

Considering Practitioner-Driven Innovations: Accommodating Information Systems Within Successful Humanitarian Work

Robin E. Mays, Melissa Braxton, Andrew Berry, John Robinson
Dept of Human-Centered Design & Engineering
University of Washington
Seattle, WA USA
rmays@uw.edu

Abstract—This paper offers an in-depth analysis of how technology emerged in stories of success from interviews with Red Cross/Red Crescent (RCRC) humanitarian aid workers named for doing good work. Our findings reveal that in these contexts, technology exists, for the practitioners, much like a language—diverse according to environment, culture and skill. As such, practitioners’ core mission to effectively identify and communicate the needs of communities among stakeholders and throughout different organizational levels drives innovation. First, the environment demands innovations by practitioners to ensure the transfer of information, and it’s embedded meaning, are bridged across disparate technological modes and information systems. Second, we found a common problem-solving perspective toward work, awareness of gaps in the flow of meaning and information across stakeholders, along with multi-modal, multi-cultural and interpersonal fluencies active where innovations occur. Third, when empowered with the autonomy to adapt tools, successful practitioners are able to support the effective transfer of meaning across cultures, organizational perspective and technological environments. Ultimately, these findings enhance our understanding of the use of technology in humanitarian work. It provides insights for ways to maximize technology effectiveness and reconsider the focus of design beyond the technology alone, and instead calls for a socio-material approach acknowledging technology as part of a larger, more complex system of systems.

Keywords—*Humanitarian practice, humanitarian technology, innovation, effectiveness, disaster preparedness, disaster response, resilience, adaptation, technology design, adaptation, tools.*

I. INTRODUCTION

There is a gap in understanding the hidden successful work of humanitarians and, specifically, in understanding how technology, broadly defined, is accommodated—and innovatively accommodated—to effectively support their successful collaborative work. This paper presents an analysis of where technology was named in stories of success from interviews with Red Cross/Red Crescent (RCRC) practitioners situated closest to the local communities they serve and recognized as doing successful work.

Our findings show where technology emerged in accounts of successful work it was accompanied by practitioner innovations for preserving meaning across multiple

stakeholders of varying cultures, organizational perspectives and technological environments. The core work of humanitarian practitioners in the field is to meet with local communities to help identify their basic needs (such as food, water, sanitation, shelter and safety), and then to help identify ways (resources and capabilities) to meet those needs while preserving the dignity of individuals, in alignment with human rights, international humanitarian law and other codes of conduct. In this role, they are often communicating the needs, for example, of a person living in poverty in an isolated village in poor country (eg, a mountainous village in Nepal whose access to water and transport was destroyed by an earthquake), to a person working in a large urban modern city for a humanitarian organization of a rich western nation (eg, a person working in a large, well-resourced office in Brussels who lobbies rich governments and people for monetary donations.) One person’s primary technology for communicating information may be a verbal way of speaking in their cultural language (i.e. if I am illiterate even pencil and paper are unhelpful technologies for me to communicate to others), while a western organization’s primary way of communicating information to others may be over emails or via excel spreadsheets, or other computer data systems.

For these practitioners, technology tends to exist and operate in their work much like basic languages (eg. English vs French vs Swahili) spoken by different subsets of stakeholders. Differing technological “languages” tend to group around stakeholder groups who share a similar work/communication culture and technological capacity or ways of using information and communication technologies (ICT). A key factor of technology within the practitioner experience is how it supports the practitioner to communicate critical information among multiple stakeholders operating with varying primary technological “languages.” We observed certain types of information or information sharing scenarios as commonly requiring an innovative way to translate and carry meaning across these diverse technological languages and environments. We observed practitioners and other self-appointed “translators” necessarily emerge to bridge meaning between “languages”: innovating and adapting to meet a wide range of technological preferences and capacities.

Finally, we observed, where innovations are necessary is where information systems may also serve as obstacles to

successful humanitarian work. These findings have implications for humanitarian organizations seeking to support practitioners' success with technology. The innovations required by practitioners suggest resources and effort directed at propagating a particular once size fits all information architecture might be better directed toward design efforts in support of practitioner's needs to translate meaning across diverse technological languages. Future work should explore ways to support the practitioner-driven needs for preserving meaning across information systems.

II. BACKGROUND

Arguably, no work is more innovative than humanitarian work. Disaster preparedness work seeks to understand risks facing individual communities if a conflict or crisis were to emerge and assist communities in building resilience to those risks. Humanitarian response work seeks to provide support to communities in the midst of rapidly changing and dangerous situations of ongoing crisis. Humanitarian practitioners operate in distributed and highly varied contexts; and with a wide array of multi-cultural stakeholders of diverse languages, designs, perspectives and motivations. [1] The nature of lowest-level decision-making and demand for highly flexible ways of operating within humanitarian work, leave scholars and practitioners wrestling with questions of how technology does, and can, support effective collaboration in such unpredictable, varied and dynamic contexts [2]

Since the turn of the millennium there has been an increasing openness by traditional humanitarian organizations (eg. non-governmental organizations (NGOs,) United Nations (UN) agencies, and other foreign aid agencies) to accommodate the escalating interest and criticism by non-traditional actors (eg. for-profit agencies, academia, such as ICT4D, see next paragraph) that there is a need for greater innovation and the integration of technology within the humanitarian sector [3]. Humanitarian organizations, themselves, are embracing the call to increase technology use, investing larger and larger amounts of time, money, partnerships and research. The RCRC dedicated it's annual World Disasters Report for 2013—on the technology and the future of humanitarian action [4]; In 2014 Medicins sans Frontiers (MSF, or aka. Doctors without Borders) began an annual scientific days to showcase it's efforts in innovation and technology [5]; and in 2012 the World Humanitarian Summit 4-year process was launched across the industry to address future innovation challenges [6]. The past five years have seen a burst of multidisciplinary, cross-sectoral communities, conferences and movements co-led by humanitarian agencies such as the World Conference on Humanitarian Studies (WCHS) and the Humanitarian Innovation Project (HIP). With this greater involvement from those who perform the work, we entering into an era of hope for greater understanding for the wider socio-technical¹ complexities of use technology, its relationships to, and promise for, supporting and improving humanitarian effectiveness.

¹ Leonardi [14] would acknowledge the system as a whole as a socio-technical system (the humanitarian organization, practitioners, community members, technologies, customs, norms, roles, hierarchy, etc.)

Historically, the Information and Communication Technology for Development (ICT4D) began to gain traction in the early 2000's, as one of the earlier emergent technology-oriented communities devoted to the use of ICT in eliminating poverty and empowering poor and marginalized communities in developing countries. ICT4D scholars [7] caution against a modernization perspective and against imposing development agendas that are biased toward a Western, democratic, capitalist and/or Christian ideal in communities with their own unique development goals. However, primarily born out of technology academic community, much of this literature focuses on imposing tools and technological capability where technological capabilities and increasing technological literacy are often introduced as neutral or positive [3]. ICT4D predominantly posits, and in some cases directly proposes, that the propagation of ICT into developing communities is desirable and that technology's "success" in these communities hinges on its diffusion [3, 8]. Embedded in this view, technological literacy is equated with the ability to use tools as designed. Access to technology is equated to use, which equals increased knowledge, which equals improved lives.

We hold a pessimistic summary of the perspective that: disadvantage stems from lack of knowledge and information; knowledge and information stems from a central point, usually the government, and that this knowledge is by definition beneficial and useful to recipients [3]. This echoes "universalism"—which has pervaded the forward ambitions of technology design for decades—a way of framing "best" solutions as though seeking a single universal design for all. [9] This perspective is now prevalent in efforts to harness technology in service of humanitarian goals. Even within long-standing aid agencies, we see an association with technology which belies a modernization perspective [4]. Such top-down perspectives are problematic, hindering innovation at the lowest-levels.

Technological capability and technological literacy are not neutral concepts. Historically, technological literacy theory recognizes the much broader distinction of a power within technology diffusion. As early the 1960s researchers hypothesized top-down approaches could be avoided "by making sure that the messages were culturally relevant, properly explained, and correctly targeted. [10] Equally importantly, communication had to be a two-way process "so that target groups could take a more active role in overcoming their resistance to change." [11] This is consistent with the findings from our larger study on RCRC successful work (which this study is derived): where, underpinned by trust between practitioners and their community partners, the practitioner's central ability to adapt (ie. innovate) and allow agency within communication and processes are critical to success, and therefore, also to successful humanitarian technology design. [12]

Therefore, we offer that more relevant to the values of humanitarian culture and more relevant to the successful practice of its work are critical-cultural perspectives of technology [13], accounting for socio-material aspects of technology and implications for affecting greater social systems, cultures or balances of power. Such perspectives express (even if only tacitly) the need for flexibility in the

materiality of technology to accommodate, for example, the practitioner-driven innovation necessary for accomplishing successful humanitarian work. Understanding the impact technology will have on culturally relevant and reciprocal information exchange requires a socio-material approach. Stephen Petrina [15] calls for “critical technological literacy:” Being critically literate of technology means that we have: (a) a critical orientation to representations of technological literacy; (b) the sensibility or critical intention to engage politically with technological practices such as those that sustain high rates of capital, consumption, inequities, and unegalitarian distributions of profit and waste; and (c) the political or critical agency to mobilize and produce actions and ‘texts’ that work against or ‘jam’ the discourses and works of culturally and ecologically destructive technologies.”

As such, this paper advances a critical-cultural perspective on technology, technological capability, and technological literacy that draws on the Orlikowski’s concept of sociomateriality that recognizes that technology is not the innovation, but instead accommodates the innovation of the practitioner: in which “what is sociomaterial is not the technology, but the “practice” in which the technology is embedded.”[8]. We advocate for more field research informed by practitioner perspectives to illustrate what it may look like to be critically technologically literate in humanitarian contexts. This picture is intended to help inform action moving forward in design, policy, humanitarian practice, and future research.

III. METHODS

This qualitative study analyzes data from 91² of the semi-structured interviews of practitioners who were peer-identified as doing successful preparedness and response work as part of a larger project conducted on successful humanitarian work within Red Cross and Red Crescent (RCRC) societies. That study aimed to understand *What are successful RCRC practitioners doing that works?* with a focus on information needs, and the findings were written into 44 page operational report [10]. The findings revealed information (data) most critical for practitioner success resides in the local communities being served. This data is accessed by *The 4 Must-Have’s of Success* (figure 1). Through a practitioner’s facilitation of *trust* with an *organized* community; and the promotion of community *agency*, the project achieves *long-term impact*. It provides a basis for understanding for how information is valued within successful humanitarian work.

² Six societies named for doing good work, that were representative of the larger study’s preparedness-relevant categories, all geographic regions, and able to participate, became the focus of in-country interviews and observations: Colombia, Jamaica, Burkina Faso, Uganda, Kyrgyzstan and Nepal. We conducted a total of 96 additional interviews with national, branch and local level society presidents, administrators and project implementers (including health, water, sanitation, shelter, refugee, response, disaster risk reduction and other projects) these societies, investigating and observing successful practice in each country for two weeks. Five of the 96 interviews were not coded due to unavailability in Saturate at time of coding.



Fig. 1. The 4 Must-Have’s of Success depicting the overall flow of successful humanitarian practitioner’s work for accessing critical information for effective disaster preparedness and response work. [12]

Building on our learning, this paper addresses, a question we were next motivated to ask: *How did technology emerge in successful practitioners stories of success and failure?*

The qualitative analysis described in this paper investigated specifically how technology emerged within practitioners experiences of successful work. Interview transcripts were loaded into the web-based qualitative analysis platform³ for group analysis. Two team members first open-coded all transcripts, labeling all instances where technology was described or named within the text data. Second, a team of five researchers, including the lead interviewer and a humanitarian practitioner then conducted discussion of emergent open-coded themes, iterative interpretation and analysis of the specifically identified data, and iteration of the open codes into focused-themes. Focused-theme analysis consisted of writing memos to elaborate, define and refine the focused themes. The team then used affinity diagramming to further analyze, revise, define and establish relationships among the themes. A diagram depicting those themes and their relationships is shown in figure 2.

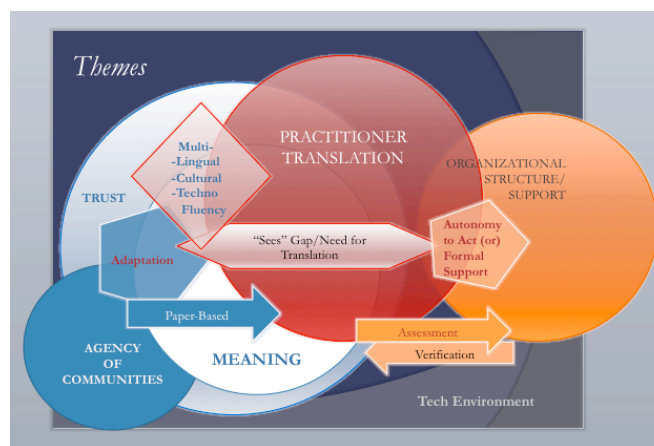


Fig. 2. Final Depiction of Focused Themes.

IV. FINDINGS

Our analysis revealed that preservation of meaning of information exchanged in the field and with the larger organization as an important, yet hidden, driver of successful

³ SaturateApp

practitioners' work. Information technologies in RCRC's examples of successful work are consistently accompanied by practitioner care and facilitation for carrying, translating and preserving meaning throughout the information journey.

Where work and technology joined together, practitioners were actively innovating to preserve meaning. Failure to achieve these meaningful connections limits the organization's ability to incorporate technological options in achieving a successful sustainable impact. The subthemes (see figure 2) that emerged from the data have been organized into three sections:

- *The Journey of Information:* How practitioners access meaningful information via trust and agency, and preserve meaning as information journeys across stakeholders and modes of communication
- *Environmental Barriers to the Transfer of Meaningful Information:* The contrasting perspectives of the work and technological environments around uncertainty and options throughout the organization that creates disconnects in the effective flow of meaningful information.
- *Translating Across Boundaries:* Successful practitioners' critical and hidden work of escorting meaning across technological, multicultural, and personal boundaries.

A. *The Journey of Information*

In order to understand where technology was helpful or not, it is important to understand that technology serves as a carrier of information as it traverses between stakeholders in various forms---going from one mode of technology to another, each stakeholder interpreting and adding meaning, the information and mode changing along the way based on whose domain (or perspective) it is traveling through. Meaning is the critical component that we found practitioners shepherding along the journey which allows information to hold its value across stakeholders and ability to bring sustainable impact to work. The most critical information practitioners reported as needed for success—whether status updates, identification of needs, appropriate resources or strategies appropriate to the local environment—was provided directly by community members. Therefore, from the beginning, successful practitioners go to great lengths to secure trust, agency and adaptation in their methods at the community level to ensure projects are originating with meaningful information or data.

1) *Relationship, Trust, and Meaning*

For some stakeholders in this journey of information, the meaning of information they interact with starts in another country or culture or with a group of people in a community they have never been a part of. What one may think is important to collect, see, know or do may not be fully representative of what is actually occurring. This disconnect is one of the first places information can go wrong in efforts to bring impactful results. A disconnect in a lack of understanding of the culture of another and meaning of information originating from another stakeholder will lead to unhelpful actions and efforts.

Practitioners and different levels of the red cross and practitioners are keenly aware of their responsibility to convey, community needs properly, to preserve, in particular, the community's meaning without distortion all the way through to the those providing funding and calculating metrics. Personal relationships are key to overcoming several of the potential barriers including technological and cultural differences. On the ground, the personal, face-to-face connections are important to understanding the meaning from the people the organization seeks to serve. These connections create a schema or framework through which meaning may be more readily communicated. This often may be a cultural and local knowledge of the community. It is these types of trusted connections that help determine the salience of any metrics and the approaches that will be used, not simply for communication but for any organizational response to community needs. Trust serves as a pre-requisite for both release and uptake of meaningful information between parties, and trust in personal relationships are critical for establishing trustworthy information and data.

2) *Agency, Mode and Speed of Communication*

Preserving the relevant meaning (that which is owned by the community) depends not only on a shared relationship, but also on what mode might be most appropriate for the community to express and maintain agency. We ascribe to a definition of agency as “a community acting in their own power to advocate on their own behalf.” As community members exercise agency, communities come to have a more collective perspective on their needs and can forward their own, more sustainable, ideas and initiatives as an organized group. Therefore, as established trust developed between parties elicits the most trustworthy and relevant information, agency drives the most effective and efficient mode of communicating the relevant information.

For example, in one community, agency was expressed through map-making and storytelling. Members would draw maps of their community and identify through simple stories the region's recent history. Sharing, personal experiences of how disaster affected people during the last earthquake and where, are powerful communication tools and motivators to people. This is especially true when the disasters happened further in the past or happened to a nearby town and therefore people may not remember them clearly firsthand. As communities become confident in their own knowledge, assessment, and voice, they do so in the technological and cultural language that is most effective for their community (in this case, drawing pictures and storytelling.) If community agency is operating—i.e., decision-making belongs to the community—then the community will drive the mode of communication with which the practitioner must also operate.

Further, speed of information flowing via a particular communication mode is relative to its ability to communicate and maintain meaning between specific parties, than its apparent appearance of convenience. In other words, the fastest mode to use is the one that will convey not just words or data, but correct information. Because of trust and agency's critical roles in preserving relevant meaning, this means what is “fast” as a mode of communication —e.g., in person, by phone, by text message, over email or an app or through an excel

spreadsheet,— depends on the ability to maintain meaning across actors and contexts and to be used effectively by those actors. Sometimes the most objectively “fast” option is the least efficient option if it creates a meaning gap.

In one example, a practitioner devised an inventive and resourceful way to help communities deliver information about disaster response needs to an Emergency Operations Center (EOC). Some community members are trained to report to EOC when a disaster occurs: report the community name, number, and the type of issue (e.g., flooding). If there is cell service, the community member will simply call EOC and report the information verbally. However, if cell service breaks down, text messaging may be the only option. This is problematic for communities in which literacy levels are low, but the practitioner discovered that even community members who cannot read or write may be able send text messages:

"Don't ask me how, but they're able to send a text."

Each community knows its community number, so if the community member reporting a problem cannot read or write, they will send a text message with the community number and the issue:

"They normally just call. And I said to them...If you can't call and get me, just put the community name or the community number. Because you know that there are a lot of persons there that, even how they want to help, they might not be able to read and write...But they can send a text. Don't ask me how, but they're able to send a text. So I'll say to you alright, there are eighty-four communities, I'll just number you one to eighty-four. So if you can't spell the community name your number is ten, or your number is twelve, or your number is thirty-six. Just put thirty-six and tell me flood."

The practitioner capitalized on the widespread usage of cell phones, despite the community's low literacy.

B. Environmental Barriers to the Transfer of Meaningful Information

In the previous section we described how important it is to preserve the meaning of preparedness- and response-related needs of communities for successful organizational support as that information is communicated upward from the communities, through practitioners, and on to the organization. In this section we outline key challenges that successful practitioners are addressing in their endeavor to communicate meaning throughout the information journey. These manifest where differences in work and technological environments exist across organizational geography, the contrasting perspectives they bring, and we highlight where organizational support mitigates those differences. Uncertainty in a practitioner's work environment within highly diverse technological environments contrasts with that of organizational administrators (ie. various headquarters support roles) who strive for standardization and stability from a more uniform perspective.) Therefore, we find practitioners sharing stories of successfully navigating these differences where the organization has empowered practitioners' in their translation work.

1) Contrasting Work Environments and Perspectives on Uncertainty

The practitioners' work environment is dynamic and uncertain, not only because they are in the context of rapidly changing circumstances during disasters but also because the community's knowledge and agency needs maximum freedom to access the information needed to bring successful solutions for community resilience. For practitioners to best facilitate communities in accessing their knowledge, communities must be allowed to approach and express themselves in a way that is grounded in community-owned communication. In this state of necessary unpredictability, and the need to remove constraints to achieve community authority, one of practitioners' only certainties is that they need a wide range of flexibility, adaptable tools and approaches to be able to accommodate and respond to the known constant of uncertainty and diversity.

The practitioners' comfort with prevalent uncertainty within their work and technological environment can conflict with common donor and organizational perspectives that tend to seek standardization of data collection techniques and data formats. For administrators who aren't on the ground, the day-to-day work exists under a more uniformly agreed perspective of ways of operating and technological language or capacities that allow information and meaning to move quickly within their organizational community and work environment. Where field practitioners expect to work within the widest range of uncertainty and therefore view their adaptability as part of the work, administrators may treat uncertainty as a problem to be resolved. For example, one practitioner shared a challenge where a donor had requested a specific format of data in an excel spreadsheet about the community where alterations were restricted. As the practitioner had facilitated the community agency in design of the program, essential meaning was derived and conveyed in a narrative form. Recognizing the impossibility of the community to understand the spreadsheet need for the community to speak on their own behalf and the possible loss of their voice, perspective and meaning, the headquarters level manager protested the restrictive requirements of the donor format. She intervened by translating the communities narrative as best as possible into the required excel language and format, and remained bothered by the fact that the organizational system did not support the ability to preserve meaning in the form of the community's conveyance—contradicting their own understanding that facilitating the community's voice is an important best practice.

2) Organizational Empowerment of Practitioner Translation

Donors and higher HQ administrators hold a position of authority where they are able to demand information in certain formats and demand delivery of information using a certain technological language. However, administrators are attempting to interpret information sent to them from practitioners on the ground in order to initiate specific actions and this can threaten the loss of relevant meaning for those decisions, emphasizing the necessity of practitioners' work to translate between their own direct engagement with uncertainty on the ground and the donors' position of relative stability, uniformity, and rational decision-making approach

This general truth highlights a polarized relationship in which the donor and/or higher headquarters of the organization deals with uncertainty through efforts at standardization and uniformity, and while practitioners adapt to accommodate stakeholder agency and diversity in communication in their environment. Yet, our data shows that a successful marrying of these approaches can happen when the organization's information needs explicitly recognize the need for translation.

For example, we see in the case of the response phase, the organization hired a person to sit in the emergency operations center (EOC) and translate information that arrives via different communication modes (in-person, phone calls, text messages) into a standardized report:

"And you can train persons to do it. You can train a series of what we call 'loggers', persons who log the information to take that. Because we have that structure as well – somebody who's specifically there. Their one job in life is to log all the information."

In this case the practitioner is formally empowered and supported in their translation work because it is explicitly recognized as a need by the organization when time is of the essence. He concludes:

"[Having] a logger because the most important thing is to document the information as it comes in. Very important because if you don't document the information there's nothing to report."

The example above points to where the adhoc translation performed by a practitioner can be transformed into a different kind of translation: standing translations. They require experience the same way ad hoc translations do, but the translation is primarily seen to meet the needs of the organizational support roles demand for translated information over the practitioner's or community's need. However, in an example where the higher headquarters explicitly recognized the need for translation to meet the needs of community agency (the practitioner's traditional role vs. the organization's role), it resulted in a highly successful region-wide resilience program.

In the case of another key success story, rested in cultural appropriate graphics being developed and adapted for each disparate culture. The practitioners needed to convey the appropriate meaning within each graphic, and in order to do that, they had to change the images for each region that they worked with the people in that region. The higher headquarters resourced the time and funds to have practitioners meet together to identify those parts of the instruction that could and should be shared across cultures (that which could be replicated) and that which need individual, contextual attention according to the culture and context.

In both these examples where the translation is recognized as an explicit need in two directions, the translator performs a reliable function that allows other systems to develop around that translation, and therefore the organization to scale up the overall work. The work itself becomes recognized and fit into a larger system, expanding the organization's overall capacity and impact to communities.

C. Translation Across Boundaries

We found in successful work, *where technology is present, it is accompanied by the practitioner's translation work*. We found technologies' role in successful work largely depended upon the human component of *translation* work. "Translation" is the term we are using to describe a practitioner's specific innovation efforts and ingenuity that is working to preserve meaning across highly varied technological and cultural environments and gaps. Our analysis shows that navigating these environments successfully relies on the ability of practitioners to effectively convey and preserve meaning embedded within information that flows between diverse stakeholders and their varied perspectives, including divided community, local groups, governments, and multiple levels of the RCRC organization. Sometimes this means adjusting the language of communication to clarify the meaning of a message. Other times this means using technology in creative ways to preserve meaning that would be lost. The successful flow of relevant meaning and value of information across these differences depended upon the practitioner's recognition of the need and get-it-done perspective; their multi-domain fluency in cultures and technologies; and their use of adaptable, often paper-based, tools for ferrying meaning across these boundaries.

1) Recognition and Problem-Solving Perspective of the Successful Practitioner:

Logically, prior to practitioners' ability to facilitate translation is practitioners' ability to recognize the need for translation. This means identifying a mismatch or gap in understanding or the need to infuse trust, facilitate agency, explain cultural meaning, adapt language and/or technology. Successful practitioners showed a keen skill for recognizing communication gaps.

That skill along with a perspective that problem-solving combine to form a foundation for successful translation work. Successful practitioners rarely viewed these gaps as "problems." We observed that practitioners are resourceful and inventive in facilitating translation when disconnects appear. They possess a "get-it-done" attitude where, when asked about problems, they told us only stories of very high-level issues, such as national politics or infrastructure issues (e.g. lack of funding or bad roads). Alternatively, the challenges seen throughout the journey of information were not viewed as "problems," but a central part of their job.

The need to preserve and translate meaning across these ubiquitous gaps exist in their day-to-day work between different community groups as well as across different levels within their own organization. Such uncertainty around communication is not the exception---but instead a core task of the daily work: to facilitate the shared meaning and understanding required to meet communities' needs across any boundaries that arise.

2) Multi-Modal, -Cultural, and Interpersonal Fluency

Successful practitioners shared the skill of fluency across languages, cultures, and technologies, as well interpersonally. These skills link closely to the need for trust and agency for correct information, and the fluency of practitioners in these interpersonal and cultural areas become necessary bridge for

understanding and translation to and from organizational entities.

a. Interpersonal and cultural fluency

Being familiar with local customs and cultures is important not only for having correct meaning in the data, but also for building trust among the many people living within a community. Practitioners go to great lengths to ensure that the meaning isn't lost through cultural disconnects. Subtle nuance can really shift the needed meaning and hence, quality of information received and sent. Translation through language alone may miss this subtlety, but a skilled practitioner who is familiar with the locality may use their knowledge to bridge this gap. With a native speaker, cultural translation may at times appear invisible and becomes important on the interpersonal level. Culturally important communication can take the form of gestures, facial expressions, cultural references, local references, or even local history references. These subtle differences are critical for preserving meaning. Understanding the local customs, traditions, and history can come into play when the language is ambiguous, a problem especially common for community outsiders.

Successful practitioners fluency with the region and the specific issues is critical in understanding needs. When in the community, evaluators translate the questions on the fly to fit the local community. This implicit translation occurs across languages—English and French—and is tailored to particular communities:

“And when we go with the questionnaire into the field, we will not ask the questions directly to how do we call it? To the person who is in the community. Maybe there is a translator like you are doing, but now it's essential for the questions to be well oriented so that they are well adapted for the population, because the populations are not the same. Err there are some types of questions that are asked, or how difficult or easy they are. The wording of the question can also make it easy to get the desired answers. So in fact it is on these details...So since she was talking about key points, in fact the most important points on which we usually insist are a little variable, it's variable.”

Another practitioner noted doing a successful evaluation requires more than simply giving people forms, emphasizing the need to first meet and get everyone on the same page before attempting to do the evaluations. Some of the meaning that needs to be preserved can require local knowledge of an area, to ensure that members of a community understand the intent of the Red Cross communications. This includes not only translating information, not simply into the local language, but also the local culture. For example, in multiple countries, practitioners would hire an artist/designer to adapt generic images provided in a training program for the local area. These images are used in materials that train both practitioners and community members.

b. Multi-modal and technological fluency.

As previously described, the Red Cross practitioners are often at the center of many conflicting values, and actively have to resolve these conflicts through creativity. Technology can help them resolve this in the right circumstances, but which

technology can help varies widely between practitioner, community, and situation. When successfully adapting to situations, the practitioners had the autonomy to be creative in solving their own problems. This creativity extends into technology, as the practitioner is fluent across different audiences technological languages—and is more fluent themselves in modern tech.

The need to translate from one technologically appropriate language to another can create inefficiencies. Practitioners recognize that any given solution is unlikely to remain sufficient over time. The conditions under which a solution was crafted will shift over time, a kind of uncertainty that practitioners recognize and deal with regularly. Our study shows that it takes significant time and dedicated human resources to translate, for example, data collected in questionnaires into a spreadsheet format. In the same process, it takes time and dedicated human resources to visit homes and speak with people to elicit information that meaningfully answers the questionnaire. For example, trust that was created by multiple visits creative practitioners was later able to capitalize on the wide-spread and inexpensive availability of cell phones, despite the communities low literacy. Once trusted, the practitioner and community developed a way to use number codes across the cell phones during times of disasters to convey to the practitioner residing in a district capital, their critical information during hurricanes.

This ties in from existing research is that in distributed teams, it is often helpful to start with face-to-face communication that builds a foundational connection so that people will then continue to engage with each other through technology as needed. We also saw this with building relationships with community members and paying for cell phone minutes and then community members calling when disasters happen.(other modes are used to stay connected over the distance—after trust is established—via emotional conveyance another modes (email, phone calls) when face to face is not possible.)

3) The adaptation and agency efficacy of paper-based.

Translation via adaptation occurred in every setting. Preserving RC workers opportunities to adapt information sharing strategies increases agency. The community's knowledge and agency is the central component to information that brings successful solutions for community resilience. And for communities to access and express this knowledge they will do so in the languages and mode of communication or technology in which they are most fluent. If Community Agency is operating —i.e. decision-making belongs to the community, then it will tend to drive the format of the information...the specific words, the methods for most articulately expressing their views and the meaning of their situation, values, risks, vulnerabilities and most effective solutions.

“It's not like the design at the beginning works every time, it should be changed with the need of the community and whatever findings are from the community.”

Evaluators attend a meeting together before going out to communities. In this meeting, evaluators make sure they all

have “common understanding” about the meaning of the questions.

“If right now there were a questionnaire on which we three had to work on as if we were in the field, during the briefing with all the evaluators that will go into the field...we help everybody to understand and to see if he could reformulate it or not... if [the evaluators’] understanding of the document differs from the beginning...I will get answers that are not the desired ones. That’s why we proceed with getting this common understanding of the document in order to have the same idea at the beginning. That way, we can send results that are satisfactory, even if the evaluation is done in French.”

Second it is through face to face meetings that agency is enabled -- for full participation: meetings for participation, participation as very central to the success of the work. 83: *We make a program, and in the program we choose dates we will go and, ... during the meetings we have people of all ages and genders. It’s not exclusively for the youth, or for the old. When you go to meet people in a community, it’s everybody: there is the youth, there are the women, there are the old people. There is no exception.*

I: Ahaa! Ahh! So, err, so you are saying that it is important for you to meet everyone, and you have a system to make sure you meet with everyone. Is that what you are saying?.

83: Yes. Without any exception.

Meetings provide critical pathway for community ownership by providing a critical venue for wide range of perspectives and participation, which means also a wide range of community knowledge and information and agreements—hence, sustainable solutions. Verbal information sharing facilitates the “translation” of knowledge from implicit and possibly individual to explicit, visual, and communal. For example, in the development of the historical maps of disasters, community members together share information and ‘translate’ the information into shared visual depiction. At meetings practitioners facilitate greater agency for communities as community members perform “translation” of information from verbal discussion to written documents. Practitioners conduct line by line review of written documents as a group.

Finally, it is also this opportunity for shared group participation is also important when crossing over from community to organizational communication. After community assessments where volunteers have gone door to door to collect information they meet to develop summary sheets: *“The summary sheets are done by hand. However, when we return back to office, then we would have contracted someone who would transfer this information to an excel document and this document would show us...how the community is vulnerable.”* Paper-based is valuable for the need to balance consistent question meanings with on-the-fly translation. Keeping the meanings of questions consistent helps ensure that the translation work between the community and the preparedness organization is as accurate as possible.

V. CONCLUSION

The practitioner’s ability to innovate (ie. adapt and translate between the community and the organization) is indispensable. Often the skills of the practitioners in doing their work successfully is invisible, and this includes: recognizing skill differentials and translating between different languages, cultures, value systems, and media. Current information systems still struggle to translate between two languages, and so it is unlikely that technology will replace these roles of practitioners. Also important is the face-to-face communication which helps build both trust and agency within a community.

Universalism is an often hidden value found within technology designs, where solutions are assumed to be solved in identical ways across technologies, but the implementations of such solutions often impose rigid structures to complete tasks. For example, many technological survey pieces can require the practitioner to spend more time servicing the software, which can detract from face-to-face time. This includes doing more work than would be necessary with a piece of paper. This face-to-face communication is important for building trust with members of the community. It is also not enough to simply translate into a language appropriate for that region or area, as different regions typically have differing cultures and values and this can be important in eliciting specific information required for thorough assessments. Universalism is also seen in communication from local agencies and a headquarters. Again, it is often assumed that some set of communication media and modalities are sufficient for all types of information and value systems to be communicated.

To best support practitioners in their jobs of providing agency and trust with the community, it is best to approach technological solutions from a practitioner-centered approach. There are no universal solutions which will work across large international organizations, requiring a constant capacity for allowing practitioner innovation. Software must enable significant flexibility to be used in adaptive approaches by practitioners in supporting the existing successful processes.

This critical work and the space speaks directly to the need for greater sociomaterial solutions for effective work. As practitioners go to communities, conduct surveys, collate them, write summaries, translate these into an Excel document, and then send the document to the next stakeholder, they highlight and fill the sociomaterial space. Each enactment (e.g., sending a message w/ the phone) binds together the material interface of the cell phone, the training/knowledge of the community member, whomever receives the message, how that information is used to provide relief/support, etc. All of these elements mutually constitute the sociomaterial practice, for example, of reporting the location of flooding according to the planned cell phone method.

For technological interventions to reliably help practitioners rather than cause harm must be designed with an eye to the complexities of practitioners’ innovation work to preserve and accurately communicate meaning.

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