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Lessons From Selected Joint Decision Support and Simulation Centre Activities (Nov-Dec 2007)

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Joint Operations Division
Defence Science and Technology Organisation

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ABSTRACT

This report is a review of a series of activities held in the Joint Decision Support and Simluaton Centre in November and December 2007. This report accompanies a classified report containing more details on the outcomes of the activities. The purpose of this report is to capture, in an unclassified way, some of the process lessons learned during these activities. While many of these lessons are not new it is hoped recording them in this way will help prevent mistakes being repeated in the future.

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Executive Summary

This report is an unclassified accompaniment to a classified report on the same topic. Together, they describe an event made up of a series of activities held at the Joint Decision Support and Simulation Centre (JDSSC) in Fairbairn, Canberra during November (Event 1) and December (Event 2) 2007. The activities were classified, but it is beneficial for the management of similar activities in the future if the unclassified methodological insights are presented in an accessible way.

The event comprised a one day Defence-only 'rehearsal' activity, and a three day activity which included other Government agency participants. Both of these were preceded by several days of set up, and a day of practice runs for each activity. One further event (Event 3) was planned, but was subsequently indefinitely suspended following the change of government in November 2007. Most of the observations refer to Event 2, the December activity because it was the larger and longer of the two conducted.

This report attempts to identify and learn from errors as well as acknowledging techniques that worked well. As such, it is not intended as an overall assessment of the event. Nor is the report a comprehensive review of techniques, rather it provides some pragmatic information on methodologies that worked and those that did not work in this context. The degree to which the event was a success can be determined from the goals and outcomes as set out in the joining instruction, this is assessed in the classified report. It is important to note that this event aimed to look at command and control structures associated with the system rather than the explicit details of the system itself.

A wide variety of lessons are identified in four areas: planning, game play, data capture mechanisms and analytical tools, These lessons range from agreeing goals with clients and choosing scenarios that appropriately use the capabilities to room set up and having effective facilitation.

Contents

1. Introduction

This report is an unclassified one, but is closely associated to a classified report on the same topic [1]. Together, they describe an event made up of a series of activities held at the Joint Decision Support and Simulation Centre (JDSSC) in Fairbairn, Canberra during November (Event 1) and December (Event 2) 2007. The activities were classified, but it is beneficial for the management of similar activities in the future if the unclassified methodological insights are presented in an accessible way.

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2. Background

DSTO assisted CDG staff in the design and implementation of a man-in-the-loop command and control wargame. In this wargame the tactical level was represented by simulation models. The participants were divided into four groups during the wargames, representing different, geographically dispersed organisations within a C2 structure.

A team of four DSTO analysts was established to carry out the task. The team was provided limited guidance on the activities and found it difficult to seek further information or influence decision makers (the client) who seemed to change the scope of the events after the initial guidance had been given. The goals of the events (and hence the analysis) were never clearly articulated, in fact elements of the sponsor group appeared to have differing objectives based on discussions from the activities[1].

Event 1 was intended to be preparation for Event 2, which was in turn preparation for Event 3, which was later indefinitely postponed. However, it would be unfair to simply write off

[1] Aspects of this can be attributed to the transition of the sponsor's area from one part of Defence to another, with a resulting flux in staff and guidance.

these activities as purely rehearsals because both activities had significant numbers of subject matter experts present and resulted in the collection of significant relevant data for the client.

Additionally, Event 1 aimed to look at the issues in an Australian Defence Organisation/Force (ADO/ADF) only context and Event 2 then looked at them in a whole of government context. Event 2 therefore included some non-Defence participants. Event 3 was supposed to look at the issues in a coalition context with participants from various nations invited to attend.

Some aspects of the activity were dictated by the sponsor group, including the use of a simple simulated environment to immerse the players in a set of scenarios. These scenarios were used to create the context in which the C2 wargame was studied, they did not need to be (and were not) high fidelity simulations of the tactical battle.

Each scenario was examined by proceeding through four phases which are discussed in more detail in various sections:

1. An introduction to the scenario.
2. The human in the loop simulation.
3. A review phase done in the play groups.
4. A facilitated discussion.

Both of the events used a senior ADF member as event facilitator and were held at the JDSSC facility in Canberra.

2.1 Event 1

The analyst team was given just over three weeks to plan for the first activity held on 12 November, and during this time met several times to discuss the guidance given and determine specific aims and client requirements from the activity. Given the short timeframe for planning (the analysis team was formed in mid-October), the team selected an analytical approach that would effectively capture stakeholder views, questions and enhance understanding, with minimal set up time and rapid turn around on results. This approach focused on capturing the results of a facilitated discussion aided by information gathered from active observations[2] and questionnaires.

It was agreed that the client requirement for findings to be delivered as "insights rather than as definitive specifications", indicated that quantitative analysis methods would not be necessary. Instead, recording of discussions and analysis of key questions and conclusions would provide sufficient detail and rigour to satisfy the needs of the client.

The primary aims of Event 1 were to:

- Rehearse the proposed approach with ADF participants prior to Event 2 which would include other Government agency participants;
- Collect information relating to ADF/ADO thinking.

[2] Active observations allow the observer to directly and interactively engage with the subjects to elicit information.

Therefore, during the activity, the analysis team focused on identifying key areas of interest to drive Event 2 discussions and potential obstacles to sharing of views and maintaining participant engagement.

2.2 Event 2

In preparation for the 3-5 December activity the team sought feedback from the client and assessed the strengths and weaknesses of Event 1. This assessment yielded improvements for the planning of Event 2. These improvements are detailed under appropriate headings below, but largely involved changes to the analytical and facilitation techniques and substantial changes to the scenarios being used.

The longer nature of Event 2 meant that more scenarios were covered and more discussion was entered into. It also allowed for some of the scenarios to be replayed with altered assumptions. Additionally, the whole of government approach created a different dimension to the event.

3. Planning Lessons

The compressed planning timeframe allowed prior to the events was not ideal for research and preparation of analysis techniques. It has been suggested that this also reduced the ability to secure the desired number and variety of participants, particularly given the proximity to the Christmas stand-down period and end of year deadlines, but this timeframe was dictated by external factors. The Department of Prime Minister and Cabinet did not send their representative due to circumstances beyond the control of the organisers.

In retrospect, having a series of events leading to an event (Event 3) which was then cancelled was not the best approach. However, the need for rehearsal and practice events is well established and desired amongst experimentation practitioners. The ability to successively practise for what would have been the final event would have certainly proved valuable to its smooth running, although it does mean that each event needs to have well established goals that link together and build on each other in order to avoid confusion and duplication.

4. Game Play

The activity used a simulation tool to run four teams of players through a scenario. While the players were asked to respond to scenario developments they were not able to influence the events occurring in the scenario, which were completely pre-determined. This was consistent with the analysis team's goal of looking at command, control and communication issues and not the events themselves.

Prior to game play an introduction to the scenario was carried out. This session introduced the participants to some basic concepts required to effectively participant in the scenario and gave them an opportunity to clarify issues such as terminology.

The teams were required to communicate with one another in order to transmit and receive knowledge as they saw fit. These exchanges were governed by a C2 structure which was the main subject of the analysis.

4.1 Teams

The four teams consisted of 3-4 members. This smaller number appeared to be sufficient to allow internal discussions and also appeared not to be excessive, which was a risk given the limited role of participants at various stages of the simulation. After the first activity, it became clear that there was room for improvement in encouraging all participants, regardless of rank or experience, to share their views as part of the group discussion. For Event 2, this was considered a particularly significant issue if invited representatives from other Government agencies were to feel comfortable in making a contribution where they may otherwise have felt inexperienced. The analysis team concluded that this could largely be achieved by emphasising this aspect of the facilitator's role.

4.2 Room Layout

The room layout at the JDSSC was relatively simple and is shown in Figure 1. The middle section was used for briefings and discussions. The edges were divided into sections for each of the four teams.

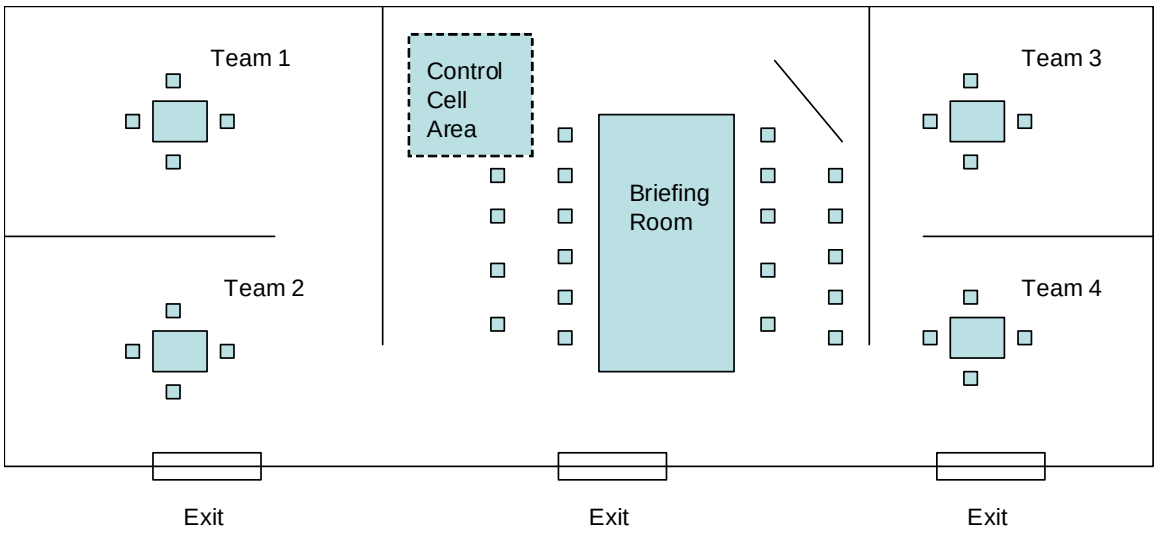

Figure 1: Simplified Room Layout

The barriers between teams 1 and 2 (and similarly between team 3 and 4) were not sufficient to prevent teams from being aware of what other teams were doing. This was little more than

a distraction in the context of this event, but could present a significant problem in a different wargaming context (i.e. when there is competition between the cells to "win" the wargame or when there was inappropriate information that could have been shared this way).

The open plan layout meant that players, visitors, analysts and white cell members were able to move easily from team to team. This was useful for analysts and the white cell, but possibly the movement of players and visitors was a distraction. The space available was adequate for the approximately 30 people involved in this event, but would be uncomfortable for any larger number.

4.3 Scenario Usage

Scenarios were designed to allow participants to experience different perspectives during a crisis. The idea being to then explore the implications of that experience with the group during the post-run discussions.

The scenarios required each of the teams to play a different role in a command and control network in response to scripted information received about the unfolding situation. Scripts were read by members of a non-playing cell. This scripted information was injected at predetermined times irrespective of what actions the players had taken previously. These were synchronized with events occurring in the simulation.

The team members defined their own goals surrounding their wargame role in the scenario, based on the information they received during the pre-play briefing.

The scenarios provided by the clients for use in the activities were not endorsed, but were approved by CDG for the purpose considered. The scenarios were elaborate for the purpose of the event and stretched some of the underlying assumptions about capabilities associated with the events. However, they were designed with a focus on stressing the systems being examined, rather than being concerned with realism or likelihood. Further, during Event 1 the analysis team concluded that some of the more realistic aspects of the scenarios needed to be changed to make them more engaging for participants. This extra complexity also added to the resources required to generate the supporting simulation and other elements.

4.4 Communication

Communication between teams and with the white cell was conducted using a number of tools that are described in Section 5.

The C2 network was prescribed to reflect candidate vertical and horizontal lines of communication. This resulted in communication being controlled to only allow certain teams to talk to one another based on the C2 model being explored.

4.5 Situational Awareness

Situational awareness was provided to the players via the Dynamic Agents Representation of Networks of Systems (DARNOS) tool. This was used to display a map of the operational area

containing all elements and in some cases a 3D rendering of events. Each participant was provided with a monitor that allowed them to view DARNOS and slightly alter the way information was displayed based on their preferences (i.e. zoom in or out, or view their team's communication logs etc). The information presented to each team was based on the information available to them, which was often different to what was available to the other teams and was not a complete picture.

This provided the players with some information than was not necessary to their decision making, however this information did increase the players' sense of immersion in the game. Further, the event did prove to be a useful opportunity for the simulation designers to practice using situational awareness tools.

5. Data Capture and Communication Mechanisms

Both phone lines and headsets were made available for communication, and all verbal communication was captured via room speakers. Other data capture mechanisms, including video and audio capture, are also discussed in this section.

In a few instances, having multiple methods did create some confusion with occasional duplication and conflicting messages being given over different systems. However, these were mostly unrelated to game play and could have been overcome with additional training/protocols had they been problematic. For instance, a protocol for who was authorised to give certain pieces of information could have been used.

5.1 Phone Logs

The phone system used Voice over Internet Protocol (VOIP) technology. All phone calls were logged and recorded in the standard WAV format[3] which were saved to a location on a shared drive when the phone call ended. Calls were logged using a naming convention that identified the source and receiver of the call as well as the time the call was made. It was these logs that were subsequently used to generate the social network analysis.

The phones were set up in a way that dealt with engaged lines by ringing secondary phones available in each cell.

5.2 Headset Logs

An internet voice chat system was also used in parallel. It was constantly available on several channels, although, for the small number of participants and the relative simplicity of their roles, it was not often used, and probably not necessary.

[3] WAV files have the extension .wav and are common audio files able to be played in Windows and other platforms.

The primary function of the headset system was as a means for the part of the white cell conveying scripted information to communicate with the players.

All the conversations were recorded but were not reviewed in detail as the content of the white cell inputs was already known and conformed to the script in nearly all cases.

5.3 Video and Sound Capture

Video and sound data was recorded from various angles during the event. The data was streamed live into the analyst room and was used to monitor the situation from there. It has not been reviewed since the event, but could potentially be used to verify data from other sources.

5.4 Note Taking Through Observation

In addition to the team of four DSTO analysts, there was a number of observers present throughout the event. This meant that there was more than sufficient resources to make note taking and passive and active observation an effective method of collecting data. This, along with the whiteboard notes taken during group discussion, was the source of many of the conclusions [1].

There were some issues with notes taking too long to be safe-handed from the JDSSC to the analysis team at Edinburgh and some notes were accidentally destroyed. Care should be taken to manage data, especially classified materials.

5.5 Facilitated Discussion Groups – White Board

After the teams of players had been given a chance to back-brief on their experiences during the wargame a facilitated session was conducted. This was designed to further encourage the sharing of knowledge and discuss assumptions and challenges. Facilitation was performed by two people; one senior ADF member and a senior member of the analysis team.

The facilitation was partially aimed at guiding discussion to explore some key issues of interest, determined by the client. However it also allowed for the raising of new issues. This was to be the main source of information for analysis.

During Event 1 it was noted that strong personalities expressed their views on each of the analysis questions. The facilitator, who often agreed with this view, did not then allow for explorations of wider issues, or dissenting opinions. Especially during Event 1 the facilitator interpreted some of the questions in the questionnaires (see Section 6.1) too literally which added to the confusion over the event's goals. It was therefore concluded after Event 1, that the facilitated discussion would benefit from greater focus on the activity objectives.

This was achieved during Event 2 by ensuring that all participants provided a back brief initially and the cross-questioning then allowed broader discussion. Additionally, participants were frequently reminded of the objectives, and the facilitator's and lead analyst's

responsibility to halt discussion and redirect it, particularly when it became entrenched in tactical detail, was reinforced.

From this experience, the analysis team concluded that the military facilitator had the experience and authority (through his rank) to guide and direct the conversation. While the lead analyst's role is to make sure that sufficient depth and breadth are covered to provide sufficient relevant data for productive analysis of the activity. When these two people work effectively as a team they possess all the necessary criteria for successful facilitation.

The analysis team agreed that characteristics of good facilitation practice for this type of event include:

- Record consensus opinions and describe issues of disagreement on the white-board;
- Striking the appropriate balance between the strategic and the tactical;
- Encouraging views from all participants;
- Having a clear understanding of the purpose;
- Minimising destructive interjections from senior stakeholders, which can very quickly erode atmosphere of free exchange of ideas and questions;
- Have and keep in mind well defined structure, goals, and deliverables of activity in larger project context;
- Minimisation of repetition of well-made points by using intermittent "Conclusions" summaries which give assurance that a point has been captured and we can move on;
- Usage of common language and definition of key terms;
- Alternating which individual or group is invited to start each discussion;
- Facilitator asking participants to articulate the assumptions behind their assertions, even when there is consensus;
- Facilitator having the freedom to not slavishly follow prescribed structure and judge when a given issue has been sufficiently covered in conjunction with analytical guidance;
- For broader purposes, participants should be encouraged to go beyond focusing on what they do and don't know about the topic. Rather, they should be encouraged to focus on immersing themselves in the simulation enough to consider what they would need to enable them to carry out their role effectively, what the measures of effectiveness would be, and what the risks and consequences of ineffectiveness would be;
- Not be advocates for a point of view.

6. Analytical Tools

While facilitation and note-taking are important skills for analysis there were two areas of more traditional analytical work which are reviewed in this section. These are the use of questionnaires and social network analysis.

6.1 Questionnaires

The information captured in discussions was augmented by a questionnaire which was filled out by each team. After each simulation run, participants were asked to remain seated in their respective cells and were asked to consider their responses to a list of questions that would aid them to identify key issues for their back brief. These group discussion questions were drawn from the master questions list provided by the client. This approach aimed to lay the foundations for enhanced participation and greater diversity of input, by distinguishing between cell and group discussion, and giving each cell an opportunity to communicate their experience to the rest of the group in turn.

The questions aimed to encourage innovation while setting boundaries relevant to the client's needs. As such, the questions were open, but also asked the participants to think about particular issues. Organisational psychologists from DSTO were used to review the questions to help ensure they achieved these goals.

During Event 1, participants appeared to have insufficient time to fill in the questionnaires, and displayed a preference for sharing their experiences verbally. Therefore, Event 2 benefited from replacing the questionnaires with longer group discussion time which was more carefully guided by a predetermined group of discussion questions.

6.2 Social Network Analysis

The phone call logs provided a nearly complete record of the information transfer (the subject of interest) between the teams. The phone records were reviewed in near real time to construct diagrams similar to the one shown in Figure 2.

The linkages between the teams were based on the number of phone calls that were made between teams, and also reflected the direction that information was transferred. Some phone calls were eliminated because no information was transferred (such as joke calls and wrong numbers) and in some cases information was transferred in both directions in a single call. Information was not assessed for quality, depth or accuracy, however, a more detailed study could have included these factors. Neither was information tested for uniqueness and the same information could be represented multiple times.

The diagrams presented a simple way to represent a large amount of phone call data. Figure 2 shows that Team 1 is providing information to Teams 2 and 4 but not 3. Team 2 is then passing on information to Team 3. In this structure Teams 1 and 3 as well as Teams 2 and 4 were unable to communicate.

MS PowerPoint was used to generate the plots and MS Excel was used to tally and record the data. A simple diagramming tool might have aided the process, especially if the diagram was able to be automatically generated from the data.

The use of this technique was not planned prior to the experiment and is a positive example of how ad-hoc analysis can produce robust results. Its purpose was to demonstrate that the command and control structures being imposed were being followed. It also provided an

insight into the amount of information which was being shared between the groups and between which groups it was being shared. This in turn could be used for further analysis and comparisons regarding such things as expected information flows.

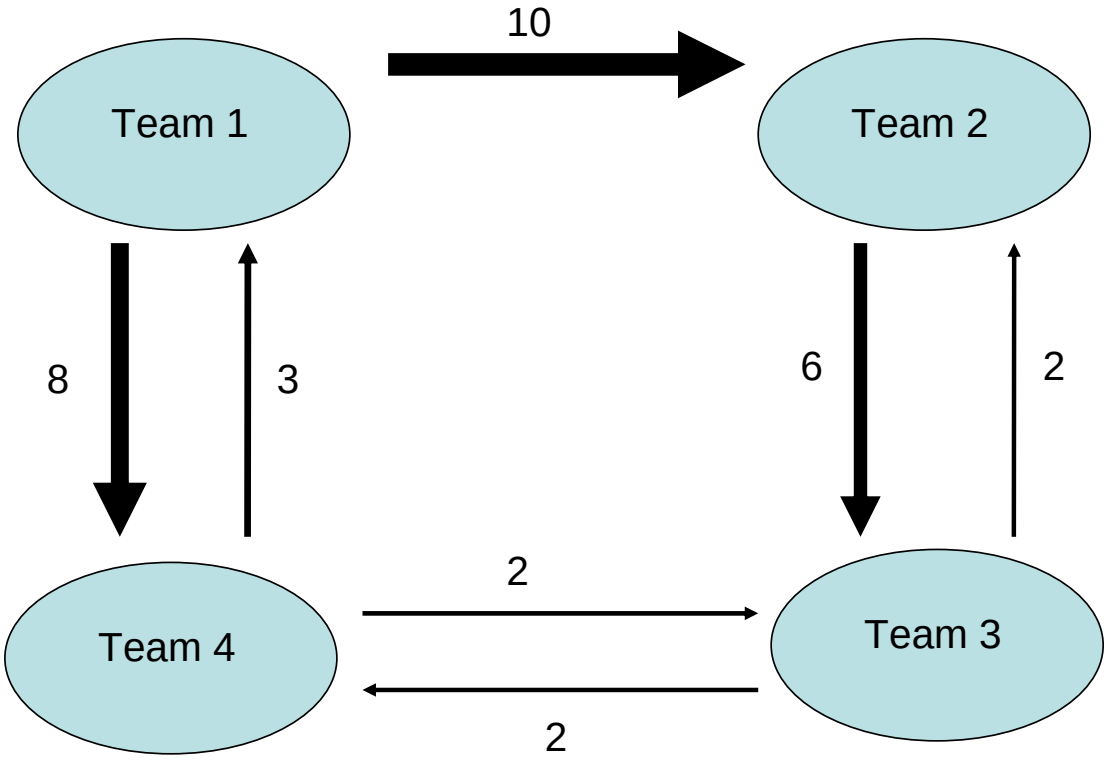

Figure 2: An example of a social network diagram showing the transfer of information between teams. The numbers are the number of information exchanges that occurred in each direction. The thickness of the lines are proportional to these.

7. Administrative/Minor Matters

7.1 Civilian Attire

The use of civilian attire during Event 2 encouraged equitable input from civilian personnel and ADF members, regardless of rank or organisation.

7.2 JDSSC Space

The benefit of the JDSSC being away from the hectic Russell/ADFHQ environment was observed. There was only some attrition of participants and those that did participate were fully engaged in the activity while they were there. The number of people attending the event (in whatever capacity) meant that the middle section of the decision space was not large enough to cater for them all. Subsequently, the whiteboard was not visible to all participants during the facilitated discussions.

7.3 Hospitality

It was suggested that instant coffee might not be acceptable to some international participants. The urn proved excessively noisy when in the JDSSC Decision Space.

It was also mentioned that it would be appropriate to break-up the week by organisation of social activities in the presence of international participants.

7.4 Security

A number of participants and analysts expressed a perception of poor security. This most commonly related to the frequent absence of the site security guard from the entry point desk. This was compounded by errors and significant delays in processing visitor passes and responding to queries.

7.5 Ethics Permission Sheets

Participants were required to give permission for data to be captured in line with DSTO policy.

There was at least one issue with the wording in the permissions sheets. It is recommended that the committee responsible for creating the pro-forma for the approval forms review some of the ambiguous terms.

8. Summary

This report summarises some lessons identified from a classified set of activities in an unclassified way. It is not meant as an instruction manual, merely as a mechanism of recording these lessons for possible future consultation in similar areas.

9. References

[1] Greg Newbold, Alison Hickman, Michele Wilson, Justin Beck, Title Restricted, AR-2008/1017990/1, In preparation.

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