




Control:
A Case Against

CHAOS

S. K. Numrich

Let a thousand flowers bloom

Did anybody think fertilizer?

A cartoon character with spiky black hair, a white face, and a black suit is shown from the chest up. The character has a large question mark on their forehead. They are positioned behind a green, leafy pattern that looks like a field of crops. The background of the entire graphic is orange with a sunburst pattern.

In a Resource-Constrained Environment



- **We can't afford to plant and sustain a thousand flowers**
- **Control, at least in the context of a rational plan and framework, must be applied to a situation**
- **We need to determine**
 - What we need to model
 - Why we need to model it
 - What we have to get out of it
- **And we have to admit we can't have everything we want all the time.**

Why Do We Care About VV&A?

CNN.com

Pilots dead after Patriot accident

Sunday, March 23, 2003

DOHA, Qatar (CNN) -- The pilot and co-pilot aboard the British Tornado GR4 aircraft that was shot down by a U.S. Patriot missile are dead, London's Defense Ministry has said.



A British Tornado GR4 similar to the one shot down

(AP FILE)

NAVY
newsstand

Patriot Missile Possible Cause in Loss of Hornet

Story Number: NNS030404-02
Release Date: 4/4/2003 9:10:00 AM

From U.S. Central Command Public Affairs

CAMP DOHA, Kuwait (NNS) -- A Patriot missile may have downed the U.S. Navy F/A-18C Hornet which was flying a mission over Central Iraq at approximately 11:30 p.m. (3:30 p.m. EST) April 2. The circumstances of the incident are under investigation.



A flight deck worker watches as an F/A-18C Hornet comes in for a landing on the flight deck aboard USS Constellation (CV-64)

One cause of these failures stemmed from using an invalid simulation to stimulate the Patriot's fire control system during its testing.

S. Hoffman, NAWC-PMTR, NAVMSMO VV&A TST Meeting

We care because errors can cause serious consequences



The Truth About VV&A

Validation

- **Validation:** does the design of the program meet the demands of the **conceptual model** – what the sponsor/user agreed were necessary for this model/simulation/wargame
 - **Issue:** almost nobody builds a conceptual model
 - **Result:** costly rework in the last stages of development
 - **Tragic Result:** unadvertised, sometimes fatal features
- **Validation:** *The process of determining the degree to which a model and its associated data provide an accurate representation of the real world from the perspective of the intended uses of the model.*

Verification

- **Verification:** software testing to make sure the code behaves as the designer intended
- **Verification:** The process of determining that a model implementation and its associated data accurately represent the developer's conceptual description and specifications.

Accreditation

- **Accreditation:** the process by which a model/simulation/wargame is judged suitable for a given purpose. Is it **fit for this use**?
 - To do this, the user must have a solid set of requirements
 - The model/simulation/wargame must have documented its capabilities – as it would during the validation process
- **Accreditation:** *The official certification that a model, simulation, or federation of models and simulations and its associated data is acceptable for use for a specific purpose. [DoDI 5000.61]*



Issue 1:

What do the sponsors (or clients, or consumers) of wargaming want from the games they commission or fund?

On any given day they want some portion of the world (militarily relevant) to be modeled (or simulated) at some (every would be better) resolution representing a new mission thread (Service, Joint, Coalition)

MISSION IMPOSSIBLE

There are too many demands for too many capabilities with no focus on priorities or even possibilities.

Yesterday we wanted precision representation of platforms and weapons.

Today we want comms and C4I and most of all *culture!*
After all, now we're fighting tribes.

We need a disciplined and informed requirements process – not a straight jacket – but a process informed by military need and technical capability. Hey, we might even get a conceptual model and something to measure against a product!



Issue 2:

From the high-minded and objective perspective of us analysts and gamers, what do they actually need?

- **Discipline and guts**
 - Determine what you really want and need to do
 - Do you really need absolute fidelity for everything?
 - Use distributed simulate when it makes sense (does help, but not guarantee reuse)
 - There is probably no one size that fits all
- **Standards are enablers, but subject matter expertise creates models**
 - We are so eager to create standards – because we know how to
 - We are less willing to take the time to understand what needs to be modeled and what expertise is necessary to do that
- **Match capabilities to real requirements**
 - Real requirements are given in terms of what the simulation needs to do, not in terms of available databases
 - NEVER just do it because you can
 - NEVER require it just because it's what you have
- **Invest in *targeted* intellectual capital – provide direction and support**
 - Engage in dialog with the builders – make sure you speak the same language
 - Before you demand, make sure you know the costs
 - There are times when what you want is really **Flight Simulator**



Issue 3:

How can we give them what they need in addition to or instead of what they want?

- **Help build a logical framework for thinking through the problem**
 - Decide what is really needed and what can be done
 - Be willing to collaborate to get it as right as possible
 - Think seriously about creating conceptual models
- **Be honest about what is possible in a given time frame and for a given dollar amount**
 - Don't agree that there is one model that can do it all – we know that's not the case
- **Understand and articulate what you need in your toolkit**
 - Don't dismiss capability just because it comes out of another community
- **Remember that the toughest battleground is not Iraq – it's the corridors of the Pentagon – where collaboration falls on the sword of budget wars**



Issue 4:

How can we integrate wargaming with traditional military OR/analysis in ways better able to meet the needs of decision makers in the future?

- **Acquisition grew up with “simulate before you buy”**
 - Maybe Analysis can think about “wargame before you decide”
 - Start with the back of the envelope if that makes sense
 - Match accuracy, resolution and “fidelity” to the problem
 - “The highest resolution you can give me” is nearly always the wrong specification
- **Put the notion into practice and create a framework for wargaming the future needs**
 - Create a “requirements” wargame to refine and prioritize the needs space
 - Could a game environment be injected with just enough “sense” to help parameterize the future?
 - Or do you even need a computer environment – maybe just the gedanken framework?
- **After all VV&A is just a matter of**
 - Specifying what you really need so that it can be built (or used)
 - Making sure the vendor checks his own work
 - And being reasonable about what is good enough for your current purpose