Mediating Design Claims: The Social Media and Housing Disaster of the 2017 Halabja Earthquake

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Abstract: In disasters, social media offers a platform for sharing vital information between affected communities, responders, journalists, designers, planners, and policy makers. In some cases, however, social media seeds contentious political and professional debates. The social media discussions that proliferated around the damage at the Maskan-e Mehr social housing site in Iran immediately following the Halabja Earthquake that struck at the Iran-Iraq border on November 12, 2017, became the center of heated design and policy controversy. This paper analyzed the uses, misuses, and politicization of design expertise. Social media content across three platforms was analyzed and compared with state-of-the-art engineering and planning knowledge. The study found that design experts have active and passive roles in the politicization of disasters. Examples were provided of ways that designers politicize discourse around disasters in both public and political spheres through social media. The impact of their social media engagement in contentious politics and high-level policy was brought to light. The authors suggest an expanded role for design experts and expertise in post-disaster political engagement. **DOI: 10.1061/(ASCE)NH.1527-6996.0000352.**

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Introduction: Role of Experts in the Politics of Disaster

The Halabja Earthquake that occurred on November 12, 2017, resulted in structural damage, injury, and loss of life at a new social housing project at Sarpol Zahab, a town outside Kermanshah, a western province of Iran near the Iraq border. The impact of the earthquake on the Maskan-e Mehr social housing project launched a politicized debate about the vulnerability of Iranian social housing. The debate that erupted on social media amplified contentious claims by politicians, technical experts, and the public.

This paper explored ways in which social media discourses escalate contentious political debate as disasters unfold. In particular, the study determined how expert knowledge is used and misused—and, ultimately, politicized—as disasters unfold. The authors posed two research questions. First, the study examined how expert knowledge is claimed, used, and misused—or politicized—as disasters unfold. Second, the study examined how social media creates a platform on which experts can contribute to politicized technical controversies.

The study analyzed high-visibility social media content for contentious claims about the design and planning of the Maskan-e Mehr project. The study examined this content in the context of the complexities of state-of-the-art seismic design and planning knowledge. In doing so, the authors analyzed the role of experts and expert knowledge in political and popular response to disasters. It was found, for example, that expert knowledge about the vulnerability of the social housing projects was deliberately misused and then appropriated by debates on the privatization of housing and neoliberal governance.

This paper demonstrated how social media response to natural disasters shapes post-disaster reactions by politicians and communities. It is argued that design experts (e.g., engineers, planners, and architects) and their expertise play a significant role in the politicization of disasters. This occurs through active and passive engagement by designers and through the use, misuse, and politicization of their expertise.

Background: Politicized Appropriations of Expertise

In 2007, the first term of Mahmoud Ahmadinejad's presidency, Iran's government initiated a plan to provide affordable social housing for low-income groups. In 2008, Parliament passed this policy into law. This initiative was called Maskan-e Mehr (which translates roughly as Affection Housing). The law allowed the government to use public and national lands to reduce the total cost of housing development. The Maskan-e Mehr projects include buildings built and financed by the government as well as privately built buildings financed by the government across the country. For both types of Maskan-e Mehr housing, residents must qualify as low-income households (Ministry of Roads and Urban Development 2008).

Three days after the earthquake, on November 15, 2017, Iranian President Hassan Rouhani addressed a crowd at the site of the damaged Maskan-e Mehr social housing development project at Sarpol Zahab. The project includes 20 7-story buildings comprising 576

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units. He drew the crowd's and the media's attention to the damage to the government-built social housing project by comparing the extensive damage of one of the Maskan-e Mehr buildings to an adjacent privately constructed building with comparatively little visible damage. In a widely disseminated statement, Rouhani lamented that, "the government-built Maskan-e Mehr buildings are significantly damaged and beside them the other privately built buildings didn't have as much as a crack or a broken window" (Khabar Online 2017).

The following day, another video clip circulated that looked more deeply at what had by then been labeled by many as "the other building" (referencing the privately built housing that Rouhani spoke about). In that video, the narrator circled around the "other building" to reveal extensive structural and architectural damage hidden from the cameras at Rouhani's address. Through wide distribution on social media, this second video was leveraged as evidence against Rouhani's praise for privately built housing. Indeed, Rouhani's condemnation of government-built social housing in favor of private-built subsidized housing fit squarely with his general agenda of privatizing social projects such as Maskan-e Mehr social housing. The social media timelines of those circulating the second video revealed their general political opposition to his neoliberal politics.

This vignette (which is discussed further in the findings sections) illustrates how Rouhani's address, citizen evaluations of the buildings, and the circulation of videos by Rouhani's opponents evolved into politicized social media exchanges. Such exchanges are the evidence we drew upon to suggest an expanded understanding of the vulnerability of the Maskan-e Mehr social housing projects. Design experts—engineers, planners, and architects—figured prominently in these exchanges.

In this analysis, the authors—a city planning scholar, earthquake engineering scholars, and a scholar of political engagement by design professionals—investigated the ways social media discourse are leveraged to politicize the Maskan-e Mehr disaster. The paper presented evidence of ways in which various stakeholders participating on social media conflate design complexities through politicized claims. The claims that circulated on social media as the disaster unfolded cited design and performance of the buildings in connection with planning and policy choices. Although important, these claims were at times poorly founded. The complexities layered upon the social media discussions include city planning, seismological, and engineering hazard analyses. The people who participated in politicized claim-making included residents of Sarpol Zahab, the broader public, design (engineering and planning) professionals, journalists, politicians, and activists. The authors compared claims from these groups with current state-of-the-art knowledge and practice in earthquake engineering and social housing project planning (collectively termed design complexities in this paper).

The politicization of social media debates was a significant part of the Maskan-e Mehr disaster. By recognizing this, the authors intentionally position social media beyond the traditional scholarly focus on social media in postdisaster response. When scholars of disasters and disaster planners make sense of, or plan for, postdisaster social media response, the authors argue that such politicization of social media content is important to consider. These dynamics not only affect how we measure the reliability, validity, and veracity of content, but they force us to reflect on power structures that extend beyond the typical purview of response and recovery. Indeed, in the context of the Maskan-e Mehr housing projects, the contentious design claims circulating on social media emerged as a significant force in shaping policy maneuverings around the fate of social housing in Iran.

Analytical Framework: Contentious Politics and the Hazard–Disaster Divide

Recognizing that the definition of disasters has evolved (Perry 2018), this paper used definitions that attribute disasters to social disruption and natural hazards to physical phenomena, such as earthquakes (e.g., Castillo 2016). Such perspectives build on the now long-standing tradition of understanding disasters as socially constructed sets of events and relations (Tierney 2007). Castillo (2016) emphasized that disasters occur when there is a significant disruption of social order. The combined effects of the Halabja Earthquake and the social media response analyzed in this paper are representative of such disruptions to social and political order. To shed light on the combination of seismological and sociological forces at play in the Maskan-e Mehr disaster, this section presents the analytic framework for navigating contentious politics in terms of hazard and disaster.

Hazard

Regional earthquake hazard typically is characterized in terms of its characteristic size and rate or probability of occurrence. The earthquake size (typically measured with moment magnitude, M_w, which correlates with the seismic energy released) is influenced by the tectonic environment, fault type, geology, geometry, and displacement (Kramer 1996). The size of the earthquake, together with its location, site conditions, topography, and direction of fault rupture with respect to the site, influence the intensity of ground shaking experienced at a given site. It is this ground shaking that damages the physical infrastructure (Kramer 1996). The rate or frequency of earthquakes in a given region is influenced by the earthquake size and slip rate. The earthquake risk is a function of the hazard characteristics (e.g., size and frequency of earthquakes) as well as the vulnerability of the physical infrastructure (typically measured in terms of dollars or fatalities).

The magnitude (M_w) 7.3 Halabja Earthquake near the Iran border with Iraq occurred on November 12, 2017, at 9:18 p.m. local time, a time when many residents typically are inside their homes (Farzanegan et al. 2017). This earthquake struck the Kermanshah province of Iran where most excessive damage occurred in the counties of Sarpol Zahab (population 80,000), Qasr-e Shirin (population over 24,000) and Islam Abade-e Gharb (population over 141,000) (Yekrangnia et al. 2017). According to the United Nations Institute for Training and Research (UNITAR), of the 79,000,000 population of Iran, 1,222,000 people were exposed to moderate shaking, 178,000 people were exposed to strong shaking, and 6,800 people were exposed to very strong shaking. In Sarpol Zahab, 16,723 people were exposed to a moderate level of shaking, 38,474 people were exposed to strong shaking, and 493 people were exposed to a very strong level of shaking. In the county of Qasr-e Shirin, 8,497 people were exposed to moderate shaking, and 4,453 people were exposed to a strong level of shaking. In the county of Islam Abade-e Gharb, a total of 153,221 were exposed to a moderate level of shaking, 18,937 people were exposed to a strong level of shaking, and 6,808 people were exposed to a very strong level of shaking. The counties of Qasr-e Shirin and Islam Abade-e Gharb suffered a loss of less than 20 people (Yekrangnia et al. 2017). At least 440 people were reported dead and more than 9,400 injured after the earthquake (Yekrangnia et al. 2017).

The earthquake occurred as a result of oblique-thrust faulting at a midcrustal depth of about 25 km (Yekrangnia et al. 2017; USGS, n.d.) very close to the Iran–Iraq border (220 km northeast of Baghdad, Iraq). The rupture occurred on a fault dipping

shallowly to the east-northeast or on a fault dipping steeply to the southwest (Yekrangnia et al. 2017). This is where the Arabia Plate moves north with respect to the Eurasia Plate at a rate of about 26 mm/year, leading to the general uplift of the Zagros Mountains in Iran and the seismic activity of faults at the boundary of the two plates.

There are two primary faults near Kermanshah [Tatar et al. 2017, International Institute of Earthquake Engineering Research (IIEES)], the closest metropolitan area to Sarpol Zahab: the High Zagros Fault (HZF), and the Mountain Front Fault (MFF). The HZF is a thrust and reverse fault about 1,375 km in length, and the MFF is a thrust fault about 1,368 km in length with scattered sections ranging from about 16 to 112 km (Tatar et al. 2017, IIEES). The HZF led to earthquakes as early as 1226 CE with a surface wave magnitude (M_s) of 6.4 and several other earthquakes of moment magnitude (M_w) about 5.8 (1865, 1984, and 1990). The MFF led to several earthquakes as early as 1,200 years ago (872) with a M_w of 6.7 to more-recent earthquakes (1883) of M_w 5.7 (Farzanegan et al. 2017). The region is known to be seismically active, with four other known earthquakes with $M_w > 6$ within a (hypocentral) distance of 250 km from the November 2017 Halabja Earthquake (USGS, n.d.). In addition, a M_w 7.4 earthquake in 1990 in the Rasht-Qazvin-Zanjan area of Iran, 400 km to the northeast of the Halabja event, caused between 40,000 and 50,000 fatalities, with many more injured and left homeless (USGS, n.d.). Hence, with its history of strong earthquakes and quality of construction, the severe vulnerability of the region to seismic risks has been known for quite some time, leading to relatively rigorous planning and engineering code provisions.

To understand the seismic risk faced by the Maskan-e Mehr housing projects, the authors accounted for these regional and site characteristics as well as structural vulnerability. An analysis of the earthquake's effects on the site is discussed in section "Design Complexities." The next section examines the ways in which the public responded to this hazard through social media.

Disaster

When scholars of disasters use social media, they employ techniques such as triangulation to evaluate the validity and veracity of social media data. Most of these studies approached social media as a source of information and communication around "swift and critical decisions about how to protect lives and property" (Mehta et al. 2017, p. 549). For example, pioneers of crisis informatics Palen and Anderson (2016, p. 224) studied ways in which social media in disasters can be used in first response and emergency management. In studies of social media in the context of disasters, attention generally is focused on the use of social media for personal communication, as citizen sensing, and for official communication (Castillo 2016).

The range of methodological and analytical approaches to social media in the study of disasters remains, at the time of the writing of this paper, mostly limited to the topics identified by Castillo (2016). Notably, however, Houston et al. (2015) argued for an expanded scope of influence of social media in the context of disasters. They presented 15 different forms of social media use in disasters. Their framework considers community, individual, government, organization, and media consumers and producers of content. One of their 15 forms of social media use by these groups is to "discuss sociopolitical and scientific causes and implications of and responsibility for events" (Houston et al. 2015, p. 15). This sort of use is categorized by Houston and others in the postevent phase of disasters—when speculations about causes are debated, blame is expressed, and a politicized discourse peaks and then tapers off. In contrast to this postevent view of politicized discourse, however, the present analysis considered the politicized discourse on social media to be part of the disaster.

When a disaster occurs, the production and consumption of media content traditionally is buffered by power relations. In their study of the BBC's coverage of the UK flooding crisis, Valencio and Valencio (2018) highlighted the perspectives that do and do not make media headlines. They focused on "perspectives and actors with more social prestige who prevail" in expressing narratives about a disaster (Valencio and Valencio 2018, p. 3). Valencio and Valencio (2018, p. 13) identified cohesive, conflicting, and concerning categories of social interactions. The conflictive or obstructive content they highlighted included criticisms of government and political decisions—mainly those that reveal "a political environment with little consensus on public actions to mitigate the crisis" (Valencio and Valencio 2018, p. 13). The analysis in the present paper expands this political dimension of social media interactions. Whereas Valencio and Valencio's focused on power relations among mass media channels, the present paper focused on power relations between various kinds of social media producers and consumers.

To achieve this analytical position, the authors focused on contentious politicized debates around the hazard that the Maskan-e Mehr projects faced. Sociologist of collective behavior and social movements Tarrow (2013) defined contentious politics as "episodic, public, collective interaction among makers of claims and their objects when: (a) at least one government is a claimant, an object of claims, or a party to the claims, and (b) the claims would, if realized, affect the interests of at least one of the claimants or objects of claims." Approaching the rich social media discourse around Maskan-e Mehr as politicized and contentious revealed the political work which that content is poised to accomplish. The framework of this paper built on the convergence of microlevel users, mesolevel organizations, and macrolevel agents that participate in the social media arena as disasters unfold (Jung and Moro 2014, p. S129). Jung and Moro (2014) used social media response in the wake of the Great East Japan Earthquake of March 2011 to show the multiple functioning of social media for individuals, organizations, governments, and mass media. They outlined five functionalities of social media after a disaster at the microlevel (communication between individuals), the mesolevel (channels for group communication), the macrolevel (channels for mass media), for information sharing and gathering (which operates across micro-, meso-, and macrolevels), and "direct channels between individuals and mass media, government, and the public" (which also operate across levels) (Jung and Moro 2014). Much of the communication analyzed in the present paper is in the last category of cross-level communication. However, importantly, there is a political dimension to the communication that adds to Jung and Moro's (2014) framework.

Method

To investigate the Maskan-e Mehr housing disaster, the authors combined research approaches from sociology, planning, and engineering. This interdisciplinary approach productively disrupted the divide between hazard and disaster presented above. The politicized context of Iranian social media use and housing planning policies together made the case of the Maskan-e Mehr disaster a unique one for integrating the following methods and data sources.

Social Media Data

Scholars and planners have written about the political dimensions of social media use in Iran. Elson et al. (2012) used quantitative

content and word-usage analysis to evaluate political perspectives and opinions in the wake of the 2009 Iranian presidential election reactions. Iran has a high internet penetration rate, 53.2% in 2016 (Freedom House 2017). Iran's mobile penetration, notably, is 100%.

The Freedom of the Net report noted that "significant restrictions on content [in Iran] have been in place since 2009. Platforms like Facebook and Twitter remain blocked, although newer social media and communication apps such as Telegram and Instagram are generally accessible" (Freedom House 2017). The same report noted that "Telegram is one of the most important digital platforms in the country, with over 40 million monthly users" (Freedom House 2017). Among social media and messaging platforms, Iranians participate in Telegram the most, followed by Instagram, WhatsApp, Facebook, and Twitter, in order of usage (Jafari 2017; Small Media Report 2016).

For this analysis, the authors used data from Telegram and Twitter, primarily, and Instagram where relevant. To collect data systematically, different strategies were adopted for each platform. For Twitter, Twitter Archiver Premium (October 2017 version) was used to downloaded over 55,000 tweets based on 12 keywords, which included English and Persian words and phrases. For Telegram, the authors tracked and archived key channels that reposted and circulated content about the disaster. These numbered over 1,000 posts. Instagram posts necessitated constant monitoring over the course of 3 weeks from when the earthquake struck to when evidence for the debates analyzed in this paper reached saturation.

Individual posts and conversations were tracked with consideration given to their dialogical context (Palen and Anderson 2016). The sample was grown by snowballing into an expanded set of users, controversies, and comment threads. In some instances, the snowball sample also extended across platforms. For example, the authors tracked conversations that spanned Telegram and Twitter. The sample was drawn from high-visibility posts with a comparatively high number of followers, likes, comments, or retweets. The selection criteria for social media content was twofold: first, the authors sought content with high visibility as measured through numbers of comments, likes, and retweets. Second, they sought content with evidence of contentious political discourse. Table 1 lists data collection methods, number of posts, and number of key posts by platform.

Telegram content is not geotagged, and user profiles can be anonymous. Posts in Telegram are distributed through channels. Users follow these channels and receive content feeds through them. Posts can be redistributed and shared in more than one channel. In some cases, it is possible to track down the original post, but some channels repost content without traceable attribution to original authors. These are among the reasons why Telegram is gaining popularity in Iran as a space to engage in politicized discourse. In an analysis of social media and human rights in Iran, Semati (2017) noted that "Telegram makes a smartphone a powerful communication tool in the hands of citizens who find entry points to politics in their quotidian social interaction" (p. 165).

Validity and veracity, although important in this analysis, did not affect the authors' measures of reliable data sources. The study cited content with relatively high measures of visibility—whether valid, truthful, and reliable or not—to examine the politicization of technical and political claims. For example, the authors selected Instagram posts with significant numbers of likes and views compared with other items in similar conversations and timelines. Different platforms offer different measures of visibility for content. Telegram displays the number of views per post. Twitter displays replies, likes, and retweets. Instagram displays the number of likes and the number of comments. This study cites rating counts (number of likes, shares, retweets) in parenthetical citations where content is referenced. Table 2 summarizes social media content by subject.

Table 1. Data collection methods by social media communication platform

Parameter	Telegram	Twitter	Instagram
Data collection method	Following main channels; forwarding key posts to a personal account	Twitter archiver premium	Review of key hashtags
Number of reviewed/collected posts	About 1,500 posts	55,000 tweets based on 12 keywords	About 1,000 posts
Number of key posts	250	180	70

Table 2. Summary of social media content

Subject	Media platforms (original key posts only)	Key author example	High-impact instances	Controversies and biases
"The other" building	Instagram (20 posts), Telegram (50 posts), and Twitter (25 posts)	@Khabar (Telegram, 9,000k followers)	45,000 views	Neutral informal media
Reclaiming "The other building"	Instagram (5 posts), Telegram (10 posts), and Twitter (5 posts)	@FarsNews_Agency) Twitter, 88,000 followers)	50 likes	Ultraright wing
The columns	Instagram (20 posts), Telegram (50 posts), and Twitter (25 posts)	@Mamlekate (Telegram 300,000 followers)	400,000 seen	Government opposition; informal media
Site selection of Maskan-e-Mehr	Instagram (5 posts), Telegram (45 posts), and Twitter (25 posts)	@BBCPersian (Telegram, 1.2 million followers)	600,000 views	Government opposition; formal media
Social housing	Instagram (10 posts), Telegram (30 posts), and Twitter (50 posts)	@Jedaaal in Twitter (31,000 followers)	1,500 likes	Socialist activist
Inspection expense cut off	Instagram (5 posts), Telegram (45 posts), and Twitter (15 posts)	@BBCPersian (Telegram, 1.2 million followers)	589,000 views	Government opposition; formal media
Code compliant structural design	Instagram (2 posts), Telegram (20 posts), and Twitter (20 posts)	@Issamasiha (Twitter 1,123 followers)	275 likes	Right wing
Planning problems of Maskan-e-Mehr projects	Instagram (2 posts), Telegram (30 posts), and Twitter (25 posts)	@YasharSoltani (Twitter, 50,000 followers)	3,800 likes	Reformist party
Summary of all subjects	Instagram (70 posts), Telegram (250 posts), and Twitter (180 posts)	—	—	—

Design Data

This study cited five comprehensive and reputable reports on the Halabja Earthquake that were prepared within a week of the event, as well as Iran's national code of practice for seismic resistant design of buildings, the Iranian Code of Practice for Seismic Resistant Design of Buildings, Standard Number 2800 [ISIRI2800 (ISIRI 2007)]. These sources comprised (1) the Ministry of Transportation, Housing, and Development (MTHD), (2) the International Institute for Earthquake Engineering and Seismology (IIEES), (3) the Iranian Seismological Center and Institute of Geophysics at University of Tehran (IRSC-UT), (4) the Iran Construction Engineering Organization (IRCEO), (5) Organization for Development, Renovation and Equipping of Schools of Iran (DRES), and (6) Iran's Institute of Standards and Industrial Research. These reports are in Farsi and were translated by the authors for this analysis. The MTHD, IIEES, and IRSC-UT reports summarized preliminary observations on the nature of the earthquake, fault rupture mechanisms, and ground motion characteristics as measured by the strong motion stations triggered during the event. They also provided preliminary observations of building damage across the region. The IRCEO report summarized the primary technical reasons for damage to buildings during the Halabja Earthquake. The ground motions resulting from the November 2017 earthquake were recorded by 106 digital strong motion stations, most of which were activated successfully and accessed by the authors. This offered an accurate and relatively detailed recording of ground shaking across the region.

For information about the planning of the of Maskan-e Mehr projects, the authors used governmental and national academic planning resources. These comprised the official website of Ministry of Roads and Urban Development (MRUD) for Maskan-e Mehr planning and implementation information, and peer-reviewed publications in Iranian planning journals that provided domestic research-based perspectives and local expert evaluation.

Design Claims

The findings are presented in this and the following section. Contentious claims about design and politics garnered significant traffic on the social media timelines that were analyzed. This section highlights debates illustrating how technical, political, and expert claims about Maskan-e Mehr, earthquake hazards, social housing in Iran, and Iranian governance are intertwined. There was ample evidence of social media and popular sources making technical claims about engineering design, seismic vulnerability, construction methods, and site planning. In some cases these claims were valid, but in others, they were invalid; in some cases, they were complete, but in others, they were incomplete; at times, they were misleading, revealing, accurate, inaccurate, reliable, and not reliable. This section analyzed the validity and reliability of media content. This analysis addressed the first research question regarding the ways in which contentious technical claims are articulated and politicized. Next, cases were identified in which experts participated in politicized discourses directly. This addressed the second research question, providing insight into ways in which experts and expert knowledge can be leveraged in post-disaster contexts.

Claiming Expertise

Section "Background: Politicized Appropriations of Expertise" provided a vignette of the contention that emerged around President Rouhani's comments about government-built housing. When he compared the damage of the government-built Maskan-e Mehr homes and the adjacent "other" privately built buildings, he set off a heated debate across social media platforms that was coined "the other building" debate. In a video disseminated on social media, initially published by the Khabar Online news agency (2017), translated by the authors, President Rouhani contested the claim that the proximity of the Maskan-e Mehr buildings to a fault was the culprit for their degree of damage: "Why was the other building not damaged, then? This shows that the buildings that people built themselves are better. We should delegate housing construction to the people. They build faster, better, and with more precision. The government should provide loans and financing options through banks." Although this debate was offered as a comparison of government-built versus privately built social housing, it quickly was attributed to and appropriated by debates on the privatization of housing.

A significant volume of social media content around the politics and policies of social housing was triggered by the earthquake. @Jedaaal (with 31,000 followers on Twitter), a journalist known for his socialist and leftist politics, argued against those stating that the Maskan-e Mehr projects were "a betrayal" when he tweeted "pointing out the quality of the Maskan-e Mehr, [Rouhani] said this project was a betrayal. But I say, it's not as big of a betrayal as that of all those who stood by the past three decades after the [Iran-Iraq War of 1980–1988] without building any housing for the deprived and the poor" (1,500 likes, 287 retweets, and 121 comments as of November 22, 2017). In another instance, in a highly circulated tweet (3,600 likes, 425 retweets, and 88 comments as of November 22, 2017), @smhadimousavi (4,000 followers on Twitter) claimed that

> This has nothing to do with the governing administration, whether [President] Khatami (the Bam Earthquake), [President] Ahamadinejad (the Azarbaijan Earthquake), or [President] Rouhani (the Kermanshah Earthquake), our country is not at all prepared for earthquakes. Even if the Maskan-e Mehr projects were built under an administration other than Ahmadinejad's, it wouldn't have been better than this. Let's not spoil these complexities with games of politicization, so that perhaps we can do something meaningful.

In a series of technical claims by leading politicians, Vice President Jahangiri criticized the siting of the Maskan-e Mehr project (Eghtesad News 2017). He asserted that the Maskan-e Mehr buildings were sound but that their location on a fault was the problem. Arguing that any other building in that location would be damaged, a high-ranking official (in political opposition to the Vice President) said that the Maskan-e Mehr projects should not be blamed because that blame "makes 10 to 12 million people living in [social housing] sites across the country unnecessarily concerned." The political discourse around the Maskan-e Mehr projects came under further criticism when an off-the-record comment by that same oppositional leader was circulated on social media in which he used harsh, impolite language to blame the Vice President for sparking misleading and politicized discourse. Those exchanges had 325,000 views on Telegram as of November 14, 2017.

The quality of construction received significant attention from the general public and design experts. There was, however, another discussion about the planning process of the Maskan-e Mehr projects. Because the Maskan-e Mehr projects did not follow the general discretionary planning process that is required for all regular projects, the government of the time was criticized for poor planning. @YasharSoltani (50,500 followers on Twitter), a well-known journalist in planning and architecture, raised this issue in a tweet (3,800 likes, 393 retweets, and 123 comments as of November 17, 2017) in which he stated that 9 years ago, Memar News suggested

investing in blighted neighborhoods in cities instead of funneling money to Maskan-e Mehr construction outside of cities. In this tweet, he said, their technical perspective was attributed as a political move. As part of a series of debates on poor planning practices, @m_bayatzanjani (5,000 followers on Twitter) argued in a tweet (296 likes, and 17 retweets as of November 22, 2017) that "we should blame those who located this project on a fault."

Expert Claims

Members of the public and politicians are actively engaged in shaping the conversation and making claims on social media and the general media. The authors observed that design experts also have been able to influence the discourse in both public and political spheres. They do so actively and passively. In active engagement, experts published their opinions with supporting evidence in social media. Some experts with official positions also tried to shed light on the political controversy. In the passive engagements—such as those discussed previously—the opinions of experts were distributed by others, including journalists and the interested public.

The claims on social media regularly crossed between the domains of politics and policy on the one hand, and design and technical expertise on the other. Political parties, activists, design professionals, and the general public engaged one another in digesting and shaping the nature of the disaster. A highly referenced Telegram post (64,000 views as of November 22, 2017), was redistributed by @Eslahaat_press, an account attributed to the reformist party, affiliated with the office of the President. In this post, a member of the regional Construction Engineering Organization claimed that before starting the Maskan-e Mehr project in Kermanshah, he attended a meeting with the Minister of Housing and Planning at the time and that it was decided that the regular inspection procedures should be modified or circumvented in order to speed the construction and reduce the cost of inspection per square meter from IRR 240,000 to IRR 30,000 (approximately IRR 8 = USD 1 at the time).

The conversation about the quality of construction projects on social media was generated not only by the general public, but also by experts. On Instagram, @a.parandoush (23,500 followers), citing @Civilaz, exchanged comments in a post (with 245 likes and 23 comments) about a photo illustrating the quality of structural columns in the Maskan-e Mehr buildings. The photo has been a controversial one, with 382,000 views on Telegram that became the basis for many claims about the low quality of construction. However, @a.parandoosh explained that the quality of columns and the structure actually was not structurally problematic. The shared photograph showed low-quality materials used as a nonstructural cover around the structural core. In another instance, @Mamlekate (341,000 followers) shared a video on Telegram (288,000 views as of November 14, 2017) in which a person who seemed to be an engineer concluded that the quality of both the concrete and the concrete reinforcement of the columns was poor. Posts claiming technical expertise received significant attention, as measured by the relative number of views, likes, retweets, and comments.

Although a general trend on social media discrediting the buildings and their structures was observed, some posts provided technical perspective that were not motivated by politicized claims. @Issamasiha (1,123 followers on Twitter) posted a photo (275 likes and 42 retweets as of November 12, 2017) showing damaged Maskan-e Mehr buildings and claimed that their friend who has a Ph.D. in architecture believed that the structures were good enough because they resisted such a strong earthquake without collapsing.

Design Complexities

Although Maskan-e Mehr provided a significant number of housing units across Iran (1.8 million) for 6–7 million low-income households, it was criticized remarkably by planners. One of the main criticisms is the site selection processes. In most cities, the sites are outside of the city limits and they are chosen because the land acquisition has been free for the government. In contemporary planning theory, there is an emphasis on infill development and densifying areas within and near urban cores (Heris 2017). Accordingly, the Maskan-e Mehr site locations are considered by many planners to be inappropriate for the spatial structure of cities. Among the problems of this approach to siting housing is the traffic generated to city centers (Bertaud and Malpezzi 2003) and development in areas without sufficient public services and infrastructure. Lack of access to schools, parks, and public amenities is reported in most cities planned this way (Ghanbari 2015). Planners studying regional and housing development in Iran argue that funding funneled to projects such as Maskan-e Mehr could be better spent if it were used to improve existing and blighted urban areas (Rezaei and Nemati 2013). In the case of Maskan-e Mehr, Soltanpanah and Hoseini (2012) argued that the rushed implementation of the projects resulted in the discretionary process for site selection being circumvented. Ultimately, it is the authors' opinion that locational constraints did not leave room for in-depth risk evaluation and site planning considerations.

However, in terms of seismic vulnerability, there was ample discussion in influential social media conversations that the Sarpol Zahab project was sited in a hazardous location and on active faults. The distance from the Maskan-e Mehr project sites to the closest active faults was assessed by the authors as 45 km. Therefore, contrary to some of the arguments on social media, the project site was not located on an active fault. Furthermore, the project location does not violate any building code regulations related to fault proximity, even based on the standards in the United States. (The insufficiency of code provisions is a different matter, which is discussed subsequently.) Building structures and lifelines in general, however, should be planned and designed with great caution when close to active faults (particularly within 10–50 km). Strong motions and rupture directivity effects (discussed subsequently), which can be highly damaging to structures, are expected at close distances from the fault, in addition to other permanent deformations and offsets that are the direct result of rupture. Detailed site investigation and hazard studies often are warranted in areas of high seismicity and near faults for sensitive projects (e.g., hospitals and schools).

The Halabja Earthquake led to extraordinarily strong, long-period, and directional ground motions across the affected region. The closest digital strong motion station to the event hypocenter was the Sarpol Zahab Station, which recorded free-field motions—motions unaffected by the presence of structures (Tatar et al. 2017) (Fig. 1). The records indicated a possibility of multiple ruptures along the fault, which amplified the observed amplitude and duration of shaking (Farzanegan et al. 2017). Although the region is known for high seismicity, the level of shaking experienced during the 2017 event is considered to be quite strong. The peak ground accelerations (PGAs) at this location, which were the strongest recorded during the event, were $0.69g$ [horizontal north–south (HNN)], $0.57g$ [horizontal east–west (HNE)], and $0.36g$ [vertical direction (HNZ)]. The predominant periods of the motion, which influence the response and vulnerability of structures, were 0.22, 0.3, and 0.08 s, with a significant duration (D5-95) of about 11 s (Farzanegan et al. 2017).

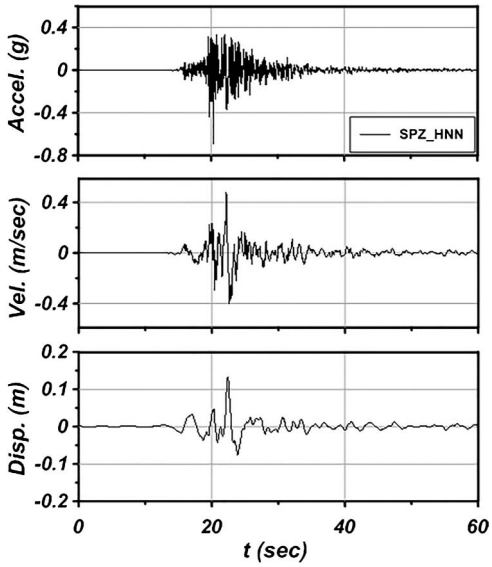

Fig. 1. Acceleration, velocity, and displacement time histories of the Sarpol Zahab (SPZ) recording station, horizontal north–south component (HNN). Image created using the acceleration time history data publicly available from the IRCS-UT.

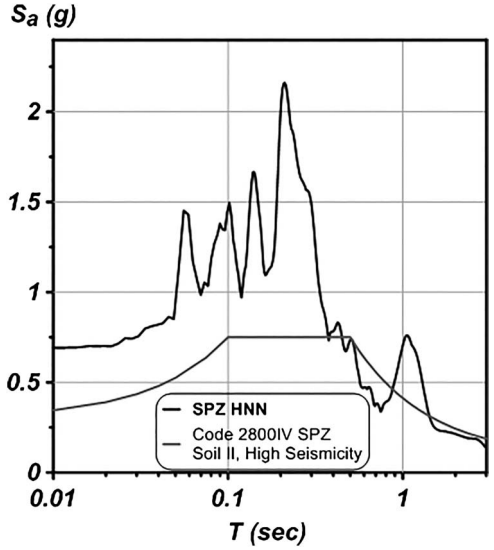

Fig. 2. Code-based acceleration response spectrum versus recorded spectrum (5% damped) at the Sarpol Zahab (SPZ) station, Horizontal north–south component (HNN). Image created using the acceleration time history data publicly available from the IRCS-UT.

The observed motions exceeded the design limits (2800IV Building Code) by a factor of 2 or more in periods that could be damaging to shorter structures (Fig. 2). According to Iran's building code (2800IV, Appendix 1), the city of Sarpol Zahab is assigned to a relative earthquake hazard level of high; this corresponds to a Seismic Zone Factor of 0.3, which for Site class II translates to an expected peak ground acceleration of about $0.35g$ (Fig. 2); this also corresponds to a peak spectral acceleration of about $0.76g$ in periods ranging from 0.1 to 0.5 s, which corresponds to an approximate fundamental period for one- to five-story buildings for Site class II.) A comparison of the code-regulated spectral accelerations with those measured at the closest station to the epicenter (Sarpol Zahab) showed that the building code reasonably captured the observed seismic demand in periods greater than about 0.5 s (corresponding to modal response of structures with more than about four to five stories), but greatly underestimated the demand at shorter periods (affecting low-rise structures, with one to three stories). The difference between the code and observed levels of shaking was particularly severe at a period of about 0.2 s (which is expected to damage two- to three-story structures the most, if placed on the same site conditions). The recording station was on a stiff soil–soft rock site (Iranian Seismological Center and Institute of Geophysics at University of Tehran). Local site amplification can increase the period of the observed motions at other locations with other soil types (e.g., Maskan-e Mehr with softer soils), which would damage taller buildings.

Local site effects (such as the influence of local soil properties on surface motions), which can vary drastically from one block to another, can play an important role in ground motion amplifications near periods that can damage buildings of a specific height. For example, significant amplifications were observed in the ground motions near the fundamental period of the soft clayey soil deposit in Mexico City (about 1–2 s) during the 1985 Mexico City Earthquake, which damaged particularly buildings that had a similar fundamental period, 10–20-story structures (Kramer 1996). In the case of the Maskan-e Mehr project near the Shahid Shiroodi complex (founded on farmland soils of shallow groundwater table), there was evidence of sand boils and liquefaction (Farzanegan et al. 2017, pp. 28–30). This response is typical of looser, saturated sand deposits that can lead to considerable deformations as well as amplification of accelerations at longer periods, affecting taller structures (for example, three to six stories). In the absence of detailed site investigation during design, such local site conditions can be overlooked, leading to considerable damage to the foundation due to excessive settlement and tilt, as well as possible damage to the superstructure in taller buildings with longer periods.

There are two Maskan-e Mehr residential complex buildings in the city of Sarpol Zahab, namely the Shahid Shiroodi complex (34°28′1″N, 45°50′39″E) and the Karmandi complex (34°28′22″N, 45°50′59″E). These sites are about 6–8 km from the MFF, about 45 km from the HZF, 0.8 km from each other, and 2.3 km from the closest recording strong motion station. Based on the United Nations Institute for Training and Research (UNITAR) imagery analysis reflecting the density map of damaged structures at the Sarpol Zahab (UNOSAT 2017), the number of damaged structures at the Shahid Shiroodi (soft soil) site was about 30, whereas this number for the Karmandi site (less than 1.5 km away) was only 4. These two residential complexes experienced completely different damage characteristics that perhaps can be partly related to local site effects, even at a distance of only 1 mi from each other. The Shahid Shiroodi complex was built near a river on what were originally farmland soils (i.e., shallow groundwater table and looser sandy soils typically susceptible to liquefaction), which experienced notably more damage than the Karmandi complex built on the foothills near a mountainous area (likely with stiffer soils or soft rock).

The directional, pulse-like nature of the motions near faults due to rupture directivity (Abrahamson and Somerville 1996) may have further amplified the longer-period motions and damaged taller frame structures, especially those with their weak axes aligned with the stronger horizontal direction of shaking. For example, near-fault rupture directivity effects, which are influenced by the direction of fault rupture and wave propagation with respect to a given site, were highly damaging during the 1994 Northridge (California) and 1995 Kobe (Japan) Earthquakes. These effects could lead to

localized and directional amplifications in ground motions, depending on the direction of fault rupture with respect to a particular site or local soil conditions.

Construction quality (e.g., lack of proper connection between the ceiling and structural walls, inadequate reinforcement, or inadequate welding of steel connections) is an important consideration for judging the causes of damage and collapse in any region. These problems typically can be avoided with proper design (following the building code) and adequate inspection during construction (which may have been circumvented in the Maskan-e Mehr project to reduce costs). However, the other complexities noted previously also must be considered in the engineering evaluation of building performance and future engineering or design regulations imposed. In particular, it is possible that the code regulations or guidelines related to the acceleration demand and site investigation were insufficient for near-fault regions, in view of the seismic risk or local site conditions observed following the Halabja Earthquake.

In summary, in investigating the complexities behind the claims on social media, the authors found that there is insufficient evidence to conclude that the Maskan-e Mehr structures were damaged (solely or in part) because of poor design or negligent construction; even if the buildings had been designed in compliance with the building code (regardless of whether developed by the government or private citizens), they still may have been damaged given the intensity and type of this earthquake. Although the design site analysis and soil exploration could have been more comprehensive, and although there may have been important shortcomings in design or construction, there is not enough evidence of negligent design, in the absence of a forensic investigation, to substantiate the claims circulating on social media.

Discussion: Claims, Complexities, and the Collapse of Social Housing

The disaster of the Maskan-Mehr housing projects is inextricably linked to claims of expert knowledge. The use and misuse of this knowledge by community members, journalists, politicians, and popular social media accounts defined an enduring characteristic of the Halabja Earthquake disaster. The authors compared the claims circulating on social media against the technical complexities associated with the hazards present. This analysis aimed to highlight the role of social media in the evolution of contentious political discourse as disasters unfold.

Experts and expert knowledge occupy three positions in this analysis. First, there is an active role for design experts. This is manifest when engineers, planners, or architects participate in social media debates directly. Second, there is a significant passive role that experts and their knowledge play. Various statements about hazards are attributed to engineers and planners. These attributions are circulated widely on platforms such as Telegram and Instagram. As shown previously, these statements enter impactful discourses even at high levels of government engagement. Finally, as expected, there is ample evidence of expert knowledge being distorted, falsely manufactured, and disseminated. This is done by a range of actors, including journalists, politicians, and local stakeholders. And they do so for various purposes. In this analysis, the authors focus on how these groups' social media participation fueled and politicized controversy around the Maskan-e Mehr housing project.

The torrents of politicized social media around the Halabja Earthquake in general, and the Maskan-e Mehr housing projects in particular, are indicative of extreme levels of participation in contentious political discourse. Tarrow (2013) noted that contentious politics go beyond studies of social movements to also include "less sustained forms of contention—like riots and strike waves—and more extensive ones—like civil wars, revolutions, and episodes of democratization—and it intersects with routine political processes—like elections and interest group politics." The Maskan-e Mehr debates generated contentious and political discussion among and between different audiences. Maskan-e Mehr residents, the broader lay public, journalists, engineers, planners, architects, political activists, politicians, and others produced and consumed content across categories. In doing so, they mobilized and amplified political debate. Not only was this an example of Jung and Moro's (2014) multifunctionality of social media, but it represented an important politicization of social media debates, which are not yet understood in the context of natural hazards. The confluence of audiences and discourses expanded political engagement and provided wide opportunity for participation in contentious politics.

This study found that the social media debates around the Maskan-e Mehr projects neglected design complexities in favor of politicized design claims. More strikingly, the authors found that design experts—engineers and planners prominently among them—participated actively in the production and consumption of such claims. Their opinions—well founded or not—circulated with claims that were consumed and recirculated by community members, the general public, journalists, and politicians. Their participation in social media conversations strengthened the illusion of the validity and veracity of expert opinion. This evidence exemplifies ways in which design professionals furthered political position, ideology, and agendas by leveraging design claims to support or discredit politicians and policies. In this way, engineering and planning experts and their expertise become involved in the political work that surfaces in the wake of disasters. Klein (2007) argued that capitalists (and their interests embedded in states) leverage disasters to advance their agendas. Leveraging the Halabja Earthquake to further the demise of social housing in Iran is an example of how austerity measures are wedged into public opinion in the wake of natural and manmade disasters. "Every time a new crisis hits, the fear and disorientation that follow lead to radical economic re-engineering" (Klein 2007, p. 49). The findings presented in this paper suggest ways that social media content—particularly content by or about design experts—becomes intertwined in politicized agendas with high stakes. The authors suggest that scholars and policy makers more thoughtfully engage experts to better understand (and manage) postdisaster decision making.

Indeed, the politicization of social media debates was a significant part of the disaster—not just part of postdisaster response. In the context of the Maskan-e Mehr housing projects, the authors found that the contentious design claims on social media were a significant force in shaping policy maneuverings around the fate of social housing in Iran.

The authors found "collapse" to be a productive metaphor for juxtaposing design and political debates around the Maskan-e Mehr projects. The M_w 7.2 earthquake that struck at 9:12 p.m. at Halabja sent physical shockwaves through the Earth's crust for a duration of about 11 s. These shockwaves did severe damage to the Maskan-e Mehr projects, costing lives, affecting safety, and causing infrastructural damage. Starting at about 9:16 p.m., a second set of shockwaves started propagating on social media with increasing intensity over 6 days. The seismological and social media tremors together brought much attention (and damage) to the Maskan-e Mehr housing projects in Sarpol Zahab. These two disturbances together brought political attention to the Maskan-e Mehr projects,

social housing in Iran, and the politics of key state actors. Through this design and discourse analysis of the events surrounding the Maskan-e Mehr projects and the earthquake, the authors showed how politicized claims in postdisaster social media are poised to amplify and extend the effects of hazards into contested politics—with constructive and destructive effects. Furthermore, this paper showed how social media debates are leveraged for social and political change by conflating and collapsing design claims and complexities.

The hope is that by sharing these findings and connecting to sociological theories of contentious politics, this analysis will impress upon design and planning experts the variety of ways in which their presence and their knowledge can be used and misused in disasters in the age of ubiquitous social media use.

Limitations and Future Work

This research was inductive. The intent was to use the case of the Halabja Earthquake and the Maskan-e Mehr disaster to frame new questions about how expert knowledge is used and misused through social media as disasters unfold. As an interdisciplinary project, this investigation explored connections between earthquake engineering, city and regional planning, and political studies of design. Both aspects of this research—inductive and interdisciplinary—have opportunities as well as limitations. Because it is not a deductive evaluation of an existing theoretical framework, this analysis does not quantitatively confirm a testable hypothesis. The authors hope that future work might test the larger ideas suggested in this paper. Similar to Tagliacozzo's (2018) study of governmental communications in postdisaster Christchurch, the authors used this paper to expand upon positivist, deductive readings of disasters with interpretive, inductive readings in order to open up new areas of inquiry into sociotechnical dimensions of disasters. Toward this aim, the interdisciplinary approach suggests an alternative structure for inquiries that are important for political and social complexities of disasters. As a collaboration across engineering, planning, and the social sciences, the authors recognize that they are spanning multiple fields and multiple epistemologies, or ways of knowing. The arguments presented do not conform neatly to scholarly discourse in any of these fields. Future work that challenges or supports the epistemological framework put forth in this analysis will contribute to expanding studies of hazards.

The collection and interpretation of social media data presents more-direct challenges. For social media platforms such as Twitter, the presence of tools for collecting data systematically is very helpful. However, for platforms such as Telegram and Instagram, which both figured prominently in this analysis, there is no systematic data collection method. Therefore, the authors used heuristic methods of data collection and archiving which make reproducibility difficult.

Working with contentious and politicized debates concerning the authors' own fields of expertise presented a third challenge. Confronting their own biases and tendencies to favoring some claims over others was a complex task that required vigilance throughout the research. The authors found themselves swayed by provocative assertions by design experts or observers that made compelling claims about problems of structural design or project siting. The authors' respective disciplinary positions enabled them to challenge contentious claims by bringing important complexities—from earthquake engineering, planning, and political engagement in the design professions—to bear on the problem. Furthermore, the political stakes of the debates were personally meaningful to the authors, all of whom have lived and worked in Iran. By systematically reviewing data and holding each another accountable for their own positionalities, they strived to overcome this bias.

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