Digitale Annotationen: 'Best Practices' und Potentiale (R 6.2.1) part I

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Content

Infrastructure in Need: the Case of Annotations

In 2012 the computer-science researcher, mathematician and linguist Dirk Roorda called annotating "a new paradigm in archiving" (2012) in which annotations are a "carrier for elements of scholarship". At first glance this claim might not seem very paradigmatic. Research in digital scholarly annotation practices always perceived annotations as pragmatic units representing episodes and fragments of any scholars' 'struggle' (Bélanger, 2010; O'Hara, 1996). One of its core functions besides memorization techniques was taken to cut or extract something out of the flow of research processes for later use (Chiang, 2010). With the advent of digital technologies both aspects (as representing units and as instruments) might have changed gradually but they expectably will remain crucial aspects in the way they were before (of everyday humanistic research?).

Yet, change in scale can very well lead to substantial qualitative changes. This observation is one major insight in early theoretical analysis of modern technology (Heidegger, 1938; also see Marx 1962: 348). In fact, some observations could be done in this context showing a change that both affects annotations as a conceptual humanistic tool as well as its position within research as one "scholarly primitive" (Unsworth, 2000) among others.

A first relevant change in terms of scale is clearly visible beginning with the wealth of initiatives and projects dealing with the annotation-topic in digital contexts on a very fundamental level. In 2013 the W3C Open Annotation Community released the final draft of a widely shared model for the modeling of computation annotations (hereinafter "OA") (Sanderson, Ciccarese, & Van de Sompel, 2013). This work was continued by the W3C Web Annotation Working Group (hereinafter "WA") which tries to bring the OA to an official standard and to design an annotation architecture around this standard that aims at the WWW as its environment ("Web Annotation Working Group," 2015). The Mellon Foundation in conjunction with other funders support the implementation of a tool that should enable to "annotate with anyone, anywhere" . Around 40 scholarly organizations are cooperating.

This first overview still lacks many activities around the topic of annotations that are carried out by EU-funded infrastructure projects like DARIAH, CLARIN, DASISH, EU-DAT and many others.

What qualitative change in humanistic research is facilitated by these activities? There are a few of which only 3 are indicated here. With their digital implementation, annotations become first class citizens. This means annotations are detached from their former

physical dependency, from each material object (or media / as 'text') that is annotated. Thus digital annotations can be collected, stored, enriched and processed independently from what is annotated. Thereby, a formerly clear hierarchy between annotation and annotated object is blurred – a process that is observable f.e. in thePelagios project for instance ("Pelagios," 2016). In Pelagios annotations are the explicit primary output of research – and whereby formally sources are annotated with place names in this projects results the sources appear as annotations to a specific place. Even more explicitly, the OA model primarily refers to annotations as "associations between two distinct pieces of information" (Sanderson et al., 2013, p. 1), thereby intentionally neglecting the former categorial difference between annotation and annotated object.

Historically, many of the formal aspects of annotations that are highlighted by the W3C groups mentioned resemble more sophisticated approaches to 'Hypermedia' architecture than the WWW. Accordingly, the idea of technically independent links that for example enable bi-directional linking is promoted by Hypermedia Research for a long time (Carr, De Roure, Hall, & Hill, 1995). How is it possible to profile the main pragmatic methodological aspects of digital annotations when their embeddedness in architectonic endeavours is so crucial?

Regarding WA and hypothes.is, these projects seem to carry out a big contribution to themes of collaborative and more real-time oriented research which are widely discussed. However, while transferring more aspects of research into situations of communications our introduction began with the topic of archiving. That means annotations considered as resources for long term thinking though their usage was historical informally bound to specific research processes. How is it possible to curate these resources in a reasonable way that enables sound reuse and meaningful interpretation?

Having said this, it is obvious that the questions what annotations 'are' and what the methodologies behind them 'are' could far less be answered today than ever before. This does not implicate that traditional aspects of annotations have become obsolete. Naturally, most digital annotations are still annotations that add information to research objects thereby maintaining an information hierarchy that does not exist on a technical level anymore.

However, this is the very challenge: Sometimes you can get the impression that everything could be called annotation today; and this means: the real questions are: should we care about more concise ways to refer to annotations? Should we draw artificial lines

on the ground of a demand for theoretical and methodological evaluation within this new situation?

From an infrastructure as well as a researchers point of view these questions do only have a positive answer.

As has been mentioned previously, there is the question of curation, esp. of well suited metadata to describe each resource in a way that it can be reused.

Due to the initiatives outlined above, the situation has improved regarding technical and administrative-descriptive metadata. However, on a semantic level the situation is more urgent than before. Nothing demonstrates this more clearly than a set of 12 more or less contingent and inconsistent "Motivations" that the OA model defined for this purpose. If long term preservation of annotation data should be worth the effort a clearer picture about annotation practices and annotation contexts is crucial, both for depending services- as well as research oriented reasons.

This task is especially well located in the Humanities. Not only do Humanities consider the reflection on their methods and tools as one of their key strengths, not only are these questions typical Humanists' research questions, at current time such a project will not be carried out by Sciences where annotation is congruent to the specific use of annotations which is attaching metadata for data integration at the end of the research process (Agosti, Bonfiglio-Dosio, & Ferro, 2007).[1] Humanities have a very close relationship to annotating. Therefore, some researchers like Jan-Christoph Meister consider it an "epistemological practice" peculiar to the Humanities (Meister, 2015). There is another consequence of this viewpoint that was also highlighted by Meister and which is that such an evaluation enables to facilitate a broader access and appropriation of Digital Humanities to Humanities scholars. The reason is that annotations create a contact-zone in which exploration of new methods is possible on the ground and together with familiar aspects of research.

The following report combines an overview about former and current approaches to annotation practices and their specific research contexts / individual use-cases with some mild evaluations pragmatically aiming on our current needs from a digital infrastructure prespective. Thereby its authors hope to contribute to all the efforts surrounding digital 'annotations' which only can be outlined in a versatile way as above

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[1] The SWAN Ontology, its use of the concept of annotation and how it is applied gives a very good example for this kid of thinking

to give readers a sensible introduction and some first hints and links to current areas of interest in this broad innovative area of digital annotating.

How to Identify Properties and Practices in Digital Annotating: Models and Approaches

In the introduction many reasons were given which showcase the need for a broader and more systematic evaluation of annotation types, contexts and practices. There are several ways to approach such an evaluation. Each links to specific areas of research. Although the variation of viewpoints on annotations is astonishing it is possible to break them down to two basic perspectives: the first perspective classifies annotations in terms of object properties, the second by looking at the way annotations are embedded into a process of preceding and succeeding activities.

It is important to stress that there is no necessary difference in these two positions. The property of an object can always be expressed as a process which created the property (Walkowski, 2015). The difference is that of different terminology and purpose of description. It is important to underline this point to avoid problems when formal models and semantics shall be defined to enable contextual description of annotation data. These problems go together with the issue of oa:Motivation in OA for instance.

Open Annotation distinguishes between provenance information and the motivation which lead to the creation of annotations. The reason to define a motivation property was the feeling that interesting queries may result from it. In the scope of the report at hand this claim can be translated into the observation that this motivation provides meaningful insights on the annotation body. Nonetheless, the status of the motivation property was fragile along the whole operational phase of the community group. Discussions on the mailing list document this very well. Still, during the pre-conference workshop on Open Annotation at the Digital Humanities 2013 in Lincoln Timothy Cole, a member of the working group, stated that it is unsure if the property will stay in the final draft due to the uncertainty about its real meaning. Indeed, the term motivation addresses a theme that is difficult to drill down in practice. The situation becomes clearer when looking at the terms that are provided and which include motivations like replying, describing but also editing and classifying, moderating. Besides the immediate feeling that these motivations do not belong to the same level of semantic abstract the crucial aspect is that these motivations are expressed through activities. However activities belong to the provenance lens more than to the property lens. Hence the issues with oa:Motivation roots in a conceptually problematic delineation between process and property in the OA model.

The same issue can be found in taxonomies like TaDiRAH where Annotating belongs to the Enrichment class. However, annotations can of cause be used for mostly all of the other activities listed in TaDiRAH too. Thus, there is a conflict between theoretical evaluations of what annotations are and concrete research activities for which annotations are used.

To the end to get a clearer picture of annotation practices today and to create more reasonable semantics for annotation contexts the following frame to relate process and property semantics to each other seems promising. Accordingly, property semantics become possible whenever processes which create a certain type of resource become codified, reliable and familiar. Thus, property semantics are a way to blackbox process semantics. For annotations this means that they are a specific practice but that this practice is always embedded into other practices. Since historical annotations became fragile due to digital technologies it is crucial to not only evaluate properties of annotations but also research contexts in which annotations are used. This approach fits well to recent initiatives in the Digital Humanities which provide models for extended provenance representation in research processes.[2] It is significant that two of these projects use annotations to showcase their models. Having said this, the models presented in the rest of this section are split into two sections called annotations and annotating.

Annotations

Several viewpoints have been discussed to classify properties of annotations in the field of information and computer science. A comprehensive overview can be found in the work of Chiang (2010). In a birds-eye-view she distinguishes between properties of:

> form
> function
> role; and,
> value

Form refers to the appearance of annotations like highlighting, underlining but also more granular elements like shape and color. Function refers to the intention that lead to the creation of an annotation. It is comparable to motivation in Open Annotation. For instance, a researcher may highlight a phrase in a text because it is of special importance for the meaning of a text. Regarding Chiang, the role of an annotation includes questions

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[2]   see below

like: what is the intended audience of the annotation, is it for public use or private use? Value is introduced by Chiang herself and is defined as the quality and quantity of annotations in the way this property can be derived from their re-use.

The definition of filters permits to apply certain binaries to the evaluation of annotations. The state of being published compared to being held private is a binary that belongs to the role of annotations. The binaries defined by Chiang are already very abstract. The table below offers a small selection of these binaries from the survey of Chiang.

Form	Function	Role	Value
formal/informell	as writing/as reading	published/private	often/rarely used
explicit/tacit	extensive/intensive	global/personal	high/low rated
	permanent/transient		easy/difficult to use

The crucial result of her survey is the insight that both form and content do not permit to consistently define the function of annotations. To put it in different words, the meaning of annotations is not always transparent from looking at the annotation alone. This claim strongly re-phrases the points that were made in the introduction to this report: a sophisticated scheme for the classification of annotations is necessary to really make sound use of annotation data. The more this data is separated from its context of creation the more necessary is a description which uses such a scheme.

Chiang systematizes the results of her survey in a so called "Annotation Function Coding Scheme". It derives annotation functions both from empirical work as well as from theoretical evaluations. The scheme is a taxonomy that means it defines functions in multiple levels which are hierarchically ordered in terms of abstraction without any semantic overlaps. Chiang divides annotation function into three of these levels. At the top level there are five functions which are: to remember, to think, to clarify, to record incidental reflection, to communicate. Beneath the following functions are defined. The other two levels below these high-level functions provide another 22 functions.

The Annotation Function Coding Scheme is a very sophisticated approach compared to the one in Open Annotation which will be presented next. However, there are some difficulties. Although the underlying survey refers to "online annotation" the use cases include only annotation of text for reading purposes. Thus, the context of annotations which provide insights for the semantics is narrow and historically stable leaving out many annotation scenarios of today. Furthermore, activity and property still collide in the scheme. Nonetheless, the three layers of abstraction minimize the impact of this issue.

The Open Annotation Data Model (Sanderson, Ciccarese, & Van de Sompel, 2013) has already been mentioned as a point of reference for many issues in this report. The huge merit of OADM is the implementation of a common model to share annotation data across different domains. It turns the promise to re-use annotation data with limited effort for semantic integration into a realistic scenario. At the same time this fact changes the methodological interest about annotation practices into real needs as has been argued in the introduction.

Hence, it is welcomed that OADM has specifically turned to this issue by creating the oa:motivatedBy predicate and a oa:Motivation vocabulary of 12 motivations. Motivations are modeled as SKOS thesaurus like concepts. Having said this, OADM intents to have these concepts extended in project contexts. Nevertheless, as a point of reference it is meant to be stable and generic. According to the specifications "the list of Motivations in the specifications derived from an extensive survey of the annotation landscape" (W3C Open Annotation Community Group, 2013). The thirteen motivations are:

> bookmarking
>
> classifying
>
> commenting
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> describing
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> editing
>
> highlighting
>
> identifying
>
> linking
>
> moderating
>
> questioning
>
> replying
>
> reviewing
>
> tagging

A comparison of these motivations with the Annotation Function Coding Scheme of Chiang reveals a certain potential for semantic inconsistency. Where Chiang's model clearly distinguishes between different layers of abstraction motivations from OA like for instance replying and moderating tackle the same scope of activities. In fact, some motivations may contain others and the other way around, depending on the annotation

context. However, there is no way to express this without creating one's own concepts which are then linked to the oa:Motivation with a skos:broader predicate.

Furthermore, Chiang's high-level functions are much more generic than terms of oa:Motivation. The specifications of Open Annotation do not permit the possibility of more abstract concepts. Finally, there are motivations like tagging and classifying whose difference is partly technical as it addresses applications of Semantic Web compliant tagging with URIs that reference other vocabularies or ontologies.

Clearly, usability was a crucial aspect when oa:Motivation was modeled and this is reasonably so. On the other hand, expressiveness is important where this metadata should help to really understand the content or body of annotations. The problems that were just indicated raise unsolved questions which can not be answered for now since real world experiences are still missing regarding this issue.

An example of a clear but nonetheless very sophisticated multi-dimensional function scheme is provided by Matthias Bauer and Angelika Zirker (Bauer & Zirker, 2015). Both authors work on the interpretation of text under the premise of hermeneutic methodology and developed a functional scheme for annotations in this respect. More precisely, the classification scheme should consider the complex relationship between part, whole and context in hermeneutic interpretation. A translation of this relationship to a typing of annotations raise the question of information hierarchy. Regarding text interpretation Bauer and Zirker define six different levels within such a hierarchy which classify annotation into:

 linguistic

 formal

 intratextual

 intertextual

 contextual; and,

 interpretative annotations.

Obviously, linguistic annotations classify linguistic entities. Formal entities refer to organisational aspects like narrative structure whereas intratextual annotations include narrative patterns and themes. Intertextual annotations highlight the way a text references other texts and contextual annotations provide information that are important to understand the text. Finally, interpretative annotations are annotations which represent the

personal struggle of the annotator with the text beyond what is included in the other annotation types.

Although, this classification scheme was defined in the field of literature studies and on the basis of university seminars with a purpose to facilitate students capacities for text interpretation its real scope lies beyond. It introduces a crucial viewpoint for contextual metadata and the understanding of annotations that is completely absent in Open Annotation and only implicit in the work of Chiang: the question of context levels or information hierarchy. For the purpose to know what kind of contextual metadata is needed for what kinds of annotations and to find the right balance between usability and expressiveness, this issue needs intensive research in the first place. Another benefit of this approach is the fact that compared to the other approaches types can be really expressed as properties of annotations and not by implicitly referencing surrounding activities.

Annotating

One of the first and most pointed descriptions of the way annotations and its meaning are embedded in a broader activity context from information science was given by Agosti, Bonfiglio-Dosio, & Ferro (2007). They define annotations as 'dialog acts' among others. The meaning of annotations in this respect is not only provided by their body contents but also by 'its position and type within the discourse structure' (8). This observation is comparable to the insight about function, form and content relationships presented by Chiang. Although, the activity context which Agosti, Bonfiglio-Dosio and Ferro address at this point is one of collaboration, other approaches transfer this idea to other activity contexts and generalize it.

Correspondingly, Marie-Eve Belanger argues that the view on annotations as a scholarly practice is too simplistic. Instead of treating annotations as one unique practice they in fact include many different practices which link to their position within the Digital Humanities research lifecycle (Bélanger, 2010):

> Annotations, a type of information work primitive, functions as an articulation device, aligning the different levels, activities and indeed, the different phases of work neccessary to the completion of a project (Bélanger, 2010, p. 1).

Belanger continues by looking at how these different levels, activities and phases can be structured and how the result enables to identify different annotation types more clearly. Accordingly, she aligns O'Hara's typology of reading goals (O'Hara, 1996) with Clara Chu's (Chu, 1999) phases of the research lifecycle. Presupposing, that reading always serves a particular need in contrast too many possible needs O'Hara tries to

map these needs and describe the type of achievement a specific way of reading creates. Belanger proposes that an evaluation of reading types may serve to identify and even corresponds with certain annotation types. Although, the field of research in which Belanger elaborates her line of arguments is Digital Humanities and text interpretation as it is the typology of O'Hara reading can be easily generalized to information processing as such. In this respect her approach is also undoubtfully valuable for the broader context of this report.

The alignment with Chu's five phases in research allows Bellanger to derive 'information items' which hold certain characteristics. Unfortunately, she only carries out this task for the issue of potential research impact of annotations. More precisely, she investigates in a simple way how often an annotation is used again in the research process and what the qualitative impact was. She distinguishes between ephemeral, dormant and working annotations. For instance, an annotation in 'reading for text revision' during the phase of 'analysis/wiritng' is ephemeral compared to annotations made during 'reading for research' for the purpose of content 'elaboration'.

The outcome of Belangers approach and the effort she takes at the end to make use of her approach is disappointing. Nonetheless, the approach itself is promising and should be considered further for a deeper classification of annotation practices. It offers a way to systematically ground this task in a broader conceptual frame of scholarly practice of which two further examples will be given in this section. Furthermore, it demonstrates the benefit of such classifications. At the end of the article Belanger indicates that certain annotations which correspond with certain information types and that knowing this relationship is important for interpreting it appropriately. For instance there is 'information work' where the information content of an annotation remains incomplete. A classification of annotation types which provides information about properties of the content is therefore very useful in a world of a vast production of digital annotations and their reuse. In the last years the work of digital infrastructure projects has increased awareness about the issue of research practice evaluation. In the long run the right to existence of these projects and their success depend heavily on appropriate knowledge about target groups. Only by gaining this kind of knowledge these projects assure that built services are adopted and used by researchers. In this respect activities in the context of EURO-PEANA and a combined effort between NeDiMAH and DARIAH have lead to two sophisticated formal models for representing and documenting research activities digitally:

the Scholarly Domain Model (hereinafter SDM) (Gradmann et al., 2015) and the NeDiMAH Methods Ontology (hereinafter NeMO) (Digital Curation Unit, 2016).

SDM models research processes in a hierarchical model of four levels which are: areas, scholarly primitives, scholarly activities and scholarly operations. Although, the relationship between these levels is meant to be hierarchical there is neither a fixed nor a one-to-one correspondence between its elements. Furthermore a logical distinction is made between the first three levels and the last one. According to SDM this distinction follows a theme by the anthropologist Clifford Geertz who distinguishes between modeling-for and model-of types of modeling. Modeling-of modeling tries to represent something for the sake of description while modeling-for modeling describes to the end to reach a goal. Project modeling is a typical example for modeling-for models.

SDM splits research processes into 5 different areas. In these areas substantial activities take place. Areas are input, output, social, metadata and research. The social and the metadata area need some explanation. Activities located in the social area include everything which primarily does not take place for research but to sustain the research process due to its dependency from other social actors. A simple example is the application for a second term in a research project. Metadata is especially important in the context of digital research. Thus, documentation in software development belongs to this area. SDM emphasize that research does not proceed linearly throughout these areas but that, especially in the Humanities, it circulates between them.

Scholarly Primitives are directly taken from John Unsworth's famous article on research activities in the Humanities (Unsworth, 2000). It is one of the best known contributions in the field and should therefore not be repeated here. Scholarly activities are an open list of research activities which at the state of writing this report comprise 26 activities like citing, referring, annotating, selecting, writing, notetaking, illustrating among others. Some of these activities are close to the Scholarly Primitives other differ completely or are more granular.

Finally, Scholarly Operations are concrete actions which realize the other three levels in the context of a specific research process. Since every research process is treated individually, SDM does not propose operations on its own. In the same way as scholarly operations are informed by activities, primitives and areas they are meant to update the higher level of activities which represents what is going on in the scholarly domain. In this respect scholarly operations belongs the modeling-for type of modeling.

SDM is an interesting approach for theme of this report not only because it offers methodology to evaluate research practice. It was also developed together with the annotation tool 'the pund.it' (Di Donato et al., 2013) and presented with the example of annotations in the 'Wittgenstein Source' project ("Wittgenstein Source," 2016).

However, SDM has certain issues, one of these issues refers to the level of scholarly operations. Although the level of operations should not become more than a play ground for situational research evaluation it would still be useful to have something to play with. Core entities like actor, action, and resources which are vaguely referenced in the primer are not contoured.

This issue is exactly the point where NeMO is coming in. In contrast to SDM NeMO posits the question for core units of Digital Humanities for representing research before ways to classify and distinguish research. The answer that is given by NeMO is: Digital Humanities includes and can be sufficiently represented by content, tools and methods (Constantopoulos, Dallas, & Bernadou, 2016).

The second question in NeMO asks for a methodology to get to an ontological description of Digital Humanities. At this point NeMO makes use of Scholarly Research Activity Model (hereinafter SRAM) (Benardou, Constantopoulos, Dallas, & Gavrilis, 2010) which was defined in the preparatory phase of DARIA and in the EHRI project. Compliant to CIDOC-CRM (Doerr, 2003) and comparable to the general idea of provenance SRAM evaluates activities as an entanglement between agency, resources and processes. An elaboration of these three entities and its application in substantial research situations is supposed to engender a map of things like discipline, field, method, technique, procedure, research data, resource, epistemic object, research actor, environment, tools, service and infrastructure from which content, tools and methods of Digital Humanities can be induced.

In 2015 DARIAH-DE formed an international and multi-disciplinary working group on digital annotations which tried to link NeMO with the issue of digital annotations. The corresponding report presents this link in two dimensions. First, NeMO is well suited to conceptually represent annotations as an abstract idea. From this point of view descriptions of substantial annotations can be derived. Second, annotating can be described in NeMO as an activity performed by an actor at a certain point of time and place on an object. In NeMO semantics Actor is already a class while AnnotationActivity - the practice oriented representation of annotations - is a sub-class of Activity. As a NeMO activity

AnnotationActivity may have partOf Activity, follows Activity, employs Method relationships among others. The object on which an AnnotationActivity is applied is implemented as an InformationResource.

Annotations are a subclass of the InformationResource class on its own right. Technically annotations are represented as RDF blank nodes which link to a target resource at least. NeMO suggests some annotation types based on this technological perspective. These are DeclarativeAnnotation, MultiFacetedAnnotation, MultipleAnnotation, AssociativeAnnotation and Citation. The differences between these types of annotation refer to the question how many bodies or targets the technical representation of an annotation holds and how these different options of bodies and targets are combined. For instance, an AssociativeAnnotation has at least two targets but no body. NeMO also provides a mechanism to group annotations together that share certain characteristics. A special type of group in the context of annotations is the AnnotationGroups class.

By providing both options for describing annotations as a 'product' and as a 'process' NeMO is very well suited for the task to evaluate annotation practices in the Digital Humanities and to find sound metadata descriptions for annotation data. It combines the same two perspectives which SDM called modeling-for and modeling-of modeling. However NeMO has a much higher level of elaboration and consistency than SDM. It integrates both perspectives unspecified. Furthermore, a definition of annotation profiles that is informed by the many property evaluations can be conceived by using the AnnotationGroups mechanism.

As has been previously mentioned the task to evaluate contemporary annotation practices is not only important from a research point of view. It is crucial for the development of services, for the curation and long term preservation of annotation data, and for the re-use of this data, both in terms of efficient retrieval and reasonable processing.

The work of the DARIAH Working Group on Digital Annotations is committed to this task. Apart from the report on annotations and NeMO the working group has collected 20 use-cases from different fields of research an in relationship with different media types. These use-cases describe their peculiar practice of annotating in a sophisticated survey of over 40 questions that tackle administrative, technological and methodological aspects of annotations. These use-cases together with a formalized version of the NeMO Application Profile for Annotations will provide the first step towards a clearer picture of digital annotation practices and its methodological and semantic dimensions.

Furthermore, the working group aim at using these insights to provide a so called "Solutions Portal" where users can look for solutions within their specific annotation environment.

Both tasks are a great challenge and tackle the core of Humanities research like the quote of Meister in the introduction has emphasized. Therefore, the working group in cooperation with other players in the field is trying to implement an ADHO Special Interest Group which is capable of extending this issue in terms of scale and possible contributions. This is crucial because like this section reveals many activities that conceptualize properties of annotations still are closely attached to text-reading annotations. Annotations in the Digital Humanities go far beyond.

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