The Consequential Institutional IT Use Among Disaster Responders: Role Stacking

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Short Paper

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Abstract

This research seeks to unearth Information Technology (IT) use by disaster responders (DRs) deployed by their affiliated disaster response organizations (DROs) for natural disaster response missions. Our on-ground analysis sheds insights into how several types of IT use behavior are surfacing as the DRs concurrently serve the role of a member of the ephemeral disaster response organization and the affiliated DRO. Informed by the role expansion lens, role stacking and its consequential IT use behavior emerge to explain how behavior towards institutional IT tasks is shaped by the location and activities of the DRs. This research expands the understanding of IT use in situations where users are disentangled from a preexisting institutional boundary through mission deployments. Such an understanding is particularly important since providing IT applications to the employees is a substantial investment committed by an institution. However, users do not necessarily use the institutional IT applications in certain situations.

Keywords: Institutional IT use, disaster responder, disaster response, role expansion

Introduction

Natural disasters, such as volcano eruptions, earthquakes, floods, and landslides, have rapidly become prevalent and impacted human lives in various parts of the world. Crucial to natural disaster victims are responders who are assembled from different disaster response organizations (DROs)[1] to function in an ephemeral organization structure for search, rescue, evacuation, and other disaster response operations. An often-cited predicament confronting the responders is that they may be subjected to pursuing "multiple simultaneous, possibly conflicting purposes" (Majchrzak et al. 2007, p. 148). For example, a responder could be confronted with the need to perform the new role assigned in the disaster response mission as well as not forgetting the existing role obligation as an employee of a DRO (Trainor and Barsky 2011). In other words, a responder experiences an expansion of roles. Our existing understanding of the disaster response literature has primarily been taken from an organization-level perspective rather than an individual-level perspective, such as viewing the deployment to be a temporarily formed organization in which the disaster responders provisionally served (e.g., Bigley and Roberts 2001) or the inter-organizations perspective, in

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[1] Some of DROs examples are: the Federal Emergency Management Agency (FEMA) (United States), the Fire and Disaster Management Agency (FDMA) (Japan), the National Disaster Risk Reduction and Management Council (NDRRMC)(the Philippines), the National Agency for Disaster Management (BNPB)(Indonesia), the International Federation of Red Cross and Red Crescent Societies (IFRC), United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA), the ASEAN Coordination Centre for Humanitarian Assistance on Disaster Management (AHA Centre), the International Federation of Red Cross and Red Crescent Societies (IFRC).

which the DROs (enacted by responders) work together for a common cause (e.g., Berthod 2017). As the responders attune their behavior, they deliberate on their different role tasks, which entails importantly, the use of Information Technology (IT) applications, which this research interest is in.

IT applications are an integral part of a disaster response mission for many purposes such as reporting, coordination, control, and/or communication. These IT applications include Crisis Management Systems, Emergency Medical Information Systems, and Disaster Logistics Information Systems (Scholl and Holdeman 2021) all of which are accessible via web or smartphones, or by exploiting social media via Facebook, YouTube, Twitter, and Instagram applications (e.g., Kavota et al. 2020; Tim et al. 2014). They are either being used in the ephemeral organization or provided by the DROs. We term the latter IT applications provided by a DRO as the *institutional IT applications*, which denotes applications that a DRO expects the employees to use during a disaster response mission. For example, an employee deployed as a responder may need to continue to digitally communicate with the DRO to report on the work and development of the response effort through the institutional IT applications. Prior works on IT applications for an emergency have been explored in settings where employees remain working for one organizational entity, such as healthcare workers working in the accident and emergency department in a hospital (Faraj and Xiao 2006). However, little is known about IT use in settings where an employee could concurrently serve for more than one organizational entities, like one being deployed as a disaster responder by a DRO. A distantly related work is Leidner et. al. (2009) which examines the acquisition of purportedly developed IT applications; however, it does not examine IT use. Our on-ground understanding of disaster response suggests that a more nuanced understanding is needed given that the disaster responders concurrently serve the role of being a member of the ephemeral organization and that of a member of the affiliated DRO. As noted in an interview reported by the National Bureau of Asian Research on technology in disaster response, "doctrines are completely abandoned because the [disaster response] situation on the ground could be so dire that the response teams just pick up whatever [IT application] is available to them"[2]. Hence, situated in the context of a disaster response mission, this research seeks to answer: ***what is the deliberation of disaster responders in the use of institutional IT applications?***

By taking an individual-level perspective, we anchor on role expansion in the role theory as the analytical lens to answer the research question. Based on our preliminary analysis of qualitative data collected primarily through interviews, we illuminate the consequential IT use behavior by extending the concept of role expansion with the model of role stacking. By doing so, we seek to contribute to the Information Systems (IS) literature by expanding a nuanced understanding of IT use in situations where users are disentangled from a preexisting institutional boundary through mission deployment. Additionally, we also contribute to the role theory in theorizing the role stacking concept as how a role can be expanded. Such an understanding is particularly important given that providing an IT application to the employees is a substantial investment and it is certainly expected that the designated employees should use the institutional IT application. To this end, our results reveal that users do not necessarily do so in certain situations.

Prior Works

Our paper mainly stems from the following two streams in the literature.

Disaster Response as an Ephemeral Organization Structure

Disaster response is a mission-critical task in which the DROs when activated by the local government, deploy their employees for humanitarian actions. These actions seek to reduce casualties, daily life disruption, and property and infrastructure damages (OCHA 2013). The deployed employees from various DROs form an ephemeral organization, which can be visualized in terms of (a) emergent and malleability, and (b) structure.

Emergent and malleability: A disaster response as an ephemeral organization exists provisionally within the period of the response, which typically lasts for two to four weeks. Unlike permanent organizations (such as DROs), it bears a short-term nature as it is emerged as the response starts and is dissolved when

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[2] Source: https://www.nbr.org/publication/the-role-of-technology-in-disaster-management/ [last accessed: April 8, 2022]

the response ends (Bakker et al. 2016). Disaster response is characterized by its integrative nature such that deployed employees from DROs may join and leave the mission at different times[3], which makes the composition to be malleable.

Structure: the deployed employees as disaster responders operate in a duo-layer configuration. The core layer consists of disaster responders who are directly involved in disaster victims' life-saving and life-sustaining activities. Their activities include, for example, search and rescue, medical services, and evacuation. The outer layer is made up of those who provide support operations, i.e., to support the delivery of activities of the core layer[4]. The duo-layer configuration sets the disaster response mission different from the other emergency missions, such as the fire emergency that necessitates the activation of firefighters. In a fire emergency, the tasks are performed within the served institution. The duo-layered ephemeral organization structure operates beyond the DRO boundaries. While training and exercises are conducted by the DROs (Kim et al. 2012), more often than not, the responders need to quickly make sense of the situation (Schakel et al. 2016) and swiftly decide what to do (Majchrzak et al. 2007) rather than rudimentarily perform the tasks as per the training scenarios. Existing literature has alluded to the importance of ensuring information flow not only among the responders (Pan et al. 2012) but also to their DROs. The key to this is that the responders serve as the underlying human mechanism that facilitates the information flow back to their DROs. Along this line, DROs often institutionalize their own IT applications for the employees to use during a response mission to ensure proper information flow back to the DROs, which we will discuss below. This however introduces rigidity to the mission --- the DROs to whom the disaster responders belong are concerned with formal arrangements such as policy, procedures, protocols, working practices, security, and authentication matters (Allen et al. 2014). Adherence to these arrangements could land the responders in flux since they are required to fulfill their role in the mission as well (Bharosa et al. 2010).

IT Use

A way to manifest the deliberation between the DROs' expectations and that of the activated mission is how the responders utilize the institutionalized IT applications. Against the backdrop of the need for IT applications to support the disaster response mission (Chen et al. 2010), much of the existing research focus has been on having applications that ensure fluid communication and information flow (Pan et al. 2012). Such an endeavor is embraced by the DROs through the acquisition or in-house development of the applications. Insofar, the literature has been providing vast references for successful institutional IT use such as through informal rules (Bartelt and Dennis 2014), users' cognition (Kim 2009), and users' emotions (Beaudry and Pinsonneault 2010) to name a few. These studies assume stability and permanent context. Along this line of work, continuous efforts such as aligning the IT with user needs (Majchrzak et al. 2000) have been generally prescribed as the basic formula for institutional IT use success. Nonetheless, failures such as non-acceptance or suboptimal use remain. The reasons are often labeled under the heading of bad account of IT adoption, which includes themes such as poor IT and change management, poor IT governance practice, user resistance (Rivard and Lapointe 2012), or simply users' non-compliance and illegitimate acts (Davison et al. 2019).

Recent works have indicated that disaster responders face some challenges in the use of IT applications. For example, the use of social media burdens disaster responders as they need to verify the vast information due to prevalent rumor mills (Oh et al. 2013). Likewise, the use of various IT applications during a response mission also taxes the responders (Fischer et al. 2016), which may lead to workaround behavior (Davison et al. 2019). It is also probable that the responders are astray from using institutional IT applications to accelerate their task accomplishment or meet the urgent target that would be otherwise unmet by employing rigid institutional IT.

Analytical Lens: Role Expansion

The role expansion, rooted in the role theory, is the analytical lens that emerged during our preliminary analysis. The theory suggests that individuals' behavior as well as how they perform in organizational

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[3] In most situation, a responder is deployed for no more than 2 weeks due to the harsh working environment.

[4] FEMA ICS guidelines under operation area (https://www.fema.gov/pdf/emergency/nims/NIMS_AppendixB.pdf)

settings are affected by the roles that they assumed (Stryker and Burke 2000). The concept of role refers to the "rights, obligations, and privileges of a person who occupies a particular status" (Biesanz and Biesanz 1978 p.145). This means, in an institutional context, an individual's role is exogenously defined by the formal structure of the institutions he/she is affiliated to. The institution empowers the employee with the rights and privileges to accomplish the expectations, including compliance with organizational rules and policy (Rhoades and Eisenberger 2002).

A role is expanded when an individual assumes additional expectations within or beyond his/her existing role. A role can be expanded in three ways, namely, (1) additional expectations of a singular role such as a project manager being given more projects to manage (Berger and Bruch 2021), (2) additional role(s) within the same environment such as within the organizational boundary (e.g., a doctor takes on the role as a hospital manager) (Forbes et al. 2004), and (3) amalgamation of roles from two or more environments into a seamless whole (e.g., a working mother who has recently delivered a baby) (Eikhof and Haunschild 2006). Prior works on role expansion suggest that when a role expands quantitatively (Duxbury et al. 2017), a person is likely to make explicit decisions that may result in honoring some expectations of a particular role at the expense of others, i.e., the individual decides which actions to do and which actions to delay. This deliberation process of role expansion can be engendered by the punitive consequences entailed by the organizational structure where roles are defined (Cangiano et al. 2019) or by the salience of different roles (Greer and Egan 2012). When the role expansion entails contradicting expectations, role conflict resolution can be the way out for the individuals in assuming the role(s). For example, individuals could develop a hierarchy in the form of role prioritization reflecting the preference for one role over another (Ashforth and Mael 1989) or laterally alternate between roles implying role segmentation (Koch and Schulze 2011).

Empirical Study

We adopt a qualitative case study approach (Eisenhardt 1989) wherein prior expectations are tolerated (Madill et al. 2000) yet allowing explanations to emerge from the data to reflect the adherence toward interpretive tradition (Klein and Meyers 1999). Our empirical investigation focuses on disaster responders from diverse DROs for two disaster response missions that happened in one Southeast Asia country. The country is prone to natural disasters[5] and it has DROs set up to standby for and support disaster response missions. These DROs are funded by the country's government, governments from regional countries (e.g., Association of the Southeast Asian Nations (ASEAN)), or other donors (e.g., non-profit organizations).

Data Collection

The *primary mode* of the data collection was through in-depth semi-structured interviews with key employees from several DROs directly involved in disaster response missions. The interviews were guided by these probing questions: what were your roles and tasks during the disaster response? what IT applications did you utilize to accomplish your tasks? why did you use them? how did you use them? what were the impacts of using those IT applications?

We have conducted a total of 36 unique interviewees (8 females and 28 males) from several DROs, representing country-level government disaster agencies, non-governmental organizations, and an ASEAN-level disaster agency. On average, the interviewees have been working for 5.05 years in the DROs (max = 16 years and min = 1 year) and had an experience in disaster response for 5.5 years (max = 11 years and min = 1 year) at the time of the interview. As we center our study on disaster response missions, we anchored on two large natural disaster response missions that occurred one year before the interviews were conducted in 2019, i.e., in the year 2018. This deliberate choice was made because the interviewees may not be able to recall far back. In addition, we targeted large disaster responses in which all entities (DROs) were deploying their employees as responders.

While the *primary mode* of the data collection was through interviews, which was more feasible so as not to obstruct the execution of the operations and allow the disaster responders to retrospectively describe their thoughts, behaviors, and actions, the leading author spent two days to make on-premise observation during a disaster response mission that occurred in 2018. The observations occurred within the first week of the second disaster response operation at the emergency operation center of an activated DRO. This rare

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[5] More than 2,300 natural disasters from 2012 to 2020 (https://ahacentre.org/publication/annual-report-2020/)

observation opportunity was given with the assurance of not obstructing the operations of the disaster response mission. Information flowed during the mission as well as on-premise notes taken were obtained to complement the interview data. The data collected from the observation provides rich accounts that allow us to identify key markers in the interview data of how the disaster response operation works and how people perform their actions. Additionally, to have a more comprehensive narrative and reduce potential bias, our data were further triangulated with (1) public documents (those posted on public channels e.g., DROs' websites) such as situation updates/reports, and (2) DROs' internal documents namely action plans, minutes of the meeting, and one WhatsApp group archives; all of which to construct the "analytical chronology" that described the responses' sequence of events (Langley 1999).

Analysis

We split the preliminary data analysis into two parts. In the first part of our data analysis, we examined how the disaster responders are deployed, which has a direct bearing on the roles they assumed. In the second part of our data analysis, we sought to identify the patterns of IT use by the disaster responders. To allow explanations to emerge from the data, we did systematic reading and rereading of the interviews, and iteratively labeling and relabeling (Walsham 2006), which coarsely resembled a constant comparative analysis (Glaser and Strauss 1967).

Part one (deployment of disaster responders and their roles): As we aim to identify the behavioral tendency for institutional IT application use, we begin by first studying the responders' tasks toward the whole joint response mission. Retrospectively, we look at the activities of the disaster response. We refer to the FEMA Incident Management Handbook[6], which suggests that disaster response operations entail core and support activities. The core activities encompass activities for disaster victims' lifesaving and life-sustaining. Adhering to the FEMA Incident Management Handbook, we define core activities of disaster response operations as search and rescue, evacuation, medical, and logistics (of relief items)[7]. Support activities consist of activities to support the delivery of the core activities. The support activities include the assessment of disaster and response operations, personnel deployment planning, and technical provisioning. In the assessment of disaster and response operation, disaster impacts and the gaps (of victims' needs) in disaster-affected regions and their updates over time are analyzed and the corresponding situation updates are produced. In disaster response action planning, decisions to mobilize/demobilize personnel are being made. For operational technical support, any technical provisioning such as facilities for communication (e.g., equipment and channel), data storage/sharing platform to help responders fulfill their activities are provided.

The core and support activities can be performed on-site or off-site. Disaster responders who are deployed on-site (i.e., where the disaster strikes) would, for example, participate in the front-end activities to search and rescue, evacuate disaster victims, manage and distribute supplies to the victims, perform disaster and response assessment, and deliver technical provisioning. Disaster responders who are activated for off-site operations would, for example, perform back-end mobilization of rescue aid (relief items) from the warehouse/supplier to the field, coordinate logistics aid with other DROs, and perform disaster assessment and reporting. These off-site disaster responders function in a zoned-out area at their DRO offices for the specific disaster response mission. DROs provide IT applications to support the disaster responders both on-site and off-site. Hence, considering the response activities (i.e., core vs. support) and the location for performing these activities (i.e., on-site vs. off-site), we construct four distinct deployments quadrants: (Quadrant 1) On-site Core, (Quadrant 2) Off-site Core, (Quadrant 3) On-site Support, and (Quadrant 4) Off-site Support. We also differentiate between stable deployments in which the responders did not move across different quadrants during the response operation of a particular disaster and dynamic deployments in which the responders moved across different quadrants during a particular disaster.

Part two (enactment of roles – institutional IT application use): Our analysis of the data reveals that IT use behavior within each quadrant is consistent among disaster responders who are deployed in that quadrant (see Figure 1).

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[6] FEMA ICS guidelines (https://www.fema.gov/pdf/emergency/nims/NIMS_AppendixB.pdf)

[7] These activities were also confirmed by a high-rank government official of the DRO in our case.

Figure 1. Disaster Responder's Role Enactment of Institutional IT Application Use
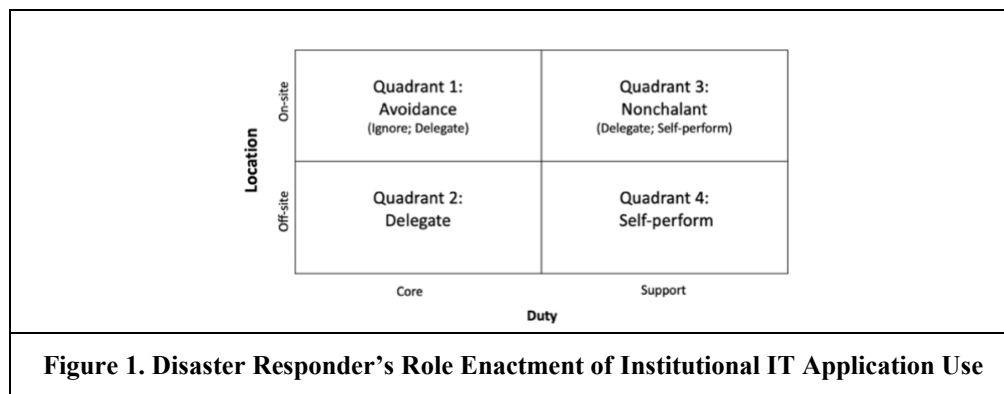
In Quadrant 1 (on-site core), the responders exhibit an avoidance behavior towards institutional IT use, withdrawing themselves from fulfilling the institutional IT tasks. In Quadrant 2 (off-site core), the responders exhibited a delegating behavior towards institutional IT use. The delegating behavior entails the notion that the disaster responders bear the responsibility for the institutional IT use. Yet, they secure its completion by delegating the accomplishment to other people. In Quadrant 3 (on-site support), the responders demonstrated a nonchalant behavior towards institutional IT use. Nonchalant entails the disaster responders being indifferent towards who will fulfill the institutional IT tasks. They may or may not ask other people to fulfill them on their behalf. In Quadrant 4 (off-site support), the responders displayed a self-perform behavior towards institutional IT use, performing the institutional IT tasks by themselves. Interestingly, redeployment instances (11 out of a total 69 instances) between Quadrant 1 and Quadrant 2, and between Quadrant 3 and Quadrant 4 showed that the disaster responders performed similar behavior as non-redeployment instances in the respective quadrants. This shows that the behavior towards institutional IT tasks in all four quadrants was shaped by the location (on-site, off-site) and activities of the disaster responders (core, support) rather than their individual preferences. To investigate the deliberation mechanism leading to each institutional IT use behavior, we look closely at the disaster responders in each quadrant.

Preliminary Findings

At the point of writing this paper, we have had three preliminary findings from our interview data analysis.

First, as employees (individuals occupying the roles defined by the DRO), they are aware of and confined within the institutional expectations. In the aftermath of a disaster, these employees are deployed to a disaster response mission for a certain period as disaster responders. Their new role as DR continues to entail the manifestation of their institutional role. This is exhibited, for example, as all disaster responders continue to wear their respective DRO's attributes such as DRO's uniform, vest, hat, etc., during their response mission. At the same time, the designation of disaster responders in the response mission engenders another set of expectations imposed upon the DROs' employees. They become part of the joint bid of humanitarian actions which is functioned under an ephemeral organization that loosely embodies the DRs from various DROs. RDA-5 said "*I also became emergency support [on-site]. I am with [my superior], so [my superior] will automatically become the team leader, I am then under him, support all, can be logistical support, support all*". Accordingly, the operation of an ephemeral organization during the disaster response mission entails the ultimate expectations, i.e., to save and preserve other people's lives as fellow human beings. Hence, the provisional role as a disaster responder is not singular; it is multifaceted whereby two roles (institutional role and disaster response role) co-exist when they are deployed by their DROs in a disaster response mission. As disaster responders perform their disaster response activities, they maintain communication and coordination with their affiliated DROs. For example, the disaster responders were tasked to record their response actions to the information systems or applications institutionalized by the DROs. Meanwhile, the disaster response role determines the humanitarian expectations that the disaster responders should fulfill such as rescuing disaster victims, evacuating the deceased, relocating the affected people to safe locations, providing medical treatments as well as serving the necessities of the affected people. As these response activities were not materialized upfront nor they were constant during

the response mission, there were continuous interactions between the disaster responders and the ephemeral organization. Consequently, their response tasks were dynamically prescribed. The syncing processes themselves were propagated through multiple coordination meetings across the disaster responders.

Second, as we walk through the instances in the four quadrants, we identify degrees of expansion of the disaster response role itself.

● The disaster responders in Quadrant 1 (on-site core) exhibited the most significant role expansion. The disaster responders at the on-site core were the front-liners who had to perform first-hand actions in urgently assessing the needs on the ground to subsequently conduct search and rescue, evacuation, and medical and logistics services for the disaster victims at various locations where they resided. Thus, during the response period, the operational decisions in the daily meetings saturated their operating time with varied and/or high quantity of tasks. There were instances where some of the disaster responders performed non-stop search and rescue two days in a row to save victims under the rubbles.

● The disaster responders in Quadrant 4 (off-site support) did not experience a significant expansion in their disaster response role during the response mission. Despite the daily meetings to dynamically task the disaster responders, instances of the off-site support showed that the operational decisions during the response mission did not vary much nor add a significant additional task load to them. Thus, during the response mission, they had more or less the same prescribed tasks such as collecting and producing situation updates, arranging personnel deployment, and provisioning technical assistance. These disaster responders were able to work within the normal office hour with ease.

● Although not as high as the disaster responders in Quadrant 1, the disaster responders in Quadrant 2 (off-site core) were showing a degree of expansion of their tasks during the response mission. These off-site disaster responders were tasked to perform back-end mobilization of relief items for the disaster victims. These disaster responders coordinated intensively with the front-liners to acquire the needs on the ground and then worked off-site to urgently fulfill the needs such as procuring and sending the aid to the field. They attuned their daily tasks to the victims' current needs communicated by their counterparts on the ground. Based on the leading author's two-day observation in one of the DRO's offices, the disaster responders who performed core activities were seen working overtime handling fluctuated urgent tasks.

● The disaster responders in Quadrant 3 (on-site support) were also exhibiting a degree of disaster role expansion. Instances in this quadrant showed that the disaster responders on-site were tasked with support activities such as collecting data and producing disaster response situation updates. Although the operational decisions during the response mission did not vary much in terms of the additional types of activities assigned to these disaster responders, they sometimes had to travel to the evacuation sites to collect disaster data and information and coordinated with various parties that are partaking in the decision response mission, adding more load to them.

Third, across all quadrants, every day the disaster responders would perform disaster response tasks first before the institutional tasks. The disaster response role takes precedence over the institutional role as illustrated in Figure 2. This suggests role stacking as another form of role expansion that refers to the degree of dominance of additional role(s) in an ephemeral environment over the role in an existing permanent environment, such as the DROs.

Figure 2. Role Stacking Schema
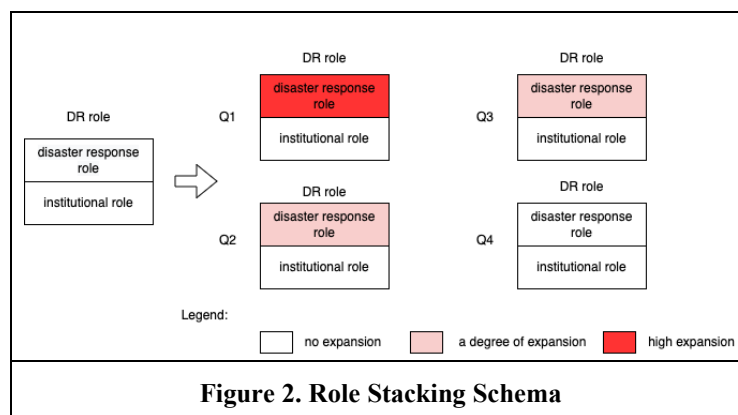
As this research aims to theorize on the deliberation process of the institutional IT use behavior of the disaster responders, we will continue analyzing our data. Eventually, we seek to draw upon our findings to develop propositions that constitute the relationship between the dual-role schema and the institutional IT use behavior. In that direction, we aim to (1) set forth the coupling between the punitive and salience aspects of roles as the location and activities dimensions are being dismantled, (2) show how the dual-role schema is attuned, and finally, (3) show how an integrative scenario of the dual-role schema unfolds to shape the institutional IT use behavior.

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