

# **Operations Research Support to the Combined Air Operations Center during the Air War over Serbia**

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## **ABSTRACT**

The operations research systems analyst can provide significant benefit during military operations. The Air War over Serbia (AWOS), a large-scale sustained combat operation, from 24 March to 10 June 1999, involved combined, coalition forces and command. The conflict was managed from the Combined Air Operations Center (CAOC) at Dal Molin Airport, Vicenza, Italy. The author, then at the Warrior Preparation Center, was a member of the United States Air Forces in Europe (USAFE) Operations Assessment Team, which stood up 3 April 1999. Deployed to the CAOC from 12 May until after the conflict, he and a small team supported the warfighter's efforts with timely operations research and analysis. In addition they collected copious data for post conflict analysis. Lessons learned include building the operations analysis capability from scratch, selling it to the leadership, and dealing with the complexities of combined, coalition forces, including information availability, management, and security necessary to fulfill their mission. In any unexpected crisis there is a time lapse between the initial operational response and knowing whether the response is appropriate; included early, operations analysts can help. This paper discusses the AWOS Operations Assessment Team's lessons learned, which may be applicable in the next crisis. Although a comprehensive solution that will account for all future problems and circumstances will probably never exist, an ongoing dialog between operators and analysts can help moderate them.

## **LESSONS LEARNED**

This section includes lessons learned from the perspective of the CAOC combat analysts. Much of what was experienced there has applicability to the analytic world we inhabit. One cannot expect to be able to model what one has not experienced. The CAOC was a pressurized atmosphere where good things happened as well as bad. Unfortunately, as happens all too often, we had to relearn many of the lessons we already knew the answers to.

a. CAOC Operations Assessment as a "Weapon System." To the extent possible, the CAOC should be brought up to the same level as US Air Operations Centers, as they undergo their transformation to a weapon system. They should be manned accordingly.

- Recommendation: The CAOC needs to be organized, trained, and equipped using the same philosophy as we use with our other weapon systems, with sufficient analytical manning for maximum effectiveness.

b. Foreign analyst involvement. The CAOC included members from 15 different NATO nations, including the United States. It grew from its peacetime training scheduling function to full-scale wartime offensive operations. The Air Force needs to be prepared to create and coordinate programs with its allies, giving CAOC personnel (operators and analysts) the opportunity to train together as a coherent team - to meet the demands of combat operations and the warfighter. We worked very well with analysts from Great Britain; they were real pros. Unfortunately, other countries' analysts were not represented in the Mission Assessment cell. Not only would the perspective have been arguably broader, but also some other hiccups and friction could have been avoided by engaging the other countries earlier in the planning process.

- Recommendation: Involve foreign analysts in the Mission Assessment process. Cross-train US analysts with other countries and their analysts with us. This will help develop an understanding of working in a NATO or other coalition environment.

c. Interoperability. As personnel train to integrate data collection, dissemination, and analysis into CAOC operations, needed improvements in equipment will become clear. Allied Force demonstrated the difficulties of working in a combined environment with multiple networks and unintegrated information systems. At least four computer networks of differing classifications existed in the CAOC. Different parts of the staff operated in different information spheres that did not overlap. Sharing information was sometimes impossible, and situation awareness was not necessarily common knowledge.

- Recommendation: Develop and improve procedures for sharing information across networks and between all participants. This is particularly important between the NATO Secret Critical Response Operations NATO Open System (CRONOS) network and the US Secret Secure Internet Protocol Router Network (SIPRNET).

d. Analyst experience base. Although operations analysis is doctrinally part of the ATO cycle, few analysts, civilian or military, have been given the training and opportunity of experiencing the hurly-burly of the CAOC and the ATO process. The axiom of training the way one expects to fight could not be more valid than with combat Operations Assessment. Unfortunately, only two US analysts worked at the CAOC; the experience would have benefited the rest greatly. Restrictive CAOC manning limitations and procedures precluding more exposure. The RAF, operating within its own channels, rotated its analysts through every three weeks.

- Recommendation: Analysts need to train, equip, and practice in peacetime the tasks they will be expected to perform during a conflict. They should be involved in the planning process from the beginning of a conflict or crisis. They should be deployed immediately. Don't wait for an invitation. Rotate them frequently.

e. Continuity and training. Given that there is an established requirement for operations analysis, where does one find these analysts? How does one create and maintain the capability? How does one augment the capability when the need arises? Building and maintaining a wartime operations analysis capability is just like building and maintaining any military capability. Analysts do not grow on trees; they take time to train and develop. Critical

knowledge and skills, both technical and operational, must be learned, developed, maintained, and kept up to date. This begs the question: what does one do with one's wartime analysts during peacetime? There are parallels between real world and exercise events, and there is some value in making a comparison of the two to make two observations that illustrate the difficulties implied in this question. (1) Operations assessment is the last thing on anyone's mind while planning and during operation execution. Very often, the crucial feedback loop is left off or receives scant attention from operators. (2) Typically, exercises are too short to overcome this mindset and demonstrate operations analysis' inherent value.

An anecdote from experience is a good way of illustrating the first observation, from both the exterior and interior. While the author worked at the WPC, 1996-99, he was involved in planning and implementing after action reviews (AAR) for exercise participants. This implied focusing and training observers, collecting observations, and tying them to training objectives for feedback and learning purposes, i.e. providing an external look at the exercise event. Training exercises are developed over a 12-18 month life cycle that encompasses four phases: concept development, planning, execution, and assessment. The AAR is the final event in an exercise, aside from cleaning up, and had received little attention at the WPC until then. It had always been assumed, theretofore, that, unglamorous as it was, the assessment would "happen" and it usually was an unsatisfactory train wreck. This is surprising, because the AAR provides a real learning opportunity for the training audience and, according to US Joint Doctrine, it should be designed into the exercise beginning at concept development when the training objectives are developed and continue through all phases. Getting the horse before the cart took some doing, but the quality of the assessment and training experience and the satisfaction of the training audience improved immeasurably.

Another example describes what happened on the inside of the exercise. WPC provides exercise support for all kinds of customers and the author had a good opportunity to observe, particularly during JFACC exercises such as Union Flash, how the Air Force exercised the entire ATO cycle. The operations assessment teams, usually made up of augmentees from various Air Force agencies, many of whom are reservists, who arrive the morning before the exercise begins, supporting a core of local USAFE analysts, fell in and attempted to support the commander and his strategy team with feedback. Anyone who has seen one of these exercises, especially a war fight, knows that after five to seven days - the length of the exercise - battle damage assessment and other critical data is just beginning to be available. Through no fault of their own, without data to analyze, there is no opportunity to demonstrate much value at all! We were "lucky" with AWOS in that the war lasted 78 days and 78 ATO cycles; we had plenty of time to learn.

- Recommendation: Analysts should be involved from the very beginning of the operation, the development of campaign strategy, so that they are able to help establish operational objectives and their analytic support strategy.

- Recommendation: Maintain a resident cadre of experienced analysts with every Numbered Air Force and theater staff. Make it a requirement that analysts be deployable to support operations. This is good for the analysts and good for the Air Force.

f. Database design. Databases are not analytical tools. They are repositories of information. Too often, the coherent linkage between data elements is severed to fulfill the “relational” limitations of the database. We tended to strip out “useless” data too early and build our data from scratch rather than leave what was available whole. It became, therefore, excruciatingly frustrating to answer simple questions that could have been answered directly from the original spreadsheet. This became clear at the CAOC and we developed our own databases to fulfill the demand.

- Recommendation: Databases need to be designed to support analysis. Designers need to observe the process they are collecting information from to ensure they get the whole picture.

- Recommendation: Databases should be reverse engineered from the data displays they are intended to be used to produce. This will reduce the dependency on expert authors of arcane data queries.

g. Information management. Allied Force clearly demonstrated that information management remains a nebulous, inexact science. Brute force will not replace careful planning. Information “etiquette” was lacking. Files were overwritten and unorganized. Drives were purged to make space. Filenames were reused daily and rarely indicated what their content was. Too much or too little, or simply bad data, results in no usable information. “Pretty” usable information is not often found; it almost often requires major massaging. Operational knowledge cannot be taught to a computer, “intelligent” data mining and archiving remains a full-time human function. In order to analyze data, analysts should arguably be responsible for information management planning and collection during an event. Assuming that usable data will appear on a silver platter without input to the information management process makes no sense.

- Recommendation: Analysts should be prepared to take on and embrace the role of information managers. They should be involved in early planning and they should know where to find what they need. They must be the “expert” systems.

h. Split-based operations. Operations Assessment Teams Forward and Rear worked well together during the war. We had the same boss, Col Kenkel, and we knew and trusted each other. This did not mean it was always easy. As this was the first time any of us had done this, we had a lot to learn and we had to develop many of our coordination procedures on the fly. Coordination with other organizations had to be carefully developed and managed. One thing that sticks out in my mind is how reassuring it was to find a sympathetic voice at the other end of a telephone late on Sunday night and to know that there were others who were working and supporting when you needed them. It is wonderful to know that badly needed support is forthcoming. Nothing can be more frustrating or exasperating than to find that others are not sharing the same sense of mission urgency when they should be.

## SUMMARY

This paper began with a summary of the events that led to the establishment of the Operations Assessment Team Forward and the CAOC C5 Mission Assessment cell. The next section identified the essential objectives of the team’s two missions. Then an attempt was made to

clarify some of the noisy terminology and identify unique functions. The following discussion described the Operations Assessment Team Forward and Mission Assessment cell organization and personnel, functions and interactions, communications, and products. The paper concluded with Lessons Learned and recommendations for future operations. As stated in the Introduction, this paper is written from the perspective of deployed personnel operating at the CAOC. It is intended to provide an understanding of the activities of the small, but extremely effective team of operations analysts and specialists who supported current operations analysis for the CFACC. At a post-conflict conference, LtGen Short was quoted as saying that when he needed to know something “he came to us.” One ominous point deserves comment. Many of the current Air Force analysts have devoted their careers to the care and feeding of models. There are good models and bad models, but a model is not going to get the analyst inside the head of his customer. I am convinced that the data that analyst seeks to feed his models does not currently exist in a real-world operation. Coming equipped to run a model is a sure-fire way to get off on the wrong foot with the customer, who is looking for an open mind and some insightful analysis. I recommend leaving the models at home until the analysts’ credibility and willingness to listen has been firmly established. Events and circumstances leading up to Operation Allied Force elicited a response from NATO that was unique, but only in it had never happened before. There is no doubt that it will happen again. Future circumstances and actors will no doubt change but it is safe to say that the United States will never fight a war in Europe alone. It must continue to prepare to win and not in a vacuum. Operations analysis played a small, but very effective role to bring the war to closure as quickly as possible.

## **Appendix**

### **Taking the Show on the Road**

Typical personnel and administrative reminders for an analysis team taking the field

While working at the Warrior Preparation Center, I had the good fortune to learn from some of the most conscientious officers in the world. One of them, Col Eric Wildemann, had a sure-fire methodology to get a project jump-started, while guaranteeing successful results. It works well for crisis planning, something a combat analyst can expect as a matter of course. I recommend it as a combat analyst’s credo. (1) Form the Team, (2) Identify the Vision, Mission, and Objective, (3) Establish the Rhythm, (4) Identify the Show Stoppers, (5) Chart the Way Ahead, and (6) Stay on Schedule. The following discussion describes the Operations Assessment Team Forward and Mission Assessment cell organization, personnel, and communications. It also includes a list of recommended personal qualifications, as well as a list of recommended support equipment and supplies. Reading this article closely, the reader will see that we followed COL Wildemann’s “way” as closely as possible.

Organization and personnel. Almost all of the personnel in the “BOB” were augmentees from elsewhere. Organization was initially somewhat haphazard. Under the circumstances, the team’s camaraderie was exemplary. In fact, the whole BOB - about 25 people total - was an oasis of esprit de corps, professionalism, and good will. Some of the smartest people around worked there; they came in from all over. We were called “the guys with three hundred pound brains.” It was a great place to work.

a. Operations Assessment Team Forward consisted of a civilian US analyst and a military Intelligence specialist. The choice of Intelligence specialists as data seekers was particularly prescient; they had the requisite knowledge and clearances required to gain entry to many of the sources of data. The Forward team supported the Mission Assessment cell in addition to their Operations Assessment Team mission. An additional Intelligence specialist supported the final data cleanup.

b. The Mission Assessment cell did combat analysis. It was organized with two co-chiefs: Ltc. Rein and Maj Dorsey. These officers provided very capable top cover and helped prioritize the myriad requirements and taskings that came our way. It should come as no surprise that a civilian analyst is at a disadvantage in a military environment, but that does not mean that he should not participate as much as possible. Although there was no explicit chain of command between the WPC personnel and the CAOC, there was indeed an implied one – it made life easier to roll one's sleeves up and support where needed. US and British analysts performed the analytical work. They were ably supported by FltSgt Ian Schofield, Capt Dowling, and SRA Hartman, who undertook most of the research to find stuff out, tracking down data and making things work. They worked 12-18 hour days and were fortunate to have one day off a month, if that.

Manning. There is no correct definition of what an operations analyst should be. Useful skills can come from almost any source. After all, operations research has always been a multi-disciplinary approach to problem solving. As mentioned earlier, Intelligence analysts are very useful, because they are very familiar with the targeting process. Operators understand strategy and operations. Logisticians understand logistics. Perhaps the most essential rule is that the analysts are able to find the person who can explain critical information to them.

Communications. Communication with Operations Assessment Team Rear was often difficult. Telephone connections were generally rough, so STU-111's were of limited use. Most of the CAOC used the CRONOS network; it was not until after Capt Dowling returned to the Operations Assessment Team Rear and discovered an unused CRONOS machine in its midst that communications became timely. There was also a 2-MB limit on the file sizes we could transmit. The BOB did not get SIPRNET until the war was almost over. Early in the conflict, before day 30, SIPRNET communications were almost impossible. All communications had to be done from the US National Intelligence Center (NIC) using draconian measures requiring long waits to use computers. Later, when a common area was built, we shared three SIPRNET computers along with dozens of other US personnel. The Common Area building was on the other side of the CAOC, about a kilometer away from the BOB. One would walk over there and stand in line for 30 minutes to use a computer. Needless to say, communications over that mode were not very responsive. Once SIPRNET was up and running in the BOB, we used it extensively.

Equipment. As difficult and messy as the CAOC experience may have felt at the time, it was not so bad, by the time I arrived. Many of the kinks had already been worked out. We had high-speed computers, comfortable, secure accommodations, excellent cappuccino, and we were fed daily at the Italian officers mess. That said, future combat analysts should not expect the same. When the first team was deployed, sixteen people were crammed into peacetime space for four.

There were only four, long-in-the-tooth computers. It was uncomfortable to say the least. The second team came prepared for the worst, with our own laptops and extra hard drives, and other removable storage media. That was not necessary in the event - they were provided in the BOB renovation - but we would not have been allowed to attach them to the classified network in any case. Separate classified hard drive or not - those were the rules. This makes perfect sense, but rather than lulling future combat analysts into a false sense of security, prepare for the worst! Plan to have no support and, at best, an ambivalent customer who may or may not want you around. Logic has no place in the equation until you have proved that you provide benefit to his process. Expect no space accommodation or access. Be prepared to supply all your own administrative supplies, including paper and pencils; we often deployed with a footlocker full. While at the Warrior Preparation Center the author developed a portable system, called the Exercise Life Cycle System, that included two laptops, printer, projector, scanner, mini VTC, zip drive, and CD-ROM writer that would fit in a single deployable packing crate. Such a system is ideal for a combat analyst team.