

Appendix B

Planning Models Improvement Program Task Force – Second Meeting

Alexandria, Virginia
17-19 June 2003

Tuesday, June 17, 2003

Welcome, Introductions, Agenda Review (Orth, Kitch)

- Task Force work noticed in an RD meeting – H. Kitch, Guidance and Development Group, Planning and Policy Development
- Is a third meeting needed?
- What do you think the recommendations should be from this group?

Exercise:

1. Make a list of the planning tasks that a model does
2. Write the Planning Step that the task falls into next to it
3. If you haven't identified a task for one of the six Planning Steps try to add a task to your list that would be from that step

LESSONS LEARNED

Positives

Enthusiasm
Survey Ideas
Identify Problems
Teleconference
Sharing Ideas
Product
Quality of work
Good work
In writing
Communication
Involvement & commitment
Good group

Needs Improvement

Prioritize
Direction from here
Consolidation
End in mind
Consolidate pieces
Group feedback
Certification
Standardization
Teleconference/phone
Survey response
External participation
What's problem
Solution in search of problem
Focus on end user

- Concern: Are we going to have enough trained people in the Corps to use new models?
- To what extent is the Corps committed to using analysis in decision-making.
- Cost-sharing and sponsor inputs are constraints to how studies are done.
- Political decisions were stated in the past; today political decisions are sometimes placed within the analysis.

ERDC Modeling Observations/Perspective

(Richards)

ERCD Laboratories – 7

- What is a model; terminology is not descriptive and could be misused
- Types of models: analytical, numerical and empirical (water resources, environmental, structural, geotechnical, warfighter, network security, other)
- **Problems:** ill-defined purpose for model; insufficient funds&time; insufficient processes, dimensionality, scope, boundary, initial conditions, inexperienced modelers; contracted out without sufficient Corps participation
- **District areas of improvement:** include the Corps best modelers in IWR, ERDC, the Districts in the earliest stages of project planning; encourage your staff to stay technical by keeping the most complex modeling jobs in house(contract out easier efforts); use the state of the art tools developed by ERDC and IWR and avoid black box models being pushed by contractor both foreign and domestic
- ERDC Areas of Improvement: Provide guidance to indicate what level of modeling is necessary; become engaged in PDTs where modeling is important; make high fidelity modeling relevant and user-friendly to District; make HPC resources easily accessible for District use; Implement an informatics strategy to solve multi-disciplinary modeling problems
- Informatics Strategy – Informatics focuses on methodologies to combine scientific data and models to solve institutional problems. Informatics related activities can be categorized into five technology areas: integrated frameworks, data fusion/aggregation/mining, modeling and assessment, decision support, knowledge management
- Regional Modeling of Chesapeake Bay – 4 models needed to adequately model
- Current Modeling Practice** – Computational tools; computational frameworks; limited integration between data, each organization has its own implementation strategy
- Informatics tasks** – Automate data retrieval; improve tools to manipulate and build conceptual data, extend tools to perform analyses on multiple platforms – (HPC, PC, and Web based), manage output data – (visualization, etc.), develop decision support tools, provide web publishing ...
- Common Deliver Framework (CDEF) – Foundation of ERDC Informatics Strategic Plan; provides common access to functionality and information; provides technical architecture guidance
- The CDF architecture is based on a three platform integrated framework
- Data and database tools – data repositories for active and archived data; business and technical; relational and otherwise; COTS and freeware; DSS, ACCESS, ORACLE
- USGS, NOAA multiagency support in developing informatics
- Modeling and Assessment – analytical and numerical; empirical and physics-based....
- Modeling and Assessment (Design Goals) – Provide pre- and post-processors for model generation and visualization of results; facilitate entry of geographical and physical data; provide easy-to-use visualization and animation capabilities; facilitate the use of and data transfer between regional and local scale models
- GIS/CADD – Need to get a handle on GIS and CADD; there is low level mapping and high level analysis and modeling.
- Decision Support – Supports multiple communities of practice

- Regional Modeling Requirements – taking a holistic modeling approach in any current environmental project. Modelers determine whether a 1D or 3D model is needed to solve complex problems.
- Informatics Summary – A corporate approach to informatics
- Everglades Restoration – Need 0.1 ft vertical accuracy; deliver defensible, verified results within reasonable time constraints on available computing platforms; in the end make all models go through a verification
- Conclusions – success in future depends on ability to model regional problems; Corps has the institutional responsibility for maintaining and improving our waterways; models are critical to that responsibility; Corps should embrace modeling and be the best practitioners in the world; Modelers are required on all projects

Discussion

- Need to address the issue of sponsor having their own model that they want to use in the study and how to address these situations.
- Good model must have all critical processes, physically-based, good modeler

Chief, Planning and Policy Division Perspective

(Dawson)

- Why do we need to transform the Corps? It's life in the 21st century
- This year's WRDA will be mostly about policy – streamlining the feasibility process; ITRT; how long the review can take, cost; centers of expertise
- Meeting of Centers of Expertise is upcoming in Dallas to establish 5 centers – Inland navigation, hurricane and storm damage reduction, deep draft navigation, flood damage reduction, and ecosystem restoration,
- OMB wants centers of expertise so they don't have to get involve; delegate authority
- Goal: to get PCAs out of Headquarters within 2 years; legal document
- ITRT- review on some projects will be done by people outside the Corps
- Key is sustainable solutions
- Corps has not embraced adaptive management; limit is currently 1% unless request a waiver.
- Environmental Principles and P&G focus
- Regional sediment management – Institute of Resource Management –Coastal Policy established and now look at the entire coastal zone
- Book Recommended: Deep Change by Robert Quinn

Discussion:

- What should TF be solving? Models are critical to Corps because of our scientific and technical ability; it's up to Corps to make sure that our models are accurate. Models – that's what the Corps is here for and defines our very existence.

Science and Engineering Technology (SET)

(Bank)

- Defining a Technology Future – USACE Campaign Plan, Process Section, Strategy 2.2 “We avoid risk”
- Technology to support Water Resources Mission – we need to move away from how we are doing business today and toward a watershed approach

- Future USACE Science and Eng (S&E) Worker – needs to access to data; data is crucial to models; does Corps look at data as a resource or is data attached to a project; how do you get data into GIS; standards to communicate with models and data while looking at security issues; data set/plans & specs available to sponsor when project is complete and turned over to sponsor
- What is the SET concepts/objectives – provide uniform S&E tools and practices to support PMBP, project analysis, and project collaboration; improve access to knowledge and tech; improve quality control and project quality; reduce overall costs/better utilization of money we have (data exchange and GOTS/COTS; provide common framework for dev. of S&E tools; web enabled delivery; cost avoidance to improve project value)
- Miles project comment letter read that states the Corps could no longer support stand alone models under the current enterprise system.
- SET integration of ongoing activities
- OMB is supporting the President’s Agenda through IT – Congress doesn’t want to give Corps a line item in budget rather IT capital has to be costed to a project; not a lot in the budget for S&E
- Corporate Policy Issue –
- Technology Management Process – corporate commitment to funding and transfer of technology—► change to manage by product line rather than individual model
- Elements of Technology Infusion – Readiness of an Organization such as skill-level, improved process, cultural readiness
- SET Tasks – Where are we at and where do we want to go with end goal of policy, strategy and recommendations

Discussion

Certification has not been included in presentation? Something we don’t like to do, but will have to do as part of process

Panel Discussion on Modeling to Address: What’s a Planning Model, Criteria for a Good Model, What’s the Problem, What Would YOU Recommend, To What Extent Should Models be Mandatory? (Males, O’Neil, Rogers, Yoe)

Insuring Quality of Planning Models (Males)

- 1985 – Needs Assessment of Planning Information Management Systems
- Findings: proliferation of local home grown systems; little or no design, documentation, backup, or support
- Real World—►Understanding of the Real World —►Abstraction of Understanding of Real World —►Model of Abstraction of Understanding of Real World —►Implementation of Model Abstraction of Understanding of Real World
- Development Process/Common Architecture
- Incorporate Headquarters early on in process
- Team Roles – visionaries, reviewers, testers, problem domain definers, test bed/domain definers; technology developers, applicers, financiers, public relations/political

- Design Documents – top down analysis, framework describing problem components/solution approach/limitations, literature review/state of art search, explicitly consider build or buy, think big/build small(er), early involvement of team
- Development Process – rapid prototyping, tinker toy, spiral dev, test bed, object orientation, combine custom and commercial tools, testing
- Corps Culture Issues – complex problems, rigorous analysis, framework, R&U
NIH, follow the leader, HQ Seal of Approval; Budget/Schedule/Reviewers, Find benefits, Non-programmers as modeler builders
- What is a planning model – “computer implementation of process representation used as decision aid for Corps planning studies, typically incorporating estimation of benefits and/or costs
- Criteria for a Good Model – built by reasonable process, properly implemented, validation, transparent operation, documented, explainable, appropriate technology, level of effort commensurate with desired usage
- What’s the Problem – difficult tech/econ/env problems; many unknowns/complex interactions; need for rational decision aids; adversarial approaches; heightened scrutiny; not “science”
- Recommendations – manage application development; transparency/glass box models; centers of expertise; understanding of technology; meaningful review; attempt a sound process, do not prescribe product
- Models should not be mandatory – defensible process; defensible model, if used; evolution towards modeling over time

Panel Discussion (con’t)

(O’Neill)

- Problems – natural systems; fish and wildlife habitat, ecological function and process are complex
- Limitations of Species HIS Models – many are not tested
- What’s a Model – a function of the builder and the data
- What Kinds of Models are There – Conceptual and Mathematical in planning
- Planning Model is used to quantify benefits
- Criteria for determining the quality of model may change depending on perspective
- Recommendations: Models not be mandatory; models encouraged; No to model standardization, Yes to method standardization, follow some current directions

Panel Discussion (con’t)

(Rogers)

- What is Planning –
-Planning is a way of looking at possible futures that should reflect the norms and goals of society
-Planning should help society decide upon a desirable future
-Planning should define pathways to achieve that future
- Knowledge based planning – use of scientific, technical and social data to describe present and future conditions
- Vilfredo Pareto – one of the fathers of welfare economics; introduced concept of “Pareto Feasibility”; Pareto efficiency is basis of P&G; goal of all planning models is to establish the pareto frontier

- Criteria for Good Model – simplicity, transparency, structure the conception of “what is the problem”, all models have to be Decision Support Models; appropriate to level of decision making; allows tinkering by different stakeholders; parsimonious on time, information, and cost
- Diminishing returns adding variables at certain points in model development
- Problem: most useful models help structure an understanding of the problem under discussion; help DMs understand their problem; and the most useful applications are where the model discovers that the articulated problem is not the “real problem”
- Should Models be Mandatory – Yes and No; Yes for replicability by agencies across regions and protection against legal action; No as there is a tendency to force all problems to use the same amounts of data and info when not indicated by the application. It also leads to excessively complex models that have to consider all possible contingencies
- Recommendations: Start small and simple; focus upon the social and econ context of decision being analyzed; don’t waste time on elaborate valuation weighting schemes; look for Pareto; when the Pareto Frontier has been roughly identified, start to build more complex models to fine tune the analysis

Panel Discussion (con’t)

(Yoe)

- What’s a Planning Model – tool, supports decision making, answers questions
- Know what questions you are trying to answer
- Models are representation of reality; simplified and generalized statement of most-important element of real world situations; abstraction to gain clarity; reduce variety and complexity to level we can understand
- Types – physical (iconic, analog), abstract (conceptual, analytical)
- Criteria for Good Planning Model – answers the question, science based, uses best evidence, complexity commensurate with resources in proportion to problem addressed, recognizes uncertainty, unbiased; open to evaluation; has educational value; documented
- What’s the Problem – few people you hire are planners; so do you train them or educate them; training is dominating right now; not a good long range strategy
- Training or Education – training is short run orientation, skills, conditioned response to known situations while education is long-term orientation; knowledge; intelligence in unknown situations; Need not be either/or a mix is important
- Recommendations – Avoid temptation to develop models as quick fix; invest in workforce before models; training & educating employees; steer clear of models that “do everything”
- Should Models be Mandatory – Mandatory encourages uniformity and stifles innovation; where do you need uniformity?; where do you need innovation?; err on the side of innovation; it is easier to impose uniformity than to inspire innovation

Panel Discussion Q&A

- Prediction & Communication interrelationship importance
- Mandatory – somewhere in the process it’s incumbent on those doing the project to show use of model and use of model correctly.

- Model evaluation group review during model application
- Who becomes responsible for model certification
- What are we really after here; what does the Corps leadership really want – important
- Was it the model or the model user that cause the problems for the Corps?
- Modelers/technology people are not notably good communicators
- Temptation to fragment modeling process; need to look at integrated planning process;
- Can the Corps afford what the TF will recommend
- Technology transfer/expertise is needed

Presentation/Discussion (What's a Planning Model)

(Carlson)

Why?

1. What are we talking about?
2. Boundary issues
3. Response to survey
4. Construct for prioritizing

Provides info. To:

1. Decisions
2. Comparison of alternative

Planning:

1. Quality decision documents

Wednesday, 18 June 2003

Summary of First Day

(Orth)

- Speakers from yesterday all think that we should not make models mandatory
- Problems with models, data, and inputs were also discussed by several of speakers

Discussion

- Identify limitations of data otherwise leads to a false sophistication
- Model reviews should look at critical elements both for reviewers and users

Frameworks for Modeling

(Hihara-Endo)

- Programs
- Planning tech Capabilities
- Planning Phase: Recon, Feas, Post-Auth
- Planning Scales: Site, Local, Watershed
- Geographical Applicability: Regional, National
- Model Types: Models used by Planners, models that provide input to above, models that receive input from above

Panel Discussion – Review/Validation/Criteria/Mandatory Status

(Durden)

- Goal of not making recommendations burdensome
- Interaction with SET group where there is a very wide range of opinions
- Corporate consistency standpoint for platforms is needed as well as reducing the total number of models
- Schedule:
 - 19 June Inventory Structure
 - 30 June Existing Models
 - 3/7 July Test
 - 14/16 July Deploy
 - 30 July Initial Results

“Who Responds”

(Sulzer)

- One District response from Planning Chiefs or Everyone has chance to respond to survey
- Do we want to hear from MSE or HQ; they see a lot of models that are hard to review.
- Do we want to get input from Engineers on the Planning models?
- Planners could initiate contact with other Division’s for input that could be helpful.
- The introduction will be important to capture interest
- Telephone call to District Planning Chief before sending out survey will help.
- With a wide distribution of survey, may receive a consolidated response from a District and some responses from individuals from within that same District.
- Finding out what models are out there is the primary object; provides people the opportunity to express opinions

- Should require the surveyee to indicate whether or not they are a model user.

“Models We Know About” (Dunn)

- List from SET (400+ models)
- Percentage of use can tell you a lot about a model
- Question what the user would like to see the models do
- Survey asks respondents to provide/list other surveys being used that are not included on the SET list
- Noted: problems are not coming from people using models coming from IWR, ERDC, HEC; problems are occurring when Districts are using their own models to make project recommendations

“Output/Analysis” (Appell)

Input from Task Force (primary Qs):

- How many models are there
- What do they analyze
- How many Districts have used/are using them
- Are they nationally applicable
- What is not currently being modeled that planners do
- Has anyone else done a survey earlier that we can compare this survey to
- What models are being used
- Where are the model gaps

Questions that survey help should answer

- What analytical tools and models are used by which members of the PDT
- What tools and models do others use that are crucial your analyses or job
- How would you rate those tools on a scale of 1-10

Survey/Inventory Team Discussion

- Should we ask survey/inventory respondents to provide “Quality Indicators”
- Should the TF of Survey/Inventory Team consolidate responses or should we ask the Districts to provide a “District Response”
- Concern: we should use survey to obtain as much as possible to determine gap

Discussion (Durden)

- If a model is identified that is unique to a District, survey needs to include a question about whether the model was developed by the Corps or commercially
- Survey is structured in 3 parts: SET list, non-SET list, Open-ended question

Survey (Jax. S.D. Model)

Name

Developer – P.L. (Corps, Contractor, Other Gov’t)

P.O.C. – open end

Business Process – P.L.

Community of Practice – P.L.

Function – P.L.

Planning Steps – P.L.

Who's Filling This Out? - O.E.
 How frequently have you used this model? – P.L.

Open End

-Current or under development of needs/gaps

- Training
- Support
- New models

-Future (10 yr.) needs/gaps

-Other Models are critical and causing problems

-Data requirements for this model are best described as:

		flexible	
		yes	no
quantity	small		
	large		

-Can this be run on a minimal amount of data?

-With inc. data will this inc. accuracy

-
- Concerned about finding homegrown models that are being used for critical planning studies
 - SET will have report in October; could offer to address any planning models the SET team identifies as causing problems; parochial approach
 - Tech transfer/infusion – District needs to know models available, how much it's being used, and who's using it so the Chief can provide planner with POC.
 - Need to frame what "how often do you use a model" means – is it daily use of a model on one project or the use of a model on a single project.
 - Looking for models that at least have cost and benefit totals, impact analysis, decision-making analysis
 - Function Pick List – CE/ICA, w/ & w/o project analysis, NED Plan, benefit-cost analysis, alternative impact analysis, simulate system
 - Scale of data use meaning in a survey question could capture whether you could get a reasonable answer with a little data for Recon and use the same model for Feasibility adding more data and expect better results.
 - Tactical approach to identify high risk, near-term project issues is needed – Reg (?)
 - Should a question about the data intensity required for model use be included.
 - Flexibility may be the issue because some models allow for the exclusion of some data groups like R&U in an HEC model and still produce results for some purposes.
 - Does increased data improve the accuracy of the results produced by the model.

- Are we trying to tell Management that we have ‘n’ that are being used nationally and another group that are being used frequently in major studies that need to be critically reviewed? (Kitch)

18 Planning Models

1. Develop the list to be included in survey
2. I.D. owner to answer the basic Qs.
3. Develop Qs to be asked in survey.

Survey

What’s a Planning Model?

Frameworks

Review/Certification

- Models
- Users
- Data/sources

Criteria for good model

Mandatory?

Report

- Problems
- Recommendations

Review/Certification/Criteria/Mandatory

(Wilbanks)

- Planning Models and Tools Review Board Structure (see diagram)
- Decide on whether it’s approval or validation as outcome of review board action
- Need to work on criteria for levels of review and guidance on the selection of board members; Academy of Science has a general set of protocols that they follow.
- Review model: is the theory and math correct; application correct to specific area
- Model certification process separate from ITR?
- Peer review of model taken care of by process proposed here, but should this peer review panel be available to review some studies.
- Timing of a review – how long to certify model may need to be stated in this process
- Evaluate a process, then if agency like HEC follows process in development of any new model with the end product being in a certified model.
- HEC, IWR, ERDC as model developers should be given more latitude since modeling is their field of expertise and product review is less necessary.
- Process that requires project to go into the Corporate process to determine modeling requirements (earlier approach than ITR).
- Need a clearinghouse for models; get R&D funds

- Recommend a support mechanism that lets Districts do some R&D
- Bound a range of costs for review of models needing certification (5-year plan)
- Any model that comes out of the labs get a pass; District Models will need to go through cert. Process; and other Agency Models will require review of backup documentation to determine if it meets the cert. Process
- Models needing certification for use in a study should be done during development of the PMP; get with the peer review/support board to lay out what plan to do and find out if the model review process will affect the project schedule & quality of report.
- Complexity of model and study will be used to determine whether a board review is needed.
- Functional area people may be needed to review projects for complexity for referral to the board
- Opposing opinion is that adding another layer of review makes the process too complex; stay away from getting too detailed
- Talk generally about what need to get done in this report; provide more specificity in follow-up reports.
- Leave it to Board to establish protocols
- Driver's license issue should be addressed where training is being emphasized

Criteria for a Good Model

(Laird)

- Technically Sound

Theory – State of the Art; Regulations

Computationally Correct – Parameters/Answers; Calculations

- Usability: interface, data import/export, data requirements, hardware, documentation, data validation
-

Discussion:

- Potential accuracy of model, need data because it is an abstraction of the real world
- How to interpret the output; make sure applications are used correctly
- When data needs to be synthesized; need to determine if use of this type of data is appropriate.
- Criteria for a good model – source code has to be available
- Training and Tech Support

Model Users/Mandatory

(Fredericks)

- Form a users group – i.e. HEC, technical manuals are also available
- Certification
- Training
- Mentoring
- Checklist
- Educating
- Identify
- Match the PDT with the models
- Mandatory: Peer review of models should be mandatory
- Specific models for studies should not be mandatory
- National models provide level of standardization

- Local models can be more adaptable
- Recommends different levels of review for different types of models.
- Don't want to discourage new models that need to be built, need to require these models to go through the certification process.
- In a way certified models can be considered under warranty because the Corps will fix any bugs as part of maintenance; added features would require additional funding.
- May be aiming toward a smaller suite of models
- Proprietary products will not reveal source codes; does that mean it cannot be certified?
- We do not want to say anything is mandatory except for peer review.
- During review of PMP catch whether a PDT is contemplating use of a new model.
- At the District there are forces at work that drive people to use models already in use.
- If a PDT wants to dev. a new model to use when there is already a certified model available that serves the same purpose – leave these issues to Districts
- Need to save databases
- Enterprise GIS – more real time data is needed.