Crisis Planning via Scenario Development Gaming

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ABSTRACT

This paper introduces a particular approach to improving the planning process in emergency preparedness. This involves the specification of a competitive game to have opposing defense and offense teams develop and improve their respective plans for defense and offense.

Keywords

Crisis planning; sencario development; gaming.

INTRODUCTION

A great deal of planning goes into the preparation for a reaction to a crisis situation, but it is not at all clear that there is an adequate mechanism to deal with extreme events of both natural and human origin. Today, even the hundred year natural disasters seem to be happening at a far greater frequency. Local, regional, state, and federal planning seems wrapped up in plans to deal with more limited events, such as a plane crash, that can be well formulated, documented in great detail and become the basis of the typical physical training exercise. This physical rehearsal is certainly useful and a valuable aid in training in the mechanics of response, but it does not expose the participants to the improvisation necessary to deal with the unfamiliar, the unexpected, and the extreme events for which there is not prior experience on the part of anyone who will be involved in responding to the situation. It is unlikely that we can simulate realistically the diversity of problems that can occur in a terrorist action or a major natural disaster. Our challenge is to create a planning process that will allow people to mentally rehearse dealing with such occurrences in a manner that will allow creative insights to emerge and to be examined in a reflective manner for their appropriateness in dealing with the unexpected.

A very popular approach to planning is the creation of scenarios to represent the forecast of what will occur in the future. This process is deeply ingrained in economic planning as the sort of planning accompanying mergers and acquisitions. It is a method of depicting an unusual situation to try to make people who not experts in a given subject understand the relationships between the plans and the impacts that the plans will have on the events. Schoeffler in his book (1955) refereed to scenarios as a form of story telling that was often misused in economics because an individual scenario could be basically a story with no way to confirm its validity or nature as a certain degree of evidence. Society relies heavily on these stories and we use them with our children to try to make "real" the abstract concepts of human behavior (i.e. the various fables about evil that occur in most cultures). Before writing, the story was the manner of transmitting knowledge and potential reoccurrences of history (prophecies) to future generations. It is so ingrained in our society that part of the cognitive processes we have evolved is an episodic memory, devoted to the storage and remembrance of event sequences.

The way we understand and try to analyze a real crisis situation is by investigating and relating series of events. So story telling and scenarios are an appropriate way to try to plan future actions and promote understanding with respect to potential crisis situations. However, a scenario alone is insufficient in that we have no criteria to establish the validity of a single scenario about an event that has not occurred. We cannot rely on the story telling form for our purposes.

In the literature on establishing the degree of validity or the evidence for a finding there is one philosophical scientific approach that has considerable merit in the crisis planning process. This is the Hegelian Inquiry Process as characterized by Churchman (1981; Mitroff and Turoff, 1973; Linstone and Turoff, 1975). In this process two opposing world views are created that are constructed to be the most extreme in being opposite to one another. These two views about the future are than compared with the expectation that a collaborative group can reach a consensus on a synergistic combination that represents an improvement over either extreme view. This latter outcome is not guaranteed by the process. In military planning for defense a version of this process is the creation of a "defense conservative" plan and an

opposing "offense optimistic" plan. Wherever there is a choice for the defense one assumes the existence of Murphy's Law, and every benefit of a doubt about offensive capabilities is assumed for the offense. Then one compares the two plans for defense and offense to expose the most serious weaknesses for correction.

We base our design for an emergency preparedness planning game on the above philosophy and use some concepts and idea from the Delphi Method (Linstone and Turoff, 1975) to set up competing teams to evolve and improve scenario plans for both the offense and the defense.

STRUCTURE OF THE SCENARIO PLANNING GAME

The environment for operating the game is a group communication system (WebBoard). The players play online in an asynchronous manner so that they can use any free time they individually have available during the typically weekly cycle of the fundamental process. With the particular Computer Mediated Communications System we are using all the players have pennames and no one knows the identity of the others members of their team or the other players. All the players have the same email address which is that of the administrator for the "board or forum" they are in. This is actually desirable so that no private messaging can occur and there is a record for analysis of the discussion that occurred and a post mortem of the results.

The fundamental kernel of the game defines two teams of 5 to 7 members each of the:

- Defensive Planning Team
- Offensive Threat Team

The defense team seeks to develop a plan to defend a particular facility. This might be a utility, a dam, a chemical plant, a museum, etc. It can literally be anything that the team is familiar with. In other words if it is a chemical plant it should a specific one in the area where the team is located. If the game is larger and there is multiple defense and planning teams than each matched pair of teams are given a specific instance of the facility in their particular location. This means all the teams are attacking or defending a given instance of a particular type of facility. In this case there all the defense teams share their plans on each cycle and all the offense teams share their plans so that they can capture good ideas from one another.

The defense team must supply the latest version of the following information once a week:

- A list of the assumed defense resources believed available to the facility being defended
- A list of the people (human resources) needed to staff the defense plan should an attack occur.
- A public plan for defense for the benefit of those located at the facility.
- A confidential plan presented in scenario form (if x occurs then y will take place as a reaction).
- A request for any additional defense resources the defense group now feels should be added to make their plan more effective.

There is a planning form to fill out to specify each of these things.

The offense team designs a threat in the form of a scenario that says how they are going to launch an attack and what is going to occur over time with the resources (both people and equipment) they have been provided to conduct their attack.

The offense team is given initially a list of resources they have available such as financing and the number of human operatives they can employ. Every week they must update the following:

- An event driven scenario that indicates the sequence of events that will occur and the resources that will be used.
- A request for any additional resources they feel they need to make their plan more effective.

For the most part we are talking about terrorist actions. However, with a slight change of the detailed team instructions, the offense team could be designing a specific natural disaster that impacts an area in their locality. It could be a flood, earthquake, or whatever is possible in their location. In this case the offense team is given guidelines on how large a natural disaster they are designing. However, they can request approval for variations in their "disaster generating" resources (e.g. inches of rain fall in a given period, a higher Richter scale earthquake, etc.) as the game proceeds.

In addition to the above there are three additional human roles some of which, for a larger game, can become new team types:

- Overall Game Director
- Defense Intelligence Agent

- Offense Intelligence Agent
- Judge or Evaluator

The judge or evaluator is a person able to make judgments about the resource requests of the teams to make sure the resources desired are within the expected budget constraints. If this is a training exercise it would be the person providing the training. In general there would be a separate person for every paired team and the resulting judging group (team) would act as a team and compare potential decisions on resources to ensure that all the teams are dealing with the same level of resources on either the defense or the offense side.

The defense intelligence agent has access to the final defense plan in a cycle and prepares a "leak" of information to go to the threat team. This is limited to a 500 word abstract in phrase form that gives offense team some unclear information (or hints) about what they might face in the way of defensive capabilities. There is an offense intelligent agent that receives the final offensive plan in a game cycle and prepares the same type of abstract for feedback to the defense team.

It is these leaks to both the defense and offense teams that hopefully cause of improvements on the part of both sides as they carry out the next cycle of the game. In theory we would like to see a final state reached in which both teams cannot find a way to improve their respective plans within the resource constraints that have been imposed upon them. At this point one could say that the best possible plans had evolved from each team as a function of the composite talents of the members of the teams. This is the fundamental limit for all collaborative activities.

As the number of matched teams go up their will be a separate intelligence teams for the offensive groups and for the defense groups to prepare a synthesis of all the leaks they obtain from the two agents. We will also look at the automatic generation of the leaks by an automated abstraction process. Until that is put in place the leaks will be constructed by humans given that role. The intelligence teams will not see the plans for which they get leaks but they will see the plans for the side they represent. In the larger game we feel the leak process and the summary process of leaks adds a lot of real world realism to a larger scale game.

The Overall Game Director is responsible for controlling all the communications and delivering the material from one party to the next. At some point many of the duties of this individual will be automated. However in the first version of the game we are attempting to design it in a form such that almost any group communication system can be used to carry out the process. However most commercial groupware systems do not easily allow the pen name and message restriction possibility.

EXPERIENCE TO DATE

In the fall of 2004 we ran the game in the minimalist form with only one class. We did find a number of corrections we need to make to the instructions that resulted in a few difficulties of interpretation. However, the students seemed to find the game extremely motivating. .

The initial "pilot" of the game consisted of one attack team (7 people), one defense team (4 people) and one intelligence team (8 people). The game was couched within an existing course as an assigned project and continued for approximately three weeks. The teams developed a web based critiques of the game and their involvement that included comments about the following:

1. Getting Started
2. Problems
3. Benefits
4. Recommended Actions

Getting Started and Problems

Leadership resulting in a well understood command and control structure proved to be vital to effective team performance. The teams that developed effective leadership at the onset of the game experienced cohesive behavior and a better situational awareness than the team(s) with poorly structured leadership. As time progressed the teams with effective leadership met their targets and published their plans in a timely fashion. At the meta level (the command and control level) above the three functioning teams, the Overall Game Director (OGD) was shown to be a factor in the performance of the teams. This is because OGD's presence and involvement was vital at the onset of the game when there is initial confusion about what is supposed to happen and when things are supposed to be published.

Even though anonymity of participants was stressed at the onset, some team members felt that a face to face meeting prior to the game beginning would have been helpful. Yet some other team members felt that anonymity was a good thing. Future games should investigate the roles that emerge and are assumed by each team member in each team during the game. Further investigation should focus on the function played by anonymity in role development. During

emergencies do team members interact with others based upon role identification or is identity required in addition to role?

One of the problems identified was the technology that was used. It was a technology WebBoard that permitted asynchronous communication even though there was a chat function that provided a minimalist form of synchronous communication. However the team members experienced conditions of uncertainty and ambiguity in performing their tasks during the game. Weick (1995) indicates that uncertainty is grounded in ignorance but ambiguity is grounded in confusion. All teams and groups encounter both conditions during communicative interaction. Teams in the game were no exception. Media Richness Theory suggests that uncertainty is best addressed by media that is not considered to be rich in non verbal cues. The rationale is that ignorance can be reduced by obtaining additional information equated to the concept of uncertainty reduction. Asynchronous communication through WebBoard and similar threaded discussion technologies do this well. However conditions of ambiguity are different in that they are grounded in confusion and are best addressed by technologies that permit both verbal and non verbal communication cues to emerge during discussion. This permits team members to enter into meaning making scenarios best addressed by synchronous technologies and the wide variety of communication cues synchronous technology permits. The use of both technologies should be investigated in future gaming scenarios. Most of the members of this class had not experienced WebBoard prior to the exercise and this might well have contributed to the initial ambiguities. There is a learning period for this form of communication. It probably would not be so difficult for an existing team or a class using WebBoard for its class work. The real function of anonymity in this case is to prevent any communications between roles in different teams.

Benefits

Each team as part of their after action critique suggested the benefits they felt resulted from playing the game.

The Intelligence team felt that a benefit to them was a better understanding of intelligence activities that underlie scenario identification. They stated: "Understanding Intelligence Agencies: The main benefit was learning how involved the work of an Intelligence Agency is. They have to constantly consider scenarios and try to determine the accuracy level and relevance of reports they receive from the field. They must also take into account that double agents are very likely to exist, and section information so that access to it is limited to a certain few." (Intelligence Team)

The Defense team felt that there was benefit in working through the technology as plans were being developed. One of their statements was: "Most users have not participated in a "game" such as this; therefore we gained experience with communicating and solving problems asynchronously." (Defense Team)

The Attack team indicated that given the limitations of the technology they had to work harder to develop their plans and scenarios. They said: "Some of the benefits received from the game include the ability to converse and make plans on an online forum. Decisions are hard enough to make in a group in real life, and it becomes exponentially harder when everything is not talked about in real time. Being exposed to this type of process in a game situation is very beneficial." (Attack Team)

The major benefits seem to underlie issues of understanding and communication. Both are addressed during actual emergencies and emergency scenario planning. Understanding has two major components. Understanding the situation and scenarios that can emerge and understanding the roles that are formed during communication and how they evolved and were used in the construction of plans.

Recommended actions

Most of the comments from the teams focused around the use of technology during the game, the role of OGD, and the timing of when reports were to be posted. The technology recommendations aligned themselves with the previous discussion about communicative action during conditions of uncertainty and ambiguity. The teams felt that in playing a game of this nature there will be times when synchronous communication, face to face or on line chat, would be necessary and therefore should be accommodated by the technology.

Coordination and communication by OGD prior to the game, during the socialization period, and at key points during the game are important factors to the success of the game.

Lastly, a schedule of posting the reports required by each team during the game should be revisited and altered as well as adherence to times posted. Teams cannot be late in posting reports because it affects the timing of all activities later in the game.

Observations

There are actually many potential applications for a motivating competitive game of offense and defense interaction with respect to dealing with a number of problems we face in the emergency preparedness field. In strategic planning for

things like mergers and major new products, the utility of the use of scenarios according to van der Heijden (1996) and Wack (1985) is in developing mental capabilities of the decision makers based upon the following elements:

- Changing mental models of those involved
- Further understanding of predictability and uncertainty
- The need to take existing mental models as the starting point
- Creating a reframing of the issues involved, through the introduction of new perspectives.

Too often decision makers become infused with the idea that what worked in the past to bring about a success will work just as well in the future Duncan and Wack, 1994). The current assumptions limit the vision of the future. The process of gaming the creation of scenarios (Fahey, 2000) appears to bring out unforeseen consequences that begin to cause a reexamination of basic assumptions. Scenarios can then be improved to the point of becoming action plans (Wilson 2000) with variations that reflect new alternatives that need to be considered (Shoemaker 1995). Clemons (1995, page 65) put it very well: "One of the greatest limitations to strategic change is the considerable number of things successful incumbents know about their industry that unfortunately are no longer true."

In the field of emergency preparedness we have to train first responders and others to react by instinct in situations of crisis for which they have no preparation. While this is very necessary it can have the negative impact of limiting improvisation and creativity in dealing with new and unexpected situations. Most of the techniques for physical simulations for training exercises are rarely designed to expose people to the unexpected. Our purpose in this game is to focus more on mental rehearsing than physical rehearsing and to expose the trainee to the unexpected and challenge him or her to deal with new insights and assumptions. Mental rehearsal is also a key method in the field of NLP (Neuro Linguistic Programming), which studies how human represents and utilizes experiences to cope with pressure and achieve peak performance when needed. (P. Murphy, Wikipedia.com)

A step in the direction of competitive analysis was the introduction of having different stakeholders construct different scenarios for the same future projection (Eden and Ackerman, 1999). Gausemeier, Fink and Schlake (1998) discuss the concept of scenario management wherein the scenarios become an integral part of plans and are continuously updated along with the evolution of the plan rather than the one time strategic analysis exercise. This is clearly the approach that needs to be taken in the crisis management and response planning process. Coates (2000) points out the need to bring the scenarios down to the operational levels in organizations as a way of ensuring more realistic understanding of organizational capabilities at the operational level: using scenarios to convey knowledge in both directions between the operational and executive levels.
In the last two decade, scenarios have become a prominent technique in evaluating and evolving requirements for the design of information systems (Go and Carroll, 2004; Hooper and Hsia 1982). We have need in Emergency Preparedness to think about the unthinkable (Kahn 1965) and, as a result, scenarios will not only affect training but they can and will influence changes in our systems and technology.

The scenario game described here has a variety of applications:

- Training emergency professionals for using improvisation in unexpected situations
- Improving plans by introducing more creativity in the planning process
- Creating an ongoing continuous integrated training and planning process for any local or regional emergency preparedness organization
- Developing systems and equipment requirements that can be extracted from new scenarios
- Establishing mental rehearsal as an ongoing continuous process.

In our prior work (Turoff et al 2004) we point out the need to integrate scenarios into operational emergency response information system as a fundamental metaphor for the design interaction through related events comprising a scenario for an ongoing event. Here we have pointed out the critical use of scenarios to evolve and improve the planning process for emergency preparedness.

One student suggested that the game was metaphorically the equivalent of an "intellectual chess match". Following in that vein the game showed that the development of a plan resulted from a team's understanding of scenarios and what would be required to both execute a scenario as well as defend against possible scenarios. However the scenario process as was observed during the pilot contained elements of Hegel's dialectic philosophy mentioned in the introduction to this paper. Hegel suggested that there is a thesis and antithesis that results in a synthesis that becomes the thesis for the next iteration. As the defense team developed their plan and the attack team did as well both plans represented an initial thesis. Of course the antithesis was no plan at all. However during the second and subsequent iterations of the team

planning processes, given additional information, each original plan (the original thesis) was synthesized into a different plan. This plan became the staring point for the next iteration and in a Hegelian sense represented a new thesis for both teams.

The game showed that in constructing a new plan communication plays a vital role and is in turn enabled or constrained by the technology used for scenario development. During scenario development the occurrences of team ambiguity must be identified in order to use technologies that permit the communication of both verbal and non verbal cues. These technologies need to be identified and then incorporated into actual emergency response scenarios. Homeland security today both in assessing a threat and reacting to one needs a wide range of technologies to leverage the uncertainty and ambiguity underlying sense-making (Weick, 1995) activities within team and group scenario planning.

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