

New Collaborative Analysis Approaches
The Internet, War Rooms & Wargaming

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Abstract

Many current military situations are highly complex where effective solutions require a multi-disciplinary, collaborative approach. NATO's Kosovo intervention provides an excellent example highlighting many military and non-military issues. The War Room process is an integrative, interactive process for studying and understanding such complex problems. The rapid growth of the Internet provides unprecedented access to much unclassified data that enhances this process. During NATO's Kosovo campaign, all parties posted large amounts of near-real time information, including imagery, on the Internet. These data were used to build an unclassified Kosovo War Room at the Johns Hopkins University Applied Physics Laboratory. This talk describes the process of using the Internet to build this War Room and analyze the Kosovo campaign. Location and validation of military data on the Internet are discussed, as is an experiment that examined the military utility of such open source information in command decision-making. A computer-based virtual war room is also described. The war room process forms a basis for more in-depth wargaming to evaluate future command and control architectures and weapons concepts. The use of a state-of-the-art wargaming facility, the Warfare Analysis Laboratory, will be described. Future implications of new collaboration techniques for warfare analysis are also discussed.

Topics: Collaborative Tools for Military Analysis

The following topics are covered in this paper:

- War Rooms for the Understanding of Future Warfare
- Open Source Information in the NATO Kosovo Campaign
- Open Source Information Management Limited Objective Experiment
- Concept Evaluation Wargaming Using the “Warfare Analysis Laboratory”
- Future Implications of New Collaboration Sources and Techniques

War Rooms for Understanding Future Warfare

Why War Rooms?

War Rooms are used for studying and understanding complex problems. They facilitate the display of large amounts of disparate information from a variety of sources. They provide opportunities for:

- Developing cognitive associations
- Integrating concepts
- Collaborating among participants
- Integrative, interactive analysis process



Figure 1. Kosovo War Room during a collaborative analysis session

War Rooms are not only used for analysis they can be used for operational planning and command support.

War Room: A Process and A Place!

War Rooms help people develop an understanding of the multiple dimensions of complex problems by drawing associations between diverse elements of information & ideas. War rooms help you recognize what you know, what you don't know and what you don't know you don't know. They are useful for:

- Generating & synthesizing ideas
- Subjecting ideas to critical review
- Building consensus & highlighting conflicting views
- Sustaining positive communications flow

See the Appendix for a set of guidelines to use in building and using a War Room.

Open Source Internet Information in the NATO Kosovo Campaign

At the beginning of the war in Kosovo, APL analysts set up a war room to help understand what was happening and what deficiencies in military capabilities were becoming evident. It was believed that much could be learned from the conflict in the Balkans since it may be very representative of future small-scale contingencies involving coalition warfare.

Developing a war room is an iterative process as shown in the figure below.

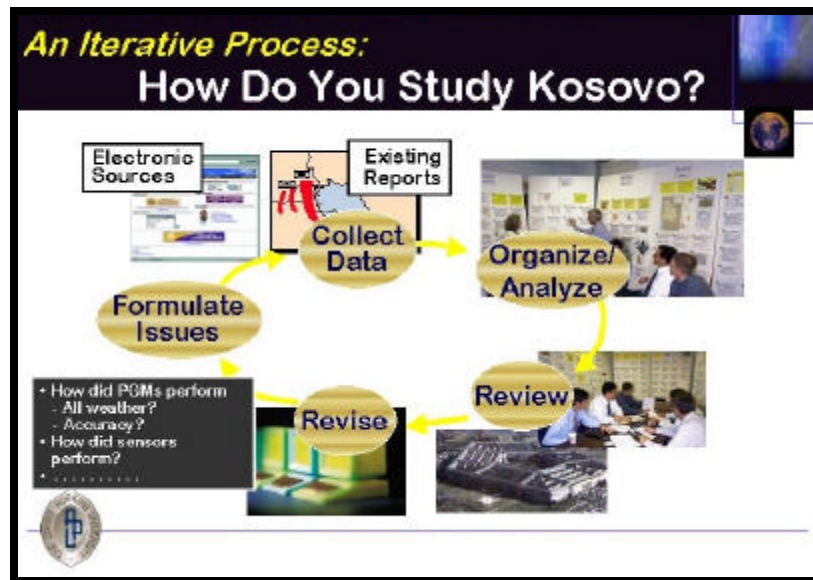


Figure 2. A War Room is an iterative process.

An Evolving Story Visualized: War Room Organization

A key step in initiating a War Room is to decide on the major topics that need to be understood and analyzed. The arrangement of the Kosovo War Room is shown in the figure.

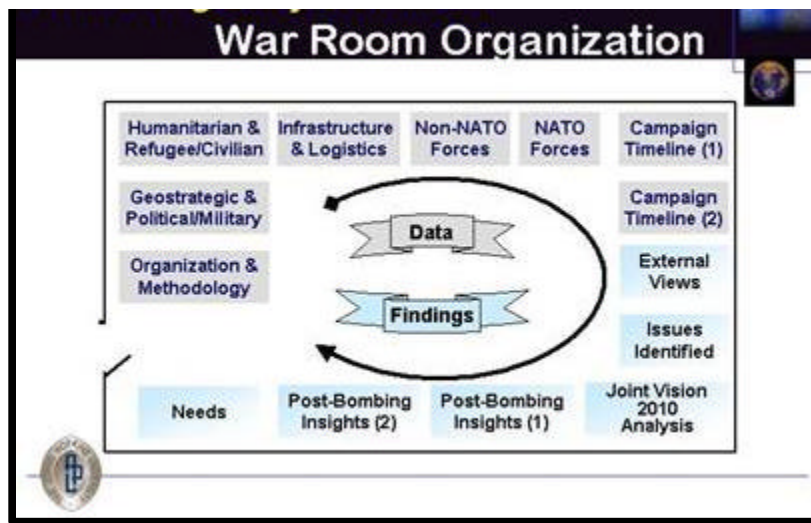


Figure 3. Organization of a War Room reflects the analysis plan.

Sources of Electronic Data: The First Internet War

The Kosovo conflict can be considered the “first Internet war.” Lessons learned in trying to exploit Internet data include using caution with “unofficial” sites and validating open source data with in-depth subject matter expert knowledge. Primary websites that were found to be useful were those of the U.S. Government (State, CIA), NATO, DOD, U.S. Services, Allies (UK, RAF) and independent research organizations. Information obtained included armored vehicle strike results, potential NATO invasion scenarios, target sites, and pre- and post-strike assessments. Unreliable sources included Yugoslavian websites whose main functions were propaganda and misinformation.

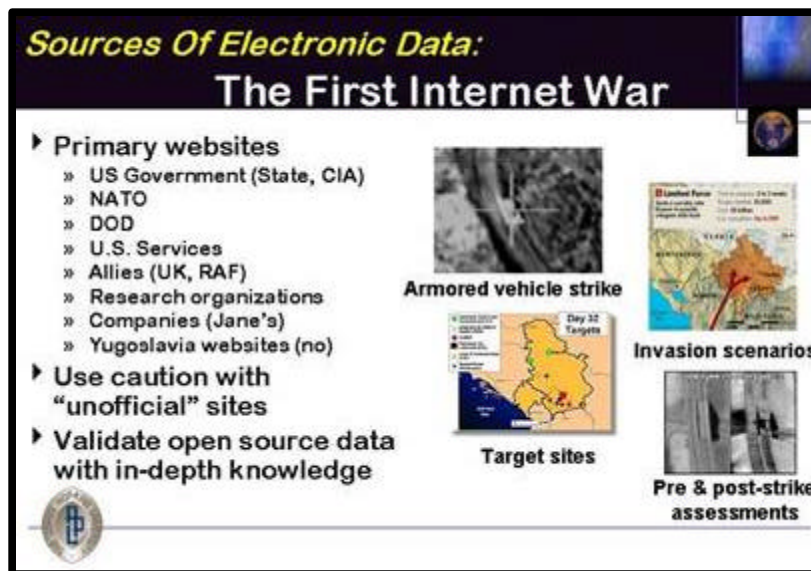


Figure 4. Kosovo War Room Internet Data Sources

Example Findings: New Asymmetric Counters

Joint Vision 2010 identified a number of asymmetric threats that an adversary o the future might use. Through the war room process, our adversaries in Kosovo used additional asymmetric threats that were not anticipated such as:

- Intermingle forces with civilian population
- Reserve use of air defense weapons; fire on visual contact
- Use refugees as strategic weapons & stress coalition logistics
- Concentrate light infantry forces in mountainous terrain

Use of Unclassified Internet Information: Not a Limiting Factor

The Kosovo War Room was built using only unclassified information available from open sources. The use of unclassified information is not a requirement for War Rooms; they can be built in the same way using classified information. However, using only unclassified information in War Rooms can still provide considerable insight into situations while allowing the War Room to be visited by a much larger group of people, often resulting in new perspectives and observations. Although the current Operation Enduring Freedom and the War on Terrorism have been conducted with much less provision of open source information, there has still been considerable information available on the Internet that could be used in War Rooms. Images of pre and post-strike assessments of US air strikes in Operation Enduring Freedom have been posted on various websites. Al-Qaeda has also attempted to operate a website several times during the conflict, although it has been shut down each time by US Government action. However, the War Room process can still be useful, even with this reduced quantity of information, in identifying emerging operational and technical challenges. Insights gained from unclassified data should be evaluated using classified sources whenever available.

Note: Since the Kosovo War Room, APL used the war room process to explore Homeland Security, Army Transformation and Mass Casualty Response.

Conventional War Rooms Advantages & Disadvantages

Advantages of conventional war rooms are that they provide an interactive, multi-disciplinary environment for the comprehensive view of a complex problem. They are easy to change or rebuild as knowledge regarding a problem increases or changes. Disadvantages of war rooms are that they are difficult to physically transport to another site, the individual viewgraph sets do not capture physical scope of the war room, the material cannot be accessed from external sites, and the audit trail of the development process is not preserved. Also it becomes cumbersome to include too much amplifying information and source material that cannot be readily searched for key topics of interest.

Virtual War Room Concept: Kosovo War Room Example

Electronic war rooms called virtual war rooms overcome some of the limitations of physical rooms. A major goal of the virtual war room concept is to replicate feeling of being in physical war room. Since you can only read one figure at a time, the basis of the virtual war room is to preserve that capability while giving a sense that you are looking at the associated board within the overall war room. The format selected for the virtual war room is a 3-frame HTML display showing overall room layout, the board of interest, and the specific selected slide. The virtual war room uses “point & click” to emulate moving around and selecting information in a physical room. An example of the virtual Kosovo War Room is shown in the figure.

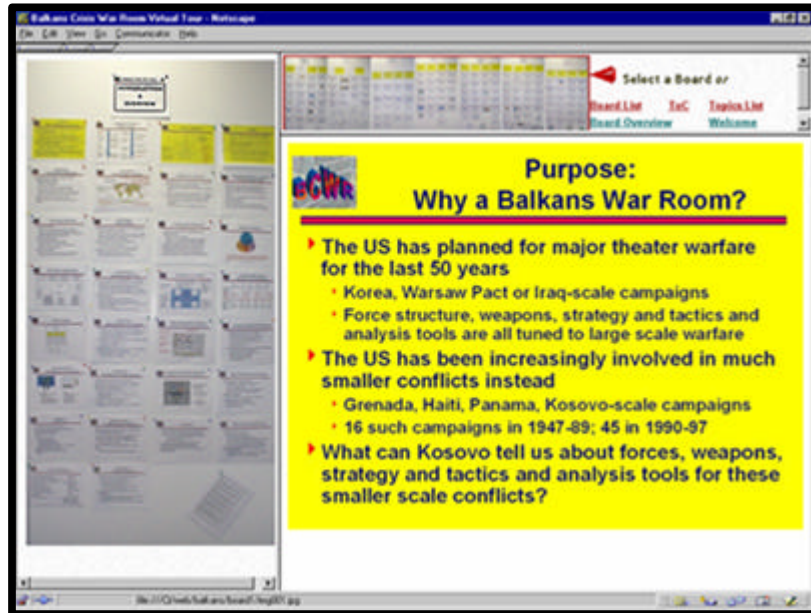


Figure 5. Screen arrangement for the Kosovo Virtual War Room

Virtual War Rooms Characteristics

The virtual war room can be used for big screen presentations or for small screen one-on-one viewing. The characteristics of a virtual war room are:

- Emulates “walking through” the physical war room
- Centralized analysis / de-centralized viewing
- 24/7 access from anywhere via the Internet
- Links to documents, clippings, websites, videos, etc.
- Access to previous versions of the war room
- Targeted discussion opportunities (chat room)
- Focuses attention on a single “chunk” of information momentarily

Improvements to virtual electronic war room under development include:

- Individual viewgraph download capability

- Comments on individual slides (sticky notes)
- Links to handle viewgraph overlays & note pages
- Mouse-over captions & zooming images
- User-friendlier setup / operation

Virtual War Rooms are more amenable for adaptation to real-time, operational, collaborative planning and analysis to support command decision-making.

Open Source Information Management Limited Objective Experiment

As a result of the knowledge gained from developing the Kosovo War room, we saw the growing value of open source information to support military operations and analysis. Working with the Joint Futures Laboratory (J9) of the Joint Forces Command (JFC) and the Joint C4ISR Battle Center Command Center Decision Aids Project, APL assisted in developing and conducting a Limited Objective Experiment to measure the value-added of open source information to a Joint Force Commander's decision-making process.

What is Open Source Information?

Open source information (OSI) is that which is processed by private sector parties and available through legal and ethical means. Government interest in the information may be classified, but the information is unclassified and available to anyone. The limited objective experiment sought to quantify value of open source information to Joint Force Headquarters as a complement to assured data.

Potential OSI Benefits to Warfighters

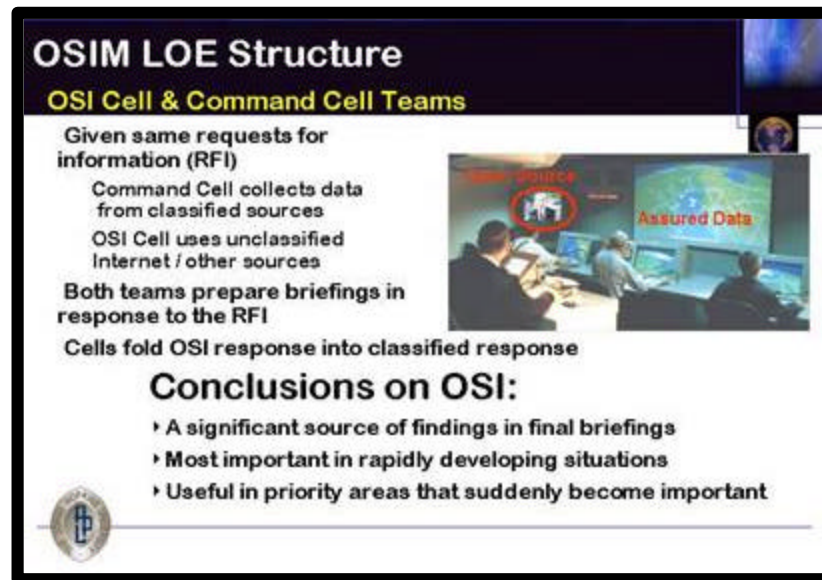
OSI may be the only available rapid response resource for non-traditional effects-based operations. OSI may be more up to date with little or no political risk associated with its collection. OSI may provide:

- Essential information from commercial sources in less time and at lower cost
- Rapid orientation adequate for initial assessment by Commanders and staffs to plan, and establish requirements for traditional intelligence collection
- Foundations for coalition operations without revealing traditional intelligence sources and methods
- Option to free scarce intelligence assets to focus on mission-critical information gaps

The purpose of the OSIM LOE was to determine the extent to which the above statements are true based on a realistic scenario-based experiment.

OSIM LOE Structure and Conclusions

The OSIM LOE involved two separate cells searching for the same “Requests For Information.” Both teams prepared briefings for the Joint Force Commander, and the analysis team evaluated the added value of open source information. In particular it was found that OSI provided valuable insight for conducting effects-based operations. Key findings are shown in the figure.



The slide, titled "OSIM LOE Structure", details the workflow between a Command Cell and an OSI Cell. It states that both cells receive the same Requests For Information (RFI). The Command Cell collects data from classified sources, while the OSI Cell uses unclassified Internet and other sources. Both teams prepare briefings in response to the RFI, and their findings are folded into a classified response. An inset image shows a control room with operators at consoles, with a red circle highlighting a "Open Source" icon and a red arrow pointing to "Assured Data" on a screen. The slide concludes with three key findings on OSI: it is a significant source of findings in final briefings, most important in rapidly developing situations, and useful in priority areas that suddenly become important.

OSIM LOE Structure

OSI Cell & Command Cell Teams

Given same requests for information (RFI)

- Command Cell collects data from classified sources
- OSI Cell uses unclassified Internet / other sources

Both teams prepare briefings in response to the RFI

Cells fold OSI response into classified response

Conclusions on OSI:

- ▶ A significant source of findings in final briefings
- ▶ Most important in rapidly developing situations
- ▶ Useful in priority areas that suddenly become important

Figure 6. This Open Source Information experiment demonstrated the value of OSI to commanders.

Follow-on Limited Objective Experiments are examining Multi-National information sharing and collaboration with coalition partners during Rapid Decisive Operations (RDO). The objectives are to assess the ability of a Combined Joint Force Headquarters (CJFHQ) planning RDO to:

- Share relevant information with coalition partners during RDO
- Conduct distributed collaboration between a CJFHQ and coalition partner HQs across different security domains
- Use open source information to facilitate collaboration with coalition partners during RDO

Concept Evaluation Wargaming Using the Warfare Analysis Laboratory

Open Seminar Gaming Applications

War Rooms are often used to form the basic understanding of a complex problem or to develop concepts to address a specific operational need or deficiency. The next step in the process is to take the material generated in the War Room and evaluate new concepts in a structured wargaming process. APL has conducted open seminar war games in its Warfare Analysis Laboratory for the following purposes:

- Concept Evaluation
- Experimentation Plans & Analysis
- Warfare Requirements Development
- System Architecture Analysis

Open seminar war games are those where both Blue and Red sides have access to ground truth and the focus is on the exploration of key events and issues. While not simulating the “fog of war” open seminar gaming allows much more in-depth understanding of new concepts and capabilities. For example, discussions may involve identifying who needs what information, when, and from what source.

The WALEX Process

The Warfare Analysis Laboratory Exercise (WALEX) process is a methodology that has evolved over many years for conducting open seminar war games in the Warfare Analysis Laboratory. The process shown in the figure is rigorously followed to assure that the objectives of the exercise are met. Much of the material for the exercise or game book is derived from War Room-like analyses.

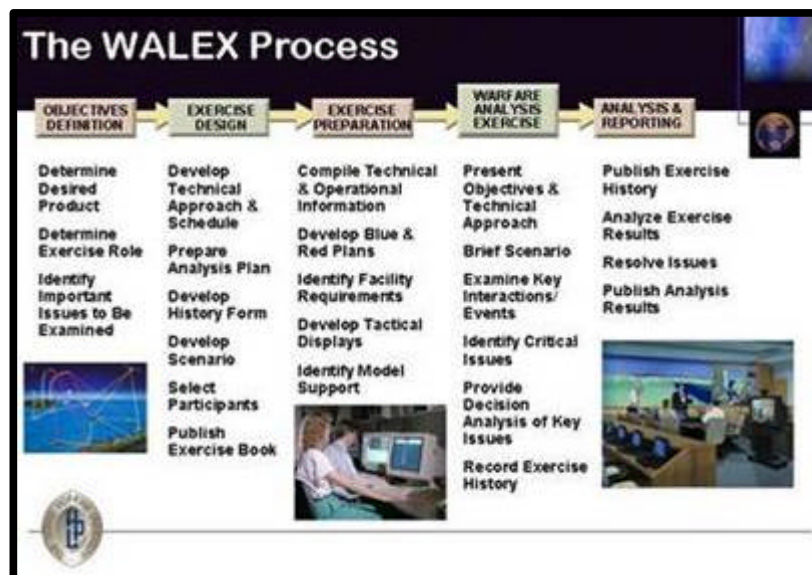


Figure 7. The WALEX Process involves many steps outside the WAL.

The WAL: Warfare Analysis Laboratory

The WAL design has evolved from over 20 years of experience. The fourth generation WAL opened in May 2000. WAL capabilities are summarized in the figure.

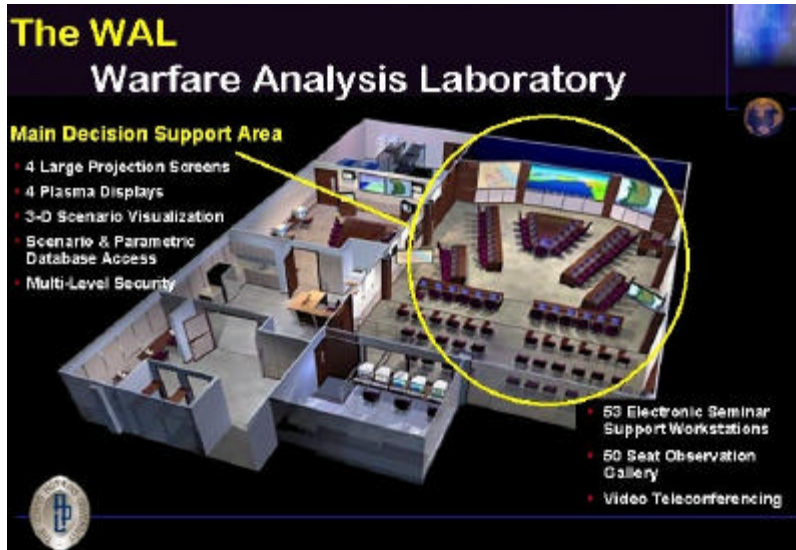


Figure 8. The Warfare Analysis Laboratory (WAL) designed for the next decade

Electronic Seminar Support

A key aspect of the WAL is the electronic group decision support system, which allows all participants to register their comments in a networked environment. The types of tools used in the WAL are shown in the figure.

Electronic Seminar Support

In the WAL...

- DECISION-MAKING SUPPORT AIDS**
 Group Systems Tools
 Analytical Hierarchy Process
 Team Expert Choice
- SEMINAR HISTORY – RECORD & SYNTHESIZE**
 Participants enter comments / ideas simultaneously and anonymously
 Provides documented record and audit trail for decisions
- ASSESSMENT & ALTERNATIVE EVALUATION**
 Participants evaluate alternatives versus a set of criteria
 Displays statistics of group results
 Identifies degree of consensus
 Use several voting tools

On the Road ... at NATO

Figure 9. Electronic group decision support systems are key to WAL operations

Future Implications of New Collaboration Sources and Techniques

Open Source Information will provide a rapidly expanding set of resources primarily from the Internet to support operational planning and warfare analysis. OSI is an increasingly important dimension to understanding complex problems. Open source information on the Internet includes authorizing documents, unit mission statements, force structure and objectives, news archives, and information from related non-government organizations. The amount of open source information is expected to expand as rapidly as the Internet itself.

Virtual electronic war rooms will become more commonplace taking advantage of web-based technologies and networking. This will allow physically separated teams to work together, interactively and iteratively, to plan operations and analyze complex problems.

Collaborative “virtual” war gaming using distributed real-time simulation, advanced visualization, and a wide range of assured and open source information resources will become the preferred approach.

War rooms, LOEs and WALEXs will be used in concert to conduct sophisticated analyses of the requirements, performance and utility of complex systems. These collaborative analysis techniques will be used to analyze system architectures especially command and control architectures described using the DOD Architecture Framework. The war room process will be used to help understand requirements and develop basic architectures. LOEs will be used to exercise specific architectural characteristics to explore how well they support particular missions (e.g. a team plays through a mission scenario bounded by the architecture constraints to see where the breakdowns in information flow and decision making occur). The major issues discovered in the war room and LOE exercises will then be evaluated by a wider range of experts in a scenario war game (WALEX-like) environment. This will help identify the overall challenges in the architecture design in a full joint operational context and evaluate various options for modifying the architecture to address these problems.



Figure 10. New technologies will enhance the use of collaborative techniques.

**For More Information on War Rooms, Warfare Analysis, or Wargaming
please see:**

<http://techdigest.jhuapl.edu/td/>

Volumes 21-2 and 21-3

Appendix

War Room Guidelines

1. Make organization of room very visible
2. Give visibility to problem to be solved; identify your approach for addressing problem
3. Organization of room/boards should mirror team objectives/products
4. Keep an executive summary board; use satellite boards to support & detail executive summary board
5. Team leader owns executive summary board
6. Identify the owner(s) of each board; put their name(s) on it; make them "own it"
7. Give the important things visibility; wheat from the chaff and all that
8. First steps might include organize/collect/analyze/synthesize...The team's initial role
9. Second steps include display/disseminate/refine/socialize...This is the participative phase
10. Regularly scheduled (and frequent) team walk-throughs, with update/action items specified
11. Common structure for each board helps with communication (and board preparation)
12. Common format/layout for each chart
13. Each chart author-marked and time-stamped
14. Give one person overall responsibility for monitoring physical production of charts
15. Get something on each board ASAP; big trees from little acorns and all that
16. If the boards are static, it's not working
17. Use pictures and graphics and charts and...
18. Get a baseline up before you bring visitors/contributors through; set near-term date for having your baseline in place
19. Try to have a number of team members present for visitors; share the experience
20. Use post-its for collection of comments/critiques
21. Capture those visitor comments which are relevant, reflect in the charts, and provide attribution in the revise charts
22. Provide some reflection of alternative or dissenting views
23. Encourage drop-in visits and use of (signed) post-its

War Room Materials Format Suggestions

Slide Layout is Key to Comprehension

- Make each viewgraph a single thought
- Emphasize the message of the slide in the title block
- Eliminate as many words as possible; replace with bullets not sentences
- Use graphics, maps, charts to illustrate information & trends
- Consider animations & interactivity for virtual war rooms & presentations

Slide Format is Key to Readability. Use:

- As large a font size as possible (avoid less than 18 points)
- Bold, non-serif fonts (Arial) for better distance viewing
- Colors, font size, italics, bold, underline to organize and highlight points