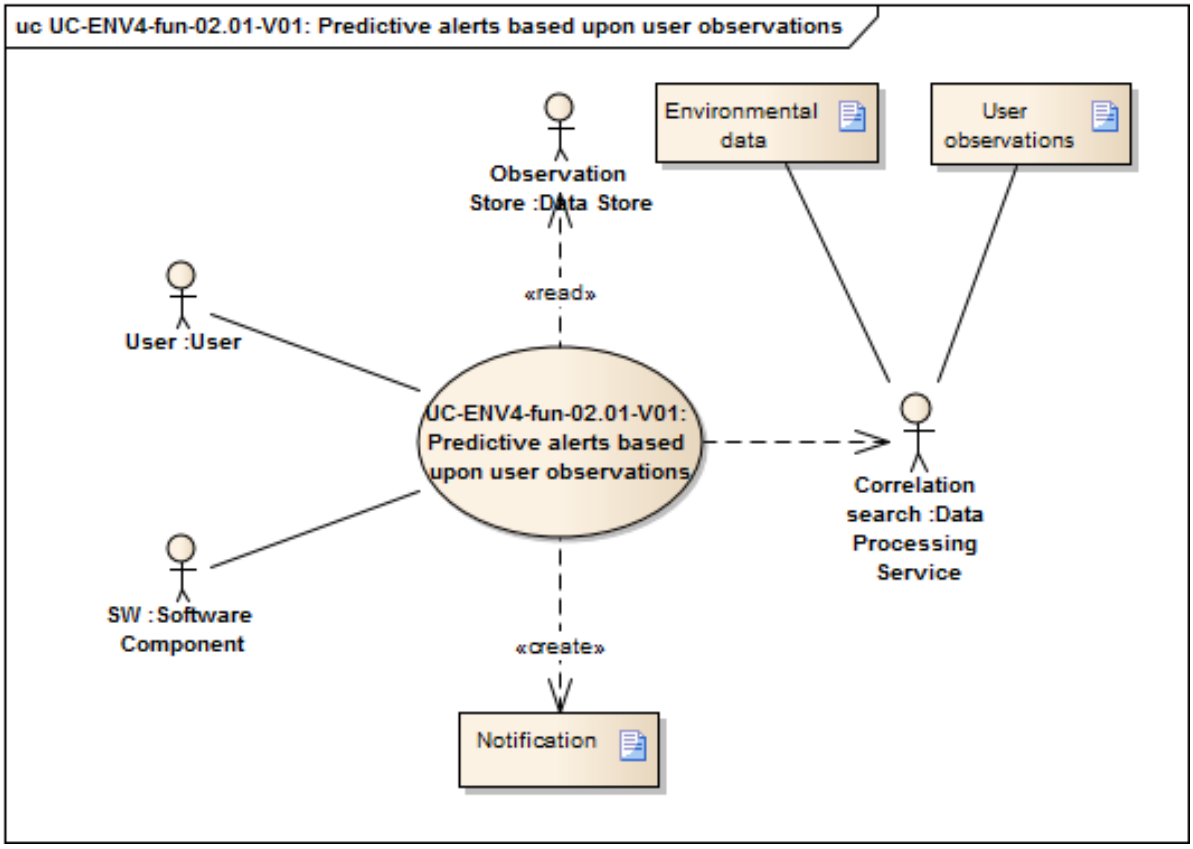

Figure 6: UC-ENV4-fun-02.01-V01 Predictive alerts based upon user observations

2.1.7 User provides new observation(s) to the system

Use Case ID	UC-ENV4-fun-03-V01
Use Case Name	User provides new observation(s) to the system
Revision and Reference	V01;http://envirofi.server.de/servlet/is/5376/
Use Case Diagram	
Status	In Progress
Priority of accomplishment	Must have
Goal	Provide observation by user
Summary	The user contributes new observation(s); after some quality assurance steps (optional), the observations are stored on a server.
Category	Data Input
Actor	User, SW Component
Primary Actor (initiates)	User
Stakeholder	
Requested Information Resources	• Observation data and meta-information model (e.g. observation schema, ontology; depends on type of observation) • Observation storage facility (e,g, SOS server) • background information for plausibility checks
Preconditions	User has started ENVIROFI application; User is uniquely identified by the system (optional?)
Main success scenario	• The user chooses the type of observation (e.g. from a list, or by choosing a special application) • The user provides the information and meta-information required by observation schema • Data is uploaded to the server • User is informed about successful upload

Extensions	Extensions: 2a.Some of the required information may be provided automatically: time, user's position, sensor readings, NFC input, ... 2b. Sensor/observation data is preprocessed on local device 2c. User adds continuous data source, like a network enabled sensor, that automatically supplies data at a regular interval 3a. System estimates the 'value' (trust, uncertainty..) of information based on user's 'trust level' 3b. System estimates the 'value' of information based on automated plausibility checking mechanism 3c. System estimates the 'value' of information based on review by other users 3d. System urges the user to improve initial record 3e. System urges the user to perform additional observations 3f. Large number of observations is uploaded to a server at once (bulk upload) 3g. Observation is linked to related observations in system repository 3h. Observation is linked to related observations in external repository 3i. Network QoS is measured by system, text data upload only, multimedia data is stored locally for later upload 3j. Network cost is measured by system, text data upload only, multimedia data is store locally for later upload 3k. Data is stored locally for later upload when no network connection available 3l. Data is stored locally for later upload when user decides to do so
Alternative paths	2a. User enters incorrect data. 3a. Data is not stored because check failed.
Post conditions	New occurrence records (one or more) are available in the ENVIROFI repository.

Non-functional requirements	Should have: Access/use conditions can be set/modified by user: • Users should have a right to decide what level of access and which IPR conditions are assigned to the data they submitted - within the limits set by provider. (e.g. the provider may decide to prohibit 'private' records, or require special IPR conditions fo the observations maintained on his server) Must Have: Access/use conditions set/modified by service provider: • Service provider should have a possibility to limit the users choices concerning access and use conditions of the observations submitted by users. In addition to global settings, service provider may need a possibility to alter these limitations for certain records. For example, the sightings of endangered species are considered sensitive and need to be obfuscated before presenteing them to the general public. Input of observations shall usually be done either through mobile device (smart phone, tablet PC, other?), or through a fixed PC. Each of these devices has advantages and disadvantages, resulting in following requirenments: • Must have: support for various screen sizes (smart-phones have 3' screen, tablets 7-10.1', PCs >20') • Must have: support for disconnected observation gathering (network may not always be available) • Should have: support for various input methods (in particular, the NFC cards can be used as a replacement for menues; also support built-in sensors on a phone; if possible additional external sensors too) • Should have: support for slow and expensive networks (transfer textual part of the record first; upload multimedia data when on fast/inexpensive network; also possible to pre-load help information prior to field-work)
Validation statement	A new observation is available in the ENVIROFI repository, and owned by user that submitted it. Also see non-functional requirements!
Notes	
Author and date	KS-UBA, 2011-07-20
Includes UseCase	• UC-ENV4-fun-03.01-V01 - User provides new observation(s) to the system through mobile PIS • UC-ENV4-fun-03.02-V01 - User provides new observation(s) to the system through web portal • UC-ENV4-fun-03.03-V01 - User provides large number of new observations to the system at once • UC-ENV4-fun-03.04-V01 - User links to observations in external repository

Maps to Requirement	• WP5-SE-GEO-1 - Environmental geo-referenced observation collection service • WP5-SE-GEO-10 - Environmental geo-referenced observation proxy service • WP5-SE-GEO-7 - Environmental geo-referenced image sample archive service • WP5-SE-GEO-9 - Geo-referenced sample quality assessment service

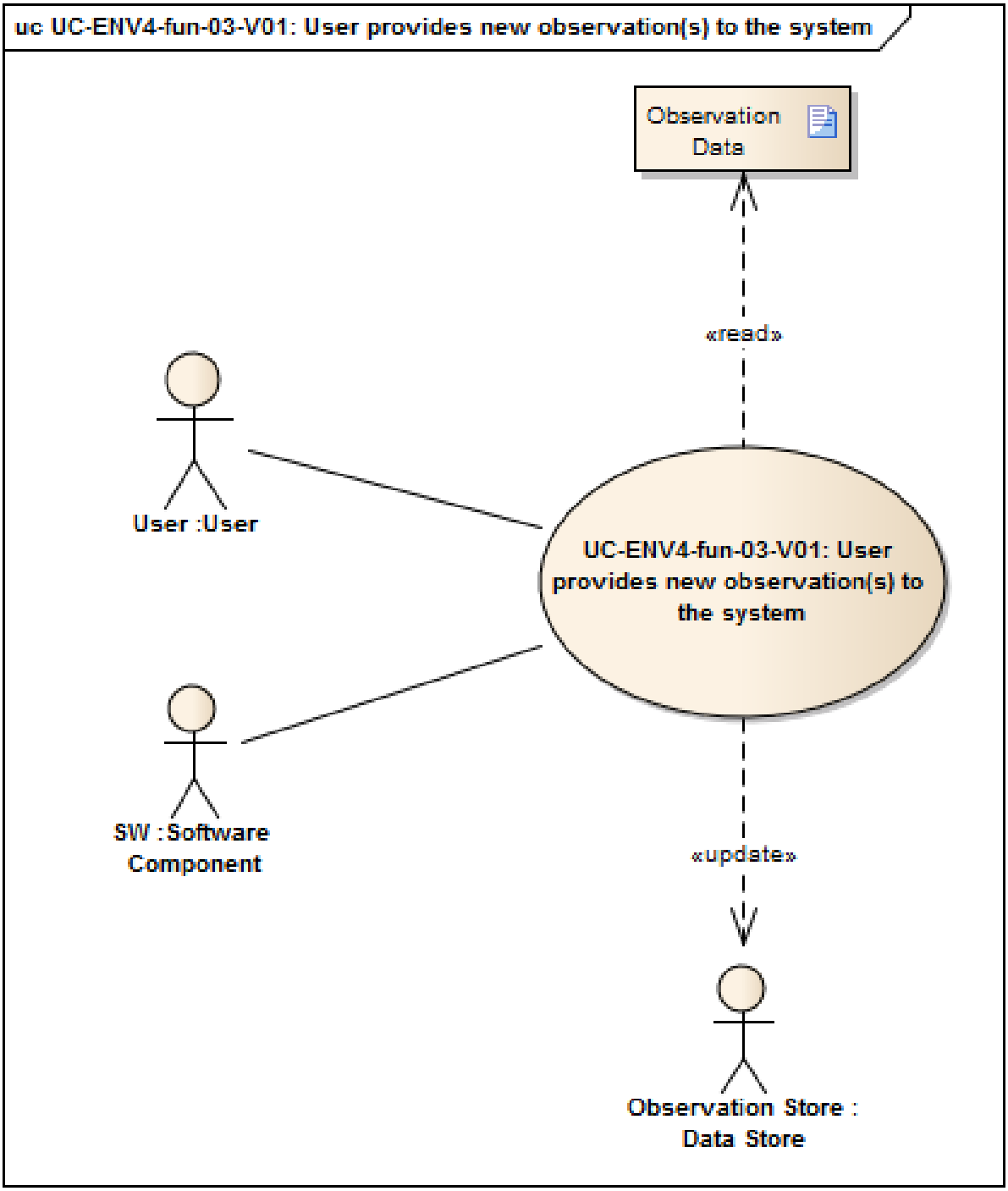

Figure 7: UC-ENV4-fun-03-V01 User provides new observation(s) to the system

2.1.8 User provides new observation(s) to the system through mobile PIS

Use Case ID	UC-ENV4-fun-03.01-V01
Use Case Name	User provides new observation(s) to the system through mobile PIS
Revision and Reference	V01; http://envirofi.server.de/servlet/is/5993/
Use Case Diagram	
Status	In Progress
Priority of accomplishment	Must have
Goal	Provide observation by user
Summary	The user contributes new observation(s); after some QA steps (optional), the observations are stored on a server. Observations are provided through 'mobile Personal Information System'; position and possibly other information (sensor readings?) is added automatically
Category	Data Input
Actor	User, System
Primary Actor (initiates)	User
Stakeholder	
Requested Information Resources	• Observation data and meta-information model (e.g. observation schema, ontology; depends on type of observation) • Observation storage facility (e,g, SOS server) • bacground information for plausibility checks
Preconditions	User has started ENVIROFI application; User is uniquely identified by the system (optional?)
Main success scenario	• The user chooses the type of observation (e.g. from a list, or by choosing a special application) • The user provides the information and meta-information required by observation schema. • Time and position are added automatically • Some sensor readings may be added automatically • Data is uploaded to the server
Extensions	(Optional) extensions; • NFC tags can be used to choose the correct entry; this simplifies the task for the users. • System estimates the 'value' (trust, uncertainty..) of information based on user's 'trust level' • System estimates the 'value' of information based on automated plausibility checking mechanism • System estimates the 'value' of information based on review by other users • System urges the user to improve initial record • System urges the user to perform additional observations • other?

Alternative paths	Data is stored on mobile device for later upload to server
Post conditions	New occurrence records (one or more) are available in the ENVIROFI repository.
Non-functional requirements	same as in generic UC-ENV4-fun-03-V01 'User provides new observation(s) to the system'
Validation statement	A new observation is available in the ENVIROFI repository, and owned by user that submitted it.
Notes	
Author and date	DHa-AIT, 2011-09-08
Includes UseCase	• UC-ENV4-fun-07-V01 - Determine position of mobile device
Maps to Requirement	• WP5-SE-GEO-1 - Environmental geo-referenced observation collection service • WP5-SE-GEO-10 - Environmental geo-referenced observation proxy service • WP5-SE-GEO-11 - Environmental geo-referenced observation app

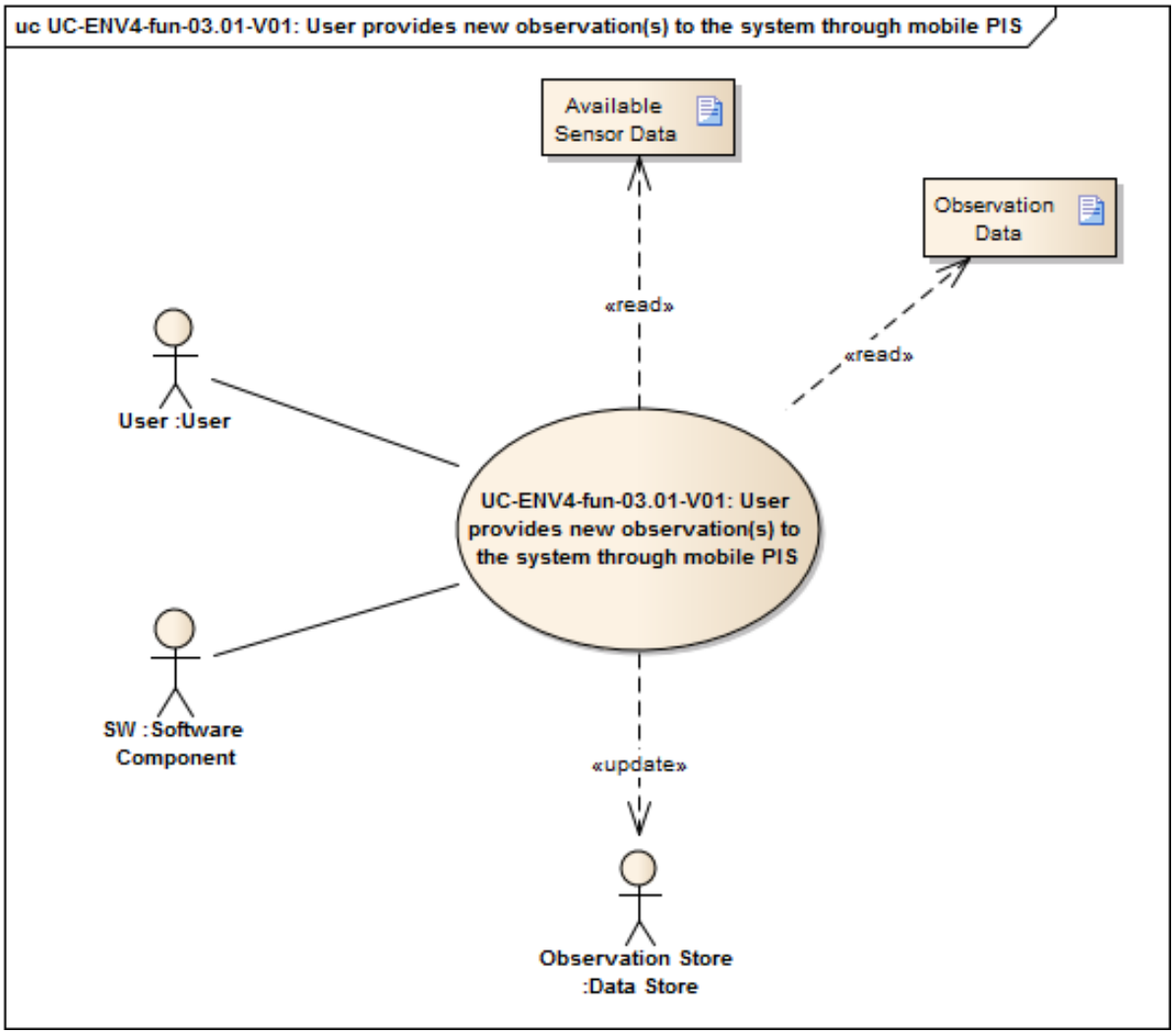

Figure 8: UC-ENV4-fun-03.01-V01 User provides new observation(s) to the system through mobile PIS

2.1.9 User provides new observation(s) to the system through web portal

Use Case ID	UC-ENV4-fun-03.02-V01
Use Case Name	User provides new observation(s) to the system through web portal
Revision and Reference	V01; http://envirofi.server.de/servlet/is/6012/
Use Case Diagram	
Status	In Progress
Priority of accomplishment	Must have
Goal	Provide observation by user
Summary	The user contributes new observation(s); after some QA steps (optional), the observations are stored on a server. Observations are entered one by one through web-portal.
Category	Data Input
Actor	User, System
Primary Actor (initiates)	User
Stakeholder	
Requested Information Resources	• Observation data and meta-information model (e.g. observation schema, ontology; depends on type of observation) • Observation storage facility (e,g, SOS server) • bacground information for plausibility checks
Preconditions	User has started ENVIROFI application; User is uniquely identified by the system (optional?)
Main success scenario	• The user chooses the type of observation (e.g. from a list, or by choosing a special application) • The user provides the information and meta-information required by observation schema. • Data is uploaded to the server
Extensions	(Optional) extensions; • System aids the user by providing support for special entry types. Position may be entered trhough a map; taxa may be chosen from a list with illustrations, etc. • System estimates the 'value' (trust, uncertainty..) of information based on user's 'trust level' • System estimates the 'value' of information based on automated plausibility checking mechanism • System estimates the 'value' of information based on review by other users • System urges the user to improve initial record • System urges the user to perform additional observations
Alternative paths	

Post conditions	New occurrence records (one or more) are available in the ENVIROFI repository.
Non-functional requirements	same as in generic UC-ENV4-fun-03-V01 'User provides new observation(s) to the system'
Validation statement	A new observation is available in the ENVIROFI repository, and owned by user that submitted it.
Notes	
Author and date	DHa-AIT, 2011-09-08
Maps to Requirement	• WP5-SE-GEO-1 - Environmental geo-referenced observation collection service • WP5-SE-GEO-7 - Environmental geo-referenced image sample archive service • WP5-SE-GEO-9 - Geo-referenced sample quality assessment service

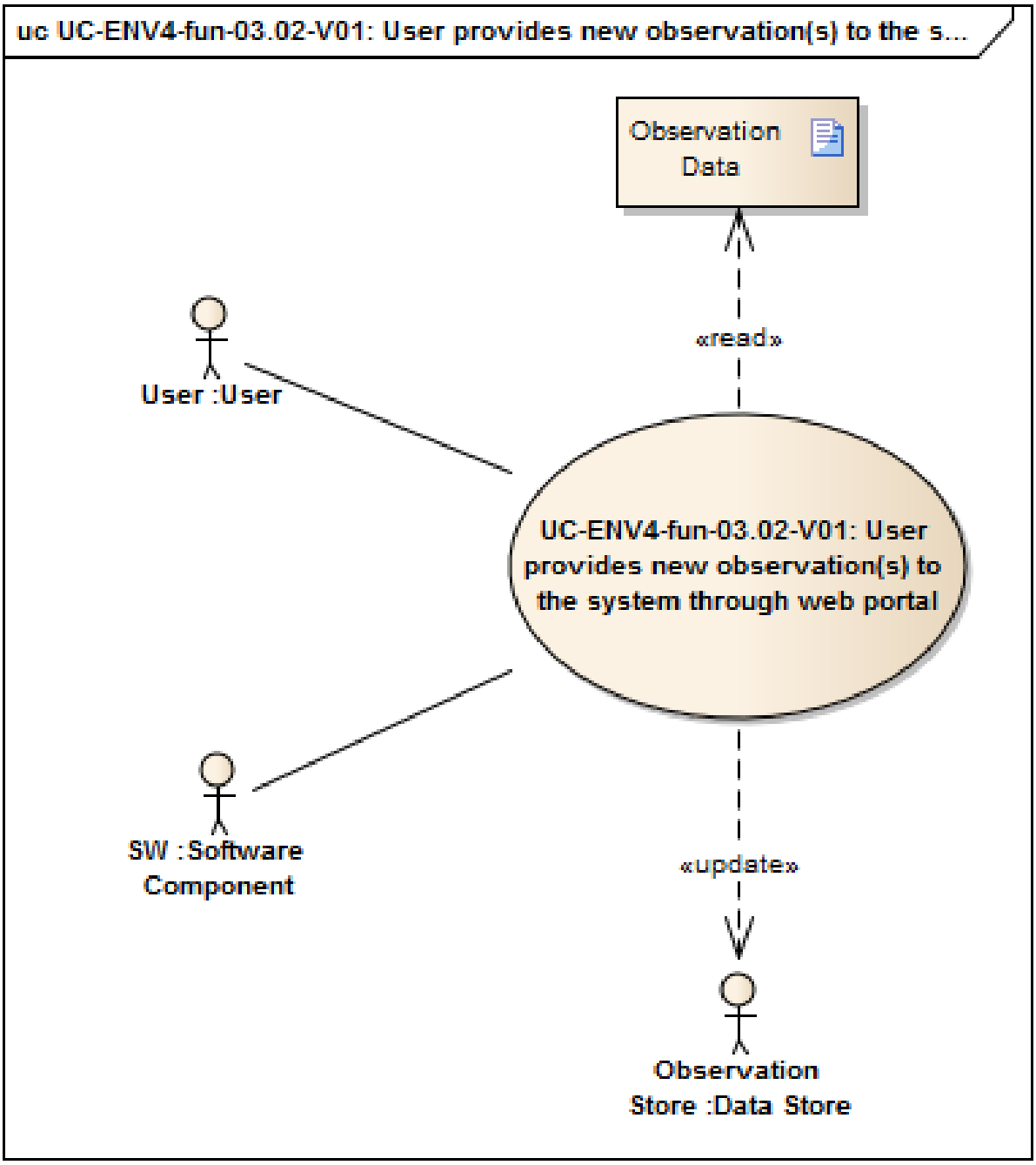

Figure 9: UC-ENV4-fun-03.02-V01 User provides new observation(s) to the system through web portal

2.1.10 User provides large number of new observations to the system at once

Use Case ID	UC-ENV4-fun-03.03-V01
Use Case Name	User provides large number of new observations to the system at once
Revision and Reference	V01; http://envirofi.server.de/servlet/is/6025/
Use Case Diagram	
Status	In Progress
Priority of accomplishment	Must have
Goal	Provide observation by user
Summary	The user contributes new observation(s); after some QA steps (optional), the observations are stored on a server. Large number of observations is provided by the user at once, e.g. by uploading a file to the server.
Category	Data Input
Actor	User, System
Primary Actor (initiates)	User
Stakeholder	
Requested Information Resources	• Observation data and meta-information model (e.g. observation schema, ontology; depends on type of observation) • Observation storage facility (e,g, SOS server) • background information for plausibility checks
Preconditions	User has started ENVIROFI application; User is uniquely identified by the system (optional?)
Main success scenario	• The user provides a file with all observations • User provides additional meta-information on these observations (if needed - ideally the file should be self-descriptive) • Data is uploaded to the server
Extensions	(Optional) extensions; • System estimates the 'value' (trust, uncertainty..) of information based on user's 'trust level' • System estimates the 'value' of information based on automated plausibility checking mechanism • System estimates the 'value' of information based on review by other users • System urges the user to improve initial records (probably not feasible)
Alternative paths	
Post conditions	New occurrence records are available in the ENVIROFI repository.

Non-functional requirements	same as in generic UC-ENV4-fun-03-V01 'User provides new observation(s) to the system'
Validation statement	New observations are available in the ENVIROFI repository, and owned by user that submitted it.
Notes	UC-ENV2.A-PSM-02.01-V02 Display current exposure to air pollution and pollen
Author and date	DHa-AIT, 2011-09-08
Maps to Requirement	• WP5-SE-GEO-1 - Environmental geo-referenced observation collection service

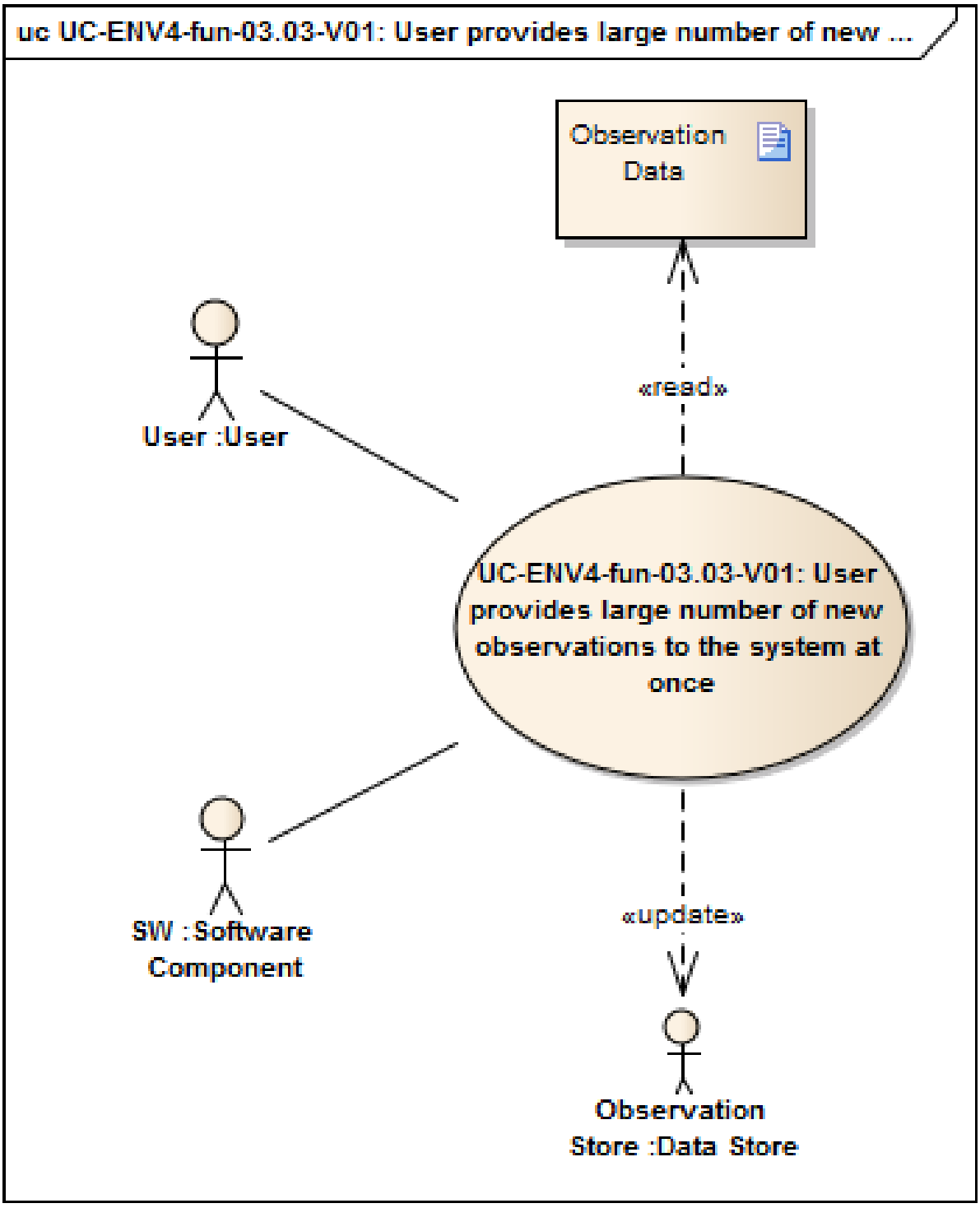

Figure 10: UC-ENV4-fun-03.03-V01 User provides large number of new observations to the system at once

2.1.11 User links to observations in external repository

Use Case ID	UC-ENV4-fun-03.04-V01
Use Case Name	User links to observations in external repository
Revision and Reference	V01; http://envirofi.server.de/servlet/is/7940/
Use Case Diagram	
Status	In Progress
Priority of accomplishment	Must have
Goal	Provide observations in external repository
Summary	The user links to an external data set. After some QA steps (optional), the observations are available to all users.
Category	Data Input
Actor	User, System, Data provider
Primary Actor (initiates)	User (admin of data provider)
Stakeholder	Data provider
Requested Information Resources	• Observation data and meta-information model (e.g. observation schema, ontology; depends on type of observation) • access information for external repository • background information for plausibility checks
Preconditions	User has started ENVIROFI application; User is uniquely identified by the system (optional?)
Main success scenario	• The user provides access details to the external repository • The user provides metadata mappings so that metadata of the repository can be mapped onto metadata of the system. • Data is linked to the server
Extensions	(Optional) extensions; • System estimates the 'value' (trust, uncertainty..) of information based on user's 'trust level' • System estimates the 'value' of information based on automated plausibility checking mechanism • System estimates the 'value' of information based on review by other users • System urges the user to improve initial records (probably not feasible)
Alternative paths	
Post conditions	Occurrence records in the repository are available in the ENVIROFI system.
Non-functional requirements	
Validation statement	New observations are available in the ENVIROFI repository, and owned by user that submitted the link.

Notes	
Author and date	HvdS-IOSB, 2011-11-10
Includes UseCase	• UC-ENV4-dat-01-V01 - Access semantic information
Maps to Requirement	• WP5-SE-GEO-1 - Environmental geo-referenced observation collection service • WP5-SE-TAG-8 - Uncertainty annotation of environmental data service • WP5-SE-MED-4 - Connector - SOS • WP5-SE-MED-5 - Connector - WCS • WP5-SE-MED-6 - Connector - WFS • WP5-SE-MED-7 - Connector - WMS • WP5-SE-MED-8 - Connector - toolbox

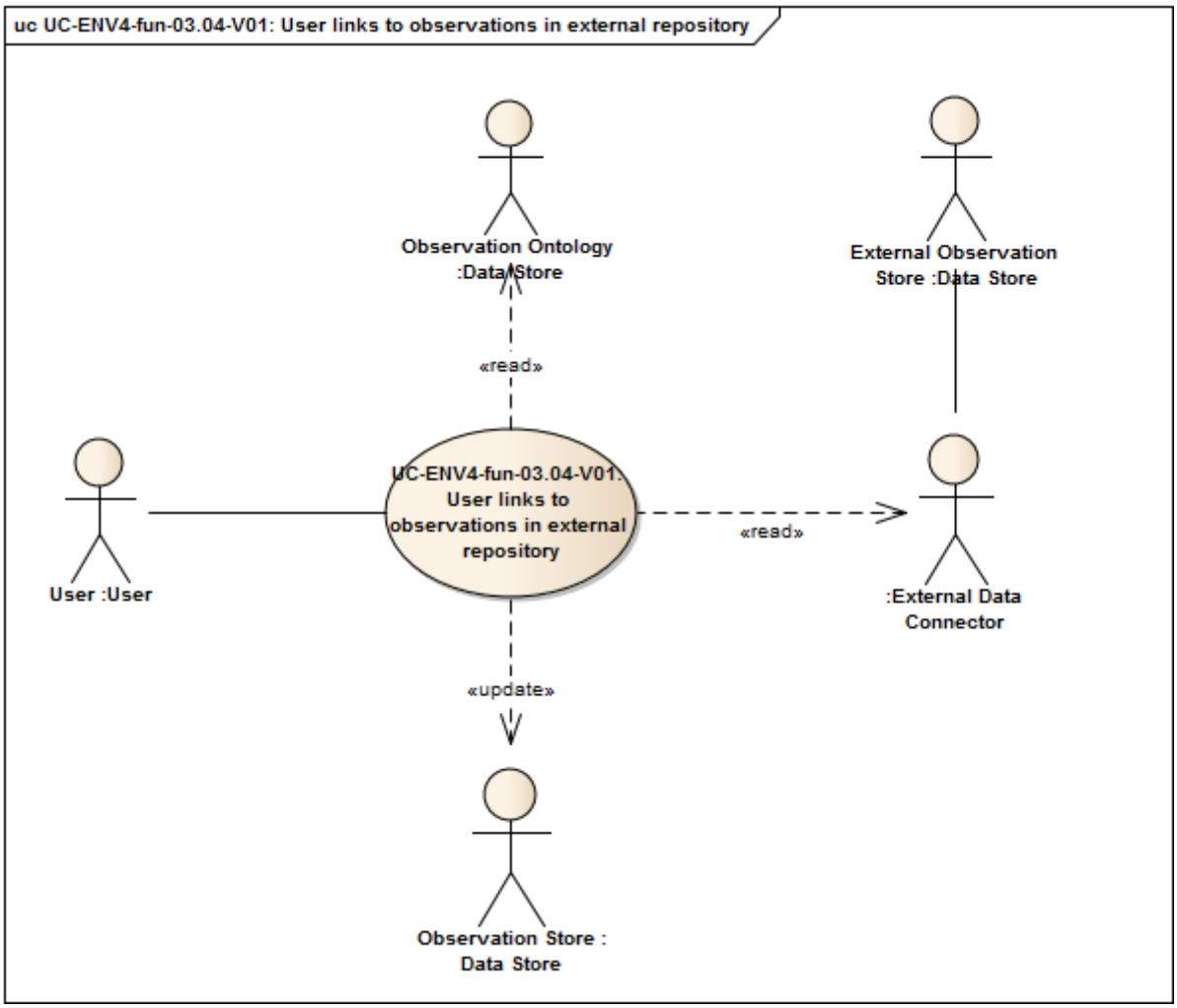

Figure 11: UC-ENV4-fun-03.04-V01 User links to observations in external repository

2.1.12 User alters existing observation(s)

Use Case ID	UC-ENV4-fun-04-V01
Use Case Name	User alters existing observation(s)
Revision and Reference	V01; http://envirofi.server.de/servlet/is/4245/
Use Case Diagram	
Status	Active
Priority of accomplishment	Must have
Goal	Alter the observations stored on the service
Summary	Observation records may be incomplete, or contain errors. Users should therefore have a possibility to alter the information (and meta-information) associated with observation record. Depending on the scenario, one or more of the following actions need to be allowed by the server and supported by end-user (GUI) application(s): • Alter the quality-assurance related parameters, such as QA/trust level or Uncertainty associated with the observation • Alter the time/space parameters associated with the observation • Alter the observed value (e.g. because the photography associated with observation clearly shows a different taxa)
Category	
Actor	User, SW Component
Primary Actor (initiates)	User or automated QA service
Stakeholder	
Requested Information Resources	• observation data and meta-information model • Observation records; • optional: additional background information
Preconditions	User is logged-in; observations are available on the service
Main success scenario	• The user has successfully modified and stored an existing observation record
Extensions	• automated and semi-automated record modifications (e.g. supported by some intelligent service) • Alter a group of related observations, rather than working on each record serially
Alternative paths	
Post conditions	A modified observation is available on the server.

Non-functional requirements	• Overwriting of existing observations is often considered bad practice => system needs to support some kind of observation versioning. • it may be necessary to syncronize records over several services (tbd)
Validation statement	• Alter existing record or group of records • Check that altered records are available on the server • optional: check consistence over a group of syncronized servers.
Notes	User may be a human user or a specialized service. It is unlikely that a generic service capable of improving/modifying any type of observation can be developed within this project.
Author and date	Dha_ AIT, 2011-08-19
Maps to Requirement	• WP5-SE-GEO-7 - Environmental geo-referenced image sample archive service • WP5-SE-GEO-1 - Environmental geo-referenced observation collection service • WP5-SE-GEO-10 - Environmental geo-referenced observation proxy service • WP5-SE-TAG-8 - Uncertainty annotation of environmental data service • WP5-SE-OGC-3 - OGC storage services • WP5-SE-GEO-11 - Environmental geo-referenced observation app

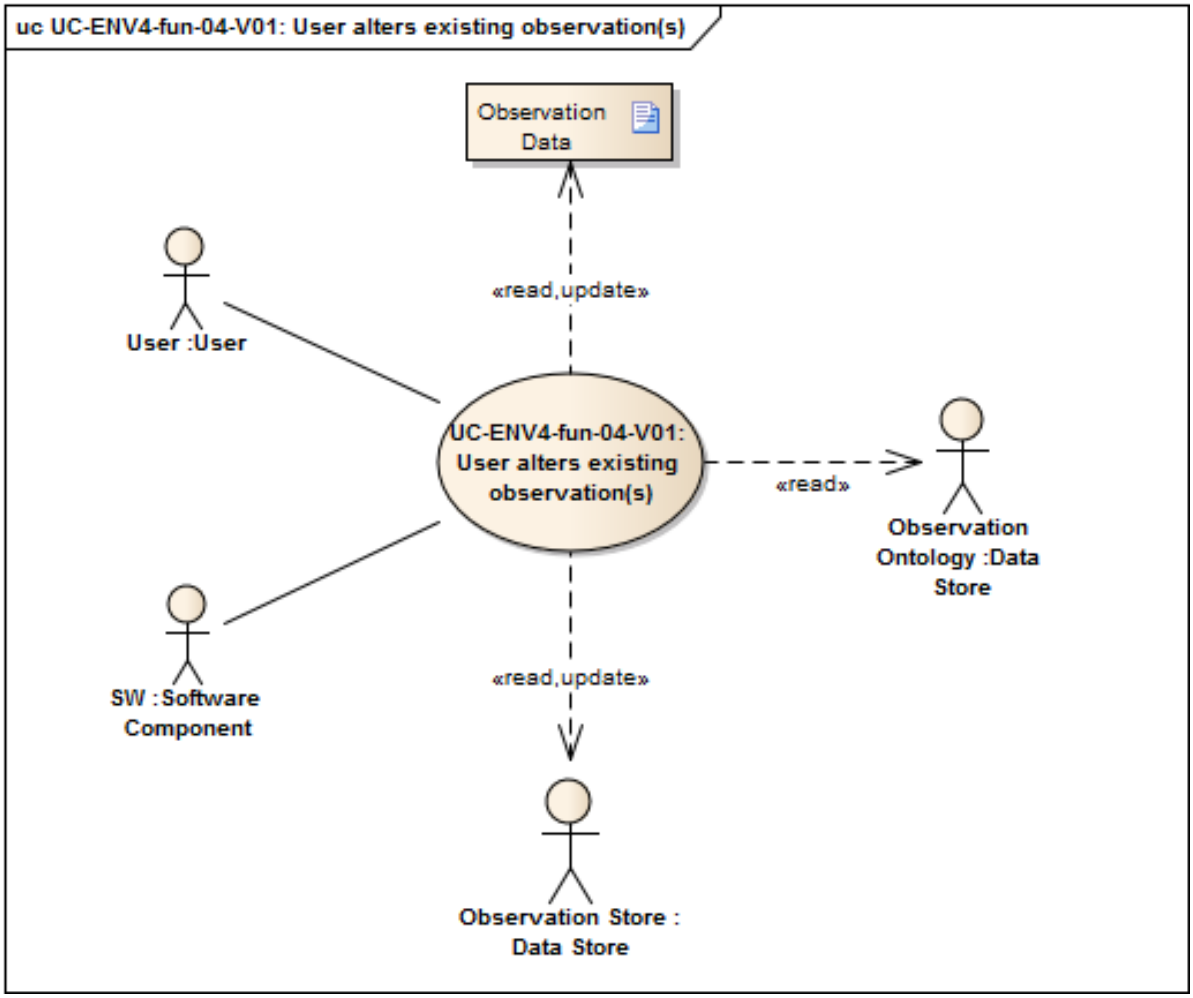

Figure 12: UC-ENV4-fun-04-V01 User alters existing observation(s)

2.1.13 User accesses existing observations

Use Case ID	UC-ENV4-fun-05-V01
Use Case Name	User accesses existing observations
Revision and Reference	V01; http://envirofi.server.de/servlet/is/5696/
Use Case Diagram	
Status	Planned
Priority of accomplishment	Must have
Goal	Assure that the user can query observations and present them in an appropriate way
Summary	User requests the system to present part of the observations corresponding to a query. The system executes the query issued by the user and makes the results accessible for the user according to the requested delivery method. This can be repeated interactively and iteratively as needed.
Category	
Actor	User, SW Component (e.g. ENVIROFI application)
Primary Actor (initiates)	User
Stakeholder	
Requested Information Resources	• observation storage (e.g. one or more services such as OGC Sensor Observation Services according to their observation offerings) • observation result sets (create) • query (manage) • cartographic materials (background) (read)
Preconditions	User knows or can find the access point to observation storages and had authorisation.
Main success scenario	• User chooses the source(s) of observations he/she is interested in • User chooses the delivery method for the data • User defines the selection criteria (in form of a query) as needed (e.g. in time, space, other?) • System provides the user with the result set • User can choose steps 1-3 and refine the results

Extensions	• User downloads the data for offline examination/processing • User views/explores the data online • User views the data using different representations (table, graph, diagram, map, hybrid) • User stores the configuration so that the visualization can be easily recalled later • System automatically updates the information presented to the user (typically because the user's position changed, or because new observations have been uploaded, or because the time passes...) • User forwards the data to a processing service • Location selection should allow several input methods, like: Current location Given city/country/postal code Drawn bounding box. • Time selection should allow precise time/date and intervals (next 24 hours) • User forwards the current configuration to processing service • User forwards the data to other users / social media
Alternative paths	
Post conditions	User accesses the observation result sets he/she is interested in. User can then continue with refined queries.
Non-functional requirements	Privacy/Ethical: Assure the observations shown to user are inline with privacy/ethical guidelines. • In some cases the user may only be allowed to see aggregates, sensitive part of the observation record may not be shown at all, or the spatial/temporal information may need to be altered before passing the data Response times: Assure the response times are in a range acceptable for the user. • Generally couple of seconds for returning the data set, well under 1 sec for GUI acknowledging the user's actions.
Validation statement	User can access the observations he/she is interested in, can continue with refinement
Notes	
Author and date	
Includes UseCase	• UC-ENV4-xui-01-V01 - Provide visualization of requested data

Maps to Requirement	• WP5-SE-GEO-10 - Environmental geo-referenced observation proxy service • WP5-SE-GEO-7 - Environmental geo-referenced image sample archive service • WP5-SE-MED-7 - Connector - WMS • WP5-SE-MED-6 - Connector - WFS • WP5-SE-GEO-4 - Environmental geo-referenced observation identification service • WP5-SE-GEO-1 - Environmental geo-referenced observation collection service • WP5-SE-MED-5 - Connector - WCS • WP5-SE-MED-8 - Connector - toolbox • WP5-SE-MED-4 - Connector - SOS • WP5-SE-GEO-5 - Environmental geo-referenced observation visualization service • WP5-SE-MED-10 - Mediator - Fusion toolbox • WP5-SE-TAG-8 - Uncertainty annotation of environmental data service • WP5-SE-FUSION-1 - Environmental spatial-temporal data fusion service • WP5-SE-FUSION-2 - Environmental image sample classification service • WP5-SE-FUSION-4 - Environmental asset analysis service for geo-referenced sample archives • WP5-SE-FUSION-5 - Areas Classification Service • WP5-SE-FUSION-6 - Prediction service • WP5-SE-OGC-3 - OGC storage services • WP5-SE-FUSION-7 - Environmental model-based fusion service • WP5-SE-GEO-11 - Environmental geo-referenced observation app

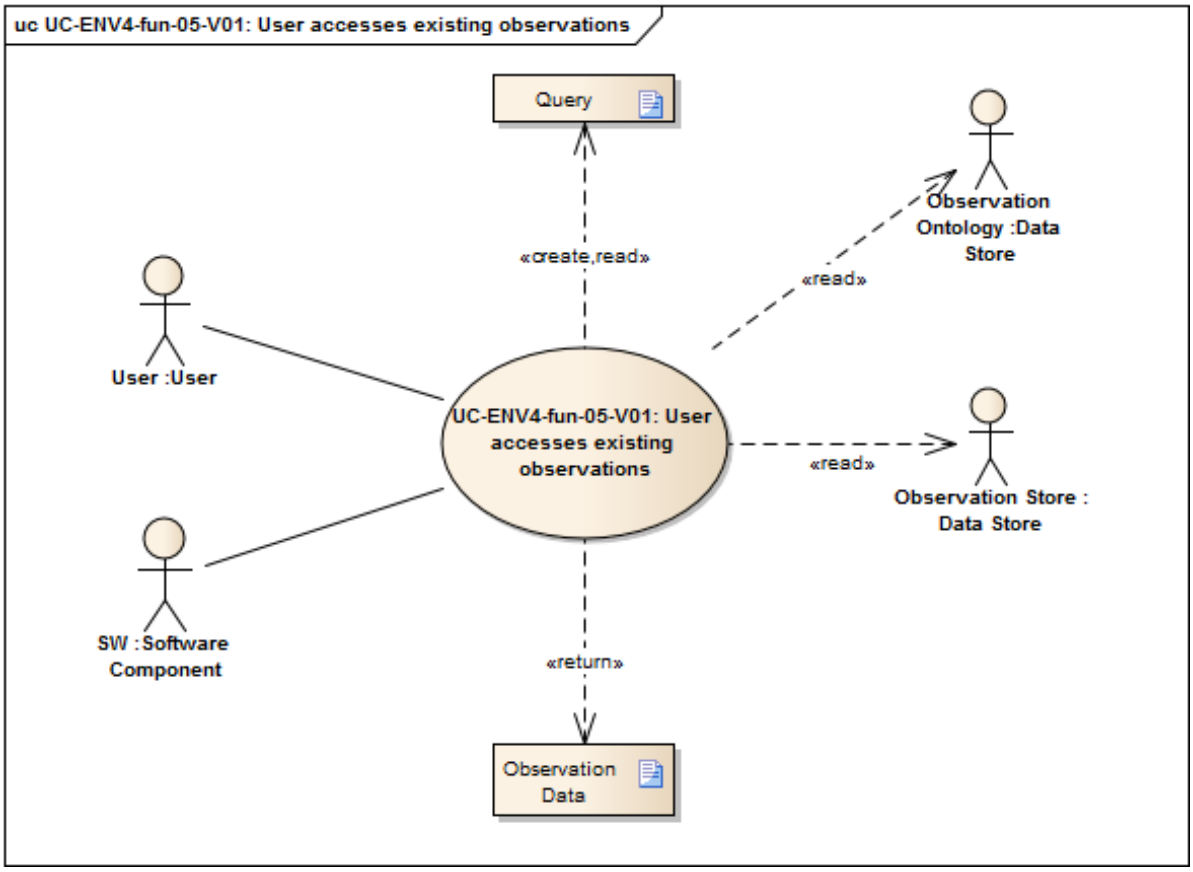

Figure 13: UC-ENV4-fun-05-V01 User accesses existing observations

2.1.14 System presents user with information on his/her surroundings

Use Case ID	UC-ENV4-fun-05.01-V01
Use Case Name	System presents user with information on his/her surroundings
Revision and Reference	V01; http://envirofi.server.de/servlet/is/5767
Use Case Diagram	
Status	Planned
Priority of accomplishment	Must have
Goal	Assure user can choose the observations he/she is interested in and present them in appropriate way
Summary	User moves (walks? drives?...) arround; the system informs him/her of 'interesting things' in the surrounding. **Example:** User is interested in birds; the system informs him which birds could be seen in environment / which bird observations have been recently reported in environment
Category	
Actor	User, ENVIROFI applicaiton/system
Primary Actor (initiates)	User
Stakeholder	
Requested Information Resources	• observations (e.g. one or more SOS services with observation offerings) • cartographic materials (background) • user's interests (profile?)
Preconditions	user is known to the system
Main success scenario	• User chooses the source(s) of observations he/she is interested in (could be stored in his/her profie) • User chooses how he/she wants to be informed. • System presents the interesting information (repeatedly)
Extensions	• Presentation of results could continuous (e.g. on a map, within augmented reality viewer). However, the system could also send alerts whenever the user comes in vicinity of some PoI, or direct the user from PoI to PoI - makes more sense in the case PoIs are rare. • The system may be asked to present the results until further notice, until certain time passes, or until the user leaves the area of interest (AoI).
Alternative paths	
Post conditions	Useris is informed of the PoIs.

Non-functional requirements	**Privacy/Ethical**: Assure the observations shown to user are inline with privacy/ethical guidelines. • In some cases the user may only be allowed to see aggregates, sensitive part of the observation record may not be shown at all, or the spatial/temporal information may need to be altered before passing the data **energy optimization**: minimize the energy consumption of the applicaiton • This UC typically runs on small batery powered devices. It is important that the applicaiton does not significantly shorten the time device can run with one batery charging - othervise we risk loosing users. **Response times**: Assure the response times are in a range acceptable for the user. • Generally couple of seconds for returning the data set, well under 1 sec for GUI acknowledging the user's actions.
Validation statement	User receives the information on PoIs in his/her environment
Notes	This is a special case of user exploring the existing information where temporal & spatial part of the query is automatically generated by the user's device (GPS, clock). However, the possibility that system inform the user is new/specific to this UC.
Author and date	
Includes UseCase	• UC-ENV4-fun-07-V01 - Determine position of mobile device
Maps to Requirement	• WP5-SE-GEO-1 - Environmental geo-referenced observation collection service • WP5-SE-MED-7 - Connector - WMS • WP5-SE-GEO-10 - Environmental geo-referenced observation proxy service • WP5-SE-GEO-5 - Environmental geo-referenced observation visualization service • WP5-SE-GEO-11 - Environmental geo-referenced observation app

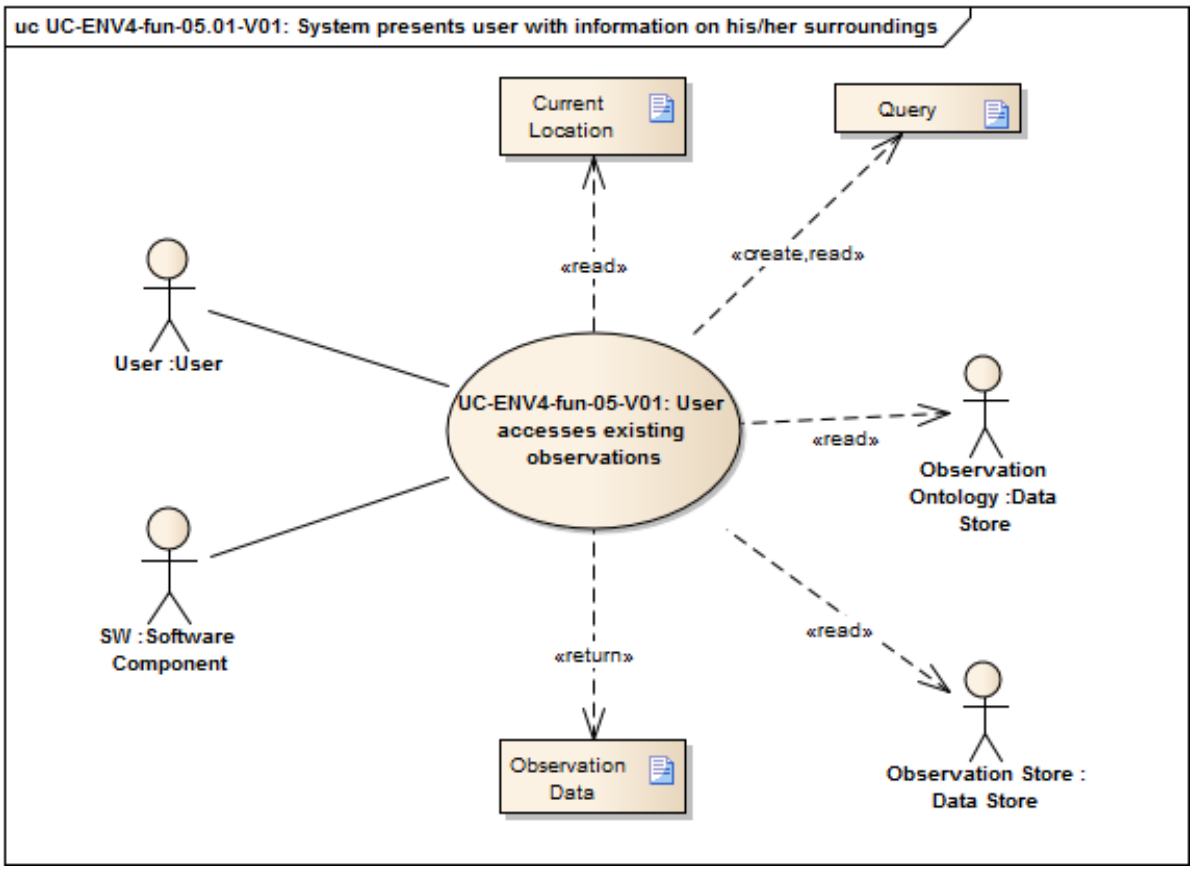

Figure 14: UC-ENV4-fun-05.01-V01 System presents user with information on his/her surroundings

2.1.15 User downloads observations set from the portal

Use Case ID	UC-ENV4-fun-05.02-V01
Use Case Name	User downloads observations set from the portal
Revision and Reference	V01; http://envirofi.server.de/servlet/is/6056
Use Case Diagram	
Status	Planned
Priority of accomplishment	Must have
Goal	Assure user can discover observations, and store them on his/her own system for later use.
Summary	User requests the system to provide him/her with a part of the observations corresponding to a query; system performs the appropriate query and provides a result in a form suitable for offline use (e.g. an XML file)
Category	
Actor	User, ENVIROFI applicaiton/system
Primary Actor (initiates)	User
Stakeholder	
Requested Information Resources	• observations (e.g. one or more SOS services with observation offerings) • cartographic materials (background)
Preconditions	user can find the observation sources
Main success scenario	• User chooses the source(s) of observations he/she is interested in • User limits the query as needed (e.g. in time, space, other?) • User decides how the data should be made available (file format; send per e-mail or download from the web, etc) • system provides the requested data set
Extensions	• User stores the configuration so that the request can be easily repeated later • system stores the data set as it was generated now (for later audits) • system makes the data available to processing service
Alternative paths	
Post conditions	User has obtained the requested data set

Non-functional requirements	Privacy/Ethical: Assure the observations shown to user are inline with privacy/ethical guidelines. • In some cases the user may only be allowed to see aggregates, sensitive part of the observation record may not be shown at all, or the spatial/temporal information may need to be altered before passing the data Response times: Assure the response times are in a range acceptable for the user. • Generally couple of seconds for returning the data set, well under 1 sec for GUI acknowledging the user's actions.
Validation statement	User has obtained the requested data set; the data is in correct form and corresponds to the query conditions.
Notes	
Author and date	DHa-AIT, 2011-09-08
Includes UseCase	• UC-ENV4-fun-05.01-V01 - System presents user with information on his/her surroundings
Maps to Requirement	• WP5-SE-GEO-7 - Environmental geo-referenced image sample archive service • WP5-SE-MED-10 - Mediator - Fusion toolbox • WP5-SE-TAG-8 - Uncertainty annotation of environmental data service • WP5-SE-FUSION-1 - Environmental spatial-temporal data fusion service • WP5-SE-FUSION-2 - Environmental image sample classification service • WP5-SE-FUSION-4 - Environmental asset analysis service for geo-referenced sample archives • WP5-SE-FUSION-5 - Areas Classification Service • WP5-SE-FUSION-6 - Prediction service • WP5-SE-OGC-3 - OGC storage services

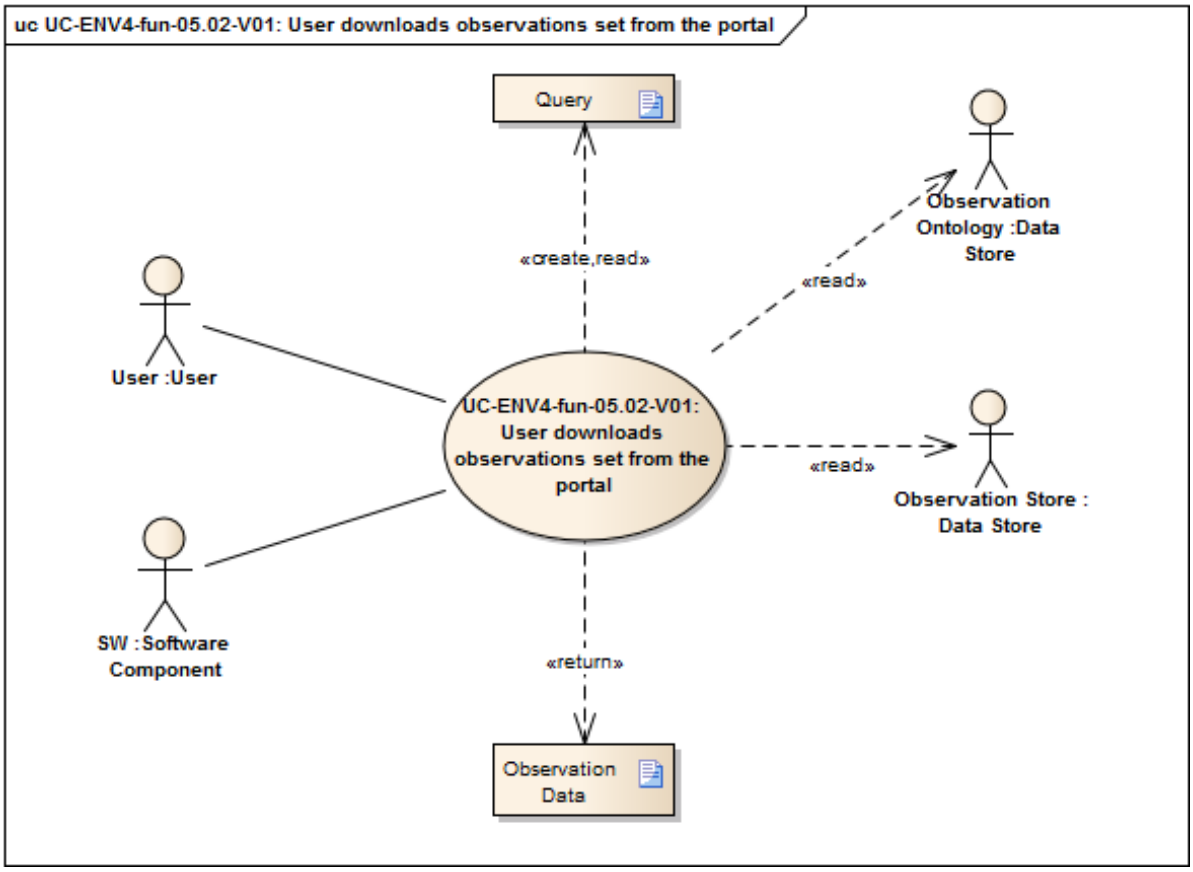

Figure 15: UC-ENV4-fun-05.02-V01 User downloads observations set from the portal

2.1.16 User interactively explores the existing observations

Use Case ID	UC-ENV4-fun-05.03-V01
Use Case Name	User interactively explores the existing observations
Revision and Reference	V01; http://envirofi.server.de/servlet/is/6041/
Use Case Diagram	
Status	Planned
Priority of accomplishment	Must have
Goal	Assure user can discover observations and present them in appropriate way
Summary	User requests the system to present part of the observations corresponding to a query; system performs the appropriate query and visualizes the results. This can be interactively repeated as needed.
Category	
Actor	User, ENVIROFI applicaiton/system
Primary Actor (initiates)	User
Stakeholder	
Requested Information Resources	• observations (e.g. one or more SOS services with observation offerings) • cartographic materials (background)
Preconditions	user can find the observation sources
Main success scenario	• User chooses the source(s) of observations he/she is interested in • User chooses the visualization method • User limits the query as needed (e.g. in time, space, other?) • system presents the result • User can choose steps 1-3 and refine the presented results
Extensions	• User downloads the data for offline examination/processing • User stores the configuration so that the visualization can be easily recalled later • System automatically updates the information presented to user (typically because users's position changed, or because new observations have been uploaded, or because the time passes...) • User forwards the data to processing service • forwards the current configuration to processing service
Alternative paths	
Post conditions	User visualizes the observations he/she is interested in, can continue with refinement

Non-functional requirements	Privacy/Ethical: Assure the observations shown to user are inline with privacy/ethical guidelines. • In some cases the user may only be allowed to see aggregates, sensitive part of the observation record may not be shown at all, or the spatial/temporal information may need to be altered before passing the data Response times: Assure the response times are in a range acceptable for the user. • Generally couple of seconds for returning the data set, well under 1 sec for GUI acknowledging the user's actions.
Validation statement	User visualizes the observations he/she is interested in, can continue with refinement
Notes	
Author and date	DHa-AIT, 2011-09-08
Includes UseCase	• UC-ENV4-fun-05.01-V01 - System presents user with information on his/her surroundings
Maps to Requirement	• WP5-SE-GEO-5 - Environmental geo-referenced observation visualization service • WP5-SE-GEO-10 - Environmental geo-referenced observation proxy service • WP5-SE-GEO-11 - Environmental geo-referenced observation app

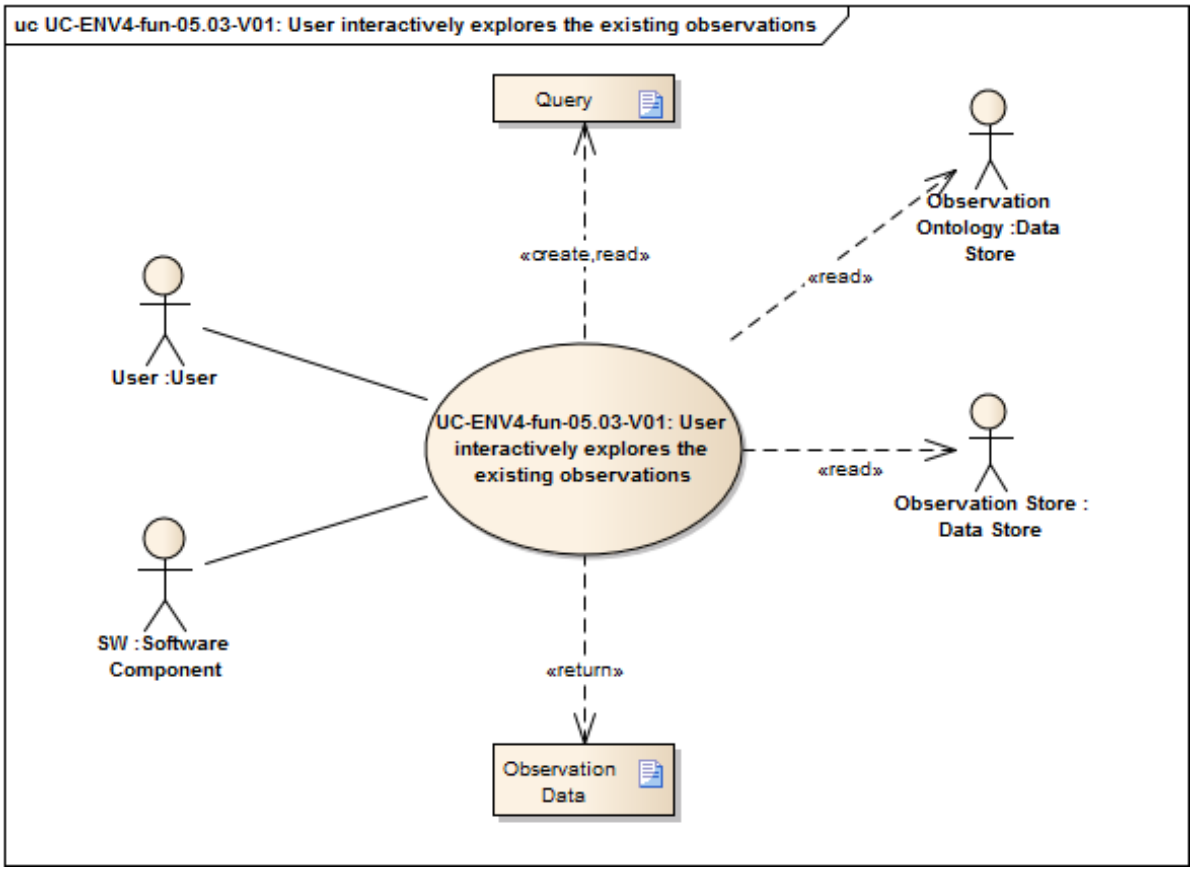

Figure 16: UC-ENV4-fun-05.03-V01 User interactively explores the existing observations

2.1.17 System urges the user to provide observation(s)

Use Case ID	UC-ENV4-fun-06-V01
Use Case Name	System urges the user to provide observation(s)
Revision and Reference	V01; http://envirofi.server.de/servlet/is/5763
Use Case Diagram	
Status	Planned
Priority of accomplishment	Should have
Goal	Assure the system can solicit additional information when needed
Summary	In addition to simply waiting for users to submit new information, system could actively solicit information from user(s). In this way, it would be possible to improve the quality of the data sets. This behaviour could be triggered by various mechanisms: • User submits observation, and system urges him/her to look for related occurences (e.g. along the food chain, or in order to estimate the geographic coverage...) - • User enters an area where a survey is currently conducted - in order to get higher density of observations • User is asked to perform the same type of observation another user recently performed at the same location - can be used for QA • User in in an area where some event occured (earthquake?) or is likely to occur (dry forest?)
Category	
Actor	User, System
Primary Actor (initiates)	System
Stakeholder	
Requested Information Resources	• Observation gathering needs (read) • Notification to the user (create)
Preconditions	system 'feels' the need and opportunity for observation gathering
Main success scenario	• System becomes aware of the need/opportunity to gather observations • System notifies the user • User gathers & submits new observation

Extensions	• Various extensions depending on the reason why system demands new information from the user. • various extensions depending on the choice of user(s) that are receiving the request. Could be just one user, right after submitting some information, could be all users *currently* in an area, could be also limited by user type/interests, time, location...
Alternative paths	
Post conditions	User can easily submit new observation (program started with appropriate parameters)
Non-functional requirements	User must have a control over the notifications, in order to avoid spamming. E.g. user choooses weather (or in which cases - time, space,) he may be contacted by the system with requests of this type.
Validation statement	
Notes	
Author and date	
Includes UseCase	• UC-ENV4-fun-02-V01 - System sends alerts/notifications to users • UC-ENV4-fun-03.02-V01 - User provides new observation(s) to the system through web portal
Maps to Requirement	• WP5-SE-GEO-11 - Environmental geo-referenced observation app • WP5-SE-NOT-5 - Sensor Event Service

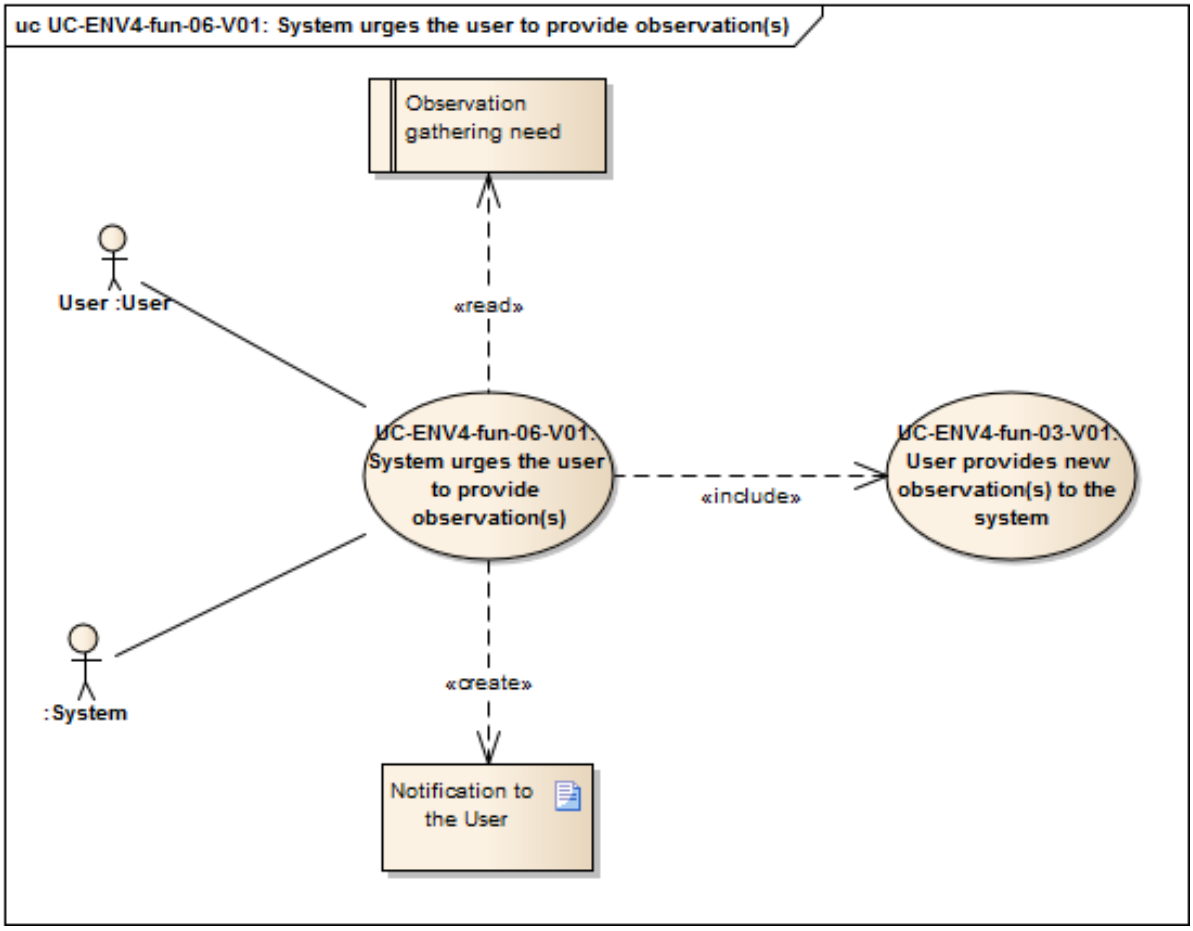

Figure 17: UC-ENV4-fun-06-V01 System urges the user to provide observation(s)

2.1.18 Determine position of mobile device

Use Case ID	UC-ENV4-fun-07-V01
Use Case Name	Determine position of mobile device
Revision and Reference	V01;http://envirofi.server.de/servlet/is/8260/
Use Case Diagram	
Status	Planned
Priority of accomplishment	Should have
Goal	Accurately and quickly determine the position of the mobile device
Summary	A user needs a fast and accurate way to find his current location, even if aGPS is not available.
Category	Functionality
Actor	Mobile device
Primary Actor (initiates)	Application
Stakeholder	User
Requested Information Resources	• GPS data • WIFI hotspot database • Cell tower location database • Ask the user to point out his location on a map • Other?
Preconditions	
Main success scenario	• The User/application needs the current location of the mobile deviec • One or more methods of determining the location are used (GPS/WiFi database/etc) • The current location is available for the user/application
Extensions	
Alternative paths	
Post conditions	The current location is known.
Non-functional requirements	
Validation statement	
Notes	
Author and date	HvdS-IOSB, 2011-11-24
Maps to Requirement	• WP5-SE-GEO-1 - Environmental geo-referenced observation collection service • WP5-SE-GEO-11 - Environmental geo-referenced observation app

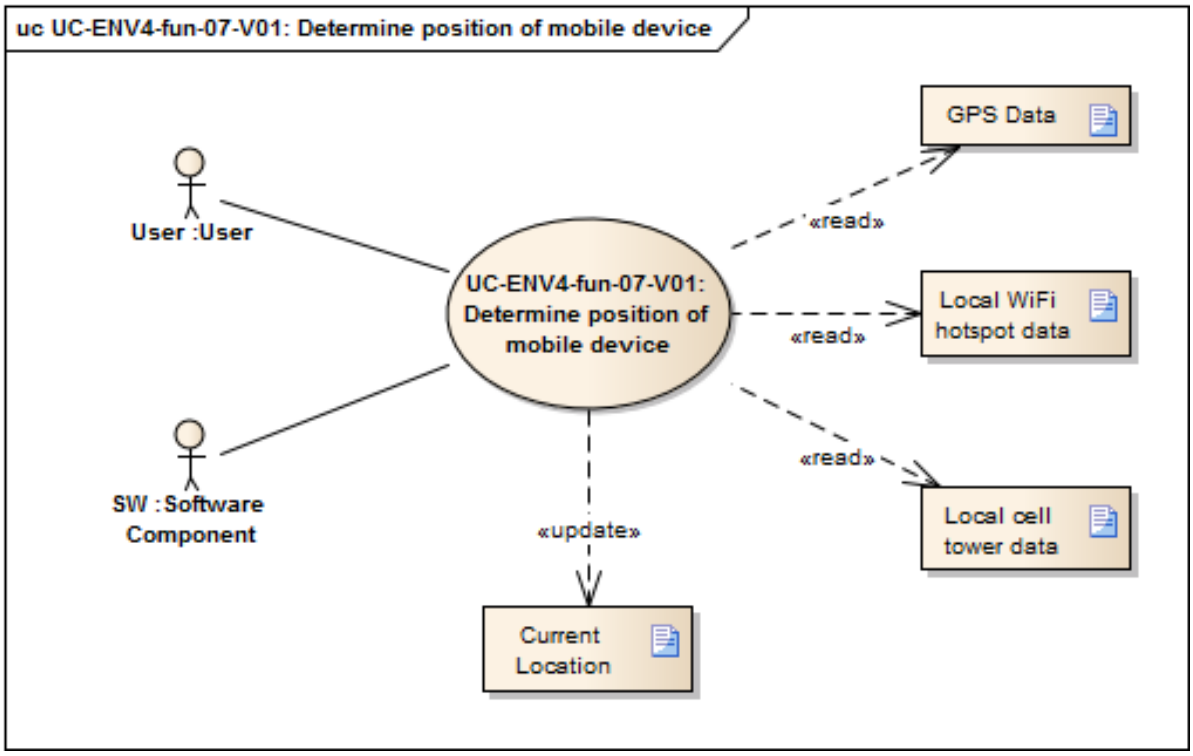

Figure 18: UC-ENV4-fun-07-V01 Determine position of mobile device

2.1.19 Run simulations with observations as data input

Use Case ID	UC-ENV4-fun-08-V01
Use Case Name	Run simulations with observations as data input
Revision and Reference	V01;
Use Case Diagram	
Status	Planned
Priority of accomplishment	Should have
Goal	The system can run simulations based on observations and publish the results
Summary	Simulations are an important tool in decision making. Some simulations require much computer power and time and can thus not be run directly on request but for instance daily or hourly. The system must allow for simulations to be run and the results to be published as predictive observations with associated uncertainty values. Multiple users can then view these results and use them in mashups as required.
Category	Functionality
Actor	Software component
Primary Actor (initiates)	User, System
Stakeholder	User
Requested Information Resources	• Observation store (to get source data and store result data) • Data processing service (running the simulation)
Preconditions	Source data for the simulation is available
Main success scenario	• Required source data is requested • Simulation is run • Simulation results are published as predictive observations
Extensions	
Alternative paths	
Post conditions	Predictive observations are available.
Non-functional requirements	
Validation statement	
Notes	
Author and date	HvdS-IOSB, 2011-11-24

Maps to Requirement	• WP5-SE-GEO-4 - Environmental geo-referenced observation identification service • WP5-SE-FUSION-1 - Environmental spatial-temporal data fusion service • WP5-SE-FUSION-2 - Environmental image sample classification service • WP5-SE-FUSION-4 - Environmental asset analysis service for geo-referenced sample archives • WP5-SE-FUSION-5 - Areas Classification Service • WP5-SE-FUSION-6 - Prediction service • WP5-SE-FUSION-7 - Environmental model-based fusion service • WP5-SE-GEO-1 - Environmental geo-referenced observation collection service • WP5-SE-GEO-11 - Environmental geo-referenced observation app

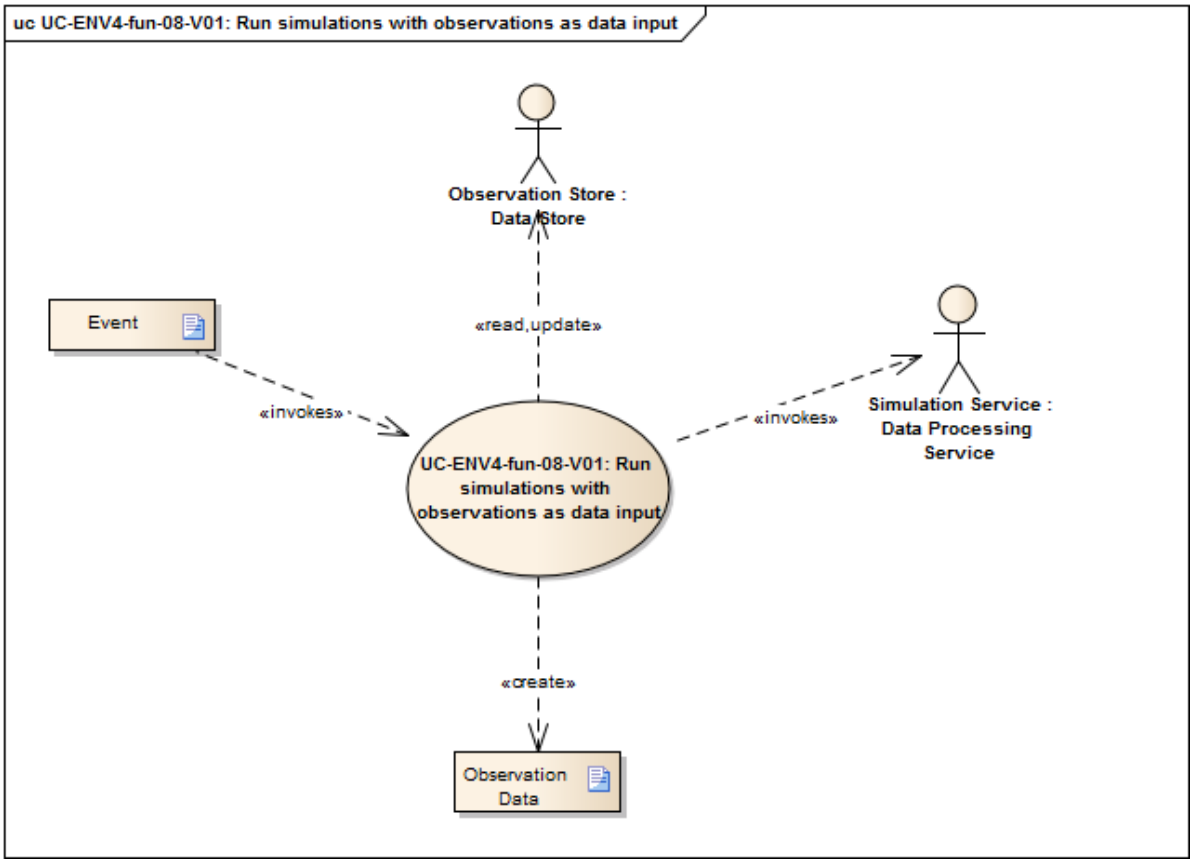

Figure 19: UC-ENV4-fun-08-V01 Run simulations with observations as data input

2.1.20 System assesses the quality of observations

Use Case ID	UC-ENV4-kno-01-V01
Use Case Name	System assesses the quality of observations
Revision and Reference	V01; http://envirofi.server.de/servlet/is/5790/
Use Case Diagram	
Status	In Progress
Priority of accomplishment	Should have
Goal	Check the plausibility of a reported observation(s)
Summary	The system compares the newly submitted observation with the known facts and estimates the plausibility of the report (e.g. probability of false report). Some possible tests: • Spatial probability (i.e. Does this observation fit into this region? Does it occur within the know distribution area?) • Temporal probability (i.e. Can it be observed at this time of the year?) • Comparison with common mis-identifications (i.e. Provide user with image of other types often confused with type identified - does the leaf of this species look like this?) • related occurrences (do observations in same time/space fit together?) • compatibility with environment (does observation fit into the geo/bio-physical characteristics of the area?) • quality of information previously submitted by this user • opinions of other users/experts
Category	Knowledge generation/Quality Assurance
Actor	User, SW Component
Primary Actor (initiates)	SW component
Stakeholder	
Requested Information Resources	• observation storage • query templates • Background information which can be used to estimate the plausibility (e.g. existing observations; habitat, seasonal changes, etc.) • plausibility record (a kind of 'receipt') for having performed the plausibility check (create)
Preconditions	User is logged in, has provided an occurrence record
Main success scenario	• system estimates the plausibility of the observation • system stores the plausibility record with the observation

Extensions	• system informs the user of observation plausibility • system presents user with alternatives to his/her observation
Alternative paths	
Post conditions	The plausibility of the occurrence record is known
Non-functional requirements	• In case the user is given opportunity to improve the observation, the time needed to estimate the plausibility has to be 'instantenious' for the user (order of magnitude: 1 sec)
Validation statement	The plausibility of the observation has been estimated and the result stored. Optional: user has been given feedback & opportunity to improve the observation)
Notes	The system could continiously update the 'trust' in user's competence based on the plausibility of the observations submitted by this user, and use this information as additional factor in plausibility estimate. This is especially interestin gin the case system uses peer review (by other users, experts) as (one of) the method(s) for quality assurance.
Author and date	KS_ UBA, 2011-07-19
Maps to Requirement	• WP5-SE-GEO-1 - Environmental geo-referenced observation collection service • WP5-SE-GEO-4 - Environmental geo-referenced observation identification service • WP5-SE-GEO-9 - Geo-referenced sample quality assessment service • WP5-SE-GEO-11 - Environmental geo-referenced observation app

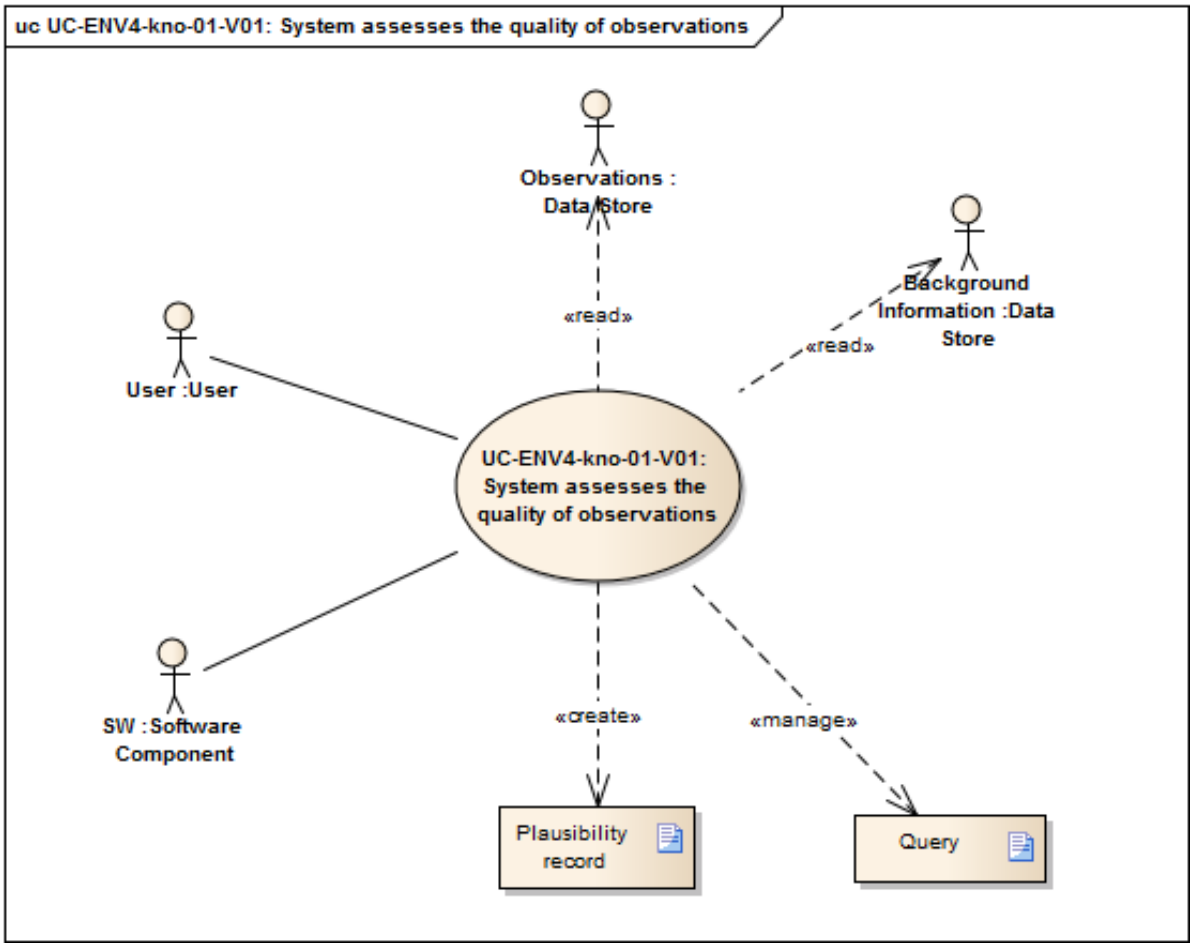

Figure 20: UC-ENV4-kno-01-V01 System assesses the quality of observations

2.1.21 System identifies the observed phenomena / environmental state

Use Case ID	UC-ENV4-kno-02-V01
Use Case Name	System identifies the observed phenomena / environmental state
Revision and Reference	V01; http://envirofi.server.de/servlet/is/5802/
Use Case Diagram	
Status	In Progress
Priority of accomplishment	Should have
Goal	Extract the knowledge from the observation; tag/name/extend/improve the observation record
Summary	System analyses the multimedia, sensoric or subjective input provided as the part of observation record, identifies the observed phenomena/state and stores this additional information with the observation record. The knowledge about the possible observed phenomena/environmental states may be known to the system by means of an environmental ontology as an example.. Example: user submits a photography of a plant; the system recognises the plant and stores this information. Example: user reports sneezing; system inferes the existence of alergenes
Category	Knowledge generation/Quality Assurance
Actor	User, SW Component
Primary Actor (initiates)	SW component
Stakeholder	
Requested Information Resources	• Environmental ontology (read) • observation data • observed phenomena (update of the meta-data of the observation record)
Preconditions	User is logged in, has provided an occurrence record
Main success scenario	• system analyses the observation (especially the multimedia records; sensor readings) & identifies the observed phenomena/environmental state • system stores analysis results with the observation
Extensions	• system informs the user of analysis results (e.g. 'you have observed a seagull') • system presents user with possible meanings of his/her observation; use chooses which one is correct (e.g. 'this could be a bird, a plane, or a superman, pleas choose one') • System stores the probabilities for several alternative identifications, rather than unique identification key.
Alternative paths	

Post conditions	The system has identified the phenomena/state of environment, generated additional (semantic) information on the observation, and stored it as part of observation record.
Non-functional requirements	
Validation statement	Additional Information/knowledge on the observation is stored with the observation record.
Notes	• The generation of new knowledge is typically heading towards 'recognition' of the observed phenomena. This UC therefore typically concernes the recognition of some state of environment (animal name, weather type, presence of allergenes) based on multimedia, sensoric or subjective observations. • An alternative to 'store as part of the record' could be 'semantic tagging', that is associating an RDF triple with existing record without actually changing the record. • The feasibility of generic recognition algorithms is questionable - state of the art are very specialized algorithms for recognising certain classes of observations (e.g. the algoritm capable of recognising various members of feline family may not be suitable for other animals, etc.)
Author and date	KS_ UBA, 2011-07-19
Maps to Requirement	• WP5-SE-GEO-4 - Environmental geo-referenced observation identification service • WP5-SE-GEO-1 - Environmental geo-referenced observation collection service • WP5-SE-FUSION-2 - Environmental image sample classification service • WP5-SE-GEO-11 - Environmental geo-referenced observation app

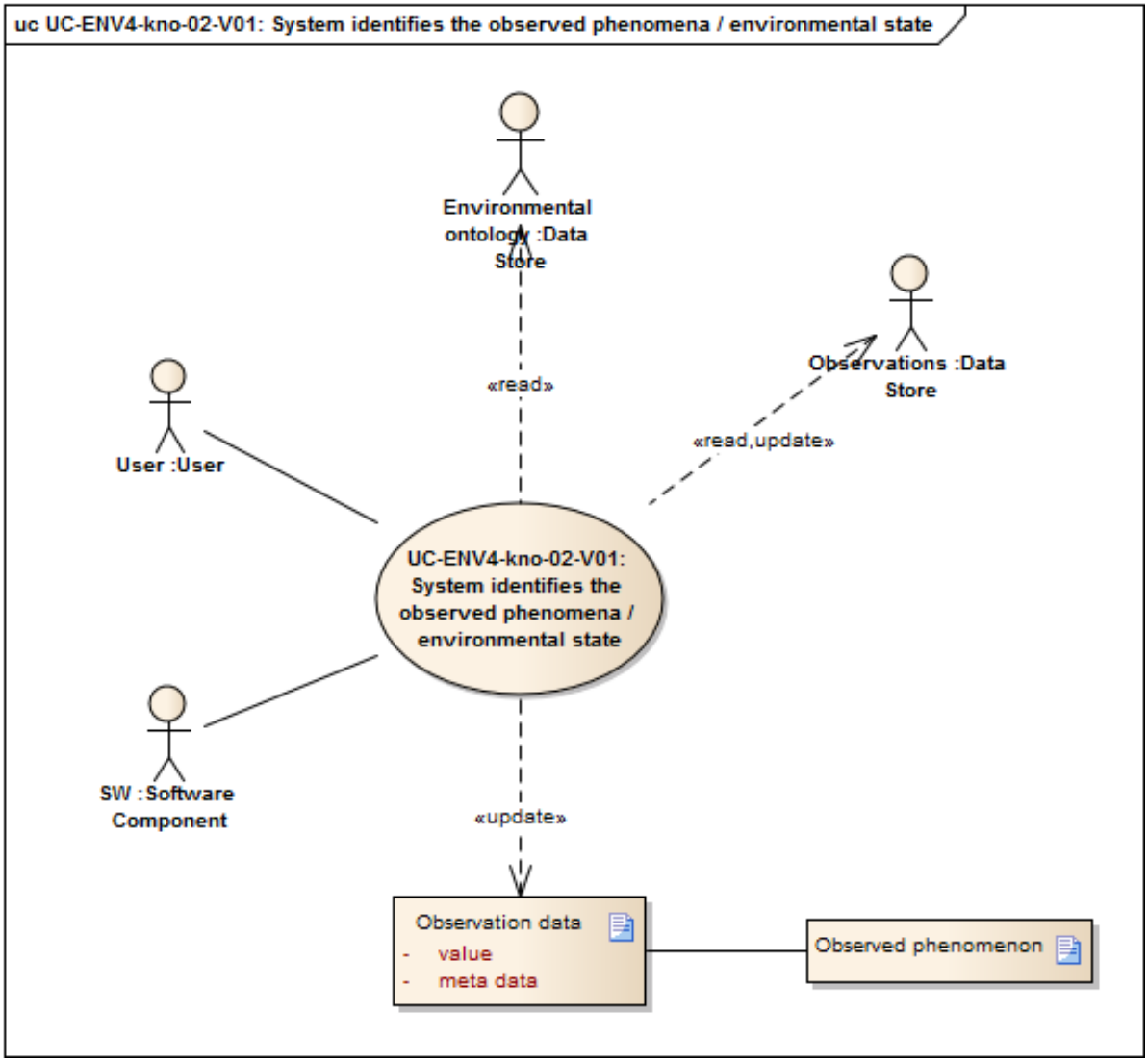

Figure 21: UC-ENV4-kno-02-V01 System identifies the observed phenomena / environmental state

2.1.22 User subscribes for receiving alert notifications

Use Case ID	UC-ENV4-not-01-V01
Use Case Name	User subscribes for receiving alert notifications
Revision and Reference	V01, http://envirofi.server.de/servlet/is/8580/
Use Case Diagram	
Status	In Progress
Priority of accomplishment	Must have
Goal	The user specifies his/her preferences in order to receive personalized alerts
Summary	Information regarding the user's preferences for the alert dissemination are stored in the system.
Category	Event handling
Actor	User, Alert Notification Service
Primary Actor (initiates)	User
Stakeholder	
Requested Information Resources	• optional: Areas affected by the threat (e.g., typically users are registered to areas of interest and are notified if there is a risk in that area) (manage) • parameters to be monitored (manage) • languages (manage) • dissemination channels to be used (e.g., fax, sms, email, rss, etc) (manage) • thresholds (only if the parameters to be monitored exceed the threshold the alert is issued) (manage)
Preconditions	
Main success scenario	1. User open graphical interface 2. User requests for available alert subscription capabilities (what type of alert types, dissemination channels, languages, etc) 3. User subscribes specifying his/her subscription preferences according to the available options 4. The system stores his/her subscription preferences
Extensions	
Alternative paths	
Post conditions	The user's preferences are stored in the system for later use when it is needed to disseminate an alert
Non-functional requirements	Usage of Common Alerting Protocol (CAP) is encouraged since it is a widely used standard for the dissemination of alerts and many of its parameters can be used in order to configure the alert to be received.
Validation statement	The user can request for his/her subscription preferences and update/cancel them

Notes	Note 1: this use case could be split in several sub-use cases for each of the configuration parameters to be set up (area of interest determination, selection of observed parameters and threshold ranges, etc)
Author and date	Miguel angel Esbrl, 2011/12/20
Maps to Requirement	• WP5-SE-NOT-1 - Alert Notification Service • WP5-SE-GEO-11 - Environmental geo-referenced observation app

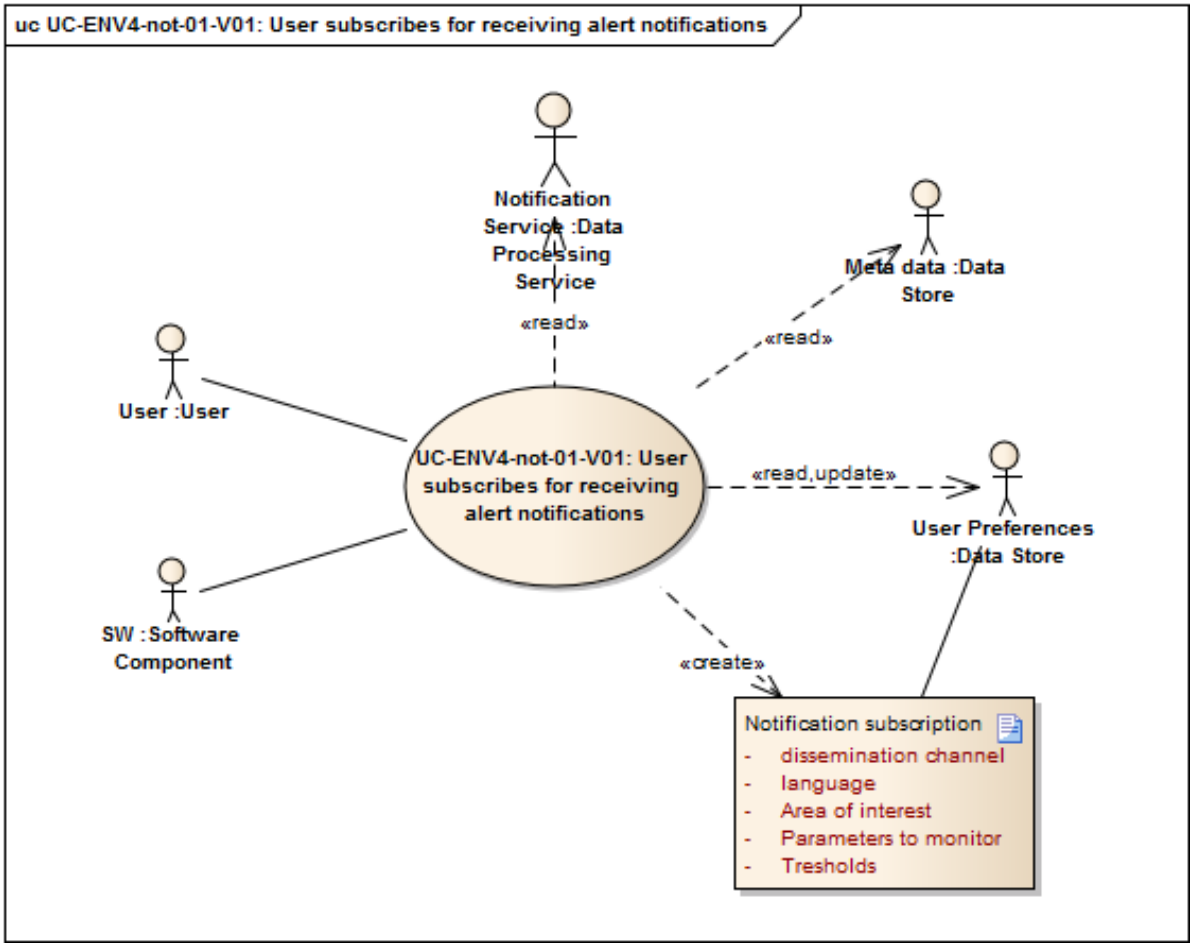

Figure 22: UC-ENV4-not-01-V01 User subscribes for receiving alert notifications

2.1.23 Configuration of Alert Types and Dissemination Channels

Use Case ID	UC-ENV4-not-02-V01
Use Case Name	Configuration of Alert Types and Dissemination Channels
Revision and Reference	V01, http://envirofi.server.de/servlet/is/8594/
Use Case Diagram	
Status	In Progress
Priority of accomplishment	Must have
Goal	Administrator defines alert types and available dissemination channels
Summary	The administrator sets up in the Alert Notification Service the available alert types a user can subscribe to as well as the available dissemination channels that can be used in order to received the alert.
Category	Event handling
Actor	Alert Notification Service
Primary Actor (initiates)	Administrator
Stakeholder	
Requested Information Resources	The user selects from combo-boxes the predefined CAP values for the different parameters that comprehend the alarm level
Preconditions	
Main success scenario	1. Administrator opens the administrative GUI to interact with the Alert Notification Service 2. The administrator creates and saves a new alert type (based on CAP parameters) using the available options presented in the GUI. 3. The administrator creates and saves a new dissemination channel settings by filling in the form fields presented in the GUI
Extensions	
Alternative paths	
Post conditions	New alert ypes and/or dissemination channel settings are stored in the Alert Notification Service.

Non-functional requirements	Value of the alert level should be taken from the already existing Common Alerting Protocol (CAP) standard (http//docs.oasis-open.org/emergency/cap/v1.2/CAP-v1.2-os.pd).CAP is an XML-based data format for exchanging public warnings and emergencies between alerting technologies. CAP allows a warning message to be consistently disseminated simultaneously over many warning systems to many applications. CAP increases warning effectiveness and simplifies the task of activating a warning for responsible officials. CAP defines for an alert message the following parameters (among others): • category: Geo, Met, Safety, Security, Rescue, Fire, Health, Env, Transport, Infra, CBRNE, Other. • urgency: Immediate, Expected, Future, Past, Unknown. • severity: Extreme, Severe, Moderate, Minor, Unknown. • certainty: Observed, Likely, Possible, Unlikely, Unknown. These fields contained in the alert would also allow the user to specify further filters in order to receive alerts (eg. user X is only interested in receiving alerts if category = Geo, urgency = expected, severity = severe and certainty = observed) Additionally, CAP also allows to specify the response type and instructions that should be followed by the alert recipients: Shelter, Evacuate, Prepare, Execute, Monitor, Assess, None.
Validation statement	The alert ypes and/or dissemination channel settings that are stored will be used in the future by the in the Alert Notification Service if an alert has to be disseminated.
Notes	
Author and date	Miguel Angel Esbri, 2011/12/20
Maps to Requirement	• WP5-SE-NOT-1 - Alert Notification Service

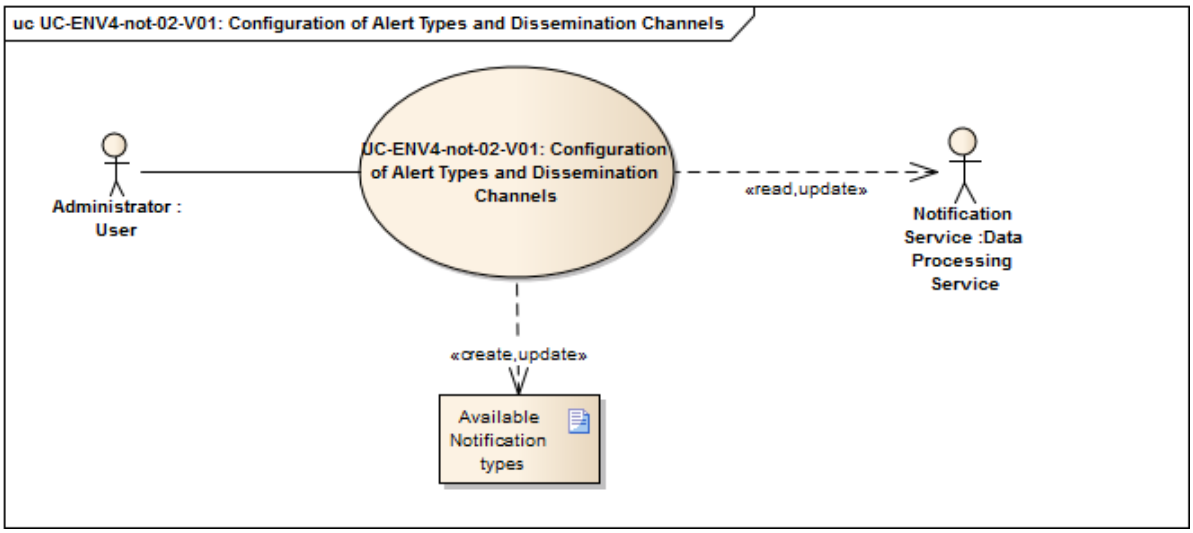

Figure 23: UC-ENV4-not-02-V01 Configuration of Alert Types and Dissemination Channels

2.1.24 System disseminates alert notifications

Use Case ID	UC-ENV4-not-03-V01
Use Case Name	System disseminates alert notifications
Revision and Reference	V01, http://envirofi.server.de/servlet/is/8604/
Use Case Diagram	
Status	In Progress
Priority of accomplishment	Must have
Goal	The system pushes alert notifications to the subscribed users
Summary	Personalized alerts are disseminated to users/other systems based on the user preferences. The dissemination is started upon a human or automatic system decision after a set of conditions (observed parameters) have been evaluated.
Category	Event handling
Actor	User
Primary Actor (initiates)	Alert Notification Service
Stakeholder	
Requested Information Resources	• User Preferences (read) • Observed values (read) • besides the observation data, alerts may include other information of interest such as maps, time series graphics, procedure instructions (Standard operating procedure (SOP,http//en.wikipedia.org/wiki/Standard_ operating_ procedure), etc. (read)
Preconditions	existence of event processing service
Main success scenario	• System monitors for events received from a event source • Alert Notification Service checks whether the event matches the constrains specified by some registered user • if it does, the Alert Notification Service tailors the alert message according to the user's preferences in terms of language, vocabulary and dissemination channel to be used. • The Alert Notification Service disseminates the alert to the user • The user receives the alert message (e.g., via sms, email, etc)
Extensions	Alert is sent to a service, thus triggering further processing/automated response (e.g. watering of a field).
Alternative paths	User/software component acknowledges its reception with observations for furhter processing
Post conditions	The user has received an alert message tailored according his needs

Non-functional requirements	• Usage of existing standards for the dissemination of alerts such as CAP (Common Alerting Protocol) should be enforced thus ensuring that the communication of the alert is interoperable through as many systems (even from other other domains) as possible. • OGC SWE SES • WS-Notification/ Open Mobile Alliance NGSI
Validation statement	users receive alerts/notifications when needed.
Notes	
Author and date	
Includes UseCase	• UC-ENV4-not-01-V01 - User subscribes for receiving alert notifications • UC-ENV4-not-02-V01 - Configuration of Alert Types and Dissemination Channels • UC-ENV3.8-NOT-06-V02 - Responder Acknowledges Notification
Maps to Requirement	• WP5-SE-NOT-1 - Alert Notification Service • WP5-SE-NOT-5 - Sensor Event Service • WP5-SE-GEO-11 - Environmental geo-referenced observation app

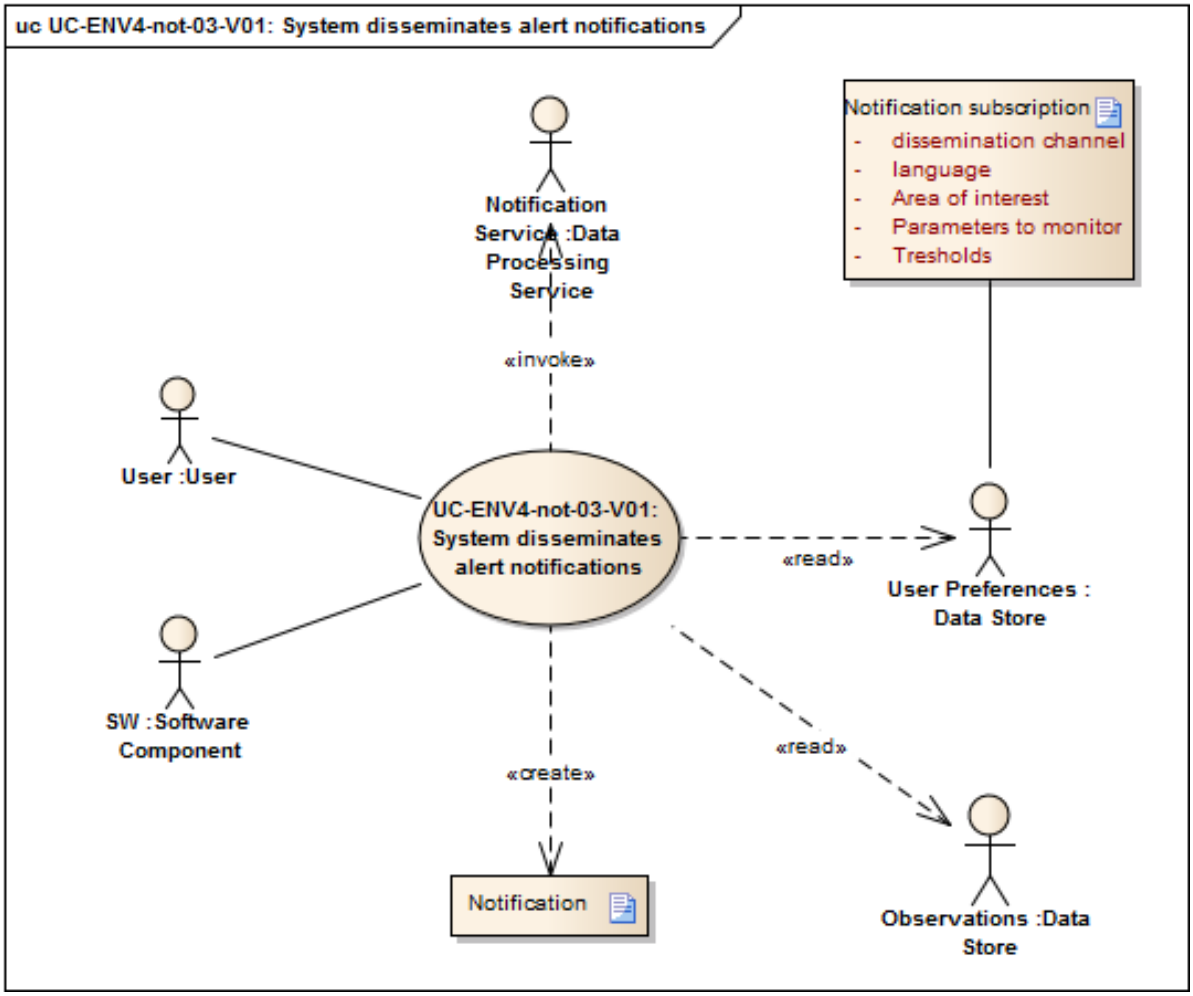

Figure 24: UC-ENV4-not-03-V01 System disseminates alert notifications

2.1.25 System uniquely identifies users

Use Case ID	UC-ENV4-sec-01-V01
Use Case Name	System uniquely identifies users
Revision and Reference	V01; http://envirofi.server.de/servlet/is/5226/
Use Case Diagram	
Status	In Progress
Priority of accomplishment	Must have
Goal	Assure application can perform user-specific actions
Summary	The user is 'recognised' by ENVIROFI application, and able to perform actions on his/her own behalf.
Category	Security, privacy, trust
Actor	User, SW Component e.g. ENVIROFI application or a single-sign-on server (optional)
Primary Actor (initiates)	
Stakeholder	
Requested Information Resources	• list of registered users & credentials
Preconditions	The user is registered with the ENVIROFI System
Main success scenario	• System demands from the user to identify himself • User provides credentials • The user is successfully identified and can proceed with further work (System allows user to continue)
Extensions	• 'Generate new login': the system generates a new user-ID, e.g. based on user's or administrators request • 'Single sign on': the same user registration should also be available across various applications. • 'ofshore profiles': sensitive part of the user's profile is stored on a different service, or on user's device. • 'automatic profiles': part of the user's profile is automatically set, user has no influence and may not even be aware of this
Alternative paths	User is prevented form further work with ENVIROFI application
Post conditions	• User is asigned unique identity within the system

Non-functional requirements	System should assure the maximal possible protection of the user's privacy. This is particularly interesting in the cases where our volunteers are minors (e.g. school classes) and in the cases where users provide potentially sensitive data (e.g. the data on user's well-beeing can be used to infer user's health status => could be misused) Therefore, the privacy-related data should be separated from the data required by the application. Possible setup: • Name, e-mail, etc. only known to trusted SSO site • Each applicaiton only sees an ID which is unique for this application, but not globaly unique • The SSO site may also provide some type of trust info to applications (tbd) • All communication with the user (e.g. send e-mail) also goes through SSO site, where user can decide wether he wants to allow this communication or not - to prevent spamming
Validation statement	• All further steps taken by this user can be clearly correlated with this user
Notes	This UC is inherently present in/required by many other WP1, WP2 and WP3 UCs. These relations are currently not shown. As a general principle, ENVIROFI applicaitons should keep the data required for the applicaitons functionality (e.g. observations provided by the user) separated from the data allowing to infer the user's real identity (name, address, e-mail, ...) . Ideally, the user's identity-relevant data should be maintained by separate organisation. Also, the user should be able to choose arbitrary 'nickname' for each of the applications he/she uses. In this way, the misuse of the data is made more difficult: • application providers have no information on real identity of their users; furthermore, they can only communicate with the user through external service provider (prevents spamming) • Single-sign-on providers have access to information on users identity and the list of the applications he/she uses, but can not access the data kept by application providers. • all other actors will find it difficult to correlate the data provided by some user with his/her identity.
Author and date	DH_ AIT, 2011-08-18
Includes UseCase	• UC-ENV4-sec-01.01-V01 - Register User • UC-ENV4-sec-01.02-V01 - Authenticate User

Maps to Requirement	• WP5-SE-GEO-11 - Environmental geo-referenced observation app

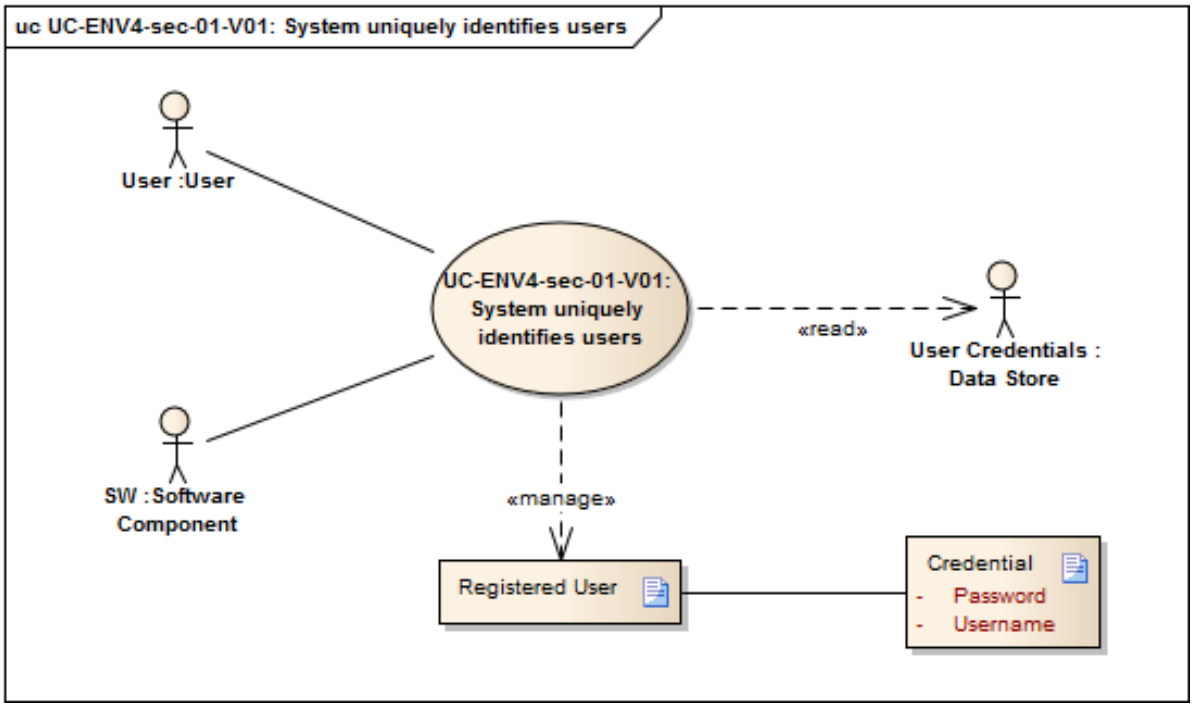

Figure 25: UC-ENV4-sec-01-V01 System uniquely identifies users

2.1.26 Register User

Use Case ID	UC-ENV4-sec-01.01-V01
Use Case Name	Register User
Revision and Reference	V01;http://envirofi.server.de/servlet/is/7620/
Use Case Diagram	
Status	Planned
Priority of accomplishment	Must have
Goal	New User is registered on ENVIROFI system.
Summary	A new user is made known to the system by defining • a unique user id and password • the user profile data
Category	
Actor	
Primary Actor (initiates)	User
Stakeholder	
Requested Information Resources	
Preconditions	The user is not known by the system.
Main success scenario	• User starts mobile application or opens portal for the first time • User is requested to register on the system • System provides registration form to the user • User enters data • User sends data to system by clicking register button • System checks input data and accepts user if data is ok
Extensions	
Alternative paths	6a. System checks input data and sends error notification when data is incorrect.
Post conditions	User has a unique identity and profile within the system.
Non-functional requirements	See UC-ENV4-sec-01.
Validation statement	
Notes	
Author and date	ME_ AIT, 2011-10-12

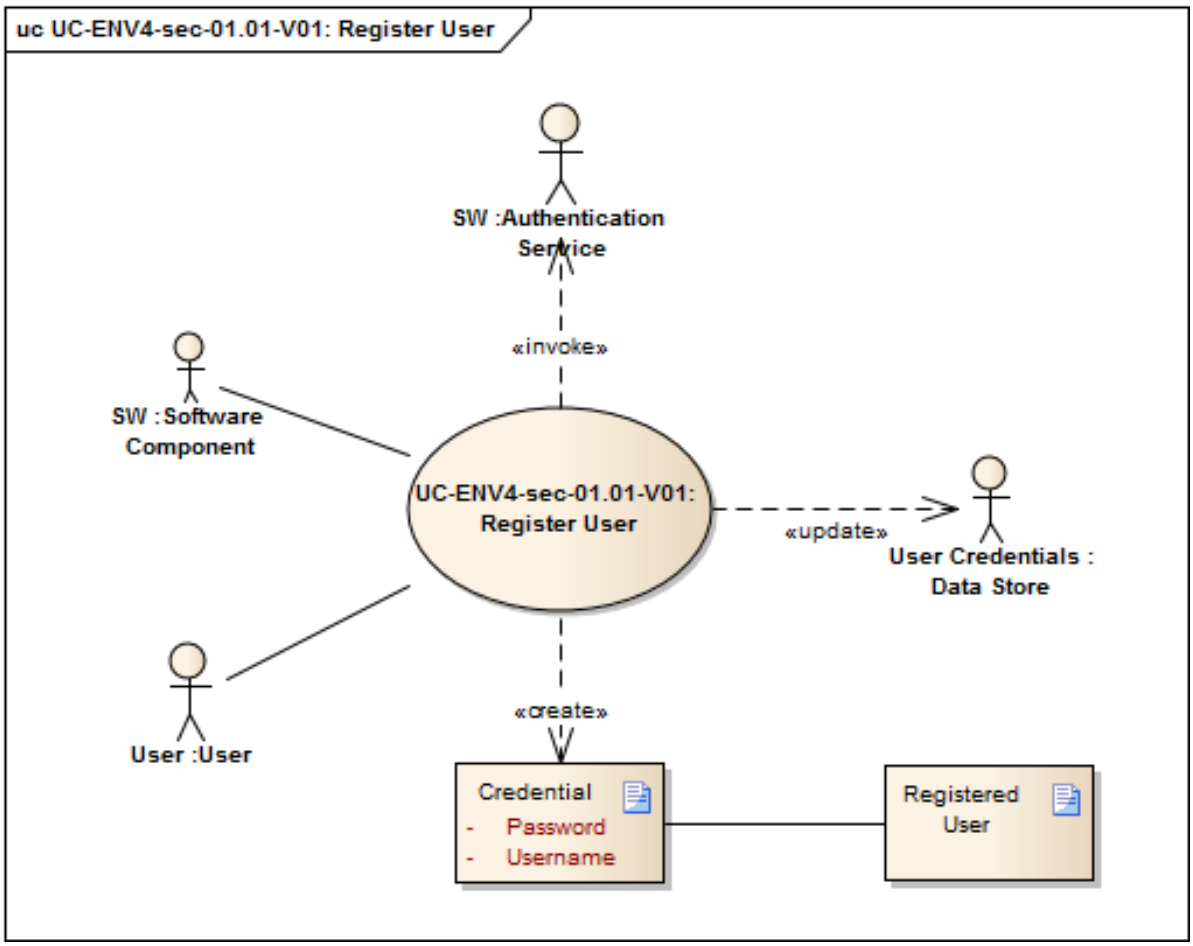

Figure 26: UC-ENV4-sec-01.01-V01 Register User

2.1.27 Authenticate User

Use Case ID	UC-ENV4-sec-01.02-V01
Use Case Name	Authenticate User
Revision and Reference	V01;http://envirofi.server.de/servlet/is/7640/
Use Case Diagram	
Status	Planned
Priority of accomplishment	Must have
Goal	User is identified by system.
Summary	User inputs his credentials and logs into the system. System identifies user uniquely.
Category	
Actor	
Primary Actor (initiates)	User
Stakeholder	
Requested Information Resources	• User credentials • User profile • User preferences
Preconditions	User is not logged into system; User is registered within system.
Main success scenario	• User starts mobile app or opens portal. • User is requested to input his user name and password. • User enters data. • System identifies user. • Application/Portal is available for user interactions.
Extensions	2a. User identification via ”anonymous” credentials, e.g. using an id card 3a. User enters data via mobile phone/NFC
Alternative paths	4a. System cannot identify user and sends error notification.
Post conditions	Mobile app resp. portal functionality is available for user.
Non-functional requirements	
Validation statement	
Notes	
Author and date	ME_ AIT, 2011-10-13
Maps to Requirement	• WP5-SE-GEO-11 - Environmental geo-referenced observation app

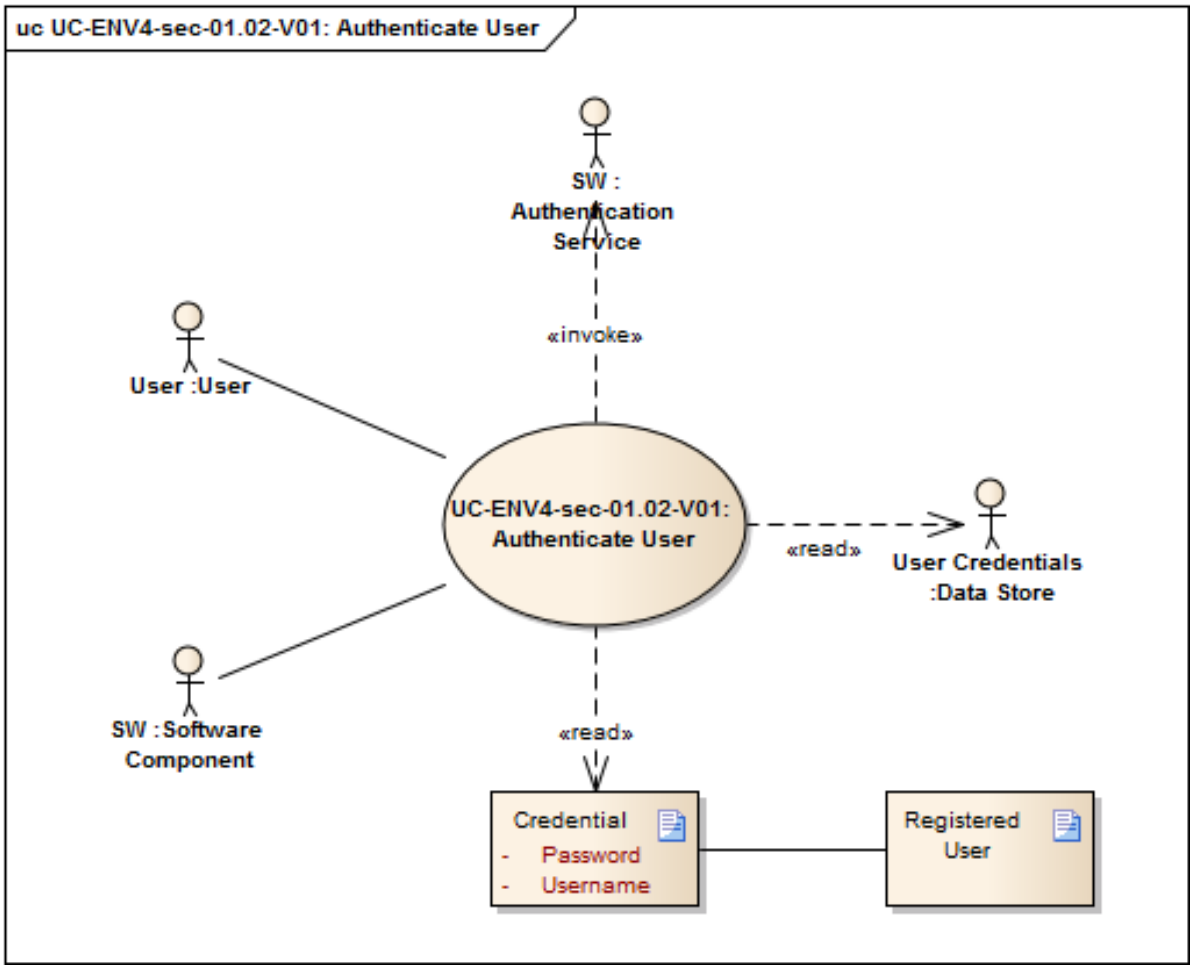

Figure 27: UC-ENV4-sec-01.02-V01 Authenticate User

2.1.28 Support user-specific application behaviour

Use Case ID	UC-ENV4-sec-02-V01
Use Case Name	Support user-specific application behaviour
Revision and Reference	V01; http://envirofi.server.de/servlet/is/5228/
Use Case Diagram	
Status	In Progress
Priority of accomplishment	Must have
Goal	Assure ENVIROFI applications can perform in user-specific manner
Summary	ENVIROFI applications should act differently for various users. For instance, the look and feel of the applications may change; system may generate different actions (e.g. send user-specific alerts); change the data shown to the user (e.g. based on his/her position or interests); or the user may be permitted to perform certain actions (e.g. view/edit/tag certai data or edit/view own profile). Also the level of trust in user-provided information may depend on the user.
Category	Security, privacy, trust
Actor	All
Primary Actor (initiates)	All
Stakeholder	
Requested Information Resources	• user's profile information • user's position • System functionality (read) (in order to know what shall be done) • Behavioural description (update) (in order to describe how the system shall behave) Note: the word p̈rofileïs used in generic way here, and includes any information that the system connects with users's id. this could be user's preferences for application's look and feel, list of users topics of interests, locations of interest, current location, etc.
Preconditions	The user is authenticated
Main success scenario	• The user is allowed to perform actions corresponding to his/her identity

Extensions	• System automatically performs actions depending on users profile (e.g. generates alerts) • System modifies its responses to user's action depending on users's profile (e.g. shows a list of birds spotted in vicinity to bird watchers) • Observations provided by the user is assigned certain trust level (note: an alternative to storing this info with the data may be to calculate the trust level on the fly when data is asked-for) • User changes the preferences • Administrator changes the preferences for one or more users (e.g. assigns users with additional rights, modifies trust level) • System automatically changes the preferences for one or more users (e.g. changes the tresholds for alerts based on correlations between users observations and known meteo conditions)
Alternative paths	
Post conditions	
Non-functional requirements	The system must be designed in a way that minimizes the risk of misuse of the information related to users that is stored on the system. Related requirenments: • System should only store the user-related data that is necessary for the application, for the duration of this need. • In particular, the system should separate the data relieving the user's identity (e.g. name, e-mail, address, telephone...) from the data relieving the user's habits, interests or health status (e.g. contributed observations) • System should allow users to determine the permissions on the data they contributes (e.g. who is allowed to view them?), as well as to choose what will be shown in äuthorfield (real name, affiliation, nickname, hidden...) Furthermore, the system must provide a mean to remove all information related to the user if/when needed. In this context, it is important to clearly state what happens with the additional information previously provided by this user, such as volunteered observations, and to assure the system follows these guidelines. Generally we have three possibilities: • delete all data provided by user when user is removed • set the owner of this data to änonymous, • set the owner of this data to a newly generated user, thus keeping the information that all this data has been provided by a single user (usefull for QA/trust management purposes)

Validation statement	• All further steps taken by this user can be clearly correlated with this user • Users' snd system's actions are bound to limitations defined in the user's profile
Notes	System's (user-dependent) behaviour can be altered in different ways. Some examples: • User manually setts new alert conditions. • System calculates new alert conditions based on well-beeing data previously provided by user. • Administrator assigns additional rights to user (e.g. by adding him/her to special user group) • User's Ṫrust levelc̈hanges based on the quality of observations provided by him/her
Author and date	DH_ AIT, 2011-08-18
Includes UseCase	• UC-ENV4-sec-02.01-V01 - Manage User Preferences • UC-ENV4-sec-02.02-V01 - Manage access permissions • UC-ENV4-sec-02.03-V01 - Define user roles and groups • UC-ENV4-sec-02.05-V01 - Define trust levels • UC-ENV4-sec-02.04-V01 - Manage user profile
Maps to Requirement	• WP5-SE-GEO-10 - Environmental geo-referenced observation proxy service • WP5-SE-GEO-11 - Environmental geo-referenced observation app

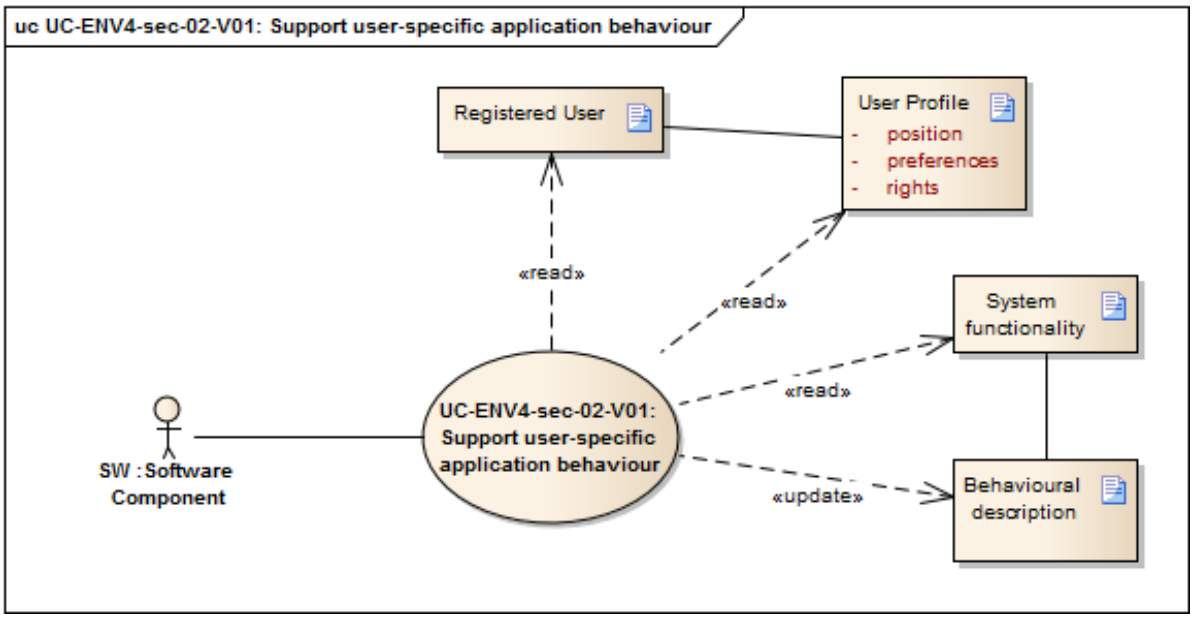

Figure 28: UC-ENV4-sec-02-V01 Support user-specific application behaviour

2.1.29 Manage User Preferences

Use Case ID	UC-ENV4-sec-02.01-V01
Use Case Name	Manage User Preferences
Revision and Reference	V01;http://envirofi.server.de/servlet/is/7664/
Use Case Diagram	
Status	Planned
Priority of accomplishment	Must have
Goal	User Preferences are stored and can be retrieved to adapt user interfaces of applications
Summary	An ENVIROFI application can store a user's GUI preferences (e.g. visualisation settings, notification settings, gui feature settings like table column width, sort order, etc.). Default values can be defined for an application which are taken if a user does not change the application's appearance.
Category	
Actor	
Primary Actor (initiates)	User, Application
Stakeholder	
Requested Information Resources	• user preferences • default application properties
Preconditions	User is regidtered and authorized in system.
Main success scenario	• Application is started by user • Application retrieves user preferences • Application shows GUI according to user preferences • User works with application • User chooses to end application • Application stores user preferences
Extensions	
Alternative paths	2.a Application retrieves default settings when no user specific settings are available
Post conditions	After start of appllication the application behaves according to user preferences set during the last session. After ending an application, user preferences are stored in the system so that they can be reloaded when the user starts the application again.
Non-functional requirements	
Validation statement	
Notes	
Author and date	ME_ AIT, 2011-10-12

Maps to Requirement	• WP5-SE-GEO-10 - Environmental geo-referenced observation proxy service • WP5-SE-GEO-11 - Environmental geo-referenced observation app

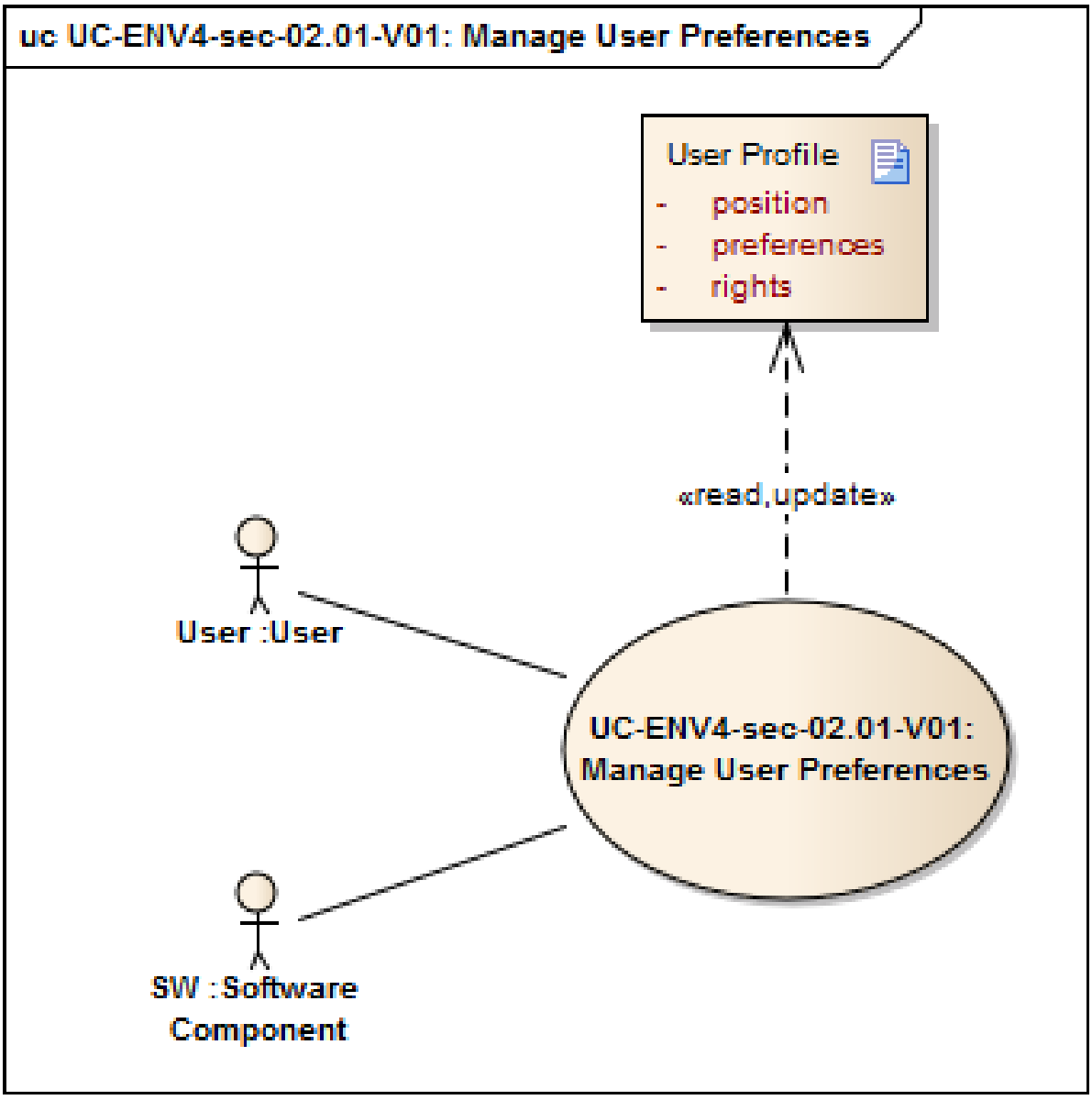

Figure 29: UC-ENV4-sec-02.01-V01 Manage User Preferences

2.1.30 Manage access permissions

Use Case ID	UC-ENV4-sec-02.02-V01
Use Case Name	Manage access permissions
Revision and Reference	V01;http://envirofi.server.de/servlet/is/7668/
Use Case Diagram	
Status	Planned
Priority of accomplishment	Must have
Goal	Access permission to specific data is allowed or denied
Summary	Administrator manages which user resp. group od users can access which data. System grants data access according to these settings.
Category	
Actor	
Primary Actor (initiates)	Administrator
Stakeholder	
Requested Information Resources	
Preconditions	
Main success scenario	• User tries to sccess data • System checks if user is allowed to access this data • Data can be accessed
Extensions	
Alternative paths	3a. User is notified about access restrictions
Post conditions	
Non-functional requirements	
Validation statement	
Notes	Access to services and data can be controlled by FI-WARE Security GEs (Data Handling GE, Secure Storage Service)
Author and date	ME_ AIT, 2011-10-12
Maps to Requirement	• WP5-SE-GEO-1 - Environmental geo-referenced observation collection service • WP5-SE-GEO-10 - Environmental geo-referenced observation proxy service • WP5-SE-GEO-11 - Environmental geo-referenced observation app

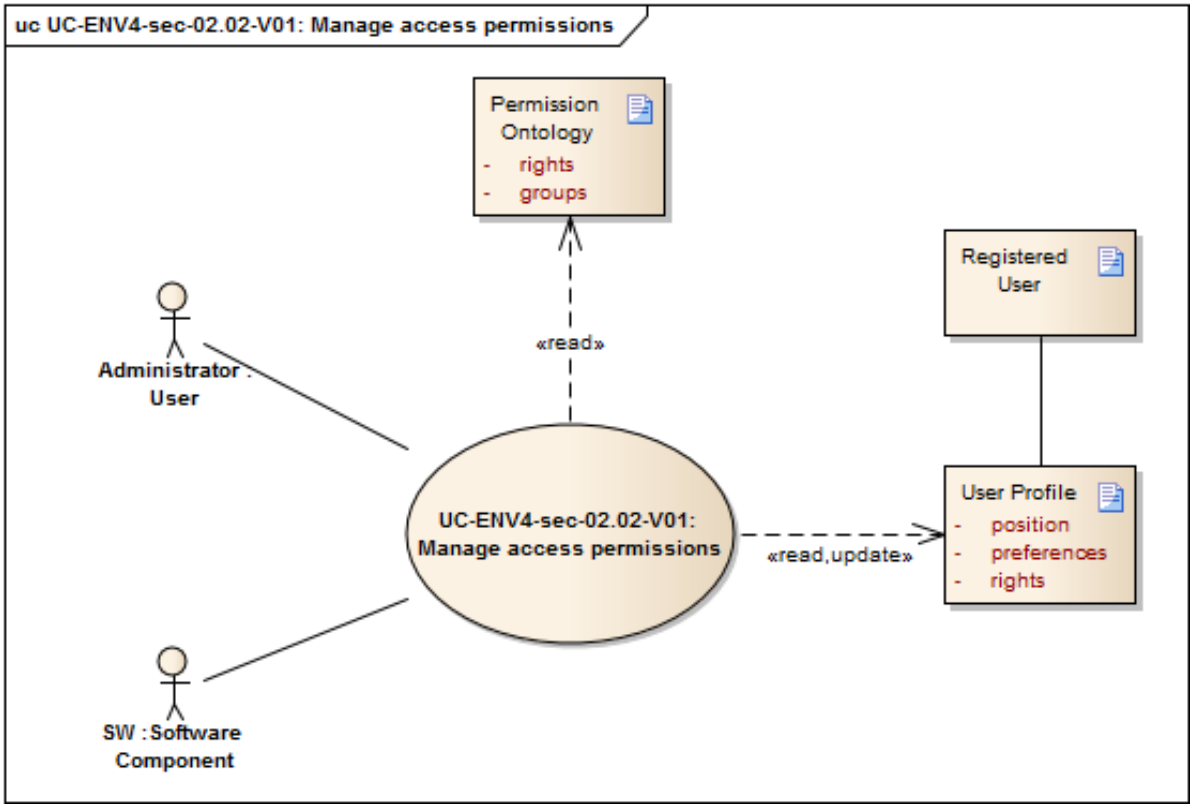

Figure 30: UC-ENV4-sec-02.02-V01 Manage access permissions

2.1.31 Define user roles and groups

Use Case ID	UC-ENV4-sec-02.03-V01
Use Case Name	Define user roles and groups
Revision and Reference	V01;http://envirofi.server.de/servlet/is/7670/
Use Case Diagram	
Status	Planned
Priority of accomplishment	Must have
Goal	Roles and groups are assigned to users.
Summary	Administrator defines user groups and roles to grant data access permissions to users.
Category	
Actor	
Primary Actor (initiates)	Administrator
Stakeholder	
Requested Information Resources	
Preconditions	
Main success scenario	• Administrator starts web application for administration/user management • Administrator defines user groups • Administrator defines user roles • Administrator assigns groups and roles to users • Administrator chooses to store groups and roles and user settings • System stores data
Extensions	
Alternative paths	
Post conditions	
Non-functional requirements	
Validation statement	
Notes	
Author and date	ME_ AIT, 2011-10-12

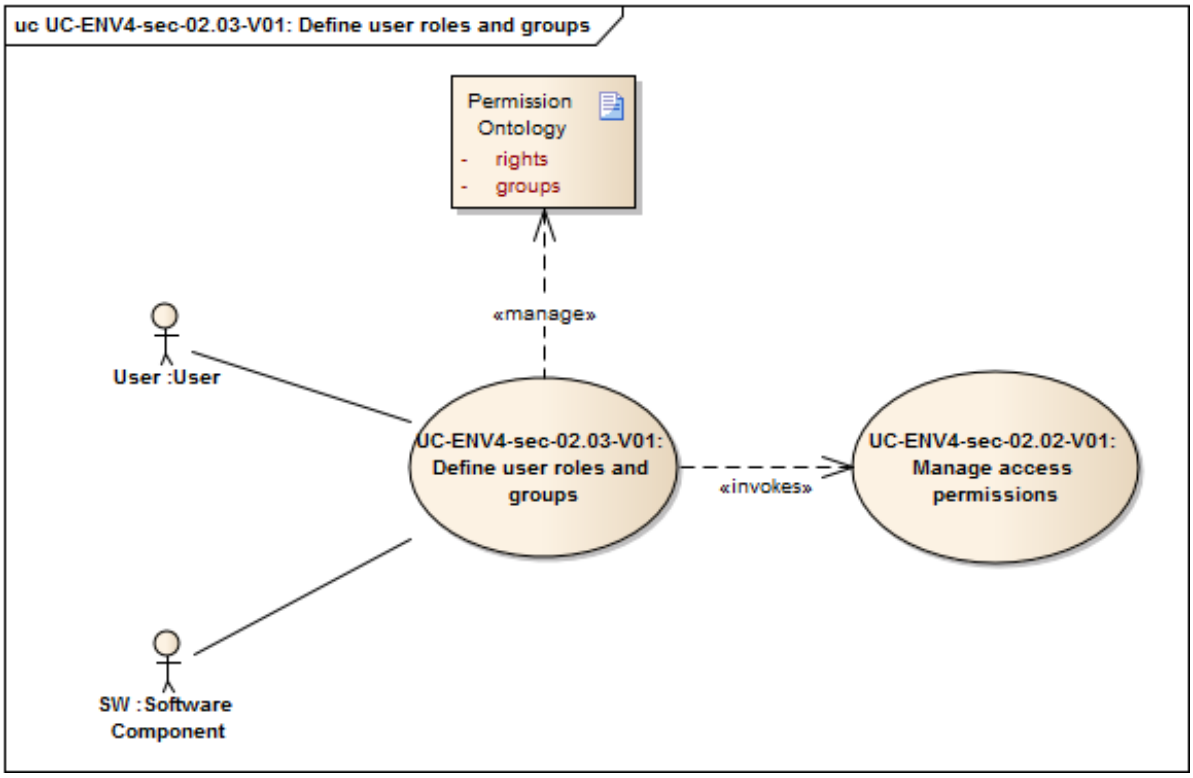

Figure 31: UC-ENV4-sec-02.03-V01 Define user roles and groups

2.1.32 Manage user profile

Use Case ID	UC-ENV4-sec-02.04-V01
Use Case Name	Manage user profile
Revision and Reference	V01; http://envirofi.server.de/servlet/is/7672/
Use Case Diagram	
Status	Planned
Priority of accomplishment	Must have
Goal	User profile can be created, stored, retrieved, edited, deleted
Summary	User profile contains information aubout the user: • identity information • trust level User profile is created during user registration; can be edited and modified by user
Category	
Actor	
Primary Actor (initiates)	User
Stakeholder	
Requested Information Resources	• User profile
Preconditions	User is registered on ENVIROFI system
Main success scenario	• User chooses to edit profile • System provides GUI containing profile data • User modifies data • User confirms modified settings • System stores user profile
Extensions	
Alternative paths	
Post conditions	• User is identified by modified settings • User's self-assessment of trust level is considered when observations are entered into system
Non-functional requirements	
Validation statement	
Notes	What user data shall user profile contain beside of id and password? Does it make sense that the user provides his own trust level? Will this be combined with an automatically calculated trust level based on the user's other profile data? FI-WARE Identity Management GE (IDM GE) will provide this functionality.

Author and date	ME_ AIT, 2011-10-12
Maps to Requirement	• WP5-SE-GEO-1 - Environmental geo-referenced observation collection service • WP5-SE-GEO-10 - Environmental geo-referenced observation proxy service • WP5-SE-GEO-11 - Environmental geo-referenced observation app

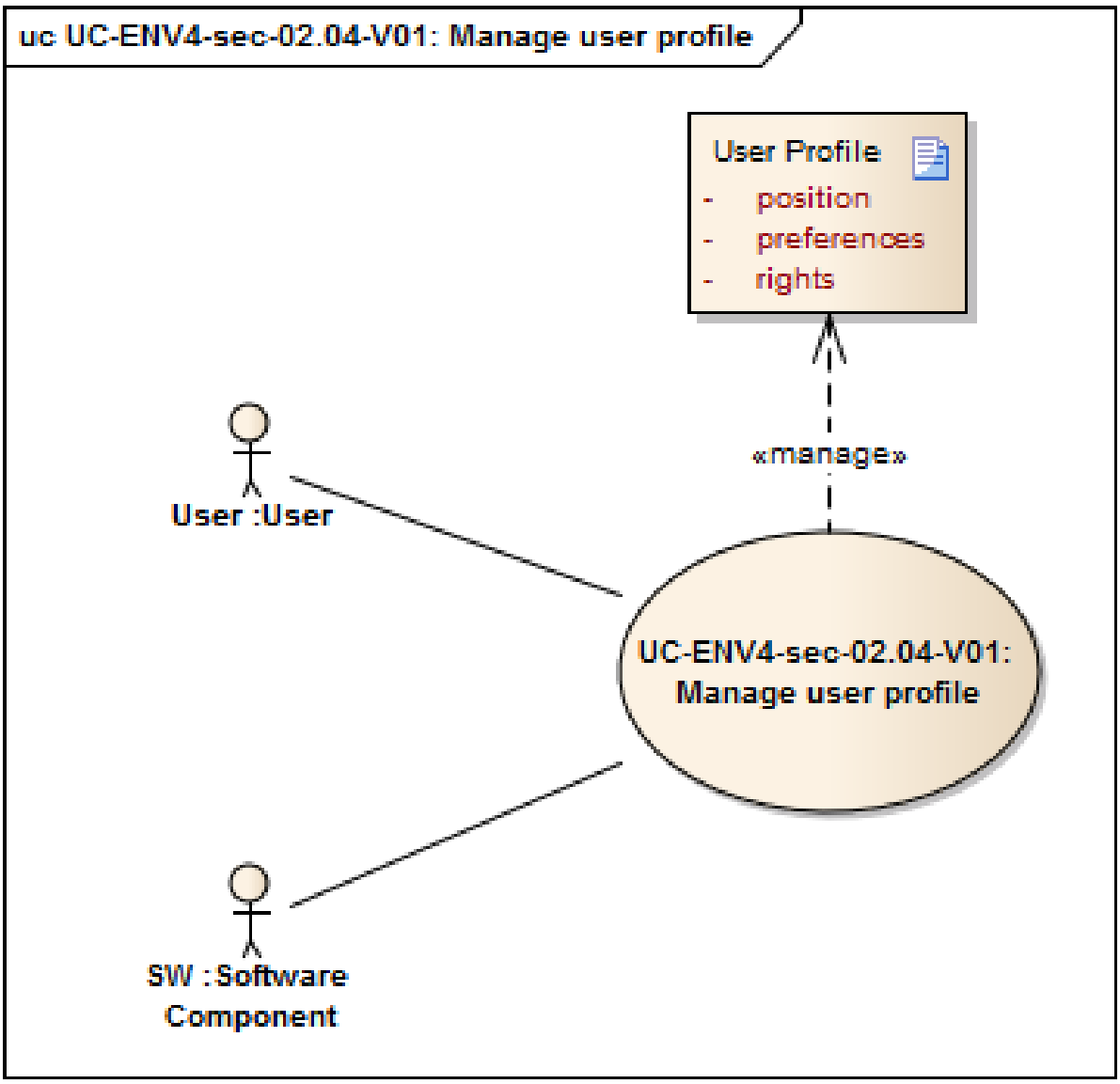

Figure 32: UC-ENV4-sec-02.04-V01 Manage user profile

2.1.33 Define trust levels

Use Case ID	UC-ENV4-sec-02.05-V01
Use Case Name	Define trust levels
Revision and Reference	V01; http://envirofi.server.de/servlet/is/7675/
Use Case Diagram	
Status	Planned
Priority of accomplishment	Must have
Goal	To have a metric for the trust in a user's observations
Summary	Starting from the user's self-assessment of his trust level, the system adjusts the trust level depending on the observations the user enters into the system. If the system decides that an observation ist correct or that the user's observations are matching observations of more trusted users, the trust level of this user will be adjusted.
Category	
Actor	
Primary Actor (initiates)	System
Stakeholder	
Requested Information Resources	• User profile • Observations of other users
Preconditions	
Main success scenario	• User provides new observation • System retrieves other observations with the same contents • System compares observations and calculates correctness of user's observation • System adjusts user's trust level
Extensions	3a. System sends a push notification to other users at the same location and requests to verify the report of the first user.
Alternative paths	
Post conditions	
Non-functional requirements	
Validation statement	
Notes	
Author and date	ME_ AIT, 2011-10-12
Maps to Requirement	• WP5-SE-GEO-1 - Environmental geo-referenced observation collection service

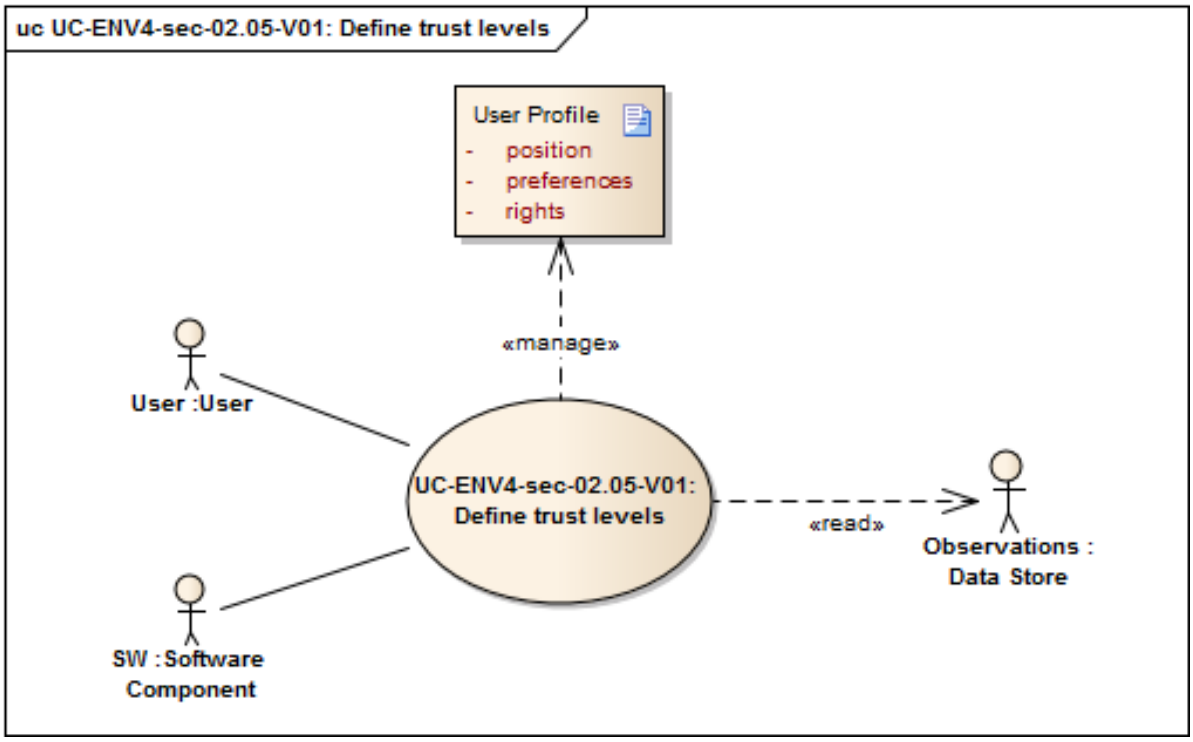

Figure 33: UC-ENV4-sec-02.05-V01 Define trust levels

2.1.34 Observation access requiring license approval

Use Case ID	UC-ENV4-sec-03-V01
Use Case Name	Observation access requiring license approval
Revision and Reference	
Use Case Diagram	
Status	
Priority of accomplishment	Should have
Goal	To allow observation providers to require an explicit approval of a license to access data
Summary	An observation provider may associate a text document reporting the license associated to an observation or observation set. Upon a user request, the license will be provided to the user for explicit approval.
Category	
Actor	User (provider), ENVIROFI system
Primary Actor (initiates)	
Stakeholder	
Requested Information Resources	License
Preconditions	
Main success scenario	• Observation provider publishes the license text • Observation provider associates license with observation • System updates observation metadata to reflect license information
Extensions	
Alternative paths	
Post conditions	Observations have associated a license
Non-functional requirements	
Validation statement	
Notes	
Author and date	
Maps to Requirement	• WP5-SE-GEO-1 - Environmental geo-referenced observation collection service • WP5-SE-GEO-11 - Environmental geo-referenced observation app

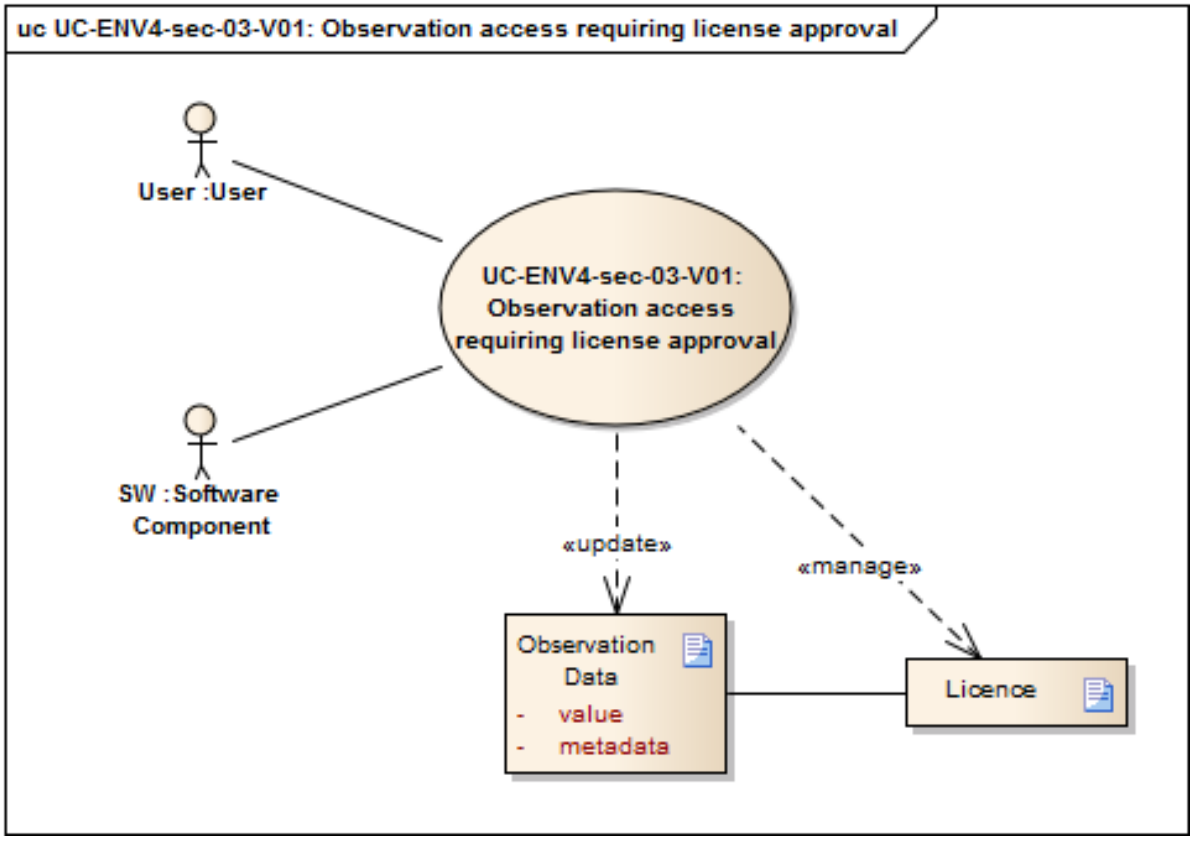

Figure 34: UC-ENV4-sec-03-V01 Observation access requiring license approval

2.1.35 Configure observation or service access to require payment

Use Case ID	UC-ENV4-sec-04-V01
Use Case Name	Configure observation or service access to require payment
Revision and Reference	
Use Case Diagram	
Status	
Priority of accomplishment	Should have
Goal	To allow observation providers to require payment to access a data set or service
Summary	An observation provider may associate a mometary fee to the access of a observation or observation set.
Category	
Actor	User, Data provider, ENVIROFI system
Primary Actor (initiates)	User
Stakeholder	Data provider
Requested Information Resources	Payment details Observation set / service User right system (user groups?)
Preconditions	The user is authenticated and owns observation set / service
Main success scenario	• Observation provider associates fee with observation or service • System updates observation metadata to reflect fee
Extensions	
Alternative paths	
Post conditions	• Observation set or service has associated a fee
Non-functional requirements	
Validation statement	
Notes	
Author and date	
Includes UseCase	• UC-ENV4-sec-01-V01 - System uniquely identifies users • UC-ENV4-sec-02.02-V01 - Manage access permissions
Maps to Requirement	• WP5-SE-GEO-1 - Environmental geo-referenced observation collection service

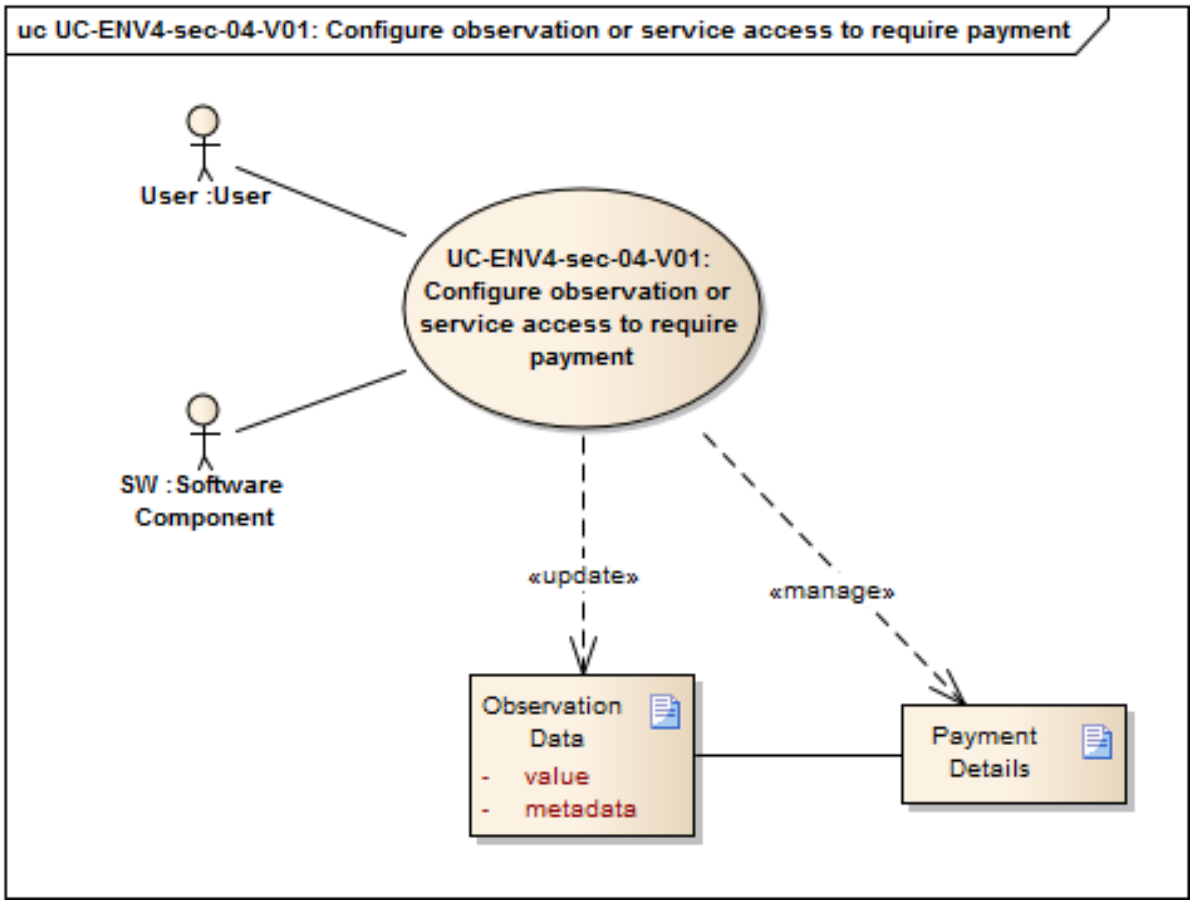

Figure 35: UC-ENV4-sec-04-V01 Configure observation or service access to require payment

2.1.36 Access observation data or service that requires payment

Use Case ID	UC-ENV4-sec-04.01-V01
Use Case Name	Access observation data or service that requires payment
Revision and Reference	
Use Case Diagram	
Status	
Priority of accomplishment	Should have
Goal	To allow users to access a data set or service that requires payment
Summary	A user can pay for access to an observation set or a service.
Category	
Actor	User, Data provider, ENVIROFI system, payment processor
Primary Actor (initiates)	User
Stakeholder	Data provider, payment processor
Requested Information Resources	Payment details Observation set / service User right system (user groups?)
Preconditions	The user is authenticated
Main success scenario	• User wishing to access observation or service pays fee • User gets access rights to observation or service
Extensions	
Alternative paths	
Post conditions	• User can access observation set or service that has a fee attached
Non-functional requirements	
Validation statement	
Notes	
Author and date	
Includes UseCase	• UC-ENV4-sec-01-V01 - System uniquely identifies users • UC-ENV4-sec-02.02-V01 - Manage access permissions
Maps to Requirement	• WP5-SE-GEO-1 - Environmental geo-referenced observation collection service

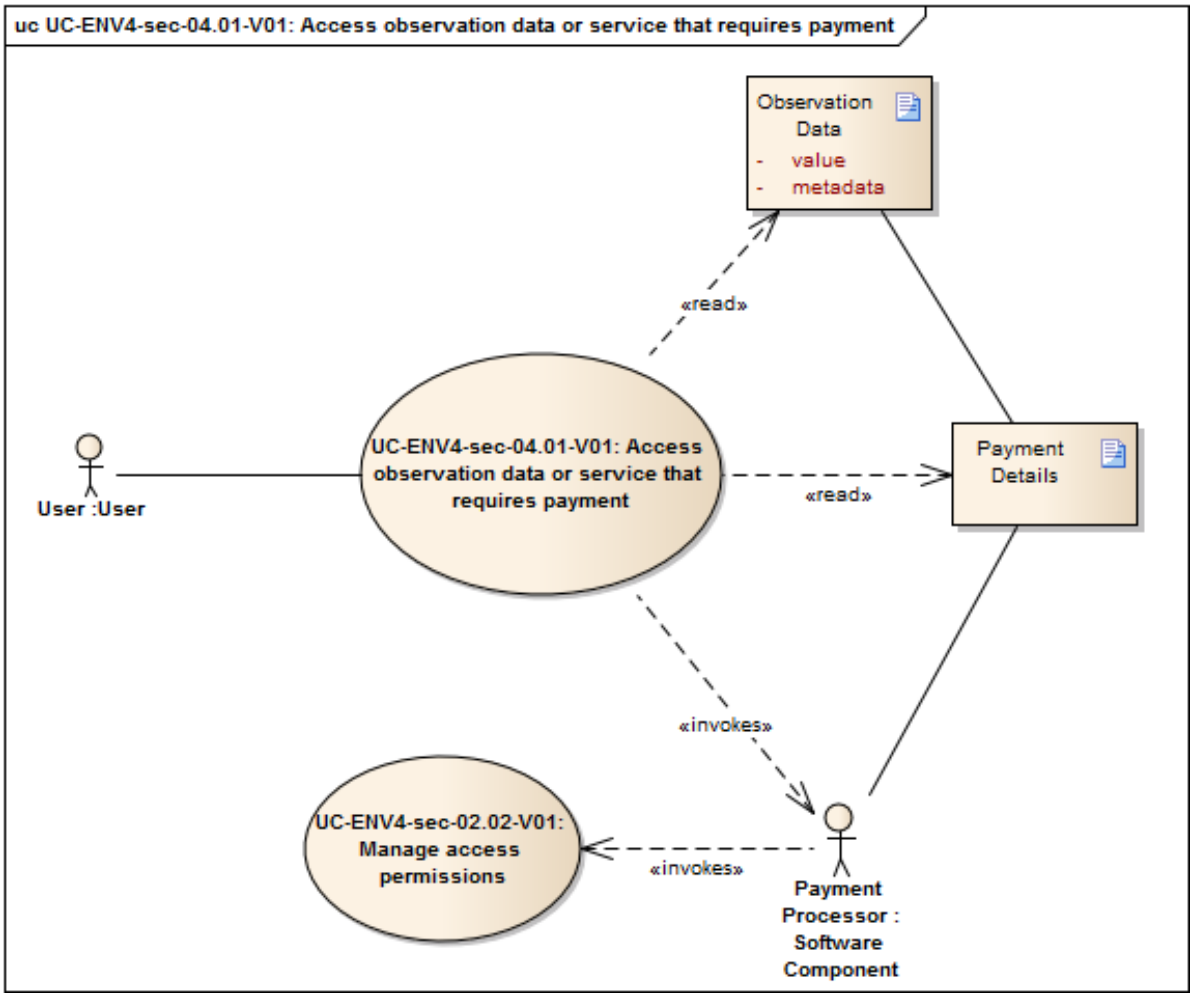

Figure 36: UC-ENV4-sec-04.01-V01 Access observation data or service that requires payment

2.1.37 Support geospatially- dependent application behaviour

Use Case ID	UC-ENV4-sec-05-V01
Use Case Name	Support geospatially- dependent application behaviour
Revision and Reference	V01; http://envirofi.server.de/servlet/is/6109
Use Case Diagram	
Status	In Progress
Priority of accomplishment	Should have
Goal	Assure ENVIROFI applications can perform actions depending on geospatial parameters and time
Summary	ENVIROFI applications should act differently, depending on the spatial parameters. • User may have different priviledges, depending on their own position, and on the position of the observations they are interested in. For instance, user may be allowed to annotate (e.g. estimate the validity of) observations in a certain area surrounding his/her place of living, but not the observations at the other side of the planet. • Furthermore, the system may allow, or even encourage/request the users to perform certain actions when they enter the area of interest.
Category	Security, privacy, trust
Actor	All
Primary Actor (initiates)	All
Stakeholder	
Requested Information Resources	• user's profile information • application profile information • spatial constraints (user-dependent, application-dependent, other - e.g. legal constraints) • user's position • position of observations Note: the word p̈rofileïs used in generic way here, and includes any information that the system connects with users's id. this could be user's preferences for application's look and feel, list of users topics of interests, locations of interest, current location, etc.
Preconditions	The user is authenticated; it's position is known to the system
Main success scenario	• System compares the users position, and position(s) of the relevant observations with the spatial constraints • User is allowed to perform the action (or not)

Extensions	• system actively urges the user to perform certain actions, depending on its position and on the positions of the relevant observations.
Alternative paths	
Post conditions	
Non-functional requirements	
Validation statement	• User is allowed (alternatively: urged) to perform actions in accordance to the spatial constraints of the application.
Notes	• This UC is for a part šecurityřelated, and for a part application-specific. While the permission to add, alter or delete observations clearly corresponds to äuthorization, this may not be true for the active urging of the user to perform actions. • Please change the title & labels on UC diagram
Author and date	DH_ AIT, 2011-08-18
Refines UseCase	• test - Testfall_ Schnebel
Maps to Requirement	• WP5-SE-GEO-11 - Environmental geo-referenced observation app

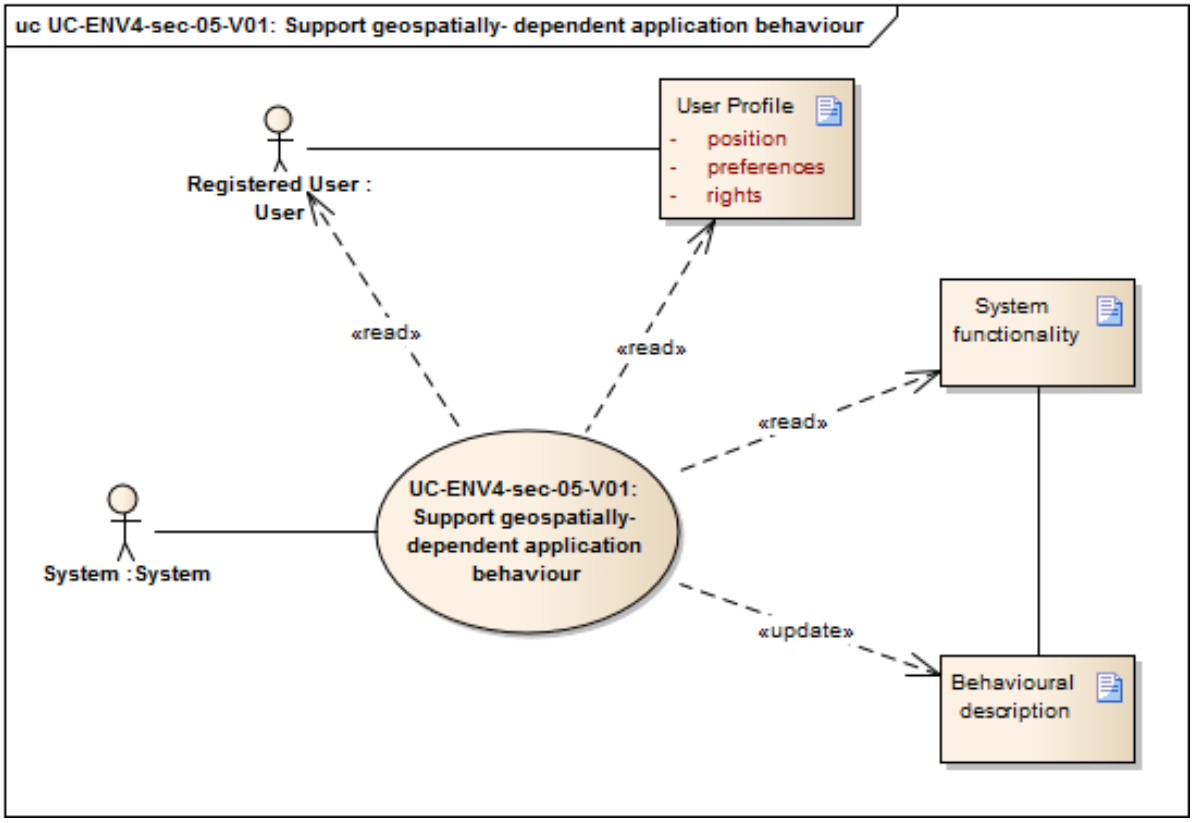

Figure 37: UC-ENV4-sec-05-V01 Support geospatially- dependent application behaviour

2.1.38 System provides information about observation uncertainty

Use Case ID	UC-ENV4-tru-01-V01
Use Case Name	System provides information about observation uncertainty
Revision and Reference	V01; http://envirofi.server.de/servlet/is/6109/
Use Case Diagram	
Status	
Priority of accomplishment	Should have
Goal	Provide information about the reliability of the observation
Summary	Beside observation data, the system provides the associated uncertainty that can be provided/visualized in alternative or along with data. The uncertainty may depend either on data quality (e.g. precision and accuracy of a sensor), or on probabilistic results (e.g. from a model simulation). Examples: a) an user runs a Ecological Niche Model on different Climate Change scenarios to evaluate changes in species geographical distribution. The result isshown as an occurrence probability map. b) an user accesses information on air pollution coming from different sensors: a certified sensor network, and a network of low-quality home stations managed by citizen scientists. The user can visualize the data map and a layer showing the different trust degree.
Category	
Actor	User, Envirofi system
Primary Actor (initiates)	User
Stakeholder	
Requested Information Resources	Observations Related Uncertainty
Preconditions	User is known to the system
Main success scenario	• User chooses the source(s) of observations he/she is interested in (could be stored in his/her profie) • User chooses how he/she wants to be informed. • system presents the interesting information (repeatedly)
Extensions	
Alternative paths	
Post conditions	User is informed about reliability of information
Non-functional requirements	
Validation statement	
Notes	
Author and date	

Includes UseCase	• UC-ENV4-fun-05-V01 - User accesses existing observations
Maps to Requirement	• WP5-SE-GEO-1 - Environmental geo-referenced observation collection service • WP5-SE-GEO-10 - Environmental geo-referenced observation proxy service • WP5-SE-TAG-8 - Uncertainty annotation of environmental data service • WP5-SE-GEO-11 - Environmental geo-referenced observation app

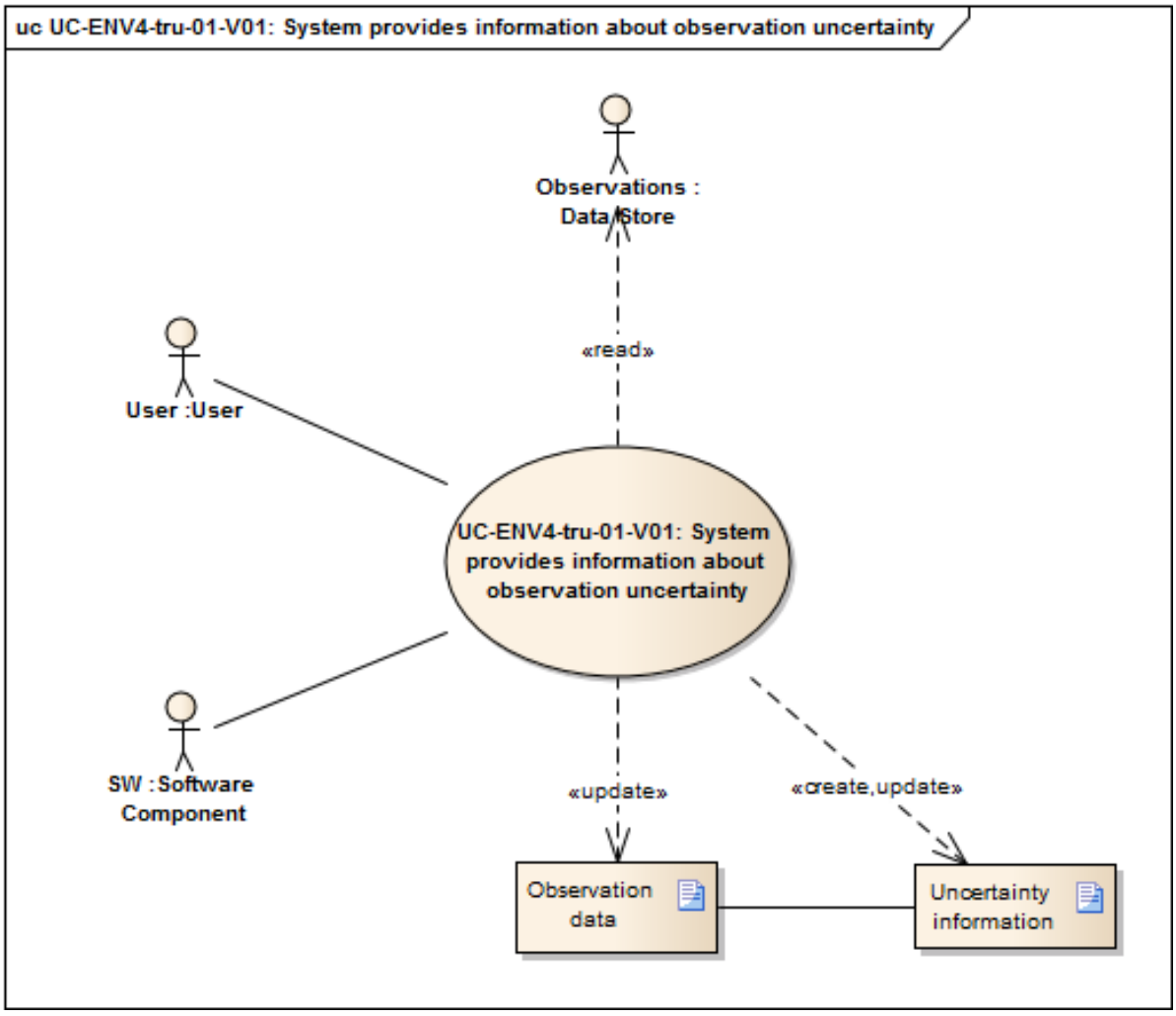

Figure 38: UC-ENV4-tru-01-V01 System provides information about observation uncertainty

2.1.39 Provide visualization of requested data

Use Case ID	UC-ENV4-xui-01-V01
Use Case Name	Provide visualization of requested data
Revision and Reference	V01; http://envirofi.server.de/servlet/is/8268/
Use Case Diagram	
Status	In Progress
Priority of accomplishment	Must have
Goal	Visualise data from different sources in a useful way
Summary	The user can request data from several sources. These data are then presented visually in a useful way, for instance on a map.
Category	User Interfaces
Actor	User, SW Component
Primary Actor (initiates)	User
Stakeholder	
Requested Information Resources	• Data store • Information Store
Preconditions	A result data set from a query is available for visualisation
Main success scenario	• Application receives a data set (from a user query or notification). • Application requests relevant additional data, like map or satalite images. • Application merges original data set with additional data and displays it to the user in a useful way.
Extensions	
Alternative paths	
Post conditions	User can view the requested data.
Non-functional requirements	
Validation statement	
Notes	
Author and date	HvdS-IOSB, 2011-11-24

Maps to Requirement	• WP5-SE-MED-7 - Connector - WMS • WP5-SE-GEO-5 - Environmental geo-referenced observation visualization service • WP5-SE-OGC-2 - OGC processing services • WP5-SE-GEO-11 - Environmental geo-referenced observation app

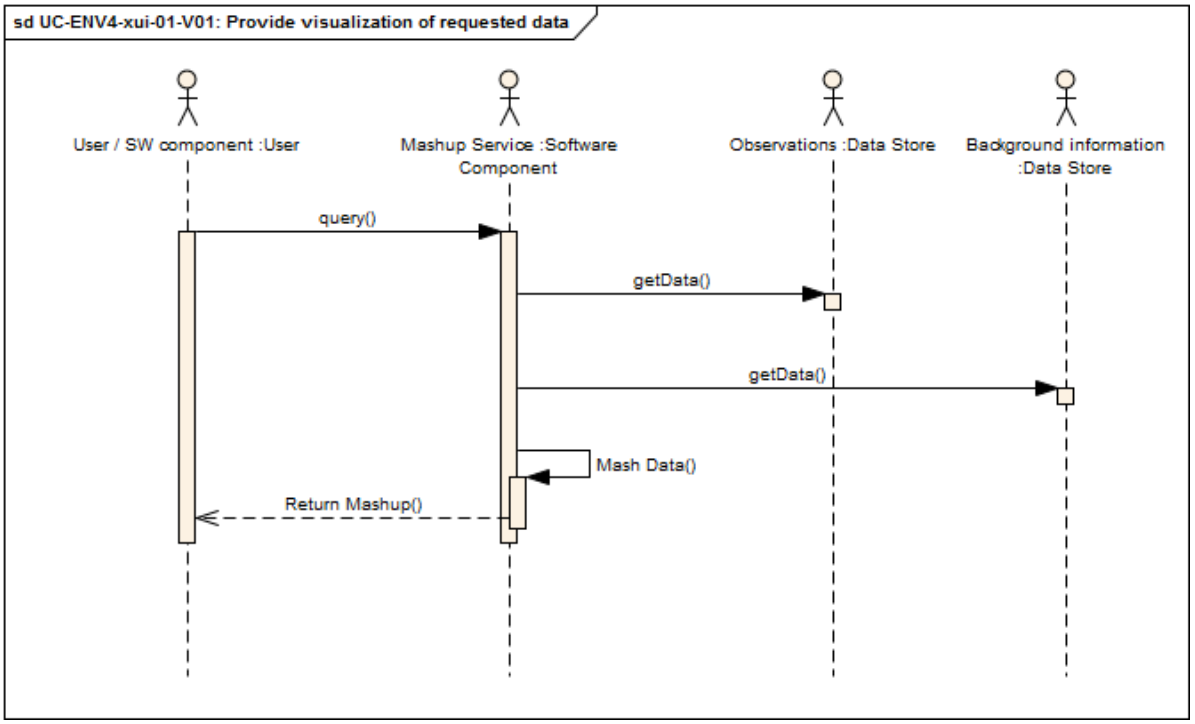

Figure 39: UC-ENV4-xui-01-V01 Provide visualization of requested data

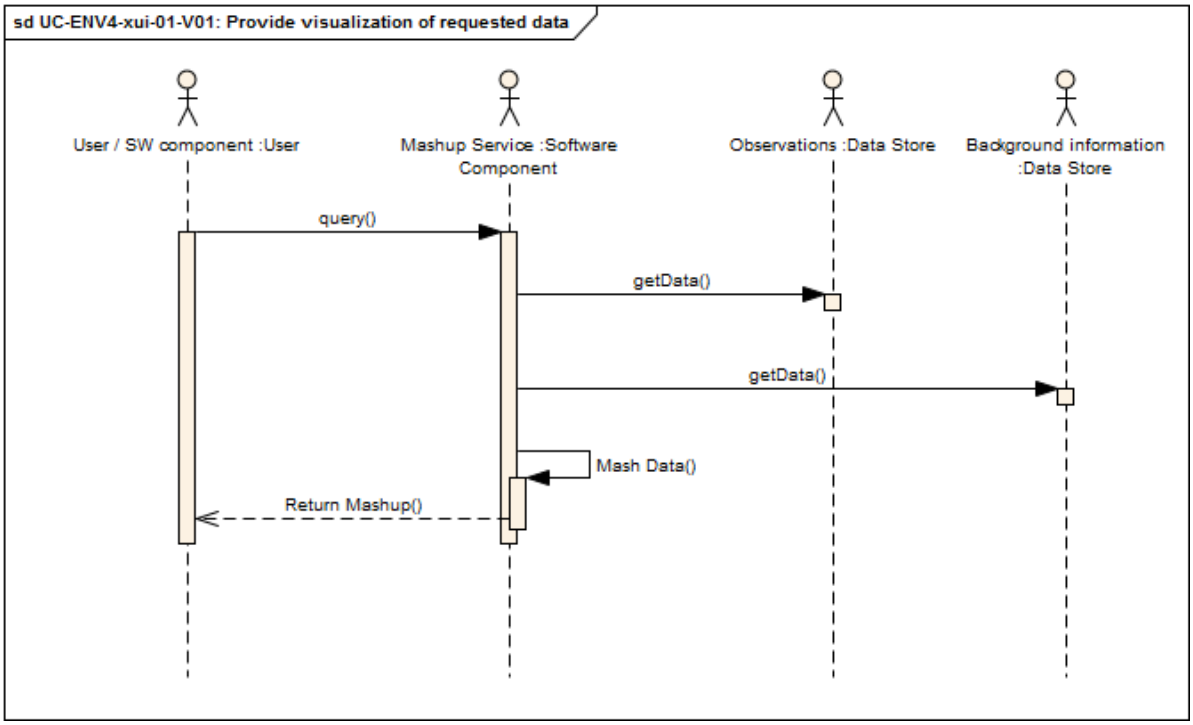

Figure 40: UC-ENV4-xui-01-V01 Provide visualization of requested data