

Digital Humanities and the Common Good

by Pamela Fletcher and Crystal Hall

Nearly every day we read news articles about how big data and computational methods such as network analysis and machine learning are profoundly reshaping financial markets, political campaigning, and scientific discovery. The humanities are experiencing similar transformations, as these same tools and methods offer new ways to understand human culture, creativity, and history. The digitization of large quantities of historical documents, archival materials, and curated collections is radically altering the scale at which scholars can conduct research and greatly facilitating public access to information. And computational methods and tools such as digital mapping and topic modeling allow scholars to identify and analyze patterns and topics across thousands and thousands of texts—novels, newspaper articles, or Tweets—and visualize historical trends in health, civic engagement, and public opinion across towns, regions, and nations. The intersection of the humanities and digital and computational tools offers exciting new opportunities for teaching, research, public outreach, and public policy. At the same time, these transformations of materials into digital objects and labor into algorithmic processes suggest new relationships between individuals and their societies that raise concerns about difference, equality, and representation—questions the humanities have a long tradition of engaging.

Together this emergent body of scholarship, teaching, and outreach is coalescing under the umbrella term of *digital humanities*. The term entered popular usage in 2004 as the title of a collection of essays edited by Susan Schreibman, Ray Siemens, and John Unsworth (2004). Now in 2014 there are professional societies, scholarly journals, graduate programs, and a grant office at the National Endowment for the Humanities devoted specifically to the digital humanities. Some claim this new field will save the humanities; others worry that it will crowd out traditional methods of reading, looking, writing, and teaching. It is our belief that neither of these outcomes at their extreme is likely. Instead, we believe that bringing computational tools to the study of the humanities and adding humanistic inquiry's focus on questions of historical perspective and context, ethics, and value to the study of technology will benefit both areas.

In addition to the promise that technology and the humanities at scale hold, the digital humanities paradigm shift has created a peril for users even greater than the often-cited fears over loss of privacy, commercialization of knowledge, censorship, hackers, identity theft, viruses, or viral falsehoods. Trend lines in big data sets often suggest a singular perspective on expression and experience, where humanistic inquiry strives to make sure that multiple voices are represented. As Cathy Davidson, scholar of the history of technology and a current member of the National Humanities Council, writes: "We're still in the beta version of the information age, and there is an urgent need for sustained, humanistic participation to ensure a better version" (Davidson 2012: 485). In this article we focus specifically on how the humanities in the digital age can be useful for the informed decision-making central to crafting public policy, and how public policies can support this new era of the humanities.

FROM DIGITAL HUMANITIES TO PUBLIC POLICY

Data that represents both the most intimate and the most commonplace experiences of people around the world continues to grow at the explosive rate of billions of gigabytes per day. The algorithms to sort and automate that data are powerful, but the analytic and theoretical foundations for identifying the right questions to ask and then interpreting the answers remain underdeveloped, in large part due to the perceived incompatibility of computation and humanistic inquiry. One temptation is to assume that because big data is so vast, it must represent everyone and all perspectives. But human experience remains incredibly diverse in the digital age, and aggregating data on such a large scale can mask important variations and exceptions and may even obscure or misrepresent certain groups or types of experiences. Literary scholars, historians, and other humanists are skilled at identifying patterns as well as exceptions to those patterns and thus can offer the critical contextualization necessary to best interpret them. So how might the insights and tools of humanities scholarship intersect with the questions of public policy?

Imagine a hot-button political issue that generates more feedback from constituents than a single office can process. It would take months for a team of individuals to read and summarize all of the responses—clearly not a feasible option. Yet, to understand the anxieties that underlie a proposed policy change, that office needs to hear the many voices represented in that avalanche of data. In August 2014 the Federal Communications Commission (FCC) found itself in just this position with the public comments on the issue of Internet neutrality. Net neutrality, also referred to as the Open Internet, is the principle that web users can visit what legal sites they want, when they want, without differences in cost or speed of access to individuals or corporations. The FCC had collected over 1.4 gigabytes of textual data, roughly 3.7 million responses, to proposed regulation about the speed and cost of using Internet infrastructures owned by corporations. Fortunately, the chairman of the FCC had insisted on an accessible and open data format for these comments to allow scholars, the media, and engaged citizens to visualize the data in a way that could make this wide-ranging content more accessible to policymakers and the public (<http://www.fcc.gov/print/node/70406>).

Many individuals and groups were quick to download the data and begin searching for patterns. Their methods and results highlight the role of the humanities in assisting with these kinds of large-scale studies. The text itself needed to be analyzed to identify themes, vocabulary clusters, and supportive or critical commentary, all using techniques developed by literary scholars. Parts of speech needed to be identified and labeled across the spectrum from colloquial to formal in several languages. Those linguistic tags then informed the computational natural language processing that helped to sort the comments into meaningful categories. Mathematical network analysis was conducted to identify the strongest connections between themes, submitters, and style. One response to this FCC call for analysis was offered by the Knight Foundation, a private organization that funds innovative approaches to creating informed and engaged communities. Working in collaboration with the data analytics firm Quid, and using the methods outlined above, they produced a series of images of the relationships among the 3.7 million comments (Knight Foundation 2014).¹

By summarizing and tabulating the types of responses received, this kind of data visualization offers

the FCC valuable information as it begins to issue rules on the Open Internet. But the perspective of humanities scholars can also add richness and nuance to the results, helping us to see not just what people are saying, but who is speaking and who is not represented. For example, media scholars contributed studies of news outlets and social media platforms to contribute a further point of comparison to the individual comments. Among their findings was that even though Internet users in Maine submitted a high percentage of unique responses, the topic received little to no coverage in local media outlets (Knight Foundation 2014). Why was this the case? In addition, because comments were collected electronically, requiring Internet access at home or at a local institution, rural web users, with the most to lose in changes to regulation, were likely to be most underrepresented in the data. As Scott Weingart argues in a blog post, here, the digital humanist can help to bridge the large-scale and the local, allowing us to see the individual and the particular within the aggregate (<http://www.scottbot.net/HIAL/?p=40944>). Similarly, methods from gender and sexuality studies helped contextualize and explain the predominance of male voices in these responses. And even the product of this analysis, the computerized network graph, is the inspiration for creative, commercially available art and consequently represents a new field of study for scholars of visual culture (<http://www.redbubble.com/shop/gephi+art-prints>).

Humanities scholars can effectively bring their expertise to bear on data generated by contemporary policy issues, helping stakeholders interpret, visualize, and understand current issues as the Open Internet example shows quite plainly. The next two examples examine how one type of more traditional humanities subject matter—novels and other kinds of books—can also yield valuable insights that can improve our understanding of a broad range of urgent public policy issues.

While computation can make large patterns more clearly visible, they are the aggregate of information about many smaller communities. Google has implemented a project with the ambitious goal of digitizing a copy of every book ever printed, which they have calculated to be 129,864,880 volumes.² Estimates of how many of these books they have digitized after years of collaboration with many large national and institutional libraries range from 12 to 30 million. While Google's corporate interest in these billions of pages and trillions of words remains a mystery, part of their scanning

project has involved transforming printed pages into searchable text, which can yield tables of word and phrase counts in books printed between 1500 and 2008. Working with a team of programmers led by a genome specialist and a data scientist, they have built an online tool to visualize the results of custom word searches in its database of books: the Ngram Viewer (<https://books.google.com/ngrams>).

The preliminary results of the Ngram development group suggest that a study of word counts in Google's holdings of digitized books can reveal universal patterns about memory, the suppression of ideas, and fame (Aiden and Michel 2013). The large-scale work of the Ngram designers suggests a fame curve, which varies according to the age at which a person becomes famous, the rate at which their fame grows, and how quickly their fame declines. The example in Figure 1 uses the search terms "Margaret Chase Smith," "Edmund Muskie," "Susan Collins," and "Olympia Snowe."

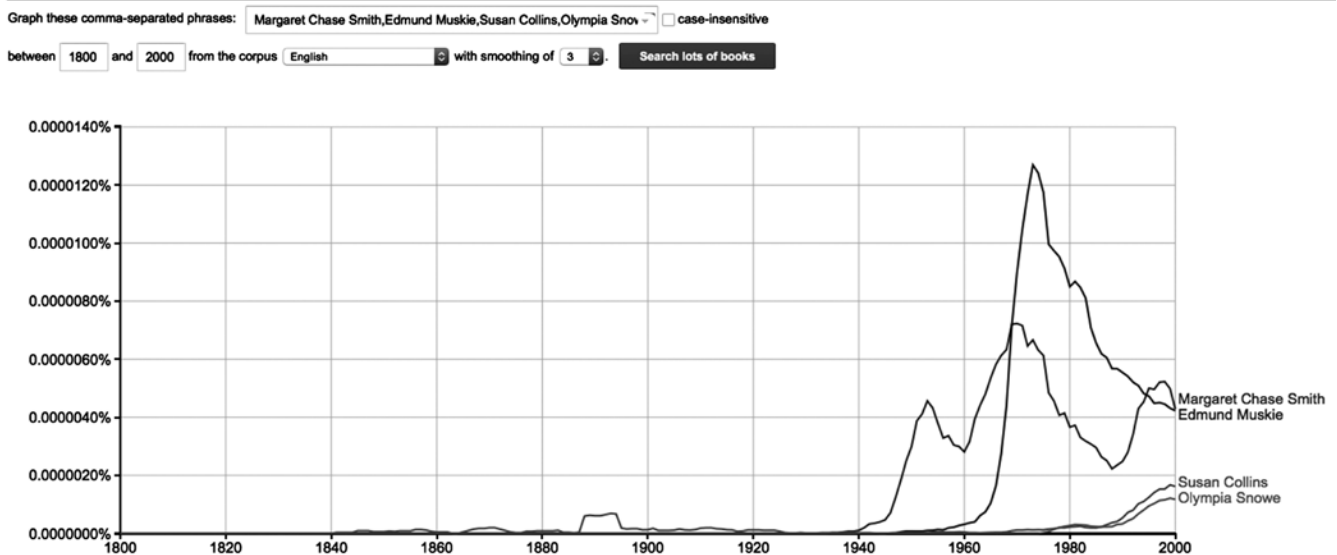
The leaders of the team that developed the Ngram Viewer recently published a book of their results, *Uncharted: Big Data as a Lens on Human Culture*, which offers some context for interpreting Figure 1. The

data for "Margaret Chase Smith" follows the general results that Aiden and Michel found for 150 famous politicians: fame arrives when the person is in their forties, increases exponentially through their seventies, and then begins a gradual decline (Aiden and Michel 2013). In broad strokes, the Ngram graph in Figure 1 shows that Smith, born in 1897, fits the trend, and Collins and Snowe seem to be following suit. Yet, the perspective of the Ngram Viewer represents such great distance and time that the nuances of community dynamics are invisible. The dip in occurrences of "Margaret Chase Smith" in print between 1953 and 1960 is an anomaly that is smoothed over and unaddressed by such a large-scale examination.

For humanists, the study of primary-source evidence that is directly derived from the subject of study is fundamental to identifying biases in the data and revealing important distinctions that are smoothed out and thus hidden within the overall patterns. Analysts typically describe the volume, variety, and velocity of big data, the 3Vs, but students at Bowdoin College are investigating a fourth V, veracity, to determine the integrity and reliability of data in humanistic fields. For

FIGURE 1: **Relative Frequency of the Names "Edmund Muskie," "Margaret Chase Smith," "Olympia Snowe," and "Susan Collins"**

Google books Ngram Viewer



Created by Crystal Hall with the Ngram Viewer application searching books in English in the Google Books database from 1930 to 2008, with a smoothing of 3.

example, in the first-year seminar “How to Read 1,000,000 Books,” students are examining and cleaning a subset of word counts from Google Books to test the conclusions about culture drawn by using the same materials. The course asks if Google’s books can (or should) represent everyone. For example, is a simple name search accurate enough to represent the popularity of a person in print? The students are asking what synonyms should be included to truly understand the frequency with which a person appears in books over time and the context in which we recognize that a book is talking about the person for whom we are searching. Creating a graph for “Senator Smith” would return many false positives. How many U.S. senators (historical and fictional) have been named Smith, after all? On that note, how many women in the country might be named Susan Collins?

Here the strengths of humanities scholars play a vital role in answering questions about big data sets: for whom is the data speaking, and how does that correspond to what the data claims to represent? The work of the literary scholar or historian can push the data to reveal more than just the relative popularity in print of, in this case, three Maine politicians (or women who share the same name). Humanists would try to answer a number of questions about Figure 1: What are the mechanisms of power and representation that influence the lines of popularity for these names? Are there other areas of print or digital communication that would better measure the presence of these women in public media? To what scale are Maine publications represented in the data set? Are the books from in-state publishing houses digitized and counted within this “universal” view of history? Having this knowledge would reveal both the historical context in which these women’s political careers flourished or continue to have an impact as well as the local or national pathways by which they entered the field.

Literary scholars are also using these kinds of digital databases to perform more complex textual analysis, translating their traditional questions to a much larger scale. Matthew Jockers, an English professor at the University of Nebraska, has performed sophisticated statistical analyses on the digitized texts of thousands of nineteenth-century American and British novels (Jockers 2013). His primary interest is in understanding the larger landscape of nineteenth-century fiction, as a corrective to traditional studies that have focused on close readings of exceptional novels.

But some of his findings also have implications for understanding the current literary market. For example, he found there were surprising correlations between the marketing and composition of thousands of novels in the United States and Britain in the decades immediately after the American Revolution (Jockers 2013). Could understanding this flow of cultural influence from a larger market to a smaller one help us to identify similar situations today? What if such a method were applied to labeling and marketing trends to help small Maine businesses to better identify trends that will help them to compete locally, nationally, and internationally?

Digital humanists have developed sophisticated tools for analyzing texts, and this scholarly expertise has a more urgent need for application beyond the academy today as a result of how readily accessible big data in our information age threatens to overwhelm meaningful interpretation and understanding. Humanities scholars are also skilled at identifying, contextualizing, and analyzing difference, the difference of expression and experience that creates richness and beauty as well as conflict and strife. When these new and traditional skills are combined, these kinds of methods can help us to anticipate, rather than just react to, matters of local, national, and international policy concern.

Every year individual academics, teams of scholars, and think-tank organizations produce thousands of documents about ethnicity, cultural dynamics, local history, religion, and other crucial aspects of human experience and creative output. With the assistance of the high-level text analysis described earlier in this article, the content of these studies can now be made more accessible to leaders and decision makers who craft and implement policy. A recent article coauthored by a big data scholar at Georgetown University and members of the U.S. Army Corps of Engineers highlights the ways in which the questions raised by digital humanists are assisting in large-scale analysis and policy design (Leetaru, Perkins, and Rewerts 2014). This work created an archive drawn from the leading databases of academic scholarship. The overall project encompassed publications related to Africa and the Middle East, and in one case study, that of the Nuer ethnic group in Africa, the algorithms located 1.5 million related publications that were used to create maps of populations, identify experts in this field of study, analyze questions of food and water security, explore themes related to the targeted genocide of this group, and chart relative scholarly attention to this group during the last 50 years (Leetaru, Perkins, and

Rewerts 2014). These results were distilled into charts, maps, and summaries to guide policymakers to the data and scholarship that would quickly and reliably inform them. The geographic coverage of the overall database is impressive, and its potential as a research tool is powerful, as the Nuer example shows, but the project also identified the discrepancy between government and academic publications. Leetaru and his colleagues (2013) argue that the geographic interest of academic literature has changed little over time, one presumes because the areas of study represent rich and complex questions of concern, while the government documents appear more reactionary. Areas of darkest color in Figure 2 indicate where government research, news media, and academic literature overlap in their concerns, but readers should note the circles in lighter shades (primarily the academic literature) that stand alone.

Perhaps most importantly, Leetaru and his colleagues found that U.S. government publications focus only on areas of present policy concern, rather than identifying potential future policy issues, while the academic literature offers broader and more constant assessment. Given the focus of the humanities on difference, change, and otherness, this is essential information that needs fuller integration with government policy. Such a study of Russia, China, or India could lead in new, preventative directions for policy, directions that allow us to anticipate emergent issues rather than scramble for background knowledge after an incident has occurred.

Our examples so far emphasize how humanists' methods and interpretative questions can help interpret big data, with a particular focus on the crucial cultural and individual variation that can be lost within the aggregate.

Digital humanities is also centrally concerned with collecting this local knowledge, history, and concerns to bring it into the larger public domain using digital and computational methods. This includes making data and interpretation accessible to the public and using the power of digital and computational methods to assist cultural organizations, elementary and secondary schools, and civic entities in developing the skills to use this information fruitfully.

Two curricular initiatives aimed at bringing policy issues to the fore highlight this kind of work. The first emphasizes the ways in which these tools and methods can have an immediate impact on a community. In fall 2014, Jack Giesecking taught "The Digital Image of the City" at Bowdoin, which used studies of New York City as models for examining issues in Portland, Maine, related to housing, infrastructure, and public space. Students in the course, many without prior knowledge of computational skills or humanistic social sciences, collected data in the form of narratives and mental

FIGURE 2: **Visualization of News Coverage of Africa and the Middle East in Different Databases**

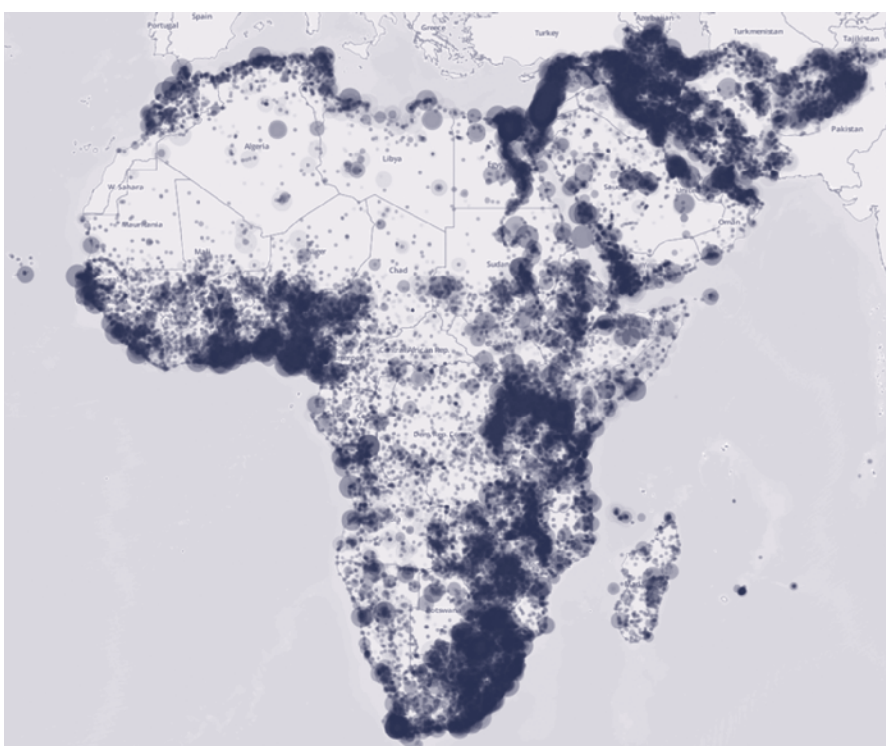


Figure is reprinted from Leetaru, Perkins, and Rewerts (2014; Fig. 25). Darkness of color indicates higher number of articles about a given area from multiple sources. The figure has been modified to blue and white from the original full-color version. For maps of each source, plus this composite one, all in color, see Leetaru, Perkins, and Rewerts (2014).

maps, which they then analyzed using the methods of text analysis and spatial analysis common to digital humanities. They incorporated data from Portland's city offices to better contextualize their qualitative findings within the available quantitative big data. At the end of the semester, students presented their findings and suggestions to representatives of the City of Portland with the goal of establishing partnerships that could inform better policy making in the future.³ Bowdoin College's Joseph McKeen Center for the Common Good is currently working to identify similar points of collaboration with the Brunswick community and regional historical societies.

The second example highlights how instruction in the digital humanities has the potential to increase outreach to the public, involve a team of collaborators, and bring visibility to historical events that continue to resonate within local communities. In November 2014, the Bowdoin College Museum of Art launched the virtual exhibition *Fifty Years Later: "The Portrayal of the Negro in American Painting"—A Digital Exhibition*.⁴ The website revisits a landmark exhibition from 1964 at Bowdoin, one of first in the nation to examine the representation of African-Americans in American art. The content of the virtual exhibit was created by Art History Professor Dana Byrd and the students in her seminar "Race and Representation" in the spring of 2014. The website was built by a student as part of a Gibbons Summer Research Program fellowship in order to incorporate technology with the interdisciplinary questions raised by the artwork and the artifacts of the original exhibit, including photographic negatives from a visit to Bowdoin by Dr. Martin Luther King Jr. The student worked with staff at the museum and Bowdoin's Digital and Computational Studies Initiative. In both cases, student learning and scholarship became a valuable educational resource for a broader public.

Such work can also have a statewide impact with implications for national policy. One example comes from the collaborative work by fisheries expert Ted Ames and digital mapping specialist Eileen Johnson. Ames and Johnson collected narratives of historical fishing grounds to identify changes in cod and haddock populations along the coast of Maine. Their research combined local, community-level humanities information with large-scale data about water temperatures, underwater topography (bathymetry), and spawning zones. Ames is clear about the challenges faced during

this project: "Simply interviewing some fishermen and then cleaning up the data to make it presentable to the scientific community is only a small part of what has to be done to interview fishermen effectively" (Ames 2005: 186). Cultural knowledge, linguistic study, textual analysis, and historical study were all required to assemble the collection of fishermen's narratives about cod and haddock populations in a meaningful way. When combined with geographic information systems (GIS) processing, those data can be compared with other spatial analysis common in the sciences, for a powerful result. The combination of digital humanities, ecology, and GIS has revealed a rich resource in these narratives that could serve as a cornerstone for informing regulatory decisions (Ames 2005).

FROM PUBLIC POLICY TO DIGITAL HUMANITIES

For these kinds of collaborations to flourish, digital humanists (and other scholars) need access to data and funding for research and outreach. Access needs go beyond a searchable database that returns one kind of result about one kind of query. All of the questions raised by the results of the Ngram Viewer search for "Margaret Chase Smith" demonstrate a need for contextualizing information within its full text, alongside image files, and with the available associated details about authors, publishers, editors, publication types, and other such metadata. Digitization is a critical first step toward providing greater access to materials, but the bigger benefits occur when users can also access the raw data in formats that allow them to manipulate the data and thus see connections and relationships that were previously invisible.

Much data is already held in public repositories (or nonprofits), but the process of digitization and building good metadata—that summarizes basic information about the data and makes it easier to find and work with—is expensive and time consuming. Some cultural organizations signed contracts in the early years of digitization, effectively giving ownership of their digital data to commercial entities in perpetuity. Open access is a goal of many digital archives, but financial pressures and interests still lead to mixed results. Google Books is accessible to anyone with an Internet connection, but there is no information available about what materials are included and why, searches turn up variable and inconsistent results, and available metadata is spotty. In

contrast, Hathi Trust is a curated and customizable digital book collection, but requires a subscription for access. The Digital Public Library of America (DPLA) has attempted to address all of these concerns. DPLA is a nonprofit, collaborative portal for accessing the collections of many American libraries. The platform for virtually studying over eight million objects held by DPLA represents a range of involvement of professional and amateur scholars.

The aggregation of all this data can also come at the cost of obscuring local histories and concerns in two main ways. The first, discussed earlier, is the danger that the small-scale is entirely masked by aggregated big data. The second is the loss of information that can occur when a small-scale collection is tallied with many other datasets, as its own value as a representation of local populations is lost. How have town, regional, and state libraries built their collections, and what do those patterns reveal about local interests and issues? The state-wide library catalog MaineCat is an excellent example of the potential for using an existing large dataset (three million unique items) to better understand regional identities and concerns over time as represented by the nearly 100 municipal and educational libraries that participate in this service.

Museums are also major repositories of data in the form of both objects and their associated metadata. The first step in making these resources available is, again, digitization and documentation. While museums have historically been reluctant to make their images publicly available—because of copyright law and because permissions are a (small) source of profit for some institutions—there is a growing movement for making all images freely available at high resolutions. Digitization may also raise concerns that the virtual will replace the real and thus reduce visitors to physical collections. Many museums, however, have found that adding context and representation online for the objects on display actually encourages visitors to engage their collections more deeply. The ability to see one object against the backdrop of the text, geographies, chronologies, and networks of an entire collection opens new doors for research and understanding about that object. This potential is of such importance nationally and internationally that a new funding initiative has been established with the support of the Andrew W. Mellon Foundation to digitize the hidden collections of unique, local historical societies and museums. The program will be administered by the international Council on Library

and Information Resources (CLIR). In a press release on the CLIR website, Dan Cohen, a board member and executive director of the DPLA, identified the value of this effort as “essential for filling in gaps in our digitized cultural record” (<http://www.clir.org/>). The continued dialogue between local stories and large-scale data will only be productive as long as each recognizes the value of the other.

People engaged in all fields of human experience will need computational literacy to engage the present and create a better future. Supporting digital and computational learning and experimentation across all areas of K–12 education is critical; students should engage such ideas and methods alongside their engagement with humanities, social sciences, and sciences, rather than having technological skills cordoned off into its own narrow field. Collaboration is critical to achieving this goal. Institutions of higher and primary education, libraries, archives and museums, and state and local organizations can share expertise and datasets by working together on so-called legacy projects, long-term collaborative efforts in which participants from different institutions—and different locations—contribute to shared project and goals.

CONCLUSION

The attentive reader might be surprised at how few of our examples come from what might seem to be traditional humanities scholarship, centered on specialized research topics. While the digital humanities is, indeed, transforming the way that research is conducted and the modes of analysis in specialized fields, we have deliberately emphasized how the lessons and larger questions of humanistic inquiry might be brought into a broader field. It is our belief that humanistic scholarship and methods have a tremendous amount to offer public policy and are vital voices in conversations about science, sustainability, social justice, and public history. Such perspectives are also critical to shaping the emergent digital world on terms that bring the efficiency and power of computation together with a commitment to the common good and humanistic values.

The same attentive reader will have seen that our presentation of the relationship between digital humanities and policy has been expressed in as many questions as statements. This has been less deliberative and more from necessity. As an emergent field, digital humanities has had little time or opportunity to help shape policy

(or vice versa). Yet, as a well-established field of disciplines, the humanities continue to prove themselves adept at asking valuable questions about problems of identity, equality, and the nature of knowledge. Solutions to those problems, particularly at a large scale, are best addressed by a collaborative effort. Dialogue is key: a dialogue between local and big data, a dialogue among stakeholders, a dialogue for the common good. 🌐

ENDNOTES

1. Technological limitations prevent us from reproducing the image, but we encourage readers to access NPR's presentation of the key visualization here: <http://tinyurl.com/lgh66ua>
2. More information about this project is available in a blog post by Leonid Taycher: <http://booksearch.blogspot.com/2010/08/books-of-world-stand-up-and-be-counted.html>
3. This blog post by Jack Giesekeing, "Digital Image of the City: Smart City Recommendations for Portland, Maine," provides more information about this project: <http://research.bowdoin.edu/digital-computational-studies/student-research/digital-image-of-the-city-presentations/>
4. Read more about this exhibit at <http://www.bowdoin.edu/art-museum/exhibitions/2014/1964-portrayal-revisited.shtml>

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Crystal Hall is an Italian literary scholar and a digital humanist. She is director of the Digital Humanities Course Cluster at Bowdoin, part of the Mellon Humanities Initiative, 2014–2016. She is author of *Galileo's Reading*. Her research uses large-scale textual and network analysis to study literature, with a specific emphasis on the library of Galileo Galilei. She teaches a first-year seminar that incorporates elementary R statistical programming language into the analysis of literature and coordinates outreach and educational opportunities for faculty who wish to incorporate computation in their courses.