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Framework**



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1. Management summary

1.1. Purpose of this document

The requirements document represents a consolidation point in the process of the TaToo requirements analysis. It describes what TaToo shall do for the Users and it is the reference for various downstream tasks, like:

- the design of the TaToo framework architecture;
- the specifications of the services and tools offered by TaToo;
- the verification and exploitation of the TaToo results.

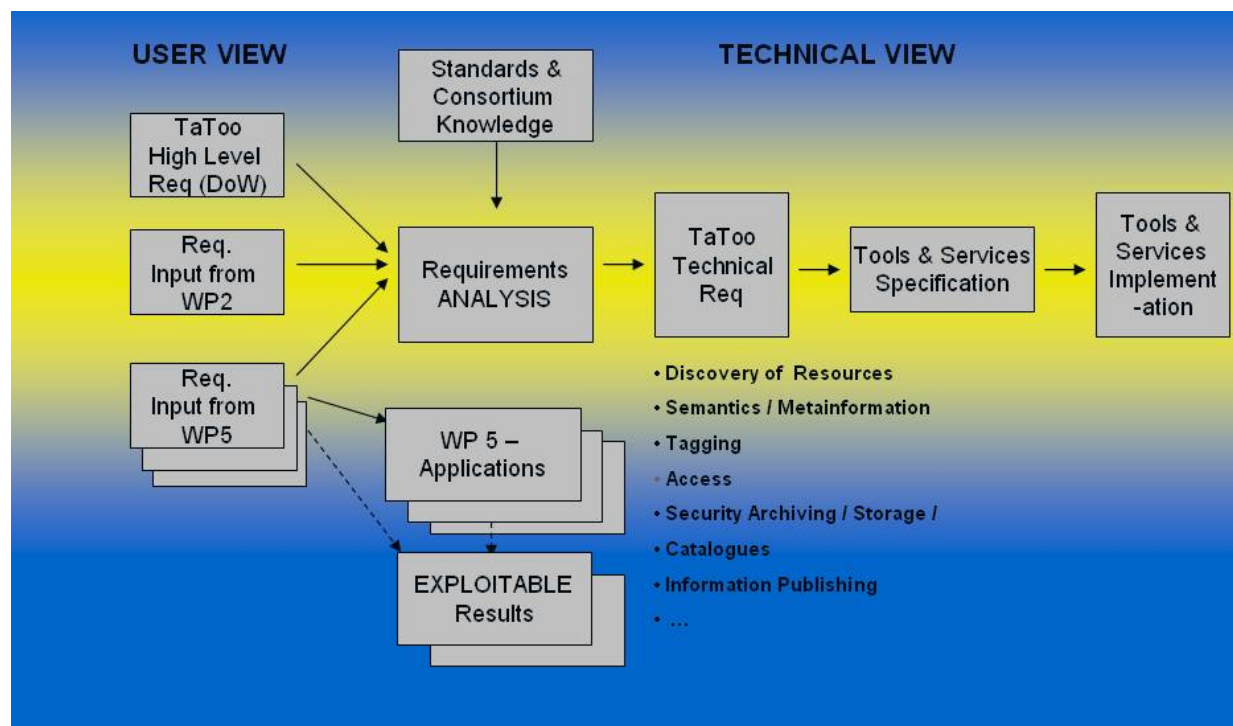


Figure 1.1: Approach to the definition of TaToo requirements

Technical requirements are the result of a consolidation process (as shown in Figure 1.1) which was subdivided into four steps, as follows.

- (1) Discerning analysis of the applications oriented requirements documented during the process of deliverables preparation of WP 5 (Validation Scenarios), in order to identify the potential link with the technologies to be used in the project.
- (2) Analysis of the user needs and translation into **relevant** technical requirements.
- (3) Analysis of other useful sources of complementary requirements derived from: the knowledge and experience of the TaToo team, other FP7 projects, standardization bodies,

and user communities.

- (4) Addressing high level project requirements as described in the DoW as TaToo measurable objectives.
- (5) Classification and formal documentation into the deliverable D2.3.3 Requirements Document (this document) describing the scope (function), the realisation time (for example implementation in version 1) as well as the trace-back to the origin of the requirement.
- (6) Discovery of new requirements from Validation Scenarios by analysing the needs of the applications implemented by Validation Scenario partners.

This Requirements Document serves as the reference for the preparation of the Architectural Design and Specifications of Tools and Services. This document is the last version in a cycle of three iterations, where the requirements document has been improved step-by-step during the first two years of the project.

1.2. Intended audience

The target readers are Workpackages and Tasks Leaders of TaToo. In particular this document provides input to partners working in WP3 and on the TaToo Framework Architecture and Service Specification. Feedback is supposed to be provided by all of them in order to achieve the Architecture Specification in WP3. This feedback process will happen through successive and iterative cycles.

1.3. Validation Scenario 1 – Climate Twins

The Climate Twins application is based on the idea that the future climate of a specific region can be derived from the present climate in other regions (Kaufmann and Peters-Anders, 2011). Climate modelling allows projections of climate change at a global but also at lower spatial levels. These simulations show that climate conditions, which are currently typical for particular regions, will eventually shift towards other latitudes. This means that the future climate conditions in a particular region can be expected to be similar to those prevalent in other regions at present. Finding such comparable regions is the goal of Climate Twins. Basically, this is done by comparing simulation data of climate parameters like temperature and precipitation in the future with present climate data. Those regions where future and present climate parameters are similar are then called "climate twin regions".

1.4. Validation Scenario 2 – Agro-Environmental Management

JRC and cooperating institutions make available to third parties data and software relevant to the agro-environmental domain (Gentilini et. al., 2011). Such resources are currently partially available either via free download or via an agreement of use between JRC and third parties. Access is provided via FTP to download data, in general in the form of comma-separated values extracted from the database and as archive files containing software components. Software

components are provided for download from dedicated web pages and are only available for the JRC members. There is no search functionality available to third parties in the dedicated web pages, and many resources are not even visible on the Web. Users, when aware of the resource (e.g. via personal contacts and publications), make a request via email to the providers.

1.5. Validation Scenario 3 – Anthropogenic impact and global climate change

The validation scenario “Anthropogenic impact and global climate change” (abbreviated “MU scenario”), led by MU and focuses on the correlation of environmental pollutants and their health impact on the population and the impact of global climate change on an atmospheric transport of environmental pollutants (Kubásek and Hřebíček, 2011). The aim is to create a central place for researchers, domain experts and decision makers to discover and access interdisciplinary knowledge in more efficient and usable way that is the currently state of the art. Due to the fact that there is an enormous amount of information resources in scientific fields, which is steadily growing, available search mechanisms like search engines, scientific networks and similar technologies are not sufficient to meet the complex requirements of today’s researchers and scientists. The results of conventional discovery processes are often not matching the domain context of the users and obligate them the tedious task of filtering large result sets to obtain the original object of the interest of the researcher intended to find with the search. Therefore the need arises for an improving discovery method, which will incorporate the domain knowledge and additional semantic information into the search in order to obtain a more fitting result for the specific context of the user.

1.6. Structure of the document

Within the first chapter of the requirements document we address the most important TaToo high-level and generic requirements driven by the project objectives.

The second part of this document lists requirements coming out of the analysis of the use cases of WP 5 and the first results of questionnaires conducted by WP 2. This leads to a set of requirements categories shown in the building blocks in the figure below. (Note: the ordering of the blocks does not have any specific meaning).

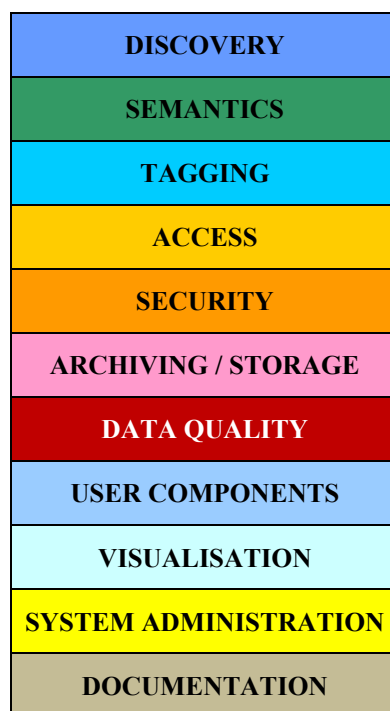


Figure 1.2: TaToo technical requirements categories (functional building blocks)

1.7. Requirement table usage

How to read and use the requirements table!

ID	Unique categorisation of the requirements in the form of TR.CATEGORY.NNN, where TR means Technical Requirement; CATEGORY denotes the major requirement categories and NNN is a unique number within each TR category
Name	Short name for the technical requirement
Scope	Description of the scope and constraints of this requirement.
Optional	If something might be used instead of above or as a substitute.
Trace	This field lists the IDs of the User Requirements (listed in WP5 and WP2 Deliverables) which relate to this Technical Requirement. Note: this field may be empty if the Technical Requirement has been set, for example, based on good practice, even though not explicitly mentioned in the available User Requirements.
Relevance/ Importance / Priority	H-M-L (i.e. high – medium – low)
Validation	Description of how and where the requirement is planned to be validated. The proof of fulfilment can be reached based on the evaluation report from WP5.

Table 1.1: Requirements table usage

1.8. References to user requirements

For better traceability of requirements this chapter provides an overview on the expressed user requirements that are referenced by the trace row in tables describing requirements.

1.8.1 Needs & Gaps Analysis – V1

The following short cuts are used: Sn for Scenario n expressed in the user questionnaires Wn for Workflow n described in the same user questionnaire.

ID	Name	Partner
S1	ClimateTwins	AIT

S1W1	Discovery of ClimateTwins tool and data	
S1W2	Tagging of ClimateTwins tool and data	
S1W3	Find additional information on a particular climate twin region	
S1W4	Add additional information on a particular climate twin region	
S1W5	TaToo User Documentation	
S2	Agro-environmental management	JRC
S2W1	Resources tagging	
S2W2	Resources discovery	
S2W3	Resources evaluation	MU
S3.1	Find, validate and qualify of epidemiology data sources (cancer registry)	
S3.1W1	Discovery of compliant data sources	
S3.1W2	Checking the validity of the data source	
S3.1W3	Harvesting of epidemiology data sources	
S3.2	Find, validate and qualify of POPs data source	
S3.2W1	Discovery of compliant data sources	
S3.2W2	Checking the validity of the data source	
S3.2W3	Harvesting of POPs data sources	
S3.3	Find relationships between discovered data sources	
S3.3W1	Managing a relationship ontology	
S3.3W2	Discover and compare data sources	

Table 1.2: Requirements from Needs & Gaps analysis V1

1.8.2 Needs & Gaps Analysis – V2

The following short cuts are used for users' requirements collected from a public online survey carried out in the Needs & Gaps Analysis task of the project, whereby n is a 2 digit decimal integer which is unique within each category.

ID	Name	Description of the requirements category
RTn	Resource Types	Resource types to consider according to interviewed users.
RT01	Geospatial Data	
RT02	Structured Raw Data	
RT03	Processed Data	
RT04	Highly Aggregated Data	
RT05	Software and Models	
RT06	Legal Documents	
RT07	Knowledge Formalizations	
EDn	Environmental Domains	Environmental domains that were mentioned by the interviewed users.
ED01	Environmental Domains	
RDn	Resource Discovery	Requirements related to the resource discovery in general and to overcome common resource discovery problems.
RD01	User-friendly Semantic Search	
RD02	Environmental Catalogues	
RD03	Online Databases and Indexes	
RD04	Community Building	
RD05	OGC Services	
RD06	Web Services	
RD07	Websites	
RD08	Avoid Over Inclusion	
RD09	Avoid Under Inclusion	
RD10	Enhanced Expressiveness	
RD11	Query Syntax	

ID	Name	Description of the requirements category
RD12	Navigation	
RD13	Iterative Search Refinement	
RD14	Resource Type Discovery	
RD15	Context Dependent Discovery	
RD16	Geospatial and Time related Search	
RD17	Multilingual Search	
RD18	Similarity Discovery	
RD19	Resource Usage	
RAn	Resource Access	Requirements related to facilitate the access to and usage of discovered resources.
RA01	Resource Meta-Information	
RA02	Quality Meta-Information	
RA03	Access Meta-Information	
RA04	Public Resources	
RA05	Online Resources	
TRn	Tagging of Resources	Requirements related to the tagging of resources.
TR01	Open Tagging	
TR02	Closed Tagging	
TR03	Public Tags	
TR04	Editing of Tags	
TR05	Public Tag Ownership	
TR06	Tagging of Tags	
TR07	Proposing new Tags	
UIn	User Interaction	Requirements related to the perceived interaction methods with the TaToo system.
UI01	TaToo Web Portal	
UI02	Services Access	
UI03	TaToo API	
UI04	Browser Plug-in	

ID	Name	Description of the requirements category
UI05	OGC Services	
UI06	Register new Domain Ontologies	
UI07	Register new Resources	
UI08	Meta-Information extraction	

Table 1.3: Requirements from Needs & Gaps analysis V2

1.8.3 Analysis of WP5 Scenario Definitions Deliverables

The following abbreviations are used: *VDS_n* for Validation Scenario – Case *n*; *UC_n* for Use Case *n* and *CT_n* for Custom Tool *n*.

ID	Name	Partner
VDS1	Climate Change Twin Regions – Discovery Platform ("Climate Twins")	AIT
UC1.1	Discovery of climate twins	
UC1.2	Tagging of Climate Twins	
UC1.3	Find additional information on a particular Climate Twin region	
UC1.4	Add additional information on a particular Climate Twin region	
VDS2	Agro-environmental management	JRC
UC2.1	Building a new resource metadata schema	
UC2.2	Building a new resource description	
UC2.3	Searching a resource	
UC2.4	Accessing resources evaluated via TaToo tags	
UC2.5	On searching the web highlight TaToo tagged resources	
UC2.6	On the Resource Evaluation Viewer, enter evaluation	
UC2.7	On the Resource Evaluation Viewer, view further information	
CT2.1	Resource Metadata Builder / Software Tools / Section 5.1	
CT2.2	Resource Model Explorer / Software Tools / Section 5.2	
CT2.3	Resource Evaluation Viewer / Software Tools / Section 5.3	
VDS3	Anthropogenic impact and the influence of global climate change	MU

UC3.1	Discover resources with existing tools
UC3.2	Generic discovery
UC3.3	Persistent Organic Pollutant Resource Discovery
UC3.4	Oncological resource discovery
UC3.5	Define discovered resource uncertainty
UC3.6	Compare discovered resources
UC3.7	Find similar resources
UC3.8	Find related resources

Table 1.4: Requirements from Validation Scenarios Analysis

2. Abbreviations and acronyms

ABAC	Attribute Based Access Control
ANNIE	A Nearly-New Information Extraction system
API	Application Program Interface
BB	Building Block
CRUD	Create, read, update and delete
CT	Custom Tool (related to use cases in the validation scenarios)
DO	Domain Ontology
DoW	Description of Work
ED	Environmental Domain
EPR	Endpoint Reference
GA	General Assembly
GOS	Gate Ontology Service
GUI	Graphical User Interface
HTML	HyperText Markup Language
IBAC	Identity Based Access Control
ISO	International Standardisation Organisation
JAR	Java Archive
JSON	JavaScript Object Notation
KB	Knowledge Base
KML	Keyhole Markup Language
LE	Language Engineering

LIR	Linguistic Information Repository
LR	Language Resource
MERM	Minimal Environmental Resource Model
OAC	Open Annotation Collaboration
OASIS	Organization for the Advancement of Structured Information Standards
OGC	Open Geospatial Consortium
OWL	Web Ontology Language
OWL-S	Web Ontology Language for Services
OWL-WS	Web Ontology Language for Workflows and Services
OWLIM	OWL high performance Semantic Repository
OASIS	Organization for the Advancement of Structured Information Standards
PBAC	Policy Based Access Control
PCO	Project Control Officer
PM	Person Month
PMT	Project Management Team
PMO	Project Management Officer (Co-ordinator)
PR	Processing Resource
QA	Quality Assurance
QoS	Quality of Service
RA	Resource Access
RBAC	Role Based Access Control
RD	Resource Discovery
RDF	Resource Description Framework
RDFa	Resource Description Framework – in – attributes
RFC	Request For Comments
RSS	Really Simple Syndication
RT	Resource Type
SAC	Semantic Access Control
SAIL	Storage And Inference Layer
SISE	Single Environmental Information Space in Europe for the Environment
SOA	Service Oriented Architecture
SQL	Structured Query Language
SPARQL	Query language and protocol for RDF
SVOD	System for Visualizing of Oncological Data
SDR	Service Discovery Registry
Tbd	To be defined

TR	Tagging of Resources
TSP	Time Series Processor
UC	Use Case
UI	User Interaction
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
UUID	Unique Universal Identifier
VDS	Validation Scenario
V _n	Version 1 to 3 of the TaToo realisation cycles/phases
VR	Visual Resource
WP	Workpackage
W3C	World Wide Web Consortium
WFS	Web Features Services
WMS	Web Map Services
WS	Web Service
WSMO	Web Service Modeling Ontology
XML	eXensible Markup Language

Table 2.1: Abbreviations and acronyms

2.1. Acronyms for project partners

AIT	AIT Austrian Institute of Technology GmbH
ATOS	ATOS ORIGIN SOCIEDAD ANONIMA ESPANOLA
CIS	cismet GmbH
IDSIA	SCUOLA UNIVERSITARIA PROFESSIONALE DELLA SVIZZERA ITALIANA (SUPSI)
JRC	COMMISSION OF THE EUROPEAN COMMUNITIES - DIRECTORATE GENERAL JOINT RESEARCH CENTRE - JRC
MU	Masarykova univerzita
TPZ	Telespazio S.p.A. - A Finmeccanica / Thales Company

Table 2.2: Acronyms for project partners

2.2. Acronyms for the technical requirement's categories

Acronyms used in the following sections are to be understood as following:

Acronym	Technical Requirement's category long name
GENENT	General Enterprise
DISCOVERY	Discovery
ONTO	Ontologies
DAQ	Data Quality
SECURITY	Security
USERMGT	User Management
META	Meta-information
VISUAL	Visualisation
REPR	Data Representation
SYSADMIN	System Administration
PORTAL	Portal
TAGGING	Tagging
DOC	Documentation

Table 2.3: Acronyms for requirements

3. Strategic positioning requirements related to SISE

A constantly growing number of infrastructures in the SISE context offers more and more seamless access to environmental resources – information as well as services. Such services include model and simulation services, sensor services, and access to mathematical services like environmental statistics and information fusion algorithms. While scientific users may be capable to use such services directly (for instance by using a combination of tools, or by programming scientific analysis software themselves, for a given purpose), many decision makers in administration, including decision makers in cities, do either lack the computer skills and/or the resources to access the services.

Since decision makers have to deal with a multitude of decision scenarios while planning and designing policy decisions, it is obvious that they need more and more precise information within a reasonably short time frame. There is a considerable gap between the services becoming available and the use of such services in the every-day work in the user's semantic context and environment.

Hřebíček and Pillmann, 2010 are addressing two key requirements in their publication about SISE (Hřebíček and Pillmann, 2010): first, access to Environmental Information (related to the Directive 2003/4/EC on public access to environmental information), and second, public participation (regarding *Directive 2003/35/EC* (EC 2003-2)).

Furthermore, Hřebíček and Pillmann emphasise the importance of ICT tools that permit an easy discovery of environmental service nodes on the Web. Implementations should include generic semantics frameworks and dynamic ontology services for the discovery of and access to distributed environmental resources in a multilingual context.

The research of SISE has therefore to take into account enlarged challenges such as: *speed; rich content; interoperability; security; public access to information; public participation; spatial and cohesion standardization*. Therefore the SISE has to integrate all types of spatial and non spatial data and information, supports integration of structured and non structured information, and supports their interrelations. It has to enable dealing with analysis, modelling, visualisation environmental data, information and services.

In this context, semantics and interoperability will play in SISE an important role. SISE elements have to support discovering of data, information and services and their relationships by networking tools. There have to be defined metadata schemes (as first candidates could mentioned ISO19115/19119, the INSPIRE and Dublin Core profiles) and catalogue services for searching for meta-data (e.g. Catalogue Services for Web or Open Web Search).

TaToo's capability to link into its framework semantic context, to discover more precisely relevant resources indicating their usability and quality of information decision maker will be enabled to overcome task like long breathtaking, exhausting and expensive search and navigation through chaotic and dynamically growing information sources like the World Wide Web.

TaToo's open nature as both, the TaToo Tools and semantic framework will be based on open standards, perfectly contribute to the requirements of SISE, technically briefly summarised as:

- discovery of relevant resources;
- the integration and seamless access to data sources residing on a standard based infrastructure;
- repositories (e.g. databases, caches, inventories) for quality controlled and securely managed resources and their results;
- security integration in order to access resources (e.g. data sources, catalogues, own or third party resources);
- the possibility to publish results on the internet for public access;
- easy to use tools and user-friendly services and interfaces, e.g. access control, workflow management, delivery management, visualisation, data extraction, administration embedded in the users semantic context;
- finally, in order to enable the sharing of environmental information in an international scale, it is necessary to deal with interoperability, multilingualism and with translation of information.

All these (and even more) requirements are reflected within this requirements document related to different functional building blocks (see Figure 1.2) hereafter.

TaToo is inherently contributing to solve SISE challenges related to subspaces of SISE like the Content Space and Technical Space (incl. Tools) as defined in Hřebíček and Pillmann, 2010 as the following requirements sections will demonstrate.

4. General enterprise requirements

The following General Enterprise Requirements (GENENT) are mainly derived from the high-level objectives of TaToo as well as from requirements stemming from the Reference Model of ORCHESTRA (RM-OA, 2007) and SANY (SANY, 2009).

4.1. Architectural design

Context

This section addresses strategic approaches to the architectural design of a semantic framework architecture as well as service networks with the aim of maximising its flexibility and ability to adapt to changing technologies and functional requirements.

Note: As TaToo refers to the experience of both the ORCHESTRA project and the SANY project (e.g. DoW, WP3 and many others) it seems appropriate to check which of the ORCHESTRA and SANY high level requirements (RM-OA, 2007 and SANY-TR, 2008) have also to be applied for TaToo and which not, especially for the general enterprise requirements, thus resulting in a valid basic list to be completed by additional requirements specific to TaToo.

Terms and Definitions (*if applicable to explain terms used below e.g. in the description section*)

RM-OA: Reference Model for the ORCHESTRA Architecture (<http://www.eu-orchestra.org/TUs/RMOA/en/html/index.html>)

Requirements (*all, respectively the whole list of requirements, this is an example*)

ID	TR.GENENT.000
Name	Use of concepts and standards
Scope	The TaToo architecture shall make use of proven concepts and standards in order to decrease dependence on vendor-specific solutions and help ensure the openness of the TaToo network and support the evolutionary development process of the architecture.
Optional	
Trace	Experience from ORCHESTRA and SANY and NeOn
Relevance/ Importance / Priority	M
Comment	
Validation	Validation in the context of WP3. The validation is done by manual testing for all services and applications. Responsible is the system architect. To validate this requirement it is needed to check the use of standards and concepts in the architecture.

ID	TR.GENENT.010
Name	Loosely coupled components
Scope	<p>The components involved in a TaToo framework shall be loosely coupled, where loose coupling implies the use of mediation to permit existing components to be interconnected without changes.</p> <p>Note: In this stringency the requirement is restricted to the SOA part of a TaToo framework. Its application within the core system components is not needed and thus needs not to be guaranteed.</p> <p>Semantics (like ontologies) are loosely coupled via the merge of MERM and Bridge Ontologies.</p>
Optional	
Trace	Experience from ORCHESTRA and SANY
Relevance/ Importance / Priority	M
Comment	
Validation	Validation in the context of WP3. The validation is done by manual testing for all services and applications. Responsible is the system architect. To validate this requirement it is needed to check the quality of the architecture and components definition.

ID	TR.GENENT.020
Name	Extensibility/Flexibility
Scope	<p>Extensibility/Flexibility is needed in different aspects:</p> <p>Extensibility of domains: the scope of TaToo shall not only be limited to a specific thematic domain dealt with in the validation scenarios. Thus TaToo must allow integrating new domains.</p> <p>Extensibility/Flexibility of functionalities: TaToo shall not be a “closed” system with a fixed set of functionalities: it must be possible plug-in new services with additional functionality into a TaToo semantic framework.</p>
Optional	
Trace	Experience from ORCHESTRA and SANY, TaToo, DOW
Relevance/ Importance / Priority	H
Validation	Validation in the context of WP3. The validation is done by manual testing for all services and applications. Responsible is the system architect. To validate this requirement it is needed to check the quality of the architecture and non-functional requirements.

ID	TR.GENENT.030
Name	Component architecture independence
Scope	The TaToo architectural process shall be such that the TaToo architecture and the architecture of components are decoupled. This means that a component shall be seen as a black box, i.e., no assumptions about its inner structure are made when designing the architecture. This requirement facilitates the flexibility to exchange or replace components.
Optional	
Trace	Experience of ORCHESTRA and SANY
Relevance/ Importance / Priority	M/L
Comment	
Validation	Validation in the context of WP3. The validation is done by manual testing for all services and applications. Responsible is the system architect. To validate this requirement it is needed to check the quality of the architecture.

ID	TR.GENENT.040
Name	Security
Scope	<p>The TaToo architecture shall be designed to allow security mechanisms to be incorporated. These mechanisms shall include user management (authentication, authorisation), as well as control of access to data, services and tools.</p> <p>These mechanisms are needed on different levels:</p> <ul style="list-style-type: none"> • access to tagging information (meta information) associated to resources • tagging of resources • integration of new services (e.g. a tagging service for a new domain, new discovery services, ...) • establishment of new domain ontologies
Optional	
Trace	
Relevance/ Importance / Priority	M
Comment	
Validation	Validation in the context of WP3. The validation is done by manual testing for all services and applications. Responsible is the system architect. To validate this requirement it is needed to check the security aspects of the architecture.

ID	TR.GENENT.050
Name	Scalability
Scope	<p>The TaToo Architecture shall be able to take scalability issues into account.</p> <p>Scalability aspects:</p> <ul style="list-style-type: none"> • Type and amount of concerned resources (for discovery and tagging) • Discovery and tagging services and tools • Domains (domain ontologies) • Size and level of detail of tagging information (meta information) • System scalability (e.g. the possibility to deploy more than one instance of the TaToo core to be able to serve increasing amount of discovery or tagging requests)
Optional	
Trace	AR
Relevance/ Importance / Priority	M
Comment	
Validation	Validation in the context of WP3. The validation is done by manual testing for all services and applications. Responsible is the system architect. To validate this requirement it is needed to check the scalability aspects of the architecture.

ID	TR.GENENT.060
Name	Alternative Service bindings
Scope	TaToo shall support alternative bindings to SOAP bindings for Public Services, e.g. RESTful or OGC compliant
Optional	
Trace	UI05
Relevance/ Importance / Priority	L
Comment	
Validation	Validation in the context of WP4. The validation is done by automated testing for public services and test clients. Responsible are WP4 developers. To validate this requirement it is needed to implement automated unit tests of the alternative bindings with test clients.

5. Discovery and harvesting

In general, we define the process of discovery and / or search as the retrieval by a system of a set of resources that satisfy an information need expressed by a user. In the scope of TaToo search is the process of expressing the need for information by the user, and discovery is the process performed by the system to retrieve the results.

In TaToo, we intend to use semantic search, a kind of search that makes extensive use of domain knowledge encoded in the form of ontologies. Ontologies are related to resources through annotations stored as metadata. It is for this reason that the search in TaToo will always be metadata-based.

A classic information retrieval system usually provides a crawling functionality in order to gather information from external resources in a (semi) automatic way. This process creates an inverted index on which the discovery is made later. In the same way TaToo harvests additional meta-information from known catalogues and repositories and consolidates the annotations in the system knowledge base, where the discovery is made afterwards.

5.1. Search and discovery

Context

TaToo is a semantic search engine, meaning that the search and discovery will be based on annotation of resources based on domain knowledge encoded in the form of ontologies.

Search in TaToo allows a user to express an information need. The user can express this need in several ways, such as selecting concepts or relations from the ontology, providing a resource that serves as a template for similar resources, establishing different criteria depending on the type of resources searched, by selecting criteria common to most of the resources, etc.

Discovery in TaToo allows the system to retrieve relevant resources for a particular need for information. Although this discovery is always based on semantic annotations and supported by domain ontologies, TaToo makes this discovery in response to different strategies: exact match, discovery of resources related to more specific concepts, finding resources related to more general concepts, resource discovery with similar comments, etc.

Terms and Definitions (*if applicable to explain terms used below e.g. in the description section*)

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Requirements (*all, respectively the whole list of requirements*)

ID	TR.DISCOVERY.000
Name	Discovery Component
Scope	<p>TaToo shall provide a discovery component. This component shall process users search requests and return a set of results relevant to a given query.</p> <p>The discovery component shall make use of the TaToo semantic metadata store (knowledge base) to perform the search.</p>
Optional	TR.VISUAL.000
Trace	S1W1; S2W1; S2W3
Relevance/ Importance / Priority	H
Comment	
Validation	<p>Validation in the context of WP5. The validation is done by manual testing for discovery portlets and custom pilot applications. Responsible are WP5 members and end users. To validate this requirement it is needed to assess whether both the generic (through the portal) as well as the custom (integrated into the pilot's applications) search GUIs fit their needs.</p>

ID	TR.DISCOVERY.010
Name	Discovery strategies
Scope	<p>TaToo discovery component shall support multiple discovery strategies. Some examples (in brackets: priority from participants of the TaToo online survey):</p> <ul style="list-style-type: none"> - Iterative search refinement (medium) - Search generalisation - Navigation (high) - Similarity - Resource Type (low) - (Domain related) keywords <p>It should be possible to limit the results to a certain time span, region, domain, etc.</p>
Optional	
Trace	VDS1.UC1.1; VDS3.UC3.4; RD08;RD09; RD10; RD11; RD12; RD13; RD14; RD15; RD16; RD17; RD18
Relevance/ Importance / Priority	H

Comment	
Validation	Validation in the context of WP5. The validation is done by manual testing for discovery tools. Responsible are WP5 members and end users. To validate this requirement it is needed to assess if the support discovery strategies fit their needs.

ID	TR.DISCOVERY.020
Name	Semantically supported content analysis of a current active web page
Scope	General search possibility for a user without precise search query formulation.
Optional	
Trace	VDS1.UC1.1;VDS3.UC3.2; VDS3.UC3.4; S3.1W1; S3.2W1
Relevance/ Importance / Priority	L
Comment	This requirement implies analysis of the current active page, which is not foreseen in the scope of TaToo. Has to be revised.
Validation	Validation in the context of WP5. The validation is done by manual testing for the discovery tool. Responsible are WP5 members and end users. To validate this requirement it is needed to provide social web plug-ins (i.e.: piece of TaToo html / javascript code, that can be included in arbitrary web pages => e.g. "TaToo Like Button") to enable users to validate semantically supported content on web pages.

ID	TR.DISCOVERY.030
Name	Similarity discovery
Scope	The discovery component shall allow "similarity" search, which is for discovery of a resource that have been annotated in a similar way to the annotated resource provided as a "query parameter". The resources could be e.g.: <ul style="list-style-type: none"> - Written documents - Models - Services
Optional	
Trace	VDS2; VDS3.UC3.1; VDS3.UC3.4; VDS3.UC3.7; S3.3W1; RD18
Relevance/ Importance / Priority	L

Comment	Note from VDS3.UC3.1 (Resource Consumer) TaToo will enable the user to search not only in records for the Czech republic but will provide the opportunity to discover similar time-trend analysis for other countries.
Validation	Validation in the context of WP5 in particular through the third Validation Scenario from MU. The validation is done by manual testing for the discovery tool. Responsible are WP5 members and end users. To validate this requirement it is needed to check if similar annotated resources can be found with “query parameters”.

ID	TR.DISCOVERY.040
Name	Resource Type Discovery
Scope	The discovery component shall provide an overview of available resources and allow navigation/search according to the typology of the resource
Optional	
Trace	VDS2.UT2.2; RD14
Relevance/ Importance / Priority	L
Comment	Resource (Model) explorer. According to the dimension of the knowledge base, this task can become increasingly difficult. Required technical and nontechnical functionality see CT2.2
Validation	Validation in the context of WP4. The validation is done by manual testing for the discovery tool. Responsible are the developers. To validate this requirement it is needed to check the representation in the UI Portlet (Navigation Tree), the functionality provided by WP4 (Distributed Service), and the validation (Resource Model Explorer in the second Validation Scenario from JRC).

ID	TR.DISCOVERY.050
Name	Context dependent discovery
Scope	<p>The discovery component shall make use of the available context information to improve the relevance of the search results and aid user in choosing the most appropriate discovery strategy. Some examples of the context related information that can be used for these purposes include e.g.:</p> <ul style="list-style-type: none"> - Time & location information - Where the request is coming from (if initiated from external site) - Type of the Resource the user is looking for (e.g. web pages, services, models, time series of sensor data...) - Domain related information provided e.g. explicitly as a part of the search, in user profile, ...
Optional	
Trace	VDS1.UC1.3; VDS3.UC3.4; S2W1; S3.1W1; S3.2W1; RD15
Relevance/ Importance / Priority	H
Comment	
Validation	Validation in the context of WP4. The validation is done by manual testing for the discovery service. Responsible are the developers. To validate this requirement it is needed to test the discovery service software to meet the scope (see scope field in this table).

ID	TR.DISCOVERY.060
Name	Geospatial and time related search
Scope	<p>TaToo discovery component and search GUI shall support geospatial and time dependent search.</p> <p>Examples:</p> <ul style="list-style-type: none"> - Search for resources based on spatial an data/time properties, e.g. select an area / a point in a map, choose a data / time span - Search for additional information on, for example, a particular climate twin region by providing spatial information (name or precise location, coordinates, regions, NUTS code, etc.) - Or for example for cancer discovery (in a country, region, city, etc.) in a specific period of time
Optional	
Trace	VDS1.UC1.3; VDS3.UC3.4; S2W1; S3.1W1; S3.2W1, RT01; RD18
Relevance/ Importance / Priority	H

Comment	Links should be provided to further information sources corresponding to the spatial unit and the theme defined by the user
Validation	<p>Validation in the context of WP4. The validation is done by automated testing (unit tests) for the tagging and discovery services. Responsible are WP4 developers. To validate this requirement it is needed to develop automated unit tests to add geo tags, search for geo tags and compare results.</p> <p>Validation in the context of WP4. The validation is done by manual testing for the geo tagging and geo search portlets. Responsible are WP4 developers. To validate this requirement it is needed to test geo tagging and geographical search through the respective GUIs (portlets).</p> <p>Validation in the context of WP5 in particular through the first Validation Scenario from AIT and the third Validation Scenario from MU. The validation is done by manual testing for custom client applications. Responsible are end users. To validate this requirement it is needed to test the portal (geo tagging and geo search portlet) and custom client applications (e.g. climate twins viewer).</p>

ID	TR.DISCOVERY.070
Name	Thematic or resource related search
Scope	TaToo discovery component and search GUI shall support thematic and resource related search for additional information on, for example, a particular climate twin region by providing thematic information (focusing on themes)
Optional	
Trace	VDS1.UC1.3; VDS3:UC3.2; VDS3.UC3.4; S1W1; S2W1; S3.1W1; S3.2W1
Relevance/ Importance / Priority	M
Comment	
Validation	Validation in the context of WP5 in particular through the first Validation Scenario from AIT and the third Validation Scenario from MU. The validation is done by manual testing for the discovery service. Responsible are WP5 members and end users. To validate this requirement it is needed to test the support of resource related search and discovery components and search GUI.

ID	TR.DISCOVERY.080
Name	Multilingual search
Scope	Search should be expanded to other languages
Optional	Start with German, Czech, Spanish, Italian, ...
Trace	VDS3:UC3.2; RD18
Relevance/ Importance / Priority	H
Comment	VDS3.UC3.2 notes in its description: The search should not only deliver results in the language used to specify the search criteria it should also deliver results in foreign languages which match the domain context (by recognising the language domain and searching for documents in the proper language).
Validation	Validation in the context of WP5 in particular through the third Validation Scenario from MU. The validation is done by manual testing for the discovery service. Responsible are WP5 members and end users. To validate this requirement it is needed to provide the functionality by WP4 and to test the multilingual search in WP5.

ID	TR.DISCOVERY.090
Name	Search result's highlighting
Scope	TaToo shall provide a mean to highlight and include links to relevant resources in the search results.
Optional	
Trace	VDS2.UC2.5
Relevance/ Importance / Priority	M
Comment	Found results having a TaToo relationship (e.g. evaluated resource, links to TaToo entries, etc.) shall be highlighted and allow access (on click) to the respective resource.
Validation	Validation in the context of WP5 in particular through the second Validation Scenario from JRC. The validation is done by manual testing for the UI of the discovery service. Responsible are WP5 members and end users. To validate this requirement it is needed to test the highlighting of search results.

ID	TR.DISCOVERY.100
Name	User-friendly semantic search
Scope	To increase user acceptance of semantic search technologies TaToo shall aim for combining usability and simplicity of classical (keyword-based) search engines with the power and advanced features of a semantic discovery framework.
Optional	See also TR.VISUAL.000
Trace	RD01
Relevance/ Importance / Priority	H
Comment	
Validation	Validation in the context of WP5. The validation is done by manual testing for the discovery portlets and custom pilot applications. Responsible are WP5 members and end users. To validate this requirement it is needed to assess the usability and user-friendliness of the search GUIs.

5.2. Harvesting

Context

One of the main objectives of a metadata-based system is the automatic or semiautomatic metadata acquisition by crawling available documentation of a resource or its actual content. However, this goal is far from being achieved due to the fact that (semi)automatic metadata acquisition is a very complex task that depends heavily on the resource itself. TaToo approaches this problem through the harvesting process.

The TaToo harvesting process aims to produce metadata usable by TaToo starting from existing information stored in catalogues. Taking (semi)structured metadata as starting point will facilitate the automatic acquisition process, making it affordable in the scope of TaToo. Since the acquisition process depends on the structure of the catalogue, it is necessary to design and implement specific harvesters for each catalogue.

With the harvesting process, TaToo aims to:

- reuse pre-existing knowledge,
- provide a mechanism for fast acquisition of a large amount of metadata and,
- avoid a cold start by loading an initial set of metadata.

Terms and Definitions (*if applicable to explain terms used below e.g. in the description section*)

- Harvesting Systems: a part of the TaToo Systems that provides functionalities responsible for the implementation of the harvesting process

- Harvester: a central component of the Harvesting System that leads the harvesting process and maintains added Harvester Connectors.
- Harvester Connector: a single module responsible for harvesting specific type of resource catalogue.

Requirements (*all, respectively the whole list of requirements*)

ID	TR.HARVEST.000
Name	Harvesting
Scope	The harvesting system that is part of the TaToo System should provide a way to harvest metadata from a number of external resources. It will be composed of the harvester, which is a central component to the system, and a number of harvesting connectors (adaptors) each of which designed to harvest specific type of resource catalogue of a group of catalogues. The harvester will provide a flexible plug-in interface that will enable a custom number of harvesting connectors to be added to the system.
Optional	
Trace	AR; RD02; RD03; RD05; RD06; RD07
Relevance/ Importance / Priority	H
Comment	
Validation	Validation in the context of WP5 and WP4. The validation is done by automated and manual testing for the harvester implementations. Responsible are WP4 developers and WP5 members. To validate this requirement it is needed to develop and tests harvesters to register WP5 resources.

ID	TR.HARVEST.010
Name	Harvesting examples
Scope	<p>TaToo Project shall provide several examples of harvester connectors. The following data sources are considered important sources of environmental information and represent candidates for harvester examples:</p> <ul style="list-style-type: none"> • Environmental Catalogues (e.g. GRID, EEA, UDK, JRC MARS, mis.cenia.cz) • Online data bases and indexes (e.g. Science Direct, FP6 projects ENSEMBLES & CECILIA, EEA project SENSE, ...) • OGC Services (WFS, SOS, WCS, ...) • Web Services (e.g. WISKI, YSI EcoNet, ...) • Websites (reports and papers, EEA, UNEP, OECD, ...) • Websites providing RDFa (e.g. as lists of other resources providing “resource name”, “uri”, “resource description”, etc.)
Optional	
Trace	AR; RD02; RD03; RD05; RD06; RD07
Relevance/ Importance / Priority	H
Comment	
Validation	Validation in the context of WP5 and WP4. The validation is done by automated and manual testing for the harvester implementations. Responsible are WP4 developers and WP5 members. To validate this requirement it is needed to develop and tests examples of harvesters.

ID	TR.HARVEST.020
Name	Harvesting extensibility
Scope	TaToo Project shall provide means (e.g. API or Service Interface) that allows adding of new harvester connectors.
Optional	
Trace	AR
Relevance/ Importance / Priority	H
Comment	
Validation	Validation in the context of WP4. The validation is done by manual testing for the harvester. Responsible are WP4 developers. To validate this requirement it is needed to validate the existence of means for adding new harvesters.

ID	TR.HARVEST.030
Name	OGC standard meta-information for services
Scope	<p>TaToo shall provide mean to harvest capability documents from standard based services like the OGC services.</p> <p>Note: The meta-information is modelled according to standardised specification of the respective service, e.g. there are different capabilities document for WFS, WMS, SOS, etc.</p>
Trace	S2W1, S2W2, S3.1W1, S3.3W2, S3.2W1
Relevance/ Importance / Priority	M
Comment	
Validation	Validation in the context of WP4. The validation is done by manual testing for the harvester. Responsible are WP4 developers. To validate this requirement it is needed to validate that OGC standard meta-information for services has been implemented.

ID	TR.HARVEST.040
Name	Automatic interpretation of content
Scope	TaToo should support the automatic harvesting of the content of a web page on user request. Only for available harvesters.
Optional	
Trace	VDS1.UC1.1.
Relevance/ Importance / Priority	H
Comment	
Validation	Validation in the context of WP4. The validation is done by automated or manual testing for the harvester. Responsible are WP5 members (Validation Scenario 1 from AIT). To validate this requirement it is needed to validate the automatic interpretation of the content.

6. Semantics

In linguistics, semantics is the subfield that is devoted to the study of meaning, as inherent at the levels of words, phrases, sentences, and texts. In computer sciences, semantics is framed in the Semantic Web field that enforces a vision of the web in which data is semantically annotated so automatic agents can understand this data, enhancing its exploitation and automation capabilities. In the scope of TaToo, environmental resources will be semantically enriched to improve its exploitation capabilities (discovery, publishing, accessing, etc).

6.1. Ontologies

Context

Adding semantics is a very abstract process which is normally done by linking data with concepts described in ontologies. The most widely used definition for ontologies is that used by Gruber (Gruber, 1993): an ontology is a formal, explicit specification of a shared conceptualisation. More specifically, an ontology provides the tools to describe a domain in terms of classes, attributes and relationships. In TaToo, ontologies have a dual role, on one hand, they describe several domains related with each validation scenario, on the other, they provide a common conceptualization for TaToo tools and services on how to describe and manage resources, annotations, evaluations, etc

Terms and Definitions (*if applicable to explain terms used below e.g. in the description section*)

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Requirements (*all, respectively the whole list of requirements*)

ID	TR.ONTO.000
Name	Ontology Framework
Scope	TaToo shall provide an Ontology Framework for integrating ontologies and mapping of ontologies (e.g. to a bridge ontology).
Optional	
Trace	S3.2W1; AR
Relevance/ Importance / Priority	H
Comment	Related to Management of Ontologies
Validation	Validation in the context of WP4. The validation is done by manual testing for the ontology framework. Responsible are WP4 developers. To validate this requirement it is needed to test the ontology integration and ontology mapping.

ID	TR.ONTO.010
Name	Ontology logic complexity
Scope	All ontologies loaded into TaToo system must be limited to a maximum of description logic expressiveness.
Optional	
Trace	AR
Relevance/ Importance / Priority	H
Comment	The expressivity of the ontologies will be decided based on the final requirements and the available software (reasoners, repositories, etc.). OWL-DL is a ceiling, but probably a less expressive language could be appropriate.
Validation	Validation in the context of WP4. The validation is done by manual testing for the ontology framework. Responsible is WP5 (in collaboration with WP4). To validate this requirement it is needed to verify the logic complexity of ontologies.

ID	TR.ONTO.020
Name	Knowledge inference
Scope	<p>TaToo knowledge base will be expanded, in terms of axioms addition, as a result of the interaction of the user with the system.</p> <p>Note: The vision of TaToo is that of avoiding the use of complex semantics for annotation and discovery. The inference will be kept to the strict minimum to have a good trade-off between expressiveness and effectiveness.</p>
Optional	
Trace	AR
Relevance/ Importance / Priority	M
Comments	This is the typical functionality provided by a reasoner
Validation	Validation in the context of WP4. The validation is done by automated testing for the ontology framework. Responsible are WP4 developers. To validate this requirement it is needed to implement automated tests for the knowledge interface.

ID	TR.ONTO.030
Name	Multilingual Ontologies
Scope	As TaToo system is supposed to deal with multilingualism issues, also TaToo ontologies are supposed to do so.
Optional	
Trace	AR
Relevance/ Importance / Priority	H
Comment	
Validation	Validation in the context of WP4 and WP5 (in collaboration). The validation is done by manual testing for the ontology framework. Responsible are WP4 developers and evaluation scenarios. To validate this requirement it is needed to verify the existence and correctness of multilingual ontologies.

ID	TR.ONTO.040
Name	Ontology Integration
Scope	In despite of using several domain ontologies, TaToo must provide a common understanding for tools and services so domain ontologies must be in some way integrated.
Optional	
Trace	AR; UI06
Relevance/ Importance / Priority	H
Comment	
Validation	Validation in the context of WP4. The validation is done by automated testing for the ontology framework. Responsible are WP4 developers. To validate this requirement it is needed to implement automated tests to verify ontology integration.

ID	TR.ONTO.050
Name	Domain Ontology
Scope	<p>A set of Domain Ontologies have to be identified / developed. .</p> <p>For example based on:</p> <ul style="list-style-type: none"> - the chemistry domain of persistent organic pollutants - health (e.g. cancer, etc) - measurements (like time series, measurement values, etc.) - geographical locations (like regions) - statistical relationships
Optional	TR.META.010
Trace	S3.2W1; S3.2W2; S3.1W1; S3.3W2; S3.1W3; S3.3W1 VDS3.UC3.3; VDS3.UC3.4; ED01; UI07
Relevance/ Importance / Priority	H
Comment	Domain Ontology engineering Tools are required. External to TaToo
Validation	<p>Validation in the context of WP4. The validation is done by automated testing for the tagging and discovery services. Responsible are WP4 developers. To validate this requirement it is needed to tag with concepts from domain ontologies, perform search, and compare results.</p> <p>Validation in the context of WP4. The validation is done by manual testing for the tagging and discovery portlets. Responsible are WP4 developers. To validate this requirement it is needed to select a domain ontology for tagging, tag resources with domain concepts, perform search, and compare results.</p> <p>Validation in the context of WP5. The validation is done by manual testing for the portal and custom pilot applications. Responsible are WP5 members and end users. To validate this requirement it is needed to tag and search with domain concepts.</p>

ID	TR.ONTO.060
Name	Semi-automatic/automatic ontology construction
Scope	Semi-automatic/automatic ontology construction from a simpler metadata structure (e.g.: XML schema)
Optional	
Trace	S2W2
Relevance/ Importance / Priority	L

Comment	Meta information will be produced and published on a web site by the JRC, in the form of an ontology or, better yet, in the form of an XML schema from which TaToo tools could semi-automatically/automatically construct the ontology itself.
Validation	Validation in the context of WP5 in particular through the second Validation Scenario from JRC. The validation is done by automated testing for the ontology framework. Responsible are WP5 members. To validate this requirement it is needed to test automatic/semi-automatic ontology creation.

ID	TR.ONTO.070
Name	Ontology exchange
Scope	TaToo shall provide a mean for exchanging ontologies over network. E.g. a service capable of serving ontologies on demand.
Optional	
Trace	AR
Relevance/ Importance / Priority	L
Comment	
Validation	Validation in the context of WP5 and WP4. The validation is done by automated testing for the ontology framework. Responsible are WP5 members and WP4 developers. To validate this requirement it is needed to test the ontology exchange over the network.

ID	TR.ONTO.080
Name	Cross Domain Mapping
Scope	TaToo Ontology Framework shall allow mapping of ontologies. E.g. to support cross-domain discovery
Optional	
Trace	AR
Relevance/ Importance / Priority	H
Comment	The TaToo Ontology Framework will provide the procedure to add new domain ontologies and map with the existing ontologies (i.e. bridge ontology). Administrators (authorised users) will then make available the new ontology to be used by the system.
Validation	Validation in the context of WP4 and WP5 (during the implementation of the 3 ontologies in the Validation Scenarios). The validation is done by manual testing for the ontology framework. Responsible are WP5 members and WP4 developers. To validate this requirement it is needed to test the cross domain mapping of ontologies (cross-domain discovery).

ID	TR.ONTO.090
Name	Bridge Ontology
Scope	TaToo shall provide a bridge ontology other domain ontologies can be mapped too.
Optional	
Trace	AR
Relevance/ Importance / Priority	H
Comment	TaToo will provide a mechanism for cross-domain search, probably based on using a hybrid ontology integration approach using a bridge ontology. However, this is an implementation issue that will be decided later.
Validation	Validation in the context of WP4 (possibly in collaboration with WP5). The validation is done by manual testing for the ontology framework. Responsible are WP4 developers (and WP5 members). To validate this requirement it is needed to test the existence and correctness of a bridge ontology.

6.2. Meta-information

Context

Typically many information items or resources are available but have no accompanying meta-information. Therefore it is important for us to enable users to add additional descriptive information (tagging of resources – see relevant chapter in this doc thereafter). On the other hand, it is important that the user could easily extract existing metadata that already comes with the resources in order to use them for further interpretation of other resources.

A common structure for metadata / meta-information for TaToo resources for the evaluation process has to be made available (defined). Also a physical place where to store this information is needed.

Terms and Definitions (*if applicable to explain terms used below e.g. in the description section*)

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Requirements (*all, respectively the whole list of requirements*)

ID	TR.META.000
Name	Generic Information model for resource description
Scope	<p>TaToo shall define a generic meta-information model for describing resources.</p> <p>The most important resource types to be supported are:</p> <ul style="list-style-type: none"> • Geospatial data and services (WMS, WFS, any geotagged resource) • Raw and processed data (time series, ...) • Highly aggregated data (documents) • software and models • services in general • websites
Optional	
Trace	VDS2, RT01, RT02, RT02, RT03, RT03, RT04; RA01
Relevance/ Importance / Priority	H
Comment	This allows everyone to assess, evaluate, and comment, etc. on a resource in the same way with the same underlying metadata structure. See, for instance: dev.twitter.com/pages/annotations_overview)
Validation	<p>Validation in the context of WP5. The validation is done by manual testing for the generic information model for resource description. Responsible are WP5 members. To validate this requirement it is needed for WP5 to verify whether MERM supports elementary (domain independent) properties required to describe their resources.</p> <p>Validation in the context of WP3 and WP4. The validation is done by manual testing for the tagging and discovery services and tools. Responsible are WP members. To validate this requirement it is needed to verify that the meta-information (MERM) is sufficient to perform general domain independent tagging and discovery (time, geospatial location, keywords, etc.).</p>

ID	TR.META.010
Name	Specialized Information models for resource description
Scope	TaToo shall provide example of extended information models for describing resources relevant to the TaToo scenarios. For example Minimal data standard for epidemiology and persistent organic pollutants (POP) data sources
Optional	See also TR.ONTO.050
Trace	S3.1W1, RT02, RT03, RT03, RT04
Relevance/ Importance / Priority	H
Comment	
Validation	<p>Validation in the context of WP4. The validation is done by automated testing for the tagging and discovery services. Responsible are WP4 developers. To validate this requirement it is needed to tag with concepts from domain ontologies, perform search, and compare results.</p> <p>Validation in the context of WP4. The validation is done by manual testing for the tagging and discovery portlets. Responsible are WP4 developers. To validate this requirement it is needed to select domain ontology for tagging, tag resources with domain concepts, perform search, and compare results.</p> <p>Validation in the context of WP5. The validation is done by manual testing for the portal and custom pilot applications. Responsible are WP5 members and end users. To validate this requirement it is needed to tag and search with domain concepts.</p>

ID	TR.META.020
Name	Extraction of metadata
Scope	<p>TaToo should provide means to extract metadata from resources. E.g. any information that can be extracted from the data source itself should be used.</p> <ul style="list-style-type: none"> • Examples for resource formats to be supported: • XML formats (e.g. ABCD) • OGC & SWE XML formats (e.g. GML) • Microsoft Word and Excel • html (websites)
Optional	TR.HARVEST.000
Trace	S3.1W1, S3.3W2, S3.2W1; UI08
Relevance/ Importance / Priority	M
Comment	See TR.HARVEST.000
Validation	Validation in the context of WP4 and WP5. The validation is done by automated testing for metadata. Responsible are WP4 developers and WP5 members. To validate this requirement it is needed to prove that means for metadata extraction are there and working (see scope field).

7. Tagging and annotation

Tagging is understood as the process of adding information (as part of the metadata / meta-information of an item) to a certain artefact or piece of interest.

The users typically want to enrich resources (e.g. data, models, services) by adding additional data on the topic, e.g. hints for future users of the data or model; quality, usability, suitability or even links to other similar resources.

The practice of adding meta-information to resources allows the information enrichment process that is at the base of the TaToo project. This is because the information enrichment makes possible the improvement of the search and discovery process by considering meta-information associated with resources while performing the process.

Tagging is not only important for users wishing to add useful meta-information to resources they can find in a second time, but it is considered one of the most important functionality the TaToo project is providing.

In TaToo we perform tagging using ontologies. According to the TaToo understanding and definition, the process of tagging with semantic information is called *annotation*. From the requirements perspective the term tagging is more generic. Therefore, in this section we use the term tagging to refer generically to the process of creating semantic meta-information.

7.1. Tagging of resources

Context

Typically users wants to tag resources immediately when or while ‘accessing’ (e.g. visualising, reading or exploring) a resource. In some cases, first the user wants to explore a resource and then, later on, come back and add tags. This normally happens when the evaluation of the found resources can be done after an elaboration that is taking some time. If the resource is a simple picture, it can be possibly tagged as soon as it is displayed. In the case of a document or raw data, the tagging can be done only after having read the document or elaborated the raw data. Both flavours of tagging are described in the respective TaToo validation scenarios.

Flexible tagging can be allowed by an implementation of a tagging service. Applications (relevant in the context of the TaToo validation scenarios) can thus contact such a service for tagging.

Terms and Definitions (*if applicable to explain terms used below e.g. in the description section*)

Tagging: is a process of adding metadata to resources

(Semantic) Annotation: is tagging based on semantics.

Requirements (*all, respectively the whole list of requirements*)

ID	TR.TAGGING.000
Name	Tagging means
Scope	TaToo shall provide means to tag resources.
Optional	
Trace	AR; TR01
Relevance/ Importance / Priority	H
Comment	
Validation	Validation in the context of WP4. The validation is done by automated testing for tagging service. Responsible are WP4 developers. To validate this requirement it is needed to implement automated unit tests for each operation of the service, creation and deletion of tags, comparison, etc.

ID	TR.TAGGING.010 DEPRECATED
Name	Meta-information on third party resources
Scope	TaToo allow users to add meta-information to third party resources. Those are resources that are not stored in the TaToo System.
Optional	TR.META.000
Trace	VDS1.UC1.4.;VDS3.UC3.2
Relevance/ Importance / Priority	H
Comment	It should be noted, that TaToo does not store any resource by itself, just meta-information about a resource. So all resources tagged are “third party resources”. This requirement is covered by TR.META.000.
Validation	Validation in the context of WP5. The validation is done by manual testing for the generic information model for resource description. Responsible are WP5 members. To validate this requirement it is needed for WP5 to verify whether MERM supports elementary (domain independent) properties required to describe their resources. Validation in the context of WP3 and WP4. The validation is done by manual testing for the tagging and discovery services and tools. Responsible are WP members. To validate this requirement it is needed to verify that the meta-information (MERM) is sufficient to perform general domain independent tagging and discovery (time, geospatial location, keywords, etc.).

ID	TR.TAGGING.020
Name	Access to tags (TaToos)
Scope	TaToo shall provide a mean to allow users to access all the tags (TaToos) associated to searched resources.
Optional	TR.ACCESS.030
Trace	S1W2; S2W2;S2W3
Relevance/ Importance / Priority	H
Comment	This requirement is covered by TR.ACCESS.030.
Validation	Validation in the context of WP4. The validation is done by automated testing for tagging service. Responsible are WP4 developers. To validate this requirement it is needed to implement automated unit tests for each operation of the service, creation and deletion of tags, comparison, etc.

ID	TR.TAGGING.030
Name	Postponed Tagging / Tagging of known resources
Scope	TaToo shall provide a means for tagging of already known resources without going back to the discovery process again.
Optional	TR.TAGGING.040
Trace	S1W2; S2W2;S2W3
Relevance/ Importance / Priority	H
Comment	This requirement is covered by TR.TAGGING.040.
Validation	Validation in the context of WP4. The validation is done by automated testing for tagging service. Responsible are WP4 developers. To validate this requirement it is needed to implement automated unit tests for each operation of the service, creation and deletion of tags, comparison, etc.

ID	TR.TAGGING.040
Name	Tagging Service
Scope	TaToo shall define a service interface and implement a tagging service that allows integrating of tagging into third parties applications. The Tagging Service shall support all operations necessary to manage tags (CRUD).
Optional	
Trace	S1W4; UI02
Relevance/ Importance / Priority	H

Comment	Allows also tagging inside pilot specific or external applications
Validation	Validation in the context of WP4. The validation is done by automated testing for tagging service. Responsible are WP4 developers. To validate this requirement it is needed to implement automated unit tests for each operation of the service, creation and deletion of tags, comparison, etc.

ID	TR.TAGGING.050
Name	Tagging Client
Scope	TaToo shall provide at least one client for tagging service. The Tagging Client shall support all functions necessary to manage tags (CRUD).
Optional	
Trace	S1W4; AR; VDS2.UC1.3. VDS2.UC1.4
Relevance/ Importance / Priority	H
Comment	
Validation	Validation in the context of WP4 and WP5. The validation is done by manual testing for tagging tools and custom pilot applications. Responsible are WP4 developers, WP5 members, and end users. To validate this users shall test the tagging client applications, create, update, delete tags, compare the results, etc.

ID	TR.TAGGING.060
Name	Semantic Tags
Scope	TaToo tags (TaToos) shall be based on ontologies that support a generic and domain independent annotation of arbitrary resources.
Optional	TR.TAGGING.080
Trace	AR
Relevance/ Importance / Priority	H
Comment	Requirement is further extended by TR.TAGGING.080 to support also domain ontologies
Validation	Validation in the context of WP4. The validation is done by manual testing for tagging and discovery services and clients. Responsible are WP4 developers and ontology experts. To validate this requirement it is needed to test the enhanced functionalities supported by semantic tags, e.g. reasoning etc.

ID	TR.TAGGING.070
Name	Storing of Tags
Scope	TaToo shall provide a component (service) to store and manage tags.
Optional	TR.TAGGING.040; TR.TAGGING.050
Trace	
Relevance/ Importance / Priority	H
Comment	Requirement covered by TR.TAGGING.040 and TR.TAGGING.050
Validation	<p>Validation in the context of WP4. The validation is done by automated testing for tagging service. Responsible are WP4 developers. To validate this requirement it is needed to implement automated unit tests for each operation of the service, creation and deletion of tags, comparison, etc.</p> <p>Validation in the context of WP4 and WP5. The validation is done by manual testing for tagging tools and custom pilot applications. Responsible are WP4 developers, WP5 members, and end users. To validate this users shall test the tagging client applications, create, update, delete tags, compare the results, etc.</p>

ID	TR.TAGGING.080
Name	Ontology supported tagging
Scope	In addition to the general requirement that TaToo tags shall be based on ontologies, TaToo shall also provide means to support users to annotate resources in accordance with their own domain ontologies
Optional	
Trace	AR; TR02
Relevance/ Importance / Priority	H
Comment	The user is forced to choose from a specific set of tags that relate to concepts from shared ontologies that can be selected by the user.
Validation	Validation in the context of WP4. The validation is done by manual testing for tagging and discovery services and clients. Responsible are WP4 developers and ontology experts. To validate this requirement it is needed to test the enhanced functionalities supported by semantic tags, e.g. reasoning etc.

ID	TR.TAGGING.090
Name	Sharing of tags (TaToos)
Scope	Tags (TaToos) shall be shared between all users and publicly visible. Ownership of the Tags shall be publicly visible.
Optional	
Trace	AR; TR05;
Relevance/ Importance / Priority	H
Comments	Each tag has an owner.
Validation	Validation in the context of WP4. The validation is done by manual testing for tagging clients. Responsible are WP4 developers. To validate this requirement it is needed to check whether all tags are publicly visible in the GUI.

ID	TR.TAGGING.100
Name	Editing of tags (TaToos)
Scope	TaToo shall provide a mean for editing, updating and deleting Tags (TaToos) by the owner or a privileged user (e.g. administrator).
Optional	
Trace	AR; TR04
Relevance/ Importance / Priority	H
Comments	Each tag has an owner.
Validation	Validation in the context of WP4. The validation is done by automated testing for tagging service. Responsible are WP4 developers. To validate this requirement it is needed to implement automated unit tests for each operation of the service, creation and deletion of tags, comparison, etc. Validation in the context of WP4 and WP5. The validation is done by manual testing for tagging tools and custom pilot applications. Responsible are WP4 developers, WP5 members, and end users. To validate this users shall test the tagging client applications, create, update, delete tags, compare the results, etc.

ID	TR.TAGGING.110
Name	Derive the structure of data records of a data source
Scope	TaToo should support the process of identifying searching and tagging terms from already available data structures. E.g. Derive structures from data records of a data source (XML Schema, Table Headers, WSDL, ...) to be used for searching and tagging. This has to be done manually.
Optional	TR.HARVEST.000
Trace	S3.3W2, S3.2W1
Relevance/ Importance / Priority	M
Comment	Requirement covered by TR.HARVEST.000
Validation	Validation in the context of WP5 and WP4. The validation is done by automated and manual testing for the harvester implementations. Responsible are WP4 developers and WP5 members. To validate this requirement it is needed to develop and tests harvesters to register WP5 resources.

ID	TR.TAGGING.120
Name	(Automatic) geo-tagging of data sources
Scope	TaToo shall support standard metadata for semi-automatic geo tagging of resources, i.e. to automatically derive the geographical location from the data source's content.
Optional	TR.DISCOVERY.020 and META.020
Trace	S3.3W2, S3.2W1, RT01
Relevance/ Importance / Priority	-
Comment	Only relevant for Validation Scenario 3 – specific to a scenario – but not a common requirement. Client side req. See also TR.DISCOVERY.020 and META.020
Validation	Validation in the context of WP5. The validation is done by manual testing for custom WP5 applications (e.g. climate twins viewer). Responsible are WP5 members and end users. To validate this requirement it is needed to test the functionality developed for the custom pilot application.

ID	TR.TAGGING.130
Name	Open Tagging
Scope	Tags can be freely defined by the user
Optional	
Trace	TR01
Relevance/ Importance / Priority	M
Comments	TaToo is considering close tagging. This means users can generally provide their tags as terms defined as concepts in the relevant Domain Ontologies. This allows taking advantage of semantics. Open Tagging i.e. free terms from users can also be allowed. Of course in this case semantics is not going to be exploited and only syntactic search is possible on free terms.
Validation	Validation in the context of WP4 and WP5. The validation is done by manual testing for tagging. Responsible are WP4 developers and WP5 members. To validate this requirement it is needed to make sure that users can define tags freely.

ID	TR.TAGGING.140
Name	Tagging of Tags
Scope	It shall be possible to tag tags, e.g. to rate or comment on tags provided by other users. Tags itself are treated as resources.
Optional	TR.ARCH.050
Trace	TR06
Relevance/ Importance / Priority	L
Comments	
Validation	Validation in the context of WP5. The validation is done by manual testing for archiving/storage. Responsible are WP5 members. To validate this requirement it is needed to provide means for evaluation of resources.

ID	TR.TAGGING.150
Name	Proposing new Tagging Terms
Scope	There must be a mechanism for proposing new tags. However, these must be duly considered and merged into the existing ontologies; otherwise multiple tags for the same meaning will emerge
Optional	TR.META.010
Trace	TR07
Relevance/ Importance / Priority	L

Comments	Related to TR.META.010 and TR.TAGGING.130
Validation	<p>Validation in the context of WP4. The validation is done by automated testing for the tagging and discovery services. Responsible are WP4 developers. To validate this requirement it is needed to tag with concepts from domain ontologies, perform search, and compare results.</p> <p>Validation in the context of WP4. The validation is done by manual testing for the tagging and discovery portlets. Responsible are WP4 developers. To validate this requirement it is needed to select domain ontology for tagging, tag resources with domain concepts, perform search, and compare results.</p> <p>Validation in the context of WP5. The validation is done by manual testing for the portal and custom pilot applications. Responsible are WP5 members and end users. To validate this requirement it is needed to tag and search with domain concepts.</p>

8. Access

Discovery and tagging often goes hand in hand with facilitating access to the discovered resources on the one side and accessing the meta-information (“tags”) maintained by TaToo about the resource of interest on the other side.

Access to TaToo meta-information which involves besides reading also creating and updating meta-information will take place in a regulated environment, the TaToo Semantic Service Environment and Framework, featuring well defined service interfaces and supporting standards-based access control mechanisms. In contrast, accessing the resource itself, especially if it is an application, a mathematical model or a service, may be way more complex. TaToo has therefore to provide appropriate meta-information on how to access the resource, including information about specific security restrictions that may apply when requesting access.

8.1. Access to TaToo meta-information

Context

Access to TaToo meta-information is characterised by the fact that it is either performed through public interfaces (user interfaces and service interfaces) exposed by the TaToo Service Environment and Framework and/or within the framework or the framework components (e.g. the TaToo portal accessing the clearinghouse) itself.

Standards-based access control mechanisms at interface level for access performed through public interfaces have to be established at least for those operations that add new or modify existing meta-information.

Terms and Definitions *(if applicable to explain terms used below e.g. in the description section)*

Access: To interact with a system entity in order to manipulate, use, gain knowledge of, and/or obtain a representation of some or all of a system entity's resources. [RFC 2828] Note: Difference between Discovery and Access not always clear. Source: <http://www.w3.org/TR/2004/NOTE-ws-gloss-20040211/#access>

Requirements (all, respectively the whole list of requirements)

ID	TR.ACCESS.000
Name	Access to stored meta-information
Scope	Access to meta-information (resource descriptions, annotations, validation information, ...) about resources. It shall be possible to obtain meta-information that has previously been attached to a resource. For example, the user should have possibility to see a detailed description for every resource found during discovery.
Optional	
Trace	S3.1W2; S3.2W2; VDS2.UC2.2; VDS2.UC2.5; VDS2.UC2.7; VDS3.UC3.4:
Relevance/ Importance / Priority	H
Comment	<p>Strong relation to discovery and search: search results may consist of stored meta-information. Access either by TaToo components (Portal) and third-party or pilot-specific applications (e.g. SVOD, Climate Twins Viewer).</p> <p>Example from VDS2.UC2.4: If found resource has already been evaluated by other users, the publisher portal shows a link (to the TaToo server) with the already inserted evaluations</p>
Validation	<p>Validation in the context of WP4. The validation is done by automated testing for tagging service. Responsible are WP4 developers. To validate this requirement it is needed to implement automated unit tests for each operation of the service, creation and deletion of tags, comparison, etc.</p> <p>Validation in the context of WP4 and WP5. The validation is done by manual testing for tagging tools and custom pilot applications. Responsible are WP4 developers, WP5 members, and end users. To validate this users shall test the tagging client applications, create, update, delete tags, compare the results, etc.</p>

ID	TR.ACCESS.010
Name	Storing meta-information
Scope	It shall be possible to attach meta-information to resources and store them.
Optional	See all TAG requirements
Trace	See all TAG requirements
Relevance/ Importance / Priority	H

Comment	User management is required in order to trace <i>who</i> (the “owner” of the tag) tagged the resource.
Validation	<p>Validation in the context of WP4. The validation is done by automated testing for tagging service. Responsible are WP4 developers. To validate this requirement it is needed to implement automated unit tests for each operation of the service, creation and deletion of tags, comparison, etc.</p> <p>Validation in the context of WP4 and WP5. The validation is done by manual testing for tagging tools and custom pilot applications. Responsible are WP4 developers, WP5 members, and end users. To validate this users shall test the tagging client applications, create, update, delete tags, compare the results, etc.</p>

ID	TR.ACCESS.020
Name	Manipulating stored meta-information
Scope	It shall be possible to manipulate (update/delete) meta-information previously attached to resources.
Optional	TR.TAGGING.100
Trace	S3.3W1;
Relevance/ Importance / Priority	H
Comment	Access control is required. Example from S3.3W1: TaToo could provide an authorised tool for editing (modelling) the main ontology of epidemiology statistics.
Validation	<p>Validation in the context of WP4. The validation is done by automated testing for tagging service. Responsible are WP4 developers. To validate this requirement it is needed to implement automated unit tests for each operation of the service, creation and deletion of tags, comparison, etc.</p> <p>Validation in the context of WP4 and WP5. The validation is done by manual testing for tagging tools and custom pilot applications. Responsible are WP4 developers, WP5 members, and end users. To validate this users shall test the tagging client applications, create, update, delete tags, compare the results, etc.</p>

8.2. Access to external resources

Context

An essential feature of TaToo is to not only provide access to meta-information about a resource but also the appropriate means to allow and ease the access to the resource itself. Uniform and transparent access to such disparate types of resources like databases, documents, services, models, etc. has to be supported and adequate meta-information about the various access mechanisms has to be provided.

Terms and Definitions (*if applicable to explain terms used below e.g. in the description section*)

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Requirements (*all, respectively the whole list of requirements*)

ID	TR.ACCESS.030
Name	Generic access to resources
Scope	<p>After the discovery of a resource TaToo shall facilitate the access to the actual content in various ways. Depending on the type of the resource concrete information on how to access the resource have to be provided to support various access mechanisms.</p> <p>Furthermore, access to the original resource might be required when the resource is initially registered in TaToo, either automatic (harvesting) or manually. See also TR.HARVEST.000</p> <p>Access methods to be supported are:</p> <ul style="list-style-type: none"> • through OGC service (WMS, WFS, ...); • through PyWrapper (a generic Python driven XML/CGI interface to heterogeneous databases); and • by download (e.g. http or ftp).
Optional	
Trace	VDS3.UC3.3; VDS3.UC3.4; VDS3.UC3.7: VDS3.UC3.7; RA03
Relevance/ Importance / Priority	H
Comment	<p>In the simplest case this could mean, for example, to provide a direct link to the resource and download the found resources in well known manner. Examples that could be realised as visualisation portlets:</p> <ul style="list-style-type: none"> • PDF viewer (Browser Plug-in) • OGC Service Viewer (e.g. WMS & WFS) <p>See also TR.HARVEST.000</p>
Validation	<p>Validation in the context of WP5. The validation is done by manual testing for tagging / visualisation tools and custom pilot applications. Responsible are WP5 members and end users. To validate this requirement it is needed to enable users to assess the supported access mechanisms (e.g. download link).</p>

ID	TR.ACCESS.040
Name	Registering new resources
Scope	<p>Besides the automatic registration of resources through crawlers, etc. users shall have the possibility to register resources with TaToo. The process of adding new resources to TaToo should automatically collect as much meta-information about the resources as possible without the need of further user intervention.</p> <p>Exemplified for resource types users want to register:</p> <ul style="list-style-type: none"> • geospatial data • model results • air – and water quality data • soil data • textual data and spreadsheets
Optional	TR.HARVEST.000
Trace	VDS UC.1.4; VDS2.UC2.1; VDS2.UC2.2; VDS3.UC3.8; UI07; UI08
Relevance/ Importance / Priority	H
Comment	Strong relation to TAG and HARVEST requirements: A resource must be registered before it can be tagged. See also TR.META.020 and TR.HARVEST.000
Validation	Validation in the context of WP5 and WP4. The validation is done by automated and manual testing for the harvester implementations. Responsible are WP4 developers and WP5 members. To validate this requirement it is needed to develop and tests harvesters to register WP5 resources.

9. Security

Since TaToo will facilitate discovery and access of a wide range of environmental resources and web-based services we have to think about how security can be provided in such an environment. Some of those services or resources may require a registration or usage fee, may be subject to copyright or lawful restrictions or may not be available to the public for some reason (Dihé et.al, 2010).

A service provider who is willing to make non-public services discoverable, accessible and tag-able by TaToo should be offered the possibility to control who can do what with his services. But not only the external services and resources accessed by TaToo may require protection. Also the access to TaToo's public services (e.g. tagging and search) must be regulated to prevent potential misuse.

9.1. Access control

Context

TaToo services, especially those services having public interfaces and allowing manipulation meta-information have to be access controlled. Access control encompasses registration / management of identities ("users"), their authentication ("login") and the enforcement of the access restrictions (authorisation).

Terms and Definitions (*if applicable to explain terms used below e.g. in the description section*)

Access control: Ability to enforce a policy that identifies permissible actions on a particular resource by a particular subject.

Source: Specification of the Sensor Service Architecture V3

Authentication: Concerns the identity of the participants in an exchange. Authentication refers to the means by which one participant can be assured of the identity of other participants.

Source: OASIS Reference Architecture for Service Oriented Architecture Version 1.0, <http://docs.oasis-open.org/soa-rm/v1.0/soa-rm.pdf>

Authorisation: Concerns the legitimacy of the interaction. Authorization refers to the means by which an owner of a resource may be assured that the information and actions that are exchanged are either explicitly or implicitly approved.

Source: OASIS Reference Architecture for Service Oriented Architecture Version 1.0, <http://docs.oasis-open.org/soa-rm/v1.0/soa-rm.pdf>

Policy: Representation of a constraint or condition on the use, deployment, or description of a resource.

Source: derived from OASIS Reference Architecture for Service Oriented Architecture Version 1.0, <http://docs.oasis-open.org/soa-rm/v1.0/soa-rm.pdf>

Requirements (*all, respectively the whole list of requirements*)

ID	TR.SECURITY.000
Name	Access control to system web services
Scope	In order to avoid access to unauthorized users, access to all the web services making up the system shall be access controlled and appropriate identity management, authentication and authorisation mechanisms have to be provided.
Optional	
Trace	S3.3W1, VDS3
Relevance/ Importance / Priority	M
Comment	Currently no specific requirements for authentication and authorisation mechanisms requested.
Validation	Validation in the context of WP4. The validation is done by automated testing for public services and access control services. Responsible are WP4 developers. To validate this requirement it is needed to implement automatic unit tests for security policies and access control.

ID	TR.SECURITY.010
Name	Identity and policy management
Scope	TaToo shall support different kinds of users (identities) having different levels of access rights. Management of users (identities) includes administration of user accounts and groups (create, update, delete) as well as the assignment of access rights (policies) and their management.
Optional	TR.USERMGT.000 and TR.USERMGT.010
Trace	VDS3
Relevance/ Importance / Priority	M
Comment	<p>Refer VDS3 for a list of requested types of users. Example for user type “domain expert” from VDS3.UC3.5: “This use case should allow domain experts to define certain quality criteria for resources like the reputation of the publishing institute, the measurement methods, used norms and standards etc.”</p> <p>This requirement is overlaying with TR.USERMGT.000 and TR.USERMGT.010</p>
Validation	<p>Validation in the context of WP4. The validation is done by manual testing for the user management component. Responsible are WP4 developers. To validate this requirement it is needed to validate the functionality to create and manage different user types and the implementation of the contracts.</p> <p>Validation in the context of WP4. The validation is done by manual testing for the user management component. Responsible are WP4 developers. To validate this requirement it is needed to test the correct implementation of permissions.</p>

ID	TR.SECURITY.020
Name	Access control to internal “system” data (MERM, bridge ontologies, ...)
Scope	A procedure must be established defining how internal data underlying dynamic modifications are updated. This procedure must include the management of the corresponding access rights.
Optional	
Trace	S3.3W1, VDS3
Relevance/ Importance / Priority	M
Comment	Authentication and authorisation requirements have to be aligned with the defined procedure
Validation	Validation in the context of WP4. The validation is done by manual testing for the user management component. Responsible are WP4 developers. To validate this requirement it is needed to validate the functionality to create and manage different user types and the implementation of the contracts. Validation in the context of WP4. The validation is done by manual testing for the user management component. Responsible are WP4 developers. To validate this requirement it is needed to test the correct implementation of permissions.

10. Archiving / Storage

All additional descriptive information provided for a specific resource (data, service, model, etc.) either via annotations, tagging of resources, ontologies etc. have to be stored at a central place and made available and accessible (if not secured) by everybody.

Context

The clearinghouse plays the role of organising the semantic information provided on environmental resources. It is a central component for accessing the semantic annotations storage and serves also as an information exchange support between the TaToo system components.

Terms and Definitions (*if applicable to explain terms used below e.g. in the description section*)

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Requirements (*all, respectively the whole list of requirements*)

ID	TR.ARCH.000
Name	Storage facility for semantic annotations
Scope	A repository is needed to store all semantic annotations provided on a resource.
Optional	
Trace	AR
Relevance/ Importance / Priority	H
Comment	
Validation	Validation in the context of WP4. The validation is done by automated testing for the archiving/storage component. Responsible are WP4 developers. To validate this requirement it is needed to test storage facilities and repositories.

ID	TR.ARCH.010
Name	Use of standard API to access to the Semantic repository
Scope	The semantic repository shall be accessed through standard interfaces (rdf2go)
Optional	
Trace	AR
Relevance/ Importance / Priority	H

Comment	
Validation	Validation in the context of WP4. The validation is done by automated testing for the archiving/storage component. Responsible are WP4 developers. To validate this requirement it is needed to implement automated tests for standard API access to the semantic repository.

ID	TR.ARCH.020
Name	Managing annotations in the knowledge base (KB)
Scope	The Core Framework shall provide methods for adding, updating and deleting annotations.
Optional	
Trace	AR
Relevance/ Importance / Priority	H
Comment	
Validation	Validation in the context of WP4. The validation is done by manual testing for the archiving/storage component. Responsible are WP4 developers. To validate this requirement it is needed to do manual tests for annotation management in the knowledge base.

ID	TR.ARCH.030
Name	Consistency of the knowledge base (KB)
Scope	The KB must be consistent after update/delete/insert operations.
Optional	
Trace	AR
Relevance/ Importance / Priority	H
Comment	
Validation	Validation in the context of WP4. The validation is done by manual testing for the archiving/storage component. Responsible are WP4 developers. To validate this requirement it is needed to do manual tests for consistency of the knowledge base.

ID	TR.ARCH.040
Name	User profile and context
Scope	TaToo shall provide storage for semantic representation of the user profile and contextual relations (domain the user is working, etc.)
Optional	
Trace	AR
Relevance/ Importance / Priority	H
Comment	
Validation	Validation in the context of WP4 and WP5. The validation is done by manual testing for the archiving/storage component. Responsible are WP4 developers and WP5 members. To validate this requirement it is needed check user profile and context functionality.

ID	TR.ARCH.050
Name	Evaluation of resources
Scope	The system shall provide storage of evaluation of resources that will be represented semantically
Optional	
Trace	AR
Relevance/ Importance / Priority	H
Comment	
Validation	Validation in the context of WP5. The validation is done by manual testing for archiving/storage. Responsible are WP5 members. To validate this requirement it is needed to provide means for evaluation of resources.

ID	TR.ARCH.060
Name	Storing/Archiving of tags
Scope	Realisation of the store / archive mechanism for resource annotations provided by the users.
Optional	
Trace	AR
Relevance/ Importance / Priority	H
Comment	See also TR.ARCH.000
Validation	Validation in the context of WP4. The validation is done by automated testing for the archiving/storage component. Responsible are WP4 developers. To validate this requirement it is needed to test storage facilities and repositories.

11. Data quality

Context

In order to increase the quality of information, indicators about data quality and uncertainty should be provided to TaToo users. According to the indicators, users are able to identify whether the information they provided is applicable to the TaToo System or not.

The quality criteria have to come from domain expert and could be commented further on by other users.

Terms and Definitions (*if applicable to explain terms used below e.g. in the description section*)

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Requirements (*all, respectively the whole list of requirements*)

ID	TR.DAQ.000
Name	Uncertainty Processing
Scope	TaToo should provide a mean to process uncertainty information associated with a resource and provide an indicator for overall level of uncertainty of this resource.
Optional	
Trace	VDS3.UC3.4; VDS3.UC3.5
Relevance/ Importance / Priority	H
Comment	Note the description of VDS3.UC3.5: This use case should allow domain experts to define certain quality criteria for resources like the reputation of the publishing institute, the measurement methods, used norms and standards etc. The user should have the possibility to assess the different criteria with a value. Based on the different weighted criteria an uncertainty propagation level will be calculated and visualised in graphical and numerical way.
Validation	Validation in the context of WP3/4 and WP5 in particular through the third Validation Scenario from MU. The validation is done by manual testing for the data quality component. Responsible are WP5 members. To validate this requirement it is needed evaluate implemented means of uncertainty processing.

ID	TR.DAQ.010
Name	Ranking Indicators
Scope	TaToo should provide a mean to process user (expert) information on a resource for providing a ranking indicator.
Optional	
Trace	VDS3.UC3.4 VDS3.UC3.5
Relevance/ Importance / Priority	L
Comment	
Validation	Validation in the context of WP4 and WP5. The validation is done by manual testing for the data quality component. Responsible are WP4 developers and WP5 members. To validate this requirement it is needed to evaluate usage and correctness of ranking indicators.

12. User components

TaToo is providing tools user components (portal, tools, clients) to allow a set of functionalities. E.g. it allows the tagging functionality thus enabling the enrichment process, which in turn enables the semantically enhanced search and discovery process.

In the context of TaToo, the term tool is intended as a front-end component, generally with a graphical user interface, which allows the user (residing in the Presentation tier) to interact with the system taking advantage of the provided functionality. A TaToo tool acts as a (Web) client of a Server side TaToo (Web) services.

It is possible to consider a TaToo tool as a portal providing a set of functionality through a set of configurable portlets, or the single portlet itself. A TaToo tool can also be a browser plug-in (for instance, implementing a tool bar) or a client side application.

12.1. Web-Portal

TaToo framework shall be accessible and exploitable through a Web portal. This makes possible taking advantage of the provided functionality theoretically without any other need apart from a Web browser and an Internet connection.

Portlet technology allow us to develop applications by aggregation of pluggable user interface software components that are managed and displayed in a web portal and executed into a portlet container.

Terms and Definitions (*if applicable to explain terms used below e.g. in the description section*)

Portal: A web portal is a web based application that provides personalization, single sign-on, and content aggregation from different sources, and hosts the presentation layer of information systems.

A portlet container runs and contains portlets, provides them the appropriate runtime environment, manages their life cycles, provides them persistent storage mechanisms for the portlet preferences and receives requests from the portal to execute requests on them.

Requirements (*all, respectively the whole list of requirements*)

ID	TR.PORTAL.000
Name	Web Portal
Scope	<p>TaToo shall provide a web portal and web-based client applications for all public TaToo services.</p> <p>This makes possible to take advantage of the provided functionality theoretically without any other need apart from a Web browser and an Internet connection.</p>
Optional	
Trace	AR; UI01
Relevance/ Importance / Priority	H
Comment	
Validation	Validation in the context of WP4. The validation is done by manual testing for the web portal. Responsible are WP4 developers. To validate this requirement it is needed to do manual tests to validate web portal functionality.

ID	TR.PORTAL.010
Name	Web Portal Access Control
Scope	Access to the Web portal shall be controlled. User has to be authenticated and authorized before being able to take advantage of the functionality.
Optional	
Trace	
Relevance/ Importance / Priority	H
Comment	Different AuthN and AuthZ approaches can be considered / adopted
Validation	Validation in the context of WP4. The validation is done by manual and automated testing for the web portal. Responsible are WP4 developers. To validate this requirement it is needed to do manual and automated tests for verifying access control of TaToo web portal.

ID	TR.PORTAL.020
Name	Web Portal User Role
Scope	User access to portal functionality shall be granted depending on the user role.
Optional	
Trace	
Relevance/ Importance / Priority	M
Comment	
Validation	Validation in the context of WP4. The validation is done by manual and automated testing for the web portal. Responsible are WP4 developers. To validate this requirement it is needed to do manual and automated tests for verifying access control of TaToo web portal.

ID	TR.PORTAL.030
Name	Community Building
Scope	Since personal contacts and conferences are mentioned very often as source for the discovery of new resources, TaToo should establish a platform for community building and exchange of experts' knowledge.
Optional	
Trace	RD04
Relevance/ Importance / Priority	M
Comment	
Validation	Validation in the context of WP5. The validation is done by manual testing for the web portal. Responsible are WP5 members and end users. To validate this requirement it is needed to enable users to assess the community building facilities of the portal.

ID	TR.PORTAL.040
Name	Personalisation
Scope	The portal should be easily manageable by the end user, in order to create its personal environment. This involves authN and authZ aspects.
Optional	
Trace	
Relevance/ Importance / Priority	M
Comment	
Validation	Validation in the context of WP5. The validation is done by manual testing for the web portal. Responsible are WP5 members and end users. To validate this requirement it is needed to enable users to assess the personalisation facilities of the portal.

12.2. Clients and tools

Context

TaToo (Tagging Tools) is providing clients and tools to provide a set of functionalities. E.g. it provides the tagging functionality, thus enabling the enrichment process, which in turn enables the semantically enhanced search and discovery process.

In the context of TaToo, the term tool is intended as a front-end component, generally with a graphical user interface, which allows the user (residing in the Presentation tier) to interact with the system taking advantage of the provided functionality. A TaToo tool acts as a (Web) client of a Server side TaToo (Web) services.

It is possible to consider a TaToo tool as a portal providing a set of functionality through a set of configurable portlets, or the single portlet itself. A TaToo tool can also be a browser plug-in (for instance, implementing a tool bar) or a client side application.

Terms and Definitions (*if applicable to explain terms used below e.g. in the description section*)

Portlet: A portlet is a web component that processes requests and generates dynamic content. The content generated by a portlet is called a fragment, a piece of markup (e.g., HTML, XHTML, or WML (Wireless Markup Language)) adhering to certain rules. Web clients interact with portlets via a request/response paradigm implemented by the portal.

Requirements (*all, respectively the whole list of requirements*)

ID	TR.TOOL.000
Name	Tagging Client for Web Browser (Plug-In)
Scope	TaToo shall develop a Tagging Client in order to provide tagging functionality directly from the Browser. (e.g. Similar to SideWiki)
Optional	
Trace	S1W2; UI04
Relevance/ Importance / Priority	M

Comment	We must have at least one client for tagging service (high priority). The priority for this kind (as a plug-in) of client is currently unclear.
Validation	Validation in the context of WP4 and WP5. The validation is done by manual and automated testing for the tagging client. Responsible are WP4 developers and WP5 members. To validate this requirement it is needed to perform automated and manual tagging client testing by developers (automated) and evaluation scenarios (manual).

ID	TR.TOOL.005
Name	Tagging Portlet for Web Portal
Scope	TaToo shall develop a Tagging Portlet in order to provide tagging functionality within the Web Portal
Optional	
Trace	S1W2; UI04
Relevance/ Importance / Priority	M
Comment	There must be at least one portlet for the tagging within the Web Portal. More portlets can be designed in V2
Validation	Validation in the context of WP4 and WP5. The validation is done by manual for the portal. Responsible are WP4 developers and WP5 members (and end users). To validate this requirement it is needed to test the tagging functionality of the portlet.

ID	TR.TOOL.010
Name	Resource Evaluation Viewer/Editor
Scope	GUI application for viewing the resource evaluation and entering resource evaluations (evaluation is a special type of TaToo?) <ul style="list-style-type: none"> - view information - enter evaluation - view further evaluation (e.g. links relevant TaToo classified resources or ontology relevant to the resource itself).
Optional	
Trace	VDS2.UC2.6; VDS2.UC2.7 S1W2; S2W2;
Relevance/ Importance / Priority	M

Comment	<p>Similar to: - Arbitrary Web Sites- TaToo functionality embedded in arbitrary websites. Store or view tags in any web application, e.g. in search engine results pages or pilot websites: ClimateTwins Viewer http://foresight.ait.ac.at/projects/climatetwins/ AGRI4CAST http://agsys.cra-cin.it/tools/</p>
Validation	<p>Validation in the context of WP5 in particular through the second Validation Scenario from JRC. The validation is done by manual testing for the resource evaluation viewer. Responsible is JRC. To validate this requirement it is needed to evaluate the functionality of the user component.</p>

ID	TR.TOOL.020
Name	Resource Metadata Builder
Scope	TaToo shall provide a GUI application that allows users to manage/edit specialized information models for resource description
Optional	
Trace	VDS2.UT2.1;
Relevance/ Importance / Priority	M
Comment	Required technical and nontechnical functionality of Validations Scenario 2
Validation	Validation in the context of WP5 in particular through the second Validation Scenario from JRC. The validation is done by manual testing for the resource metadata builder. Responsible is JRC. To validate this requirement it is needed to evaluate the functionality of the user component.

ID	TR.TOOL.030
Name	System-Administration
Scope	Client (GUI) application for system administration is needed
Optional	
Trace	
Relevance/ Importance / Priority	M

Comment	<p>Similar to: - Arbitrary Web Sites- TaToo functionality embedded in arbitrary websites. Store or view tags in any web application, e.g. in search engine results pages or pilot websites: ClimateTwins Viewer http://foresight.ait.ac.at/projects/climatetwins/ AGRI4CAST http://agsys.cra-cin.it/tools/</p>
Validation	<p>Validation in the context of WP5 in particular through the second Validation Scenario from JRC. The validation is done by manual testing for the client application. Responsible is JRC. To validate this requirement it is needed to test client application functionality.</p>

ID	TR.TOOL.040
Name	Search Client for Web Browser (Plug-In)
Scope	TaToo shall develop a Search Client in order to provide discovery functionality directly from the Browser. (e.g. Similar to SideWiki)
Optional	
Trace	S1W2; UI04
Relevance/ Importance / Priority	M
Comment	We must have at least one client for discovery service (high priority). The priority for this kind (as a plug-in) of client is currently unclear.
Validation	Validation in the context of WP4 and WP5. The validation is done by manual testing for the search client. Responsible are WP4 developers and WP5 members. To validate this requirement it is needed to test the search client for web browser (plug-in).

ID	TR.TOOL.050
Name	Search Portlet for Web Portal
Scope	TaToo shall develop a Search Portlet in order to provide discovery functionality within the Web Portal
Optional	
Trace	S1W2; UI04
Relevance/ Importance / Priority	M

Comment	There must be at least one portlet for the discovery within the Web Portal. More portlets can be designed in V2
Validation	Validation in the context of WP4. The validation is done by manual testing for the portal. Responsible are WP4 developers. To validate this requirement it is needed to perform discovery functionality tests for web portal.

ID	TR.TOOL.060
Name	Tagging Client for mobiles
Scope	TaToo shall investigate over Clients that support mobiles, in order to provide tagging functionality to the end user.
Optional	
Trace	S1W2; UI04
Relevance/ Importance / Priority	L
Comment	Addresses review recommendation
Validation	Validation in the context of WP4 and WP5. The validation is done by manual testing for the tagging client. Responsible are WP4 developers and WP5 members. To validate this requirement it is needed to test tagging client functionality on mobile phones.

ID	TR.TOOL.070
Name	Search Client for mobiles
Scope	TaToo shall investigate over Clients that support mobiles, in order to provide discovery functionality to the end user.
Optional	
Trace	S1W2; UI04
Relevance/ Importance / Priority	L
Comment	Addresses review recommendation
Validation	Validation in the context of WP4. The validation is done by manual testing for the portal. Responsible are WP4 developers. To validate this requirement it is needed to perform discovery functionality tests for web portal.

13. Visualisation

In order to evaluate resources and then provide appropriate tags / annotations for them, the user should be supported by tools, applications, or other types of user components, able to provide for the discovered resources a ‘representation’ the user is able to understand / process.

Context

The resources that TaToo is considering are usually identified by URIs. Once discovered, the resource URI has to be dereferenced and the obtained resource representation has to be either visualised (e.g. a picture, diagrams, or a document), or somehow elaborated (e.g. a set of raw data).

Some tools for visualizing resources are commonly available and they are pre-installed on the user machine, e.g. applications to display MS Word documents or PDF files. Some others have to be created from scratch as they are supposed to be used with custom or proprietary file formats.

In general, TaToo will take care about specific requirements the Validation Scenarios may have regarding the visualisation of the resources they need to access.

Note: It is nearly impossible to design and implement a web-based application able to visualise any resources and to let, at the same time, the user apply tags and semantic annotations to that resource. For this reason, the major strategy will be to design the visualisation part of the TaToo system as an extensible application that could be enhanced in its functionalities, e.g. by specific plug-ins.

Terms and Definitions (*if applicable to explain terms used below e.g. in the description section*)

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Requirements (all, respectively the whole list of requirements)

ID	TR.VISUAL.000
Name	Search & Discovery User Interface
Scope	<p>Search and discovery user interface (shall support the discovery strategies listed in “Discovery Strategies” requirement.</p> <p>Examples:</p> <ul style="list-style-type: none"> - entry field for discovery query - pull-down menu for choosing domain (e.g. cancer discovery) - map for choosing geospatial area of interest - slider for choosing time range, uncertainty range - check buttons for similarity and/or relationship search. <p>The search results should contain information about:</p> <ul style="list-style-type: none"> - Name of the found resource - Type of the found resource (e.g. word doc, pdf, web-service, etc) - Uncertainty indicator - Relevance indicator - Action control bar (for related action on a result)
Optional	
Trace	VDS3.UC3.4 (stemming from cancer discovery mock-up Validations Scenario 3); RD01
Relevance/ Importance / Priority	H
Comment	<p>TaToo should offer a search tool for general as well as more advanced search (e.g. search categories, logical filters) with explicit focus on environmental resources. -> TaToogle!</p> <p>Note: VDS3.UC4 indicates uncertainty, relevance, and similarity of resources.</p> <p>Note: GUI for Portal in WP3 and WP4. All other GUIs to be implemented in WP5 (as needed)</p>
Validation	<p>Validation in the context of WP5. The validation is done by manual testing for the discovery portlets and custom pilot applications. Responsible are WP5 members and end users. To validate this requirement it is needed assess whether both the generic (through the portal) as well as the custom (integrated into the pilot’s applications) search GUIs fit their needs.</p> <p>Validation in the context of WP5. The validation is done by manual testing for the discovery portlets and custom pilot applications. Responsible are WP5 members and end users. To validate this requirement it is needed to assess the usability and user-friendliness of the search GUIs.</p>

ID	TR.VISUAL.010
Name	Action (Resource) Controls in Application GUI
Scope	<p>TaToo GUI applications shall provide context-dependent handles for triggering actions depending e.g. on the resource type returned by discovery process. Actions can be triggered (for example via control buttons, control keys), e.g. in order to:</p> <ul style="list-style-type: none"> - Bookmark a resource - Add Resource to Compare List - Related Resource Discovery - Similar Resource Discovery - Annotate a resource
Optional	
Trace	VDS3.UC3.4 (stemming from cancer discovery mock-up Validations Scenario 3)
Relevance/ Importance / Priority	M
Comment	
Validation	<p>Validation in the context of WP5 in particular through the Validation Scenario 3 from MU. The validation is done by manual and automated testing for the visualisation component. Responsible are WP5 members. To validate this requirement it is needed to provide automated tests for controls, function checks (test plan), usability tests, and feedback from Validation Scenarios.</p>

ID	TR.VISUAL.020
Name	Resource Description Presentation
Scope	<p>TaToo GUI applications shall provide means to present the resources (e.g. the resources found in discovery process) in a resource-type dependent manner. : the type-invariant part of the presentation could for instance contain textual information on:</p> <ul style="list-style-type: none"> - General Description - Domain Description - Uncertainty Information - Validation Information - link to application(s) capable of presenting/processing/manipulating this type of resources <p>The resource type dependent part of the presentation could be e.g.</p> <ul style="list-style-type: none"> - bar- or linegraph diagram for time series; - Statistics or polar diagrams for uncertainty visualisation; Map presentation for resources with geo-spatial context
Optional	
Trace	VDS3.UC3.4; VDS3.UC3.5; VDS3.UC3.6;
Relevance/ Importance / Priority	H

Comment	
Validation	Validation in the context of WP4 and WP5. The validation is done by manual and automated testing for the GUI of WP4 portal and GUI of WP5 applications. Responsible are WP4 developers and WP5 members. To validate this requirement it is needed to provide automated tests, check correctness (test plan), and get feedback from Validation Scenarios.

ID	TR.VISUAL.030
Name	Tagging User Interface
Scope	This user interface shall provide frames with entry fields for annotation on discovered resources.
Optional	TR.TAGGING.050
Trace	AR
Relevance/ Importance / Priority	H
Comment	Requirement covered by TR.TAGGING.050
Validation	Validation in the context of WP4 and WP5. The validation is done by manual testing for tagging tools and custom pilot applications. Responsible are WP4 developers, WP5 members, and end users. To validate this users shall test the tagging client applications, create, update, delete tags, compare the results, etc.

ID	TR.VISUAL.040
Name	Tag Visualisation
Scope	Tags shall be visualised on the portal
Optional	
Trace	VDS2.UC1.3; VDS2.UC1.4
Relevance/ Importance / Priority	H
Comment	
Validation	Validation in the context of WP4. The validation is done by manual testing for the visualisation component. Responsible are WP4 developers. To validate this requirement it is needed to perform correctness tests for different kinds of tag visualisation.

ID	TR.VISUAL.050
Name	Data Quality, Ranking and Uncertainty Representation
Scope	The discovery tool shall offer the possibility to display data quality information by using an appropriate symbology.
Optional	
Trace	AR; VDS3; RA02
Relevance/ Importance / Priority	H
Comment	
Validation	Validation in the context of WP4. The validation is done by manual testing for the visualisation component. Responsible are WP4 developers. To validate this requirement it is needed to test the correctness of displayed data.

ID	TR.VISUAL.060
Name	Web Interface
Scope	Web interface to TaToo providing a User Access Point to the system. The User should be able to access TaToos without the need of installing a GUI client application.
Optional	
Trace	AR; VDS3; RA02
Relevance/ Importance / Priority	M
Comment	
Validation	Validation in the context of WP4 and WP5. The validation is done by automated testing for the visualisation component. Responsible are WP4 developers. To validate this requirement it is needed to provide automated tests for controls, function checks (test plan), usability tests, and feedback from Validation Scenarios.

ID	TR.VISUAL.070
Name	Visualisation & Filtering
Scope	<p>The Visualisation and Filtering Tagging Processor is one of the components, which are defined as Tagging Processors and are responsible for processing different kinds of tags. It belongs to the TaToo Core Component Building Block, as defined in the TaToo Framework Architecture Overview.</p> <p>The main objectives of this component are:</p> <ul style="list-style-type: none"> - Preparation of tags for visualisation to the user. - Filtering operations requested by the user. - Support for input of meta-information in XML format <p>The filtering component is responsible for filtering tags / annotations in form of specifying SPARQL queries and is used as an additional tagging processor. The visualisation functionality does not mean that the component visualises something to an end-user, but that filtering output is prepared by the component in a manner that it can be visualised (e.g. by a portlet).</p>
Optional	
Trace	VDS2.UC1.3; VDS2.UC1.4
Relevance/ Importance / Priority	H
Comment	
Validation	Validation in the context of WP4. The validation is done by manual and automated testing the visualisation component. Responsible are WP4 developers. To validate this requirement it is needed to perform manual tests for visualisation and automated tests for filtering functionality.

13.1. Data representation

Context

Data obtained from search results must be presented in a proper and attractive way for the TaToo users,. The representation of such data in the TaToo Portal has to provide a context sensitive view on the information to be investigated. This involves issues such as:

- Representation of semantic environment (available ontology)
- Representation of tags
- Representation of meta-information (e.g. expert comments)
- Representation of time series of tags

- Representation of quality or/and uncertainty information

Terms and Definitions (*if applicable to explain terms used below e.g. in the description section*)

Requirements (*all, respectively the whole list of requirements*)

Note: To be discussed further on and more precise requirements will be include in the next version of this document.

ID	TR.REPR.000
Name	Evaluation of annotations
Scope	It should be possible to evaluate Tags related to a resource at a specific point in time or over a period of time
Optional	
Trace	
Relevance/ Importance / Priority	M
Comment	
Validation	Validation in the context of WP5. The validation is done by manual testing for the data representation. Responsible are WP5 members. To validate this requirement it is needed to perform checks to guarantee that evaluation has been performed correctly and the right tag has the right evaluation.

ID	TR.REPR.010
Name	Results analysis support
Scope	TaToo should assist the user to identify from the discovered set of resources the more relevant ones. (E.g. refined search, faceted search).
Optional	
Trace	S3.1W3
Relevance/ Importance / Priority	M
Comment	
Validation	Validation in the context of WP4. The validation is done by manual testing for the data representation. Responsible are WP4. To validate this requirement it is needed to provide usability tests and automated tests to check the relevance.

14. System administration

Context

TaToo should provide functionalities for administrating the system, together with a simple client side component (GUI) or a specific portlet accessible only to authorized users. Administration functionalities includes: system general maintenance, monitoring, configuration, management of users or user groups, etc.

Terms and Definitions (*if applicable to explain terms used below e.g. in the description section*)

Requirements (*all, respectively the whole list of requirements*)

ID	TR.SYSADMIN.000
Name	Remote System Administration
Scope	A specific TaToo installation (a deployed system) shall be remotely administrated. This include: <ul style="list-style-type: none"> - start, stop, restart services e.g. tagging service, discovery service and the portal server - monitor system resource information (e.g. server load, disc space etc.)
Optional	
Trace	AR
Relevance/ Importance / Priority	H
Comment	
Validation	Validation in the context of WP4. The validation is done by manual testing for the system administration. Responsible are WP4 developers. To validate this requirement it is needed to test and validate the accessibility and availability of the system, as well as start, stop, restart of services.

ID	TR.SYSADMIN.010
Name	Safe System Administration
Scope	Administration activities shall not interfere with the on-going provisioning of functionalities to users taking advantage of the system (apart from request to start, stop, or restart the system)
Optional	
Trace	AR
Relevance/ Importance / Priority	H

Comment	
Validation	Validation in the context of WP4. The validation is done by manual testing for the system administration. Responsible are WP4 developers. To validate requirement it is needed to provide security and safety tests and tests to guarantee non-interference.

14.1. User management

Context

User Management, Authentication, and Authorisation are functionalities necessary to control access to the TaToo framework. In general, different users play different roles and are allowed to use the framework functionality in a way depending on the rights granted to their specific role.

On top of User Management, Authentication and Authorisation effective security mechanisms can be established to protect vulnerable resources or sensitive data. (See also chapter access control and security).

Terms and Definitions (*if applicable to explain terms used below e.g. in the description section*)

User Types: Different kind of users related to their expertise (i.e. domain experts, system administrator, researchers, etc.)

Requirements (*all, respectively the whole list of requirements*)

ID	TR.USERMGT.000
Name	Management of different user types
Scope	<p>The TaToo system should be able to deal with and manage different types of user:</p> <p>For example:</p> <ul style="list-style-type: none"> - scientific or domain experts, System administrator - researchers - others e.g. public or decision makers <p>Note: According to the user type it shall be possible to add or remove criteria (see figure 10 in VDS3), add or remove tags, comments or descriptions.</p>
Optional	
Trace	VDS3.UC3.4; VDS3.UC3.5; VDS3.UC3.6;
Relevance/ Importance / Priority	M
Comment	See also section Security (TR.SECURITY.010)
Validation	Validation in the context of WP4. The validation is done by manual testing for the user management component. Responsible are WP4 developers. To validate this requirement it is needed to validate the functionality to create and manage different user types and the implementation of the contracts.

ID	TR.USERMGT.010
Name	Management of permissions
Scope	The TaToo system should be able to deal with different permissions for different users or user groups.
Optional	
Trace	AR
Relevance/ Importance / Priority	M
Comment	See also section Security (TR.SECURITY.010)
Validation	Validation in the context of WP4. The validation is done by manual testing for the user management component. Responsible are WP4 developers. To validate this requirement it is needed to test the correct implementation of permissions.

15. Documentation

Context

TaToo should provide sufficient documentation for targeted end-users. I.e. users should be able to gather all needed knowledge about TaToo components and their usage from TaToo's documentation.

Terms and Definitions (*if applicable to explain terms used below e.g. in the description section*)

Requirements (*all, respectively the whole list of requirements*)

ID	TR.DOC.000
Name	TaToo user documentation
Scope	Extensive and understandable documentation for users regarding: <ul style="list-style-type: none"> - how to access the TaToo repository, - how to use the web services - variables the web services need in order to fulfil a request, - the SPARQL syntax that the query needs to use in order to transfer the tag and resource information.
Optional	
Trace	S1W5
Relevance/ Importance / Priority	H
Validation	Validated in WP5. Validation Scenarios are responsible for providing feedback regarding the documentation.

16. Conclusion

The third and final version of the requirements document provides a full set of requirements resulting from three requirements iteration steps according to the spiral development model adopted in the TaToo project. Thus this last version adds some new requirements and updates stemming from an internal final Needs and Gaps Analysis and Technology Survey as well as from feedback sessions held with the three TaToo Validation Scenarios.

Furthermore, all requirements were discussed in several project meetings within dedicated working groups. The present Requirements Deliverable forms the basic document for all the developments within the architectural, specification and implementation cycles of the TaToo project, especially for all the tasks in Workpackage 3 and Workpackage 4.

17. Acknowledgements

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