

Bridge of Cards: Combining Formal and Informal Structures in Crisis Response

To be released under open access and/or CC BY-SA

Written by Willow Brugh, Galit Sorokin, Gerald Scott

Abstract

Organizing for response in times of crisis is highly fragmented, multiple moving parts spring into action simultaneously, with little coordination. Events such as Joint Interagency Field Experiments (JIFX) attempt to bring these moving parts into sync with each other, outside of a crisis setting, but often lack representation from informal and ad hoc response. This project brought these groups together to facilitate responders towards the knowledge, skills, and networking capacities necessary to interact and coordinate with each other in the field.

By working with formal and informal groups, we were able to demystify each “side” enough to codify traits of their response abilities into a game format which others can learn from.

We did this by using a methodology for facilitation and ongoing engagement which optimizes for the adaptability of the network (informal) and the predictability of the centralized (formal). Understanding the other “side” through this gaming framework can help broader response communities learn to coordinate with greater equity, efficiency, and impact. The research covers the creation of the game and two iterations, but is not an in-depth qualitative study of the interactions which took place during game play.

The research was funded by OSD and performed as research for GTRI by Willow Brugh. Gerald Scott coordinates JIFX, and Galit Sorokin is an independent contractor.

Introduction

Tabletop exercises (scripted sessions, in which participants talk through how they, or the organization they are representing would respond to particular events) are a common tool that formal response organizations use to develop concepts and policies. Informal responders, while they may be represented at these sessions, seldom participate at the same level or frequency and so their viewpoints may go unrecognized¹. These sessions, however, provide an opportunity for the development of understanding and cooperation between the formal and informal response community. In particular, they allow for the development of organizational strategies that can improve resiliency, response, and recovery in the face of disasters.

Through a 3-day workshop and subsequent play testing and iteration, members of these polarized groups came together to demystify their strengths and limitations through co-designing and -creating a card game usable during tabletop exercises or otherwise. The card game is now playable by others, and open to ongoing improvements.

This project was undertaken with two goals, 1) to continue the ongoing bridging process embedded in the JIFX/RELIEF project and 2) to develop a tool specifically to improve crisis response by identifying, bringing visibility to, and addressing systemic failures resulting from the gaps between informal and formal response. Bridging these two different organizational structures might lead to the surfacing of the strengths of each and mitigation of weaknesses through opened up possibilities for collaboration. This

paper will cover the problem being responded to, why building a game was the course of action chosen, what methods we used to create the game, and preliminary results.

Background

The Challenge in Higher Resolution

Response organizations operate all along a continuum from the very formal (and by extension, organizationally stable, with consistent, slow-changing methods) to the very informal (organizationally dynamic, with frequently changing artifacts). For the purposes of this paper, we will mostly be speaking in terms of the extreme ends of the spectrum as a way to illustrate the most problematic disconnections in the system. The challenge here is to highlight the differences between informal and formal response, so as Pettigrew (1990) shows it makes sense to focus on the extremes where the differences are “transparent observable.”² On the informal end exist ad hoc frontline groups such as Occupy Sandy³, the Cajun Navy⁴, and volunteers in Mexico City post-earthquake⁵. At the formal end exist official response agencies such as FEMA⁶ and Red Cross⁷.

Official (“formal”) response agencies are generally comprised of personnel who are either professional specialists or operational staff supporting response missions. These formal organizations have articulated channels for accessing various resources needed to respond and recover, both in terms of human services or physical needs. The mechanisms that allow for broad accessibility to organized resources simultaneously create⁸ defined avenues while creating encumbered mobility of efficient response and information. The centralized, hierarchical structures these agencies operate in fostered vertical communication within the organization while inhibiting ‘horizontal’ communication, particularly with entities external to theirs. They know how to talk to who they’re allowed to talk to, but that’s it. This method of coordination means aid is delivered in big blocks of materials to pre-established points of relief that are accessible for mass deliveries and to majority crowds^{9 10 11}. For populations to receive this aid they must leave their homes, be easily mobile and located within reach of these centers, and be able to use the material which is made for a mass audience. In addition they must be ‘legible’ to the state apparatus (documented citizens without any pending or ongoing legal issues). Because of these parameters, often the populations most at risk (marginalized people, the disabled or elderly, trafficked humans, undocumented immigrants, etc) are the least likely to be assisted.

Emergent response groups come together as a direct result of the crisis itself, sometimes activating through pre-existing networks. They organize quickly through local and digital networks, both at ground-level and remotely. These groups include members of the local population, community leaders, and existing grass-roots and nonprofit networks already established and operating in the area. Remote groups form through similar social and professional ties, but primarily via digital channels. Informal response entities often already know, or are able to quickly gather, high-resolution information and data. Neighborhood needs are quickly assessed, support and failure points are known factors, and local knowledge is quickly disseminated. However, the definition and degree of crisis is the inability of local groups to respond out of their own capacity, where material- or service-needs are scarce, and accessibility to appropriate resources is extremely limited, if available at all. Large-scale recovery operations, such as removal of debris, providing acute medical care, and general restoration of critical infrastructures, tend to be beyond their scope¹².

Formal and Informal response groups possess complementary capabilities, knowledge, resources, information, and access. The potential for increased levels of efficiency, recovery, and accessibility while decreasing response-time, duplication of efforts, and waste are immense across the board. Yet there are few channels for such coordination, and even less trust between formal agencies and informal groups. A

lack of visibility into one another's operations, understanding of logistical mechanisms, and cultural differences, together contribute to a lack of mutual trust. The combination of complex systemic factors with an embedded lack of trust prevent these groups from working together towards a more effective, and better organized, crisis-response ecosystem.¹³

Identifying the Problem

When faced with this challenge, it is tempting to encourage these actors to begin behaving in similar ways to each other - the informal more predictably, and the formal with more agility^{14 15}. However, the key to closing these systemic gaps hinges on bridging the understanding between the formal and informal sectors, making their operational abilities visible to the other. With understanding comes trust and a willingness to coordinate. When trust is established, dividing tasks and areas of responsibility becomes part of the response process as information becomes reliable and actions are accountable to a shared mission. Failure to collaborate impacts all responders to crises and the populations directly affected by their success or lack thereof.

To illustrate, situations are not uncommon in which where dedicated resources are delivered by formal agencies to an impacted area for distribution fail to reach those in need. Of the intended aid-recipients, only those who have access to information, who are able bodied, and who are legible to the state have access to those resources, while others who do not fit into all of these categories fall outside the targeted demographics. The highly-organized efforts of providing resources on the part of formal organizations fall short due to their limited capacities to reach those most in need. Meanwhile, informal networks operating at ground level may have gathered a comprehensive mapping of pocket populations and their needs, yet lack the professional assessment abilities to anticipate and document the resource needs properly, let alone provide the necessary relief.^{16 17 18}

The disconnect between Formal and Informal response systems has been long been recognized. Even with current "information sharing" initiatives, they remain practically invisible to one another.^{19 20 21} "The Government" is considered untrustworthy and unreliable to grassroot-level responders, due to bureaucratic structures and perceived agendas and histories, or simply because of the significant cultural and operational disconnect. Grassroots are not accessible to formal level agencies as they are not formally vetted, hierarchically accountable, or catalogued in a referential manner, and therefore are not considered trustworthy or reliable by formal institutions to the degree where they can be strategically integrated in working with official agencies.

Gaining visibility and, where possible, transparency, opens up possibilities for collaboration and cooperative problem-solving. Understanding the manner in which other groups operate translates into explicit suggestions for mutual courses of action. Establishing base levels of trust upon which to build means a higher likelihood bilateral actions. For formal and informal response-ecospheres to work effectively together means a more holistic response-ecosystem, with fewer gaps and greater relief capacities, in essence transforming the way in which we respond to crises^{22 23}.

To begin the bridging process, this project brought together groups from various areas of the response ecosystem with the intent of increasing cross-visibility, codifying understandings, and developing trust across the spectrum. We aim to pave the way for identifying actionable opportunities to improve crisis response and concretely address known gaps through systemic legibility.

Organizational Theory, Collaboration, and Cooperation

Formal disaster response includes two distinct types of organization: 1) government organizations with the overall purpose, or specific task, to respond; and 2) non-government organizations focused on

response that exist, plan, and train prior to the required response. Although these organizations can vary greatly in purpose and culture; they share characteristics found widely in all types of organizations such as some level of hierarchy, bureaucracy, and norms of internal and external communication, and so models from organizational theory can help to describe and understand how these organizations function. Bureaucratic political theory, epistemic community theory, and game theory can each provide insights on how cooperation and collaboration can develop in an often discordant emergency response ecosystem.²⁴

Allison and Halperin provide a bureaucratic model of organizations based on three independent variables: who plays; what determines a player's position; and how these positions are aggregated into an outcome.²⁵ Although this model does not rule out cooperation and agreement, it does assume that cooperation is not the natural state of affairs. They showed that even in national-level crises bureaucratic organizations do not necessarily come to agreement and cooperation in national security matters. Allison and Halperin describe a non-cooperative bargaining process in which "organizations rarely take stands that require elaborate coordination with other players."

The Allison-Halperin model argues that the stand a player takes is largely determined by the institutional goals and biases that the player represents, as well as by their personal goals; in short, "where you stand depends on where you sit." This model is helpful in understanding why players might take a position or cause a debate that is clearly not supporting the overall disaster. In addition to the response at hand, individuals representing formal organizations in disaster response may also be concerned about such things as: availability of resources for future needs; public image; hierarchical pressures not related to the response; or security of organizational information and systems. These organizational motivations are typically presented as drawing the players' positions further apart as the players seek to increase their personal or organizational position, power and resources.

In the Allison-Halperin model, there can also be organizational motivations that either move the positions closer together, or make cooperation more valuable in general. In disaster response these motivations might include: the potential to improve the overall response; an inability to meet specific organizational response tasks insufficient resources.

Epistemic community theory suggests that even when there are significant bureaucratic barriers to cooperation, cooperation can arise when members within various organization. According to Haas, "an epistemic community is a network of professionals with recognized expertise and competence in a particular domain and an authoritative claim to policy-relevant knowledge within that domain or issue-area."²⁶ Although Haas was writing about international politics, epistemic communities are also found in the disaster response ecosystem. Responders and emergency managers move from organization to organization, attend conferences together, and work together for the development of concepts and procedures in training exercises and events such as the Joint Interagency Field Experimentation program²⁷ in which this work was conducted. Strong epistemic communities help to create a baseline of individual trust across organizations that can allow for the development of cooperation and collaboration even without a bureaucratic mandate to do so.

In an alternative, but not contradictory model, Axelrod (1984) shows how cooperation can evolve, and that the strategy that organizations take to respond to actions of other organizations can significantly impact how it progresses. In Axelrod's model, taking a strategy of reciprocation ("Tit-for-Tat" in his words) is a strategy that consistently breeds cooperation.²⁸ Variations of this strategy that also contain some level of "forgiveness" for "defection" can be even more effective. In short though, in most contexts reciprocity breeds cooperation, even among the government, the governed, and the ungovernable.

More recently, there has been more focus on deliberate change in organizations, both in search of (what is somewhat amorously termed) innovation, and specifically in improving collaboration as a means of

supporting innovation. The models and techniques discussed in this literature do not necessarily discredit the role of leadership and the central executive, but often shift the focus of leaders from “directing” organizations to “enabling” innovation by supporting initiative and risk-taking at all levels. These changes in the norms of organizations: 1) while implemented more readily by organizations that start off as less rigidly hierarchical, have been endorsed by all types of organizations ; 2) often results in more intra- and extra-mural collaboration as individual efforts to collaborate (often a risky endeavor) are supported by a leadership;²⁹ and 3) provides more examples of the utility of a game-theoretical model of organizational change and collaboration³⁰. Reciprocity breeds cooperation at the micro-as well as the macro-level. Other changes in organizational norms, such as a recognition of usefulness of play in work,³¹ the use of design thinking as a mechanism of organizational change,³² and globally distributed teams³³ all combine to make the use of games such as described here a potentially transformational means to improve the interaction between the formal and informal aspects of disaster response.

For the purposes of this game, “cooperation” means “staying out of each others' ways,” while “collaboration” implies actively working to the benefit of the other.

Introduction to the Project

Bridging these two different organizational structures might lead to the surfacing of the strengths of each and mitigation of weaknesses. There are many challenges to bridging between these groups, but we focused the game on a reduction in the duplication of effort, which would lead to more accurately placed resources. We also focused on how trust impacts the ability and motives of various actors. Through the act of building and play-testing the game, we also had the goal of building visibility and trust between the different groups.

The objective of the game was to create understanding about why some actors behave the way they do (paperwork, compulsivity, etc) and thereby create a faster feedback loop around lack of collaboration leading to ineffective response. The game is meant to instill a sense of frustration as the systems-level issues become apparent in game play, and players who can see each other cannot interact with one another based on arbitrary and stale system mechanics they themselves have perpetuated. Players are then encouraged to create new rules to the game, which might then also impact how they comport themselves before and during response.

Methods

We undertook this project as action research; first because it presented a problem warranting the immediate implementation of identified solutions, and also because it directly involved members of both the formal and informal disaster response community of practice in the identification, design, and development stages.³⁴

We began with several questions regarding the use of game play involving formal and informal disaster response organizations:

1. Can we create a game which adequately approximates the structure and dynamics of a disaster response ecosystem?
2. Does the use of such a game in an organizational setting identify common, recurring, and detrimental barriers to collaboration?
3. Does game-play induce strategies of cooperative reciprocity amongst the individuals and organizations within the game?
4. Does the use of the game open up opportunities for exploration that other methodologies don't?

Research Methods

Gioia and Chittipeddi (1991) served as a methodological foundation for this research for two reasons. First, the goal of the game-building project itself was to instigate change in how formal and informal organizations interact in disaster response. Gioia and Chittipeddi's research was similarly into an effort of deliberate change. Second, also similar to Gioia and Chittipeddi, the authors represent both the insider and outsider perspectives. The "insider" led the game development itself, while the "outsider" remotely monitored the process without participating.

While the insider worked with the game development team to demystify diverse approaches, to model collaboration through game theory, and to begin building trust within the development team (which was made up of representatives of both the formal and informal disaster response communities); the outsider provided some theoretical perspective, and the field-based research context within which the game development was conducted. While this paper covers only the initial game development process and play testing, a more formal qualitative analysis following the methods of Gioia and Chittipeddi is underway. The insider has begun to use the game in training workshops conducted by offices of emergency services seeking to understand and improve the integration of volunteers and informal response organizations into their disaster response operations.

Selection of Setting

Joint Interagency Field Experiments (JIFX) are a series of week-long collaborative learning events hosted quarterly by the Naval Postgraduate School. The events bring together representatives from academia, technology industries, NGOs and governments (local, state, federal, and international) to explore the application of emerging technologies to meet government needs and improve Humanitarian and Disaster Response (HADR) capabilities both inside and outside of the government. JIFX focuses on prototype technology, just ready to move from laboratory to operational testing, providing dynamic feedback from multiple potential users regarding performance, interoperability, and security early in the development cycle when design changes can be incorporated while minimizing the impact on overall timelines and development costs. JIFX also recognizes that new technology itself can make little improvement without also considering how procedures and policies should be adapted to incorporate the new capability. To address this, topical working groups and design groups often run in parallel with the technology experiments. The game development sessions described here were one such activity. A recognized outcome of these events, following the epistemic community model has been the development of a collaborative culture among participants. The event has developed into a welcoming space for persistent members of ad hoc response organizers, who are also able to meet each other. Subsequently, this is where cross-sectional trust is built, and collaborations are devised. One such collaboration was the formation and deployment of the FEMA Field Innovation Team to address FEMA's Whole-of-Community initiative during Superstorm Sandy³⁵.

Selection of Game Development Team

To represent formal and informal perspectives, the game needed to be created by people from these differing groups. Invitees included those from local response groups, including the Empowered Communities Project³⁶, San Francisco Emergency Management, and Salvation Army Crisis Response; from International nongovernmental organizations such as Save the Children, Oxfam, and UNICEF; from private sector, including Microsoft, Monkey Brains, Cisco, and AirBNB; nonprofits including Meedan, Public Labs, Sarapis, Open Referral, and Benetch; and informal groups Occupy Sandy and the anarchist responses to the refugee crisis.

While not all were able to join, this project gathered 9 individuals from various points in the response spectrum. 3 from informal response (2 from Occupy Sandy, 1 from anarchist response to refugee crisis), 2 from formal response (Save the Children and Salvation Army), 1 from nonprofit, 2 from cross-sector coordination, and 1 from private sector. The group primarily focused on ad hoc and formal response agencies, building out the initial set of player types of Concerned Citizen, Ad Hoc Response Network, International NGO, and Municipal Government. Our game is therefore lacking in the private sector lens, something we hope to remediate through further play testing.

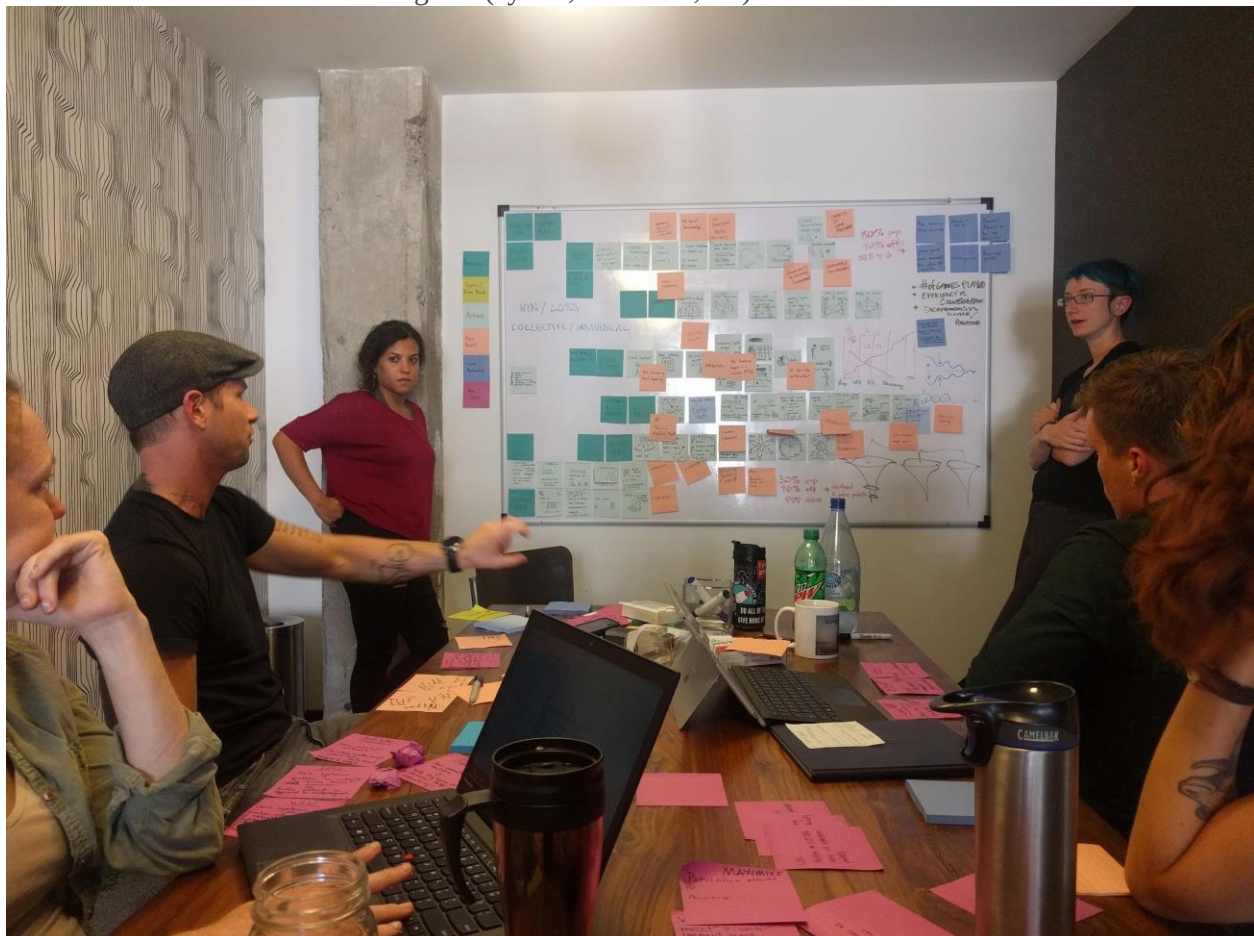
Game Design Methods

DAY 0

Establishing trust through unstructured time and food.

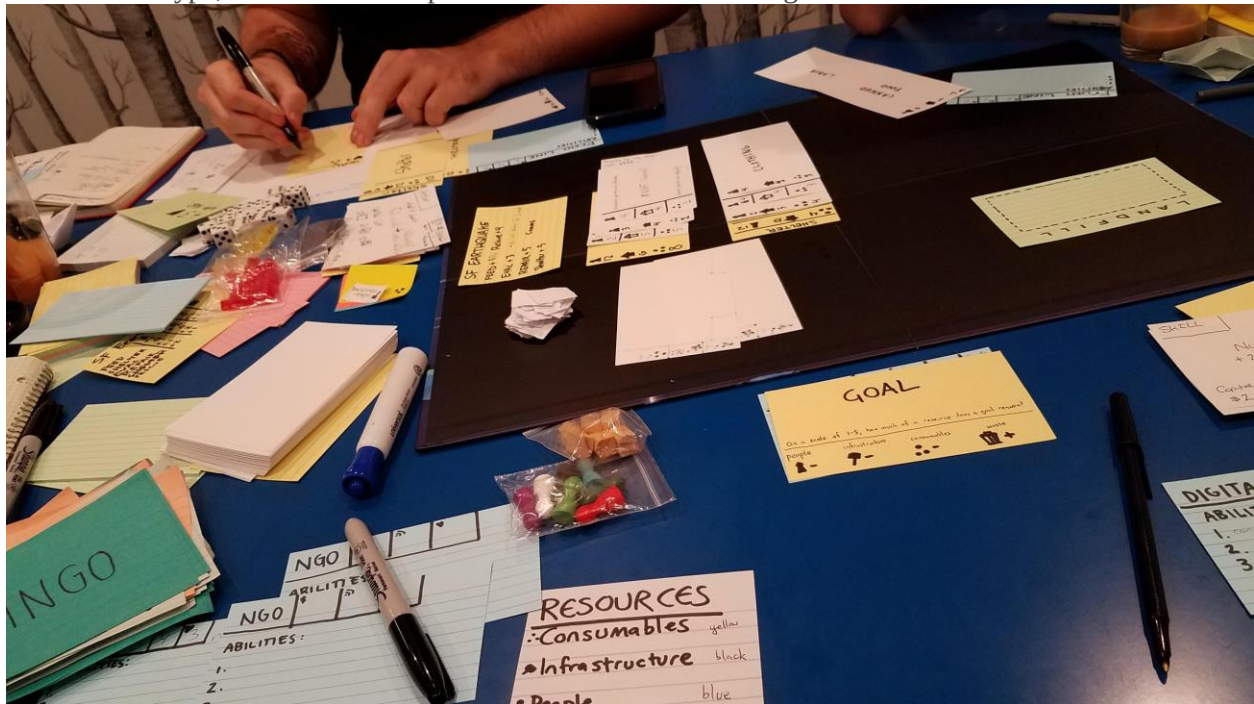
DAY 1

- Universe of Topics. This exercise is to capture all the different feelings and ideas in the room. Each participant feels heard, and can see how much and how little their goals overlap with others.
- Participants did a visual thinking exercise to describe how their ecosystem works. We then described them to each other, merged them into one visualization, and talked about pain points.
- Posited some factors for a game (cycles, resources, etc).



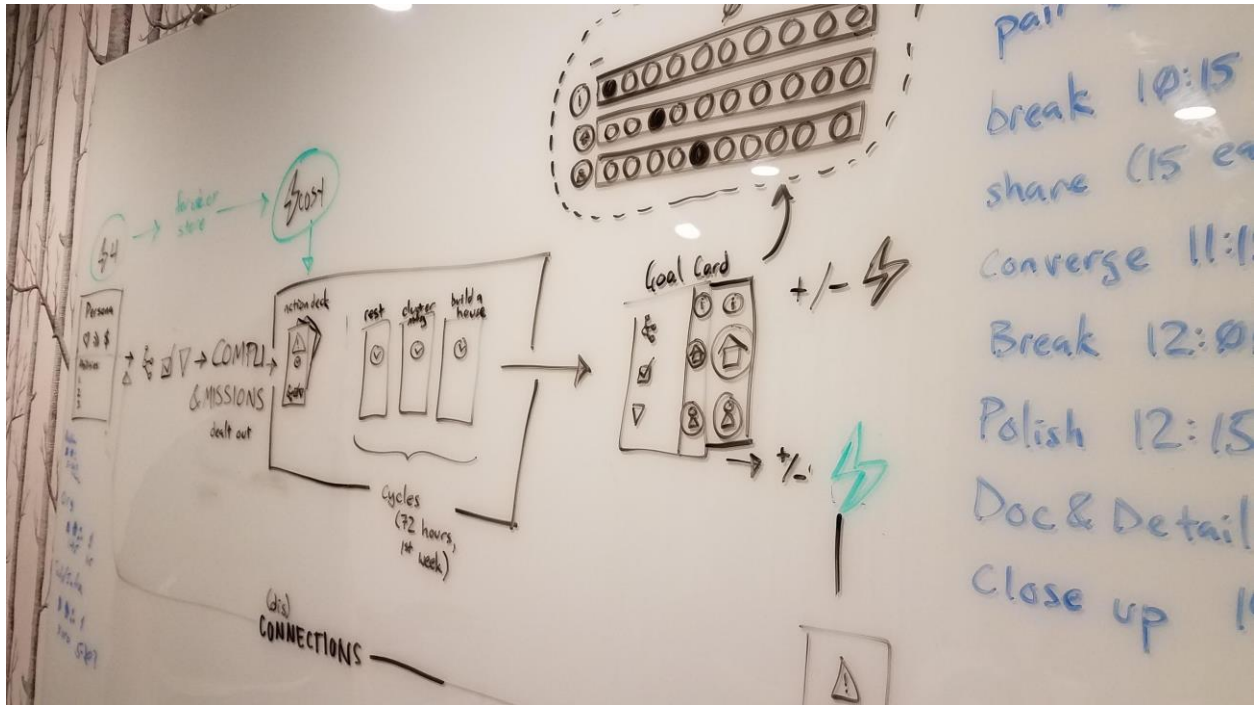
DAY 2

- Play through some games to immerse in game mechanics and instigate conversation. We played Pandemic.
- Individuals propose their own game structures and give each other feedback.
- Explore shared factors of game to coalesce around one.
- Prototype, troubleshoot the parts that don't work. Be wrong.



DAY 3

- Visualize game flow for the copasetic aspects.
- Play test – play through a round of the game, discovering what parts are unclear, imbalanced, or superfluous.
- Iterate based on those discoveries and then play test a second time.
- Document how the game works and next steps while it's all fresh in people's minds.



Results

The group of 9 participants produced and have since play tested our prototyped card game called ENCAPE (Emergent Needs ,Collaborative Assessment, & Plan Enactment). The minimum viable product is comprised of 4 parts:

1. A game how-to-play guide,
2. a playable starter deck (4 personas with connection cards, 20 special resource/action cards, 30 resource/action cards, 10 missions, 30 updates) with
3. process and templates to generate more cards of each type, and
4. a process for capturing and enacting feedback from playtesters.

All can be found at <http://blog.bl00cyb.org/2017/08/interfaces-between-formal-and-informal-crisis-response/>

The prototyped card game surfaces how different player types behave, how duplication of efforts and subsequent waste impacts the response ecosystem, and how working together might cause more efficiency in response. While inspired by Sandy response, the game has already led to insights for collaboration opportunities during Harvey and Irma response.

Discussion

Implications on the field

The ENCAPE card game surfaced three main areas for impact on the field of disaster response through the cooperation or collaboration of formal and informal efforts: de-duplication of efforts and reducing waste.

Duplication of efforts

During every crisis, there are a few core issues that will predictably occur: SOS calls from stranded or endangered people, individuals becoming separated from their loved ones, basic needs for resources, etc. Despite these well-known and expected points of system-collapse, efforts to address these issues are often duplicated. Informal groups, not knowing about formal response practices nor previous informal response, recreate common operating pictures/3W, missing persons tools³⁷, and tallies of requests from the field.

These efforts often occur simultaneously, and in parallel, by multiple groups (both formal and informal). This is caused by a lack of visibility to other efforts because even the other actors are unknown, let alone search terms or namespaces necessary for research. This also leads to the collection of replicate data for datasets that exist in silos (when unknown about) or fail to integrate (when known about) Example: During response to Harvey the Coast Guard asked the Digital Humanitarian Network to comb through social media for calls for help (in addition to coordination with 911 dispatch), while Cajun Navy was already engaged in dispatching response via requests through Zello, social media, and direct channels. Some requests posted on social media therefore had double resources allocated to them, while others remained deprioritized. These information silos lead to misallocated resources in other ways as well. Example: VOAD can get supplies to local shelters but digital responders are also coordinating donations. This simultaneous action is indicated in the game by the deployment of resources to missions without coordination.

Not all groups are out of coordination with one another however, as ongoing efforts in the response space have lead to sharing of data. However, this is limited to one “side” of the spectrum or the other - formal entities share with other formal entities when allowed to, and informal groups share with other informal groups when visible to each other. This is indicated in the game by some players defaulting to sharing with others like them, and defaulting closed to groups unlike them.

Not all duplication of effort will be possible to remove - even formal groups are forced into setting up coordinations during a response, with little investment of resources in pre-crisis partnerships. The informal sector is by definition unorganized for response until the event has occurred, with energy being expended into building what they can, rather than having spent time and energy becoming familiar with what exists and available for use. Part of the issue is that skilled volunteers new to the response-sphere are engaging in response efforts, with no previous experience or knowledge.

Waste of resources

Lack of coordination and collaboration is not just made obvious in a lack of sufficient resources, but also in an excess of resources in some places. This is sometimes referred to as the problematic “last-mile-logistics.” Large quantities of materials or labor are delivered by the formal sector but fail to be allocated in the granular manner necessary to address the most vulnerable. Informal groups have an excess of information, but lack the access necessary to match information with materials or labor.

To explore this, the game focuses on three main types of resources: information, materials, and labor. Information is necessary for understanding needs and context. Waste in “information” shows up as information overload from lack of data structures, meaning the information has become ultimately become inactionable and overwhelming. Materials are necessary for addressing needs ranging from medical services and rebuilding homes. Wasted materials are left unallocated or unused due to unpredictable oscillation in need-supply flows or complications in distribution, as manifest in food rotting on runways. Labor is necessary to use information to make use of materials. Ineffective volunteer and employee management results in a paralyzed workforce seeking direction or permissions, unable to

mobilize in a focused manner. This causes a loss of trust in the organization's ability to act intelligently or be worth showing up for.

Cautions about findings

The research in this paper covers the impetus and workshop that generated the game. Deep qualitative research (transcription, coding, and analysis) of the workshop and subsequent play testing sessions has not been performed. Much of the understanding of formal/informal issues comes from the authors' direct experience.

Future Research

While some research was located around informal organizational structures, it is nowhere near as broad or deep in the disaster response sector as research on formal organizations. Combining these two methods will require a deeper understanding.

Further improvement on the game through play testing and iteration would allow it to be more playable and useful towards its stated goals.

References

- 1 Ronald W. Perry, 'Disaster Exercise Outcomes for Professional Emergency Personnel and Citizen Volunteers', *Journal of Contingencies and Crisis Management*, 12.2 (2004), 64–75
<<https://doi.org/10.1111/j.0966-0879.2004.00436.x>>.
- 2 Andrew M. Pettigrew, 'Longitudinal Field Research on Change: Theory and Practice', *Organization Science*, 1.3 (1990), 267–92 <<https://doi.org/10.1287/orsc.1.3.267>>.
- 3 <http://occupysandy.net/>
- 4 https://en.wikipedia.org/wiki/Cajun_Navy
- 5 <http://www.npr.org/2017/09/19/552214391/in-mexico-city-volunteers-rush-to-clear-rubble-after-earthquake>
- 6 <https://www.fema.gov/>
- 7 <https://www.redcross.org>
- 8 Quarantelli, E. L. (1988). Disaster crisis management: A summary of research findings. *Journal of management studies*, 25(4), 373-385.
- 9 Boin, A., & Hart, P. (2010). Organising for effective emergency management: Lessons from Research. *Australian Journal of Public Administration*, 69(4), 357-371.
- 10 Bharosa, N., Lee, J., & Janssen, M. (2010). Challenges and obstacles in sharing and coordinating information during multi-agency disaster response: Propositions from field exercises. *Information Systems Frontiers*, 12(1), 49-65.
- 11 LaPorte, T. R., & Consolini, P. M. (1991). Working in practice but not in theory: theoretical challenges of "high-reliability organizations". *Journal of Public Administration Research and Theory: J-PART*, 1(1), 19-48.
- 12 Majchrzak, A., Jarvenpaa, S. L., & Hollingshead, A. B. (2007). Coordinating expertise among emergent groups responding to disasters. *Organization science*, 18(1), 147-161. Chicago
- 13 Shklovski, I., Palen, L., & Sutton, J. (2008, November). Finding community through information and communication technology in disaster response. In *Proceedings of the 2008 ACM conference on Computer supported cooperative work* (pp. 127-136). ACM.
- 14 Harrald, J. R. (2006). Agility and discipline: Critical success factors for disaster response. *The annals of the American Academy of political and Social Science*, 604(1), 256-272.

- 15 Mendonça, D., Jefferson, T., & Harrald, J. (2007). Collaborative adhocracies and mix-and-match technologies in emergency management. *Communications of the ACM*, 50(3), 44-49.
- 16 Sobel, R. S., & Leeson, P. T. (2006). Government's response to Hurricane Katrina: A public choice analysis. *Public Choice*, 127(1-2), 55-73.
- 17 Whybark, D. C. (2007). Issues in managing disaster relief inventories. *International journal of production economics*, 108(1), 228-235.
- 18 First hand account from Maytha Alhassen, Ph.D.
- 19 Schneider, S. K. (1992). Governmental response to disasters: The conflict between bureaucratic procedures and emergent norms. *Public Administration Review*, 135-145.
- 20 Shklovski, I., Palen, L., & Sutton, J. (2008, November). Finding community through information and communication technology in disaster response. In *Proceedings of the 2008 ACM conference on Computer supported cooperative work* (pp. 127-136). ACM.
- 21 Yates, D., & Paquette, S. (2011). Emergency knowledge management and social media technologies: A case study of the 2010 Haitian earthquake. *International journal of information management*, 31(1), 6-13
- 22 Bharosa, N., Lee, J., & Janssen, M. (2010). Challenges and obstacles in sharing and coordinating information during multi-agency disaster response: Propositions from field exercises. *Information Systems Frontiers*, 12(1), 49-65.
- 23 Majchrzak, A., Jarvenpaa, S. L., & Hollingshead, A. B. (2007). Coordinating expertise among emergent groups responding to disasters. *Organization science*, 18(1), 147-161.
- 24 Gerald Scott, 'Bureaucracies, Communities And Networks: Interagency Cooperation for Homeland Security In Monterey County.', 2003.
- 25 Graham T. Allison and Morton H. Halperin, 'Bureaucratic Politics: A Paradigm and Some Policy Implications', *World Politics*, 24.S1 (1972), 40-79 <<https://doi.org/10.2307/2010559>>.
- 26 Peter M Haas, 'Introduction : Epistemic Communities and International Policy Coordination', *International Organization*, 46.1 (1992), 1-35.
- 27 'Joint Interagency Field Experimentation', School, Naval Postgraduate, 2018 <nps.edu/fx> [accessed 8 June 2018].
- 28 Robert Axelrod, *The Evolution of Cooperation* (New York, New York, USA: Basic Books, 1984), pp 155-158.
- 29 Robert E. Hoskisson and others, 'Managerial Risk Taking: A Multitheoretical Review and Future Research Agenda', *Journal of Management*, 43.1 (2017), 137-69 <<https://doi.org/10.1177/0149206316671583>>.
- 30 Jbid Arsenyan, Gülçin Büyüközkan, and Orhan Feyzioğlu, 'Modelling Collaboration Formation with a Game Theory Approach', *World Congress on Engineering 2011*, 1 (2011), 2073-85 <<https://doi.org/10.1016/j.eswa.2014.10.010>>.
- 31 Mikko Vesa and others, 'Computer Games and Organization Studies', *Organization Studies*, 38.2 (2017), 273-84 <<https://doi.org/10.1177/0170840616663242>>.
- 32 Tim Brown, *Change by Design*, 1st edn (New York, New York, USA: HarperCollins, 2009).
- 33 Alfredo Jimenez and others, 'Working Across Boundaries: Current and Future Perspectives on Global Virtual Teams', *Journal of International Management*, 23.4 (2017), 341-49 <<https://doi.org/10.1016/j.intman.2017.05.001>>.
- 34 John W. Creswell, *Qualitative Inquiry and Research Design: Choosing among Five Traditions*, 1998 <<https://doi.org/10.1111/1467-9299.00177>>.
- 35 FEMA, *Hurricane Sandy FEMA After-Action Report* (Washington: FEMA)
- 36 <https://civic.mit.edu/blog/willowbl00/all-in-our-backyard-social-justice-in-disaster-response>
- 37 https://digitalresponse.aspirationtech.org/index.php?title=Before_you_jump_in:_Missing_Persons