FUTURE DIRECTION REGARDING RISK ANALYSIS

by

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WHAT'S THE FUTURE OF RISK ANALYSIS?[2]

Introduction. I have heard this question posed on numerous occasions and in numerous locations. The humble usually begin with "who knows?" before they proceed to pontificate and the philistines say "who cares?" but immediately launch into an emotion laden tirade. How do you answer? Regardless of the group to which we belong our long answer is tempered by our personality, our academic training, the most recent policy decision, the time of day, the day of the week, the fullness of the moon, the amount of beer consumed, and positively the views exchanged with your boss regarding your performance appraisal. This IS NOT headquarters' answer, it is my answer as of approximately 1830 hours, Friday, 20 June 1997.

The Answer. On-the-one-hand it could be very bright but on-the-other-hand maybe not.

Discussion. Before I relate a couple of things that I believe need to happen and in fact will happen with or without formal risk analysis by the Corps of Engineers, I would like to set the stage with a little history to put into my perspective of how we got to where we are with such glacial speed which should help to explain why I believe what little I do.

WHAT'S THE HISTORY?

Selected Prehistory (pre 1985). EM 1120-_-___, 1948,[3] suggested sensitivity analysis regarding the discount rate. "The Green Book" 1958, suggested that "Adjustments for risk take account of the hazards and uncertainties that intervene between the commitment or investment of resources and the accrual of benefits." "Principles and Standards" 1973. "The basis for making a risk allowance in estimating the beneficial and adverse effects of a program or project should be clearly stated." "Principles and Guidelines" 1983. "The assessment of risk and uncertainty in project evaluation should be reported and displayed in a manner that makes clear to the decisionmaker the types and degrees of risk and uncertainty believed to characterize the benefits and costs of the alternative plans considered." Population at risk was informally introduced into the Dam Safety program between 1983-5.

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Selected Ancient History (1985-1992). It began with an exchange of memos between the ASA(CW) and the Chief with ASA saying: Ya'll done good on Dam Safety so lets extend these efforts by starting a research program and follow up with guidance on: "projection of with and without conditions; project design, schedule and scale; scheduling of rehabilitation; and, the regulatory program." The Chief, in response, proposed a cooperative effort on everything but the regulatory program. The ASA(CW) concurred in the need for a cooperative effort because "the magnitude of the task will be great." And "there is a need to provide a clear policy focus for the effort." Also identified at this time were three particular focus areas: "risk based analysis of flood control and navigation project design and scale; analysis of uncertainty in benefit projections and associated benefit based revenue streams and incorporation of this analysis into non-Federal financing strategies and construction scheduling; and incorporation of risk assessment techniques into the analysis of environmental effects of project plans." Again the Chief responded positively proposing a 3 point program of: research, guidance, and training. A small risk research program was identified, general guidance in the form of and EC was promulgated and 5 informal workshops aimed at sensitizing the impervious layer were held.

During this time a major rehabilitation program for the existing water infrastructure operated by the Corps was proposed but support from OMB was totally dependent on decisions and budget recommendations being supported by reasonable risk and reliability analysis. Thus it was that the research, guidance and training supporting this program was "fast tracked" consuming the majority of available resources. Techniques were developed, guidance issued, training sessions held and decision documents completed. Still risk research supporting a flood control program continued with development of useable methods which were incorporated into draft guidance and a formal training program.

Recent History (1992-1996). The research program continued to hum along producing large number of products to support the major rehab program as well as flood damage reduction. Numerous informal training sessions/workshops for both major rehab and flood damage mitigation have been held nationally as well as regionally and formal risk analysis training available in the Prospect Program has been very popular. The risk based Major Rehab guidance was updated annually for several years to include the new technologies being developed in the R&D program. It is now published in permanent form, ER 1130-2-500, with detailed procedures in EP 1130-2-500. Similarly, the risk based flood damage reduction EC (EC 1105-2-205) is now in permanent form as ER 1105-2-101 and EM 1110-2-1619.

The Answer. A focussed productive program pushed and supported from the top.

WHAT HAVE WE DONE? NOT DONE?

Discussion. Reviewing the original ASA(CW) memo, leads me to conclude that: 1) we have done nothing about the with and without project conditions from an economics perspective, we have begun to treat the without project condition from the engineering standpoint e.g. PNP, PFP and hazard functions; 2) we have treated the project scale, e.g. top of levee, but are only

beginning on project design; 3) scheduling of rehab work is driven by the risk analysis, i.e. value is dependent upon risk and consequences; and 4) we have done nothing on the regulatory program. Reviewing the second memo and our agreement with the ASA(CW) I conclude that: 1) we have been extremely clear about the value of and need for risk analysis to support the major rehab program but not quite as clear regarding flood damage reduction; 2) we've done a pretty good job on flood control scale but not design and we have accomplished nothing significant on navigation; 3) on the economics, we have again done nothing regarding the uncertainty of the benefit projections; and 4) we are just beginning to scratch the surface in the research of environmental risk.

The Answer. We have done: an outstanding job for some things, a not so outstanding job on others and some things not at all.

WHY HAVE WE DONE SO WELL AND NOT?

Discussion and Answer. I would argue that risk analysis for major rehab was so successful for several reasons all of which are related. First, there is not much perceived pork in major rehab. Any project being considered for major rehab exists and is currently producing benefits; true the rehab project may involve big bucks being spent in a congressional district but it is primarily to maintain the benefits that already exist. Second, OMB plays a stronger role in the go no go decision and OMB made it very clear from the beginning that there would be no major rehab program without meaningful analysis. You won't see many congressional adds for major rehab. Third, the major rehab program had strong support from the HQ proponent who also understood that without this analysis, there was no program. Further, the tradition in that functional area was that HQ was in charge of the program and in fact the proponent was in charge. Finally, there was good horizontal communication, at least at the HQ level, and each of the functional divisions understood their role. The vertical communciation within the proponent stovepipe, at least early in the process, left no doubt in anyone's mind that the game would be played using the risk analysis framework and taking full advantage of interdisciplinary/"interfunctional area" teams, incidently, the other functional areas found it to their advantage to participate.

For flood damage reduction, it is amazing that we have been as successful as we have. First, there is at least some puddin if not a full slab of bacon in a new flood control project. Second, OMB plays in new start recommendations but as a key part of the Adiminstration, OMB must be sensitive to the need for compromise. Third, there is no single flood damage reduction program proponent in HQ and all of the key executives, within the Corps at that time, were luke warm at best. The executive level push came from ASA(CW). Finally, there were good communications among the technical folks, at least at HQ, but there is no recognition that HQ is in charge of the program and there were, and still are, multiple stovepipes which are critical to getting the message understood, and incidently, not all disciplines/functional areas understood it to be to their advantage to participate.

Regarding the other business practice areas, there is pork, the executive level has not shown any interest and there is only scattered interest among the technicians. Finally, the total amount of energy available is limited (see appendix).

WHAT'S THE RISK TODAY?

Recent Developments. The entire research program has been restructured. Ostensibly the intent was to match up with the 9 business practice areas. Early on this was apparently found to be not workable so we currently have 7 research areas, some of which are made up of 1 or more of the business practice areas, with some of the business practice areas not specifically identified, e.g. water supply or hydropower, the others research areas are cross cutting. One of the cross cutting areas, Water Resources Management, contains a program called, Risk Analysis. Unfortunately the current Risk Analysis research program is only a shadow of its former self, in the out years, it is to include only research that is generic and cuts across the narrow business practice areas. An example of this generic work might be the development of a risk-based evaluation and decision making framework for deep draft navigation and identifying the key sources of planning, engineering and operational uncertainty which need to be included. All R&D beyond this would then be accomplished in the Coastal Navigation & Storm Damage Reduction research area.

Current Events. (Or Non-events). The Civil Works R&D Committee has effectively blessed the current structure and allocation of resources. The guidance is essentially current with the outputs of the Risk Analysis R&D program and training is available but spasmodic. In June (97) the Planning Chiefs and the Engineering Chiefs conferences included an exercise on our ability to communicate risk information. An important conclusion from this exercise was that, with in the Corps, the "how to" of risk analysis is perceived to be less of a problem than the "what, when, why and where" of risk analysis.

The Answer. Possible demoralization of the troops, a program bordering on disarray and stagnation.

SO JUST HOW BRIGHT IS THE FUTURE?

Discussion. On the one hand it could be very bright but on the other it is absolutely pitch black. I believe it is as bright or dark as we, the corporate we, want it to be. I say this because I believe that people make their job what they want it to be and the same is true of organizations. Therefore, I must conclude that apparent darkness, demoralization, disarray and stagnation of the moment is largely caused by our own perverseness.

To deal with the future of risk analysis in isolation of the CW program would be meaningless, therefore we must first address the CW program of the future. The traditional project-by-project model of plan, DESIGN & CONSTRUCT, and operate, if we must, is the pitch

black future with or without risk analysis. In fact a full embracing of risk analysis can only cause a more agonizing demise by drawing out the pain and suffering. It will draw out the agony because it will facilitate the justification and delivery of ham hocks one at a time. That is why we must adopt a new model, or at least someone must, and will, adopt a new model.

So the bright future, my impossible dream, is that the CW program becomes a system management program. The requirements to make this happen and the implications are far to numerous to even think about listing. Suffice it to say that it will require a new culture, a couple of key components include the recognition: that the CW program is a program and not just a bunch of projects, that the taxpayer is the program customer, that resources are in fact limited, that wants are unlimited, that values change, that risk and uncertainty abound and must be dealt with in a rational way.

Closing. In the words of the Philistine, who cares? What's the relevance of this diatribe to the future of risk analysis? Assuming the new model, it means we must do lots to improve our analytical methods and communication techniques. The taxpayer is probably the most naive customer, most sophisticated customer and most difficult to please customer we can possibly have. This customer will never speak with a single clear voice. This customer will not likely trust the experts. This customer's values are continually changing. This customer will be more demanding with regard to understanding and participating in developing and evaluating: water resources goals; the costs associated with alternative levels of physical performance, economic outputs, and environmental outputs; tradeoffs; alternative estimates of value; timing; scale; and flexibility. In short, this means we need to be getting on with doing the things we haven't, developing tools or adapting our tools to be relevant for the total CW program and continuing to improve upon what has already been done. But even if we develop the improved tools, it won't do us a lot of good unless we improve our communication skills along with it. We have trouble communicating among ourselves, our naive customer certainly doesn't understand, our sophisticated customer asks things like "how safe is safe enough?" and wants to participate in making the decision. So our technican role is to perform the best analysis possible in a risk framework and communicate the results vertically and horizontally within the agency and to our customer. Thus a CW systems management program supported by a strong program of risk research, guidance and training is a very bright future indeed. On-the-other-hand ....

Answer. Obviously, I don't have a clue.