Unwinding Pluritemporal Time in Digital Humanitarian Crowdwork

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ABSTRACT

Sociotemporal order is in its most fragile state at the onset of a natural disaster or human-caused humanitarian crisis. Understanding the interplay between social coordination, collaboration technologies, and social order is crucial for effective humanitarian crisis response. Yet, these sociotemporal interactions—both social and technical—are quite complex. We draw from two sources: 1) Nowotny's concept of pluritemporalism to envision a more expansive view of social constructions of time and 2) an empirical study of sociotemporal ordering in a digital humanitarian group that crowdsources situational awareness information on behalf of the global emergency response sector. In this paper, we present an emerging pluritemporal framework as an apparatus to explore sociotemporal ordering in the context of human-computer interaction and social computing for time-critical digital humanitarian crowdwork.
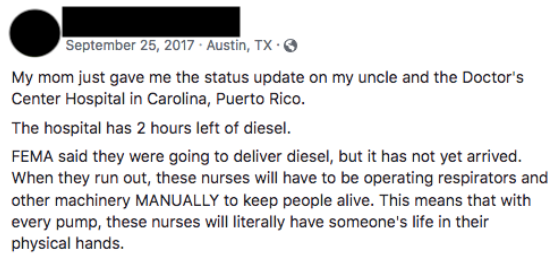
Figure 1: Public Facebook post about the status of a hospital five days after Hurricane Maria made landfall.
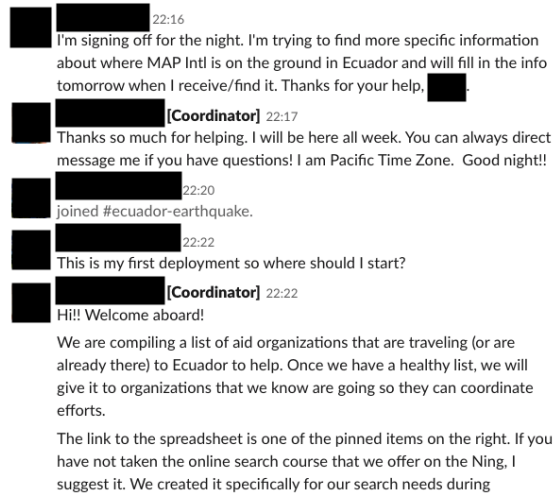

Figure 2: Slack chat between an SBTF crowdworkers and a team leader about data collection following the Ecuador earthquake data collection.

INTRODUCTION

Time is of the essence in the chaotic moments of an emergent humanitarian crisis response brought about by a natural disaster [2], mass migration of people [16] or large-scale contagious disease outbreak [17]. The fluid, high-tempo, time-critical nature of crisis response serves as a data-rich environment to explore new ways to unwind how time manifests when sociotemporal ordering is interrupted and must be re-ordered to permit social coordination.

Here, our focus is natural disaster response by digital humanitarian groups that crowdsource, collect, assess, and map crisis information for the global humanitarian/emergency response sector [6, 8, 11, 14]. These globally distributed online groups curate and visualize information to establish situational awareness about aid needs, damage assessments, and a census of responders, their United Nations humanitarian cluster designation (water, health, logistics, etc.), and location in-country. In digital humanitarian crowdwork, time manifests in two primary ways: event chronology and social order. Timestamp metadata embedded in social media posts is used by crowdworkers to generate a chronology of information, news, official declarations, and eyewitness accounts about the emergency. While affordances of clocks and calendars are widely accepted, the striking variation in how timestamps are generated, the many forms they take [7], and the lack of end-user controls on web platforms is surprisingly problematic.

Social constructs of time play a more abstract role in social life than artifacts. They help to generate a sense of social order that guide, symbolize, and convey the rhythms and routines of life and work [18] and shared meanings about time [19]. These constructs are multifaceted social phenomena characterized by timescapes [1], collective and entangled structures [4], temporal logics [5], and plural modes of time [9]. As Zerubavel writes, "Like their spatial counterparts, temporal boundaries often represent mental partitions and thus serve to divide more than just time." [1991, p. 19]. In digital humanitarian crowdwork, these temporal boundaries are further compounded by the episodic but urgent pace of the work, geographic distances of the volunteers, time zone variances, and cultural differences, to name a few.

With so many different and simultaneous factors at play, we look to *pluritemporality* [9] as a way to explore the myriad ways that SBTF crowdworkers conceptualize, structure, order, and make sense of time that they construct and/or negotiate in their information work. This more expansive view of time provides a broader lens to examine the temporal constraints and affordances that continue to vex time-critical, globally distributed social coordination work.

In this paper, we present a preliminary framework that adopts a pluritemporal approach to social order during crisis. Our backdrops are the 7.8-magnitude earthquake in Ecuador in 2016 and Hurricane Maria which made landfall in Puerto Rico in 2017. The empirical work is supported by data from public social media posts (Figure 1) and asynchronous chat transcripts (Figure 2)

generated by The Standby Task Force (SBTF), a leading digital humanitarian group. SBTF volunteers can typically stand-up an activation and begin collecting data, largely sourced from social media, within 24 hours of the disaster onset using off-the-shelf, cloud-based collaboration technologies, e.g., Google Office products, and asynchronous chat application Slack.

RELATED WORK

Nowotny coined the term *pluritemporalism* to describe "the existence of a plurality of different modes of social time(s) which may exist side by side" [9, p. 424)]. This multi-modal perspective extends the notion of social time advanced by Zerubavel and others [4, 5, 10, 18, 19] to describe the complexity of sociotemporal ordering and intersubjectivity. For instance, pluritemporal time can juggle different modes of social time that are perceived, experienced, and enacted alongside those that are embedded in technology, artifacts, and non-human agents. In this sense, pluritemporality does not impose yet another layer of sociotemporal order on top of those generated by a particular form of social time. It simply gives space to acknowledge and reveal the totality of the many, plural social times that people encounter, construct, and negotiate in their everyday lives.

Put into practice, Orlikowski and Yates [10] draw from pluritemporalism to shape the notion of temporal structuring, or the multiple ways in which people use time to orient, organize, and re-constitute their work practices to reduce sociotemporal tensions. Their study of a geographically-distributed work group found that the use of recurrent temporal structures helps online communities-of-practice find a sense of symmetry—or at least some quasi-agreement—around collective sensemaking [10]. More recently, a broad range of scholars in human-computer interaction, [4] organizational studies [3, 5, 13], and technology design [12] have called for renewed theoretical and empirical work on time to consider new expressions of sociotemporality and the technical challenges of enacting social order.

The social dimension of re/constituting temporal structures is unexplored in high-tempo, time-critical digital humanitarian work. Further, we are interested in understanding how these structures interact or breakdown with cloud-based technologies as digital humanitarians seek to achieve a satisficing [11] or "good enough" [15] level of social ordering in crisis crowdwork.

SOCIOTEMPORAL CHALLENGES IN CRISIS CROWDWORK

Social media, eyewitness images/video, official public announcements, news reports, and other forms of online information are the primary sources of data collected by the SBTF crowdworkers. Here, we illustrate three typical examples of the complexity, variety, and entangled nature of the sociotemporal representations SBTF crowdworkers encounter in their information collection and coordination work.
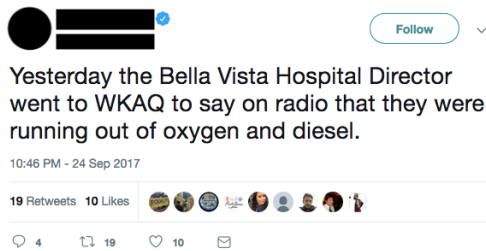
Figure 3: Public tweet referencing an event at a point in time "yesterday" from the sender's perspective. However, the timestamp reflects the reader's time setting which is -06:00 hours later.
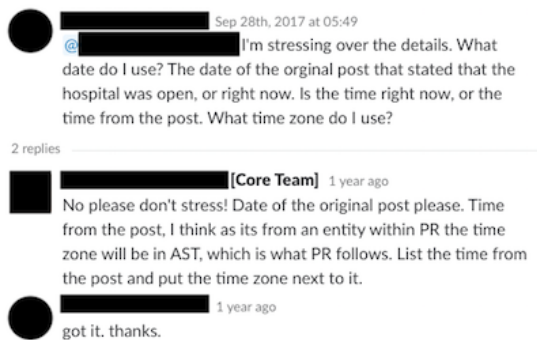

Figure 4: Slack chat between an SBTF crowdworker and a team leader attempting to disentangle temporal data.

In Figure 1, the Facebook post indicates three temporally-based bits of information: "just gave me the status update", "2 hours left of diesel" or "not yet arrived." However, the everyday language used to convey time is difficult to structure, verify, and pass along as actionable information. First, the full timestamp is not visible until one hovers over the date. Second, the Facebook default presentation of date- and timestamp on timeline posts is generated by the reader's own device clock, not the sender. This requires manual conversion of timestamp time zones for each of the hundreds of Facebook posts collected by SBTF crowdworkers. Third, presuming that the information originated in Puerto Rico, the SBTF crowdworker must then adjust the calculated timestamp of this post (the volunteer's time zone +/- poster's time zone +/- Atlantic Standard Time Zone). Last, the SBTF crowdworker must interpret the likely meanings of the pluritemporal expressions — "just", "2 hours," and "not yet" in the original post based on and in light of the new time conversion.

The tweet timestamp, in Figure 3, is also quite problematic. Again, the timestamp reflects the reader's Mountain Daylight Time Zone, not the poster's Atlantic Standard Time Zone. Adjusting the timestamp reveals a correct Puerto Rico local date and time of 12:45AM – 25 Sep 2017. Now, once the time is properly converted, the SBTF crowdworker would interpret "yesterday" to mean 24 Sep 2017, not the 23th if the timestamp was taken at face value sans conversion. Additionally, Twitter timelines are seldom truly chronological due to content throttling and algorithmic ordering by the platform which causes posts to appear up to 24 hours after they were initially sent. In essence, this tweet could have been posted many hours before it appeared on the volunteers' timelines, rendering the pluritemporal notion of "yesterday" meaningless.

Social media offers particular challenges for synchronizing sociotemporal information due to the different ways time is socially constructed, ordered, and enacted. Figure 4 illustrates an SBTF crowdworker reaching out to a Core Team member (a co-leader of the group) for help about how to collect and assess social media time zones and timestamps. This excerpt exemplifies the complexity of working with temporal data. The SBTF crowdworker must evaluate the variability of timestamp representations on different social media platforms. Then, she must address the tensions between temporal information needs related to the original post timestamp (past) vs the moment the information is accessed (present). Finally, she must geolocate the temporal information, confirm the time zone, and then look up and apply missing time zone metadata to the data collection sheet.

Understanding the interplay between social coordination, digital technologies, and sociotemporal orders of time is crucial for supporting digital humanitarian work. Yet, these sociotemporal interactions—both social and technical—are quite complex and, as Nowotny describes, often incorporate multiple modes of social time which exist side-by-side in a single encounter.

Figure 5: Slack chat with color-coded markup to represent entangled pluritemporal modes in online socially coordinated crowdwork:

Yellow – timeline
Orange – period
Red - spatial
Blue – standard
Green – synchronous

To address these challenges, we present an emerging pluritemporal framework from ongoing ethnomethodological work with the SBTF digital humanitarian community.

PLURITEMPORAL FRAMEWORK

Our current research focus is the re-appropriation of a pluritemporal framework as an apparatus to explore sociotemporal ordering in the context of human-computer interaction and social computing for time-critical digital humanitarian response work. Specifically, the emerging framework identifies distinct time modes present in computer-mediated social coordination in order to help disentangle human-to-human and human-to-computer interactions toward a more synchronous temporal structure/order. Figure 5 illustrates the pluritemporal richness of a single exchange between two SBTF crowdworkers in which five different modes of time are present. Each time mode represents a category of social time, all long-studied in the literature, but re-combined here to highlight the interplay, tension, conflict, and attempts to repair breakdowns between the temporal asymmetries of coordination work and crisis information. The *timeline* mode refers to the linear, past-present-future perspective of time and frequently involves the use of time metaphors. Durations and containers of time are represented in *period* time mode to hold common concepts of social order. *Standard* mode evokes the regulation of clock time into other social meanings, such as time stamps, time zones, or AM/PM notation. *Spatial* mode incorporates a physical axis as an expression of location and hierarchy. *Tempo* mode (which does not appear in the excerpt) refers to the pace of time during work. Finally, *synchronous* time is a response to a sense of temporal disunity or technology breakdown. Here, people often merge time modes to bring some semblance of order to the situation. In the excerpt, "good morning" serves as more than just a friendly greeting—it locates the person at a particular time in a region of the world, it situates the social order of the person's day, and it telegraphs meaning about the crowdworker's potential timeline of availability to contribute to the digital humanitarian daily workflow. We continue to develop the framework and look to our HCI colleagues for inspiration.

WORKSHOP PARTICIPATION

Our aim for the workshop is to: 1) contribute to a broader discussion about pluritemporal perspectives in HCI and social computing research and 2) elicit high-level feedback about our emerging pluritemporal framework for future study of online social coordination work and the design of temporal enhancements to cloud-based collaboration tools.

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