

# **An Interdisciplinary Approach for Cultural Heritage Valorisation and Visualization**

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## **Abstract**

City-Zen is an interactive temporal knowledge-browsing platform that aims to valorise cultural heritages. While many organizations propose relevant data sets, they are hardly accessed, analysed and reused because of the formats inconsistency and the inappropriate information browsing and visualization. The goal of the project is to valorise the existing cultural heritage through a citizen centric design platform. The use case of this project involves a user willing to discover the history of a region and to embark in a cultural journey in the past. This project addresses a novel approach of data analysis of both assessment methods of data quality and spatio-temporal information. The proposed paper will describe the approach, its model and its implementation tests in the context of the State of Wallis.

## **Introduction**

Nowadays multiple data and information sources are accessible and the simple fact of having to access, combine and analyse

these data requires companies to have handled several general s, models and data formats. Consequently, these last years the problem of data integration has seen a large number of scientific lean on (Sokhn, 2011). Integrating data from multiple heterogeneous sources leads to the coexistence of different data models and scheme and therefore different query languages. This situation raises the issue of heterogeneous data integration, management and retrieval. To deal with this issue, classical approaches exists such as wrapper mediator architectures where the wrappers are responsible to adapt local data such that they adhere to the common data model once exported and the mediator stores a global integrated schema and its relationships to the local scheme exported by the wrappers and recently approaches based on peer data management where no common global schema is required where the emphasis goes to the data co-existence providing base functionality over all data sources, regardless of how they are integrated (Mauroux, 2006; Aberer, 2011) have been proposed. This paper describes an original approach where our platform provide a semantic web oriented data model which acts as central repository and that deals with cases of incorrect and incomplete information by using the social web through active users engagement and data qualities metrics. In the following sections first, issues will be discussed; second, methods will be explained; third, platform will be described; fifth, data qualities metrics are detailed.

## **Issues**

A driving force behind the development of novel services tailored to the needs of citizens is the increasing flexibility of social time. This has resulted, in the tourism area, in a stagnation of the number of long stay holidays while, at the same time, the number and relevance of short stays has grown significantly. Unlike long stays, which are more focused on the binomial sea-mountain, short stays focus on rural towns pair space (Cuvelier, 1998; Cazes, 2001). These new tourist flows are major resources for regional development, particularly in urban areas. In contrast to conventional tourist stays and interest, these short stays are no longer restricted anymore to only religious buildings, political or military points. Rather, the entire neighbourhoods of tourist destinations are now the subject of beautification strategies whose aim is to increase their attractiveness. Even though citizens (residents) may possess valuable information for other citizens visiting their home area as tourists, it is hardly usable

with today's information systems because of the inevitably scattered information resources. The quality of data is not enough studied and the final user do not have always the needed information with sufficient and adequate performance.

The goal of the project is to valorise the existing cultural heritage through a citizen centric design platform. The use case of this project involves a user willing to discover the history of a region and to embark in a cultural journey in the past. To date this goal, this project addresses (1) the data integration by making use of existing approaches to crawl and link accessible or user-generated content, (2) a novel approach of data analysis of both assessment methods of data quality and spatio-temporal information, (3) the data visualization by taking advantages of existing approaches of knowledge visualization.

## **Methods**

In order to achieve the vision of City-Zen the components described above are essential. A knowledge sharing approach will be explored through : Data integration (Heterogeneous databases, Knowledge linking and Data analyser), Temporal multimedia browser (Data and knowledge based queries and profile-context based push up notification), and Knowledge visualization (Personalized based knowledge visualization and mobile adapted visualization and navigation).

Even if each of the described components may require a distinct research and development approach, for the overall methodology, the "Design Science Research Methodology" (DSRM) is, used The DSRM process includes the following steps: identifying issues and motivation in order to accurately plan the implementation of our proposed solution.

Defining the goals and objectives: Given the issues and motivations defined earlier, we infer the objectives of the solution in order to answer the needs and solve the problems. The objective of this step is to define the criteria against which we will be able to evaluate the solution once it is implemented.

Designing & implementing: designing the system architecture and its components concerns this step. Some elements of the architecture can be implemented just by reusing existing knowledge and technologies, but others, and given the research questions, will need to be developed.

Testing: this step is directly related to the previous and it starts sometimes with the step of design. It concerns the design and development of the proof of concept that will demonstrate the defined use cases.

Evaluating and analysing: this step is concerned with assessing whether the proposed solution meets its defined objectives. Objectives of this step are:

- Technical: to evaluate the accuracy of the results as an objective measure, the flexibility to browse the information space and the performance of the queries.
- Human: to evaluate the usability of the system and the accuracy of the results as a human evaluation given the human mental model for the decision.
- Disseminating: the objectives of this step are to disseminate knowledge through scholarly publications. It will take the form of regular reports and deliverables as well as peer reviewed articles in conferences related to diverse domains: web of data, knowledge visualization, data integration, tourism management and innovation.

## **Platform Architecture**

The platform will start by taking advantages of existing data coming from existing resources such as vallesiana, notrehistoire, instagram, etc. For this, we will apply existing algorithms whenever possible to gather data (as data extraction is not in the scientific focus of the City-Zen project). The platform will address the processes of converting, linking, mapping and cleaning information in order to link citizens' information/knowledge (such as photos, stories, tangible objects, etc.) to the web of data (web pages, Linked open data, social sites, etc.). This aspect is combined with the dimensions of quality applied to historical archives. It focuses mainly on the definition of quality dimensions and the methods that assure their measurement based on specific indicators and variables in the context of historical archives (Makhlouf Shabou, 2011, 2014).

The platform is oriented towards citizens and will integrate their data, as they will become available. The platform will offer adequate methods and appropriate visual interfaces in order to best answer the goal of our project. For this proposal project, we assume that the data from the citizens is available. To tackle this aspect, the project integrates a gamification approach to motivate citizens to upload their data and share their knowledge. This module will be integrated to the platform in a second phase.

The platform aims to take advantages of the activities done over this platform, to that end City-Zen aims to support their users by introducing adequate dashboards to give decision makers insights allowing them to (i) monitoring critical business processes when performance does not meet goals, (ii) managing the underlying reasons of problems, and (iii) managing processes and resources to help improving decision-making and optimizing their performance.

The sought for scientific outcome is concentrated on implementing integration and linking algorithms on cultural heritage data sets and demonstrating advanced browsing through spatial, temporal and profile based querying. The different modules that will be developed will be demonstrated through a mobile application show casing the querying methods available through a friendly user interface. A city will be chosen to play the role of pilot for this project.

### **Data Quality Assessment Specification: Metrics & Ranking**

City-Zen's project is an application determined to develop the culture in the City of Sion in the Canton of Valais. For this project to be well structured, we have to determine the specifications for the measurement of the information quality of the data that's going to be used. The information quality criteria's nomenclature will contribute to the construction of the type of usability that the user will perceived when he's will use the City-Zen's mobile application.

### **Methodological Consideration**

#### **Criteria Identification**

Each criteria has been identified by using different documentation related to the measurement of quality dimensions applied to electronic records and archives. Two types of

information quality criteria were determined: the general information qualities applied on information sources and the specific qualities that could be applied on information content. The assessment of this information qualities criteria were performed in the thesis *Étude sur la définition et la mesure des qualités des archives définitives issues d'une évaluation* (Basma Makhoulf Shabou, 2011) and in *QADEPs's Définition et mesure des qualités des archives et documents électroniques* (Makhoulf Shabou, Mellifluo, Rey, 2013). According to this thesis and in discussion with the City-Zen's team, a selection has been established amongst these quality criteria based on electronic archiving and applied to the digital information from a mobile application. Two reasons why we use those type of information quality criteria in this City-Zen's mobile application: first, for the mobile application, we are going to use electronic data and we need to applied a type of measurement of the information quality; second, this type of measurement it has been already tested in the Canton of Valais (QADEPs, 2013) because they have been several current works and reflection about archiving and what is the valuation of information.

## **Scoring**

The measurement of each criteria is based on a ranking system that contribute specific scores reflecting the quality level of each evaluated information quality criteria.

The different Information quality levels are:

- One to three stars : If the information is relevant, trustworthy, exploitable, representative
- Four to five stars: If the information is enhanced by a relevant source (example: Archives of Valais) and a public source (contribution of a citizen who knows on the thematic), possessed more information data about the research thematic.

## **Nomenclature Criteria**

City-Zen's application is based on several information quality criteria. Those latest represent the general s and specifics information quality criteria that determines his usability for a tourist when he visits the town of Sion in Valais. Each criteria is assessed by a scoring from one to five stars: more the information has a high score, more the information will be trustworthy, exploitable and representative for the tourist.

## **Tableau 1 : General and Specific Information Qualities**

### **General information qualities**

#### **Trustworthiness**

##### **Authenticity**

Identity

Integrity

##### **Reliability**

Traceability

Completeness

Legal and administrative compliance

##### **Historical evidence**

Extensive testimony

Scarcity of evidence

#### **Exploitability**

##### **Technical accessibility**

Usability

Access effectiveness

##### **Cognitive accessibility**

Logic reparability

Comprehensiveness

##### **Juridical accessibility**

Legal and regulatory authorizations

#### **Representativeness**

##### **Institutional context**

Creator relevance

Data relevance

##### **Socio-cultural context**

Contextual scarcity

Aesthetical value

### **Specific information qualities**

#### **Uniqueness**

#### **Information Richness**

This document will describe, justify and illustrate each criteria to explore the behavior of a tourist when he's using the City-Zen application.

In the first place, the general information qualities criteria are determined by the trustworthiness, exploitability and the representativeness of the information that the tourist is seeking in the City-Zen's application. In the second place, a description of the specific information source criteria will be put in place by describing the Uniqueness and the Information Richness of the information that the tourist is seeking.

## **General Information Qualities**

The general information quality criteria are the Trustworthiness, the Exploitability and the Representativeness that City-Zen's application have to provide for a proper operation and use by the tourist. In this part, we will describe each general information quality criteria with their sub-criteria and a specific example of a tourist practice for each criteria. A scoring is going to be set for each criteria and sub-criteria.

### **Trustworthiness**

The tourist will trust this City-Zen's application if this one gathered all the conditions to win his confidence, this means an authentic and reliable information that will make the tourist exploit it by using it. The Trustworthiness « refers to the ability of a document to gain the trust of the user as the preferred supporting facts source. This quality depends on the authenticity and the reliability and the durability of these qualities over time » (Makhlouf Shabou, 2011, p. 115; InterPARES 2, 2013). The tourist will take a document with authentic supporting fact sources that gain his trust over a document with no identifiable source that is difficult to know who the creator is.

***Authenticity*** : « an authentic document is a document whose can prove that is what it pretends to be, that it was produced or received by the person who pretends to have produced or received, and it was produced or received at the moment it pretend to have been » (ISO 15489-1 :2001, p.7). For the City-Zen's application, even if the user don't have physically access to information, the mobile will provide digital documents and citizen's testimony on a proper format. That's why is important to define the trustworthiness information criteria to show the integrity and identity of the document that are diffused in the application. For example, the institution



or the citizen's testimony are safe as a source? Are they identified? Also, that is why the reliability of the document is also important to trace it, to get to know if it's a complete information and if it's legal to diffuse.

**Reliability:** it refers to the trustworthiness of a record as a statement of fact. It exists when a record can stand for the fact it is about, and is established by examining the completeness of the record's form and the amount of control exercised on the process of its creation. The records forms generated using new information technologies make increasingly difficult to determine when a record is complete and whether the controls established on its creation are either sufficient or effective for anyone to be able to assume its reliability » (InterPARES, 2005)

- Traceability : it refers to the fact of documenting all movements and all uses of a document
- Completeness: The characteristic of a record that refers to the presence within it of all the elements required by the creator and the juridical system for it to be capable of generating consequences (thematical, chronological, geographical, format of the document)
- Legal and administrative compliance

### **Scoring & Illustrative Example**

*The information received by the tourist has to be trustworthy, it has to gain the trust of this person. It has to be authentic and reliable information.*

*Anne is a tourist that is interested by a particular building in Sion. She wants to know:*

- *When the building was built*
- *The architecture's name*
- *The history of that building*
- *If they are there other buildings with the same architecture*

*With the City-Zen's platform Anne will search the building that she's looking for in the City-Zen's application by writing the name of the building. She will received several type of information with a scoring for each information.*

*The Trustworthiness information criteria for this tourist will be evaluated by the quality of the article, who's assessed by a score of one to five stars. Anne will received several documents describing the building.*

*1) One star: It's a document provided by 1 non-institutional information source with a non-complete description of the building and his history. The document is provided by a non-identifiable source like a Citizen's testimony (not professional).*

*2) Two stars: It's a document provided by 1 institutional information source with a non-complete description of the building and his history. Provided by citizen's authentic testimony like a historian from the region for example.*

*3) Three stars: It's a document provided by 1 or more institutional information source with a non-complete description of the building and some of his history. This information was collected in the metadata of the Médiathèque Valais or by a citizen's testimony. It lacks of various data like the location of the building, buildings that are similar to this one and complementary information to give more interest for the tourist.*

*4) Four stars: It's a document provided by 2 institutional and citizen's testimony information source. Provided by multi-source information with a complete information about the building and his history. The 2 information source are combined to make a complete document that Anne can use to learn about this history of the building. It not referenced similar building or give a GPS locator.*

*5) Five stars: It's a document with a complete description and history of the building. It has even information about similar buildings in Valais that Anne could visit with the GPS locator. The information is completed by a citizen's anecdote and history about the building. The information received is trustworthy and it's reliable by two authentic sources: Médiathèque Valais and a Citizen's testimony and participation.*

*Then, Anne will choose between these articles. More the article have a high score, more they will be trustworthy information with complementary data about the building.*

## Exploitability

For the City-Zen's application, the information exploitability is established by the use of a mobile by a tourist to make the research. The information is ease of use because is not a physical document but a digitalized one. The information is trustworthy because it comes from a reliable source that are Médiathèques Valais, the Archives of Valais or just a history aficionado citizen that wants to show the Valais's Heritage by making a testimony.

The **Exploitability** is the dimension that « refers to the ease of use of a document, thanks to its location, retrievability, diffusion and interpretability. The exploitability depends on three types of document accessibilities : **technical accessibility**, including physical and material needed for reading ; **legal accessibility**, including regulatory and administrative environments required for the diffusion of document ; and **cognitive accessibility** that guarantees an adequate comprehension and interpretation of document contents » (ISO 15489-1 :2001 ; Makhlouf Shabou, 2011)

The information diffused is **legally accessible** because is author's wright free (only this legal open-access type of information will be put in place for City-Zen's application). The information will be **easy to comprehend** for the tourist but technical information can be also available for the history researchers that wanted to get to know more about Sion.

## Scoring & Illustrative Example

*The information received by the tourist has to be exploitable, located, interpreted and diffused. It has to be a technical, legal and cognitive access.*

*Patrick is a tourist who's a history aficionado that wants to have specific information with attached documents for a personal research about the Valère's Castle and his history. He wants to have specific information that he will use for his future publication about Switzerland's history. Patrick's want to know:*

*How many documents with trustful sources can Patrick find with City-Zen?*

*Are the documents popularized for the information to be understanding by any fan of history? (the purpose of his research is for writing a history book)*

*Can he use the information found on City-Zen application for reference in his book?*

*If he can use City-Zen application with is iPhone and keep some of the information for printing at his PC at home?*

*With City-Zen's application, Patrick will received several type of documents talking about Valère's Castle and his history. The exploitability information criteria for this tourist will be evaluated by the technical, the legal and the cognitive access quality of the article, who's assessed by a score of one to five stars.*

*One star: The document is only available in French. The document is easy to understand for the French tourist or citizen, but the Information is accessible but non-consultable physically. Patrick will only have the possibility to read the document in his mobile.*

*Two stars: The document is available in French, German and Italian. The document is easy to understand for the French or German tourist or citizen. Information is accessible but non-consultable physically*

*Three stars: It's a document by the Archives of Valais with information about the Valère's Castle and his history but with a strict abstract without specific information, details of the history and few references. The information is exploitable, located and interpreted but it lacks of details that Patrick's wants. For example, he want's also the historic details about the « Chapitre cathédral: the Chanoine's College ».*

*Four stars: It's a multi-language document (7 languages). All the tourist and citizen can understand easily the information provided in the document. Information is Open access and can be consulted with a request to the institution with an identifier (download if check-in as user). Patrick will do a check-in to the institution's site in order to be registered as a user so he can download the documents that he wants.*

*Five stars: It's a document that combines historical specific information by the Archives of Valais and a citizen's*

*testimony (by a history specialist in Valais for example). The history of the Chanoine's College that lived in the Valère's Castle is well described and the citizen's testimony adds a precious details to the information. The information is exploitable, located, interpreted and diffused because is an open source document, author's wright free.*

*Then, Patrick will choose between these articles. More the article have a high score, more they will be exploitable information with complementary data about the history of the Valère's Castle Chanoine's College.*

## **Representativeness**

This criteria « refers to the capacity of the documents to provide a significant testimony of the institutional context in which they were created. This quality depends on two essential elements: the completeness of testimony; and the representativeness of the socio-cultural context in which these documents were created » (Makhlouf Shabou, 2011).

The **Institutional Context** provides the creator or the Data relevance of the document presented in the City-Zen's application. The document can be provided by the Tourism Office for example, who's relevant because of the integrity of this institution.

For the *Representativeness*, the **Socio-cultural context** is also relevant because of the Contextual scarcity or the aesthetical value of the document presented in the application. But we can say that the aesthetical value will be assigned for the presentation of the digital document in the application.

## **Scoring & Illustrative Example**

*Sienna is a tourist interested in Sports. She wants to go to Valais to find some outdoor activities like hiking on the mountains or by a river. She wants to know all the good places like the different types of « Bisses » that are displaced in Valais (The Bisse is In the Valais, is a long canal bringing water for irrigation). City-Zen's application will put in place a choice of possible destinations to Sienna.*

*The information has to be representative, which means relevant and scarce, determined by the institutional and socio-cultural context.*

*Sienna will received information about the different types of sport courses in Valais who's updated every year by the Office of Tourism. The Socio-cultural context is Médiathèques Valais and Citizen's testimony validated by an institutional context to be representative of this institution, for example the Office of Tourism in Valais. The information can be consulted.*

*One star: The information received is recommended by Office of Tourism but the information displayed is not up to date (of last year for example). The information can still be useful but it lacks of precision. The Information is not scarce, it's displayed in a context summary (abstract).*

*Two stars: The information received is recommended by Office of Tourism but the information displayed is not up to date (of last year for example). The information can still be useful but it lacks of precision. The Information is not scarce, it's displayed in a context summary (abstract).*

*Three stars: The information received is recommended by the Office of Tourism but not enough relevant of all the courses displayed in Valais because the information was updated between 2014 and 2015. Information is not scarce, it's displayed in a context summary (abstract).*

*Four stars: The information received is recommended by the Office of Tourism and the document is relevant of all the courses displayed in Valais because the information was updated in 2016. Information is scarce by the exhaustiveness of the context*

*Five stars: recommended by the Office of Tourism and the document is relevant of all the courses displayed in Valais because the information was updated in 2016. Information is scarce by the exhaustiveness of the context*

*Then, Sienna will choose between these information and make a choice according to her interests. More the article have a high score, more they will be representative information, up to date and consultable. Now Sienna can choose between this types of representative information which one is convenient for her.*

## **Specific Content Qualities**

The specific content quality criteria are the Uniqueness and the Information Richness that City-Zen's application have to provide to give a rare, complete and precise information for the tourist. In this part, we will describe each specific content quality criteria and a specific example of a tourist practice for each criteria. A scoring is going to be set for each criteria.

## **Uniqueness**

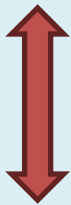
The Uniqueness data quality criteria « describes the fact that each document is related to the others within and outside the fond of which it is a part, and to the creator of the fond by a special relationship, which makes it unique. » (AAS Glossary, p.55). In short, this information quality criteria bring attention that there should be no data duplicates reported in the City-Zen's application. Each data will be unique or else the tourist will receive common and a several package of information instead of an up-to-date and exclusive information.

Asserting uniqueness of the entities within a data set implies that no entity exists more than once within the data set and that there is a key that can be used to uniquely access each entity within the data set. For example, in the City-Zen's application, each information diffused must appear once and be assigned a unique identifier that represents that information across the client applications. The dimension of Uniqueness is characterized by stating that no entity exist more than once within the data set. When there is an expectation of uniqueness, data instances should not be created if there is an existing record of that entity (Loshin, 2006).

## **Information Richness**

With the City-Zen's project, we discuss about the topic of information richness applied to the lowest type of rich information that is the numerical documentation (Kurstedt, 2000).

**Tableau 2 : The Characteristics of media that determines richness of information (DAFT and LENGEL, 1984)**

Information Richness	Medium	Feedback	Channel	Source	Language
<b>High</b>  <b>Low</b>	Face-to-face	Immediate	Developed Visual & Audio	Personal	Body, Natural
	Telephone	Fast	Audio	Personal	Natural
	Written, Personal	Slow	Limited visual	Personal	Natural
	Written, Formal	Very Slow	Limited visual	Impersonal	Natural
	Numeric, Formal	Very Slow	Limited visual	Unspecified	Numeric

The information will be formal, very slow, limited visual, impersonal and in a numeric language. However, if we use the lowest type of Information richness, for this nomenclature and the scoring we have to come out with a new table that highlights the numerical information richness. This is an approximated table explaining the highest and the lowest rich type of information applied to numerical documentation.





his researches and get to know immediately what the information source is. The lowest feedback for a tourist is not to have one without knowing who the information source is. The Channel is more the form of distribution of the application, if the information will be diffused on Visual or in Audio or to have the possibility to have both. For example, the registered tourist will receive a developed visual and audio of the information, making it the richest channel of numerical documentation. The lowest will be the non-registered tourist that will only receive a limited visual of the information. The Source is the type of information that the City-Zen's application have use for guiding the tourist in his researches. The highest source in Information Richness is when there is a combination of an official source (impersonal) like an information of the Tourism Office in Sion and a citizen's testimony (personal) that's not qualified as an official source. For this table, we have eliminated the Language part because we have only digital language.

This work will inspire the part of Uniqueness and Information Richness in the Specific Content Qualities shown on table 4 (Information Quality Metrics and Ranking)

Regarding the previously information quality criteria and metrics, we established a table representing the various specificities allowing to detail these criteria, who are displayed in two types of information quality criteria: the general information qualities and the specific qualities.

**Tableau 4: Information Quality Metrics and Ranking**

<i>Information Quality Levels</i>					
<i>Score</i>	*	**	***	****	*****
<i>Criteria</i>					
<i>General Information Qualities applied on sources</i>					
<i>Trustworthiness</i>					

<i>Reliability</i>	Provide d by 1 non-institutional information source  Non-complete description	Provide d by 1 institutional information source  Non-complete description	Provide d by 1 or more institutional information source  Non-complete description	Provided by 2 institutional and citizen's testimony information source	Provided by institution and professional testimony sources with exhaustive description
<i>Authenticity</i>	Provide d by source non-identified	Provide d by Citizen's authentic testimony	Provide d by Authentic professional testimony	Provided by multi-source information	Provided by authentic multi-source information
<b><i>Exploitability</i></b>					
<i>Cognitive Accessibility</i>	French	French/German/Italian	French/German/Italian/English/Spanish	Multi-language (7 languages)	Multi-language (more than 10 languages)
<i>Technical Accessibility</i>	Easy to understand for the French tourist or citizen	Easy to understand for the French/German/Italian tourist or citizen	Easy to understand for the tourist or citizen	All tourists and citizens can understand easily	All tourist and citizen can understand easily
<i>Juridical Accessibility</i>	Information is accessible	Information is accessible	Information is accessible	Information is Open	Information is Open access and

	le but non-consultable physically	le but non-consultable physically	le but non-consultable physically	access and can be consulted with a request to the institution with an identifier (download if check-in as user)	can be consulted with a request to the institution with an identifier (download if check-in as user)
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***Representativeness***

<i>Institutional Context</i>	Recommended by Office of Tourism but information not up to date (of last year)	Recommended by Office of Tourism but information not up to date (of last year)	Recommended by Office of Tourism but information not up to date (of last year)	Recommended by Office of Tourism and information is up to date	Recommended by Office of Tourism and information is up to date
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<i>Socio-cultural Context</i>	Information is not scarce, in a context summary (abstract)	Information is not scarce, in a context summary (abstract)	Information is not scarce, in a context summary (abstract)	Information scarce by the exhaustiveness of the context	Information scarce by the exhaustiveness of the context
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***Specific information Qualities applied on contents***

<i>Score</i>	*	**	***	****	*****
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<i>Criteria</i>					
<i>Uniqueness</i>	-Density of information, lacks of precision, - Abundance of format, media, information typology, subject, period / context	-Density of information, lacks of precision, - Abundance of format, media, information typology, subject, period / context	- Selection of information, lacks of precision, -A selection of format, media, information typology, subject, period / context	- Exclusive Information, precise and indexed - Scarcity of format, media information typology subject, period/context.	-Exclusive Information , precise and indexed - Scarcity of format, media information typology subject, period/context.

<i>Information Richness</i>	The information will be searched by personal words, there are no feedback available, the information will be limited audio, with an Impersonal source (ex. Tourism Office)	The information will be searched by a list of keywords, the feedback will be slow but available, the information will be limited in Visual, with an Impersonal source (ex. Tourism Office)	The information will be searched by a list of Keywords, the Feedback will be slow, the information will be diffused in Visual or in Audio, with an Impersonal source	The information will be searched by a Numerical Index, the Feedback will be Fast, the information will be diffused in Visual or in Audio, with a Personal and an Impersonal source (ex. Citizen's testimony and Tourism Office)	The information will be searched by a Numerical Index, the Feedback will be Immediate, the information will be diffused with a developed Visual and Audio, with a Personal and an Impersonal source (ex. Citizen's testimony and Tourism Office)
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The platform proposed in this project will take advantage from this work and will propose the partial automation of detailed metrics.

## Conclusions

The main expected outputs of our research are:

- The centralization and the classification of heterogeneous data derived from public and private records,

- The reduction of the access time to spot information in the city,
- The valorization of the private records able to promote the recognition of the contributors as participating to a community of interest and to the creation of a story, fostering the sharing of information,
- The analysis of the profile and the behavior of the users (space, time, content) in order to support public decision-makers (e.g. local heritage enhancement, town planning, etc.).

A fundamental limit to the private records addition system is based on the control of the classification and of the pertinence of the added data. Gamification, able to encourage and to reward contributors, should also allow penalizing excessive uses.

Beyond the technical developments, further researches will focus, in the one hand, on the discovery and the addition of new reliable information sources, and in the other hand, on the use cases of private users and decision-makers.

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