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Abstract

The GeoViQua project aims to improve the ways in which geospatial experts can communicate user feedback about geospatial data registered in GEOSS. In a federated environment, such as GEOSS, implementing feedback is challenging because existing approaches do not apply to federated resources. This deficiency is addressed by GeoViQua's feedback model which can be implemented independently from the resources subject to user feedback. This document describes a server-based implementation of the model which is suitable support integrating user feedback across different clients, such as the GEO Portal or GEOSS community portals. It also describes a graphical user interface to provide feedback and a integration of the user feedback into the GEO label.

Acronyms and Abbreviations

AIP	Architecture Implementation Pilot
API	Application Program Interface
CSW	Catalogue Service for the Web
DAB	Discovery and Access Broker
DOI	Digital Object Identifier
EO	Earth Observation
GCI	GEOSS Common Infrastructure
GEO	Groups on Earth Observation
GEOSS	Global Earth Observations System of Systems
GVQ	An abbreviation for the GeoViQua project used in data type prefixes only.
HTML	HiperText Markup Language
HTTP	HiperText Transfer Protocol
JSON	JavaScript Object Notation
PQM	Producer metadata Quality Model
REST	REpresentational State Transfer
UQM	User feedback Quality Model
URI	Uniform Resource Identifier
URI	Uniform Resource Location
URN	Uniform Resource Name
WP	Work package
XML	eXtranable Markup Language

About this document

This document describes the requirements and technical realization of the user feedback elicitation tool developed in GeoViQua. It is intended to assess the utility of the tool and assist in related integration tasks.

The tool and the feedback model it supports are derived from requirements identified within GeoViQua WP2. The ones most relevant for the user feedback elicitation tool are included in this document.

1. Introduction

The GeoViQua project set out to improve the ways in which geospatial experts perceive, assess and judge the quality of geospatial data. In the context of GEOSS, leveraging expert user feedback is an excellent opportunity to improve data quality assessment in practice, as has been indicated to us in various user interviews conducted to collect requirements for the project. Please see GeoViQua deliverable **D2.1 User requirements document** for further reference.

Feedback about datasets was also missing from the original GEO Portal design when compared to general web trends, which see increasingly ubiquitous so-called "social" functions. The only feedback that was anticipated in this design was about the GEO Portal itself, not about the services and datasets it contains. It is just a form to give feedback about the system; that is sent directly to the GEO secretariat and not exposed to others was available. This was a motivating factor for developing such functionality in GeoViQua. To facilitate exchange of user feedback about the contents, GeoViQua has been working on three complementary subjects:

- A feedback model to support and structure focused expert communication
- A feedback server to facilitate this communication with an database, an API and a user interface
- An integration into the GEO Portal

At the same time, there were two notable developments whose impact is not yet clear:

1. A GEO decision to put more weight into community portals, and
2. a decision to integrate social functionality into the GEO Portal.

The tool described is able to support expert exchange about geospatial data. Furthermore it supports the protocol (based on the feedback model) designed to cope with diverse frontends (portals) and multiple instances of feedback servers. It has not been tested yet in such a more complex setting but is considered a good starting point.

2. The Server Component

Based on the feedback model, a feedback catalogue has been developed, which consists of a database that holds all the feedback items and a search API to find relevant items, targets (any GEOSS catalogue item such as datasets and products) for which feedback items have been created and also collections of feedback items for a certain GEOSS dataset. The implementation has been upgraded to the GeoViQua schemas of version 4.0. The relevant models and schemas can be found here:

http://schemas.geoviqua.org/GVQ/4.0/

2.1 Technology decisions

The feedback catalogue has been developed as a stand-alone tool with web access. This way the server can be integrated into the GEOSS portal, but can also be reused for other projects and, with that, promote and facilitate the use of the user quality model (the feedback model). Another advantage of creating a stand-alone tool is that it is easier to maintain, upgrade and replace. Only the API (Application Programming Interface) should be stable.

2.1.1 API technology

The interface to the server needs to be simple and easy to understand, and cover the user feedback quality model. A popular way to make servers available and easy to use is to create a REST HTTP interface using some of the RESTful principles[1]. The RESTFul API uses the GET, POST, PUT and DELETE functionality of the HTTP protocol, which can be roughly translated to retrieving, creating, updating and deleting directly on resources. A resource is an identifiable object. For the user feedback model all elements can be seen as a resource but the most important of these resources for this model are the feedback item and the user description. Buth ha clear identifiers and are connected to the metadata-identifier which is used to identify (MD_Identifier) datasets in the current GEOSS common infrastructure catalogues (e.g. The resources connected to the Discovery and Access Broker). With understandable URLs and commands, these resources can be retrieved, created, updated and deleted. It should be noted that the API defined is not fully RESTful designed for two reasons:

1. The restful principles do not fit fully with the feedback model design, e.g. the MD_Identifier resource does not always represent a dataset, however when searching, retrieving a user is often only interested in the datasets. In other words some resources a user would be interested in do not have a unique name.
2. The GEOSS portal and DAB-Q use different methodologies for searching and retrieving data (e.g. CSW requests). It must be possible to translate the requests created within the portal to requests to the feedback catalogue.

2.1.1.1 Output formats

The DAB-Q expects XML formatted feedback items or collections. The user feedback server supports this format and returns it as result of a GET request the feedback items or collections structured according to the model schemas.
Furthermore the more lightweight and easier JSON format has been implemented. This is done for posting and deletion of data but can also be used for getting data. A request for getting output in HTML format is also supported. The response of the server when getting data in HTML format is a lot easier to read for a user and can be incorporated in web pages.

[1] REST stands for Representational State Transfer. It is an architectural style suitable for defining and implementing interfaces using the HTTP protocol.

2.1.2 Backend Technology

For storage of the feedback items a relational database is used. An advantage of using a relational database is the support for complex search queries. Since the feedback data is highly relational it makes sense to use a relational database. A disadvantage is that it is more difficult to create the highly complex XML output. Especially the elements of the ISO 19115 Metadata Standard for Geographic Data elements are sometimes very complex because of the many *zero to many* relations, many interchangeable elements, extensive namespacing and extensive support for differently formatted data.

To support reformatting of the output and allow quick searches a relational database has been chosen. It is recommended when continuing using the user feedback model and improving the user feedback catalogue to investigate if this is still the best solution (see Section 2.3)

The feedback catalogue uses the Django framework with a PostgreSQL database as backend. The API framework Tastypie is used to construct a RESTful interface. Via this interface feedback items and collections can be requested and searched and feedback items can be posted. A picture of the architecture can be found in Figure 1: .

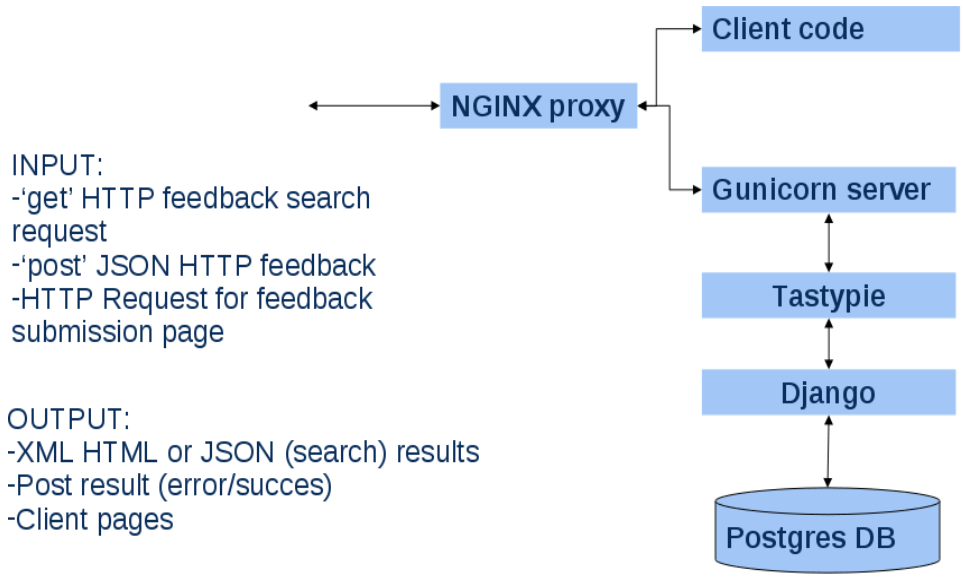


Figure 1: Server architecture

2.1.3 Server Software packages

The following software packages have been selected to support the feedback catalogue:

Django
Django is a high-level Python Web framework that can be used under BSD license. It is used by large sites such as Instagram and Mozilla and enables the developer to create his data model entirely in Python. It comes with a database independent database-access API, therefore supporting switching of database type.

Tastypie

Tastypie is a web service API framework for Django. It provides a convenient and highly customizable, abstraction for creating REST-style interfaces. Since posting data is done with JSON format and getting/searching for data with XML, Tastypie has been chosen as layer API layer on top of the Django model.

PostgreSQL
PostgreSQL is a powerful, open-source object-relational database system which can run on all major platforms. Because of its good performance characteristics and flexibility it is considered suitable for this project.

2.2 Feedback catalogue API

The feedback catalogue will be running as a web service by specifying a URI in e.g. a web browser, a request can be done. In this paragraph the queryables are defined and how they can be translated into a query request URI.

2.2.1 Queries based on user questions

To help defining the search query interface for the GeoViQua broker and indirectly the feedback catalogue, user questions have been defined from which 'queryables' could be deduced. The following ones were relevant for the feedback catalogue.

1. Is there any user feedback (for this dataset)?
A query for the number of GVQ_FeedbackItem elements

2. What's the average/median user rating for the dataset?
A query for aggregation of any integer values of GVQ_Rating_score element for a certain dataset.

3. What is in the user feedback (for this dataset)?
A query for:
Count of GVQ_Rating
Count of GVQ_UserComment
Count of GVQ_UsageReport
Count of GVQ_DiscoveredIssue
Count of GVQ_Publication
A useful response from this query would be a list of any of the names of elements that are present (>0), and ideally a count of the elements.

4. What are the individual user ratings and associated comments?
A query for feedback items which contain a GVQ_Rating with a score and justification.

5. Show me the mean/median dataset rating resulting from usage by hydrologists.
A query to find feedback items whose GVQ_ReportAspectCode is 'Usage' and whose GVQ_UserInformation>applicationDomain is a urn mapping to concepts related

to 'hydrology'.
The ratings in those records should be aggregated and returned.

2.2.2 Interface definition

Based on the user questions and requirements induced by the interface with the GeoViQua broker the following API has been developed for the server.

2.2.2.1 Get a resource

A "G resource" URI can be constructed in the following way:
server_name/api/v1/feedback/resource_name/<:id>/?format=xml
Usually a feedback item will be requested, resulting in the following URI for the GeoViQua test server:

https://geoviqua.stcorp.nl/api/v1/feedback/items/1/?format=xml

2.2.2.2 Search for a feedback item

The basic URI can be constructed in the following way:

<:server-location>/api/v1/feedback/items/search?format=xml

This will return all items in the database inside a feedback collection. The formats supported are JSON, XML and HTML

Because it will usually be unnecessary to get all details of all items, the following parameters can be added.

- view: Limits the details of each item in the collection. When not specified only the URI's to the items are returned and aggregated information such as average rating and the number of items found. Options are brief, summary and full.
  - brief: The brief response consists of the meta-info, aggregated info and a list of references to the items.
  - summary: Only some fields are returned and a reference to get the full item
  - full: complete feedback items are returned.
- limit: The maximum amount of items returned.
- offset: The offset of the items returned. Is used in combination with the limit.

Besides these general parameters, some parameters can be added to create a search query. These are grouped in the following table.

Search Parameters	Values	Relation to Feedback Model	Usage Description
target_code	<string>	//gvq:primaryTarget/gvq:resource/update	Used to look

Search Parameters	Values	Relation to Feedback Model	Usage Description
		d19115:MD_Identifier/gmd:code	for feedback related to a certain dataset.
target_codespace	<string>	//gvq:primaryTarget/gvq:resource/updated19115:MD_Identifier/gmd:codespace	
rating	1,2,3,4,5	//gvq:rating/gvq:score	Used to identify feedback with ratings of a certain value, or within a range.
report_aspect	usage, alternatives, fittnesforpurpose, problem	//gvq:usage/gvq:reportAspect/gvq:GVQ_ReportAspectCode	Look for a usage report of the specified type
feedback_domain	<string>	//gvq:userFeedback/gvq:item/gvq:domainURN	Look for feedback in a certain domain
user_domain	<string>	//gvq:userFeedback/gvq:item/gvq:user/gvq:applicationDomain	Look for feedback provided by a user who is working in a certain domain.
user_role	CommercialDataProducer? , ResearchEndUser? , NonResearchEndUser? , ScientificDataProducer?	//gvq:userFeedback/gvq:item/gvq:userRoleCode	Search feedback items given by a user with a certain role.
expertise_level	1,2,3,4,5		

Search Parameters	Values	Relation to Feedback Model	Usage Description
fields	comment, rating, citation, quality_override, domain_urn, reply_to, external_feedback, tags, usage	//gvq:userComment, gvq:usage, gvq:rating, gvq:citation, gvq:qualityOverride, gvq:domainURN, gvq:reply_to, gvq:externalFeedback, gvq:tags	Search for feedback of a certain type
q	<string>	//gvq:tags,gvq:subject, gvq:userComment, gvq:citation/title, gvq:domainURN, gvq:rating/justification, gvq:citation/gvq:publication/gvq:doi, gvq:usage/gvq:usageDescription	Looks for the specified text in the different items. Only relevant text fields are searched.

The different parameters can be combined in a URL via AND (e.g. rating=3&q=good) If you want to specify multiple parameters of the same type, you can do that by adding a comma-separated list of values, up to five values. When searching an 'OR' type filter expression is executed. An exception is for the 'q' parameter. This one is separated by '+' sign and will be executed as an 'AND' type filter expression.

Other parameters	Values	Usage Description
offset	<int> (default = 0)	Defines the offset for pagination
limit	<int> (default = 20)	The maximum amount of results that will be returned.
format	xml, json, html	The format of the response
view	full, summary, brief (default = brief)	The size of the response.

2.2.2.3 Search for targets

A second search option is the search for datasets for which feedback items have been posted. It is assumed that the user is interested in knowing which datasets have been addressed as a primary target identifier in feedback items.
The basic URL for this is:
https://geoviqua.stcorp.nl/api/v1/feedback/primary_target_ids/search?format=xml
The set of key value parameters is almost the same as for the search for items. The specification of the target_code and target_codespace is not useful for this query.
Parameters especially designed for this URL are:

Search Parameters	Values	Relation to Feedback Model	Usage Description
minimum_average_rating	<double>		For the datasets found the average rating is calculated. Only datasets with an average rating, larger than the specified value are returned
minimum_total_count	<integer>		For the datasets found the amount of comments is calculated. Only datasets with the minimum amount of items as specified are returned.

For the datasets found the amount of comments is calculated. Only datasets with the minimum amount of items as specified are returned.

2.2.2.4 Search for a feedback collection

After some experimenting with the feedback server, it was discovered that the request for items was not sufficient. Since it should be impossible to request all items in the database, pagination of the items is needed. This means that the items will be returned in batches of 20, or as specified by the limit parameter. However, to be able to construct a GEO label, there is a need for summary information on all items of a certain dataset. This summary information has been incorporated in the 4.0.0 schema of the UQM. Because a collection is always related to a certain dataset, the summary could not be added as part of the query for items. A new URI has been designed for this:

/api/v1/feedback/collections/search?format=xml&target_code=xxx&target_codespace=xxxx

Required Search Parameters	Values	Relation to Feedback Model	Usage Description
target_code	<string>	//gvq:primaryTarget/gvq:resource/ updated19115:MD_Identifier/gmd:code	Identification of a certain

Required Search Parameters	Values	Relation to Feedback Model	Usage Description
			dataset.
target_codespace	<string>	//gvq:primaryTarget/gvq:resource/ updated19115:MD_Identifier/gmd:codespace	Identification of the location of a certain dataset

2.2.2.5 Posting data

Posting of data is done in JSON format. The JSON format resembles the XML format. Attributes and namespaces are however ignored. To find an example of how to encode the JSON file, one can perform a GET request.

2.3 Planned Improvements

The following topics are improvements that are planned to be done by the end of the project.

Authorization/ Authentication

Currently the feedback server holds the user administration. Depending on the decisions of how user administration will be done in the GEO portal, a login – sign up page can be developed. In fact GEO is investigating in the possibility to have a single sign-on procedure and in that case, a sign up mechanism could be delegated to other facilities. Sign up mechanism is only relevant for the posting of data. Getting data is possible without logging on to the server. Feedback posted via the user feedback submit client, is grouped as if posted by one user.

When the user administration is designed and developed a relation between the users logged on and the user as indicated in the quality model needs to be created.

Performance

No performance tests have been done. Since it is possible to request feedback collections which can be quite large, it is advisable to do some tests. However it is noted that instead of requesting very large xml output, it would be better if each client making requests only requests the necessary information/ fields. The client implementations on the project will respect that rule.

Distribution

Since the system is developed on top of open source resources and the S&T can also be released as open source, it is intended to create an open source package for both server and client.

Updating of information

Currently, only posting and getting of data is supported, but not updating. When it has been decided how users can authorize themselves, it will be possible to improvement that a user can update e.g. his user information and update some of his earlier posts.

Posting data in XML format
For a newer version, XML should be supported as input format. This will make the tool easier to integrate by other clients and less dependent on the current client.

2.4 Recommendations for future development

In this section some recommendations are done for future development e.g. for the 6th phase of the GEOSS Architecture Implementation Pilot (AIP6)

Change API layer
The data model used seemed to be too complex to handle with the Tastypie library. For an updated version of the server it should be investigated if it is better to replace this library.

Non-relational database
As indicated in a previous section, a relational database was chosen because the data itself is highly relational and this would make it easier to support complex queries. Because of the difficulties related to creation of the ISO XML elements based on data in database tables it should be (re)-investigated if it would be easier to switch to a non-relational database. This would lead to a large redesign of the feedback server.

Authorization/Authentication
Currently the feedback server has its own user administration but users who submit feedback via the GEO portal would prefer to have a single sign on system. In a future GEO portal users might already have been logged on to be able to use some of the functionality and it would be annoying if they have to log in again. Currently, it is not clear in what way and if user authentication will be a part of portal functionality but some investigations are done in AIP6. A likely way is that the OpenID standard will be used. With OpenID users can create an account at one of the mass marked identity providers (e.g. Google, Yahoo. PayPal) and use it for signing on a website which accepts OpenID authentication. This seems a good and generally accepted way to do user authentication.

3. The User Interface

It has become a quite common concept to request a consumer for feedback on the things he has bought or used. Most of these requests involve a subject, rating and a justification of this rating. The feedback model developed for GEOSS has them and much more metadata options. This has implications for the design of the user interface, since it should be possible to add more complex data.

3.1 Feedback submit client

3.1.1 Technology

Since it should possible to integrate the feedback client into the current and future portal, the chosen approach is to keep the client as simple as possible and independent of the server. This can be done by writing HTML pages, which only use Javascript and do not require any server information, besides of course the path to POST to.

3.1.2 User Interface Design

The GEOSS user community is assumed to consist of researchers who are used to complex data, but also of users who are looking to find a dataset on which they can do a simple analysis and use the results e.g. for showing on a map on a tablet or phone application. When a researcher has worked extensively with a dataset he might want to be able to provide another researcher with information such as references and detailed information on a certain region. Since the dataset is of importance to him, he will probably take some time to provide his/her feedback. Someone who uses the dataset as-is might just be able to quickly provide a rating with justification and perhaps to add some comments and tags. To be able to satisfy both user groups several design concepts have been used.

Wizard-style input

A user without much time will only use the first page and see a simple form without a request for details. A user that wants to add more details can go to the other tabs and fill everything in as desired.

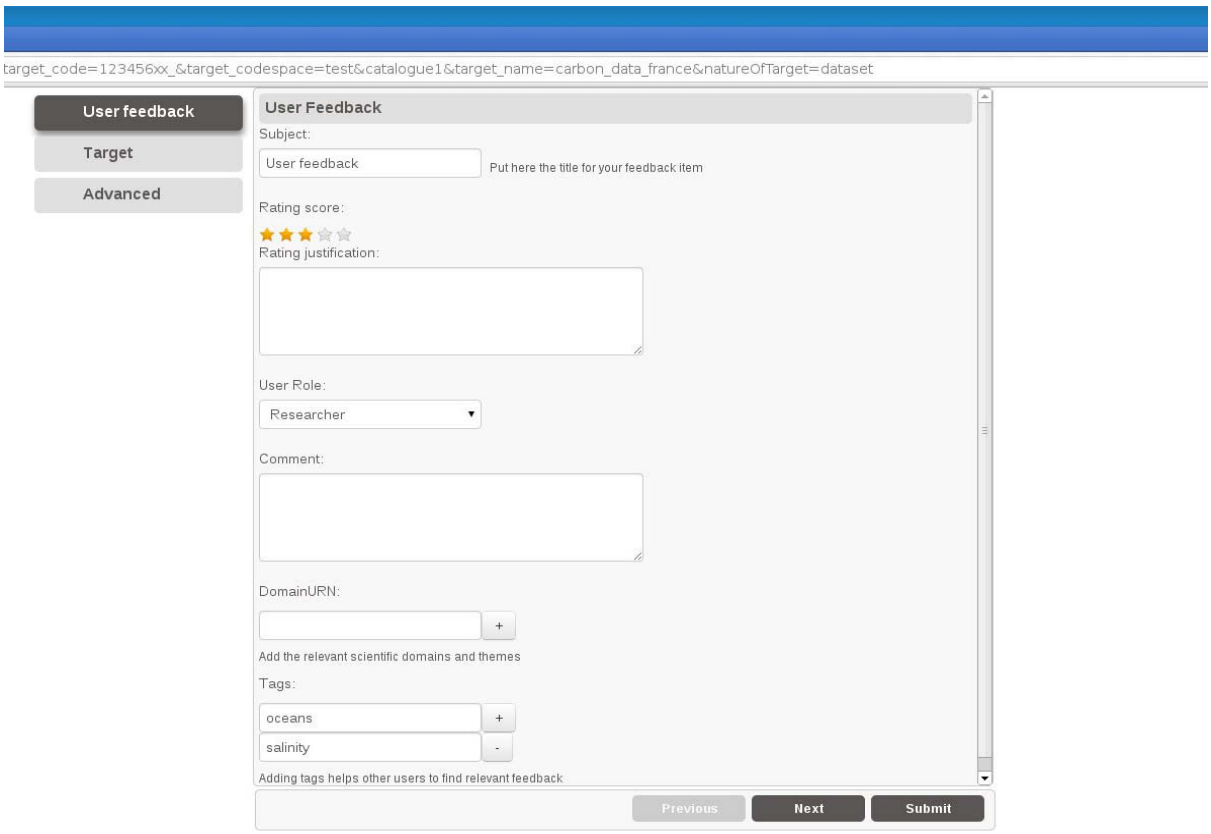


Figure 2 User feedback submit client home page

‘Add more’ button for elements

Many fields in the GeoViQua User Quality model can consist of 0 to many items. To support this, “Add” buttons are used. In this way a user can specify as many of the elements as he/she wants, but is not bothered by all the form fields if he/she is not interested in filling them in.

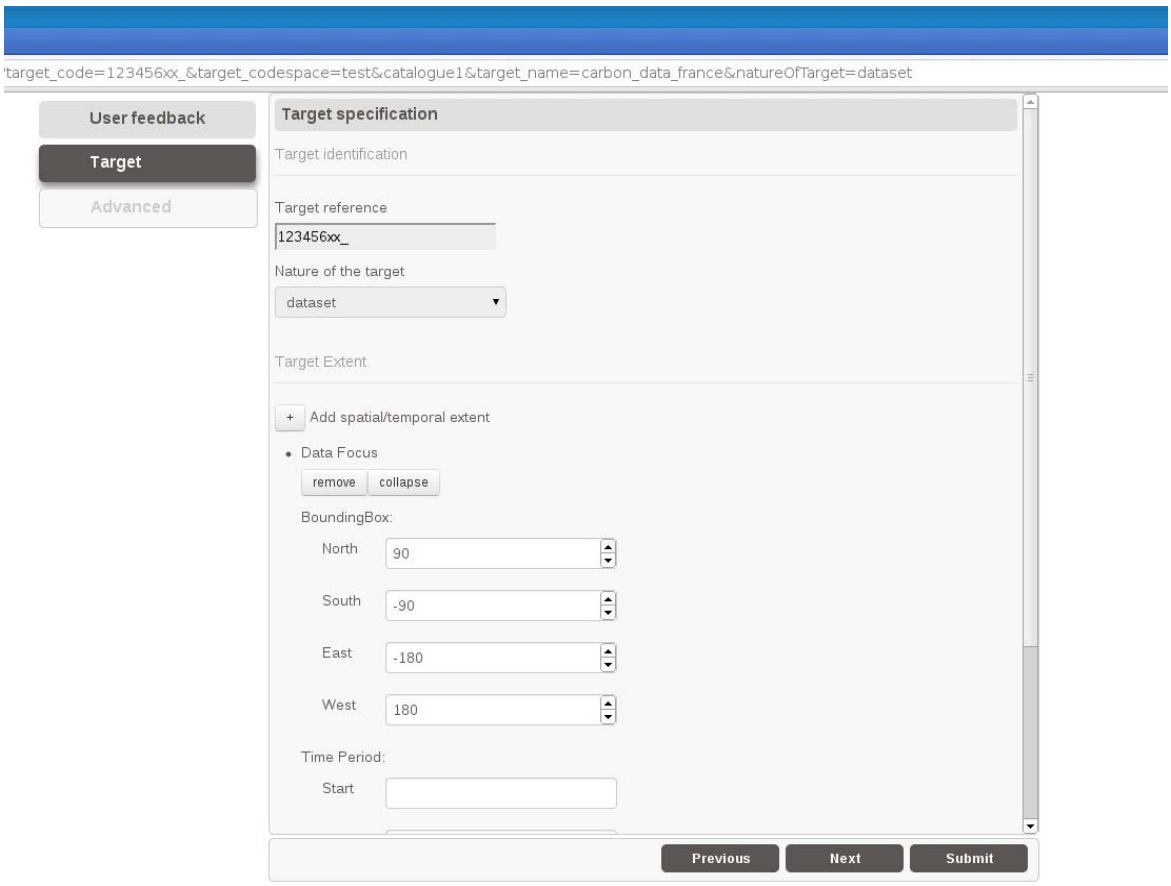


Figure 3: User feedback "add more" elements

Collapsible elements

Some GeoViQua data quality elements such as GVQ_Publication and GVQ_DiscoveredIssue contain many fields to be filled in. These fields can take up a lot of screen space, which reduces the sense of overview the user has. One solution to this problem is enabling pop-up windows for every element that open upon clicking. However users often do not like to click a lot and could get confused by nested popups. Therefore it has been decided to make such elements collapsible. The user can always reopen the element and check the content and can clearly view the relations between the nested elements.

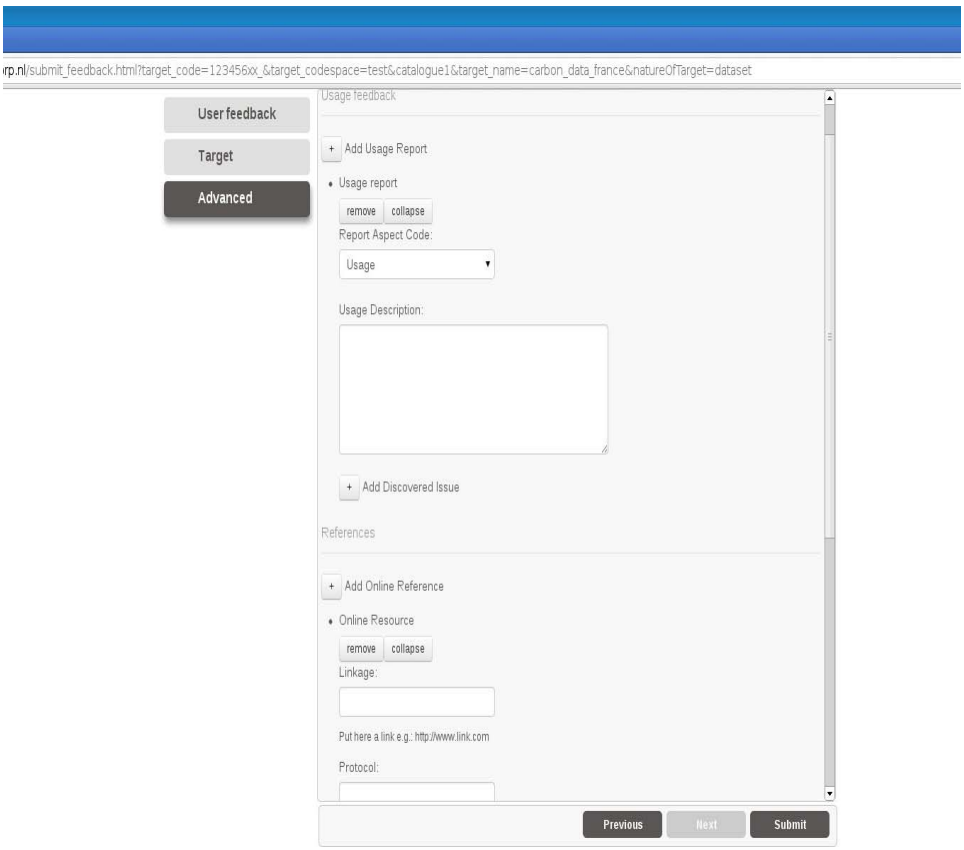


Figure 4: User feedback collapsible elements

3.1.3 URL Design

It is expected that feedback is always given on an identifiable dataset. When harvesting and checking the dataset catalogues it has been decided that a dataset will always contain an MD_Identifier with a target_code and a target_codespace filled in. The target_code will identify the data, the codespace will identify the catalogue or site where the data has been found. It is expected that these parameters are provided as part of the URL. The natureOfTarget, which is related to the type of the feedback target (e.g. dataset, series, metadataDocument, software) is an optional parameter. There is no check within the user feedback catalogue for existence of the dataset. A user can change the target_code and target_codespace to some non-existing dataset, provide comments on this and it will be stored in the database.

The URL to find the user feedback page of the currently running server is:
https://geoviqua.stcorp.nl/submit_feedback.html?target_code=123456xx_&target_codespace=test&catalogue1&target_name=carbon_data_france&natureOfTarget=dataset

The target_code and target_codespace can have comma-separated values to support multiple primary targets.

3.1.4 Future development

It is noted that the current feedback client does not support all elements and functionality present in the model. One of the important steps to take is the adding of login functionality and the creation of a user page. This is closely related to developments within AIP6.

The possibility of specifying feedback about more than one dataset at the same time (e.g. feedback about the comparison of 2 datasets) has been identified. The URL design will be extended to support this capability during the project timeframe.

3.2 Browser search client page

To support searching for feedback without using the GeoViQua broker, a search page has been developed. It does not support all possible queries of the API but a selection of the most important ones in the free text field. The input will be handled as an 'any text' request leading to searching for the parameters in the feedback item fields as described in section 2.2.1

The public URL is:
https://geoviqua.stcorp.nl/search.html

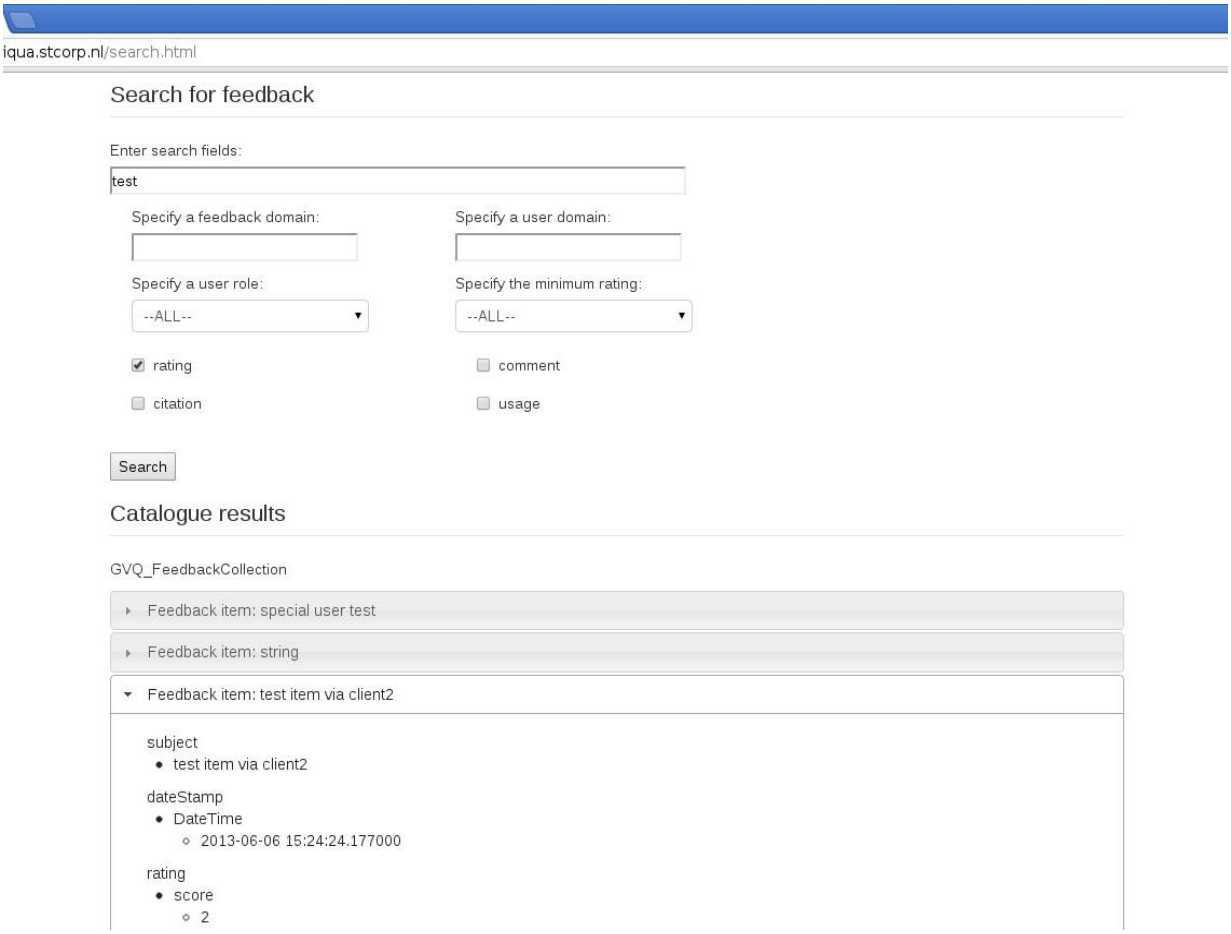


Figure 5: User feedback search interface

3.2.1 Future development

The search page is a simple demonstration of an HTML search client that can be developed. By filling in or checking some boxes the summaries of requested feedback items can be found. If the page is considered useful for the GEOSS system, it can be developed further.

A drawback of the current design is that the checkboxes would be better represented by exclusive radiobuttons. The API does not allow to specify 'AND' type of queries, but 'OR' type. When checking the 'rating' and 'comment' box the following query is performed:

"Show me the summaries of all the feedback items which contain a rating OR a comment."

A second improvement could be that one can directly click on a feedback item reference to get the full results instead of the summary.

It is foreseen that the Discovery and Access Broker will be also able to query both the producer metadata records but also the user feedback database. The GEO portal will then be able to query the user feedback database directly.

3.3 User feedback in the GEO label representation

The GEO label visually summarises and allows interrogation of key informational aspects of geospatial dataset records upon which users rely when selecting datasets for use. It comprises eight informational aspects, three of which convey availability of information recorded in the GeoViQua feedback metadata documents (see Figure 2).

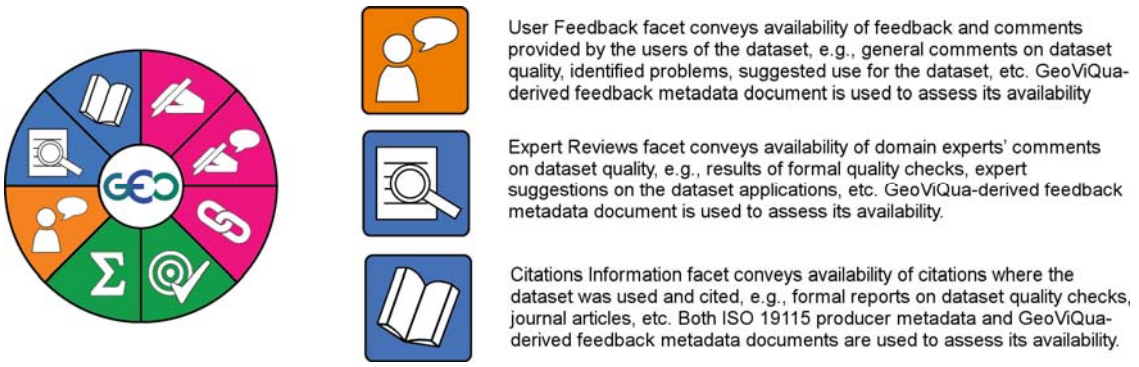


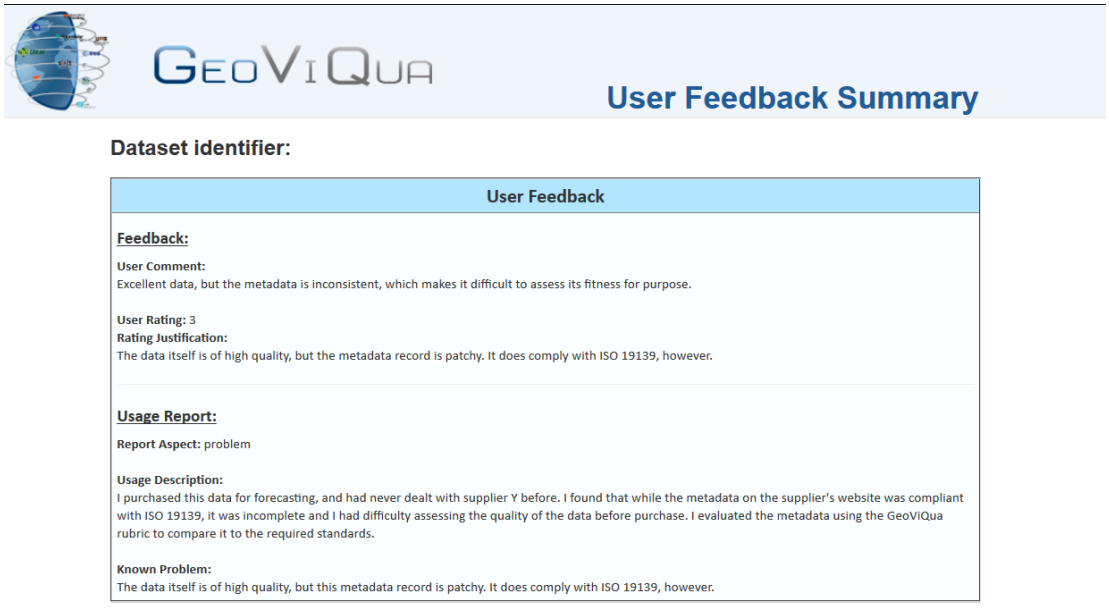
Figure 6: GEO label facets that convey availability of information recorded in GeoViQua feedback metadata documents.

User feedback facet conveys availability of feedback supplied by users with expertise level 1, 2, or 3. Expert review facet conveys availability of feedback supplied by users with expertise level 4 or 5. Citations information facet conveys availability of citations where the dataset was cited and used; both producer and feedback documents are used to assess availability of citations information. Feedback summary (version 4.0 schema of the UQM) is used to evaluate availability of user feedback, expert reviews and citations information.

The GEO label not only visually summarises information availability but also provides hover-over (for summary information) and drilldown functionalities. Hovering over an individual facet in the GEO label displays a summary of the information related to the facet for the associated dataset. On hover over, user feedback and expert reviews facets display information on total number of feedbacks, average rating and total number of ratings, and citations information facet displays the total number of citations associated with the dataset (see Figure 3). Again, feedback summary is used to calculate hover over metrics.

Figure 7: GEO label hover over functionality.

The drilldown function of the GEO label displays styled structured information extracted from the associated dataset's metadata record when a facet is clicked. Collections of feedback items retrieved from the GeoViQua feedback service are used to display detailed information on user feedback, expert reviews and citations available for the dataset that the GEO label represents. On clicking a feedback-associated GEO label facet, feedback metadata record is requested from the feedback service, stylesheets are applied to the retrieved feedback document and styled structured information is displayed to user (see Figure 4).



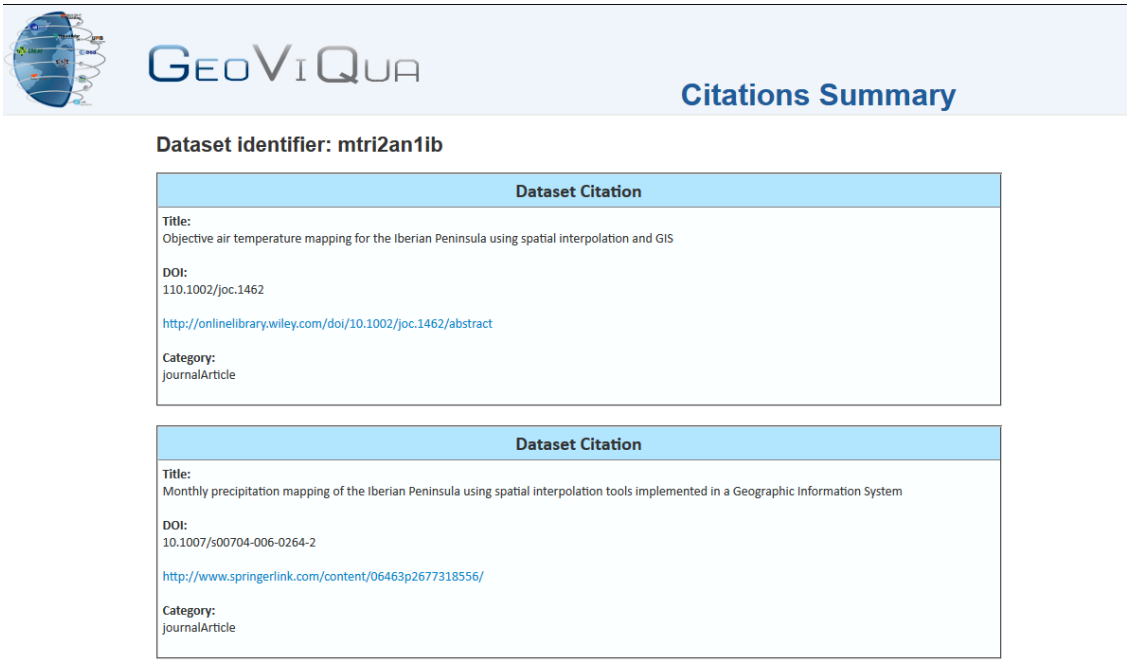


Figure 8: User feedback and citations information drilldown pages.

Feedback-associated information is a vital part of the GEO label representation. It can assists geospatial data users in more informed data quality evaluation and datasets intercomparison.

3.3.1 Future development

The GEO label service will be integrated in the GEO portal mirror. The user feedback pages of the drilldown approach of the GEO label can link to the user feedback submit client page. The GEO label final design will be presented to the GEO community in the GEO X Plenary and summit ministerial and hopefully accepted as the adopted design.

4. Summary

We presented a server-based solution to the problem of storing expert feedback about federated geospatial data, such as the one that GEOSS maintains for the benefit of its users. The server is being deployed and tested on a limited scale, but the potential for a vendor-independent large-scale deployment of expert feedback services is provided and will receive further backing from the demonstrations that will be carried out as part of the project what will improve the final implementation. Current technology is demonstrated in the following aspects: capability to show user feedback and provided metadata back to back in the GEO portal, capability to provide feedback while discovering or re-discovering data in the GEO portal, search for user feedback items and GEO label integration.

The current user interface already contains provisions for coping with the diversity of users that is to be expected in a larger deployment. It is implemented using state-of-the-art web technologies and is amenable to styling according to the needs of different communities including the ones that only want to rate how useful the data was for them and the ones that are ready to provide detailed expert reviews and formal metadata. User interfaces and performance are both issues that iterative development is typically good at tackling, so we

have reason to believe that the implementation can be extended to meet the needs of upcoming GEOSS developments.

The implementation was done keeping in mind the general GEOSS Common Architecture requirements such as the capability to generate feedback on items coming from different catalogues form different providers and a future possible single sign-on system that GEOSS is studying.

Appendix A: Requirements

The requirements discussed in this section have been identified within GeoViQua to apply to the problem domain of expert user feedback. They have been derived from guided user interviews and public sources; the details are described in the project's WP2 deliverables.

These requirements, together with technological and policy constrains present in the GCI, are the main influence on the design of the tools presented here.

Key; Summary	Description
163; Consumer metadata (feedback) shall include a list of metadata records	User generated feedback, or "peer review", at any level, may it be with our without registration, by specialists in a public or blind peer review process, can be aided by providing specific fields of information that users are particularly interested in, such as * inter-comparison, i.e. comparable datasets and respective studies/publications * citations, i.e. publications based on/using a dataset * fitness of purpose for a particular analysis (possibly as a free text) * problems of a dataset These fields must be resolvable links or unique identifiers where possible, for example in the case of other datasets or publications (e.g. with DOI). This also allows reverse linking from the referenced dataset.
136; The quality model shall support qualitative statements of belief about the data quality	To use Qualitative statements of belief about the data quality Source: Integrating new data visualisation approaches of earth Systems into GEOSS development. Annex I - "Description of Work". B.1 Concept and objectives, progress beyond state-of-the-art, S/T methodology and work plan.
134; Combine provider-generated metadata with user-generated metadata	The user will be able to comment about a particular dataset, a collection or a service (and, crucially, about the context in which they used the data, i.e., it's fitness-for-use) in a single environment that will also integrate search and visualisation.
118; Rating of dataset	The reputation of a dataset goes a long way to allowing a dataset user to make a decision to select a dataset. Akin to Trip Advisor, the system should support dataset users in being able to rate (e.g. award a star rating) a dataset which would, in turn, allow the dataset provider to receive and respond to feedback on his/her dataset and act on that feedback.

116; Peer review of datasets to establish a community of practice	To assist in quality assessment, there should be a mechanism of peer review of some kind which allows users to indicate their assessments of datasets on the basis of likes, dislikes, frequency of use, citation, etc. This should go beyond a simple star rating but allow specific parameters such as how good the spatial coverage is, how accurate the dataset is, etc.
88; Expert reviews with value judgements about datasets	Whilst dataset archivers should not make face-value judgements about datasets, there should be scope for domain experts (for example: GEO tasks members, EO data providers and the Earth science and technology community) to record value judgements with datasets to reflect on the appropriateness of the dataset for use in their specific domain. This has been derived from user interview (see [http://twiki.geoviqua.org/twiki/bin/view/GeoViQuaIntranet/WP2_Initial_User_Interviews_Results?sortcol=table;up=#Interview_with_Wim_Hugo_SAEON_31]).
45; Peer review of datasets	Some journals aim to establish a new subject of publication: to publish data according to the conventional fashion of publishing articles, applying the established principles of quality assessment through peer-review to datasets. Users can comment on datasets and discuss their opinion with other users. This discussion can involve linking to other resources, such as publications using/about datasets. As any peer review process, this can involve certain specialists reviewers that may or may not be anonymous and that may or may not know the submitter of the dataset to be reviewed (double-blind process) source: GEOSS Citation Standard. DRAFT for Discussion by ST-09-02, Date: March 20, 2011
34; Users want to know the problems identified and highlighted about this dataset	Extracted from user interviews. The interview results can be found at http://twiki.geoviqua.org/twiki/bin/view/GeoViQuaIntranet/WP2_Initial_User_Interviews_Results
33; Users want to know the citations of dataset	Extracted from user interview. See http://twiki.geoviqua.org/twiki/bin/view/GeoViQuaIntranet/WP2_Initial_User_Interviews_Results Having this as user feedback allows researchers themselves to add their citation to the dataset - and thereby the people who have the highest interest of making a research endeavor public.

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Theme: ENV.2010.4.1.2-2
Theme title: Integrating new data visualisation approaches of earth Systems into GEOSS development