

You Get What You Plan For

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ABSTRACT

This paper seeks to illustrate a few simple but common mistakes in exercise planning through a case study, in the hopes that readers may improve their use of exercises as a research and development tool.

Keywords

Exercise planning, case study, technology integration, EOC.

INTRODUCTION

Once upon a time, on a sunny day in a densely populated urban setting in the Western United States in the fall of 2007, there was an exercise. This story is about that exercise and two of the teams that took part in it. It's also about three wishes, but we'll get to them later.

The exercise was a simulated terrorism attack using an infectious bio-agent—aerosolized pneumonic plague, if you really want to know—but that doesn't really matter, what matters is that the simulated event was regional, meaning that all the neighbors would have been busy dealing with their own problems had this been real, and that it was a sector event, meaning, in this case, that, although people might be sick, none of the machines or things would have been broken. Or at least not any more broken than usual.

On the sunny day in question, many, many people were busy doing things because of this exercise. There were people driving in cars, riding on bikes and walking in shoes, and they were carrying radios and cell phones and paper surveys and PDA-based surveys and cameras and SPOT trackers and maybe other mobile technologies, going door to door doing simulated situation assessment. There were people sitting and standing and pacing at field command posts with computers and telephones and internet connections and all the same technologies as the ones who were out driving, riding and walking. They were collecting information and people with information and people without information, and sending everything they collected here and there and all over. There were also people at local schools and clinics with many of these same technologies, distributing simulated prophylactic vaccines. But what really matters to our story about all these busy people is that, because of them, enormous amounts of real-time digital data were being transmitted live in many different ways, from many different people in many different places, to many other people in many other places, in many different formats.

The deluge of dynamic data is important because the two teams in our story were on the receiving end of it. Both were in the real (not simulated) emergency operations center (EOC) operated by the local authorities. In the EOC, there were maps, LCD projectors, a radio room, a dispatch center, chairs, tables, laptops, donuts, wireless internet, a BGAN satellite connection as well as all the other technologies you expect in a smallish but well-equipped American EOC. The first team—we'll call them Team Response—was the incident command team. It was composed of the appropriate emergency response staff from the local jurisdiction, including fire, police, and public health, along with some highly experienced responders borrowed from other jurisdictions. The second team—we'll call them Team Tech—had developed a software prototype for collecting and amalgamating live data from SMS messages, blogs, email, SPOT trackers, and GPS-enabled cameras. Team Tech was composed of a software engineer/architect, a public health advisor and observing management staff.

Now the three wishes. They are simple, and are the same that we all have for our exercises:

1. May the exercise goals be achieved
2. May there be lessons for the future
3. May the time, effort and money invested in the exercise produce as much benefit as possible

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I said that this story is about one exercise, two teams and three wishes, but, we don't have much space or time, so I'm just going to tell you about whether the three wishes were granted, why the third wish really wasn't and what you can do to help make sure it will be granted in your exercises.

How did I come by this story, you ask? Well, I came by it quite by accident. A friend of a friend asked a friend of a friend to help find volunteer observers for the exercise, and I wound up as an observer in the EOC. I only met the people who were involved at seven am on that sunny day, and didn't know anything about the exercise or the people who participated in advance. This story is based on what I saw that day and what I've later learned about the people, their goals and their plans. It's my story, told from my perspective (that's really the only story any of us can ever tell). But if you like it, you're welcome to keep it for your own.

THE FIRST WISH: MAY THE EXERCISE GOALS BE ACHIEVED

To find out whether the first wish was granted, that is, whether the exercise goals were achieved, we have to know what those goals were.

For Team Response, this was a training exercise that was very much part of their preparedness efforts. Their goals were to train personnel to assume roles of new or increased responsibility—including an incident commander, a planning section chief and a public information officer—and to practice the coordination with and integration of public health agencies that would be necessary in a large scale public health emergency.

Team Response also wanted to test their plans for activating and coordinating local CERTs, ham radio operators, and other community volunteers to do things such as conducting situation assessment surveys, and for involving schools and health clinics in distribution of antibiotics. (The CERT—Community Emergency Response Teams—program trains community volunteers in basic disaster response skills so that they can provide initial responses when professional responders are not immediately available, and to support a subsequent structured response.) Along with testing plans, Team Response wanted volunteer responders to have a chance to practice using different communication technologies, especially radio and, to a lesser extent, SMS and internet-enabled tools.

Technology use was, in contrast, the primary focus for Team Tech, whose aim was to experiment with



Figure 1 Team Response members generally used at least two and often as many as five different technologies concurrently or in rapid succession.

technologies to enable direct information flows from the field to the EOC, allowing “anyone in the field to put a dot on a map in front of the incident commander,” and provide information visualizations. Their goals were to determine whether community and spontaneous responders would transmit data, and to provide the incident command team visualizations of those data. For Team Tech, this was a testing exercise.

I bet you're guessing that these goals were, in fact, achieved. If so, you're right. Both teams met their objectives. Incident command team members practiced new roles, cross-agency collaboration plans were exercised, community volunteers and organizations were engaged, and vast volumes of data flowed into EOC computers from community and spontaneous responders in the field. The first wish was granted.

THE SECOND WISH: MAY THERE BE LESSONS FOR THE FUTURE

To see whether the second wish was granted, we must look at little bit at what happened and hope that everything didn't go perfectly well. I mean, people are quite good at learning when they make mistakes, but usually don't learn well if they don't. Since Team Tech's involvement in the exercise was really about integrating information technologies in major public health responses (and, besides, information systems is what you and I are interested in), let's focus on whether there were lessons for designers, developers, deployers or adopters of technology for EOC use.

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Team Tech is ostensibly the technology hero of our story, but Team Response was no slouch in technological versatility. In contrast to members of Team Tech who typically used only one or two technologies at a time, mostly a laptop and occasionally a cell phone, Team Response members generally used at least two and often as many as five different technologies concurrently or in rapid succession, including, in approximate order of prevalence and frequency of use: pen-and-paper, cell phone, wall-mounted map, laptop, PDA, easel-pad or whiteboard, handheld radio, and landline phone (Figure 1). A quote from the Medical Chief, “[flipping through papers] I’m going to go to [the] computerized version…” illustrates this rapid interleaving of technologies.

Now Team Tech was focused on all the data coming into their computers and was prepared to show them on a shared projected screen (Figure 3, center photo), but this didn’t really fit in with all the other technologies Team Response was using.

Another quote, from the Information Officer, “So, you probably need a notepad,” points to what was, by far, the most pervasive technology used by Team Response (Figure 2): paper. They used paper to do anything ranging from taking personal notes to official message notification to requisition requests. Papers often had to be signed to indicate acknowledgement or approval, reflecting operating procedures meant to create recoverable audit trails.

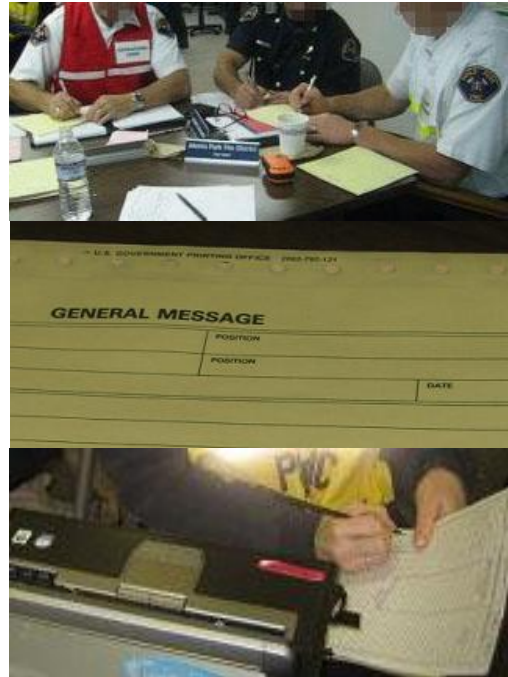


Figure 2 Paper was, by far, the most pervasive technology used by Team Response.

Despite its ubiquitousness, paper was generally poorly integrated with other technologies, and team members were constantly expending time, effort and attention in transferring tasks performed on paper to a digital medium, or in struggling with limited and limiting capabilities for going the other way. This lack of integration was also true of the technologies brought by Team Tech.

These observations lead to Lesson One: *Assume a Diversity of Technologies*. Technology designers must recognize that their technology, however innovate, brilliant or revolutionary, will most likely be only one of a variety of technologies in use, and their designs must (eventually) consider and integrate the physical, cognitive, and social demands imposed by competing and complementary technologies. For technology adopters, it means that the competing and complementary demands imposed by different technologies must be considered during selection and deployment. Since there is no sign of people giving up paper anytime soon, everyone should be mindful of the relationship between it and other technologies.

Now, an interesting shift happened in interactions between the two teams over the course of the four hours of exercise play. At first, the two teams were focused on getting their own efforts organized and there was little interaction between them. Then, gradually, Team Response began to realize that Team Tech was receiving immense quantities of live data from the field, and started to look for ways of understanding and using these data. Later, Team Tech began to realize that Team Response was not extracting the information they needed from the live data streams, and started trying to determine what information Team Response needed, devising ways of representing it and bringing it to their attention. This progression is revealed by a sequence of quotes:

#	Time from start (hr:min)	Quote	Speaker
1.	1:40	“There’s no information coming in!”	Incident Commander
2.	1:55	“It’s great that you guys [Team Tech] know everything, we [Team Response] just need what’s critical.”	Incident Commander
3.	2:35	“You need someone here [Team Tech table], watching the update.”	Information Officer
4.	3:25	“You want to show her the summary ... the summary by Team Tech member neighborhood?”	Team Tech member

This gradual discovery of the nature and availability of the information being provided by Team Tech’s technologies leads to Lesson Two, for technology adopters and deployers: *Include Technology Briefing in Incident Orientations*. Spending even a few minutes reviewing what technologies will be in use on an operation and providing a brief introduction to their capabilities can shorten the time to discovery significantly and

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enhance technology effectiveness considerably, particularly when some or all responders may be unfamiliar with them.

Not only did Team Response eventually realize that large quantities of data were flowing into the EOC, they began showing signs of recognition that the continuous nature of the digital data streams require a change in information management operations from a periodic batch mode to a continuous model of processing. This is reflected in quote #3 where the Information Officer realizes that “updates” are so numerous and frequent that monitoring and triaging them is a full-time occupation.

This leads to Lesson Three: *Prepare for and Train Information Responders*. Radios require radio operators, phones require dispatchers and switch board operators, photocopiers and fax machines require administrative staff. Streaming digital data channels require individuals with skills in digital information management, analytics, and visualization. For technology adopters, this introduces new personnel and training needs; for technology designers, it necessitates a careful consideration of who the end users really are, and raises the possibility of having to distinguish between end users of the tools (information responders) versus end users of their products (the incident command team).

Quote #2 can be rephrased directly into Lesson Four, for designers and developers: *Focus on Critical Actionable Information*. Getting data to the EOC has, for years, been a key obstacle in response management. This will always be an issue in certain types of situations, but modern communication technologies have reached a point where large amounts of dynamic data quickly become available, and finding the “right” information in a giant flow of data is a more common and even greater problem. The devil, as they say, is in the details, as exemplified in quote #4.

Well, I dare say that you can probably already see that the exercise yielded other lessons, related, for instance, to the importance of retaining and maintaining awareness of data provenance, the need to support highly complex information flows within the EOC itself, the role-specific nature of situation awareness and inherent figure-ground differences in providing a so-called “common” operating picture, and the criticality of two-way information flows. But we have enough to be sure that the second wish was granted, there were lesson for the future. So, in the interest of time, space and moving our story along, we will forego deeper discussion of these.

THE THIRD WISH: MAY THE TIME, EFFORT AND MONEY SPENT PRODUCE MAXIMUM BENEFIT

Now for the all-important third wish. To decide whether it was granted, we have to reexamine what the first two wishes brought, and decide whether it was enough or whether the exercise could have achieved more.

The first wish was granted in that the objectives each team set for the exercise were met. Team Response trained personnel, exercised inter-agency coordination, and engaged community volunteers. Team Tech found that community and spontaneous responders transmitted mountains of data, and visualizations of those data were created. However, it seems as though these two sets of objectives have little in common, and, indeed, interactions between the two teams were slow to develop: After an hour and forty minutes, nearly halfway through the exercise, Team Tech had resolved all basic technical issues and were receiving volumes of data steadily, yet the Incident Commander had the perception that “There’s no information coming in!” (quote #1). It was only toward the end of the exercise, after more than three hours, that Team Tech was actively seeking to educate Team Response about what data were available and work with them to extract useful information and visualizations!

Team Response’s training goals were focused on developing staff capacity and had no connections to the technologies being introduced by Team Tech, while Team Tech’s goals were focused on testing technical capabilities and had no connections to the Team Response’s training objectives. These dissonances manifested visibly in the room where the Team Response table had mostly pen-and-paper along with radios and cell phones, while the Team Response table had mostly laptops and some paper, and a shared projected screen offered the only link between the two (Figure 3).



Figure 3 Dissonances in exercise objectives were manifested visibly in the room where the Team Response table (left) had mostly pen-and-paper along with radios and cell phones, while the Team Response table (right) had mostly laptops and some paper, and a shared projected screen provided the only link between the two (center).

This lack of synergy between the two teams raises the question of whether it was necessary for them to be collocated in time and space, and whether—beyond both working with data being generated by field activities—either team actually benefited by conducting a joint exercise. It would seem that the opportunity created by the joint exercise was to conduct either a design exercise (in which play stops and design decisions or alternatives are discussed) focused on the information needs of the incident command team, or a testing exercise focused on information visualization designs for EOC use. Some design activity did eventually commence, but only occurred sporadically in individual interactions and only in the last hour of the four-hour exercise.

The second wish was granted in that the exercise produced lessons for the future. Unfortunately, none of the general lessons was particularly new. All of the lessons cited or mentioned above, for instance, are well-known from studies and practices of technology introduction and adoption, design for situation awareness, or general interaction design. While we must commit mistakes so that we can learn from them, spending time and resources committing well-understood mistakes keeps us from making and learning from new ones. It would seem that a more careful consideration of the social components of the technology introduction might have integrated the known lessons in advance, allowing more synergy between the two teams and a richer overall learning experience.

So, sadly, we must conclude that the third wish was not granted. The exercise certainly produced benefits, and, while they may have been satisfactory to the two teams, there could have been a lot more.

THE MORAL

So, what, if anything, can we learn from this story? Was the third wish not granted because of incompetence or lack of effort; short-comings to which you and I are not subject? Or are there pitfalls in exercise planning that await us all?

I don't know about you, but I think it's the latter. I can tell you that the people who planned the exercise in this story are all highly competent and they put a lot of effort into it, but there were three things they appear not to have done carefully enough:

1. *Align expectations.* They don't have to be the same, but if you're not going to build on each other's objectives, why bother playing together? This is particularly needed when you are mixing practitioners, developers and researchers.
2. *Do your homework.* Find out what others already have learned so that you can make new mistakes rather than repeat old ones.
3. *Consider the social affects.* You may think it's about the technology, but crisis management is about the people.

I wish I could say that this story is unique and that's why it's interesting, but I can't. I've seen it before and probably will again, and, so, I bet, will you. The moral is that, unlike in real events where you have little control over what you get, so rarely get what you plan for, in exercise planning—be it for training, testing, design or research purposes—you have near complete control over events, and, thus, you get what you plan for.