

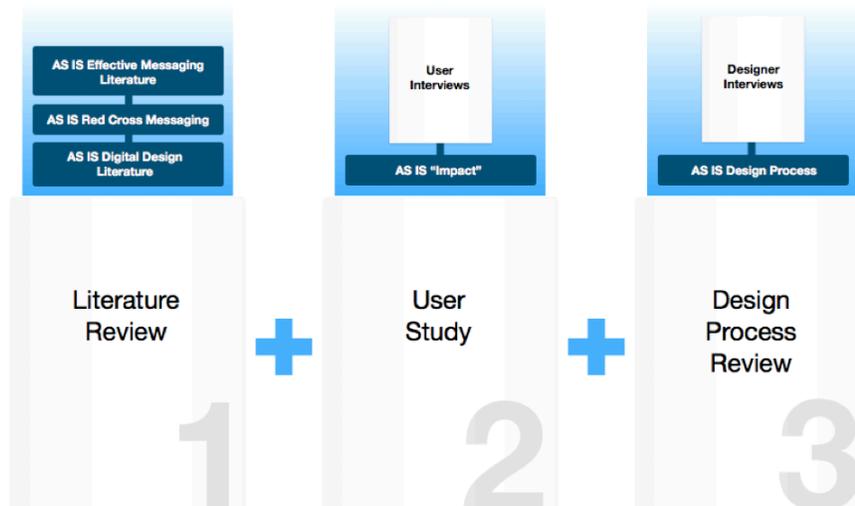
Strategies for Designing RCRC Preparedness Messaging in Digital Applications

I. INTRODUCTION:

As Red Cross Red Crescent (RCRC) societies move forward to deliver digital disaster information and preparedness messaging, the Global Disaster Preparedness Center (GDPC) is asking how best to capitalize on the growing accessibility of digital communications for future outreach. Emerging questions like, ‘Should we invest more in gaming or in applications that educate and/or deliver services?’ and ‘Which platforms and messages allow us to best reach people in a way that influences behavior toward better resilience?’ are important for more effective decisions around funding and design. Yet, answers to questions like these are impacted by many diverse factors, such as the needs of the specialized work practices of the RCRC organization, the capacity of different digital design strategies to support social practices, and the actual impact of messaging on the lives of users.

To begin to assess a baseline understanding of the “as-is” state of many of these factors, this report synthesizes the findings of three lines of research on effective preparedness messaging and digital design. They are (1) a disciplinary literature and RCRC documents review on messaging and design, (2) a user study of current RCRC digital applications, and (3) a process review of the design and development decisions of those RCRC applications.

Three Research Lines:



Through these corresponding avenues of research, we sought a baseline for the following questions:

What do “we” already know about effective messaging and digital design-- broadly and within the RCRC?
 (Three Part Literature Review)

In what ways are RC apps already Influencing Preparedness attitudes and behavior?
 (First Aid and Hazard App User Study)

What are the current application design methods, assumptions and aims?
 (FirstAid and Hazard App Design Process Review)

This report synthesizes an analysis of these three lines of learning within the context of future enhancements to RCRC digital preparedness messaging, The combined result of the overall project effort aims to help guide future strategies for effective preparedness messaging in the context of RCRC programmatic goals.

II. SUMMARY OF BASELINE STUDIES:



1. Three Part Literature Review: *What do “we” already know about effective messaging and digital design-- broadly and within the RCRC?*

To begin pursuit of what we mean by “effectiveness” for RCRC messaging and design on preparedness behaviors (in other words, what our specific intended outcome of RCRC digital services would be) we sought to understand RCRC’s practice in relation to other relevant disciplines’ view of effectiveness. We broke this into three parts (Table 1), seeking to map first, (Part A) *what “we” know* broadly from the disciplinary literature about effective messaging for achieving positive behavior change; second, (Part B) *what RCRC knows* specifically-- about positively impacting the disaster preparedness of communities within their work and contexts; and finally, (Part C) *what the digital design community knows* about effective digital design for achieving effective messaging as outlined in parts A and B.

<p>Literature - Part A: <i>What in general does relevant literature say about effective communications and messaging to affect behavior change?</i></p>
<p>Literature - Part B: <i>What do RCRC guiding documents tell us about RCRC’s view of effective messaging to positively influence disaster preparedness of communities?</i></p>
<p>Literature - Part C: <i>What does design literature say about effective digital design for positively affecting behavior change?</i></p>

Table 1: Literature Review Aims - Parts A, B and C

A. Part A: Messaging Literature – Shift Toward Receiver-Focused Determinants

Our review of relevant theory included five related disciplines (Technical Communications, Disaster Communications, Persuasive Technology, Public Health, and Education & Learning) Summaries of how effectiveness is viewed within the corpus of these disciplines. (Table 2)

Disciplinary Area	“Effective” Response to the Communication
Education & Learning (EL)	Transfer and Retention of knowledge; Application of skill across contexts
Public Health (PH)	Holding a readiness to act on public health recommendations (i.e, enough perceived susceptibility, severity, and benefits)
Risk Communication (Risk)	Following the instructions of authority communicated, ultimately at time of disaster.
Technical Communication (TC)	Successful achievement of a user’s technical task or mission.
Persuasive Technology (PT)	Change in attitudes or behaviors of users as assessed from technology interactions. Behavioral application is domain-dependent

Table 2: Disciplinary Views of “Effective” Messaging

The five primary themes across the literature that determine whether a message will positively influence the behavior and attitude of a receiver consist of four receiver-focused determinants: *motivation, agency, ability, and trigger* and a fifth overall theme of *tailoring*. (Figure 1)

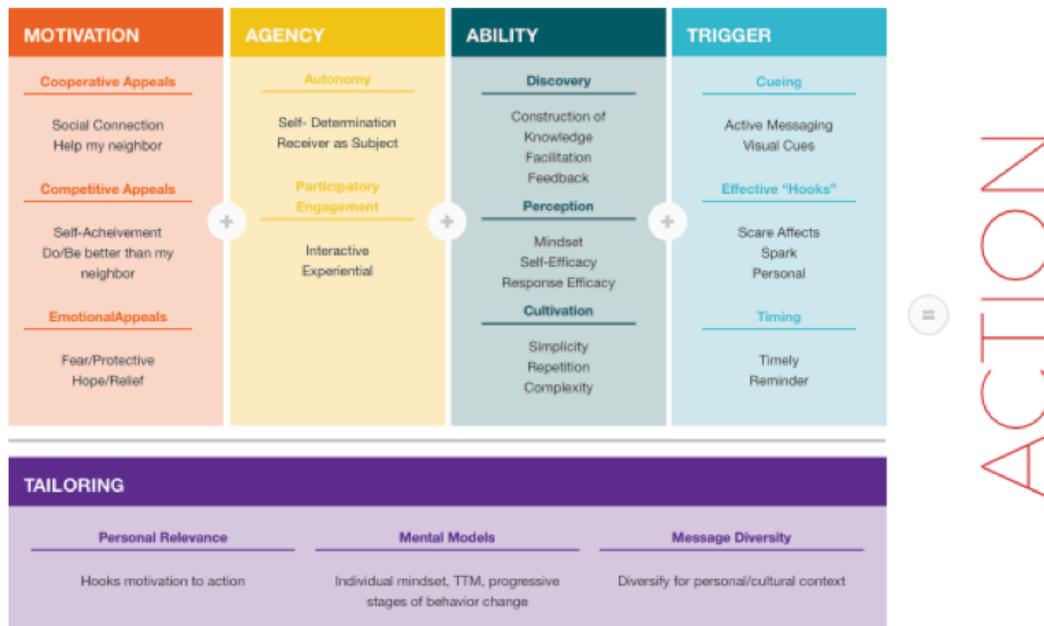


Figure 1: Effective messaging methods per determinant and post-tailoring found in the disciplinary literature

In the academic literature, messaging and campaign initiatives aim for a core message based on a primary demographic audience and post-tailor in an attempt to accommodate more specific mindsets, experiences, and culture. Tailoring of the message is THEN stratified for the four determinants (motivation, agency, ability, trigger) of targeted demographics or more specific

audiences within a given context (e.g. children in education, elderly in health, or local culture in tech design). We mapped detailed methods identified among the disciplines for reaching the determinants. These can be seen embedded under each determinant box within *Figure 1*. (Appendix A provides a brief description of the various subcomponents of each determinant and tailoring.)

Today’s modern interpretative literature on messaging, overall, tends to shift authority from the sender designing the message to the receiver interpreting the message, making the receiver the ultimate determiner of success. When the purpose of message design is to influence behavior and/or attitudes of the audience, senders must come to a better understanding of the audience -- what they want, what they are capable of achieving, and what they feel empowered to accomplish.

B. Part B: Red Cross Literature - A Sophisticated Theory of Use

Part B consults a corpus of recent RCRC communications and messaging guidance as provided by preparedness practitioners, as well as case examples of campaigns considered as successful by various entities within the RCRC. Through the lens of these materials, RC’s view of “effective” messaging can be stated as: *The delivery of communication to an audience that affects a change toward increased preparedness in their attitude or behavior.* (Table 3)

Disciplinary Area	“Effective” Response to the Communication
RCRC Preparedness	Change in attitude or behavior toward increased resilience

Table 3: View of RCRC’s “Effective” Preparedness Messaging

We observed current RCRC materials already richly reflect *what is known* in the broader literature (Findings of Part A) about effective messaging: practicing cross-disciplinary methods and innovations in reaching audience motivation, ability, agency, trigger and the central use of tailoring. Yet, RCRC matures messaging according to its own domain, representing a more robust focus on Tailoring, Agency and Motivation, in particular¹. Remarkably, the RCRC messaging contributes an even further shift of power in message design *to the receiver* that goes beyond receiver interpretation to receivers owning and identifying the purpose of the message.

C. Part C: Digital Design Literature – Deriving Compatible Human-Centered Methods

Part C presents an analysis of digital design literature in the nexus between digital design and behavior change, including controversial persuasive technology design approaches, popularized user-centered design (UCD), and more participatory design approaches for human-centered systems², (HCS). Usability approaches offer ways to optimize presentation of content for ease of use, but they lack ways for adequately achieving the over-arching need for front-end tailoring and agency-driven design. Rather, design for these types of requirements can find more robust solutions with socio-technologists designers of HCS.

Human-centered digital systems are more compatible than merely user-centered systems for humanitarian work particularly because UCSs may or may not be supporting the cooperative agency of humanitarian work or a social system. Design approaches for HCSs are addressing the reality that technical solutions are part of a larger, complex social system and requires holistic analysis. Effective design practices include a) designer as facilitator of design decisions vs

¹ See Figure 2 – Page 7, Key Discovery 1

² HCSs are technologies designed to support human operators and their distributed knowledge whereas human-centered design (HCD) is used across a broad spectrum of meanings. From being used interchangeably to represent UCD to meaning the broader methods used in designing for human systems.

decision-maker, b) holistic and hyper-participatory methods, b) iterative capacities across the develop-design divide and over time. These methods reflect greater capacity for more adequately meeting RCRC's agency-driven needs in effective digital messaging. An evolution in design away from usability design toward holistic, front-end, hyper-participatory design joins the overall trend in effective messaging away from a focus on the sender and towards a focus on the receiver's ownership.

2. User Study *(In what way are RC Apps already Influencing Preparedness Behavior?)*

With an aim to eventually grow the reach and positive impact of preparedness messaging through digital media, we investigated the current state of use of these applications, and whether they are currently leading to actual behavior and attitude changes in users. To understand **how attitudes and behaviors (e.g. intent, belief, awareness, action, etc.) of users of the Universal APP Program are being influenced in terms of disaster preparedness and first aid emergencies**, we conducted semi-structured interviews with six users of the Hazard application and two users of the FirstAid application in New Zealand and Canada to identify:

- The users' perception of whether their attitudes and/or behaviors in regards to dealing with first aid emergencies and/or disaster preparedness have changed since being introduced to the app.
- What range of attitudes/behaviors, in particular, do users feel have changed and in what ways
- Which parts of the app, messaging, or other related factors do users perceive to have influenced these changes.

The study explores the influence of the use of Red Cross ("RC") digital technologies' on adult users attitudes and actions toward making their homes and lives more resilient to health and hazard threats. The results (1) reflect back how the use of the Hazard and First Aid apps influenced (or not) the actions and/or attitudes of adult users to make their homes and lives more resilient; and (2) help guide future exploration on enhanced design of digital delivery methods.

The user study findings demonstrate that use of the RC First Aid and Hazard apps are influencing adult users' attitudes and behavior toward preparedness. Our analysis shows how this is occurring, and how what users bring with them plays a relevant role in influence. We identify seven interrelated themes named in relation to use of the apps and how their messaging collectively contributed to or influenced the behaviors/attitudes named by the participants. (See Table 5, Section III.2) The themes provide an initial mapping of (1) what is influential in the uptake of preparedness messaging via the RC apps and their messaging; (2) the attitudes and behaviors that are being reached; and (3) relevant ways for grouping users for more tailored design. Three distinct audience types (Section III.3.) emerge, mapping specific audiences for more effective targeting of user's motivations and ways to tailor messaging to their expectations, motivations and individual needs.



3. Design Process Review – Innovation Constrained by Tech Tradition

What are the current application design methods, assumptions and aims?



We interviewed members of the design and development teams for the Red Cross First Aid application and the GPC Hazard application to map an understanding of (1) the current “As-Is” state of how effective messaging is currently factored into the design of apps and what methods are being used. We conducted semi-structured interviews people who were involved with the GPC Universal App Program or a related project and the British Red Cross First Aid app for capturing both RC agents and 3rd party technical designers product design and development priorities, approaches and processes.

Interviewees told a consistent story of doing the best possible job while working under time, organizational and technical constraints. These constraints resulted in design and development processes that were less participatory and comprehensive than the interviewees would have liked them to be. In general, design and development focused more on optimizing access to and presentation of content than on impact of the application.

Overall findings from the interviews were that:

- Strong vision by RC leadership pushed designers to expand beyond usual technical priorities in order to meet more of RCRC’s unique messaging requirements.
- Content development focused on motivating, enabling, and guiding the users by clarifying the actions they should take and building their self-efficacy.
- Developers employed a waterfall methodology
- Users were involved in summative testing, but not in the design process
- If there had been more time and organizational cohesion, designers would have used a more iterative, participatory methodology

Strong participation and oversight by experienced RC leaders of the design priorities and requirements can be linked to many of the influential successes revealed in the User Study. However, technical priorities and the use of Waterfall rather than participatory design methods contributed to some disconnect between achieving learning and action during an emergency and how the apps were designed and tested.

III. KEY DISCOVERIES:

The key discoveries included here are a synthesis of an analysis across the three baseline studies toward understanding effective practice for preparedness messaging and digital design approaches that support that practice. The discoveries highlight an advanced methodology for preparedness messaging curated within RCRC practice that centrally positions the principle of “agency” in messaging and design. This RCRC approach uniquely harnesses the more recognized principles of motivation, ability, and trigger for more nuanced tailoring to the receiver. The findings ultimately suggest that while predominant digital development methods currently lag behind in their ability to fully meet the dynamic and socially agentic digital needs of RCRC preparedness messaging and design, innovative use of hybrid methods that incorporate participation and human-centered methods are reaping returns.

Key Discovery 1: Effective RCRC preparedness messaging is agency-driven: front-end tailoring uniquely activates agency to strengthen message linkage to receiver-specific motivations, abilities and triggers for action.

RCRC societies uniquely prioritize agency in messaging. In order to develop effective messaging for their particular mission, audience agency is activated to drive the message design through situating of tailoring activities at the beginning. Front-end tailoring is achieved via participatory design methods, creating a forward function for embedding audiences’ preferred determinants. In doing so, RC’s approach advances a broader trend in messaging literature to shift authority from sender to the receiver to the receiver actually *designing the message, itself*.

Among the sub-elements, in RCRC literature, the strongest determiners of achieving positive action are aligned with humanitarian assumptions of the community’s self-determination and self-efficacy, making determiners like agency and tailoring central to design. These are central to the humanitarian ethos. However, common effective change strategies such as fear appeal and non-transparent competitive appeals are not compatible with humanitarian codes of conduct. (Fig 2)

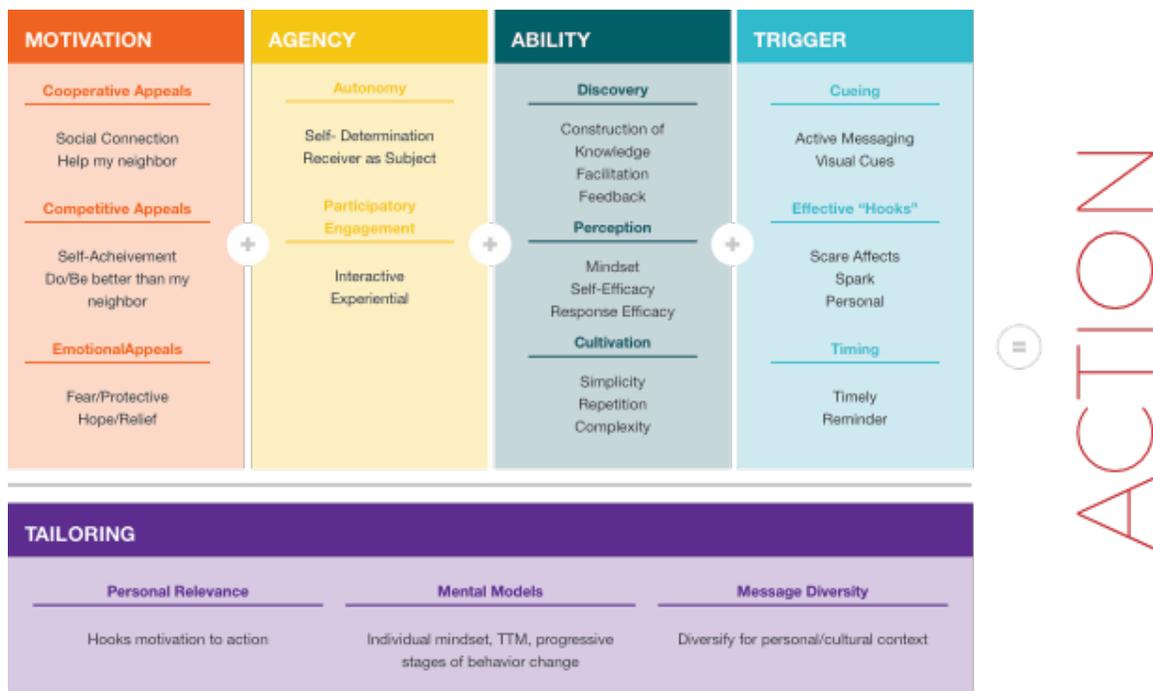


Figure 2: Effective Messaging methods reflected in RCRC preparedness literature

Contrasting from the disciplinary approaches , the RCRC approach accommodates a much more specialized or localization of all the messaging determinants by resituating “tailoring” to the front of the process as reflected above in Figure 2.

$$\text{Tailoring} + \text{Agency} \rightarrow \text{Motivation, Ability, Trigger} = \text{Action}$$

Doing so activates the audience’s agency as the driver of the message design. While this shake-up in flow may create a greater burden to the front-end of the process, it seems to offer RCRC a more reliable linkage for embedding an audience’s precise motivational, ability, and trigger needs for behavior change within the design.

Key Discovery 2: RCRC First Aid and Hazard apps influence on preparedness attitudes & behaviors align with design decisions that prioritized the five principles of effective messaging. Additional areas of influence manifested where users could express more agency.

The First Aid and Hazard apps user study revealed that use of these apps have influenced the actions and/or attitudes of adult users to make their homes and lives more resilient. Factors such as trust in the source of information, a mindset for learning or preparedness, people’s ecosystem of preparedness, the application’s ease of use, and other identified factors, work together and contribute to change in behaviors and attitudes.

Table 5: Summary of Design Influences on Preparedness Behavior

<i>Design influences on improved preparedness attitudes & behavior (e.g. intent, belief, awareness, action, etc.) according to users’ self-reported experiences after using RCRC First Aid and/or Hazard apps</i>	
RC Design Influences	Broader Influences
1. Alerts Trigger Action and Awareness	5. Mindsets for Helping, Learning and Preparedness Motivate Uptake
2. Alerts and Messaging Are More Influential When Filling Capacity Gaps	6. Apps Are Part of a Trusted Preparedness Ecosystem for Validating Information
3. Quizzes and Alerts Are Motivators For Learning and Awareness	7. Primary Users’ Multiply Reach of RC Apps through Transmission
4. Ease of Use and Visual Design Increase Confidence and Reassurance	

Design Influences that Aligned with Design Intention

Among the seven identified, interrelated themes, four are influences that align with the intentional aims within the design that aligned with RCRC effective messaging determinants of *motivation, agency, ability, trigger* and of localized and individual front-end *tailoring*. These linkages were specifically ushered through by RCRC experts on the team in the roles of content manager and project advisor who worked closely with the developer and designers.

1. Alerts Trigger Action and Awareness

Participants view the alerts in the Hazard app as warnings, which successfully served as a significant trigger to awareness or action. This is in line with the design intention for alerts to be the trigger that drive the user to read about preparedness information. Alerts activate participants to survey the other resources in their preparedness ecosystem to either validate the alert or get more information about it. In other words, the alerts initiate a heightened awareness in people to stay informed by checking other sources, paying more attention to the hazard risk, or rethinking their priorities. Further preparedness actions inspired by the app include sharing the alert information more widely, to shoring up property or changing upcoming plans.

2. Alerts and Messaging Are More Influential When Filling Capacity Gaps

Use and influence of the apps and their messaging were most often named when filling a unique capacity within their desired information ecosystem for preparedness. This reflects an intentional design attention by RC managers that echoes the effective messaging principle of *ability*.

In the Hazard app, a requirement was for the ability to allow local government feeds. Participants from New Zealand told us that the RC Hazard app is the only source that provides alerts on tsunami and extreme weather. In particular the NZ Hazard app actually partnered with the local emergency providers to merge and discontinue the predecessor alert app. In the First Aid app, BRC sought to create unique features to make the app action-focused. Features such as CPR metronome, strobe light, and ‘I’m safe’ notifications were named by users as things that were new capabilities drawing them to the app. They were considered actual tools of their first aid kits and led to greater awareness due to these additional unique, capabilities it offers.

3. Quizzes and Alerts Are Motivators For Learning and Awareness

RC learned that quizzes were popular in drawing users to the app. The use of quizzes provide a motivational competitive appeal to the users, and earning badges gives a sense of self achievement, and a greater sense of agency. Once they began using the apps, participants expressed increased learning and awareness related to preparedness and resilience. Reading the alerts and informational components, especially the quizzes, leads to discovery or building of new knowledge, which motivates increased awareness of key preparedness activities. Participants said that when they learned or discovered new knowledge in the apps, they felt more motivated to stay aware and be prepared, i.e. information in the apps increased participant’s motivation to be more aware.

4. Ease of Use and Visual Design Increase Confidence and Reassurance

Design teams from both apps incorporate effective messaging practices of *motivation, ability, agency* and upfront *tailoring* with a shared focus on simplicity and ease of use within content presentation and formatting. Participants reported that ease-of-use, and navigation making information more easily accessible, influenced positive uptake of information, and removed barriers to action and increased confidence via 1) the tailored nature of the messaging, 2) the visual components, and 3) the all in one nature of the apps.

Messaging and alerts where participants received information about what to do before, during, and after emergencies led them to feel more confident. The images and multimedia featured different ages and ethnicity, within their culture to whom users could relate. That this information was tailored to their own environment and needs made it more easily actionable for them.

Participants indicated that with the videos, and step-by-step GIFs of the instructions they felt more reassured that if they ever found themselves in a first aid emergency, they would be able to handle it. The visual nature allowed participants to navigate quickly, as well as digest the knowledge and make things easier to remember and perform. As people became acquainted with information in the apps, they also perceived that preparedness actions were easier to perform, even though they were not medical professionals and/or disaster response experts. That the videos were “real-life” increased their sense of self-efficacy and response-efficacy.

Both apps consolidate information in one place, allowing for quick and easy access during a time of panic, and have become an anytime, all-in-one companion in participants’ preparedness ecosystem. Participants indicated it had become natural for them to pull out the smartphone and read information from an app as needed. The way information was presented in both apps helped participants gain confidence in their preparedness knowledge and capacity. This in turn reassured them that they could make a difference, which increased self-efficacy (ability + agency), response-efficacy and their motivation to act.

Influential Opportunities for Future Design Intention

The three following themes reveal broader systems interactions that synergized opportunities for influencing improved resilience via RC apps. These influential dynamics enforce the importance of *mindset* and introduce social factors of *ecosystems*, *trust* and *transmitting* in influencing behavior change for improved resilience—identifying expanded areas for future design and research of preparedness apps.

5. Mindsets for Helping, Learning and Preparedness Motivate Uptake

Most significantly, participants often credited personal values or interests in helping, learning or preparedness to a pre-use mindset for taking preparedness actions or seeking awareness. Attributing a pre-use mindset with a personal or professional sense of responsibility for helping is a universal driver for RC app use in this study. All participants mentioned having some sort of interest for building knowledge (a mindset for learning) or for wanting to stay vigilant (a mindset for preparedness). For four participants who take seriously preparing for disasters (aka “preppers”³), preparedness stemmed from a career or hobby in anticipating disasters.

MindSet Barriers to Uptake. Although our recruitment consisted of users active in preparedness, users also revealed mindset barriers to preparedness messaging that impeded app usage or prevented users from taking preparedness actions. These included lack of resources (such as time, space, and money), lack of perceived risks in the disasters, and uncertainty as to the value of taking actions

6. Apps Are Part of a Trusted Preparedness Ecosystem for Validating Information.

Digital apps do not exist in a vacuum. They exist as part of people’s greater preparedness *ecosystem*, which includes other trusted sources used to help people stay aware and prepare for emergencies. With the First Aid app users, the app took a more prominent role in the ecosystem, depending on it as having everything they need for first aid. Users saw this app as not only part of their first aid “toolkit” in terms of information, but also as a tangible “thing” within their first aid kit.

Trust contributed to participants feelings of reassurance and confidence to act on or share information from the apps. Both First Aid app participants said that they use the app and trust the information because it is a product of Red Cross, and that they see Red Cross as a trustworthy and credible organization that they can rely on to give them accurate first aid knowledge. Hazards app users trusted the local emergency agency hosting the app. Further, when exchanging information from the Hazard app with others, receivers trusted the information because they trust the person validating or sharing it.

7. Primary Users’ Multiply Reach of RC Apps through Transmission

The influence of the Red Cross messaging reaches more people than is indicated by the download numbers, because participants regularly share the information from the apps. We call this action “*transmitting*.” This transmitter role was true of all participants, where users monitor the specific locations of people they care about or feel responsible, and notify those people when risk heightens. We heard stories of a father monitoring for his son, a man watching out for the elderly in his community, and a foreign consul concerned for his citizens’ well-being.

³ <https://en.oxforddictionaries.com/definition/us/prepper>

Key Discovery 3: Common determinant pathways to action emerged in three distinct audience types emphasizing trust as trigger for expanded influence.

Participants bring pre-use mindsets that vary in distinct ways in hazards and first aid, mediated by related factors such as trust in the information source and a personal ecosystem. Three common determinant paths to action existed among participants in how they used the apps and responded to their messages according to pre-use mindsets.

Audience Type 1: Preppers

“Preppers” appear to be people who have extensive prior experiences in related preparedness or emergency fields. Preppers have a fairly extensive preparedness ecosystem, and the Red Cross apps are one of the many established, trusted resources they rely on to obtain information for different, specific crisis information.

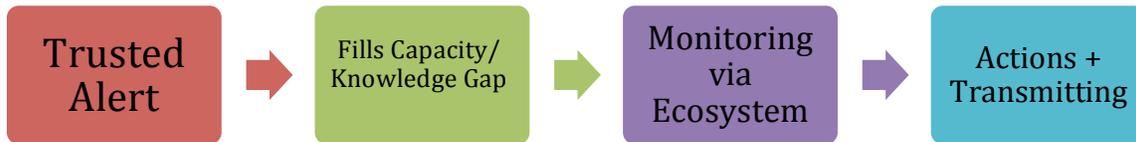


Figure 3: How several factors work together and contribute to action for “Preppers”

Once Preppers receive an alert from their ecosystem—the alert triggers them to survey other sources to confirm the information received, and continue to monitor the situation. They will take their own personal preparedness actions and, at the same time, transmit what they know by sharing the alert information with other people in their network.

Audience Type 2: Learners

“Learners” focus on using the apps, particularly the First Aid App, for learning and exploring new knowledge. They seem not to be as experienced as the Preppers in terms of disaster preparedness, but are motivated by learning and have prior exposure to relevant knowledge through reading or training. Learners require a chain of activities to occur before they have sufficient motivation to act on app messaging.

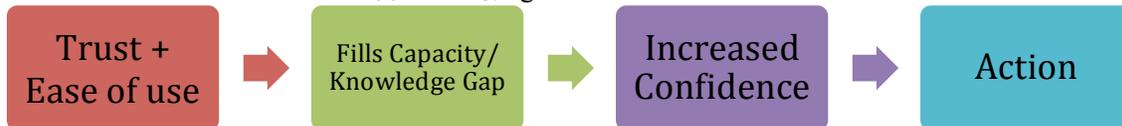


Figure 4: How several factors work together and contribute to action for “Learners”

Generally, Learners need to develop a feeling of trust in the app’s information source, reinforced by the app’s visual presentation and ease of access to the data. They then use their own initiative and capability to navigate to messages that fill their knowledge gap. This results in increased confidence in their own ability to act in emergency situations. As a result, the person feels more motivated and ready to act.

Audience Type 3: Trustors

“Trustors” are secondary “users” of the Red Cross apps. They do not have a predisposed mindset or the resources to stay vigilant and prepared. They are not users of the Red Cross apps or other preparedness apps. However, because of their relationship with and trust of another person who is a member of one of the first two audience types, they benefit from the messaging in the apps.

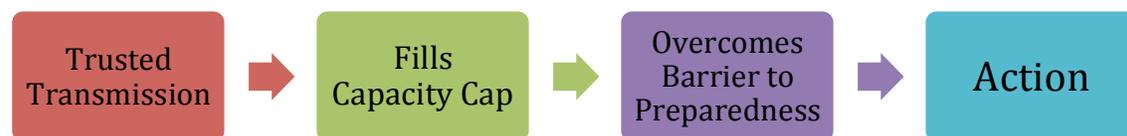


Figure 5: How several factors work together and contribute to action for “Trustors”

Information is transmitted to Trustors by someone with whom they have a trusted relationship which overcomes their tendency to block out such information. The Trustor takes preparedness actions based on the triggers passed by their trusted transmitter. Here, trust allows RC preparedness information to cross over to non-users of the apps, and overcome a distinct mindset barrier to preparedness information.

Key Discovery 4: Digital application designers doing Agency-driven design are using holistic, highly participatory, front-end design methodologies. In some compelling ways, so is RCRC.

To translate RCRC effective messaging into digital design, design and development methods will need to accommodate front-end tailoring for the activation of agency.

A place where tech designers are intentionally focusing on agency is in the design of Human – Centered Systems. Shared among these designers is the use of highly participatory methods which include members of social system or work system from the very beginning of the typical discover-define-design-develop process (i.e. especially on the front-end), and holistic iteration across the design-develop divide.

Via this study we found strong practice-oriented RC managers--when working with especially flexible 3rd party technology developers in the creations of the RC Hazard and FirstAid apps—were able to guide technologists using traditional (e.g. waterfall) methods to innovate similar practices into their design process. For example, in the FirstAid app the RC manager prioritized content presentation inline with educational design knowledge. In the Hazards App, the manager participated closely to direct design of the content management system ensuring the “how” (shared RCRC practices) to be universal while he directed the parameters for the “what” of design (videos, language text) to be localized. With extensive experience or knowledge of practice, their leadership role over the project presented a situation where the designer could often act in more of facilitation role while the RC member guided design.

IV. APPLICATIONS:

1. Recognize RCRC’s agency-driven messaging approaches are leading in the innovation for meeting digital social challenges.

RCRC is already practicing sophisticated messaging— and in fact have advanced beyond the disciplinary shift in authority from sender to receiver. That is, extending receiver interpretation to receiver-driven messaging. With a lens for activating agency, their approach brings more than self-efficacy. Autonomy itself becomes embedded as the source of motivation, removing a dependency on the designer to devise multiple motivational approaches. RCRC resituates specific context from being added to the determinants in a post-editing fashion, to context defining the core messaging from the beginning.

Significantly, this advancement offers the wider disciplines leadership into advancing effective messaging. Further, it creates new kinds of challenges and insights for digital messaging, bringing the call for innovation from design and developers of digital technologies that hold possibility for a broad range of social advancement digital needs.

2. Evolve evaluation & metrics to include assessment of actual preparedness behavior and expand profiles of the preparedness app audiences.

Assess behavior and attitude impacts (e.g. qualitative research & data on behavior of users)

Although we conducted a small user study, it reaped a great deal of learning about influences on actual behavior. It is essential that RCRC conduct future research include some studies that seek to assess actual preparedness behavior changes in persons such that cannot be viewed through data on application use. While technology designers are often required to test and validate that their systems technically “work” as they intend, and left to their own devices, designers will often sacrifice carefully constructed design goals for technical priorities. Thus, this important level of assessment rests with the domain experts.

Leverage the user study themes.

The themes revealed in the user study provide an initial mapping for understanding how current apps are influencing changes towards stronger preparedness attitudes and behaviors. While this provides a great deal of initial insight, leveraging this learning for greater application requires more in-depth research.

Expand User Type Profiles

This initial view of profiles comes from a very small subset of users. Scaling user studies to recruit a more robust cross-section of users promises to bring even greater insights for capitalizing on RCRC’s effective approach to upfront tailoring--where Red Cross might more specifically identify user’s motivations and identify ways to tailor messaging to the expectations, motivations and individual needs of broader audiences.

3. Use current RC apps innovation learnings to advance agency-driven digital design approaches

Designing for Agency

The transfer of RCRC’s sophisticated messaging more completely into a digital context is not straight-forward. Agency’s role as driver in RCRC effective tailoring creates various dilemmas for current common approaches to application design:

- It is necessary to not have an end product in mind.
- The central position of trust and participation, where the community must drive decisions in order to reach effective outcomes.
- To be effective, the design has to be holistic so that community decisions can be incorporated throughout the entire design process.
- The time required to allow community agency, enable participation, and holistic iteration, requires more time.

As our analysis reveals agency as a critical determinant for effective messaging in disaster preparedness to achieve behavior change, it is vitally important for designers to explore more cutting edge innovations to achieve social agency in the design process. With a focus on the “user,” traditional design limits methods to a subset of a chosen-technology’s feature iterations and predominantly reside isolated from both socially and technologically holistic iteration needed to address social agency within design.

Design methods for human-centered systems are an alternative that can better meet the needs of agency-driven work, but require longer timelines and greater participation. RCRC might benefit to incorporate structure to support highly participatory methods and invest in robust training in human-centered methods for managers leading digital initiatives. RCRC is uniquely positioned to lead researchers in *the innovation of methods for technology design and development that can better serve social agency.*

APPENDIX A – Determinant Descriptions

The five primary themes across the literature that determine whether a message will positively influence the behavior and attitude of a receiver consist of four receiver-focused determinants: *motivation*, *agency*, *ability*, and *trigger* and a fifth overall theme of *tailoring*.

1. Motivation

Understanding and connecting to the target audience's motivation to act is a shared focal point across the literature for engaging potential change or action. Appeals to motivate the audience reflect the wider shift of authority from sender to receiver in messaging. These appeals are not usually stand-alone, but more often are linked to increasing ability, agency, and/or providing a trigger to act. Across disciplines, motivational appeals can be grouped as follows: (a) cooperative appeals, (b) competitive appeals and (c) affective or emotional appeals.

2. Agency (ownership)

Stemming from psychology and anthropological roots, *Agency* has been described as individual-centric power for transmitting personal meaning through the means and ends of one's own actions, capacity, or decision-making. (Kockelman). Explicitly, it positions people as agents of their humanity or subject, *acting* rather than being acted upon. Where rhetoric focused on informing and persuading listeners to believe or act based on the quality of the message, agency shifts the listener's role from receiver of the external message to interpreter, arbiter and subject. Agency is the critical link between motivation and ability to take action.

Overall, while the literature alluded to notions of agency, only education explicitly positioned it as a central theme for learning and holds the most advanced understanding and methods for providing it.

3. Ability (to change or take action)

Much of the thinking on ability, is born out of Social Cognitive Theory: to act, an individual must know what the behavior is and have the skills to perform it. E&L theories are rooted in developing one's ability or capacity to know. However, ability is predominantly viewed as an enabler of motivation. The information processing model in TC, to listen, like, then act---reflects this view, where physical effort and brain cycles (i.e., thinking) are elements of ability linking to a motivational aspect to bring action. While PT places motivation at the forefront of their approach, it places second to this, increasing ability performance, (Fogg: increasing motivation is not always the solution to behavior.)

We group effective messaging methods in three areas related to targeting ability or capacity:

- *Discovery*--- to be able to recognize, learn and perform the required action;
- *Perception*—One's orientation, assessment or view of their own or others' ability
- *Cultivation*—to nurture and grow the possibility of a capacity or way of thinking

4. Trigger (to action)

Triggering is aimed at eliciting specific actions via brief and specific message design techniques. Trigger is predominantly the culmination message of previously cultivated motivations, abilities and agency and intended to directly link from those to acting.

- *Cueing*--- linking previous messages, experiences or lessons to a call to act.
- *Affective 'Hooks'*—linking emotional reactions to action.

- *Timing*—the relevance of linking when individual is near to the junction of heightened motivation, awareness, or ability with a specific desired behavior.

Cueing and timing is present across disciplines but cueing is especially central to PH. Affective Risk & E&L triggers tend toward the affective hooks of individuals, while Fogg offers a need for diversity, identifying three types of PT triggers: facilitator, spark and signal.

5. Tailoring (to the Receiver)

The disciplines emphasize recognition of the power of personal relevance as a link to action, catering to the individualized mental models of the listeners, and creating diversity in delivery. Tailoring to the individual as much as possible is the rule of thumb, and makes up a large amount of an organizations efforts to craft messaging. Motivational messaging is predominantly targeted at the personal level. While collective social motivations can boost individual motivation, good messaging constantly names the need to accommodate audiences as specifically as possible.

While the post-tailoring approach allows for a more universal initial message that can be broadcast quickly, it requires extensive rework and validation for greater localization. It also creates central constraints within the message design to holistically address the motivation, ability and trigger needs of diverse audiences and cultures.