

NEW GEOGRAPHIES

**GEOGRAPHIES OF
INFORMATION**

edited by ALI FARD & TARANEH MESHKANI

New Geographies 07

Geographies of Information

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New Geographies is the journal of Design, Agency, and Territory founded, edited, and produced by doctoral candidates in the New Geographies Lab at the Harvard University Graduate School of Design. *New Geographies* presents the geographic as a design paradigm that links physical, representational, and political attributes of space and articulates a synthetic scalar practice. Through critical essays and projects, the journal seeks to position design's agency amid concerns about infrastructure, technology, ecology, and globalization.

New Geographies 07: Geographies of Information has been made possible by grants from the Graham Foundation for Advanced Studies in the Fine Arts and the Aga Khan Program at the Harvard University Graduate School of Design.

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New Geographies Lab
Harvard University Graduate School of Design
48 Quincy Street
Cambridge, MA 02138

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Printed in Cambridge, MA, by Universal Wilde
Logo Design by Jean Wilcox
Distributed by Harvard University Press
ISBN: 9781934510384
www.gsd.harvard.edu/newgeographies



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Information Geographies and Geographies of Information

Mark
Graham

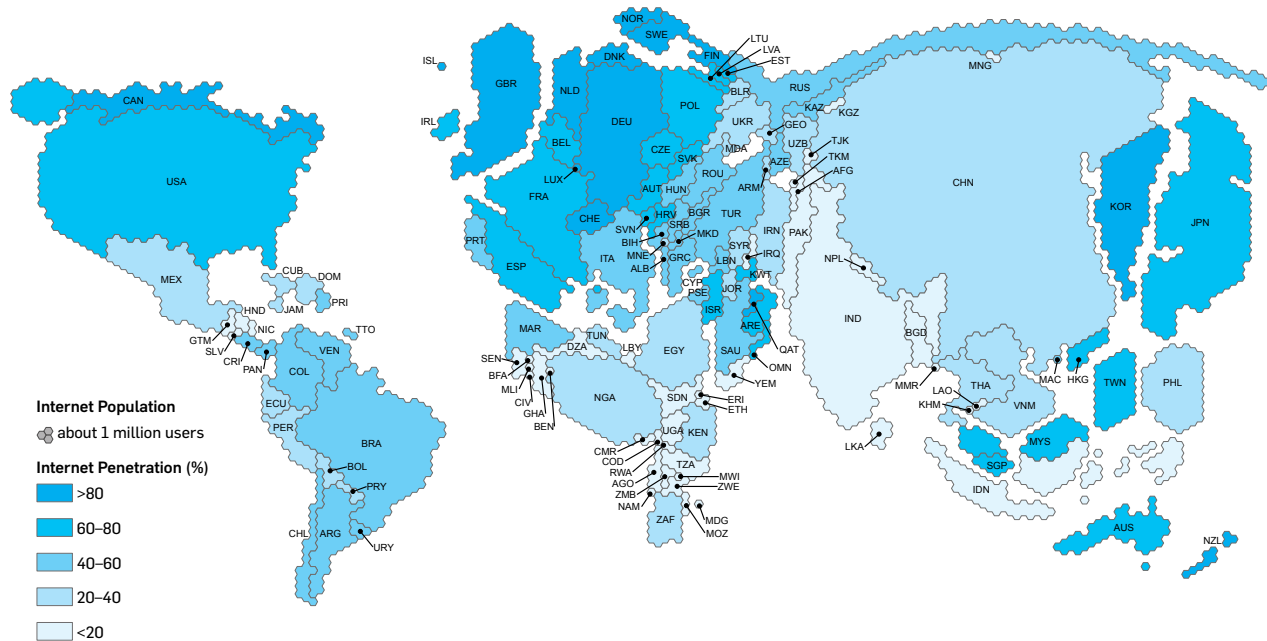
Human geographies are infused with information. Information is created, processed, and used in places. It is stored in places, moves across places, and ultimately annotates and augments places.

Until relatively recently, however, much of the world's geographic information was tethered to particular parts of the world. Some of it passed orally, from person to person. Information, or content (for instance, directions, a description, a story), was stuck to its container (the person who spoke about it, who heard about it). As a result it was necessarily mutable. Information mutated or changed as it moved from person to person.

Mass media such as books, radio, and television allowed information to become immutable while remaining mobile.⁰¹ Information was still stuck to its container (words were printed onto a book's pages), but that information could move around the world without significantly changing. This fundamentally altered the political economy of geographic information. Immutable but mobile geographic information could be employed to exert power in economic, social, and political spheres of

life and governance. This meant that those in control of the means of informational production (publishers, printers, media companies, governments, and censors) could wield enormous influence over how places came to be represented.⁰²

But the digital moment has brought about a fundamentally different relationship between content and its container.⁰³ Information now can be separated from its container and yet still remain immutable. This ability to detach content from its container has massively lowered the barriers to entry associated with earlier media production (the hand-copied manuscript, for example, and the first television sets). This has led many commentators to point to the possibility of more democratized information geographies. The digital moment therefore offers the potential for a radically different political economy of geographic information:⁰⁴ the potential for broad-based participation and representation that can circumvent traditional mediators of information; and the potential for citizens to play a greater role in shaping the immutable geographic information that plays such an important



role in everyday life.⁰⁵ By exploring a few examples of the global geographies of information, some empirical evidence may be brought to bear on those promises.

Here it is relevant to point out an important difference between “information geographies” and “geographies of information,” as I see them. The former is a way of signifying concern about the augmented or saturated nature of places with information. Because places are ontogenetic (that is, in a state of becoming that emerges through practices), talking about already existing information geographies poses a challenge.⁰⁶ In the same way that a walk through Osaka draws upon and brings into being very different geographies for me than it would for an Osakan, information geographies likewise have no ontological stability or fixity. “Geographies of information” instead refers to the geographic distribution of information: sometimes treating information as representative of some other underlying phenomena and sometimes treating it as a phenomenon itself.⁰⁷ This paper explores geographies of information, but it does so as a starting point to understand one crucial facet of information geographies.⁰⁸

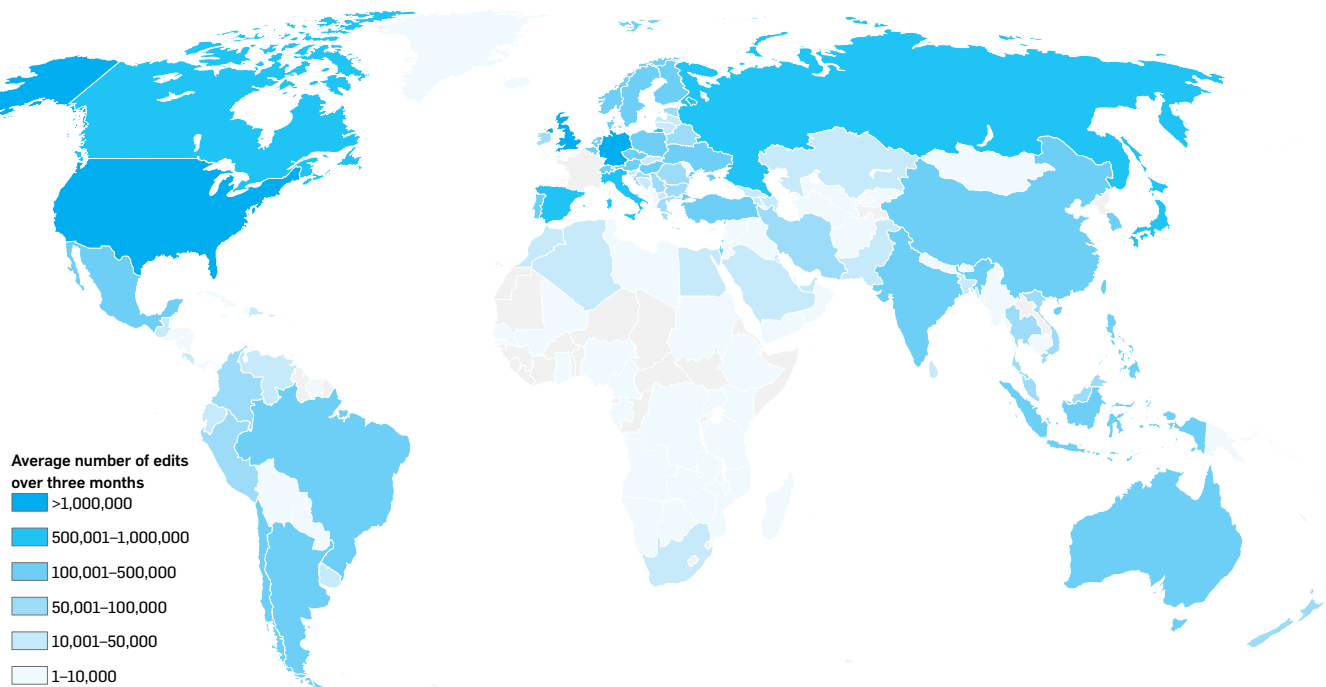
Three categories of information seem especially worthy of consideration: geographies of access and enablement, geographies of participation, and geographies of representation. The goal of this investigation it is to identify some of the key contours of unevenness, barriers to participation, and concentrations of content or representation that exist today and influence the overall

political economy of information. In particular, access to the Internet (as an example of access and enablement), contributions to Wikipedia (as an example of participation), and content on Wikivoyage (as an example of representation) will be explored. Although information geographies as seen through the lens of these three distinct datasets may not prove in any way representative of other digitally mediated practices, the mode of analysis undertaken in this essay offers a guide for the type of questioning we may want to pursue when looking at other datasets related to information geographies.

Internet Access

When reflecting on the geography of access, disconnection, and enablement, it is crucial to begin with basic internet access, a prerequisite for most types of digital engagement. Data from 2013 collected by the World Bank and International Telecommunications Union records internet use among the total world population.⁰⁹ The data is mapped as a cartogram in which the size of each country represents its population of internet users, with each hexagon on the map symbolizing one-third of a million internet users.¹⁰ Shading on the map is used to represent each country’s internet penetration rate, with darker shades symbolizing higher levels of internet usage among the population.

Above: Map showing average number of edits to Wikipedia.
Opposite: Map showing internet population and penetration.



The map paints a revealing picture about human digital activity. The world's largest internet population (over half a billion connected people) lives in China. Indeed, 42 percent of the world's internet users now live in Asia: China, India, and Japan alone are home to more internet users than all of Europe and North America combined.¹¹ Few countries, however, can count a majority of their populations as internet users: India, for instance, falls into the lowest category of penetration, at less than 20 percent. This is not to suggest that significant change is not occurring. Between 2011 and 2014, some African countries experienced staggering growth in internet penetration: almost all North African countries doubled their internet population (Algeria being the exception). Kenya, Nigeria, and South Africa also saw significant growth. Other countries, however, have seen little change, with more than twenty countries located in sub-Saharan Africa having internet penetration of less than 10 percent in 2013, and exhibiting very little growth since then.

Looking at this data as a starting point, therefore, reminds us that despite the massive impacts that the Internet has on everyday life for many people, there remain starkly uneven geographies of access. The majority of humanity has never used the Internet.

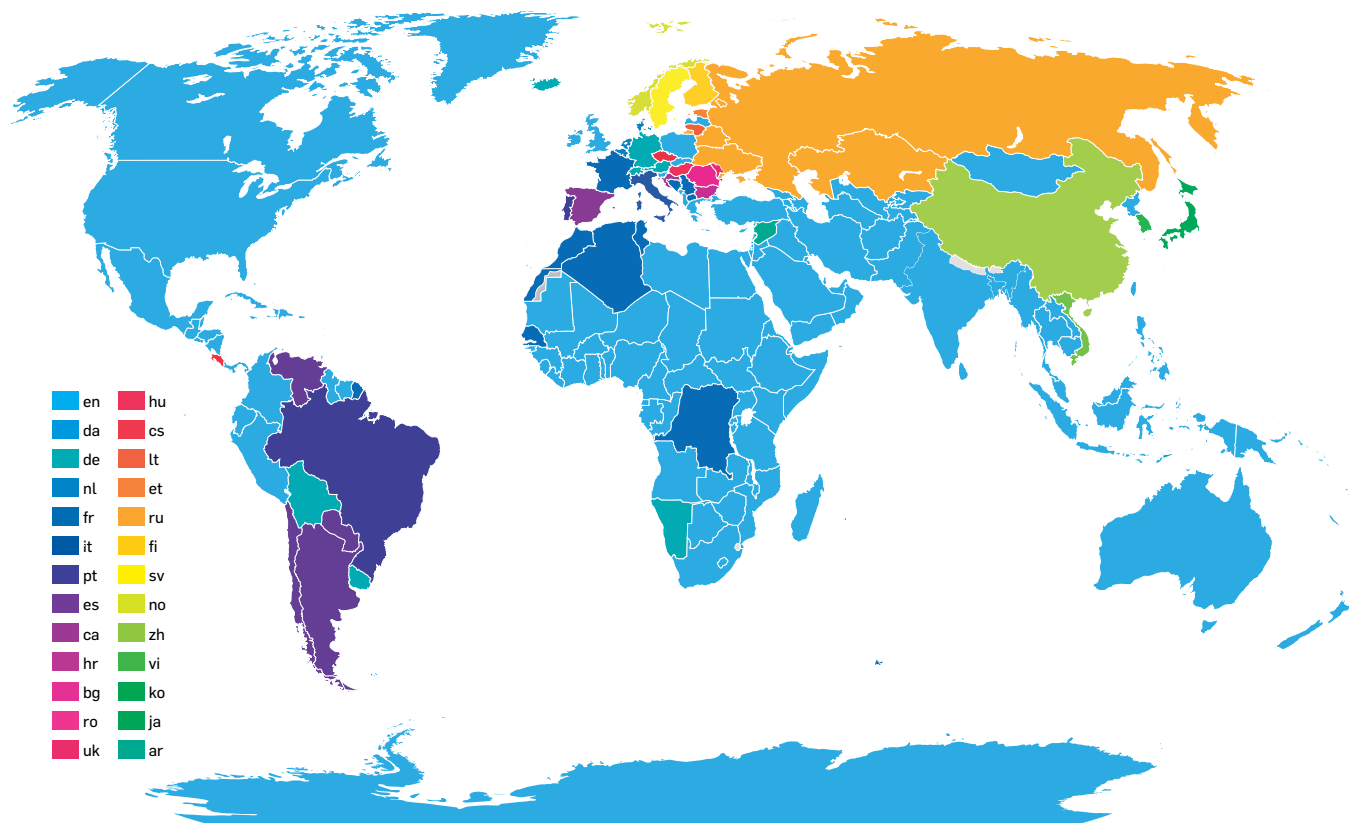
Contributions to Wikipedia

Wikipedia is one of the most visible components of digital information geographies. It contains 32 million articles and exists in more than 200 languages. Fifteen

percent of all internet users access it on any given day. Content on the platform thus plays an important role in annotating parts of our world.¹² Wikipedia operates using a digital architecture that, in theory, allows anyone with an internet connection to contribute content: indeed, the platform's strapline is "the free encyclopedia that anyone can edit." In practice, however, the geography of participation is highly geographically uneven, as demonstrated by mapping data related to Wikipedia editing activity over time.

Quarterly data regarding the total number of edits to all Wikipedia versions that emerged from any territory (that is, the amount of content people producing in each country) was averaged over a two-year period (2010–2011) and plotted on the world map.¹³ Inequalities in the amount of content produced are stark: the United States, Germany, the United Kingdom, and France all have on average over a million edits each quarter. Most countries in Africa and the Middle East, in contrast, register only a few thousand edits per quarter. Interestingly, more edits originate in Hong Kong each quarter than within the entire continent of Africa.

Some of this variation can be explained by internet population: generally, the more internet users in a country, the more edits originated there. However, even adjusting for their small internet populations, most Middle Eastern and African countries still register far fewer edits than would be expected when internet penetration is considered.¹⁴



These uneven geographies of participation cannot be simply explained by considering internet access. Something else is at play. Said plainly, geographies of participation are heavily skewed in favour of internet users in high-income countries. Interviews and focus groups involving Wikipedians revealed that a number of other circumstances also affected participation. The availability of reliable infrastructure (such as power supply), a broad ecosystem of local information, and an educated and tech-literate population that included both men and women were all found to be significant enabling factors, as was the prevailing belief that the internet could be trusted rather than feared as an arm of surveillance by the state. Having the critical mass for local-language tools, platforms, and communities was also identified as a significant factor enabling participation.¹⁵

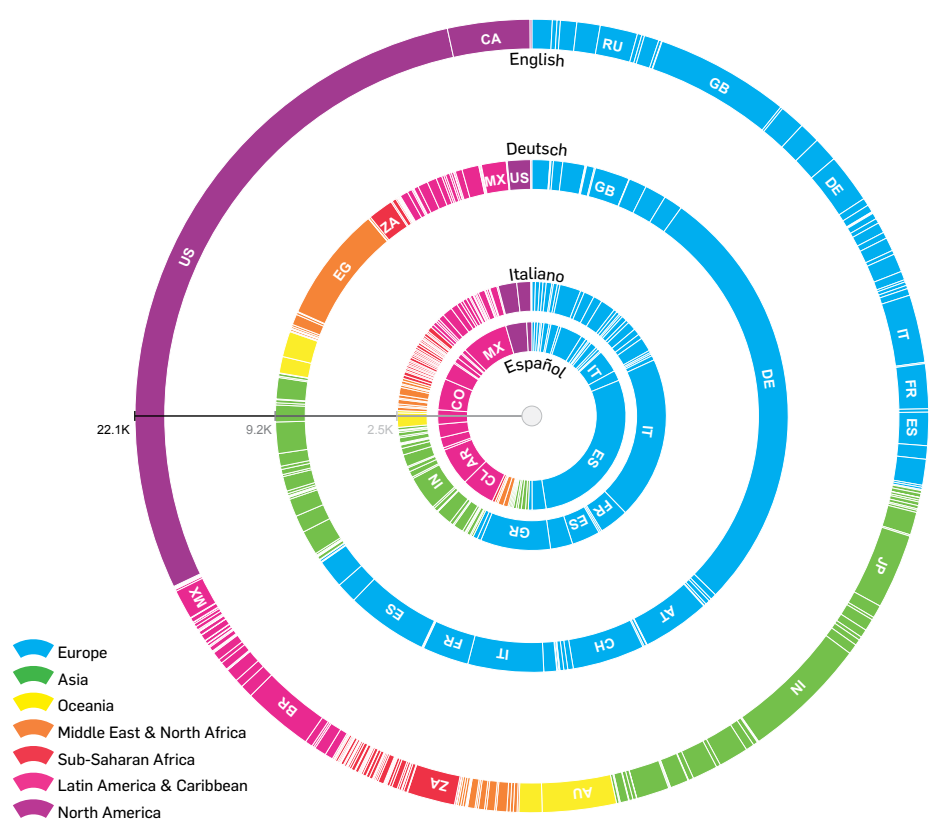
The massively uneven rates of participation on Wikipedia manifest themselves in other patterns as well. One such pattern involves the varying amounts of information about a country that appear in different languages—most notably, in languages other than that country's dominant one. There are more articles about France in French, for example, than in any other language. Mapping

statistics related to the entire world reveals that almost every European country has more articles about itself written in its own dominant language than in any other language: more articles about Finland in Finnish than in English or German or Russian, and so on.

But that pattern is not replicated across many low-income parts of the world. English emerges as the dominant language of digital content in much of Africa, the Middle East, South and East Asia, and even parts of South and Central America. French and German are similarly dominant in a few other countries scattered around the world.

The scale of these differences results in some implausible comparisons. For instance, not only are there more Wikipedia articles in English than Arabic about almost every Arabic-speaking country in the Middle East, but there are even more English articles about North Korea than there are articles in Arabic about Saudi Arabia, Libya, the United Arab Emirates, and many other countries in the region. These patterns illustrate one way that uneven rates of participation manifest. Some parts of the world are well represented by locals, while others are largely defined by people with few ties to those places.

Right: Geographic coverage of Wikivoyage. Opposite: Wikipedia articles by country (depicting dominant language).



Content on Wikivoyage

Entirely user-generated, Wikivoyage is one of the Internet’s most accessed travel guides. Like many other platforms, such as Wikipedia, Twitter, and OpenStreetMap, it displays significantly uneven geographies of content. But Wikivoyage is particularly notable because the presence or absence of content on the site has an obvious and direct link to economic and cultural geographies.¹⁶

Data for 2013, which is freely available from the Wikimedia Downloads website, compares English, German, Italian, and Spanish content.¹⁷ These languages represent the largest subprojects and provide examples of both geographically concentrated and dispersed languages. Each circular ring in the Wikivoyage infographic above represents one of four languages and is sized in relation to the number of articles present on Wikivoyage in that language. Each section of a ring represents a country—or more specifically, the number of articles in that language about a country.

The graphic reveals the selective picture of the world offered in Wikivoyage. We see that there is a large amount of self-focus in each language version of the travel guides

on the website. English-speaking countries account for about half of the pages written in English; the same holds true for Spanish-speaking countries. German-speaking countries account for only about one-third of the German platform, whereas the Italian edition dedicates about one-fifth of its content to Italy. This is particularly notable because, unlike other platforms that rely on user-generated content (Wikipedia and OpenStreetMap, for example), Wikivoyage is a project designed to explicitly facilitate writing about distant parts of the world. But even under those preconditions, contributors still tend to be more inclined to focus on local topics. This is important, because—as demonstrated in the previous section—participation has its own, uneven geography.

We therefore see that low-income countries are particularly underrepresented by the English, German, and Italian projects, with only about one-third of articles in those languages dedicated to countries outside the Global North. The Spanish version understandably contains more content about South America, but with only 0.1 percent of the guides about sub-Saharan Africa, it practically ignores that region.

Information Geographies

As the sections above have demonstrated, not only are the geographies of access uneven but so too are patterns of participation and representation: producing geographies of information characterized by data shadows and digital divisions of labor that are heavily concentrated in global economic cores. Furthermore, the broadening of internet access (with more than 3 billion people able to be counted as users today) does not seem to have resulted in any significant leveling of the playing field.

As human societies became exponentially more complex, moving from preindustrial to industrial to postindustrial modes of economic organization, the reliance on geographic information that is both immutable and mobile grew evermore pronounced. But the digital moment has offered the potential for something different. Geographic information can remain immutable, but unlike in previous eras content now can be more easily separated from its container. This matters because geographic information becomes simultaneously influential in the ways that it can travel around the web and often becomes untraceable to particular organizations or people. For instance, think how a Wikipedia article on London or OpenStreetMap edits in Edinburgh can impact a multitude of other sites and services that use that content; yet the conditions under which that information was produced (who created the content, why they chose to highlight some elements and omit others, etc.) remain relatively opaque and often untraceable when accessed through those third-party users. The removal of the tether between content and container does not untether that geographic information from the very geography that it represents; rather, it untethers it from the digital contexts of its genesis and production.

This tethered yet untethered geographic information is essential to critically understanding information geographies. At a time when an increasing amount of everyday life is mediated by the digital, we need to better understand both the political economy of, and the forms of power that produce particular information geographies. And because immutable geographic information

is becoming increasingly untethered from its contexts and containers, we face more complexity at a moment in which we really need opacity.

The uneven geographies of information outlined above can profoundly impact economic, social, and political life. Geography is fundamentally informational, and that information has its own geography. Yet as information infrastructures and the political economy of digital information shift into a digital era, it has become ever harder to map, understand, and critique those geographies.

This piece has sought to explore a few examples of the geographies of information in order to attempt a better understanding of how we might interrogate one important facet of contemporary information geographies. As content separates from its containers, as more complex relationships between mutable, immutable, fixed, and mobile information are brought into being, as creative destruction ceaselessly creates ever more information infrastructures, and as geographic information is increasingly governed by a diverse array of political economic configurations, we need to ask what rights should be expected in the contexts of our immersive information geographies.

What sort of information opacity should be a right? What sort of privacy should be a right? What sort of access to digital information should be a right? And what sort of voice and speech within the contexts of information geographies should be a right? Legal scholars, philosophers, and computer scientists engage in rich debates about rights, privacy, transparency, and access. What can we as geographers add to the debate? I would argue that productive questions sit at the intersection of research about uneven geographies of information (access, production, and representation) and power within information geographies. We currently know too little about how people are empowered or disempowered within information geographies; how some circumvent some forms of power; how some forms of power are reinforced and amplified. As more collections like this one on the geographies of information are assembled, we may more productively turn the theoretical and methodological tools of geography into information geographies.

Acknowledgments: This paper is an abridged and amended version of: M. Graham, S. De Sabbata, M. Zook, "Towards a Study of Information Geographies: (Im)mutable augmentations and a Mapping of the Geographies of Information," *Geo: Geography and Environment* (2015). I wish to give special thanks to Stefano De Sabbata whose work on the images on pages

160 and 163, as well as our broader Information Geographies project (geography.oi.ox.ac.uk), has been invaluable. I am also grateful for the help of numerous people who collaborated on a multiyear effort to map and measure the geographies of Wikipedia. In particular I would like to thank Bernie Hogan, Ralph Straumann, and Ahmed Medhat. This work was

also made possible by research grants from the International Development Research Centre and the European Research Council under the European Union's Seventh Framework Programme for Research and Technological Development (FP/2007–2013) / ERC Grant Agreement n. 335716.

01. Bruno Latour, "Visualization and Cognition: Thinking with Eyes and Hands," *Knowledge and Society: Studies in the Sociology of Culture Past and Present* 6 (1986), 1–40.
02. Ernesto Laclau and Chantal Mouffe, *Hegemony and Socialist Strategy: Towards a Radical Democratic Politics* (London: Verso, 1985).
03. David M. Berry, *Critical Theory and the Digital* (New York: Bloomsbury Academic, 2014); Heather Ford and Mark Graham, "Semantic Cities: Coded Geopolitics and the Rise of the Semantic City" (unpublished manuscript, 2015).
04. Lawrence Lessig, "An Information Society: Free or Feudal?" (lecture, World Summit on the Information Society, Geneva, Switzerland, 2003); Yochai Benkler, *The Wealth of Networks: How Social Production Transforms Markets and Freedom* (New Haven, CT: Yale University Press, 2006); Axel Bruns, *Blogs, Wikipedia, Second Life, and Beyond: From Production to Produsage* (New York: Peter Lang, 2008); Henry Jenkins, *Convergence Culture: Where Old and New Media Collide* (New York: New York University Press, 2006).
05. Daniel Sui and Michael Goodchild, "The Convergence of GIS and Social Media: Challenges for GIScience," *International Journal of Geographical Information Science* 25, no. 11 (November 2011): 1737–48.
06. Rob Kitchin and Martin Dodge, "Rethinking Maps," *Progress in Human Geography* 31, no. 3 (2007): 331–44; Rob Kitchin and Martin Dodge, *Code/Space: Software and Everyday Life* (Cambridge, MA: MIT Press, 2011).
07. Matthew W. Wilson, "Morgan Freeman is Dead and Other Big Data Stories," *Cultural Geographies* 22, no. 2 (April, 2015), 345–49.
08. In other words, the goal of my own empirical project is to understand power in digitally augmented places. I approach this through two lenses: (1) how information geographies are augmented (what they contain, who they serve, etc.); (2) whose voices get to shape information geographies (and who gets left out). Geographies of information necessarily only offer a selective lens on one important facet of information geographies. Geographies of information tell us little about the various ways that geographies are variably performed and enacted, but they do reveal some of the informational raw material for those performances; they reveal whether some of the necessary, rather than sufficient, conditions are in place for inclusive, participatory, and representative information geographies.
09. At the time of publication, 2011 data was the most complete dataset available. For an older but more detailed discussion of these patterns, see M. Graham, S. Hale, and M. Stephens, "Digital Divide: The Geography of Internet Access," *Environment and Planning A* 44, no. 5 (2012), 1009–10.
10. Countries with fewer than that number are not included on the map.
11. India has the world's third largest Internet population, and Japan has the fourth largest.
12. For similar arguments about geographic imbalances in digital participation, see M. Haklay, "Neogeography and the Delusion of Democratisation," *Environment and Planning A* 45 (2013), 55–69, in which the author argues about a 'delusion of democratization'; see also Mark Graham, "Internet Geographies: Data Shadows and Digital Divisions of Labour," in *Society and the Internet: How Networks of Information and Communication are Changing our Lives*, eds. Mark Graham and William H. Dutton (Oxford: Oxford University Press, 2014), 99–116, with a focus on "digital divisions of labour"; or Monica Stephens, "Gender and the GeoWeb: Divisions in the Production of User-Generated Cartographic Information," *GeoJournal* 78, no. 6 (August 2013), with a focus on the gendered nature of user-generated content.
13. This data was obtained from "Wikimedia Traffic Analysis Report—Page Edits," Wikimedia, <http://stats.wikimedia.org/wikimedia/squids/SquidReportsCountriesLanguagesVisitsEdits.htm>.
14. For detailed statistical analyses on the topic, see M. Graham, S. Hale, and D. Gaffney, "Where in the World Are You? Geolocation and Language Identification in Twitter," *Professional Geographer* 66, no. 4 (2014), 568–78.
15. See Mark Graham, "Inequitable Distributions in Internet Geographies: The Global South is Gaining Access but Lags in Local Content," *Innovations* 9, nos. 3–4 (December 2014): 17–34.
16. For an analysis of Wikipedia, see Mark Graham, "Wiki Space: Palimpsests and the Politics of Exclusion," in *Critical Point of View: A Wikipedia Reader*, eds. Geert Lovink and Nathaniel Tkacz (Amsterdam: Institute of Network Cultures, 2011), 269–82; for an analysis of Twitter, see Graham, Hale, and Gaffney, "Where in the World Are You?," 568–78; for an analysis of OpenStreetMap, see M. Haklay, "How Good is Volunteered Geographical Information? A Comparative Study of OpenStreetMap and Ordnance Survey Datasets," *Environment and Planning B: Planning and Design* 37, no. 4 (July 2010): 682–703.
17. "Wikimedia Downloads," Wikimedia, <http://dumps.wikimedia.org/backup-index.html>.

Image Credits

160: Mark Graham and Stefano De Sabbata. Internet Geographies at the Oxford Internet Institute, October 2013. Data source: World Bank 2011.

161: Mark Graham, Bernie Hogan, Ahmed Mohammed, and Richard Farmbrough. Oxford Internet Institute, 2015. In collaboration with Ilhem Allagui and Ali Frihida. Support provided by IDRC. Data obtained from Wikipedia in January 2012, averages taken from the 2011–2012 period.

162: Mark Graham, Bernie Hogan, Ahmed Medhat, and David Palfrey. Oxford Internet Institute Support provided by the IDRC. Data obtained from Wikilocation and the Toolserver in July 2012. Four million georeferenced articles analyzed in 42 languages.

163: Mark Graham and Stefano De Sabbata. Data source: Wikivoyage.org.