Seeing With Transparency:
Mapping the Privacy-Security Controversy Over Digital Contact Tracing in Vietnam

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Tracing the debates among technical experts across GitHub, social media, blogging platforms, and diasporic and state news media, this article examines a public controversy surrounding user privacy and app security regarding Bluezone, Vietnam's national digital contact tracing app. Using controversy mapping, a method rooted in the actor-network theory, the article approaches what appears to be a highly technical debate among experts and displays the various actor associations through which the controversy is fought and social arrangements established. Arguing that the technical transparency produced through open-source architecture is incompatible with the epistemic transparency conducive to transformative politics, the article demonstrates the kind of work that transparency is made to do in a conspicuously nontransparent governmental context through an open-source architecture. It also argues that transparency can neither be relied on as a framework for legitimacy nor welcomed as a substitute for formal institutional structures that ensure accountable governance of public socio-technical systems.

Keywords: transparency, open source, privacy by design, controversy mapping, Google/Apple Exposure Notification

The rollout of digital contact tracing systems across the world during the COVID-19 pandemic has been the subject of much controversy. The issue of privacy took center stage early on with the introduction of the Google/Apple Exposure Notification (GAEN) protocol—widely applauded by privacy experts for its privacy-preserving technical specifications—where big tech came to be portrayed as greater champions of privacy than some democratic governments (Sharon, 2021). Debates about potential "mission creep" resulting from automated contact tracing have tended to be framed in terms of a trade-off between individual privacy rights and public health (Goldenfein, Green, & Viljoen, 2020). In response to this, calls for privacy-preserving app designs by advisory groups and governing bodies alike have emphasized voluntariness, transparency, collection and sharing of non-traceable identifiers, and decentralized storage (Sharon, 2021). The "privacy by design" paradigm insists that the value of privacy can be translated into technological design, thereby negating the false trade-off between privacy and public health.

Stated another way, technical transparency is supposed to faithfully translate institutional transparency by way of participation and efficiency. When the development team behind Bluezone—

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Vietnam's national contact tracing app—published its code on GitHub, it was widely celebrated by state media as having made "a progressive move to follow international best practice" (Chau An, 2020, para. 4). Situating this move against wider pandemic responses in Vietnam, the team stated that by making the app open source, it sought to "ensure transparency, and invite the local and international tech community to critique, contribute, and help build the product" (Chau An, 2020, para. 1). At the launch of Bluezone in April 2020, the minister of Information and Communication remarked that this openness would "allow citizens to monitor whether the app they're using is indeed safe" (Chau An, 2020, para. 3).

For a country that ranks 77th of 180 on the Corruption Perception Index with a score of 42 of 100 (Transparency International, 2023) and 178th of 180 on the Press Freedom Index (Reporters Without Borders, 2023), Vietnam's embrace of the language of transparency echoes that employed by international observers intrigued by the country's success in pandemic management (Willoughby, 2021). The transparency thesis stipulates that, despite poor financial resources, limited health-care capacity, and an authoritarian system of government, Vietnam's pivot to transparency across a range of governance activities from public health communication to the timely publication of detected cases has allowed the country to be among the best-performing jurisdictions in managing infection and fatality. Political pundits rushed to declare this unprecedented enactment of transparency a "double-edged sword" for the ruling Communist Party (Truong, 2020), anticipating a cascading effect in demand for transparency in other areas of Vietnamese political life. Transparency appears to be something that governments are infinitely capable of yet practice only sparingly; when transparency is said to be in action, several kinds of openness are also at play: Processes and actors becoming open to view, and open-ended discourse that cannot be governed in advance.

Transparency and the Governance of Automated Systems

Transparency as System Accountability

How we understand and hold complex systems accountable has historically relied on the ideals and logics of transparency (Ananny & Crawford, 2018). The underlying assumption behind the increasing demand for transparency in our modern society is that the act of observing a system not only presents opportunities but also creates obligations to hold it accountable and, consequently, bring about change. The logic of transparency rests on an epistemological assumption that the more facts are revealed about a system, the more truth can be known through the logic of accumulation: That is, the more we are able to observe a system, the better positioned we are to assess whether a system is working as intended, and what changes are required. This chain of logic ensures that systems can be defensibly governed and held accountable (Ananny & Crawford, 2018). The intertwined promises of openness, accountability, and autonomy drove the creation of the 20th-century "domains of institutionalized disclosure" (Schudson, 2015, p. 7) and generated a significant proliferation of research, policy interventions, and cultural commentary on the kind of work that transparency does with regard to governance and regulation of socio-technical systems (Flyverbom, 2016; Gray, 2023; Rieder & Hofmann, 2020).

Much has been written on the limitations of the transparency ideal in the governance of automated systems, but they broadly fall under two main narrative categories: The deficit narrative and the corruption narrative. The deficit narrative generally states that transparency in itself is not enough to facilitate accountable governance of socio-technical systems and in the wrong circumstances might even cause negative consequences

(Ananny & Crawford, 2018; Kemper & Kolkman, 2019; Wang, 2022). Transparency cannot facilitate accountability in the absence of a "critical audience" (Kemper & Kolkman, 2019); additionally, transparency can also be disconnected from power, intentionally occlude, create false binaries, invoke neoliberal models of agency, privilege seeing over understanding, and even facilitate manipulation (Ananny & Crawford, 2018; Wang, 2022). The corruption narrative, on the other hand, states that failure to mobilize transparency toward accountable governance is due to either "the wrong kind" or "not enough" transparency (Andrada, Clowes, & Smart, 2022; Kaplan, 2020; von Eschenbach, 2021). Information transparency, transformational transparency, material transparency, or reflective transparency in artificial intelligence systems, for example, work toward different goals in different practices under different constraints (Andrada et al., 2022). Ethical concerns hinging on a perceived lack of transparency in algorithmic socio-technical systems and how they operate are also well-rehearsed (Kaplan, 2020; von Eschenbach, 2021). There is a third possible narrative that so far has not been explored in the literature on transparency and accountable governance of automated systems, one that tackles the conceptual architecture that enables the many promises and transformative potential of transparency.

The Magic Mandate of Transparency

Transparency as a concept has an exceedingly positive connotation. Alloa (2018) argues that transparency qualifies as what Pollitt and Hupe (2011) call magic concepts—concepts that are imbued with a magic aura that promises to solve major dilemmas in society. Similar to concepts such as governance, accountability, or network, transparency has "a high degree of abstraction, a strongly positive normative charge, a seeming ability to dissolve previous dilemmas, and a mobility across domains" (Pollitt & Hupe, 2011, p. 641). Valdovinos (2018) contends that transparency's conceptual structure has a sharp capacity to translate structures of power into structures of feeling, enabling the proliferation of contemporary discourses in its favor. Fenster (2017), commenting on the technocratic and moralistic meanings of transparency in governance, argues that the ideology of transparency foreshadows the overcoming of conflicts through a one-size-fits-all "transparency fix" amid a public discourse obsessed with problem solving.

The promise of transparency, therefore, is contingent not on "more" or "better" transparency but on the conceptual architecture that supports its transformative potential (Valdovinos, 2018). What transparency promises in accountability, reduction of secrecy, and exposure of the intricacies of power, it conceals in the ways the medium of transparency refracts, diffracts, and scatters some of the lights it transmits onto the open view it affords. Transparency pretends to regulate only the form but not the content of social interactions even though "what is easily legible or transparent for some, can be dark and opaque for others" (Bauman, 1998, p. 29). As such, transparency should not be taken for granted as a device for demystification but rather an intervention vis-à-vis the ideology of neutrality—that which has significant bearing on what (and who) is being made open to view as well as the outcomes of things (and people) being in the open (constative vs. transformative). Tracing how transparency is enacted in relation to the aspirations it purports to bring about can give us a map of how decisive issues of modernity are negotiated as well as how the ideology of transparency not only lets vision *through* but also lets things *come into view*.

Out in the Open: Open Source as Technical Transparency

The open source movement, marked by the 1998 launch of the Open Source Initiative, was an offshoot of the free software movement in the 1980s based around the free operating system GNU, which

can be used as an operating system on its own or in parts with other operating systems. The GNU General Public Licenses (GPL) were designed to use the mechanism of copyright against itself so that an application or text can be accessed, made visible, dissected, and modified or "remixed" (Lessig, 2008)—thus remaining always "open." The GNU GPL in particular states that not only should any piece of software created under it be accessible and modifiable but any derivative of an earlier text/program must also adopt the same license.

Against this background, open source was advocated as a business-friendly alternative to free software by foregrounding the technical dimension of these software practices (i.e., source code), focusing on the technical excellence and efficiency brought forth by reusable software and the culture surrounding these practices rather than their political implications (Tkacz, 2012). Stallman (2009), commenting on what he saw as the fundamental difference between open source and free software, remarked that open source has come to embody only practical values around building more powerful and reliable software—and as such is centered around popularity and success while paying no attention to what is right and wrong. "Open source is a development methodology; free software is a social movement," argues Stallman (2009) while also emphasizing that the fundamental freedom in free software should be understood to mean "free speech" not "free beer"—free as in *libré* rather than free as in *gratis* (p. 31).

While Free and Open Source Software (FOSS) has become normative practice across global software communities, dedicated projects seem to be largely concentrated in North America, China, and Western Europe, with relatively little documented activity across Central America, Southeast Asia, and Africa (Mombach, Valente, Chen, Bruntink, & Pinto, 2018). There is a geographical unevenness in FOSS practices that mirrors the kind of unevenness found in other areas of the open knowledge Web, such as participation and representation on Wikipedia, OpenStreetMap, and GeoNames (Graham & de Sabbata, 2020). Bluezone is among the first few high-profile public software projects in Vietnam to aspire to the ideals of FOSS by depositing its source code on GitHub. As such, it represents an important case study through which to interrogate how the values of FOSS might be translated and enacted in a context where the norms of collaboration, transparency, and community participation in software development are not ingrained in local industry practices.

GitHub is a popular collaborative code hosting site built on top of the Git version control system, designed with a range of functions to enable teamwork and continued discussion over the life of the project. GitHub represents a new generation of software forged Web-based collaborative platforms providing tools to ease distributed development in that it combines traditional capabilities of version control systems with social features (Cosentino, Izquierdo, & Cabot, 2017). GitHub uses a "fork & pull" model where developers create their own copies of a repository (masterless peer-to-peer replications) and submit requests when they want the project maintainer to pull their changes into the main branch. GitHub's issue tracking system allows users to report and discuss bugs and other concerns with each other; if not directly contributing to the project, users can also "watch" a project or "follow" other users to receive updates about people and projects of interest. User activities within GitHub can be accessed through their profiles, where their commits (snapshots of the entire repository at specific times), the projects they forked, and the issues they reported are shown. That such a technical architecture became the de facto test bed for coding excellence in the case study described below is a result of the convergence between open coding culture and the transparency mandate as a legitimization mechanism. The next section discusses the methods used to trace the case as it unfolds on GitHub and across social media, blogging platforms, and diasporic and state-owned news media.

Methods

This article implements the controversy mapping method (Venturini & Munk, 2022) to describe socio-technical debates about the rollout of digital contact tracing in Vietnam. Rooted in the actor-network theory (ANT; Latour, 2007)—a sociological framework that emphasizes the interconnectedness of human and nonhuman actors in shaping social phenomena—controversy mapping involves identifying and mapping out the various actors, their relationships, and the controversies they are involved in. The method recognizes that controversies emerge through interactions among different actors, such as individuals, organizations, technologies, and institutions. These actors form networks and engage in dynamic processes of negotiation, cooperation, and conflict. The overall goal of controversy mapping is to provide a comprehensive understanding of the controversies, their key actors, and the underlying factors contributing to a controversy (Venturini & Munk, 2022).

I started by downloading all issues and issue comments across four repositories on Bluezone's GitHub profile using GitHub's application programming interface (API). The repositories are Bluezone-app (hosting Bluezone's source code), react-native-bluetooth-scan (hosting Bluezone's code to operationalize Bluetooth capabilities), bluezone-be-sample (hosting sample backend codes), and documents (hosting white papers and other official documentation). The query date was June 16, 2022. I collected 56 open and closed issues, together with 21 pull requests. As issues are assigned a number as they are lodged, it was possible to spot from the data set that 24 issues were deleted from the Bluezone-app repository. These issues can be requested from the GitHub API.
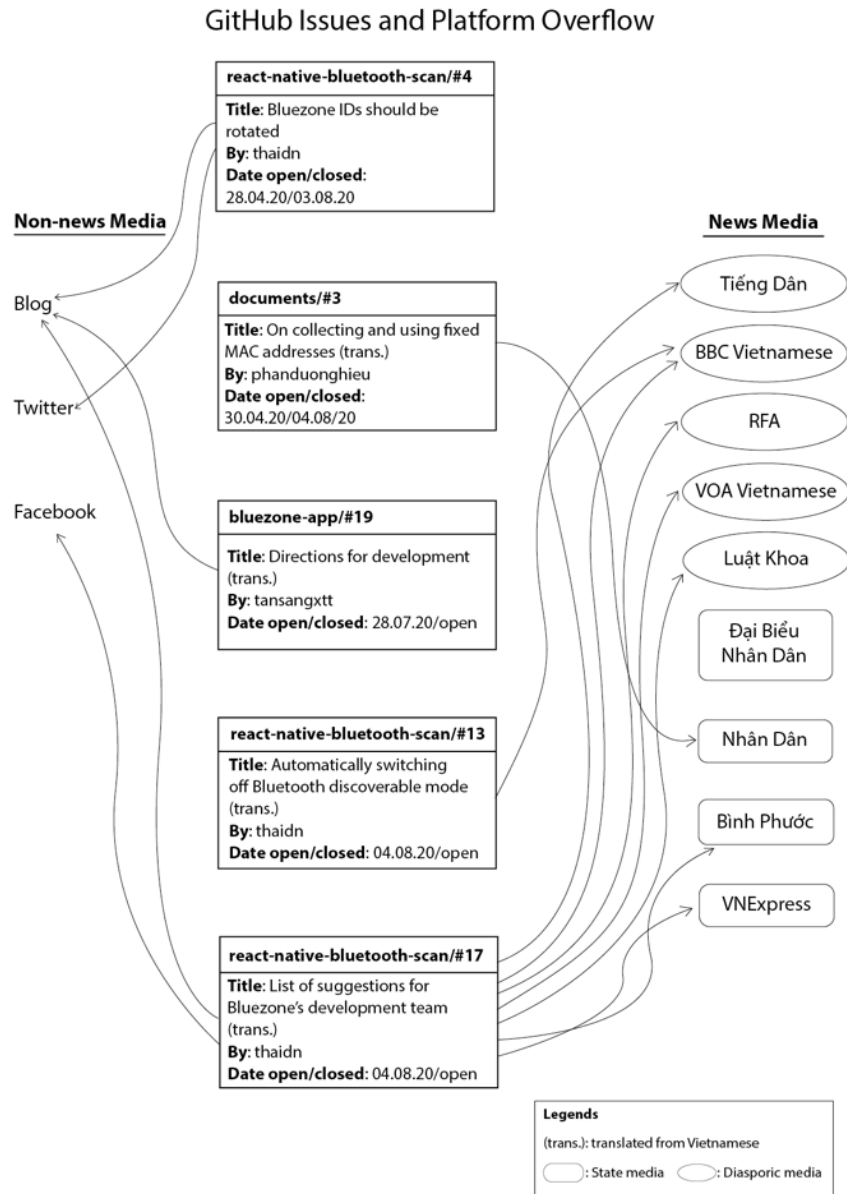
From this data set, I sorted the key debates across all four repositories according to the number of comments, the number of actors involved, the social importance of the issue, and the interest generated outside of GitHub. A summary of these issues and their platform overflow is presented in Figure 1. I then mapped the key actors within these debates, their associated networks, as well as the evolution of their viewpoints throughout the course of the controversy. Finally, I mapped the changes made to Bluezone's source code as claimed by these actors in relation to broader changes in their enactments of transparency and openness.

At the heart of controversy mapping is the idea that actions are *overtaken* by actors. Following Latour (2007),

> Action is not done under the full control of consciousness; action should rather be felt as a node, a knot, and a conglomerate of many surprising sets of agencies that have to be slowly disentangled . . . action is borrowed, distributed, suggested, influenced, dominated, betrayed, translated. (pp. 44–46)

Controversies as enactments of overtaken actions therefore always *overflow* by the appearance of new actors and new alliances in a manner akin to what John Law and Annemarie Mol conceptualized as the constant transformation of "fluid spaces" (Law & Mol, 2001; Mol & Law, 1994). This conceptualization prompts researchers to overcome the static nature of the network metaphor in ANT and rebuild their "base map" for each case study rather than simply projecting the trace of a new debate on a standard map of the collective space (Venturini & Munk, 2022). With the Bluezone controversy, the base map goes beyond the original site of controversy to

include news and non-news media. Within news media, the distinction between state media and diasporic media is significant because of how they variously undermine and promote different viewpoints, ideologies, strategies, and values enacted by different actors, as we will see in the sections below.

GitHub Issues and Platform Overflow

react-native-bluetooth-scan/#4
Title: Bluezone IDs should be rotated
By: thaidn
Date open/closed: 28.04.20/03.08.20

Non-news Media

Blog

Twitter

Facebook

documents/#3
Title: On collecting and using fixed MAC addresses (trans.)
By: phanduonghieu
Date open/closed: 30.04.20/04.08/20

bluezone-app/#19
Title: Directions for development (trans.)
By: tansangxtt
Date open/closed: 28.07.20/open

react-native-bluetooth-scan/#13
Title: Automatically switching off Bluetooth discoverable mode (trans.)
By: thaidn
Date open/closed: 04.08.20/open

react-native-bluetooth-scan/#17
Title: List of suggestions for Bluezone's development team (trans.)
By: thaidn
Date open/closed: 04.08.20/open

News Media

Tiếng Dân

BBC Vietnamese

RFA

VOA Vietnamese

Luật Khoa

Đại Biểu Nhân Dân

Nhân Dân

Bình Phước

VNExpress

Legends
(trans.): translated from Vietnamese
: State media   : Diasporic media

Figure 1. GitHub issues that turned into controversies and their platform overflow.

Staging Characters: Assembling the Actors

While not all actors involved in the controversy contributed equally to the debate, the controversy involved not only decision and opinion makers and scientists and engineers but also lay experts who are frequent contributors to GitHub. I identified six primary actors who directly drove the controversy forward with their conflicting viewpoints: Thai Duong (diasporic Google engineer), Duong Hieu Phan (diasporic professor at Télécom Paris and notable cryptographer), Sophie Schmieg (head of cryptography at Google), BKAV team (Bluezone developer), GitHub user @truongsinh, GitHub user @KILLERST, and GitHub user @abrahamnguyen. Secondary actors included the various state and diasporic media identified in Figure 1, whose alliances with the primary actors created an indirect but important influence on the course of the controversy. Table 1 summarizes the interactions among these primary actors as well as their overall positions in the debate over the design of Bluezone.

That discussions on GitHub issue threads variously overflow to state and diasporic media is significant in this context. The Vietnamese diaspora is primarily rooted in the mass exodus that occurred after the end of the Vietnam War in 1975, when millions of Vietnamese fled their homeland as refugees, seeking asylum in countries such as the United States, Canada, France, Australia, and others. While the diasporic relations between Vietnamese in Vietnam and overseas Vietnamese have evolved and diversified over time, there remain fundamental tensions around issues such as political ideology, cultural adaptation, and differing perspectives on historical events. These tensions are still being played out across state-funded and diaspora-funded media. As such, what might appear to be a purely technical debate has always been deeply cultural and political; the positions taken by the relevant actors are not formed in a vacuum but actively shaped by and shaping the cultures of their scientific practices, which in turn are entangled in other cultures and practices.

Table 1. Actors, Their Positions, and Interactions.

		Bluezone Should Employ a Decentralized Privacy-Preserving Design		
		Thai Duong (@thaidn)	Duong Hieu Phan (@phanduonghieu)	Sophie Schmieg (@sophieschmieg)
Bluezone does not have to employ a decentralized privacy-preserving design	BKAV team (@BkavMS17)	Mild verbal discord	Mild verbal discord	Third-party credibility testimonial
	GitHub user (@KILLERST)	Strong verbal hostility	Strong verbal hostility	Third-party credibility testimonial
	GitHub user (@abrahamnguyen)	Cultural and technical agreements	Neutral and nonsignificant acts	Neutral and nonsignificant acts

As we will see below, it is not sufficient to characterize certain actors as inherently "diasporic" or otherwise. Rather, as actors call on diasporic and state media to make their case, their positions and strategic alliances in the debate become modulated so that the nuances in their viewpoints and values can come into view. Transparency regulates both the form and content of social interactions; while the openness

architecture of GitHub enables technical transparency through open codes, it obscures other kinds of transparency—such as institutional transparency and epistemic transparency. Institutional transparency in this context refers to the degree to which an organization or institution, such as BKAV (Bluezone's development company) and the Ministry of Information and Communication (MIC), provides accessible and reliable information about its activities, processes, and decision making to the public. Epistemic transparency in this context refers to the full expression of an actor's beliefs and knowledge claims in ways that expose their positions to scrutiny beyond the narrow problem-solving apparatus of GitHub's open-source architecture. The next section interrogates these enactments of transparency firstly by looking at the use of the English language as a facilitator of transparency.

Of Debates, Actors, and the Language They Use: The English Language as Controversy

Language as a Transparency Parameter

Language of exchange became a site of controversy early on and remained an issue that actors would come back to during the course of their multi-platform exchanges. As discussions began, it became clear that who gets to participate, become noticed, and responded to, are all contingent on whether they speak the language of openness and transparency. Thai Duong started the *react-native-bluetooth-scan/#4* discussion, dated April 28, 2020, with a message that sought not only to establish the terms of engagement quickly but also to define what constitutes openness and transparency (Duong, 2020e). Writing in English, Thai explained that he decided to start a discussion on GitHub only after e-mailing (presumably in Vietnamese) the development team on a vulnerability he discovered, where Bluezone assigned a fixed six-character ID to each installation and broadcasted it repeatedly—which compromised user privacy. In the same message, Thai tagged Kenny Paterson and Henry de Valence, respective proponents of the DP3T and TCN protocols for ephemeral user-ID generation for support and offered to translate into English any questions that the Bluezone team might have.

Transparency, therefore, is invoked only in its demonstrated absence; once summoned, transparency requires that as many actors (who would not normally engage with each other) as possible should be assembled. English as "the language of science and technology" (Ammon, 2001, p. 142) also becomes the de facto language of transparency. In offering to translate the development team's response—that is, if they decided to respond—Thai volunteered to contribute not only to the technical design of Bluezone but also to the brokerage of transparency and openness as collaboration par excellence.

However, when Bluezone responded to the issue on 1 May 2020, the response neither followed the terms of engagement Thai had put forward nor acknowledged the issue raised as a vulnerability. Responding in Vietnamese, Bluezone referred Thai to their white paper and reiterated their position that because their current implementation uses Bluetooth Classic signal, the broadcast of unique Media Access Control (MAC) addresses is inevitable. Once such fixed information is broadcast, argued Bluezone, devices can be considered to always be identifiable and vulnerable to hacking, rendering the randomization of IDs ineffective. Affirming that Bluezone was open to implementing ID randomization when "it becomes meaningful to do so" (Bluezone, 2020, para. 3) the response suggested that it would be willing to adopt the GAEN framework once it became available.

That Bluezone's white paper (written in both Vietnamese and English) explicitly stated its position in collecting the MAC addresses of Bluezone users and nonusers against the background of changing international industry norms is in itself a defiant act of transparency. It is difficult to parse the motivation behind this enactment of transparency since it so readily goes against the interests of the party being transparent. In this instance, Bluezone's transparency is enacted as disclosure of self-knowledge: A communicative act meant perhaps not to unmask underlying ideologies as the ideal of perfect self-knowledge but rather to enact a weak form of transparency as communicative abundance. Transparency as communicative expression has the effect of offsetting dominant narratives around emerging normative technological standards, producing the optic that contested narratives are at play. Within the purview of transparency is the affirmation of the plural character of narratives; whether narrative plurality would eventually overcome socio-technical fragmentation, however, is outside its purview. The proliferation of self-knowledge disclosure in the name of transparency does little to clarify what it is that transparency is after: In the absence of legitimate mechanisms for consensus, narrative plurality breeds the conditions for inaction and induces a sense of alienation from the practice of transparency itself.

The friction created by code-switching between Vietnamese and English as the language of transparent exchange throughout the course of the MAC address controversy marks the discursive limits of self-disclosure as transparency. It also demonstrates that transparency operates on asymmetrical mechanisms of accountability through a regime of visibility whose transformative potential is at best ambiguous: That actions can be traced to a self-disclosed source does little to hold the source accountable. As actors revisited the issue with language to facilitate "better" transparency, however, they sought to regulate not only the form but also the content of their interactions. Just as language is always contextually bound, it turns out that transparency also cannot be detached from the context in which it was called upon.

Language as Agonistic Openness

That Bluezone refused to follow the terms of engagement set by Thai, however, was no reason for others to not play along or for Thai to not insist on these terms elsewhere. In another issue thread written in Vietnamese under *react-native-bluetooth-scan/#17* (Duong, 2020f), the language controversy resurfaced when Thai, having reverse engineered Bluezone's source code, linked to the thread a demo written in English on how Bluezone's centralized server "has the capabilities to silently grab all contact history from any users" (Duong, 2020a, para. 3) in a repository on his GitHub account. The repository was accompanied by a post on Thai's personal blog in Vietnamese, titled "Proof that Bluezone's centralized server can quietly collect all user information" (Duong, 2020b, para. 1). Such skillful code-switching would ensure that the demo is open to a range of actors while ensuring that the terms of engagement accommodate the party being held accountable—the Bluezone development team.

When a GitHub user (username @KILLERST) responded to Thai's demo in the *react-native-bluetooth-scan/#17* thread (KILLERST, 2020a), they did so in Vietnamese until Thai took to Twitter to ask his colleagues at Google to confirm his credibility. Insisting that Thai's demo findings did not qualify as a security vulnerability, @KILLERST based their insistence mostly on the claim that they had helped develop a contact tracing app for the U.S. government. When the protracted exchange between him and @KILLERST

in Vietnamese seemed to have hit a dead end, Thai switched to English so that once again the parameters of transparency and openness could be redrawn. Disclosing his role as one of two Google cryptography leads of the GAEN, Thai took to Twitter to solicit endorsements from his cryptography community (Duong, 2020d). Heeding Thai's call on Twitter to provide testimonials, Sophie Schmieg confirmed that Thai was responsible for reviewing and auditing the cryptographic and security aspects of GAEN in the same thread. Praising Thai as one of the most skilled and intelligent security engineers she had worked with, she dismissed the attacks on Thai's character as baseless and unreasonable, suggesting that they only serve to undermine the credibility of those who fail to address his vulnerability report.

While testimonials as a persuasive technique might seem out of place on an open-source collaborative platform such as GitHub, where built-in rewards such as achievement badges and metrics such as number of contributions, number of sponsors, and number of followers act as in-platform proxies for credibility, it is a particularly potent mechanism for credibility check in the context of a national digital contact tracing project. Even though actors repeatedly attempted to make the distinction between technical and political discussions on the same GitHub issue thread, it soon became clear that technical designs could not be subtracted from the sociopolitical values from which they were derived and of which they were of service. Responding to @KILLERST's comment that Thai was using GitHub to advance his political agenda by posting "a list of requests full of political issues instead of actual technical problems" (KILLERST, 2020b, para. 1), Thai conceded in Vietnamese that while some of his requests pertain to policies, they nevertheless pertain to Bluezone's trustworthiness. Explaining that he posted these requests on that particular forum because it was the only place where he had seen responses from the development team, Thai expressed the importance of having public discussions to ensure accountability and avoid the perpetuation of Vietnam's track record of making critical decisions behind closed doors.

With Thai's concession, the parameters of transparency are once again redrawn, and the terms of openness once again recalibrated. Technologies of openness—in this case, GitHub—have context, and they never operate without or outside of this context. GitHub as a collaborative platform was not built to facilitate the deliberation of contested socio-technical values; it was built, rather, to help engineers collaborate through the mechanisms of transparent record making and recordkeeping as safeguards against coding errors and unintended consequences of large-scale collaboration. This kind of transparency serves a focused (albeit myopic) regime of seeing as rooted in the values of efficiency and convenience. When the values being contested extend beyond this limited framework of transparency as procedural robustness (a kind of technical transparency) and require accommodation for transparency as truth making and as a public good (a kind of epistemic transparency), the open-source architecture collapsed on itself.

Haunting the frequent practice of code-switching as agonistic openness is the specter of diasporic politics; diasporic actors are political agents through whom mechanisms of political influence and change are assembled along a transnational continuum that includes not only the "homeland"—in this case Vietnam—but also diasporic communities whose continuing ties to the homeland can in themselves be a source of controversy. As the next section will show, the symptoms of agonism on GitHub as expressed through language of exchange can be traced both back and forward to diasporic politics played out on diasporic and state media coverage of Bluezone's security vulnerabilities.

Of Actors and the Networks They Spin: Diasporic Versus State Media Coverage of Controversy

Even with Sophie Schmieg's endorsement, Thai's credibility continued to be questioned on *react-native-bluetooth-scan/#17*, the comment section on his personal blog, and elsewhere on GitHub. While it seemed established that Thai indeed was a security expert who was well-placed to comment on Bluezone's security vulnerabilities, his motive for reporting these issues became a matter of controversy as GitHub users brought up an interview he did with BBC Vietnamese. The BBC Vietnamese language website has been intermittently blocked by Vietnamese Internet service providers since 2002 for featuring interviews with Vietnamese diasporic political dissidents (*The Guardian*, 2002). Internet censorship in Vietnam has consistently blocked websites written in Vietnamese or dealing with issues related to Vietnam while sites not specifically related to Vietnam or only written in English are rarely and less systematically blocked (OpenNet Initiative, 2012). BBC Vietnamese has been frequently portrayed as "reactionary" and "malicious" by Vietnamese state media (VTC, 2021); to be associated with BBC Vietnamese is often enough to be seen as working against state interest.

While Thai's BBC interview was mentioned on *react-native-bluetooth-scan/#17* (Duong, 2020f) to discredit him, the interview was picked up by various other diasporic news outlets equally critical of the Vietnamese government—Luật Khoa Magazine and Radio Free Asia Vietnamese. At the same time, Duong Hieu—choosing to engage with the development team in Vietnamese from the start—took to Nhân Dân (The People's News) and Đại Biểu Nhân Dân (The People's Representatives), which are major state news outlets, to make his case. These nonoverlapping networks of influence, as the controversy unfolded, turned out to have worked in tandem in getting Bluezone to tweak its design.

As Thai assumed the role of the rogue hacker, Duong Hieu played the diplomat whose connections with the Authority of Information Technology Application at the MIC helped confirm Thai's reverse-engineering results. When Thai reverse engineered Bluezone's source code in August 2020 and raised the issue that Bluezone's centralized server could send commands to clients (users' phones) via push notifications to retrieve user data without their explicit consent, he also concluded that Bluezone was no longer collecting users' MAC addresses. Providing an update on *documents/#3* (phanduonghieu, 2020) where the issue with MAC address collection was initially raised by Duong Hieu, Thai revealed that he and Duong Hieu had been coordinating their efforts behind the scenes in a sub-thread before closing down the issue.

This partnership carried through to Thai's demonstration that Bluezone could prompt users to upload their complete contact history without their consent on *react-native-bluetooth-scan/#17* (Duong, 2020f), contradicting Bluezone's repeated and public claim across state media that its "decentralized" approach would ensure that user data are only stored locally on their devices. In practice, Bluezone's design cannot be classified as either fully centralized or decentralized. In a decentralized contact tracing system, a user's device generates its own list of temporary identifiers to ensure its anonymity while also storing a list of temporary identifiers of the same system generated locally by other devices with which it comes into contact (Sharon, 2021; White & van Basshuysen, 2021). This is a feature adopted by Bluezone. A device's list of temporary identifiers is associated with a stored long-term identifier to ensure that it is unique to the system. When a user tests positive for COVID-19 and agrees to upload their information, they only upload either their own list of temporary identifiers or their own long-term identifier (depending on specific

implementation), but never the list of the temporary identifiers that they have "seen." This is where Bluezone departed from the decentralized approach, in that it appears to also request users to upload their entire contact history—a feature of the centralized approach.

This distinction matters because, in the decentralized approach, the crucial task of matching the server's list against the list of temporary identifiers that a device has "seen" within a set time frame is done locally on individual devices. In the event that there is a match, the app user will be alerted and given instructions on what to do depending on their specific context. In contrast, in a centralized system, a device's list of temporary identifiers is generated by the centralized server along with its long-term identifier (White & van Basshuysen, 2021). When a user tests positive for COVID-19 and agrees to upload their information, the centralized server gets access to the list of temporary identifiers that the device has "seen," at which point the server would match this list against the long-term identifiers it already stored. The server has a complete map of who has come into contact with whom and, as a result, can alert users who have come into contact with someone who tested positive. While Bluezone allows individual devices to generate their own temporary identifiers (decentralized), the matching of temporary and long-term identifiers happens at the server level (centralized). This peculiar hybrid design allows Bluezone to insist in its promotion materials that user data are stored locally on their phones and as such conform to the decentralized approach, which has been widely praised for its privacy-preserving standard while omitting centralized elements in its design.

The project of transparency, under these developments, has become that of moralization—where the insistence is that if the source code is under permanent exposure, then the individuals behind these codes are forced to act virtuously. Transparency here is also invoked in service of authenticity in the sense that genuine privacy protection can only be kept true to its intended purpose when nothing is withheld from public view. As a supposed device for demystification, transparency acts as a promise of access to the "real" that has become a crucial element in an ongoing fetishization of the medium of transparency: That of the open-source collaborative architecture. Even when this architecture has clearly failed to deliver on its promises, the instinct is still to call for "more" and "better" transparency on the very same terms in which transparency failed to materialize. Transparency persistently oscillates between a state ("being transparent") and a future requirement ("more and better transparency")—it is as such neither fully descriptive nor prescriptive. That transparency has become a guarantee of morality for both institutions and their subjects obscures its legitimization effects: Transparency is held to be impartial, democratic, and progressive—as such, it facilitates a sense of stability and legitimacy through permanent open-endedness. The perpetual incompleteness of the transparency project means that this open-endedness is often equated with openness, which in turn is often equated with access—and access with transparency (Valdovinos, 2022). Participation in itself becomes a guarantor of democratic engagement regardless of the particularities involved in its specific modes of articulation. As the next section will show, technical transparency as facilitated by the ideals of the open source cannot be directly translated into an epistemic transparency conducive to transformative politics. In the context of this specific controversy, I will show, technical and epistemic transparencies are not only inconvertible but they are also fundamentally incompatible when it comes to holding transparency accountable for the values it purports to instill into the practices it facilitates.

Of Changes (Quietly) Made and the Limits of Transparency

As the development team altogether stopped responding to discussions on GitHub, open issues started piling up, and the code repositories started looking increasingly abandoned. What transparency promises in asymmetry reduction through its oppositional articulations against practices of secrecy, it falls short on stipulating the conditions for what symmetry would ultimately look like—and whether perfect symmetry is the end goal for transparency. Without Bluezone's responses to unresolved issues, discussions became littered with ad hominem attacks as actors brought in examples of digital contact tracing around the world to debate the best approach to developing a contact tracing app. Responding to one exasperated GitHub participant who commented that *react-native-bluetooth-scan/#17* (Duong, 2020f) should just be closed because it has become derailed beyond repair, Thai insisted on keeping the issue open to avoid creating a misleading impression of resolution. Citing an incident where the Bluezone team deleted a nonconfidential file from their repository after it was mentioned on Twitter even though it made no difference to the integrity of the code, Thai deduced that Bluezone team members were actively monitoring the conversation and making changes without publicly disclosing it. Thai also cited Bluezone's newly modified terms of use, where the collection of user data was unceremoniously added, as evidence of the quiet impact of continued public discussion by way of transparency.

By tracking every change in Bluezone's publicized source code, tracing the possible origins of these changes, and then publicly reporting on them back to the discussion, Thai was enacting a form of transparency as rationalization—in which his insistence on openness (and open-endedness) makes a case for pervasive bettering of rational behavioral standards for all involved. In this way, technical transparency can be enacted (through reverse engineering, through tracking) even in the absence of transparency from the party being held accountable. This technical transparency, however, is ultimately unproductive in that it cannot be mapped against—or translated into—discernible changes in underlying approach, philosophy, or shared understanding of the value that all these debates about technical design are supposed to converge on—that of user privacy.

Bluezone's reactive and tactical responses to critiques are not rooted in any coherent set of principles; they are instead contingent on whether the right advocate speaks the right thing to the right people at the right time. That the advocacy for changes in Bluezone's design was led by technical experts—a cryptographer and a security engineer, whose shared articulation of privacy as privacy by design was indistinguishable from technical security against adversarial behavior—meant that the important conceptual work behind privacy as a fundamental human right was left unarticulated. Technical transparency is epistemically opaque; that we can crack open a technology and see how it operates does not directly translate into—or map against—how it operationalizes the socio-technical values against which it is judged. Technical transparency also does not directly map onto the intentionality and epistemology behind its design; instead, snapshots of "open codes" can only make accessible heuristics—shortcuts that are sufficient for problem solving and immediate judgment but not much else. Because heuristics are quickly inferred under conditions of uncertainty rather than collectively deliberated over, they beget impressions of antagonism that could conceal and distort individual standpoints—which are multifaceted and rooted in individual knowledge and perspectives whose temporal horizons outlast these heuristics.

Open source as transparency came undone when privacy became uncoupled from technical security, revealing standpoints as superseding heuristics. Responding to a comment on *bluezone-app/#19* (tansangxtt, 2020), in which a user (username @abrahamnguyen) brought up Singapore's TraceTogether app as an example of a design similar to that of Bluezone in that they both use an Android device as a bridge between two Apple devices that cannot detect each other under the default privacy-preserving undiscoverable mode, Thai wrote the following(Duong, 2020g):

> Even though I prefer the decentralized approach, I actually don't oppose Bluezone's centralized design. I think this approach suits the Vietnamese cultural context. Even so, since the whole nation is entrusting Bluezone with its contact history data (and its derivative data—the associated social graphs), Bluezone has the responsibility to be transparent. The model here is trust-but-verify. If you want people to trust you, then help them verify that you are protecting their data properly, and that you won't abuse your power. Bluezone is still not doing this. The development team might be very busy at the moment, but for me transparency should be a priority, not something you only get around to doing when you're less busy. (translation; para. 3)

Here, transparency becomes ouroboric. That "more" and "better" transparency is permanently required is illustrative of its limited emancipatory potential at the very conceptual level. Transparency is parasitic in its logic; without a host value with which it can partner, transparency becomes a self-contained and self-perpetuating operation that serves no other interest than its own enactment. Despite Thai's insistence on transparency as a model of trust, it is not at all clear that more and better transparency will result in more and better public trust in technology (Duong, 2020g). This is not because imperfect transparency will facilitate conditions of seeing that are always opaque to some but because transparency is what Valdovinos (2018) calls an "empty signifier" (p. 665) in that it possesses not content but rather structures of a specific locale from which to look at the rest of the symbolic landscape. As such, transparency structures other signifiers—such as privacy, security, and now trust—in specific ways. Transparency is deceiving because it instructs the modes of engagement in ways that give actors the illusion of deliberating within and across well-delineated domains of practice—codes, politics, public health—while they can be more accurately said to be dealing with socially constructed values, hopscotching from one to the next. The foregrounding of transparency through the modality of disclosure supersedes the level of content and obscures the mediated nature with which "transparent" content—codes, white papers, debates, and demonstrations—becomes selected and made available to the public. In this sense, transparency is but a nom de guerre for the normalization of transparency mediation—of mediation architectures becoming increasingly see-through rather than seen-with, clouding our perception about the intermediary agencies with which they regulate our social relationships.

The somewhat unexpected decoupling of technical security and user privacy in Thai's above comment is heuristics ceding space to epistemology. This demonstrates the narrow terms on which technical transparency operates: User privacy as articulated within the privacy-by-design paradigm is but a security puzzle solved mostly through adversarial testing of codes. Even though technologies cannot be separated from the values that shape them and that which they help shape, the practice of technical excellence is always detachable from the technician's standpoint that spans a complex web of upbringing, education,

sociocultural influences, and professional affiliation. Similarly, technical transparency as a facilitator of technical excellence does not translate to epistemic transparency as facilitator of discourse excellence—good-faith exchanges of what actors believe to be true. In this particular controversy, technical transparency as open-source code and reverse engineering not only does not map onto but is also incompatible with epistemic transparency. That Thai could be critiquing the less-than-excellent privacy-preserving design of Bluezone and subsequently confessing that privacy-preserving excellence is not necessary in the Vietnamese context is a demonstration not of nontransparency but rather of the transparent incompatibility of the technical-heuristics and the epistemological-standpoint. The open-source architecture of GitHub affords and encourages the articulation of the former but not the latter; in the absence of mechanisms for the translation between the two, actors have no other option but to restart the transparency circle so that they can find yet another socially constructed value from which to practice their technical excellence—that of trust.

Discussion

This article traced a public controversy over user privacy and app security in the implementation of a digital contact tracing system that involved a range of Vietnamese diasporic and non-diasporic actors. That the controversy started on GitHub before unfolding over other Web platforms has had significant bearing on how transparency became articulated, setting the tone for all the disputes and debates that came into view with this transparency framework. GitHub as a medium of transparency affords technical transparency but not epistemic transparency; the narrow terms and contracted temporal horizons on which technical transparency operates are incompatible with the broad-ranging and multifaceted domain of individual standpoint and epistemology. Technical transparency through codes is a constative act: What it reveals in snapshots of what goes on "under the hood," it conceals in the ways in which the technical is inseparable from the social. Transformative social change cannot be brought about with altered codes; it requires changes in processes of reflective identity, sustained and inclusive collective actions, and space for different paradigms of thinking toward broad-based consensus.

The uncoupling of user privacy and app security during the Bluezone controversy has facilitated the success of neither. As contact tracing evolved with shifting public health surveillance needs, its automation begets automation in all other aspects of pandemic management: Self-tracking, mobility tracking, quarantine management, vaccination recording, and risk profiling. Living with COVID-19 has come to mean living also with automated technologies; that technological solutions to pandemic response became normalized in this way is due in no small part to contested enactments of technical transparency and openness during the early phases of successful infection containment. Even though the medium of transparency does not produce more accountability, privacy, security, or trust, its pervasive ideology as a source of tacit social consensus produces a legitimization effect through the perpetual promise of transparency to come. In this sense, transparency animates mechanisms for the design of "seamless" and "frictionless" technologies that recede to the background not through its failed enactments but rather through its magic mandate as an unproblematic and neutral value. Unobtrusive technologies are seen through (transparent in structure) and rarely seen with (transparent in content); it is in this sense that transparency is inherently ambiguous as it acts both as a barrier and a passage. Transparency for its own sake cannot be relied on as a framework for legitimacy and cannot substitute for inclusive, multi-stakeholder

approaches to the deliberation of sociotechnical systems that affect the lives of everyday citizens, for whom technical transparency serves little, if any, purpose.

The controversy mapped here has demonstrated the limits of the conceptual architecture of transparency as accountable governance of automated systems. Beyond the deficit and corruption narratives of transparency critiques, researchers should attend to the ways in which enactments of transparency in different domains of practice (institutional, technical, epistemic) undermine, obscure, and obstruct each other, such that the permanent call for more and better transparency conceals not only the restrictive vision *with* which transparency is seen but also confuses this limited vision as the fundamental panacea for governing automated systems.

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