
Chapter 3 – KEYNOTE ADDRESS: DAY 1 – REPRESENTATION OF HUMAN BEHAVIOUR IN CONSTRUCTIVE SIMULATION

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Dr. Foster set the framework for considering HBR “futures” by defining the “domains” for military applications of HBR in models and simulations. The key point was that developments in HBR to date have concentrated on tactical-conventional warfare and the emergence of world-wide “irregular warfare” and “small wars” drive the present and future need for a new scope of modelling. This emergent future was summarized in the domain space graph repeated in Figure 3-1. He pointed out that the new challenges to HBR in simulations are emerging from current military missions and can be expressed in the following shifts in the demand for research: from a conventional warfare tactical focus (the “B” space in the graph) to tactical – operational – strategic levels of military operations in irregular conflict environments (a HBR project depicted as “A” in the graph); from weapons-centered conventional missions to missions involving stability, support, reconstruction (SSTR) and governance support; from 24 hour tactical operations to longer term strategic initiatives lasting years. The new context is ‘Non-kinetic warfare’ in contrast to ‘Military formation-based warfare’ and the military focus is the spectrum of operations from irregular warfare to post event reconstruction. Non-kinetic warfare may require new approaches to modelling, whereas NATO militaries know how to develop and use “combat simulation” for analysis of formation based warfare. These existing real-time, integrated synthetic environments do not appear to be capable of supporting non-kinetic warfare modelling. There is a need for integrating available social science knowledge and models, possibly into new modeling environments such as “agent-based models”. This is due to the possibility that extant military constructive simulations may not be able to be engineered to address social and cultural aspects of HBR as applied to non-kinetic military problems. While the US DoD has an emerging investment in research on human terrain and the socio-cultural understanding of conflict environments, much work in the M&S area needs to be undertaken to bring this science into the practice of formal military constructive simulations.

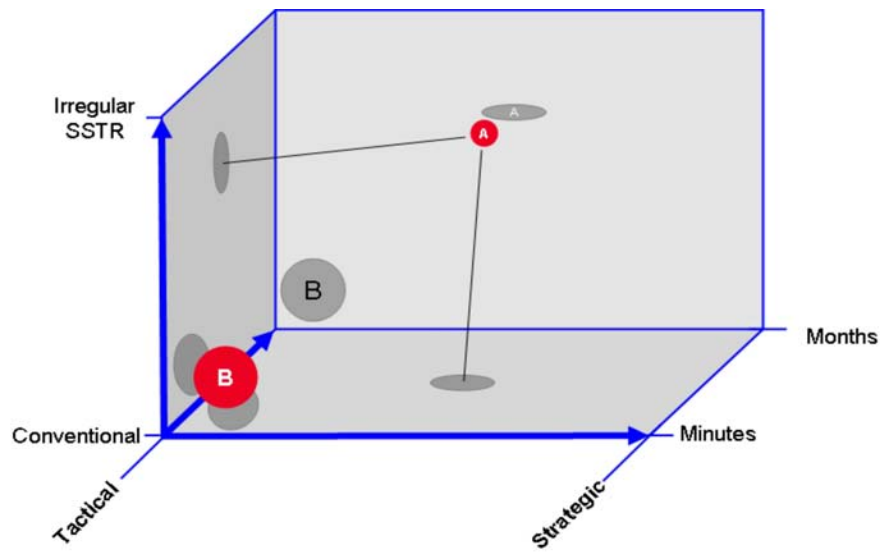


Figure 3-1: Conceptual Relationships Among the Factors Relevant to Traditional Military Manoeuvre Warfare Simulations and the Evolving Focus of Strategic Modelling for Non-Kinetic Warfare.

Among the other needs of NATO is authoring technology for developing human operator models. Operational experience has to flow into simulation environments more directly and the ideal way would be to let military Operational Analysts do the modelling, rather than the modeller. Later in this meeting it was doubted if this can be achieved anytime soon, because of the complexity and limitations of the human models, yet Pew and Mavor (1998) acknowledged the need for composable behaviours almost a decade ago.

A third need is validation, particularly of higher level simulations. Lack of data is an obstacle to validation of practical military simulations. The use of moderators is regarded as a primitive way to change performance. Confusion may arise about what a moderator is. Here, it was interpreted as a “dial” that influences the entity behaviour in a generic way, without distinction of goals and tasks, or as “white cell” entity handlers who manually control the behaviour of SAFs. Later in the meeting, a different definition of moderators was used that refers to formal, scientifically sound cognitive or physiological models that affect performance, for instance accurate thermal physiological, physical fatigue, or mental workload models. Game environments have the potential to be used as a test environment, notably “Real World” (DARPA) and “A Force More Powerful” (<http://www.aforcemorepowerful.org/game/index.php>). But, Dr. Foster pointed out, with the lack of evidence of validation or inclusion of scientifically based human moderating functions, do we have confidence in the predictions from these simulations? What should the research programs of the NATO nations address to move validation forward?

The audience wanted to know how scientists can collect the data required for model development and validation from the field. Although direct observation would be difficult, web based data collection using tools are in existence (e.g., LexisNexis; <http://www.lexisnexis.com/>) and could be assessed for feasibility. Another option is to leverage “blog”, “chat room” or other social network technology. The US Army is exploring this opportunity for data sharing by operating a ‘soldier-team-commander’ website to gather such data and lessons-learned from individuals in-theatre. Hypotheses might be tested on these raw observations to develop more general conclusions, as this is standard procedure in marketing research.

Dr. Foster admitted that modelling traditional/conventional combat activities is still prevalent. He was hopeful for progress in that there is expanding interest in the non-traditional modelling: in 2006 some 56 projects were sponsored on socio-cultural modelling that could be applied to analysis of Effects Based Operations in irregular warfare scenarios. And, there is an increasing understanding between engineers, computer scientists and the human science communities that interdisciplinary research is required to solve today's problems, such as improving the efficiency and effectiveness of the various, dispersed humans operating within Network Enabled Command and Control.

