# THE YING AND YANG OF A COMPETITIVE DOWNSELECT PROCESS

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ABSTRACT: The Warfighter's Simulation (WARSIM) 2000 procurement was planned and managed using a competitive downselect strategy. An initial contract was awarded to three competitors. Each were funded to accomplish domain engineering, systems requirements analysis, system design, and a simulation of their proposed architecture. The government was interested in assessing both the competitors' technical approach and their ability to demonstrate their proposed development processes. Other government procurements have used competitive downselect approaches to "fly off" proposed solutions to weapons system requirements and vehicles, but this is the first time that the procurement of a training device or system has followed this approach. The fundamental difference between STRICOM's approach and these other more traditional down selections was the emphasis on assessing contractor discipline in adhering to their key processes. In this paper we describe the six month downselect process that was followed and the experiences and perspective of both the procurement activity and the contractor. We include lesson's learned and recommendations for following this approach in the future.

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## 1.0 INTRODUCTION

Warfighter's Simulation (WARSIM) 2000 is the next generation command and control training system for the United States Army. It is the primary contributor to the land component of the evolving Joint Simulation System (JSIMS) and will be used to train Army commanders and their staffs from Battalion through Corps level. By the year 2000, WARSIM will replace the existing constructive models, Corps Battle Simulation (CBS), Brigade/ Battalion Battle Simulation (BBS) and Combat Service Support Training Simulation System (CSSTSS), currently used to accomplish this training. The need for WARSIM was identified by the Army's National Simulation Center (NSC) in its role as the combat developer for training simulations within the Training and Doctrine Command (TRADOC). NSC, as the combat developer, prepared the Operational Requirements Document (ORD) for WARSIM in 1993 based on recognition of the need for a next generation system which would take Army training into the 21st Century.

Existing constructive simulations are limited in several ways. Most significant is the extensive overhead associated with conducting Command Post Exercises (CPX), requiring upwards of 1500 supporting personnel during major Warfighters. In addition, existing simulations have reached their capacities in rapidly adapting to the needs of the Warfighter, requiring significant investment to attain increased functionality. There is also a need to interoperate with the emerging $C^4I$ systems to provide a more robust and seamless environment for the Warfighter, without dependencies on artificial environments. With the advent of object-oriented technologies and the need to be able to "scale" exercises to satisfy training/exercise objectives, the timing is ripe to develop a new or next generation simulation to train commanders and their battle staffs.

Given the software intensive nature and development complexity of the Army's next generation simulation, WARSIM 2000, STRICOM concluded that a paper proposal would not be sufficient in determining the most viable contractor. Key to the success of the program would be the contractors discipline in following robust software engineering design approaches. Accordingly, the Government recognized the need to invest time and money in the front-end decision to select a contractor that not only demonstrated a feasible approach, but one that could also effectively implement the solution derived. The best way to achieve this was through a six month award to multiple contractors which was used as a source selection downselect mechanism.

## 2.0 OVERVIEW OF WARSIM 2000 PROGRAM

### 2.1 WARSIM 2000 Description.

WARSIM 2000 is a scaleable simulation that will support command post training for units from Battalion through Corps level conducting CPXs. It will also be used by senior officers conducting professional development training and instructors in Army schools in a seminar mode to facilitate discussions and analysis of tactical problems.

The WARSIM system will function as a distributed system using central repositories of models and other training support software deposited at Regional Training Centers (RTCs). WARSIM Simulation Support Modules (WSMs) will collocate with the training unit. The WSMs will provide direct connectivity to and stimulation of automated $C^4I$ systems used to manage combat operations (e.g., MCS or GCCS). For large scale exercises the WSM will provide real time long haul communications linkage to the RTCs to access the plethora of models and additional computational resources needed to execute the simulated battlefield in faster than real time.

As an element of the Joint Simulation System, WARSIM will provide the land warfare functionality to the JSIMS environment, addressing both Service unique needs and the land campaign contributions to the joint representation. JSIMS will be providing the underlying architecture to this environment. JSIMS is a multi-Service initiative to develop an environment which supports "composing" an exercise from the software components which comprise the JSIMS enterprise.

In concert with JSIMS, WARSIM will provide an initial operational capability (IOC) by the year 2000. The initial operational capability will provide the functionality to replace CBS, BBS, CSSTSS, and TACSIM. A final operational capability (FOC) will enhance the IOC system with a robust set of cognitive models of command and control processes so that subordinate staffs and commanders will not necessarily have to be role-played by humans in the loop. This capability will be completed and delivered by 2003.

### 2.2 Synopsis of Procurement Strategy

The source selection strategy supported award of a Cost Plus Award Fee contract for the Engineering and Manufacturing Development of the WARSIM 2000 system. The source selection was based upon a best value decision, with cost as the lowest evaluated element. A traditional proposal evaluation was conducted to determine a set of contractors to participate in the downselect phase. The downselect phase of the source selection focused on the conduct of specific tasks allowing the Government to gain insight into both the contractor's processes and their ability to implement these processes. Funding for each contractor was provided up to $1M to accomplish the tasks over a six month period. During this period, members of the Government source selection team monitored and evaluated the participating contractors against the paper proposed processes and the established source selection criteria. The results of these assessments, written/revised proposals, and the deliverables were used to make the best value downselect decision. Initial contracts were awarded in May 1995. The downselect process was completed in April 1996 with the announced award of the WARSIM follow on contract to Lockheed Martin Information Systems (formerly Loral Federal Systems).

## 3.0 PERSPECTIVES

The following sections were prepared independently by the STRICOM and Lockheed Martin counterparts in order to give the reader an opportunity to gain from the differences in perspective of this downselect process. The Lockheed Martin perspective addresses how the contractor responded to this particular source selection mechanism, the frustrations encountered and the perceived benefits and shortfalls realized. The STRICOM perspective addresses considerations which should be given in deriving the mechanisms, how to manage the activity, the lessons-learned and recommendations.

### 3.1 Government Perspective - The Ying

3.1.1 Setting the Stage. The Government team established two basic objectives in deriving the tasks to be conducted. The first and primary objective was to establish tasks and work efforts that would give the evaluation team an opportunity to assess the contractor's ability and discipline in following their proposed processes. However, the Government was also concerned with ensuring that work efforts resulted in a set of products which would serve as a departure point for the eventual EMD. This secondary objective was intended to maximize leveraging from the work performed in support of the ultimate system development. It was not considered prudent to expend resources with nothing to show for it but good processes.

In thinking through the tasks to be performed, traditional balancing between cost, schedule and performance must be considered. In WARSIM's case, a target cost was established from which a set of tasks and products were defined. The Government team then had to assess whether the tasks were sufficient in meeting the primary objective and whether sufficient time could be allocated to accomplish them. This review is a very key element in adopting this

source selection method. The tasks should not necessarily be oriented on the processes, but rather be a set of tasks which are expected to exercise those processes and also provide useful work products. The following WARSIM tasks were adopted to accomplish this focus:

- Prepare a the System Specification (performance-oriented)
- Conduct a domain definition/analysis which scopes the problem space for Battle Simulation Systems domain of which WARSIM is a part.
- Prepare a Domain Specific Software Architecture
- Conduct a system/software architecture model demonstration
- Conduct a software engineering exercise (initial implementation of a system capability based on the DSSA to show contractors quality, discipline and process for software development)
- Conduct an analysis of legacy systems (CBS, BBS, etc.)

3.1.2 Managing the Process. Although under contract, limitations and constraints were imposed due to the source selection sensitivity associated with the downselect process. Communicating these constraints to the contractor was essential in establishing the ground rules and ensuring that the contractors, as well as the Government members, understood the environment. The Government took on a passive role in the activity, limiting the dialogue to clarifying issues. The very real possibility of leveling contractors through extensive dialogue could potentially compromise the process and care needed to be taken to mitigate this risk.

In order to facilitate the evaluation, Government discipline in maintaining a continuous assessment was necessary. Formal mechanisms were established to ensure that assessments were made with each substantial interaction and product so that the evaluation could be managed. Waiting until the end of the period to document the evaluation would not have resulted in a robust assessment and would have likely resulted in some confusion as to events that occurred earlier in the phase. A continuously documented assessment must be pursued to ensure a fair evaluation. WARSIM maintained Assessment Reports which were used in preparing the Performance Evaluation Report at the end of the period.

Concern did exist that contractor activity might begin to diverge from Government requirements during the extended downselect phase. As a result, formal mechanisms were established to provide feedback during the process to ensure that resources were not being expended along a obviously wrong track. Care was taken to ensure this feedback did not occur during the established meetings, but rather through formal correspondence via the PCO.

This process is a very resource intensive activity for the Government to manage. Maintaining cognizance of multiple contractors, deconflicting schedules and reviewing multiple products is a daunting task. Although the Government recognized the commitment needed to implement the strategy, members were overwhelmed in keeping pace. Some thought was given to organizing separate teams for each contractor as a more efficient and manageable mechanism, however, the potential risk associated with evaluation inconsistencies was considered too significant a tradeoff.

3.1.3 Lessons Learned and Recommendations. The following section discusses the lessons learned from the material developer's perspective.

- Period of Performance. The six month period of performance for this activity could certainly be debated. A more compressed time period for the performance of the tasks outlined for WARSIM may have resulted with sufficient insight into the contractor's ability to implement the processes. As this downselect strategy is oriented to focus on contractor's processes, sufficient time must be allocated to ensure that a full thread of these processes can be observed. Based on the experience on this particular implementation, no less than three months should be considered. This depends, in part, on the complexity of the effort and definitization of the tasks.

- Play it again, Sam. Given the restrictions in dialogue, assumptions will necessarily be made by the contractor in the work products. The WARSIM work scope following the downselect included revisiting these activities and did not assume that the results of the downselect phase would establish a six month baseline. In adopting this source selection strategy, activities following the downselect award should include re-baselining work products based on Government participation.

- Place of performance. The WARSIM Request for Proposal did not require that the downselect participating contractors be collocated with the procuring activity, however, all the participating contractors elected to establish their teams within the immediate area. This allowed the Government to observe contractor activities more frequently than originally conceived which proved to be beneficial to the Government and allowed more Government members to participate in contractor meetings. If adopting this source selection strategy, but not benefiting from collocation, consideration should be given to establishing separate Government teams, otherwise the process may become unmanageable due to scheduling conflicts. In this event, robust mechanisms would need to be established to ensure consistency is maintained in evaluations among the Government teams.

- Continuous Assessment. Essential to the success in conducting this strategy is maintaining discipline with continuous assessments. Forcing functions need to be established to ensure these assessments are well documented and timely. Evaluating multiple contractor inputs will become unwieldy if reporting is not timely.

- Dialogue. As previously stated, Government dialogue was constrained due to concerns associated with compromising the source selection process. Frustration was evident on both the Government and Contractor side in working in this environment. The paramount concern was the potential to infuse ideas from one contractor to another. The secondary concern was associated with leveling the contractor's even within the context of their approaches. A structured approach should be considered that permits more dialogue, perhaps through periodic Government-hosted sessions (open to all participating contractors) where interchange is encouraged based on contractor stimulated issues.

3.2 Contractor Perspective - The Yang

Lockheed Martin Information Systems Center (then Loral Federal Systems) began preparing for the down select performance period within the structure of a Systems Architecture Working Group shortly after submission of its Best and Final offer. All subcontractor team members were represented in that working group. During down select, they were organized as an Integrated Development Team (IDT). All team members participated in both the planning for Lot I and its execution. Preparations focused on training the IDT so that upon contract award, systems requirements analysis could begin immediately to be followed by system design. The team organized its work effort into a requirements analysis phase and a design phase.

3.2.1 Requirements Analysis. During requirements analysis, the team evolved the systems requirements originally proposed to STRICOM in a System Specification. Particular attention was paid to incorporating the results of analyses of legacy systems into those requirements. The team found this a challenging task because the competitive downselect rules precluded open communications with the procurement activity and the user community who had developed the WARSIM requirements document. The lack of open communications and continuous feedback was an issue that made the Lot I experience quite frustrating for a contractor team used to close collaboration with their customer and user community. At the conclusion of this phase, the System Specification was resubmitted to the government and a System Requirements Review (SRR) conducted. The SDR was extremely atypical of modern procurement practices because the customer would only ask questions of clarification and provided little, if any, indication of the correctness of the team's interpretation of what the WARSIM 2000

system had to accomplish. As a result, the IDT entered the system design phase with a high degree of anxiety about their understanding.

3.2.2 System Design. The design phase of Lot I was organized by the IDT into three iterations, each one refined the system design being proposed. Trade studies, the products of domain engineering as captured in a Domain Specific Architecture (DSSA), and empirical results from a simulation of the proposed architecture were incorporated into each iteration. Risk assessments were made of those areas for which the team had a technical concern. The team was required to conduct a software engineering exercise to demonstrate its proposed software development processes. At the conclusion of the design phase a System Design Review (SDR) was held with government participation. To support the SDR, a number of contract deliverables were provided to the government: a System/Segment Design Document, the DSSA, technical reports on the software engineering exercise, and updated Systems Engineering Management and Software Development Plans.

During the design phase the contractor team conducted presentations of its domain engineering effort, the simulation of the architecture, risk analyses, and trade studies. The IDT solicited STRICOM attendance at those presentations the IDT thought relevant to government interests. The STRICOM evaluation team was in fact present for many of these. But, again were precluded from interacting except to ask clarifying questions. The IDT would meet afterwards for a self assessment of these events aimed at trying to determine how government reviewers might have perceived the information discussed, and then use those hypothetical results to evolve its approach. This was very frustrating for the engineering staff and a challenge to the program management team. The SDR marked the final contractor-government Lot I interaction. The SDR was augmented with a demonstrations that included: the simulation of the architecture results, and a WARSIM prototype developed as an R&D project. The government team was more animated during this event than they previously during Lot I because all deliverables and the final update to the team's proposal were already submitted.

3.2.3 Contractor's Perception. Lot I was a useful exercise for the contractor team as it provided the opportunity to focus on a proposed solution using proposed processes. The resulting evolution of both the requirements specifications and the system design that forms the EMD technical baseline better prepared the team to embark on the WARSIM engineering and manufacturing development (EMD) contract. During EMD, the requirements are being revisited with another SRR and then an update of the proposed design by product focused Concurrent Engineering Teams. These teams are being organized using the Integrated Product Team philosophy particularly to include government participation. The down select phase could have produced a superior product if the procurement activity could have been more interactive with the contractors.

3.2.4 Lessons Learned And Recommendations. Using a competitive downselect proved to be an effective approach for WARSIM 2000. Both the contractor team and the STRICOM engineering staff benefited from investing time in the front end of the procurement process.

- Systems and Design Evolution. A complex system development, especially a simulation system of the size of WARSIM 2000, must include a robust systems requirements and design phase. Often these efforts become schedule driven to insure sufficient software development and integration time is set aside in the schedule, rather than being allowed to occur with a deliberate fashion that insures both requirements and design are sufficiently stable to begin implementation. The down select phase used in the WARSIM procurement afforded the contractor the luxury of putting greater effort and several iterations into both products. We believe this will result in a more mature system design and a better understanding of requirements for EMD.

- Process Improvement. The contractor team realized it was being "graded" on its ability to implement and follow proposed processes, so it naturally paid closer attention to them. This has two benefits. First, the team made an extraordinary effort to understand and implement the processes, thereby helping to train engineering staff and prepare for using the processes during EMD. Second, because the team was attending more closely to what the processes called for, they quickly recognized areas where process improvement was appropriate. The updated System Engineering Management Plan and Software Development Plan submitted incorporated these process improvements, again positioning the IDT much better to execute the follow on EMD effort.

- Communicating the Proposed WARSIM Design. STRICOM could not provide feedback as to acceptability of design decisions or suggestions on improvements; although this was a frustrating experience for the contractor team, the opportunity to further elaborate the proposed solution during meetings and reviews was a significant plus. The team not only had the opportunity to refine and better understand their own approach, but also were able to present it in detail to the procuring agency. This was a positive aspect of the competitive downselect process akin to an oral presentation of a proposal.

- Overall Assessment. We believe that the use of a competitive downselect process will result in a superior WARSIM solution and that the extra time added to the front end of the procurement process was well worth the effort. We would recommend that other similar programs consider such an approach in the future. That are several aspects of the approach used for WARSIM that, at first glance, may not appear to be key that we believe deserve emphasis. The use of a simulation for the architectural solution is important to enhancing both the developer's and the procurement activity's understanding of and confidence in the technical approach. We recommend that this be included. Although it was not required, the team completed a WARSIM prototype using a COTS product, demonstrating key features of the proposed solution. We would recommend that a demonstration also be included as requirement elements of the downselect phase.

- Suggested Improvements. Although recognizing that the procurement activity is somewhat limited in its ability to interact with the contractor during a downselect process, we do believe that it is feasible for the government to structure a more open approach to dialogue. We recommend that when a down select approach is used, that the associated guidelines allow the government engineering staff the opportunity to provide feedback during meetings with the contractor.

## 4.0 CONCLUSIONS

The source selection strategy delineated above should be considered for software intensive developments which may not have the luxury of conducting robust and traditional "fly-offs". This strategy allows the procuring agency to evaluate the contractor's developmental capabilities and determine how well they align with the requirements of the application domain being considered. The strategy can be likened to not only reviewing a resume, but also conducting an interview of the perspective employee. It is a valuable tool which mitigates risk, while requiring marginal investment.