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TaDiRAH: a Case Study in Pragmatic Classification

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Abstract

Classifying and categorizing the activities that comprise "digital humanities" has been a longstanding area of interest for many practitioners in this field, fueled by ongoing attempts to define digital humanities both within the academy and in the public sphere. The emergence of directories that cross traditional disciplinary boundaries has also spurred interest in categorization, with the practical goal of helping scholars identify, for instance, projects that take a similar technical approach, even if their subject matter is vastly different. This paper tracks the development of TaDiRAH, the Taxonomy of Digital Research Activities in the Humanities developed by representatives from DARIAH, the European cyberinfrastructure initiative, and DiRT, a digital humanities tool directory. TaDiRAH was created specifically to connect people with information on DiRT and in a DARIAH-DE bibliography, but with the goal of adoption by other directory-like sites. To ensure that TaDiRAH would be usable by other projects, the developers opened drafts for public feedback, a process which fundamentally altered the structure of the taxonomy and improved it in numerous ways. By actively seeking feedback from the digital humanities community and reviewing data about how the source taxonomies are actually used in order to inform term selection, the development of TaDiRAH provides a model that may benefit other taxonomy efforts.

1. Introduction

Classifying and categorizing the activities that comprise "digital humanities" has been a longstanding area of interest for many practitioners in this field, fueled by ongoing attempts to define digital humanities both within the academy and in the public sphere. The emergence of directories that cross traditional disciplinary boundaries has also spurred interest in categorization, with the practical goal of helping scholars identify, for instance, projects that take a similar technical approach, even if their subject matter is vastly different. This paper tracks the development of TaDiRAH, the Taxonomy of Digital Research Activities in the Humanities developed by representatives from DARIAH, the European digital infrastructure initiative, and DiRT, a digital humanities tool directory. TaDiRAH was created with the short term goal of enhancing discoverability of resources in the DiRT directory and the DARIAH-DE bibliography while also anticipating adoption by other digital humanities directory-like sites. To ensure that TaDiRAH would be usable by other projects, the developers opened drafts for public feedback, a process which fundamentally altered the structure of the taxonomy and improved it in numerous ways. By actively seeking feedback from the digital humanities community

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and reviewing data about how the source taxonomies are actually used in order to inform term selection, the development of TaDiRAH provides a model that may benefit other taxonomy efforts.

2. Motivating factors

2.1 DiRT

Since the inception of the DiRT Wiki in 2008, the site has used an ad-hoc set of categories. In its original form, each category represented a wiki page where tools were listed. In 2010, a migration to the Drupal content management system gave each tool its own profile page. However, even under this new structure, the original categories persisted as a way to organize the individual profiles. Starting in late 2012, the DiRT Directory undertook an assessment of its categories, with the goal of identifying any gaps, phasing out rarely-used terms, and adding new terms to better reflect the scope and nature of the tools presented in DiRT. Early investigation into how the categories were being used produced striking results. Entire classes of commonly-used digital humanities tools were largely rendered invisible through the lack of an obviously matching category. For instance, optical character recognition (OCR) tools were scattered between the categories of "data conversion", "transcription", "data collection" and "annotation". The DiRT categories clearly needed revision; when an opportunity arose to collaborate with DARIAH-DE on a taxonomy that could be shared across multiple sites with different purposes, doing so was clearly preferable to undertaking another isolated effort.

2.2 DARIAH-DE "Doing Digital Humanities" bibliography

The other partner in the development of TaDiRAH was a working group in DARIAH, the European initiative to build a "digital research infrastructure for the arts and humanities" (see [Romary 2014]). This working group was concerned with research and education and formed part of DARIAH-DE, the German contribution to DARIAH. The group aimed to establish a principled overview of the research methods and procedures shared by humanities scholars. Presented as prose, such an overview (published in [Reiche, Becker, Bender, Munson, Schmunk, Schöch] could help newcomers understand the field more quickly and could connect established and digital research by demonstrating their fundamental methodological similarities. Presented as a taxonomy or ontology, the same overview would form the basis for discovery systems for bibliographic references, tutorials or research projects. The first use case for such a taxonomy was DARIAH-DE's "Doing Digital Humanities" public bibliography on Zotero [1], which became a test bed for a keyword system that would become one source of seed terms for TaDiRAH.

3. Digital humanities taxonomies

The taxonomy of digital research methods described here builds on previous work towards a structured and principled overview of the complex field of digital humanities. The following three approaches were particularly influential for the development of TaDiRAH.

The goal of providing an orientation to and a means to think about the field are at the heart of McCarty and Short's idea of the methodological commons. Using the metaphor and the tool of "mapping" to represent the complex "terrain" of the digital humanities, McCarty & Short (2002) suggest a map which has the "methodological commons" at its center. They define the methodological commons as "an abstraction for the computational methods that the various disciplines of application share", which functions as a space of encounter between "disciplinary groups" and "areas of learning". The research methods are not named, but are represented through

broad data types with which they are associated, such as "narrative text", "images", or "music". McCarty and Short's data types are roughly equivalent to TaDiRAH's "Object" category.

With a similar goal of structuring and abstracting from individual research undertakings, but using a somewhat different approach, John Unsworth proposed in 2000 a short list of "Scholarly Primitives" of research, particularly in the humanities. Contrary to McCarty and Short, Unsworth defines scholarly primitives as "activities [which] are basic to scholarship across eras and across media"[2]; so fundamental that they form "basic functions common to scholarly activity across disciplines, over time, and independent of theoretical orientation." Unsworth's tentative list was the following: Discovering, Annotating, Comparing, Referring, Sampling, Illustrating, Representing. Unsworth's formulation laid the groundwork for the TaDiRAH team to include both methods and objects into the taxonomy, and to keep them as separate entities with the potential to enter into multiple and changing relationships.

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Another, very ambitious undertaking, situated at an even higher level of abstraction, is documented by [Benardou, Constantopoulos, Dallas, and Gavrilis 2010]. Their outline of a "Conceptual Model of Scholarly Research Activities" is based on an activity model which includes inter-related entities such as research activities, research goals, methods, procedures, tools, information objects, and actors.[3] This model does not analyze research methods in isolation, but contextualizes them in the framework of the entire research process. From the beginning, TaDiRAH was meant to be designed in a way that would allow it to be integrated into such larger undertakings.

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4. Sources and alignment

TaDiRAH terms were derived from three very different sources: the DiRT categories, the DARIAH-DE tag set and the arts-humanities.net taxonomy. The sources were not selected as part of a long process of research and deliberation but were pre-determined based on the particular use cases that motivated the work. The task of alignment involved mapping the taxonomies to one another, while attempting to address differences in structure, scope and granularity as they arose.

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4.1 DiRT categories: tools classed by function

The categories used by the DiRT directory were developed as an ad hoc classification of digital research tools used in the arts and humanities, for use on the original DiRT wiki. Despite the positioning of DiRT as a humanities-oriented "digital research tools" directory, most of the tools listed in DiRT originated in other domains, and have non-research applications. The categories form a flat list of 32 tool functions without scope notes, and are accompanied on the site by a rapidly growing and unwieldy list of uncontrolled tags. As illustrated in the frequency distribution chart below, three categories (data analysis, visualization, and annotation) have a significantly higher number of tools associated with them than the other categories; these were candidates for division into a series of more granular categories.

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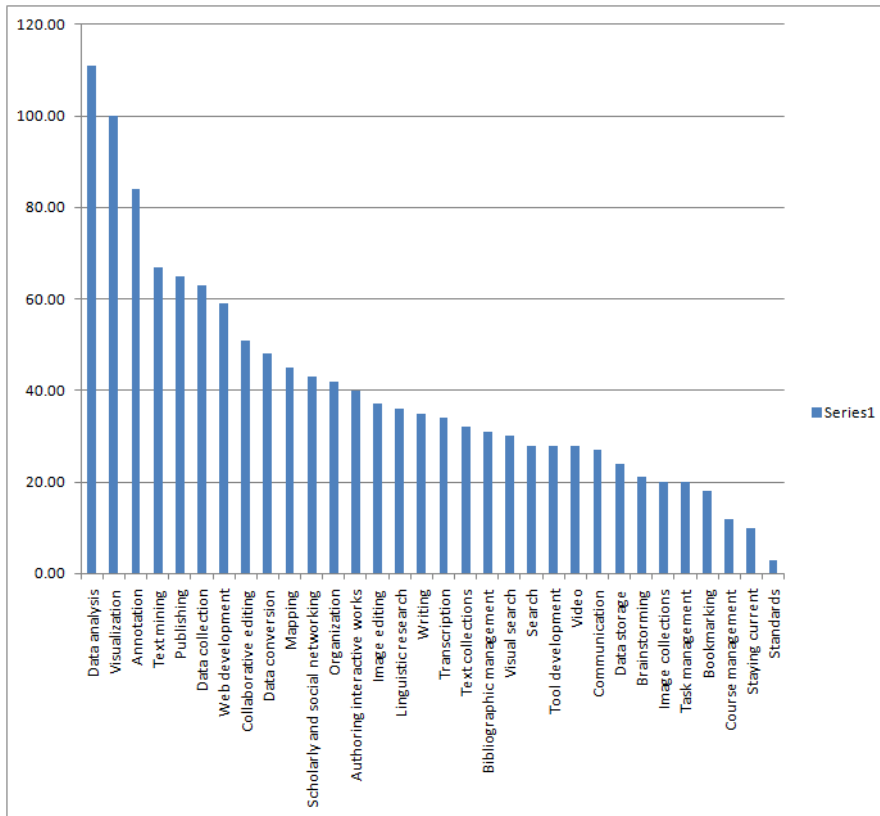
Figure 1. Frequency distribution of the DiRT categories as applied across DiRT tool profilesCategories on the high end of the distribution (e.g. Data Analysis) were candidates for dividing into a series of more granular categories, while those on the low end (e.g. Staying Current) would be candidates for merging with other related categories.

4.2 Arts-humanities.net taxonomy: projects classed by method

Arts-humanities.net was developed by the Centre for e-Research at King's College London and had its origins in a 2008 collaboration between the Information and Computer Technology Guides database and the Arts Humanities Research Council ICT Methods Network. Its primary purpose was to promote and provide access to information on the use of digital tools and methods for research and teaching in the arts and humanities. In support of that mission, it was home to a directory of projects, events, centers, case studies and other information. It was also home to a methods taxonomy where "methods" refer to "computational methods used by artists and humanists."   `10`

According to the project's former website, the taxonomy is based on one originally developed by the former Arts and Humanities Data Service (AHDS) for classifying projects. The taxonomy structure is broad and deep containing seven top level methods categories, which include between eight and twenty-five specific methods each; see below for the distribution of top-level categories across all content on arts-humanities.net. All but the top-level categories, which appear to be used primarily as guide terms to navigate through the taxonomy, include detailed scope notes. Taxonomies such as this, with complex hierarchies that are both broad and deep, tend to be faced with challenges regarding consistent application, updating and maintenance (NISO).   `11`
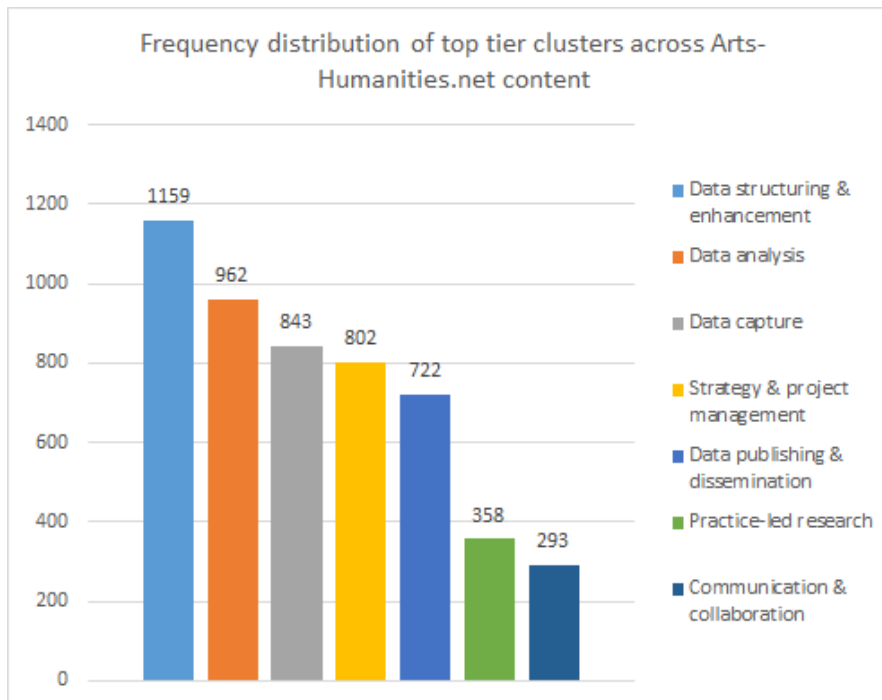
Figure 2. Frequency distribution of top-level arts-humanities.net categories as applied to content on arts-humanities.net

4.3 DARIAH-DE tag-set: digital humanities literature classed by research activity

The DARIAH-DE taxonomy was developed specifically for implementation in the Zotero-based "Doing Digital Humanities" bibliography. It was informed both by the arts-humanities.net methods taxonomy, Unsworth's formulation of scholarly primitives, and the idea of phases in the research lifecycle. The focus was primarily on research-based activities and objects. It originally consisted of nine top-level interdisciplinary activities that matched methods from the arts-humanities.net taxonomy, as well as a second level of forty-nine methods and a limited list of object types. `12`

4.4 Taxonomy alignment

There are two basic approaches to human-mediated taxonomy development: top-down and bottom-up. A top-down approach begins at the top level of the hierarchy, followed by the second level and so on. It starts with developing the basic structure or framework. In contrast, the bottom-up approach is informed by an existing collection of content (documents, objects, datasets, vocabularies, etc.) with the resulting scheme emerging from that content (see [NISO 2010]. All of the source vocabularies described above were designed using some combination of the above approaches. The development of TaDiRAH, which is based entirely on existing taxonomies, was the product of a bottom-up process. `13`

Adopting a bottom-up approach made the most sense given our limited resources and pragmatic aims. To begin with a top-down process would have meant starting over. It also had the advantage of being user centric and was aligned with the principles of *user warrant* and *literary warrant* (see [NISO 2010] leveraging terms already in use – terms which had been applied to existing content by `14`

different classes of users in the DH community: tool users, developers and practioners adding and tagging content in DiRT and scholars adding and tagging content in the DH bibliography.

Given the differences in structure, scope and granularity across the selected sources, the team was faced with a number of challenges including: [15]

- Making distinctions between goals, methods, and techniques (i.e. all are related to activities).
- Specific terms that could be mapped to more than one category (e.g. modeling).
- Terms with several different meanings (e.g. visualization as an activity or as an object).
- Categories combining multiple concepts which required decisions about whether something was distinct enough to stand on its own as a separate category (e.g. storage vs. storage and dissemination).
- One to many relationships between goals/methods and techniques (e.g. mapping).

Each source taxonomy was created with a slightly different purpose. Aligning the sources detailed above was an iterative process that included human-mediated matching, review and discussion. The larger challenge was to go beyond identifying similarities among the taxonomies, and review differences in turn, considering the nuanced ways in which a term or series of terms might be interpreted and applied. [16]

Following some general guidelines, [4] the team began with an analysis of the existing DiRT taxonomy and how it was applied across DiRT content. That was followed by a series of mappings, starting by mapping DiRT to DARIAH-DE, identifying and resolving points of poor alignment. It was much more challenging to map the results of the DiRT/DARIAH alignment to the very granular art-humanities.net taxonomy. Fortunately, the latter included detailed scope notes which facilitated discussions and decision-making throughout the process. The final step before releasing TaDiRAH for public comment was adding scope notes to all terms in the final draft. [17]

5. Public review process & revisions

On September 12, 2013, the team sent out a call for feedback on the first public draft of the taxonomy, via the Humanist Discussion Group. The public draft[5] was open for comments for a two-week period, where it received over 60 comments from individuals outside the project team. In addition, the team received multiple emails pointing to published and unpublished work in the area of digital humanities taxonomies. The comments ranged from suggesting that scope notes be rephrased to discussions about the best choice among a set of near-synonyms to use as the label for an overall concept ("scanning" vs. "imaging" vs. "digitizing" was the subject of particularly active debate). [18]

Prior to the first round of feedback, specific techniques (such as "stylometry" and "topic modeling") occupied the second level of the taxonomy, as did much broader terms, like "publishing" and "annotating". Multiple commenters pointed out this issue, and recommended that "techniques" be moved to a separate list. This was preferable to creating a third level of the taxonomy, as it would be difficult in some cases to unambiguously assign a technique to only one parent term. Having a separate list for techniques had the added benefit of better supporting the rapid evolution of new techniques, without requiring constant revision to the core TaDiRAH terms; like the "objects" list, "techniques" would be an open list. [19]

Due to an extensive amount of detailed and thoughtful feedback, the process of revising the taxonomy took almost five months of periodic meetings and asynchronous work. In early February [20]

2014, the taxonomy team opened a revised draft for feedback, this time for a week. While there was still considerable engagement (with over 20 external comments), comments in the second round were mostly focused on smaller issues of phrasing, and there were no fundamental challenges to the structure of the taxonomy. Within a week after the feedback period closed, the taxonomy coordinators were able to incorporate the proposed changes and release the first public version of the taxonomy, version 0.5.

6. Current version of TaDiRAH

Realizing that there needed to be some easy way to refer specifically to this taxonomy, the organizers devised the name "TaDiRAH", which stands for "**Ta**xonomy of **Di**gital **R**esearch **A**ctivities in the **H**umanities". The name is also a near-anagram of DARIAH and DiRT, the organizations responsible for its development. The only Google result for TaDiRAH at that time indicated that it was the name of a child's dragon on the virtual pet website Neopets; in honor of that creation, the team adopted a silhouette of a dragon as the TaDiRAH logo. |21|

In its current version, TaDiRAH consists of several sets of terms: two closed sets of so-called Research Activities, one with eight top-level categories that represent broad research *goals*, and below that a second set of more fine-grained research *methods*. In addition, there are two open lists, one representing specific research *techniques* and one representing research *objects* to which methods and goals can be applied. |22|

The goals roughly cover the entire research process — Capture, Creation, Enrichment, Analysis, Interpretation, Storage and Dissemination. An additional "meta" category includes activities that transcend all other categories (e.g. "Assessing" or "Community Building"). Each goal includes three to seven methods, with the methods section of TaDiRAH containing 40 terms in all. For example the research goal of "Capture" can be achieved using the following methods: |23|

Capture |24|

..Conversion |25|

..Data Recognition |26|

..Discovering |27|

..Gathering |28|

..Imaging |29|

..Recording |30|

..Transcription |31|

There are two separate open lists of terms that can be associated with terms from the goals/methods section. They include 36 terms representing a wide range of digital research objects (e.g. "text", "metadata", "manuscript") as well as 34 terms representing specific research techniques (e.g. "Topic Modeling", "Debugging" or "Gamification"). For example, a tool such as SIGIL, which is used for creating eBooks, could be tagged with the terms "Creation" (goal), "Writing" (method), "Encoding" (technique) and "Text" (object). A tool such as QGIS could be tagged with the terms "Analysis" (goal), "Spatial Analysis" (method), "Georeferencing" (technique) and "Maps" (object). |32|

7. Early adoption

Apart from DiRT and the DARIAH-DE bibliography that were the initial test environments for the taxonomy, other initiatives have shown interest in TaDiRAH or have already begun to apply it to their content.

<div style="text-align: right;">33</div>

Applications that emerged from the taxonomy development team's own work include the use of TaDiRAH within the DARIAH Teaching Resources Registry available on the project website [6] and the DHCommons project directory. DHCommons is still in the process of developing a new project profile schema that can accommodate the projects originally stored on arts-humanities.net; TaDiRAH categories will be a core part of the new profiles once they are deployed. An implementation on the DARIAH-DE portal (DARIAH Germany's website) is planned and currently under way. The "Doing Digital Humanities" bibliography on Zotero has also adopted the current version of TaDiRAH.

<div style="text-align: right;">34</div>

In addition, a variety of projects and initiatives have adopted TaDiRAH for structuring their data. One example is the draft of a DH Course Registry[7] hosted by the Dutch CLARIAH initiative in collaboration with DARIAH-EU. In the near future, each member country will provide an overview of digital humanities courses that are being offered in that country, including a visualization and links to each of the programs. A consistent classification built on TaDiRAH keywords will support a well-interlinked European digital humanities landscape. There has also been discussion about applying TaDiRAH to the classification of in-kind contributions within DARIAH-EU.

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Individuals working on smaller projects that deal with structured data have also requested to use TaDiRAH. For these projects, it is especially attractive to implement a widely-used taxonomy in order to become or remain visible within the scholarly community. Examples include "Zeitschrift für Digital Humanities"[8], a digital humanities journal that is currently being designed in Germany and which is considering using the taxonomy to classify contributions, as well as the German DHd-Blog[9], which is considering TaDiRAH as a way of tagging posts.

<div style="text-align: right;">36</div>

8. Current and future development

8.1 Dissemination

TaDiRAH is publicly available via GitHub under a CC-BY license. In addition to the actual taxonomy containing activities, objects, and techniques, the repository includes information on coordinators, the initiatives using TaDiRAH, and related presentations and publications. GitHub also has support for versioning and issue tracking. When users report issues encountered when implementing TaDiRAH in their own projects, this will lead to improvements in future versions.

<div style="text-align: right;">37</div>

In support of the pragmatic goal of creating a resource that would be widely available to a distributed community of users and which could be applied in a variety of contexts, it was important to provide a standards-based machine-readable version. The taxonomy team used an instance of TemaTres Vocabulary Server (Ferreyra 2014) hosted by DARIAH-DE[10] It produces SKOS core and makes TaDiRAH available as linked open data. The SKOS version is available via GitHub[11] and through TemaTres as a SPARQL endpoint[12].

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8.2 Further revisions

<div style="text-align: right;">39</div>

The taxonomy team will remain in close contact with the groups implementing TaDiRAH on the DiRT directory, the DARIAH "Doing Digital Humanities" bibliography, and DHCommons, in order to identify opportunities to revise TaDiRAH. Growing interest in the use of TaDiRAH may require a more formal review of best practices for documentation, sustainability, and governance of public value vocabularies, particularly those made available in a linked open data environment. Standards for the latter are still a work in progress but important discussions have begun among stakeholders in the information standards community including W3C, NISO, DCMI and others[13].

The taxonomy team intends to make TaDiRAH multilingual, a feature requested by the community and supported by TemaTres. There have already been volunteers from several countries to help achieve this. Interactive visualizations are another potential feature that may help users navigate the taxonomy. Here, first experiments have been made using SKOS play![14] which might be integrated in future versions.

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8.3 NeDiMAH

Within the broader DARIAH context, the work on TaDiRAH was originally viewed as part of the ongoing cooperation between the research and education working group of DARIAH and NeDiMAH, the Network for Digital Arts and Humanities. NeDiMAH's goal is to "contribute to the classification and expression of digital arts and humanities"[15] by developing a theoretically sound ontology that can classify work in digital arts and humanities, thereby contributing to its visibility and academic credibility.[16] Ontology development has moved forward in collaboration with DARIAH as there was a considerable overlap and synergy between the two organizations. Developing this ontology is necessarily more challenging and time-consuming than developing TaDiRAH, which has a pragmatic orientation. Nonetheless, the TaDiRAH team intends to work with the NeDiMAH team to ensure that the taxonomies are interoperable to the greatest extent possible.

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9. Conclusion

TaDiRAH is currently available in version 0.5 in several human-readable as well as machine-readable forms. It has been implemented in several different contexts, has been presented at several high-profile venues (including the Digital Humanities Conference, see [Borek, Dombrowski, Perkins, Schöch 2014] and the Dublin Core Metadata Initiative Conference, see [Perkins, Dombrowski, Borek, Schöch 2014], described in dh+lib (see [Dombrowski2014], and is likely to be adopted by more projects. What can be learned from TaDiRAH's brief history so far is that a bottom-up approach such as the one adopted by TaDiRAH can work if a small but sufficient number of people can be brought together to collaborate on a common goal. In the context of a taxonomy aiming to attain a certain level of consensus from the community of potential users, it has been essential to quickly publish and publicize preliminary versions of the taxonomy in order to gain the broadest range of feedback possible. This seems particularly true in the context of a taxonomy that prioritizes pragmatic adoption over theoretical soundness. The TaDiRAH team has sought to learn as much as possible from previous practical implementations in the same domain of digital research methods in the humanities, while seeking to address issues arising in projects that implement TaDiRAH. We strongly believe that the best way to move forward and learn more about the strengths and possible limitations of TaDiRAH lies in actual experience with using it in various contexts. In this sense, the value of TaDiRAH and the true potential of the development approach undertaken here will increase as more projects adopt it and feed their experience into future versions of TaDiRAH.

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10. Acknowledgements

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Notes

[1] The bibliography is available at: https://www.zotero.org/groups/113737/.

[2] The figure of "A rough intellectual map for humanities computing" can be found in [Mccarty 2003, 1224].

[3] The initiative concluded in the NeDiMAH Methods Ontology (NeMO) and the Digital Methods and Practices Observatory (DiMPO). For more information on NeMO, see Hughes et al. (in print).

[4] See Bedford's interpretation of Ranganathan's Principles, Table 1. http://onlinelibrary.wiley.com/doi/10.1002/bult.2013.1720390206/epdf

[5] Available at https://docs.google.com/document/d/1uosCjUW_dpSjdRNxBaFdDY0W-D0dTMHbLwTFuEvbDFg/edit?usp=sharing

[6] See https://de.dariah.eu/schulungsmaterial-sammlung.

[7] See http://dhcoursereg.hki.uni-koeln.de/

[8] http://www.zfdh.de/

[9] http://dhd-blog.org/

[10] http://tadirah.dariah.eu/

[11] https://github.com/dhtaxonomy/TaDiRAH

[12] http://tadirah.dariah.eu/vocab/sparql.php

[13] For example http://wiki.dublincore.org/index.php/DCMI_NKOS_Task_Group and http://www.w3.org/2005/Incubator/lld/XGR-lld-vocabdataset-20111025/

[14] http://labs.sparna.fr/skos-play/

[15] http://www.esf.org/fileadmin/Public_documents/Publications/nedimah.pdf (p. 2).

[16] See the above for more information on NeDiMAH and its key goals.

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