Guest Editorial

Materials and Media of Infrastructure

What are the materials and media of infrastructure? It could be claimed that scholars in communication and media studies have always been infrastructuralists (Peters, 2015). Infrastructures of all kinds, including telecommunications satellites, data centres, and oil pipelines, are increasingly at the forefront of critical communication studies. Rather than remaining in the operational background that subtends the contemporary digital landscape, these infrastructures establish "the rules governing the space of everyday life" (Easterling, 2014, p. 11), emerging as integral "chokepoints" (Carse, Cons & Middleton, 2019) that reveal the varied materials that both constitute them and travel across them. Whether in mineral extraction or the newsprint industry, examining both the materials and media of infrastructural arrangements allows for a better understanding of the social, political, and cultural configurations they make possible. Functioning in this way as logistical media (e.g., Cowen, 2014; Peters, 2015), these visible and invisible infrastructures ultimately shape the physical movements and mediations of data and information.

As researchers, we are fortunate that, especially if studying the contemporary moment, the tangible materials of infrastructural architectures are available for analysis, starting with how they have been inscribed on the land. Infrastructure, capitalist extractivism, postcolonial space, and a damaged environment are bound together through a set of relationships that cohere in the project of settler infrastructure building. While infrastructures are invariably and most often extractive, drawing from the land in the sense of taking space and making use of materials and resources, one of the central aims of this special issue is to gesture toward how infrastructures are themselves forms of mediation that are shaped by their material constitution. The materials *and* media of infrastructures signal a broad set of evolving relationships between humans and the environments they colonize, and how they cohere in highly contingent and mutable entities known as "infrastructures." This issue examines the range of infrastructure as a category, one that can contain material registers as varied as salmon farming, mineral exploration, oil extraction, papermaking, emergency test signals, and more.

There has been a growing interest in infrastructure in media studies in the past few years, whether physical, digital, or the ethereal in-between. It has been part of a broader "infrastructural turn" that has seen the objects and processes of

infrastructures treated with increasing depth and dimensionality across many adjacent fields. On questions of land and environment, our colleagues from anthropology or Indigenous studies have focused on the temporal politics (Anand, Gupta, & Appel, 2018), detrimental environmental consequences (Hetherington, 2019), and potential infrastructures hold for Indigenous-led sovereignty (LaDuke & Cowen, 2020). Media studies is indebted to Harold Innis' investment in the infrastructure of Canada's complex communication systems, which he considered as part of the inherently material dimensions of our communications practices and networks (1970, 1999, 2007). While this foundational work might in part explain why Canada produces so much stellar infrastructural scholarship, the field of media studies has by no means fully mined the tangible frictions that inhere in the material make-up of infrastructures or their geographic situations.

Thanks to work by Lisa Parks (2013), John Durham Peters (2015), Nicole Starosielski (2015), Janet Walker (Starosielski & Walker, 2016), and many others (Gabrys, 2016; Jue, 2020; Parikka, 2015, and the list goes on), scholars in environmental media studies in particular have become accustomed to thinking about the political ecological dimensions of media and their infrastructures. Building from this, the articles collected in this collection make a strong case for thinking *geo-graphically* about infrastructures—as material practices of "Earth writing" that can be made manifest through the specificities of very sited locations. As precise geographies through which to consider the materials and media of infrastructures, they allow us to take into account the many layers—economic, political, cultural—that shape the relationship between media and site, and how these are, in turn, entangled in the current reverberations of settler colonialism. The mediation of territory, whether through digital practices of mineral staking or through Kwawaka'wakw social media communication practices in what is now known as British Columbia, is an integral dimension of this geographical treatment of infrastructures. Building on Parks' (2009) method of media infrastructural fieldwork and Kathryn Yusoff's (2019) scholarship around the racialization of geology, this issue seeks to put forward a broader methodological orientation toward the physical nodes of infrastructural networks and attend to the lives "on the ground" that can be woven into and across contentious settler realities, rather than abstract and disconnected technological and communication "bubbles."

This tension is the subject of **Patrick Brodie**'s "Hosting Cultures: Placing the Global Data Industry," which examines how Ireland's makeover into "data centre country" is changing not only its physical landscape but also its cultural fabric. He uses the concept of "hosting" to think about how the internet's infrastructure relies on ecosystems of mutually interdependent big and small tech companies leaching on "hosts," physical places (cities, town, and regions) that are financially, environmentally, and socio-culturally transformed by these new arrivals. The ex-

traction does not merely refer to the level of the energy resources required and the outputs of major industry; a "cultural extraction" must occur to accept and host these "outsiders."

Hannah Tollefson's contribution also works through a particular site. Her focus is an area of British Columbia known as the Golden Triangle, which is often imagined to be particularly rich in minerals. Information about the area is recorded in Mineral Titles Online, a subsurface mineral tenure staking system that aims to facilitate integration in supply chain logistics and management. This online system that manages extractive infrastructures can be understood as part of platform capitalism. Drawing on industry journals, archival sources, and an analysis of the Mineral Titles Online interface itself, Tollefson interrogates the logistical politics of settler-colonial territoriality that take shape through these infrastructural arrangements.

Shirley Roburn continues this sited work on extraction by proposing an expanded notion of "infrastructural action." In her analysis of Kwawaka'wakw social media communications in the Broughton Archipelago, she argues that communications about fish farm occupations in the area was about more than this specific issue. Rather, by regularly referencing their sovereignty and salmon stewardship, the Kwawaka'wakw actively used social media to state infrastructural positions. In this case, then, social media are acting "infrastructurally," doing the broader material and discursive work, as Tollefson puts it, of "staking a claim" (p. 178) on both digital and material terrains.

Roburn's discursive work provides a provocative counterpoint to **Darin Barney**'s interest in infrastructure as a non-discursive politics. He begins the issue by situating infrastructural and material thought in communication and media studies, and reviewing the recent scholarship on the infrastructural "turn" across various fields. Departing from the work of scholars who consider the relationship between the technical and the political, he points in particular to renewed attention to infrastructure as a *form* of politics, what he explains as "the shape of politics and the arrangement of its parts, and also its determining principle" (p. 226). Infrastructure, he argues, is a non-discursive politics—one that is entangled with state and capital, and specifically extractive capitalism and settler colonialism. Barney shows us how the work of critical, postcolonial, feminist, and queer theory allows for a better understanding of the ways that infrastructure becomes a formal and material performance of politics. These reassessments are ultimately vital for rethinking the relationship between politics and infrastructure, including within the context of communication studies.

Jordan Kinder continues the work of challenging extractivist capitalism and its infrastructures with a close look at the 2017 video game *Thunderbird Strike* and the way it is able to mobilize its players into action. The game—a combination of Anishinaabe storytelling and the sabotaging of the Canadian tar sands—arguably

incentivizes player-activists to move their sabotage from the game to physical terrain. Kinder spurs infrastructuralists to these material zones of friction; land itself is a contentious infrastructural form seen through the lenses of Indigenous jurisdiction and the settler petrochemical imaginary.

As is so often the case, understanding the present benefits from historical perspective. The overlaps between infrastructure studies and media history that feature in Innis' studies are implicit in research on how communities are connected across geographical space, such as with work on signals (Rikitianskaia & Balbi, 2021; Thibault, 2018), postal networks (Blevins, 2021; Pringle, 2020), or alternate computer networks (Peters, 2017; Schafer & Thierry, 2012). Though in many instances questions of colonization, the environment, and the extraction of natural resources might be only indirectly addressed, this does not mean that there is no *geo-graphing*. The focus is however in some of the myriad other ways that site comes into play and leaves its mark: company and patent wars, the development of standards and protocols, ammendments made to improve accessibility, et cetera. In this issue, **Andy Kelleher Stuhl**'s treatment of the recent reintroduction of national emergency alert systems is a good example of this kind of work. He brings our attention to the American Emergency Alert System, "the first and last medium of American emergency broadcasting" (p. 272). As a "sonic structure" for sending important and urgent messages nationwide, it builds on the infrastructures and broadcasting capabilities of radio. The Emergency Alert System offers an original example of the regulatory impacts on a form of communication that is meant for the public but is not quotidian. Stuhl makes us aware again of the ways the state communicates directly with the population in times of crisis, of the infrastructures and protocols this requires, and, in this particular case, of the interesting continuations between old and new media infrastructures, particularly as terrestrial radio experiences a resurgence.

The ground of infrastructure, the material of land, is ever-present across these locations of research. It makes manifest the vital and unpredictable ecological points of contact between infrastructure-making and sited environments. What these locations hold in common is an attempt to attend to these open-ended transformations—the mutability of the place where infrastructures and environments meet. This is not, of course, limited to the horizontal plane of land. From recent work around "Indigenous solarities" (Kinder, 2021), which have the capacity to support solidarity projects of Indigenous self-determination through solar energy, to foundational scholarship on the ocean as a contested media space, namely one constituted through sonar technologies and their mapping of its depths for capitalist and militaristic ends (Shiga, 2013), attention to the volumetric dimensions of infrastructure-making is another key attribute of the contributions to this issue (Billé, 2020). To think critically with infrastructure is to think vertically and cycli-

cally across three and four dimensions. It is to recognize the protean nature of infrastructure to largely respond to the ongoing settler-colonial project to claim property and land (Pasternak & Dafnos, 2018; Ruiz, 2021; Spice, 2018). In this way, infrastructures become akin to fluids, or capital itself, in their capacity to move across "phases" and become reified through a mixing of agents, from resource staking to property claims upheld by the settler state. Infrastructures possess both materials and media that are implicated in this process of reification—they often constitute what Winona LaDuke and Deborah Cowen (2020) characterize as "Wiindigo infrastructure" (p. 243). To unbind them and start to see what regenerative, or even "alimentary" (p. 245), potential their relationships to land hold.

Research on the histories of infrastructure, meanwhile, is also being developed in a variety of fields other than communication and media studies, including material culture studies, art history, book history, urban studies, anthropology, and film studies. What is significant here is that this scholarship can be both a fine-grained analysis of materials and one that places them within the macro contexts of infrastructures. These histories reach into the pre-modern to consider local, regional, and global routes and networks of communication and trade. Using an example close to media studies, consider the recent painstaking work of book historians who mapped the locations of all of the booksellers and printers of a particular region and time, such as Malcolm Walsby (2020) did for regional France and Etienne Posthumus (2021) produced in the form of a digital map of Amsterdam. Such projects are a mapping of the infrastructure of historical Europe's emerging print and book culture, including the circulation of ideas and knowledge of the time. One such important material for the book would eventually be paper, with paper mills themselves a historical infrastructure reliant on natural materials—flowing water, wood, et cetera—or processed materials, such as rags. Today, materials such as glass or sand, or metals such as gold, silver, copper, and nickel join the plastics produced through the extraction of oil to help explain the material world of digital media technologies and the infrastructures they make possible. These traditions help us consider Tim Ingold's (2007) call to study *materials* rather than materiality, which he considers to be a concept too theoretically unclear and abstract. Regarding one such conference session on "materiality," he writes:

> These presentations were overflowing with references to the works of currently fashionable social and cultural theorists, and expounded in a language of grotesque impenetrability on the relations between materiality and a host of other, similarly unfathomable qualities, including agency, intentionality, functionality, sociality, spatiality, semiosis, spirituality and embodiment. Not one of the presenters, however, was able to say what materiality actually means, nor did any of them even mention materials or their properties. For the most part, I have to confess, I could make neither head nor tail of what they were talking about. (p. 2)

Without making an argument *against* such philosophical approaches, the articles in this issue take the geographies and histories of materials as their starting point and focus.

In addition to the aforementioned contributions, the remaining three articles have a pronounced focus on material artefacts. **Rachel Jekanowski** digs into the archive of the Hudson's Bay Company to reveal a corpus of "fur films" produced in the early 1920s and 1930s. She situates their creation of "settler imaginaries" as emanating out from the company's vast infrastructural network of fur production. Her aim is to position non-theatrical films and their role in the perpetuation and consolidation of colonial infrastructure-making in the settler state of Canada. Fur and film become bound together as holding distinct but interrelated forms of material agency. The production of both, Jekanowski claims, can create a point of articulation that lays bare how they relied on the exploitation of Indigenous lands and labour in order to consolidate an understanding of white supremacy at the heart of these settler imaginaries.

Turning attention to Canada's status as a prime papermaking settler colonial country, **Aleksandra Kaminska** and **Rafico Ruiz** offer a close reading of *The Bowater Papers*, a trade magazine produced by the British-owned Bowater Paper Corporation in a truncated run of four issues in the 1950s. Our goal is to understand the magazine as a lens through which to observe the broader consolidation of a post-World War II paper-driven "xylomedia" modernity. Following this, our aim is to reassert wood and paper as infrastructural materials at the heart of media studies, with particular attention to their environmental anchoring in the settler forests of Canada. Ranging across the scales of industrial paper production, from mature trees to pulp to by-products such as lignin, the article traces the development of a particular material infrastrucutre of modernity.

The last article begins with a very specific artefact: a bridge in Wakefield, Québec. Through this heritage bridge, **Rob Shields** furthers this issue's investigation into the temporal dimensions of infrastructure. Questions of land and territory are understood as attempts to work through the infrastructural forms of the colonial past, or in a different register, the enduring links between media old and new. Shields uses the example of a reconstructed wooden bridge to articulate four "moments" of "time infrastructures." In doing so, he argues that infrastructures are rhythmic, that they have multiple and unequal temporal effects and modes. This helps explain infrastructure as a "super-object," something that transcends presence "to reach forward into the future as well as back to the past" (p. 348).

As this special issue suggests, infrastructure can be articulated and studied in many ways. While its aim is not to explicitly investigate the methodologies of infrastructure studies, placed side by side, the contributions reveal the variety of research that can fall under an "infrastructural" rubric. Indeed, the methodological differences in these pieces bring to light the many epistemologies of infrastructures

past and present. The articles are nearly all *geo-graphic*, some are historically situated. They are bound to questions of contested territoriality; and they often address these questions through thickly described locations that help articulate precise land-based entanglements. There are instances of particular systems in specific sites (Brodie; Stuhl; Tollefson), singular artefacts (Shields), and media productions (Jekanowski; Kaminska & Ruiz; Kinder; Roburn). There is fieldwork and ethnography work, there are close readings, and activist orientations that are directly engaged with political questions and social justice (Barney). Many of these preoccupations and approaches overlap, and the goal is not to divide and classify but rather to show the range of sited possibilities offered to the field of communication and media studies. Playing off these methodological orientations, **Nicole Starosielski** offers an experimental and provocative means to capture this analytical diversity. Her afterword charts the ways that infrastructuralists can parse not only the varied geographies, materials, and modes of settler colonialism, but also how reading infrastructure is a practice that is ubiquitous, constant, and rooted in the creation of entanglements and relationships. To read infrastructure is to bind together and disaggregate—to examine traces left behind and also sound out the composition of material.

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