Foreign objects? Web content management systems, journalistic cultures and the ontology of software*

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Abstract:

Research on 'digital' journalism has focused largely on online news, with comparatively less interest in the longer-term implications of software and computational technologies. Drawing upon a six-year study of the *Toronto Star*, this paper provides an account of TOPS, an in-house web content management system (CMS) which served as the backbone of thestar.com for six years. For some, TOPS was a successful software innovation, while for others, a strategic digital 'property'. But for most journalists, it was slow, deficient in functionality, aesthetically unappealing and cumbersome. Although several organizational factors can explain TOPS' obstinacy, I argue for particular attention to the complex ontology of software. Based on an outline of this ontology, I suggest software be taken seriously as an object of journalism, which implies: acknowledging its partial autonomy from human use or authorization; accounting for its ability to mutate indefinitely; and analyzing its capacity to encourage forms of 'computational thinking'

Key Words:

actor-network theory; computation; digital media; newspapers; organizational theory; phenomenology; practice theory; site ontology; software; web content management systems

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Introduction: mundane troubles with software

As readers of thestar.com begin their morning in late August, 2011, there is a flurry of activity in the *Toronto Star* newsroom. That morning, at 4:45am, Jack Layton, leader of the New Democratic Party of Canada, passed away in his Toronto home. Earlier that year, Layton led his party to a remarkable 103 seats in the Canadian general election, becoming for first time in party history the official opposition in Parliament. For newsroom editors, his death is a big story. The *Star* is Canada's largest newspaper, and dedicates significant coverage to national politics. Moreover, Layton was also a longtime Toronto city councilor, and onetime mayoral candidate, making the story doubly relevant for the newspaper's primarily urban readership. But his death, though sad, is not unexpected. Layton had fought the election while recovering from prostate cancer, and later announced a leave of absence to fight a new and unspecified cancer. The newsroom is busy because of the timing, at the beginning of the working day for many readers. The print edition, finalized the previous day, has no account of Layton's death. The *Star*'s online and mobile editions, however, are providing saturation coverage, just as readers log in to their office computers or check the news on their commute.

Yet, as editors add and update obituaries, editorials, news stories, commentaries, photo galleries and more, they are experiencing troubles. Near the central newsroom hub, under a large LCD screen displaying web metrics, sits Brian Kilburn[1]. Brian's not at his usual desk, indeed he is not 'of' the newsroom. Brian is from 'Group IT'. He looks at the computer screen, one hand on mouse, the other on the telephone receiver. He explains to an unknown conversant that 'TOPS is not performing as it should'. Updates on the Layton story are lagging. Using technical language, he summarizes an earlier call with Torstar Digital. He remains calm; he almost seems to be performing a service. If this is the case, his 'clients' are to either side of him. To his left, three web editors,

currently huddled around a computer looking anxiously at a web browser displaying thestar.com. They debate whether various bits of content are old or updated versions. To his right, Lloyd Dover, the Managing Editor. Lloyd is checking and sending emails, but is also periodically craning his head, checking on Brian's progress, and the web editors' too. This is not the first time TOPS has caused such mundane troubles.

Drawing upon an ethnographic study of the *Toronto Star*, this article tracks the 'many faces' of TOPS, a web content management system (CMS) produced by a fledgling digital media arm within Torstar, the newspaper's parent company. For some, TOPS represented innovation in software design; for others, it was a strategically-important digital 'property'; and for others still, it was seen as wrongly imposed on the newsroom. For those in the last category, typically journalists and mid-level editors, for six years, Canada's largest newspaper was forced to cope with a web CMS that was slow, deficient in functionality, aesthetically unappealing and cumbersome. Some organization members saw TOPS as the product of ham-fisted boardroom maneuvers, and watched it persist in frustration, while they became increasingly familiar with social media, mobile devices and cheaper off-the-shelf software packages. My argument in this paper however will be that the apparent inability of the *Toronto Star* rid itself of TOPS sooner has as much to do with the complex ontology of software objects as with corporate hubris or disorganization. Following a review of the extant literature, this argument will proceed through two main sections. First, I will trace the appearance of TOPS across three organizational sites – the web operation, the developers, and senior newsroom managers – to provide a multisited lens into the operation of web CMS as a software object of journalism. Second, I will theorize the implications of TOPS' differential appearance across these sites by connecting with literature in the growing field of software studies.

My main finding is that taking software seriously as an object of journalism would mean: acknowledging its partial autonomy from human use or authorization; accounting for its ability to mutate indefinitely; and analyzing its capacity to render humans as its objects, by encouraging forms of 'computational thinking'. This, in turn, opens up some areas needing further investigation, including the longer-term proliferation of digital computation technologies and their associated forms of 'IT' expertise within news organizations, and more recent shifts away from in-house software systems, toward third-party prepackaged software 'solutions' that further standardize journalistic form across organizations. I end by arguing that journalism research should accept the partial autonomy of software systems from journalistic practice, and in turn, develop ways to study such phenomena as genuine objects of journalism.

Networked journalism and technologies of software

Literature on the implications of digital and networked media for news work is now one of the richest and fastest moving areas of journalism studies, and it will not be feasible to account for this literature exhaustively here (for a review, however, see Mitchelstein and Boczkowski, 2009). Instead, I will focus on research which has studied, and debated *how* to study, the relationships between technology and professionalized journalism. This strand of debate has arguably arisen most fruitfully from qualitative researchers in dialogue with the newsroom ethnography tradition (e.g. Paterson and Domingo, 2008), who have been interested in mapping technological change in relation to situated journalistic cultures. Such work has observed the degree to which many journalistic routines and hierarchies remain founded in the assumptions of print production. It is in this apparent entanglement of print technology and practice, rather than any philosophical stance vis-à-vis journalism, which has often led to limited implementations of interactive online platforms and tools

(Domingo, 2008; Steensen, 2009; Thurman, 2008). This has also formed the context for the ways in which professional journalists have tended to normalize new genres such as blogging and microblogging, typically hosted by third party services such as WordPress or Twitter, within more established regimes of journalistic practice (Lasora et al., 2012; Singer, 2005).

Even as such ethnographic research provides nuanced accounts of transforming journalistic cultures in a digital era, it often under-theorizes the question of technology, and its complex and historicized interrelationships with journalistic practice. In the last decade, however, a more theoretically-inflected literature has emerged in response, inspired by science and technology studies (STS) and actor-network theory (ANT), which seeks to address the journalism-technology relation head on. A notable example is Boczkowski (2004b) who, drawing on STS and focusing on the computerization of newsrooms, argues journalism research needs to go beyond merely describing the 'effects' of technologies. Instead, attention needs to be paid to their varied 'appropriation' through organizational structures, working practices and representation. Plesner makes a similar argument, though drawing on ANT, suggesting that "we should refrain both from essentializing the 'effects' of ICTs and from forgetting to include them in our analyses of work practices" (2010: 605). For Plesner, technologies are densely interwoven into associations with other actants, and do not possess independent "forces or consequences" (ibid: 604). Hemmingway (2008) represents the most in-depth application of ANT to the study of journalism, exploring in detail the ordinary alliances of regional television journalists and their myriad technologies . Echoing Plesner (2010) and Boczkowski (2004b), Hemmingway asserts, and goes on to demonstrate empirically, that what is crucial is not just the agency of technologies, but their agency via associations with human actors. In short, the wave of journalism research interested in theorizing technology has also been at the forefront in rejecting the implicit technological determinism of some writing on online journalism.

Considering that the above research tends to be concerned specifically with digital and networked media, 'technology' could be seen as too broad a concept. Indeed, it is surprising that so little has been written in journalism studies on software technologies in particular. While the online publishing of news has well recognized implications, less is understood about how this development has emerged within the much longer term proliferation of computational technologies related to and even 'of' journalism, such as digital page composition. Indeed, by Manovich's (2001) definition of 'new media objects', focused on their provenance in computation, printed newspapers were digital media well before news went on the web.

There are of course notable exceptions to this research gap. Weiss and Domingo (2010) combine the approaches of ANT and Wenger's concept of 'community of practice' to trace a web CMS platform as an actant performed and positioned differently in relation to distinct knowledge communities, such as those of web editors or technical staff. In a methodological piece, Anderson and Kreiss (2013) also provide an account of CMS software. With the aim of demonstrating the analytical strengths of ethnographic research informed by ANT, they provide a remarkably detailed account of the protocols, procedures and malfunctions of a CMS which goes well beyond technical description, outlining how software infrastructures both reflect and instantiate the routines, roles and hierarchies of practical journalistic cultures (see also Rodgers, 2014: 77-78). Perhaps the most ambitious literature concerned with software in journalism studies are accounts of various experiments which bring journalists together with software programmers. Lewis and Usher (2013) convincingly argue that while such experiments might present new frontiers of possibility, it is important to remain critical and not simply take for granted the intrinsic value of computational concepts such as open source for journalism (see also Aitamurto and Lewis, 2013). Czarniawska's

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(2011) recent research provides one reason to be cautious: she found remarkable standardization in the way three otherwise differentiated news agencies (Swedish TT, Italian ANSA, and Reuters) formatted their news product, largely due to similar implementations of software platforms.

These strands of emergent research point to some of the ways in which we might study what Anderson (2013: 1017) recently called the "shaggy, emerging beast" of computational journalism. This paper represents a modest but I hope helpful contribution to this new research agenda. My argument will center on a claim that journalism research needs to take the autonomy of software more seriously. As the ethnographic research I am about to recount will substantiate, I accept the merit of studying technology as localized and appropriated within particular practical milieus. Yet what seems missing in much of the existing literature is recognition of the trans-local and trans-human forms of standardization that software objects introduce into such milieus. Before I expand on this conceptual point, however, I will first present an empirical interlude, examining the case of the TOPS web CMS within the organizational settings of the *Toronto Star*.

Case study and methodology

This paper draws upon a multi-year (2005-2013) study of the *Toronto Star*, Canada's largest newspaper in readership terms, and the flagship holding of Torstar, a large media company by Canadian standards (owning more than 120 newspapers, several digital properties, and Harlequin Books). Though Torstar is a publicly-traded corporation, its voting shares are controlled by five families with a longstanding historical interest in the *Toronto Star*. Through special corporate governance structures, they ensure the newspaper remains faithful to a series of left-leaning 'principles' set out in the will of the founding editor, Joseph E. Atkinson.

While my larger study focused on the changing relationships of journalism and urban public life, the research also produced a wealth of data around the changing practices, technologies and authority of professionalized journalism in a digital age. The cornerstones of this data are two ethnographic field studies: the first taking place over six months in early 2005, involving six weeks of participant observations and 58 interviews; and the second taking place over two months in summer 2011, involving four weeks of participant observations and 23 interviews. These ethnographic studies were significantly augmented by desk-based research of archival records, documentation, online materials, and historical news clippings. Collected data were coded and recoded iteratively throughout the multi-year study, using computer-assisted qualitative data analysis software.

An important theoretical resource for the research was Schatzki's (2002) 'site ontology', which helped to analytically account for the inherent dependence of various organized practices (e.g. editing, layout, copyediting, beat reporting) upon material arrangements (e.g. office spaces, devices, infrastructures, mediums) (see also Rodgers, 2013: 3-4; 2014: 72-73). In connecting practice theory with new materialist thinking such as ANT, this approach has some similarities to that of Weiss and Domingo (2010), though with a stronger emphasis on what I would term the nonhuman and nonrepresentational aspects of journalism work. This entailed three main dimensions. First, while I was interested in self-conscious reflections in interviews, I also emphasized narrative accounts of activities respondents considered routine and even uninteresting, but which could be analyzed as basic preconditions of work rarely discussed explicitly (cf. Markham, 2011). Second, I was interested in the tracing the silent work of infrastructures (see Star, 1999), for example software (cf. Bruni, 2005) and mundane texts such as daily editorial schedules (i.e. 'skeds') (cf. Cooren, 2004). Finally, I sought to account for how spatial arrangements were both crystallizations of, but also conditions of

possibility for, journalism and its associated technologies (see Rodgers, 2014). These three dimensions allowed me to account for objects such as TOPS as at once enacted through situated practices, yet also existing as trans-local and partially autonomous objects.

Following TOPS

TOPS began its public-facing life on 18 December 2006, when it was announced as the new 'high-performance engine' of thestar.com. TOPS is a web CMS: a database or repository which organizes the publication of content on web browsers and mobile apps, and allows for the simultaneous authoring, updating and management of content by users who may have little knowledge of software architecture. TOPS initially denoted 'Torstar Online Publishing System', a name highlighting its in-house, bespoke nature in 2006, when it was primarily intended for use by and sharing across Torstar-run websites. In time, however, 'Total' replaced 'Torstar' as TOPS became more of a prepackaged product for sale to other organizations.

If one read only official announcements, TOPS is the coherent outcome of a seamless development process. But such narratives conceal a much messier situation. TOPS had what I will provisionally call varying 'edges' (to borrow a phrase from Gaonkar and Povinelli, 2003: 392; see also Rodgers, 2014) across the different organizational sites in which it appeared. Drawing primarily from my 2011 field research, I will consider three such sites in particular: the web operation; the developers; and the senior newsroom managers. These sites are not exhaustive – TOPS also appeared at other sites – but represent the three most coherent appearances of the web CMS within the partial confines of my own ethnographic analysis.

The first site at which we will locate TOPS is near the center of the recently redesigned *Toronto Star* newsroom. Here, adjacent to a new central hub, was the 'web operation', a small group of around 13 who oversaw the content – though not the underlying web architecture – of thestar.com. They sat along a row of desks, interacting occasionally but with eyes almost continuously directed at dual-screen workstations. The hub next to which they were located somewhat modestly mimicked new 'integrated' newsrooms ostensibly prioritizing content over medium. As if to underline this, the redesign also symbolically pushed aside another row of dual-screen workstations: those related to print page production, right to the very edge of the newsroom. However, by all accounts digital had not displaced print; indeed as at many newspaper organizations, the complexities of producing a print product continued to hold sway.

Though members of the web operation often described their work in more expansive and even aspirational terms, much of their daily labors amounted to maintaining thestar.com via TOPS. It was they who decided the relative positioning of stories and content on the main homepage. They who arrived early in the morning to manually clean up the content automatically migrated overnight to TOPS from CCI NewsGate, the CMS system for the printed newspaper. And they who liaised between department journalists and technical IT staff around the implementation of minor tweaks (e.g. photo galleries, live chats), or the resolution of minor system bugs. Having a centralized web operation of this nature, with these sorts of responsibilities, was seen as a temporary measure. In recent history, the *Toronto Star* had attempted to disperse 'web evangelists' across various departments and, indeed, in principle anyone within the news organization could add and amend content using TOPS. Yet in practice, the web operation was deemed necessary, as staff dedicated to

the day-to-day editorial maintenance of the web CMS.

And in this guise, TOPS largely appeared as a constraint inserted into the daily working environment of the web operation. It is a software object, a *thing*, with which they coped:

> It sounds like it's patched together with duct tape and elastic bands; it just doesn't… it doesn't give us the flexibility we need to respond to things instantly and overly creatively. I mean, I think you've probably seen, like we have one way we can display a photo gallery, one way we can do this and one way we can do that. It's really a testament to those who work on the web desk that they can like get around some of the issues and present some of their… present their content as well as it is presented. They call it … I forget what it actually stands for, but they call it Total Operating Piece of Shit. (Daina Simone, Senior Editor, Digital)

For web editors, TOPS created delay, lagging several minutes between an update and its public availability to website users (as seen in the short account in this paper's introduction). TOPS also constrained – unduly for web editors – navigational and layout possibilities. For example, the TOPS template dictated that only stories with a photo could appear as the main item on the home page. Perhaps most crucially, TOPS was seen to perform poorly in terms of search engine optimization (SEO). This is even though editors such as Sheena Rutherford regarded SEO as "a bit of witchcraft … I'm not saying that there aren't people who have cracked it, but I don't know that it really can be cracked … with design elements." Nevertheless, after reviewing several competing websites, web editors negotiated a small redesign, wherby a new column titled 'In the News' was created on the left hand extreme of the main page, listing several stories buried on sub pages. Far from aesthetically appealing, the column added 'density' to the main page, in an attempt to drive more traffic to the website. Via such maneuvers, the web operation largely sought to subvert TOPS.

The developers

If the web operation saw TOPS as a thing to subvert, a rather different edge of TOPS emerges upon

leaving the newsroom, housed in the *Toronto Star'*s 1970s waterfront office tower, and travelling to

590 King Street West. Here, in Toronto's trendy 'Fashion District', was Torstar Digital, a division of

Torstar Corporation and the developer of TOPS. Its offices were housed in a refurbished industrial

loft building, with open plan wooden desks, exposed brick walls and visible ventilation systems. It

was a company clearly seeking to project the gritty entrepreneurial flair of startup digital media: as

recently as 2013 its website described a journey from just 2 to over 250 employees, beginning "in a

small basement office with a handful of forward-thinking innovators who understood the power of

digital disruption". 'Digital disruption' was something of a philosophy for Torstar Digital, certainly

for its President Vidar Waltersson:

> You know, its independence from the assumptions, philosophies and culture of traditional
> media organizations is crucial ... we don't say 'the great media company from the traditional
> world in the digital realm is…' and are able to finish that sentence. The great digital media
> companies are all digital media companies. They're Facebook and Google and Twitter … So
> we created those kinds of conditions, so we need the entrepreneurial flexibility, and lack of
> assumptions, and lack of a hard-set past culture that comes with a traditional media
> organization who's been around for a hundred years. That ends up being as much a liability
> as an asset, and it becomes more of a liability than an asset on the Internet. (Vidar
> Waltersson, President, Torstar Digital)

Torstar Digital's public story may be one of building from the ground up, but the reality is less gritty

than the facade. Vidar had relatively deep roots at Torstar and the *Toronto Star*. He first joined the

newspaper in 1995, taking a one-year contract to help launch the *Toronto Star*'s first website,

considered at the time to be a 'revenue-free' experiment. By 2005, Vidar had risen in Torstar's

executive ranks, and led a cross-media study which recommended investment in digital media

properties. As a result, Torstar Digital was created, with only two employees, though these

employees were given a project to grow a new digital division for a large media corporation. Indeed, by 2011, a much larger Torstar Digital was developing very few products in-house, instead primarily acquiring existing startups needing additional resources and expertise.

TOPS was one of Torstar Digital's early in-house projects. Though built to service several Torstar websites, its initial development was anchored to its anticipated uses for thestar.com. On its release in December 2006, it was viewed by some in the local web developer community as a significant improvement:

> The Toronto Star Website (http://www.thestar.com/) has FINALLY gotten a facelift. And it's about time too. However, this is no ordinary front-page overhaul… oh no sir… Ladies and gentlemen, boys and girls, children of all ages, the NEW Toronto Star website is… get this… ALL CSS!!! Nary a table in ~~site~~ sight … [T]he old design … was rife with horribly messy markup, and had more tables than a furniture store. Code validation was nothing short of a joke. Speaking of jokes, I'm quite sure at one point, thestar.com became the butt of jokes amongst Toronto web standards designers. (http://www.pxleight.com/journal/2006/12/27/thestar-gets-a-facelift/ Website now inactive, last viewed 27 December 2006)

As can be seen in this indicative quote, for developers, TOPS was a veritable improvement in terms of web *architecture*, rather than the content it organized. It is via web architecture that the developers asserted their authority vis-a-vis news organizations:

> ... traditionally [a newspaper] company's digital strategy up until then was, what's your traditional media brand, take out the spaces, put it all in lower cases, and put dot com at the end … So we had www.thestar.com and that was the *Star*'s digital strategy. It wasn't about how do you get user-generated content, what are you doing in terms of video, are you offering free classified with up-scaling, or are you operating a web 2.0 experience? None of those things were really a part of the thinking in traditional media companies; they were going to ride out their brands into the digital environment. (Vidar Waltersson, President, Torstar Digital)

At Torstar Digital, traditional news organizations were seen as deeply mistaken in assuming they

could simply transfer their content and brand online, and mistaken that they could still monopolize content selection and layout within the newsroom. Few working at Torstar Digital had journalistic backgrounds. Instead, it was an organization inhabited by web designers, computer programmers and digital media entrepreneurs. They tended to see 'news' as a category of content produced via increasingly 'participatory' means, and mediated by algorithmic logics and hierarchies, both of which required well-designed software architecture. It was in this vein that TOPS was repurposed in 2008 towards a major redesign of thestar.com, transforming it from a webpage to a 'portal' for various online 'verticals' (e.g. 'yourhome', 'wheels', 'parentcentral' and 'healthzone'). The redesign was ostensibly collaborative – with Vidar Waltersson holding a dual role as President of Torstar Digital and Vice President for Digital Media at the *Toronto Star* – though as we'll see shortly, others disagreed. In any event, by 2011, TOPS became a relatively minor property for Torstar Digital. A 'prepackaged solution' for the *Toronto Star* and external organizations, for which Torstar Digital acted as an 'outside' vendor.

The senior newsroom managers

The third edge we will trace for TOPS is that of senior managers in the newsroom. Senior newsroom managers occupied an in-between position. On the one hand, when looking toward the upper echelons of Torstar, they saw a corporation that was avowedly cautious towards digital publishing, and which had historically tended to reward 'print people'. On the other hand, when looking towards the newsroom they collectively managed, they tended to adopt the same realism of many reporters and production staff: they assumed a progressively shrinking printed newspaper; they assumed a future with an increasingly prominent multi-platform, digital *Toronto Star*; and they felt compelled to take into account an audience presented to them via quantitative web metrics. So

TOPS appeared to senior managers in overlapping and contradictory ways. But, similar to the web

operation, senior managers largely regard TOPS as a sort of foreign object. Their concern, however,

was an apparent lack of managerial authority over the platform's design and evolution, particularly

evident in editors' accounts of the 2008 website redesign:

> ... we had so many things go wrong. The guy who was in charge of the web under [Reid, Editor-in-Chief, 2006-2008], he went into a corner of the newsroom, and no one even knew him. He was terrible, he was fired, and I think [Sheena] took over and discovered he'd agreed to all these kinds of things for the new website design … it was news to the newsroom that these things were being done. Cause the guy sat in his little glass bubble and didn't speak to anyone about it. Sold us down the river into some awful things. (Jon Reilly, City Editor)

> By the time I moved over in May, it was like, done, over. It wasn't going to change. I would say it was not done collaboratively ... You know, one of the favorite sayings ... was 'the disrupted cannot manage the disruption' or whatever the hell that means … well, okay, that's fine except the disrupted have to produce the content for whatever the hell the people who are managing the disruption are doing. (Sheena Rutherford, Associate Editor)

The neat 'us' and 'them' distinction deployed by Jon and Sheena was not so clear cut in practice. In

their everyday working practices, as lead editor of the so-called web operation and City Editor

respectively, Sheena and Jon interacted with TOPS essentially as end users. Yet they were also

embroiled in regular interactions with other senior managers, from their own and other departments,

where TOPS appeared as a highly ambivalent object of managerial decision-making. Ambivalent,

because TOPS and indeed the entire information technology infrastructure at the *Toronto Star* was

managed by 'Group IT', a digital division outside of the newsroom as such, and beyond senior

editors' direct control. Having grown to over 300 staff, and in 2011 moving to occupy vacated space

on the same floor as the newsroom after its redesign, Group IT was seen as needing containment.

This was evident not only in relation to TOPS, but also Group IT's management of other systems,

notably the CMS system for the printed newspaper, CCI NewsGate. While NewsGate was an

externally-supplied rather than in-house product, its implementation at the *Toronto Star* was complex

and cumbersome. It required several installations, in-house plug-ins, and 10 years of internal

training. Senior newsroom managers complained that the system's complexity was self-fulfilling: the

army of technical staff responsible for maintaining it had an inherent interest in sustaining its

intricacy.

But beyond its growth as a division, senior managers worried about Group IT's 'client service'

approach, which they regarded as both alien and insufficient:

> There's a newsroom culture and there's an outside newsroom culture, and the thing the web
> people always found here is the technicians who were supposed to fix bugs and all this, they
> don't understand that I mean you need it *now* … I know when [Sheena] was doing the web
> and would want to do things, you had X-number of points a month or something, and this
> was how tasks were allocated. If you had six points, and to, let's say, fix the website so that,
> let me think, it would say 'updates' for the updated stories? Well that's six points so, if you
> use that card, they'll do it this month, but that's the only thing they'll do this month … And
> so they would, like, allocate points where you could buy yourself a priority. Well, we're the
> *Toronto Star* so we kind of want, we're the top priority site, we want staff dedicated to what
> we do. (Jon Reilly, City Editor)

Senior managers, accustomed to the print medium, expected a 'master-servant' relationship between

editorial decisions and its resulting formats, but instead:

> ... it's reversed with online … the masters are IT telling you what you're going to get … 'You
> want it to scroll? No, you can't have that'. Or, 'You can have it, but it will take you four
> years' … a ticket will be written, a team will get together, they'll have a discussion, they'll
> have a taskforce. It will take us a weekend to consider the options and they can come back in
> a couple of years. It's a massive frustration. (Lloyd Dover, Managing Editor)

Theorizing TOPS

In narrating the preceding accounts, my intent has not been to evaluate TOPS, nor valorize any of

its particular 'edges', whether of the web operation, developers or senior newsroom managers.

Rather, I will now mobilize these accounts to outline three themes related to the operation of software as an object of journalism.

The first is to think through the ontology of software as an object in and of itself. The ordinary naming or practical treatment of TOPS as a 'thing' tells us something important. It is true that many of its apparent 'effects' are best understood as associations, appropriations and even misrecognitions produced through its entanglement with aspects of situated journalistic practices. However, this cannot comprise a full account of TOPS as software object. As Thrift and French (2002) observe, 'software' objects shows up in several guises. Perhaps most prominently, software is imagined as commodified products. Or otherwise, as the object of the field of software programming. Yet the most basic expression of software is as an underlying language of instructions, otherwise known as 'code'. As Berry (2011: 29) notes, studying code directly is by no means straightforward. Programmers may work with and interpret it as kind of a textual artifact, but for computational systems, code is not interpreted, it is directly executed. This duality of code, argue Kitchin and Dodge (2011: 23), is at the heart of software: it is designed and created, and therefore is a "product of the world"; yet it is also deployed and made operable, and so it "does work in the world". As a result, software is a form of 'secondary agency', in that it can operate autonomously from human use or authorization (Kitchin and Dodge, 2011; Mackenzie, 2006).

To be clear, this agency is not identical to nor crudely deterministic of human agency. It remains crucial to account for the situated interactions between software and journalistic practices. But there are limits to such localized analyses:

> It is no doubt reasonable to assume that whatever organizational and social implications technologies may have, these are ultimately the outcome of the ways they are enacted in local settings. Yet, the local enactment of technologies is never *ex nihilo* creation. It necessarily

presupposes the object of enactment. Certainly, the study of the incongruence of design and use and the ways technologies are locally appropriated are essential to understanding the social involvement of technology and the diversity by which technological systems are negotiated in situ. By the same token, such perspective is not well suited to deal with layered, back-staged operations beyond the inspection, understanding, and manipulative ability of situated agents. (Kallinkos et al., 2013b: 397-398)

What this suggests is that while it is legitimate and helpful for journalism researchers to study the localized appropriation of technology, and more specifically software, it is equally important to attend to how such computational technologies introduce forms of standardized decision-making and functionality unavailable to local interpretation or authorization, yet which produces conditions of possibility for journalism practices at trans-local scales. Thus, even as we might explain the uneven appearance of TOPS across the three sites discussed here in terms such as local practical appropriation or misrecognition, we must also explain or at least acknowledge its partial autonomy as a web CMS software object.[2]

Second, we should consider the implications of software objects' capacity to continuously mutate. As Mackenzie (2006) argues, software is a type of object which "undergoes phase transitions … It solidifies at some points, but vaporizes as others" (p. 2; cf. Manovich, 2001). Software objects such as web CMS can be made and remade into potentially infinite versions which, Mackenzie points out, perhaps explains why such objects are ordinarily understood by non-specialists as immaterial or intangible (ibid). Thus, as Kallinikos et al. (2013a) argue, digital objects such as software have an 'ambivalent ontology'.

This ambivalence or mutability at least partially accounts for the growth of specialized 'Group IT' support seen in the account of TOPS at the *Toronto Star*, and known to exist in similar form in virtually all large organizations. In the context of newspapers, the need for such support has a long

history, certainly predating online publishing, extending to earlier print alternatives (see Boczkowski, 2004a) as well as computerized page composition. Group IT inhabited the interstices of the three sites narrated in the preceding section, and also my field observations more generally. But their presence was not only obvious, but most clear in the ongoing maintenance of the organization's software and computational infrastructure, for example in fixing bugs, installing patches, running updates and implementing new installations. Group IT ultimately held responsibility for maintaining TOPS, and in turn they also had effective authority over thestar.com. So, even as the newsroom redesign pushed page production to edge of newsroom, symbolically prioritizing the web, the substantial practical work involved in page production was still understood as controlled *within* the newsroom.[3] TOPS occupied different terrain. It was produced by Torstar Digital, self-proclaimed experts in the "power of disruption", and it was maintained and project-managed by Group IT. This division of labor was said to be founded on the ethos noted by senior web editor Sheena Rutherford, that "the disrupted cannot management the disruption".

The final theme I will highlight is the ways in which software objects can encourage 'computational thinking'. While there are complex interdependencies between software and habitual or organized practices, it is insufficient to see such interdependencies from an anthropocentric point of view alone. As Berry (2011: 120) argues, using the example of SatNAV systems and Google Live Search, we can also become objects of software, being required to think computationally in order to effect its intended functions. Berry observes that unlike Heidegger's 'ready to hand' hammer – which withdraws from view as its user focuses on the end of ramming a nail into wood – software platforms such as Google Live Search are 'unready to hand'. As a user types their search, algorithmically-determined terms are suggested, encouraging the user to recognize, and think with, the computational agency in play. Dispersed in and around the use, maintenance and management

of TOPS were several manifestations of so-called computational thinking. For example, there were noticeable shifts in the treatment of quantitative audience data. Particularly in longer term strategic thinking, editors' increasingly justified action in light of available audience metrics (for further discussion, see Anderson, 2011; Lee et al., Forthcoming; MacGregor, 2007). It was also evident in those cases where editors and journalists worked with developers and IT staff to formulate and implement tweaks to TOPS, intended to optimize the discovery and presentation of content via algorithmic means, such as search engines. As should hopefully be clear, computational thinking is not a byproduct of crude technological determination, but rather a phenomenology of action always already taking place through and in conjunction with the formal logics of computational technologies (see Hayles, 2012).

It is important that the preceding analyses of TOPS not be seen in static terms. Between my two observation periods, not only was their increasing comfort with and acceptance of computational technologies, but also a remarkable shift in the everyday phenomenology of newsroom technologies. In 2005, aside from desktop computers, the main computational devices visible were the BlackBerry smart phones used by some senior editors. But by 2011, mobile devices proliferated: editors regularly used tablets in news meetings; reporters used smart phones for all manner of tasks, from search to story writing to video and photo capture. One result was that the mystique and novelty ascribed to web CMS, and digital media in general, seemed to be eroding. My interviews in 2011 made clear that editors and journalists increasingly felt comfortable and confident enough with their emerging multi-platform situation to turn away from questions of technology, and towards 'content':

> I think this is also an important part of the lesson, is to understand your content, because this is what this is really about. It's not about being on the website. It's not about going digital I don't think. It's understanding how your content will play on different platforms, and how its consumed on different platforms. (Sheena Rutherford, Associate Editor)

I would argue however that this confidence is less a case journalists commandeering software infrastructure. Rather, it indicates a further domestication of such software and its associated infrastructures, with its status as an object partially receding from the prevailing practical language of journalism (see Helle-Valle and Slettemeås, 2008). Less and less a foreign object, and more and more a silent appliance of journalism work.

Conclusions

By January 2013, TOPS finally met the end of its six-year run as the web CMS underlying thestar.com. In a major website re-launch, thestar.com shifted to a new off-the-shelf web CMS (Adobe CQ5). Its stated ethos is 'engagement': it presents users arriving at a story via social media or search engine referrals with linked content designed to drive them deeper into the site; and it offers regular visitors a 'mystar' platform with a series of personalized content settings. In addition, the new web CMS is designed to allow much more flexible layout in both news content and advertising. Mobile versions of thestar.com were likewise shifted to off-the-shelf, third party providers: the newspaper's first tablet platform making use of the Pressly web app; and its mobile app and website moved from TOPS to Polar Mobile's MediaEverywhere platform. Organizational changes went alongside changes in technical platforms. By most accounts, online news assumed elevated status in the newsroom, with priority placed on web news in the main morning meeting, and the reorganization of the web operation into departments. At the corporate level, Torstar Digital was closed to attain 'operational savings', with its digital properties redistributed to other divisions within Torstar. There were relatively few layoffs; the projected savings will largely result from shifting staff from Torstar Digital's former open-plan loft offices in Toronto's Fashion District, back to the newspaper's modernist waterfront office building.

These more recent changes no doubt emerge from a confluence of factors. One worth underlining is the *Toronto Star*'s relatively unique ownership arrangements, mentioned earlier. The voting trust who control its parent company ascribe near-mythical status to their flagship newspaper, and are strongly inclined to a revalorization of 'traditional' journalism in a digital age. So it is likely that, if only in part, some of these moves have been made to redress perceived imbalances between the authority of the different organizational sites involved in thestar.com and its mobile platforms. But this does not necessarily imply a lessening weight for software objects in relation to journalism at the *Star*. If anything, these recent developments represent an example of a more widespread shift, noted by Pollock and Williams (2009), whereby organizations are replacing software systems developed in-house with externally-supplied, commercialized and prepackaged IT 'solutions'. Arguably, this introduces even greater software-mediated standardization between news organizations and indeed with other organizations and outlets also (see also Czarniawska, 2011: 176-215).

My argument in this paper in that journalism research needs to take seriously the trans-local, autonomous operation of software, even as they rightly emphasize nuanced research into the local and associational interactions of journalistic practice and technology. If we accept the partial autonomy of software objects such as web CMS from journalistic practices, then one possibility is that we do not regard software as objects *of* journalism, but instead as objects *in relation to* journalism. This would be somewhat pessimistic, as it would imply journalism studies is a scholarly arena that views software as foreign objects to journalism proper. There is another possibility, however. This is to maintain that software objects are 'of' journalism. In this case, what would be required is a sense of 'journalism' as part-constituted by non-human or technical agency; that is, by forms of 'secondary agency' increasingly constituting the basic conditions of possibility for journalism. In this scenario, it

would be understood that some objects of journalism (not necessarily software objects alone) are institutionalized at the point of design rather than through the performance of organizational hierarchies or everyday routines (cf. Kallinikos et al., 2013). This opens up interesting, and certainly not straightforward, questions about whether, and in what sort of conditions, (some) journalists might learn to write code, or collaborate with software programmers (see Aitamurto and Lewis, 2013; Lewis and Usher, 2013).

In summary, I have asserted that software objects do, to a degree, determine the circumstances of journalistic practices – and increasingly so. This has presented 'digital' journalism as not only broader than online news, but also broader than recent examples of 'robot journalism' whereby algorithms are being used to automatically produce certain forms of news content (e.g. see Clerwall, forthcoming). I have sought to point to the longer term, and perhaps more ordinary, ways in which software forms conditions of possibility for journalistic practice. While I maintain that empirical accounts of how such software objects matter for journalism should remain strongly situated and ethnographic, I have argued that it is *conceptually* inadequate to reduce software to such localized settings. It is worth ending with a note on the political implications of this view. The point made here is emphatically *not* to prioritize a 'hidden' or nefarious politics operating beyond human practice or consciousness. Rather, what is needed is a better account of the conditions of possibility though which the political communication represented by journalism practices is experienced, performed and ordered.

Notes

[1] The names used when referring to *Toronto Star* and Torstar staff in this paper are pseudonyms.
[2] Such attention to objects themselves, independent of human involvements, leads toward the more controversial terrain of object-oriented philosophies, one strand of which (e.g. Bogost, 2012; Harman, 2011) seeks to radically extend Heidegger's tool-analysis beyond human experience to the phenomenology of objects or 'things' (for discussions vis-a-vis software studies, see Berry, 2011; Caplan, 2013). There is insufficient space here to explore this emergent intellectual field, but such approaches potentially mark a dramatic shift from investigations (including that of this paper) which begin and end their investigation of software objects from the perspective of human social life.
[3] At least, that is, until March 2013, when the *Toronto Star* outsourced its page production entirely.

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