

Preparing for an Uncertain Future: Building the Foundation

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In keeping with President **Andy Loerch's** overall theme (and **Don Bates'** 73rd MORSS theme) of *Balancing Risk for an Uncertain Future* for the 2004-05 MORS year, the theme for the Education and Professional Development (EPD) Committee's year is: *Preparing for an Uncertain Future: Building the Foundation*.

As we consider balancing the risk for the future, who better than the EPD Committee to build the foundation. What a challenge and how exciting!

Since there is very little detailed information in the MORS Organization Manual on the EPD Committee, the goal is for the EPD Chair to develop an overall Strategic Plan for the committee — for the 2004-05 year and beyond. To meet this objective, we will be researching several task areas and will provide recommendations to the Executive Council and Board of Directors for implementation in the following years. We will also be performing tasks in accordance with current requirements for the committee.

This article provides a brief description of the four subcommittees that have been formed to research these tasks and complete the current committee requirements, soliciting volunteers for each, as well as advertise our plans for the upcoming Education Colloquium in April.

Administration Sub-Committee –

This sub-committee is responsible for drafting the MORS Education and Professional Development Strategic Plan and the Education Colloquium Final Report. The Strategic Plan will include a vision, charter, annual plan (for this MORS year, June 2004 to June 2005), and follow-on plan (beyond June 2005). It will contain more details on the information provided in this article and a timeline to completed each of the tasks.

This sub-committee will be led by the EPD Committee Chair who is looking for 1-2 volunteers to assist with the report writing.

Advertising Sub-Committee –

This sub-committee will be responsible

for advertising the Education Colloquium using three different methods: a tri-fold pamphlet, posters displayed at the special meetings scheduled for this MORS year, and articles in *PHALANX*.

The planned *PHALANX* articles will be written by the sub-committee leads. We are looking for 1-2 volunteers to help with the poster development.

Education Sub-Committee –

This sub-committee will be responsible for encouraging Operations Analysis students in the academic environment, educating seniors on the value of operations analysis, and developing “basic OA skills” courses.

The Education and Professional Development Colloquium is the main event for this group and is scheduled to be held at the United States Air Force Academy on 5-6 April 2005. More details on Education Colloquium are provided later in this article. We are looking for 4-8 volunteers to help plan, coordinate and conduct the Education Colloquium (with a few of the volunteers in the local area of the site) and about 5-7 additional volunteers to assist with the other tasks for this sub-committee.

Professional Development Sub-Committee –

This sub-committee is responsible for examining how operations research analysts can get involved and grow in MORS. After the Education Sub-Committee “builds the foundation,” the Professional Development Sub-Committee plans to provide assistance in shaping and maintaining our membership by providing opportunities for to grow within the Society and as an Operations Research Analyst. This sub-committee will be doing research over the next year and offer recommendations for the following years.

We are looking for 6-10 volunteers to assist us in providing opportunities for our fellow members to grow within our community.

Education and Professional Development Colloquium –

In line with the overall EPD Committee theme, the proposed theme for the Colloquium is *Preparing for an Uncertain Future: Calling All Operations Analysts!* Again, it is scheduled for 5-6 April 2005, at the United States Air Force Academy.

The planned agenda is:

- **1st Day Morning:** *You're going to be an Operations Analyst. Now what?*
 - Keynote and military/civilian presentations on potential jobs as a BS, MS or PhD graduate
 - Highlights of the education training / tutorials developed during the year
 - Start student presentations from represented schools
- **1st Day Late Morning/Afternoon:** *Student Competition Preparations*
 - Breakout into student teams
 - Balanced team among BS, MS and PhD students
 - Balanced team between military and civilian; including Services
 - Real-world problems
- **2nd Day Morning:** *Student Competition Presentations*
 - Teams introduce themselves, what they bring to the team and their part of the solution
 - Prizes presented later in the day
 - Complete student presentations, if necessary
- **2nd Day Afternoon:** *Perspectives of OA Careers*
 - Military and civilian presentations from senior military/retires and civilians on possible OA careers, injecting their own experiences – basically selling the idea of an OA career.
 - Highlights of the professional development training / tutorials developed during the year

Highlights of several Education-related and Professional Development-related training topics will be presented at the Colloquium. Some of the Education topics being considered are: *Presentation Skills*, *How to be a Successful Working Group Chair*, *Value of Operations Analysis to the Decision Maker*, *Training for the Combat Analyst*, and *Basic Problem Solving*. Some of the Professional Development-related topics being considered are: *Getting Involved with MORS*, *Growing in MORS*, and the *Junior/Senior Mentorship Program*. Specific topics will be identified and available on the MORS web-site early in 2005.

Students from the MORS Chapters (USAFA, USMA, AFIT and NPS), the local INFORMS Chapters, other local schools, and schools that participated in the last Education Colloquium will be invited to participate in this year's Student Competition. In the mornings of both days, the students will make presentations from their current projects. In the afternoon of the first day and on the second day, all of the students will be divided into teams – balanced by degree (BS, MS, PhD) and by background (military or civilian). Each team will be provided “real world” problems solicited from the Services, industry and the field. Prizes will be awarded to the winning team.

The goal of the two days is for attendees leaving the Colloquium to: (1) be glad they chose to be an Operations Analyst, (2) look forward to their OA careers, and (3) “wave the flag” convincing others OA is an interesting/exciting field. We want to influence more potential analysts early and then try and keep them interested throughout their careers. That's one potential way the EPD Committee can contribute to “building the foundation” for that uncertain future.

Summary

Talk about an exciting year for the Education and Professional Development Committee! We are seeking several non-board members to assist us in this exhilarating year. If you are interested in getting involved with this committee, please contact the me at kirk.a.michealson@lmco.com. As one of my mentors in MORS has always said, “What a great day to be involved with MORS!” I'd like to change his phrase slightly to: *What a great year to be involved with MORS!* ♣

TOP TEN

(continued from p. 13)

#7 Model Robustly

Make sure your model considers alternate future scenarios, and renders a robust solution.

In the military, we plan for what is possible, not what is likely, so we seldom employ random variables to represent the likelihood of each alternate future. We do use simulation to make quantitative (perhaps random) changes to data elements, but we rarely randomly sample qualitative future changes.

There may be many theater war plans, but you normally only get one chance per year to ask for what you need to get ready for all of them.

Pay attention to the current defense planning guidance, and try your best to address the resulting requirements for your sponsor with your model.

Suppose our guidance is to fight and win one engagement while suppressing another, and then turning to fight the other and winning it. If there are, say, 20 fashionable war plans on the shelf for such potential engagements, and we don't get to choose our favorites, we may have to plan for 20*19 permutations of engagement pairs.

Worst-case plans are expensive. So what? It's better to convey truthful insights to your sponsor than to delude ourselves with baseless optimism.

From the worst case, we can devolve to, for instance, meeting a maximum subset of scenario requirements, or maximizing some gauge of scenario fulfillment, or some-such. Whatever turns out to be advisable, do your best to document with exquisite clarity what assumptions have been made, and what compromises have been necessary, in contrast to the naked, overarching defense planning guidance. This is key: we all have to try to sing from the same sheet of music. Despite apocryphal tales of the demise of analysts bearing bad news, an OR analyst using diplomatic, but unambiguous language and careful analysis to deliver bad news is a hero. Witness that in our OR community, we know who these outspoken heroes are, and honor and protect them.

Start with the robust (worst) case, because that's what we all are duty-bound to worry about and defend against.

#8 Model Persistence

Optimization has a well-earned reputation for amplifying small changes in inputs to breathtaking changes in advice.

Decision support engagements typically require many model excursions, followed by analysis, followed by revisions and more model plays. When we have heavily invested in analyzing a *legacy* scenario, and make some trivial adjustment to attend to some minor planning flaw, the last thing we want is a *revision* that changes everything.

If your model is ignorant of its own prior advice, it is ignorant, and you can expect annoying turbulence and disruption when solving any revision of a legacy model. Any prescriptive model that suggests a plan, and, if used again, is ignorant of its own prior advice, is free to advise something completely, needlessly different, and lose the faith of its sponsor. This is silly.

Persistence means “continuing steadily in some course of action,” and that is exactly what we do with long-term optimization-based decision support engagements. We have to successively meld expert judgment of our sponsors with optimal advice from our models.

It is easy to add model features that limit needless revisions. To do this, you need to *state a legacy solution as an input*, and then add model features to retain attractive features or limit needless revisions of this legacy. These persistent features might include:

- Don't change this legacy resource consumption by more than 2 percent;
- Between this legacy solution and any revision, add (or delete, or change) no more than 3 of the binary options in this set;
- Don't change this unless you also change that; and so forth.

We give our students a handout showing how to state integer linear constraints expressing the ubiquitous logical relations required in decision support (for instance, for binary options A and B, “A only if B,” “A and B, or neither,” “A or B, but not both,” “A or B, or both,” etc.). We also show them how to state persistent guidance for revisions (because — you knew this was coming — this stuff rarely appears in textbooks).

(See **TOP TEN**, p. 26)