Tag-based
information retrieval for educational videos

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In this article we report on a study that explores the contribution of social tags, professional metadata and automatically generated metadata to the retrieval process. In the tagging phase of the study, 194 participants tagged a total of 115 educational videos. In the search phase, 140 participants searched the video collection for answers to eight questions.

The results show that, in the current context, social tags yield an effective retrieval process, whereas automatically-generated metadata do not. In this study we have found some evidence for the claim that social tagging is effective, because in the retrieval process the same terminology is used as in the process of assigning metadata.

1. Introduction

Due to a steadily growing amount of media content – including collections of movies, music, archived TV programmes as well as websites' content – metadata that enable users to find what they need become more and more urgent. The problem of annotation, i.e., adding metadata to content, increases likewise. Firstly, because an increasing amount of resources needs to be spent on annotation, as argued by Mathes [1]. Secondly, the quality of the metadata becomes more and more critical: a growing collection requires good indexing of the content to enable effective content retrieval. The question then is to which extent existing forms of metadata suffice to guarantee an easy retrieval of information on the one hand and to keep the costs of adding metadata to resources under control on the other hand.

Technical solutions may help to provide better retrieval support to users, while these solutions simultaneously alleviate the pressure on resources required for adding metadata. For the same reason, the notion of involving the target group is appealing, even more so since many consumers have become content producers, who are well aware of the impact of proper metadata on retrieval.

Most tagging research focuses on the act of tagging and on emerging folksonomies and communities, whereas the contribution of social tags to information retrieval is rather underexposed (e.g. [2] is an exception). We assume that tagging is an efficient method for annotating content in a way that fits a user's needs and conforms to a user's frame of reference during retrieval. In this article we report on a study of the respective contributions of ***social tagging***, ***automatic keyword extraction techniques*** and ***professional annotation*** to the retrieval process.

2. Tags as a metadata source

2.1. Introduction

Many researchers state that the common formal way of professionally assigning metadata is no longer the optimal way of annotating content, both in terms of efficiency and in terms of user support[1]. Macgregor & McCulloch [3] argue that if applied to digital libraries and the web, traditional metadata creation and indexing suffer from scalability problems and the need for a substantial amount of resources. In an opinionated web article [5], Shirky argues that "Users have a terrifically hard time guessing how something they want will have been categorized in advance, unless they have been educated about those categories in advance as well, and the bigger the user base, the more work that user education is." In a similar vein, [6] discusses tagging as a potential means to bridge the semantic gap between art historians and art museums' visitors.

Social tagging or ethnographic classification is an *informal* way of assigning *user-defined* labels, called "tags", to content items. Instead of formally classifying content according to the principles of documentation experts, users define the terms themselves informally, based only on the associations that the item to be classified triggers. Definitions in this domain abound, as shown in *Table 1*.

Table 1
Definitions of social tagging

Study	Object of definition	Definition
[6]	Social tagging	"The collective assignment of keywords to resources"
[7]	Tagging	"Labelling objects with free-style descriptors"
[8]	Tag	"One-word descriptor[s] or term[s] to describe the image or bookmark"
[9]	Social tagging	"The collaborative activity of marking shared online content with keywords, or tags, as a way to organize content for future navigation, filtering or search"
[3]	Collaborative tagging	"A practice whereby users assign uncontrolled keywords to information resources"
[10]	Tags	"Short free form labels used to describe items in a domain"

One observes a variation in what is defined (i.e. the tags or the activity of tagging) and in the extent to which social aspects of tagging are included. The common denominator in these definitions is that users can create a set of descriptors to characterize content items. Furthermore, [6] and [9] add a collaborative aspect to the tagging process.

2.2. Advantages and disadvantages of tagging

The problematic scalability, the costs, and the lack of compliance with the user's frame of reference have been introduced as the disadvantages of formal classification systems. Also, such systems are hard to keep up to date when, for instance, geographical information becomes outdated (e.g. about the German Democratic Republic) or new concepts emerge [5]. Furthermore, strictly hierarchical systems in which concepts cannot have more than one broader term do not easily allow for the combination of concepts from different parts of the classification system to express compound topics, e.g. "African butterflies".

Since tagging is assumed to be an alternative to formal classification, its advantages and disadvantages are presented in the next section.

The hypothesized benefits of tagging are:

- tags allow for more flexibility in organizing content;

1. Note that this typically relates to descriptive metadata rather than to structural or administrative metadata [4].

- tags facilitate the annotation process because little or no knowledge about the system is required;
- tags facilitate content retrieval and discovery.

A folksonomy is the result of social tags being added to content over time. It reflects an emerged consensus about the terminology people use to describe content items. Trant ([6], p. 83) defines a folksonomy as "the assemblage of concepts expressed in such a cooperatively developed system of classification" (in contrast to [1], who prefers the notion of "categorization" to the stricter notion "classification").

Folksonomies allow for far more flexibility than strict ontological systems can provide [5]. This is beneficial for, in particular, non-expert users – both if they want to organize their content under various headings and when they intend to retrieve content. For instance, tags support the goal-driven search for a specific item.

Apart from these advantages of tagging, research also identifies a number of disadvantages to social tagging. According to Golder & Huberman [11], Mathes [1], and Guy & Tonkin [12], there are also disadvantages to tagging that require serious consideration:

- **Ambiguity** (polysemy and homonymy) – a term or concept having multiple meanings.
- **Synonymy** – multiple terms which describe the same things or actions. This includes misspellings, spelling variations, conjugated verbs and mixed uses of singular and plural forms.
- **Level of term specificity** (hyponymy and hyperonomy) – e.g. "Siamese", "cat" or "animal".
- **Tag syntax** – multiple words, spaces, symbols and other idiosyncrasies.

Solutions to these problems fall outside the scope of this article, but these are the directions that we expect them to come from:

- Combining formal ontologies with free-style tags. Whereas in strict ontological systems the user is forced to think in terms of the ontology, in tagging systems the ontology is instrumental to the free-style tags that users add to content.
- Power of the masses. Research on **http://del.icio.us** [11] demonstrates that the number of new tags attached to particular types of items declines over time, indicating that with a critical mass of users, a more or less stable system emerges.
- Using ontologies and natural language analysis. Furthermore, ontologies and natural language analysis techniques together can be used to deal with the issue of synonymy (see [13]), which relates words to hyponyms and hyperonyms, thereby reducing the term-specificity problem.

In the next section we describe a video-tagging application that takes these solutions into account. The main focus of this application however is to support content retrieval by means of social tags. The application will be used to test whether social tags fulfil the expectations with respect to their support for content retrieval. This study will be presented in *Sections 4* and *5*.

3. The video-tagging application

3.1. General description

For the purpose of this study an application called ViTa (short for video tagging) was developed that allows users to retrieve, play and tag videos. The application provides access to a limited collection of short video clips that are supplied with professional metadata such as keywords, the title, and the description of the clip. The metadata were provided by Teleblik, a Dutch organization that provides access to multimedia sources for students in secondary education. The metadata were written by professionals, who take the age and knowledge of the users into account.

Searching / browsing on the one hand and playback and tagging on the other are the two key components of the system. In this section we sketch the generic application; aspects that specifically relate to the experiment are presented in the next section.

Searching and Browsing

Users start their search by entering a search term. Each entry in the result list consists of the video clip's thumbnail, its title, duration, keywords, first lines of the description, and its tags. By clicking on a tag, that tag is added to the search filter. Similarly, users can select content terms from the title and the description and add these to the filter. *Fig. 1* provides an overview of the search interface.

Figure 1
The search interface

Tagging

When a user clicks on a video clip's thumbnail in the result set, the application presents the video playback and tagging component. We introduced tag suggestions to help users come up with relevant keywords. Other tagging applications start offering the users suggestions for potentially interesting tags. For instance, when users start typing a tag, Del.icio.us offers them suggestions for tags they have assigned themselves by means of a small list from which the user can choose a few tags. These suggestions are based on both popular tags and the tags the user has assigned himself. The ViTa application, however, computes suggestions a priori. They appear at the same time as the video clip is loaded, after being selected from the result set. The suggestions are based on various recommendation techniques:

1) most popular tags assigned to that video;
2) tags assigned to similar videos;
3) tags that the user used most frequently;
4) professionally assigned keywords;
5) keywords extracted from the professional metadata.

No information about these sources or the reliability of tag suggestions is provided to ViTa users. The reader is referred to [14] for a discussion on these tag suggestion techniques.

Fig. 2 provides an overview of the tag interface.

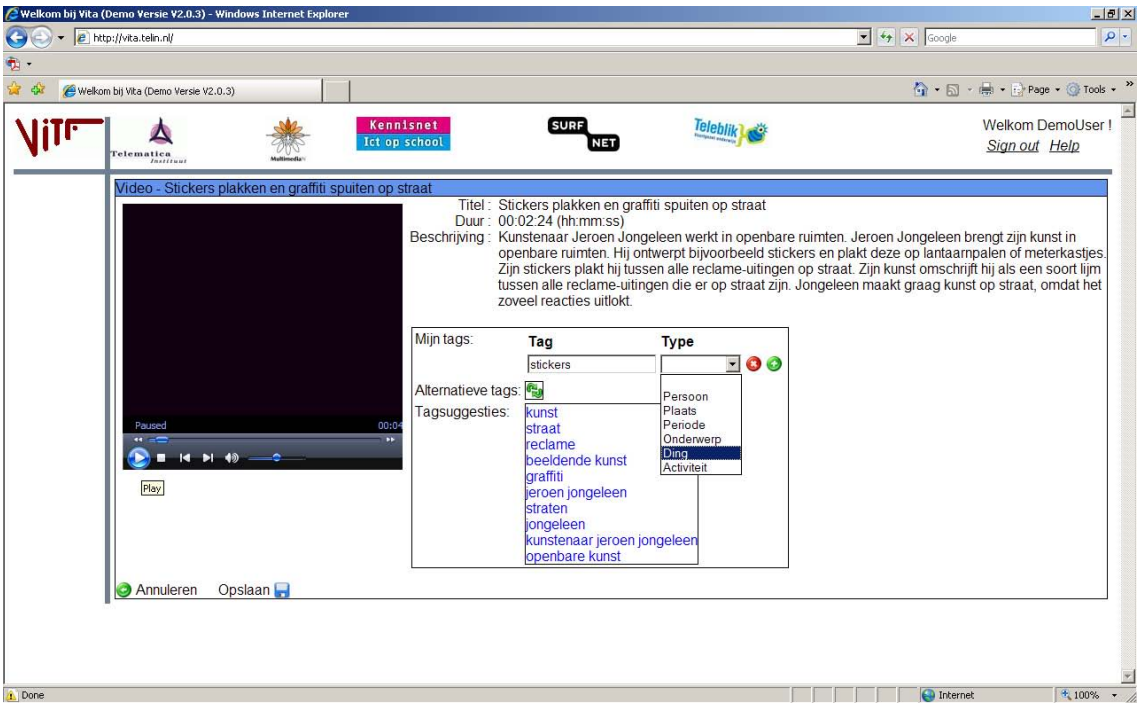

Figure 2
The tag interface

4. The search study

4.1. Research questions

Melenhorst & Van Setten [15] studied the production aspects of tagging and found large differences in the number and nature of the tags that participants assigned to TV programmes. They found that users attach meaningful tags that describe the programme's topic, express an opinion, or contain self-references. This seems to strengthen our assumption that tagging is an efficient method for annotating content in a way that fits a user's frame of reference during retrieval. In this study we verify this assumption by comparing different sources of metadata in terms of their contribution to the retrieval process. The key research question is:

> *To which extent can keywords as metadatum for educational video clips be generated by the target group, by professionals and by automatic extraction?*

In the current study, we considered successful metadata as these metadata that offer the best support for video retrieval. Whereas Van Setten & Wartena [14] discuss the part of the study concerning the automatically-derived tag suggestions, we focused on the use of various metadata in the retrieval situation.

4.2. Domain

The study focused on the educational domain, in particular on tagging and retrieving arts videos in the last classes of Dutch high schools. Since high school students are the primary target group of these videos, we assume that their tags fit the user's frame of reference during content retrieval. Therefore they have been recruited as participants [2].

2. Many so-called broadband schools from the **SURFnet/Kennisnet Innovation Programme** assisted in recruiting participants.

4.3. Terminology

The following table gives definitions of the terminology we used during the study.

Term	What it refers to
Metadata	The most generic term
Professional metadata	Professionally assigned **title** and **description** together
Keyword	Professionally assigned **keyword**
Smart keywords	Professionally assigned keywords and terms automatically extracted from all three professional metadata fields (**title**, **description** and **keyword**)
Smart tags	**Tags** that are suggested in the tagging phase
(User) tags	**Tags** assigned by users
User terms	**Terms** typed in while searching

4.4. Methodology

The study consisted of two separate phases: a tag phase and a search phase. In this article we only report on the search phase of the experiment. However, for the sake of clarity, we also outline the set-up of the tag phase.

In the tag phase, 194 participants were asked to tag 115 short video clips. Apart from the video clip itself, they could use other users' tags, professional metadata or a combination of tags and metadata. In the *BasicTagger* condition, participants could only use the metadata offered on-screen. In the SocialTagger condition, participants could make use of tag suggestions, consisting of tags that were assigned by other users. In the LazyTagger condition, the participants could use suggestions that were derived from both other users' tags and the professional metadata.

The tags that were generated were used for the search phase. The method we used for this phase of the study is described hereafter.

Tasks

In the search phase, each participant was asked to answer eight questions, the answers to which could be found in particular video clips. All participants had to answer the same questions[3], although posed in random order. The video screen contained a "this is the right video" button; when clicked, it invoked a dialogue window in which the participant could type the answer before proceeding to the next question *(see Fig. 3 on next page)*. It was possible to skip a question.

Materials

In addition to the professionally-applied metadata (title, duration, description and keywords of the clip), participants could search the collection of 115 short video clips that had been tagged previously. By manually entering a term in the search filter, participants retrieved their first results list[4]. For each result, the application shows title and duration of the clip. Depending on a participant's search condition, fewer or more of the other textual sources were available for search, which was reflected in the user interface.

3. Due to the limited size of the collection, the assignments' phrasing had to be slightly abstruse to force the participants to really search and not simply spot the correct clip.
4. The possibility to simply browse through the whole content collection was deliberately excluded.

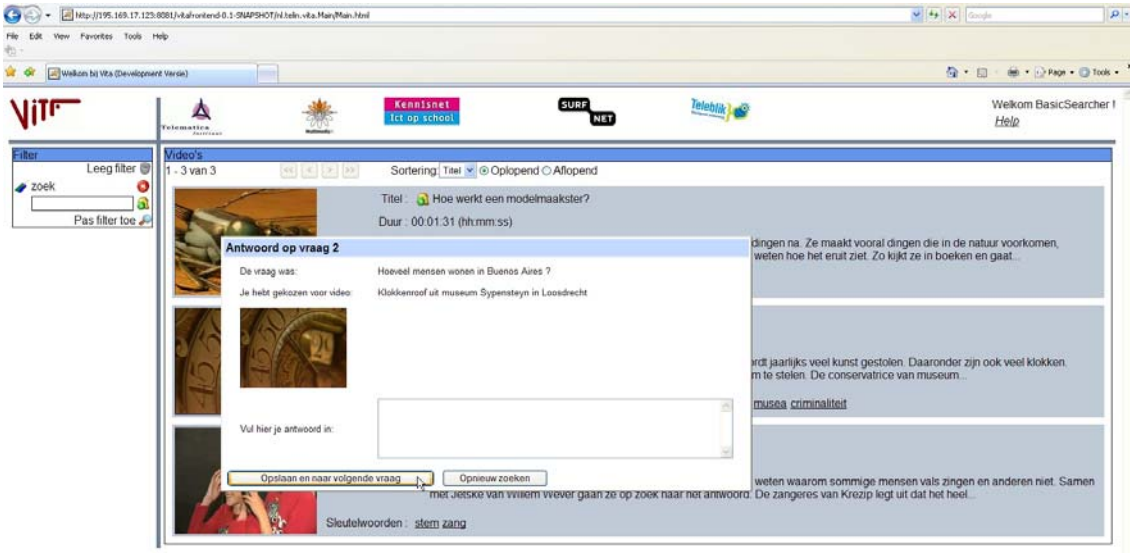

Figure 3
The answer dialogue

Participants

For the search phase we recruited 153 high school students. They participated individually, although often class-wise. No student participated in both phases of the experiment.

Experimental set-up

The participants could search various metadata sources for the clips that answered the questions posed to them. The 153 participants were randomly distributed over five groups:

- ***BasicSearcher*** could search in the professional metadata;
- ***SocialSearcher*** could search in user tags;
- ***BasicSocialSearcher*** could search in both professional metadata and user tags;
- ***DocumentSearcher*** could search in smart keywords [5];
- ***SmartSearcher*** could search in smart tags.

Table 3 summarizes the search conditions:

Table 3
Search conditions: who searches what?

Conditions	Professional Metadata	User tags	Smart keywords	Smart tags
Basic	Yes	No	No	No
Social	No	Yes	No	No
BasicSocial	Yes	Yes	No	No
Document	No	No	Yes	No
Smart	No	No	No	Yes

5. The number of available metadata in the respective search conditions varied. In order to provide DocumentSearchers with a reasonable number of metadata, the original smart keywords have been extended by means of semantic expansion ([13]).

When a participant added a term to the search filter or removed one from it and when he or she started a video, the ViTa application logged this as navigation actions. The number of navigation actions is used as an indicative measure of search efficiency.

Fig. 4 and *Figs 5* to *8* (on the following pages) show what the search results looked like in each of the conditions. In the subsequent sections we present the results of this study.

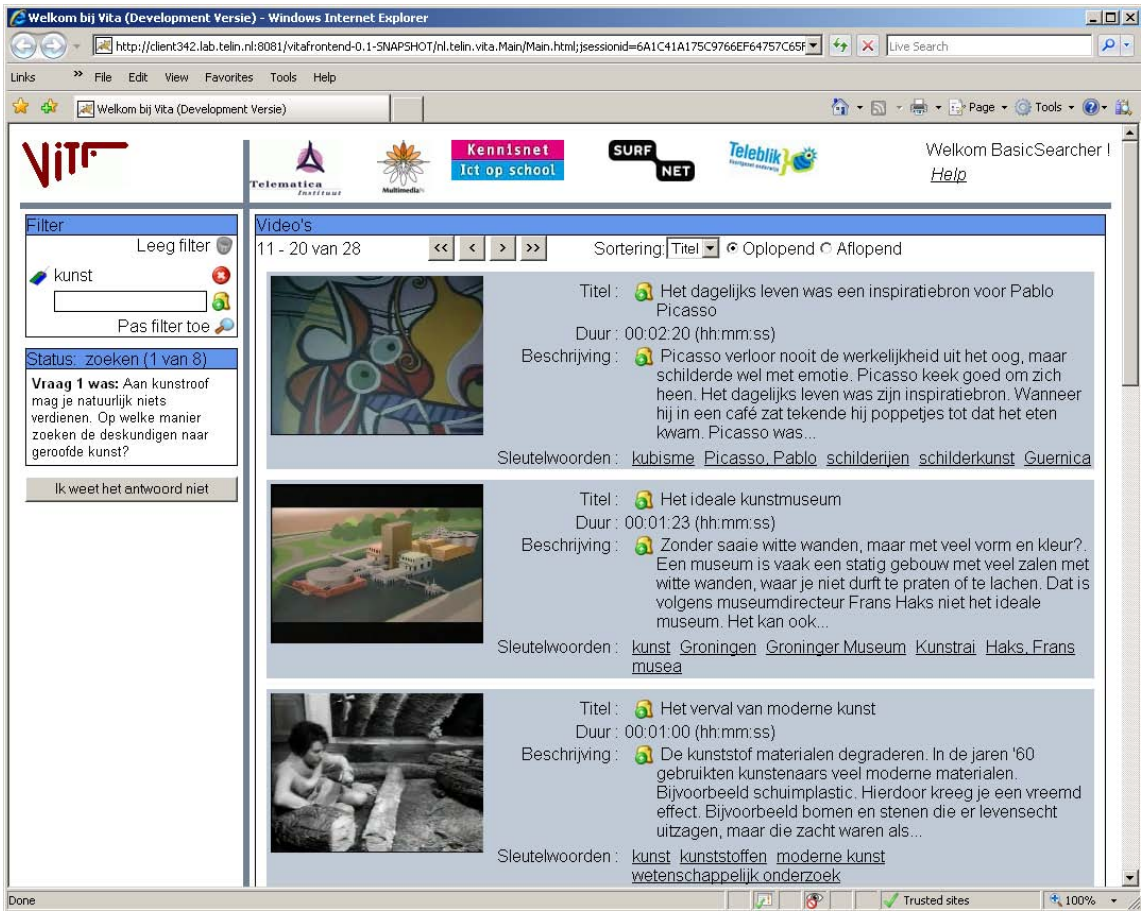

Figure 4
Search Results in the Basic Condition

4.5. Results

4.5.1. Summary of the Tag Phase

In the tag phase, we found that users produced 4373 unique tags in total for the 115 video clips. Participants were able to produce tags even when no support was offered with tag suggestions. Participants did however make use of tag suggestions, when they were offered. Those participants who could use tag suggestions did not rely only on the suggestions. They also came up with new tags themselves. Thus, the tag set that formed the input for the search phase was a mixture of tags invented by the users along with accepted tag suggestions, which in turn were derived from the metadata and from other users' tags.

In the following sections we present the results of the search phase.

4.5.2. Respondents

In total, 153 participants participated in the search phase. Unfortunately, 13 participants had to be excluded because they proved to invest too little effort in the experiment. They executed less than the minimal two navigation actions per task (entering a search term and selecting a video). As a result, they could not have given an answer and were therefore excluded.

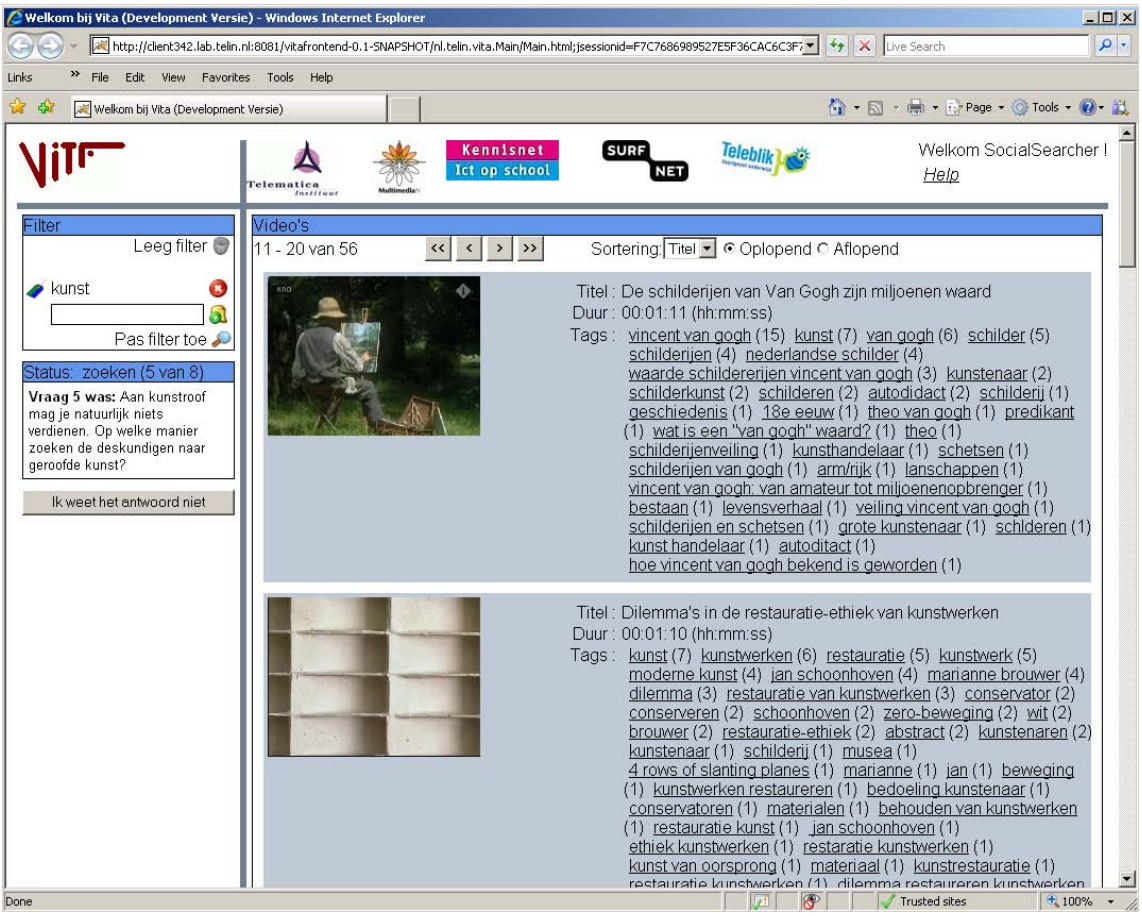

Figure 5
Search Results in the Social Condition

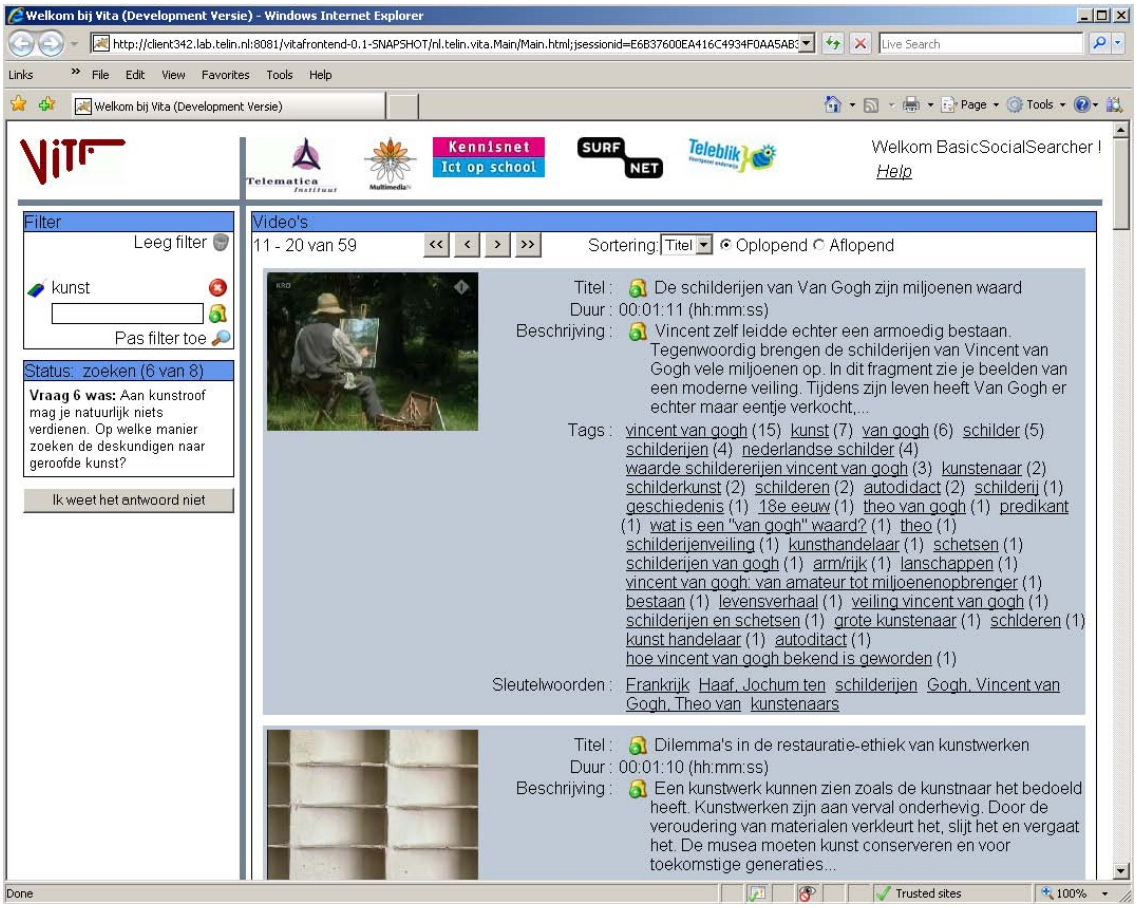

Figure 6
Search Results in the BasicSocial Condition

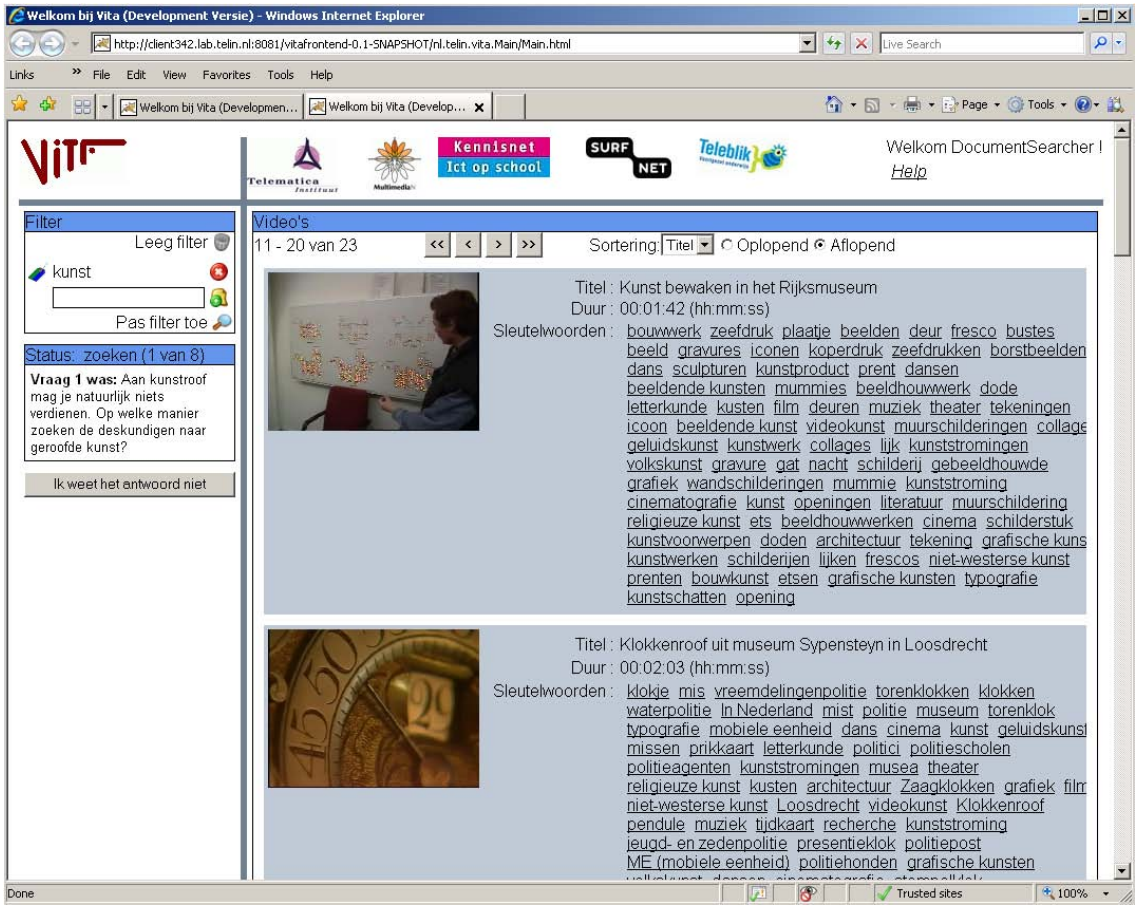

Figure 7
Search Results in the Document Condition

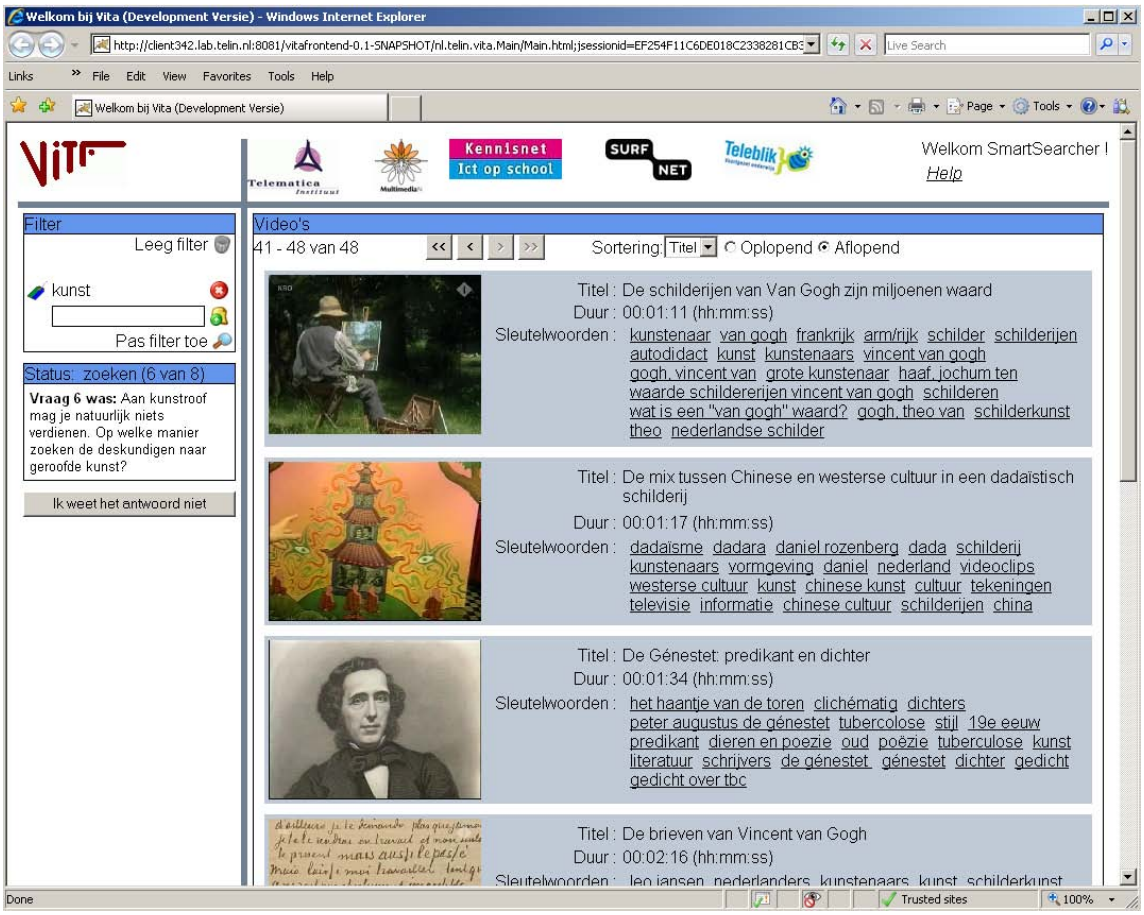

Figure 8
Search Results in the Smart Condition

Table 8 shows the distribution of the remaining 140 participants across the five search conditions.

Table 8
Number of Participants in the Search Phase

Condition	No of participants
BasicSearcher	25
SocialSearcher	31
BasicSocialSearcher	22
Document Searcher	31
SmartSearcher	31
Total	140

In *Table 9* we summarize the characteristics of the participants.

Table 9
Characteristics of Participants in the Search Phase

Background Characteristic	Mean, #	S.d.
Age	15.6	0.8
Sex		
Male	68	
Female	72	
Education (all high school)		
Havo (intermediate level)	79	
Vwo (higher level)	61	
Experience with tagging and video applications [a]		
Flickr	1.1	0.6
Del.icio.us	1.1	0.4
YouTube	4.3	1.3
Amazon	1.3	0.7
FabChannel	1.2	0.6
GoogleVideo	2.6	1.4

a. Scale ranges from 1 (never) to 6 (very often)

We did not find any statistically significant difference between the conditions on each of these characteristics ($F(4) < 2.02$; $p > 0.05$).

4.5.3. Responses to the Search Tasks

In the introduction we conceived "successful" metadata as the metadata that offer the best support to find the required information. To test whether manipulating the type of metadata affects search

performance, we computed the average number of answers and the average number of correct answers for each of the search conditions. In *Table 10*, the number of questions answered and the number of correct answers is displayed, categorized by role.

Table 10
Average number of answers and correct answers

Role	*N*	Answers found		Correct answers	
		Mean	*S.d.*	*Mean*	*S.d.*
Basic *	**25**	6.4	2.3	4.5	2.2
Social * +	**31**	6.7	1.4	5.5	1.6
BasicSocial * +	**22**	6.7	1.6	5.0	1.6
Document	**31**	5.3	2.2	3.5	2.1
Smart +	**31**	6.2	2.2	4.8	2.0
Total	**140**	**6.2**	**2.0**	**4.6**	**2.0**

* Significant difference with DocumentSearcher condition for no. of answers found
\+ Significant difference with DocumentSearcher condition for no. of correct answers

As can be seen from *Table 10*, both the number of answers and the number of correct answers is lower in the DocumentSearcher condition than in other conditions, while the SocialSearcher and the BasicSocialSearcher seemed to give the most answers and the best answers.

We tested whether the participants' search condition affected the number of answers given and the number of correct answers. Both ANOVA tests yielded statistically significant differences ($F(4) = 2.53$, $p < 0.05$ and $F(4) = 4.26$; $p < 0.01$) respectively). The Tukey LSD post-hoc tests confirmed that participants in the DocumentSearcher condition answered less questions than participants in the BasicSearcher, SocialSearcher and BasicSocialSearcher conditions (Tukey LSD mean diff. < -1.10, $p < 0.05$).

In the case of correct answers, we found statistically significant differences between the DocumentSearcher condition on the one hand and the SocialSearcher, BasicSocialSearcher and SmartSearcher on the other (Tukey LSD mean diff. < -1.26, $p < 0.05$). Between the other conditions, no statistically significant differences were found.

These results suggest that in the DocumentSearcher condition, the available metadata (i.e. the smart keywords) did not correspond with the terms that users had entered to search for the answers. In other words, there seems to be a terminology gap: users seem to employ a different set of terms than professionals do. If participants search in their own terms and the searchable metadata does not contain these terms, the participants will not get the desired results.

Furthermore, *Table 10* reveals that participants in the SocialSearcher condition answer as much – or even more – questions correctly than participants who can make use of professional metadata. This provides support for the claim that social tagging can substitute or at least complement professional annotating (as explained in the introduction).

Next, we analyzed the number of navigation actions the participants needed to find the correct answer for those cases in which they succeeded in finding the correct answer. The results are shown in *Table 11*.

As can be seen from *Table 11*, the number of navigation actions is comparable to the number of correct answers. That is, in those conditions in which relatively few correct answers were given, people also needed more navigation actions.

Table 11
Average number of navigation actions to the correct answer

Condition	N [a]	Mean	S.d.
BasicSearcher	141	8.9	10.3
SocialSearcher [b]	193	6.9	7.8
BasicSocialSearcher [b]	158	6.8	7.3
DocumentSearcher	136	10.8	14.5
SmartSearcher [b]	186	7.5	8.0
Total	**814**	**8.0**	**9.7**

a. Cases represent user-search task combinations

b. Significant difference with DocumentSearcher condition

Furthermore, similar statistically-significant differences between the conditions were found with respect to the navigation actions ($F(4) = 4.71$, $p < 0.01$). The DocumentSearcher condition is again outperformed by the other conditions except for the BasicSearcher. The lower number of navigation actions for the SocialSearcher and BasicSocialSearcher proved not to be statistically significant from the other conditions.

These results suggest that users need less navigation actions when the metadata they can search comes from other users: the conditions in which tags are available for searching outperform the conditions in which professionals have generated the metadata.

4.5.4. Source of search terms

In the previous section we have analyzed the number of answers on the search tasks. In this analysis, we have not yet assessed the participants' search strategies to the extent that these strategies can be observed from the metadata elements used in their queries.

In this section we analyze the search terms the participants used to compose their queries. The 140 participants in the search phase searched with 3744 search terms in total. These search terms came from the search question, the professional metadata, the tags, the smart keywords or the smart tags, depending on the condition and hence on the type of information that could be searched. The types of information that could be searched are referred to as "sources".

In *Table 12* the distribution of the search terms is shown. As terms can occur in more than one source, we constructed a cross-table to display the source of the search terms. The cells thus represent search terms that occur in one or more sources. For instance, 202 search terms occur in both the professional metadata and the search questions simultaneously.

As can be seen from *Table 12*, 2620 of the 3744 search terms were related to either the search question or the sources of information. The remaining 1124 terms were invented by the users themselves.

Furthermore, a significant number of the search terms proved to be derived from the search questions. Apparently, the participants' search strategy primarily involved selecting the most characteristic terms from the search questions. In the current context, the effectiveness of this strategy is doubtful since the questions were formulated with the purpose of having participants really search for an answer.

In sum, 621 search terms occurred in the tags, a significant share of which also occurred in the search questions (281). The other sources cover, at the most, 379 of the 3744 search terms.

Table 12
Distribution of search terms over sources

Source	Search question	Prof. metadata	Metadata + search question [a]	Tags	Smart keywords	Smart tags	Total
Search question	**941**						926
Prof. metadata	**187**	132					351
Tags	**302**	54	119	146			621
Smart keywords	**221**				158		379
Smart tags	**243**					100	343
Total	**1894**	186	119	146	158	100	2603
Undetermined							*1141*
Total no. of search terms							**3744**

a. This column represents search terms that occur in three sources simultaneously, namely the metadata, the search questions and the tags

Since the amount of searchable information differs between conditions, it may be that the percentage of search terms that do not occur in the information sources also differs between conditions. We expected the DocumentSearchers and the SmartSearchers to have a larger percentage of such search terms. In *Table 13* we show these percentages across all conditions. We excluded the terms from the task description since these terms are not searchable sources of information that would yield search results. In the fourth column we display the total number of terms that could be searched in a particular condition.

Table 13
Average percentage of undetermined search terms

	Mean	S.d.	Search base
Basic	53.8	14.8	1932
Social	48.9	14.7	4373
BasicSocial	41.2	17.1	5466
Document	56.6	12.5	4022
Smart	54.1	13.0	1528
Total	**51.5**	**15.0**	

Note: Search base refers to the unique number of terms that could be searched

As can be seen from *Table 13*, the percentage of search terms that did not occur in the metadata sources was the lowest for the BasicSocialSearcher and the SocialSearcher, the conditions in which tags could be searched. The conditions in which metadata or extracted metadata could be searched yielded a higher percentage of terms that were not covered by any of the metadata sources. A one-way ANOVA analysis shows that the differences between the conditions are statistically significant ($F(df=4) = 4.23$; $p < 0.01$).

This suggests that user tags provide a better coverage of the search terms our participants have used than the other conditions, in particular the conditions in which only (extracted) metadata is provided (BasicSearcher and DocumentSearcher). Metadata alone – whether automatically extracted or not – seems to be insufficient to cover the terms the participants wanted to use to

search for video clips. However, we have to keep in mind that the number of terms that could be searched in the BasicSearcher condition was relatively low. Thus, with social tags, users have a higher chance of successful retrieval, which is in fact an advantage of social tagging.

5. Conclusions

The results described in the previous section draw attention to a number of issues concerning the effect of different metadata sources on the retrieval process. We conclude from our analyses that, in the current context, social tags support users in finding the information they need. The results show that social tags result in an equally effective if not more effective search process than professionally-generated or automatically-generated metadata.

In the DocumentSearcher condition, in which automatically-generated metadata could be used, the smallest number of correct answers was found, while the percentage of search terms that did not occur in the metadata source that the participants could search, was highest. To a lesser extent, these results also apply to the BasicSearcher, in which only professional metadata could be used.

Dr Mark Melenhorst is a researcher at the Telematica Instituut. He holds a Ph.D. in the field of communication science (focusing on new media and communication technology). His Ph.D. thesis describes a field study on the role of note-taking software. His expertise involves technical and professional communication, interface and interaction design, user-centered design, and experimental research.

Mark Melenhorst's current work involves empirical research regarding the relation between social tagging and recommender systems, the contribution of social tagging to information retrieval processes, and users' motivation to tag video content. Apart from his current work, his research interests include user-centered design methods and applications, e-government and Web 2.0.

Dr Marjan Grootveld obtained her Ph.D. in computational linguistics from Leiden University in the Netherlands. She has developed computer-based training programmes for major German companies and is currently a member of the scientific staff of the Telematica Instituut in Enschede (the Netherlands). Her research interests centre around content engineering, learning and knowledge management. Application areas include education, cultural heritage, healthcare and industry. She has managed projects ranging from knowledge retention in the defence industry to sharing patient information in complex healthcare chains.

In Marjan Grootveld's experience, demand-driven user-oriented research is usually very gratifying. She is convinced, however, that the impact and quality of innovation projects would increase – and become even more gratifying – if more and earlier attention would be paid to the intended end users and to embedding the innovation in existing workflows.

Dr Mettina Veenstra is a senior member of the scientific staff at the Telematica Instituut in Enschede, the Netherlands. She holds a Ph.D. in computational linguistics from the University of Groningen. After finishing her Ph.D. she worked at a small multimedia publishing company as a researcher and project manager.

At the moment Mettina Veenstra is head of the Media Interaction group at the Telematica Instituut, a group of ten researchers and three software engineers. This group collaborates with partners from industry and academia on solutions for improving the access to and interaction with large quantities of multimedia content, especially in the (new) media, medical and cultural heritage domains. The focus of the research is on recommender systems, user interaction, social tagging and automatic extraction of metadata. She is involved in several national and European projects in these areas.

The explanation for the lower performance in these conditions seems to be that users do not search in terms of the automatically-generated keywords, the only source that could be searched in this condition. Consequently, within the current context, professional metadata or automatically-extracted and semantically-broadened keywords alone do not seem to be effective in supporting the retrieval process yet.

In contrast, the SocialSearcher and the BasicSocialSearcher answer the highest number of questions correctly, while the percentage of terms that did not occur in the metadata sources available for searching was the lowest. In both conditions, tags could be used. In contrast to the Document-Searcher condition, in these conditions, participants search with terms that occur in the available metadata sources more often: the search terms corresponded with the tags.

In fact, this correspondence in terminology is a basic claim of social tagging in general: social tagging enables annotating content in the terminology of the user, which makes the search and retrieval process more effective.

As a final remark, we have to keep in mind that these results were achieved in a context where professionals have explicitly attempted to take the language used by their target group into account. In most situations this will not be the case, which may result in larger differences in language use between the metadata and the users.

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