
Information standards and creativity during extreme events

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Abstract

I explore the idea of creativity in a very specific instance, that of extreme events. I am interested in post-disaster information ecologies and how information technology might be able to support activity during this time. I locate creativity in two different moments in relation to extreme events: planning and response. Creativity in these moments is presented in tension with coordination. Three examples of information standards involved in disaster planning and response are examined with the lens of creativity and coordination.

Keywords

Information Systems for extreme events; design for uncertain circumstances; creativity under constraints

ACM Classification Keywords

K.4.3 COMPUTERS AND SOCIETY. Organizational Impacts.

Introduction

My interest lies in discussing creativity under extremely difficult circumstances where there are large system (both physical and social) breakdown. I am interested in how this lens might probe ideas about the creative process under certain constraints and how using the

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"lens of creativity" might reveal something about the response to disasters that is not otherwise apparent.

The "big picture" question that guides my research is, "How do people make sense of disasters and extreme events?" My interest is primarily in the role of information systems for disaster management and response in the process of sense-making. I am particularly curious about the some of the organizational forms that may emerge as a result of "disruptive" information flows and the information standards that might regulate the information flows. Even more specifically, I am interested in the design of information standards that allow information sharing under the circumstances of extreme events. That is, I am interested in the social-technical configuration of people and information systems, especially information standards, during disaster response. So what does this have to do with creativity? There is an understood need for creativity and improvisation during extreme events and I want to examine how information systems and information standards can help to enable this activity.

I have to admit that I am uncomfortable using the word "creativity" in the context of extreme events which are often times of suffering. "Creativity" is generally used in the context of discussions of art and connotes time and leisure. I believe this is because the end product of creativity is often implicitly considered to be an art product, thus for the purposes of this discussion I would like to note that I am not talking about creativity in terms of artistic creativity.

Marcel Duchamp's Readymades challenged us to view everyday objects as art. The point of the "process of

taking everyday objects and presenting them as art" is that the outcome is art. Duchamp described the idea of ironing on a Rembrandt as "Reciprocal Readymade." However, it is the purpose of this workshop to demystify the creative process, and here I would like to propose what might glibly be called the "Converse Readymade" where the process might in fact be extremely creative, however the output is not "art."

My plan here is to first take the idea of creativity during disasters quite literally. I will show how some of the rhetoric used to describe circumstances around two recent paradigmatic disasters, 9/11 and Hurricane Katrina, describes lack of creativity in disaster planning and response. I will discuss the tensions between coordination and creativity in disaster planning and response in three cases: PeopleFinder post-Katrina in 2005, SMS text messaging in Mumbai during floods in 2005 and with UC Berkeley PeopleLocator system. Lastly I will discuss issues with the design of information system standards for disaster response and use the lens of creativity to help make some design choices more apparent.

Creativity and Control

In two recent American disaster, Hurricane Katrina and 9/11, "what went wrong" has been characterized in terms of lack of creativity in planning in the case of 9/11 and a lack of creativity in response in the case of Hurricane Katrina. Hurricane Katrina response is referred to as a "Failure of Initiative" in the title of the US Congress's Select Bipartisan Committee to Investigate the Preparation for and Response to Hurricane Katrina. They compare "the heroic efforts of those who acted decisively" with "bureaucratic inertia..."

causing death, injury, and suffering." The September 11, 2001 World Trade Center Disaster is widely referred to "failure of the imagination" because the intelligence community failed to anticipate the attacks because of lack of imagination [18]. Both of these types of failures seem to correspond to a failure of action on the part of federal officials. It seems initiative and imagination is characterized as the opposite of the prescribed bureaucratic activity.

There is an issue of the comparability of cases in my argument that needs to be addressed. Whether or not one can say that intelligence work is analogous to disaster planning is an outstanding issue with this argument. Other researchers adopt the perspective that the work can be problematized in a similar manner: "Further work is needed to encourage the 'creativity' that is needed when emergency planners use computer models to predict plausible worst case scenarios. Although these recommendations were made in response to the 9/11 Commission, they are equally valid in the aftermath of Katrina. This natural disaster exposed a lack of 'creativity' in emergency planning and evacuation modeling," [7]. Thus, for the purposes of this paper, I am going to treat creativity in the process of intelligence analysis and disaster planning as similar activities in that they each involve anticipation of what is unknown. Additionally, in the preceding quotation, Katrina is not just characterized as a "failure of initiative" in the response, but also as a failure of creativity in computer modeling (in the case of this paper, modeling hospital evacuation).

Thus, we are locating creativity in two places with regards to disasters: one is creativity in planning and anticipating disasters, while the other is creativity in

post-disaster action. While 9/11 was considered a failure from the planning perspective, it was not widely considered a failure on the level of response. However, there were creative failures with Katrina on both the level of planning and of response.

At both locations of creativity action (planning and response), we can see the tension between creativity and coordination. In a summary of disaster literature by Harrald [5], he clearly presents this dilemma: "Extreme events present unforeseen conditions and problems, requiring a need for adaptation, creativity, and improvisation while demanding efficient and rapid delivery of services under extreme conditions." Interestingly, the intelligence reforms proposed since 9/11 have made these tensions quite obvious. In their analysis of the "9/11 Commission Report," Rovner and Long [12] note: "The Commission did not consider the possibility that its two core recommendations are at odds.... Imagination involves unconventional thinking; it means paying heed to alternative analyses and developing working scenarios from speculation. Coordination, on the other hand, involves getting analysts to focus on the same threats and scenarios." Here the completing goals of coordination and imagination are presented in a manner that makes them very difficult to reconcile.

Harrald [5] says that although there is a perceived trade off between control and coordination of disaster management and enabling creativity, having one does not necessitate sacrificing the other as both must be present. "This article argues that designers of organizational systems for emergency response, like designers of software systems, must ensure both discipline (structure, doctrine, and process) and agility

(creativity, improvisation, and adaptability).” Thus, the question becomes: how does one design for these circumstances where coordination is needed and maximal creativity is possible?

The challenge of designing plans including organizational and informational systems for responding to extreme events is that by definition the context of use is unknown. It may not be clear what “event” will incite use of an organization or information system, or what resources would be available. The reaction to the uncertainty is often to try to outline the great number of possible scenarios and anticipate each one of those scenarios in emergency plans. Some emergency planners feel that this ends up creating endless numbers of lengthy, impenetrable documents of instructions that may be too complex and detailed to be used or even comprehended. Although planning in this manner requires a lot of creativity to envision every single scenario, this type of planning also seems to be the model of planning to maximize coordination in every possible response situation. (There is also a tendency to plan for the last disaster.) Other planners prefer an approach where there is a more attention to general roles that individuals can play, and to focus on tools that can be used regardless of the situation. This planning model seems to acknowledge more explicitly the need for creativity during disaster response. This planning model seeks more general plans to cover a range of scenarios because they believe that it is more realistic that these plans will be enacted. This approach does not necessarily correspond to a lack of creativity in anticipating potential events. For example, a doctor with the Red Cross said, “Flexible systems respond best... Minutiae and rigidity sap creativity, diminishing

the ability to recognize opportunities. One frames smart actions; the other is a handmaid to bureaucracy,” [11].

It might be tempting to go to the extreme and say that since one cannot predict what is going to happen, that there should be little effort to plan or design with extreme events in mind, but this is not the case: “Not only do good plans save lives when disasters strike, but formal planning processes and widely-held normative expectations regarding action can also protect property, mitigate post-disaster disruption, and speed recovery. However, in turbulent environments – particularly those characterizing catastrophic or nearcatastrophic events – improvisation is essential” [17]. Thus, it seems that thinking about the creative process in these terms of the tensions between planning for coordination and allowing for creativity is helpful.

Information System Standards

We now turn to examine some specific “informational” examples of disaster planning and response with the lens of the tension between creativity and coordination. We will look at three informational planning and response to extreme events, and even more specifically talking about information standards for disaster response information systems.

Many statements have been made about the potential for information systems to help people share information and aid the process of recovery from an extreme event. For example, the report from the White House entitled “Hurricane Katrina: Lessons Learned,” one of the recommendations is to “Establish a National Information and Knowledge Management System....develop a national system of information

management to provide a common operating picture which allows for the processing and timely provisioning of interagency information sources" [16]. But as with most technological solutions, "the devil is in the details" - both technological details as well as social and organizational details. One of the "details" is creating methods for sharing information across many sources. Information can be entered in many different formats, and it is essential that people be able to quickly condense information from multiple sources. There are of course many ways of doing this, including using semantic web techniques [20]. Clearly, information standards can act as a form of coordination in disaster response, but the question is what their role is as a location of creativity, where the information standards might enable the improvisation that is necessary.

It seems helpful to look at a few specific examples. The first example, is an example that is located in planning. The other two examples are informational responses to disasters.

PeopleLocator is a technology that has been developed at UC Berkeley to enable those directly affiliated with UC Berkeley to enter information about their personal well-being. One can imagine how it might be used creatively in response, but as we will be examining examples of informational response, I will stick to examining PeopleLocator example of an information standard in the planning phase. There are several different standards that the PeopleLocator standard can be exported to. The PeopleLocator technology is built on top of the UC Berkeley directory. People can be searched for by name or email UC Berkeley email address. This email address is a unique identifier for individuals. The directory has information about an

individual's address and phone number, this is protected under the UC privacy provision where you must be logged in to the system to see this data. However, all of the information that can be entered through the PeopleLocator system including information about the location of an individual, whether they can return to work, and personal messages, can be seen by anyone. People can log into the system and enter information about themselves or others. Or people can not be logged into the system and leave messages for people. Thus, this is a very public record about individual's personal well being.

The developers of this system believe that university officials will be able to use this system in a variety of different situations such as earthquakes and pandemics to make decisions about how to respond to disasters [2]. It seems that the PeopleLocator system is trying to enable coordination by institutional responders, but they are also taking an approach to planning that is somewhat creative in that they are trying to develop a tool that can be used in a variety of situations. For example, because power outage is possible in the case of a disaster, the service is actually located at UCLA [2].

The next example provides a similar service to PeopleLocator, but in a much less institutional context. Additionally, the information standard was developed after the disaster, as a direct response to the disaster. PeopleFinder and PFIF (PeopleFinder Interchange Format) were developed immediately after Hurricane Katrina to coordinate a lot of information about missing people. It is an example of a creative act, or improvisation after a disaster. Thus, it will be examined on two levels: as a creative response to a disaster, and

also as an information standard allowing coordination and creativity.

After Katrina many private companies and individuals set up online websites that allowed people who were affected by the hurricane to post information about their location, or messages looking for loved ones (e.g. www.familylinks.icrc.org/katrina/people, www.wecaretexas.com, www.katrinasturvivor.net, www.katrina-survivor.com) [11]. The purpose of PeopleFinder and the corresponding PFIF format was aggregate many of these sources in one place and put all of the data into PFIF [19]. What was quite remarkable about the PeopleFinder project was how quickly it was built, and how many volunteers were coordinated in the data-cleaning efforts [8]. Once the aggregated data was in the database (processed by both humans and computers), all of the information was searchable from one site.

PeopleFinder is an interesting story on a number of levels: the ability to quickly organize and coordinate a large-scale online volunteer effort, the technical design of People Finder and PFIF, and the overall impact of the information technology as part of the response and recovery effort. It is reasonable to characterize PeopleFinder as a fairly creative response to Hurricane Katrina, but also one that allowed for coordination of many information sources. While there is much information available about how the effort was organized [9,11] and the technical specifications [19], there is not much information about the use impact of the PeopleFinder information technology. We know the following: "By October 2, the site had processed over one million searches and 649,015 records were searchable," [4]. Additionally, David Geilhufe provides some evidence of anecdotal evidence of how people

found the site useful, but we don't know how many people were actually able to find out information about loved ones via PeopleFinder, if PeopleFinder was used extensively by other organizations to understand the situation that they were dealing with, or if PFIF itself allowed for creativity on the part of users. It is easy to imagine how something like PeopleFinder might enable creative responses to Katrina, but we don't necessarily know that. We do know that the PFIF information standard allowed the coordination of much information about those affected by the hurricane. It potentially allowed officials to act in a creative manner in the disaster response.

Another example of an "informational" response to disaster provides an excellent example of how a data standard was appropriated for creative responses to disaster (although it was not an information system build specifically for disaster management).

Massive floods in Mumbai in 2005 killed approximately 400 people. Despite extremely slow mobile network services and loss of electricity, many Mumbaikers sent text messages for a variety of reasons after the flood:

- Police sent text messages out to individuals via mobile networks [3].
- Individuals sent text messages and videos into media companies about what was happening [13].
- Mumbaikers used SMS as a form of activism to coordinate activist related activities to express their dismay at the government's activities and rally support for public interest litigation. [15]

- Individuals sent and received SMS messages of concern from loved ones in addition to “forwards” which gave health and safety advice [10].
- TV stations were inundated with SMS messages for their SMS chat functions [14].

This list of activities provides an interesting sample of how an information standard (in this case SMS) allowed for range of creative activities in reaction to the flooding. None of the technology was necessarily built with the expectation that it would be useful during a time of extreme need, but the very flexible nature of the design allowed people to appropriate it in a way that allowed for maximal creativity. One can see how different aspects of SMS – particularly the short length of text messages might have lent themselves to this situations where the networks were otherwise quite congested. In several of these cases, particularly those where the police were pushing information, and individuals were using SMS to spread information about available resources and health issues, that the used of SMS was a creative act for the purpose of coordination.

Thus it seems that information standards play an interesting role in the previously set forth tension between coordination and creativity. With the example of SMS use in Mumbai, creative acts were allowed by the information standards (a coordinating tool) which in turn allowed coordination of resources. In the PeopleFinder example, an essentially creative reaction to Katrina was to create a tool for coordination. And PeopleLocator is an example of creative planning that will hopefully allow coordination and potentially enable creativity if need be.

Concluding thoughts

Thus, the project here is to think about designing technology that can be used in unexpected situations where, by definition, large social and physical systems are failing that enable a variety of activities. The nature of information standards makes them a tool for coordination. By their nature, information standards are tools which are restrictive – they define rules for how information is allowed to be formatted, however they also represent spaces where creativity is located. The three examples demonstrate:

- Information standards allow coordination of information, and by virtue of allowing coordination, can potentially enable creativity during disaster response.
- The creation of information standards itself can be a creative response to a disaster when improvisation is needed.
- Creativity in planning is an important part of standards creation as many different scenarios in which the standard could be used must be considered.

I believe that creativity ends up being quite a useful lens with which to examine the questions outlined in this document with regards to understanding information system design for post-disaster situations. Additionally, they strongly influence how people make sense of disasters. Hopefully looking at creativity with the lens of information systems for disaster management and response provides a similarly helpful perspective.

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