

## Intellectual Middleware

We need digital humanities to be big for many reasons. One issue in particular that requires largeness is the coming together of research questions, data/materials, and material manifestations. On one level, this would seem to be what the field is about, but in actuality, creating such deep connections presents a major challenge. Much of the work in the digital humanities has focused on the data/material layer and to some degree on material manifestations. In light of the field's history, the reluctance to step into the intellectual territory of the disciplines seems understandable, but this reluctance constrains the methodological and technologi-

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cal work carried out. In this case, stepping in means being involved in shaping the intellectual endeavor, which is more a question of curation than service. And there has been a lack of a developed material aesthetics in the digital humanities on a par with the best work available. For example, interaction designers and digital production experts are rarely involved in the process, meaning that practices such as prototyping and user testing are underutilized. Many projects were produced for a very limited group of people, resulting in little need to tailor interfaces to a large constituency. Also, the work of the digital humanities has focused more on the back end than the front end. This propensity is not just a matter of technology or design but is also part of the field's epistemic tradition. Scholars from the disciplines, conversely, tend to lack the methodological competence and computational rigor associated with the digital humanities (and areas such as library science) in relation to working with data and materials. Among other things, this can lead to an endless series of "new starts" and to a dearth of systematic approaches. The critical sensibility and imaginary capacity of disciplinary scholars also sometimes seem stifled when engaging with digital environments. Furthermore, people can hesitate to step outside the perimeters of the disciplinary epistemic tradition, as when they engage with alternative expressive modalities such as academic installations.

While this description certainly stereotypes and simplifies complex interrelations and overlooks numerous exceptions and much excellent work on various levels, it addresses weaknesses both in the digital humanities and in the humanities at large. The digital humanities suffers from the overall lack of scholarly impact, which means that there are very few examples of achievements that have had a substantial impact on other fields or that have been intellectually remarkable on the level of the most significant work in other fields. And for a field whose foundational narrative typically refers back to the late 1940s, its supposedly emergent nature may not suffice to explain the lack of substantial intellectual impact. Work in the humanities disciplines has not engaged strongly with the levels of data structures and material manifestations where such an engagement could be intellectually rewarding. Furthermore, much expertise in design, information science, publishing, cultural heritage, and other domains is not yet optimally or systematically integrated in these processes. Big digital humanities emphasizes the potential of closer intellectual and material ties between the humanities and the digital humanities.

Johanna Drucker's notion of intellectual middleware points to one of missing elements: a space where these different levels, competencies, and intellectual drive come together (93). According to Drucker, "Designing the intellectual 'middleware' that frames artifacts with interpretation requires substantive engagement with the field and discipline." (94) The notion foregrounds intellectual work but does not disassociate it from the technological, systemic, and material levels. On the contrary, all of these competencies and perspectives are needed to create intellectual middleware. In addition, the concept recognizes that such a middle space exists and is important. However, this recognition does not automatically mean that intellectually/materially significant and innovative work will happen. Through digital humanities, we can create conditions, processes, and environments that make such work easier and that serve as a place for meaningful and sharp intellectual and technological exchange. Such a place also needs to acknowledge the importance of the institutional, cultural, and social situation. The particulars of intellectual middleware may be difficult to conceive because it sits between different levels and because it is conceptually challenging to entangle (and disentangle) complex research questions, data, and material manifestations. We need a language for articulating and critiquing middleware that is intellectually and materially sophisticated enough to be useful. One way to develop this language is to ask questions in relation to existing platforms. Omeka is an "open source web-publishing platform for the display of library, museum, archives, and scholarly collections and exhibitions." (95) But what notions of cultural heritage and associated institutions are built into the platform? And why does it display rather than interpret or enact? Do problems arise because the Dublin Core scheme must be used for items and collections? What role do the template designs play in the deployment of materials? What does it mean that the platform has an ontology based on items and collections? How does the browsing modality (as the primary way to explore the material) built into the platform affect the material structure of sites? What narrative structures are supported (and not supported) by the exhibit function? What kind of arguments are supported? Does it matter that the platform operates through a one-window interface? Why do most Omeka sites look so similar? Discussions of intellectual middleware across platforms share some recurring parameters. One parameter is the operationalization of argumentative structures—that is, how scholarly arguments are made in different platforms. Arguments are neither consequences of their manifestation nor independent abstractions. They conform to certain patterns, and it seems likely that parameters such as "comparing" and "calling forth evidence," part of classical rhetoric, have a life across different platforms. A regular search interface

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based on the Dublin Core enables certain types of comparison and typically results in a list of isolated items that conform to the search query. It is much rarer that such juxtaposition is demonstrated visually [through visual overlay or other means), although geographical distribution has become a common way of representing search results. How can one make queries that allow for complex and interpretative searches? One model is faceted browsing, where many facets (variables) can be shown and selected and where filtering is typically direct, meaning that live interaction with the dataset is carried out.

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A number of processes are commonly used to enact and understand complex relations and materials and operate on a more material level than high-level parameters such as "comparing." Examples include scaling, focusing, overlaying, layering, juxtaposing, and framing. These parameters do

not apply solely to the visual domain, although a visual bias exists here. Just like the parameters discussed previously, such processes can be useful both when comparing different middleware platforms and when thinking about what resources may be used to approach different intellectually driven issues. In most Omeka applications, items—an ontologically encoded entity in the platform—are represented in their own visual frames (one per item). The platform thus imposes cultural heritage as a list of decontextualized artifacts, although some of the intertextuality and connectivity is available in the Dublin Core data associated with the item.

An alternative entry point would be to start from the ontology laid out visually and stacking items that overlap ontologically. Such an ontological visual map would allow us to explore what parts of the ontology are not active in relation to the material or zooming in on ontological hotspots. Another approach would be to provide an alternative framing through a multiple-screen setup. One screen could hold the geographical information (showing the positioning of artifacts and allowing zooming), another one could show the ontological structure (where multiple categories and relations could be selected), and a third screen could show the five most similar or dissimilar items within the geographical and ontological focus. These images would be overlaid and shifted dynamically (five at a time). In addition, turning off parts of the ontological structure would enable us to see resulting changes in the visual landscape.

Intellectual middleware attaches to different types of infrastructures. Omeka is primarily associated with the web as a delivery platform. Other platforms have a much stronger relation to physical materiality. Shannon Mattern's work on intellectual furnishings, for example, discusses the role of furniture for knowledge work and how space articulates ideas or how ideas can be articulated by space. Mattern's project suggests "that we think about the literal furniture of our knowledge institutions—and how those material objects inform how we organize our media, structure our thoughts, and cultivate our values." (96) The use of the term furnishings instead of furniture in the title of her work seems to indicate a more abstract, middle layer, similar to the notion of intellectual middleware developed here, placed between the thoughts and the physical furniture. Mattern's work demonstrates the importance of remaining materially sensitive in this type of work. At the same time, we also must be careful not to be deterministic about the relation between the material and idealistic levels. Furniture does not condition us but creates conditions and to some degree structures our work.

Some infrastructure exists somewhere between Omeka and furniture, clearly engaging with structuring data and physical manifestations. A display system developed in HUMlab exemplifies the physical-digital infrastructure associated with intellectual middleware. This system was created for a HUM-lab's December 2014 conference on knowledge production. One challenge of a multiple-screen setup such as HUMlab's (see chapter 4) is allowing the making of arguments across screens. This can be accomplished infrastructurally by having clusters of separate computers, working with very large desktops, or doing media signal-level processing, but ultimately, it requires a platform that can serve as a materially grounded "thought tool." The web system developed gives the user a schematic view of the space in question, facilitates upload of content, and deploys a simulation of the content and infrastructure in an interactive 3-D model. This tool allows arguments to be tested and shaped in a way that was practically impossible before. We need to be able quickly to explore different argumentative

and experiential scenarios. The structuring provided by version 1 of the software imposes a number of constraints: it specifies two types of presentations (lightning talk and stepped talk) and does not allow web content or use of sensor technology. The whole platform is fairly visual-centric, and while it departs from the single-screen paradigm of most presentation software, it is still based on a notion of sequences (of decks of slides/content). These and other constraints and biases need to be discussed critically as part of reflecting on the tool and associated middleware, which in turn feeds into continuing development of this sketching tool for making multimodal scholarly arguments in a multiplex screen context.

Intellectual middleware often emerges in contact zones, and the final example comes from the productive intersection of environmental humanities

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and digital humanities. The example relates to a planned project, where the intention is to challenge the predominant narrative of nature and the environment. This discussion was originally more instrumental, as a grant proposal necessitated outreach and some multimodal expressions. Over time, however, it became clear that the intellectual questions integral to the project had a considerable digital and medial inflection. What emerged was an understanding that creating alternative narratives of nature is intimately tied to knowledge production, expressive modalities, and infrastructural resources. Indeed, environment's predominant narrative is intertwined with the research infrastructures that created it and with the expressions that manifest it. Challenging such narratives is also a question of infrastructure, in the sense both of critically engaging with the infrastructural level of these narratives and of employing infrastructure and expressive modalities to enact humanities- and arts-based narratives. This matter involves not merely presentation or representation but also ontological, interpretative, and creative processes that are critical to the understanding, creation, and sociopolitical enactment of natural knowledge. (97)

## Conclusion

A big, inclusive notion of the digital humanities can solve many of the problems the field currently faces and can provide a sustainable and inviting model for the future. This notion takes into account many scholarly, educational, and technical challenges; the multiple epistemic traditions linked to the digital humanities; intersectionality through categories such as gender and race; the field's potential reach across and outside the humanities; and the digital as a boundary object. The liminal position of big digital humanities can meet these challenges and give it strong connections to the rest of the humanities, the academy, and the outside world. As the concept of intellectual middleware emphasizes, such work has to be intellectually driven, materially sensitive, and critically aware.