

Assuring Quality of Planning Models EC 1105-2-412 Rollout

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US Army Corps of Engineers
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Ground Rules

- Please MUTE your phones.
- Please hold questions for the end
- Type all participants names in to the chat feature, so we can get a count.
- Questions and comments will be facilitated at the end of the webinar.



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Assuring Quality of Planning Models

EC 1105-2-412 Rollout

14 June 2011

Bruce Carlson

Senior Policy Advisor, HQ



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What's It About?

- Credibility, transparency – show our work!
- What are the relationships in the model?
- How have we confirmed the computations are correct?
- How understandable is the model to users and reviewers?
- Documentation so people can quickly understand what has been done and why



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Guidance and Process

- “Assuring Quality of Planning Models” – EC 1105-2-412
- Processing is done by the PCX’s
- Decision to certify / approve made by HQ panel
- Certification and approval both require thorough testing and documentation



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Don't End Up Like This!

(Independent External Peer Review Comment – 2011)

- | | |
|--|---|
| <ul style="list-style-type: none"> ▪ Comment 4: ▪ The XYZ model by itself has very limited value for analyzing alternatives and is not a substitute for conventional economic and engineering analysis. | <ul style="list-style-type: none"> ▪ Significance – High: ▪ The XYZ model functions as a black box and does not allow an alternatives analysis that is clearly based on sound technical evidence of engineering design performance. |
|--|---|



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Basic questions for Model Review Process to address:

- Theory
- System Testing
- Usability
- Future Developments
- Additional Considerations



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Theory

- Are main relationships and assumptions transparent, and reflective of the state of the art
- Are model boundaries clear? Which relationships are fixed in the model, which are user defined inputs
- Are any relationships to policy clear, along with implications for compliant applications
- Is risk and uncertainty addressed in the model? If not, is it clear how to perform R & U analysis using the model



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System Testing

- Is the level of testing appropriate for the complexity and makeup of the model?
- Has the model been tested with real data?
- Has the model been “battlefield tested” with intentionally irrational data to confirm how model processes
- Does the model employ math and logic checks to reduce errors from bad data?
- Is the model code (or spreadsheet cells) protected, so it cannot be easily overwritten or intentionally modified?



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Usability

- To what extent is the user’s manual instructive and comprehensive?
- Is training available
- Can field practitioners be expected to be able to use the model, or does it require a development team “guru” to run the model
- Is there a reviewer’s guide of tips to consider when reviewing applications of the model?
- Does the model offer useful display capabilities?



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Future Developments

- Are there recommendations for future development to keep the model current with the state of the art, and with needs of specific applications?



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Additional Considerations

- Is there an unambiguous identifier (such as model Version #) so it is clear which model version is certified – necessary for both users and reviewers.
- Are there regional restrictions or other restrictions, and are these clearly identified in the documentation
- How long until the model should be revisited?



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Corporate Models Certified

- IWR-Planning Suite (version 1.0.11.0)
Certified September 2008
- HEC FDA Certified March 2009
- Beach FX - Certified April 2009
- Harbor-Sym (widening) – Certification
pending May 2011



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Certified Economics Tools (Field Generated)

- Package of Commonly Used Economic Tools,
certified May 2010
- ✓ Average Annual and IDC
- ✓ Compound Growth Rate
- ✓ Unit Day Value
- ✓ Interest and Annuity Table
- ✓ IWR Plan Annualizer



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Assuring Quality of Planning Models

Planning Model Review

Jodi Staebell
Ecosystem Restoration
Planning Center of Expertise



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Objectives

- Provide an overview of the Model Review process
- Highlight key information related to model review and the model review process
- Provide some lessons-learned



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Model Review

- Process to review, improve, validate analytical tools and models
- Toolbox - Ensure high quality methods and tools available to enable informed decisions
- Technical quality
 - ▶ Theory
 - ▶ Computational correctness
- System Quality
- Usability



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Model Review References

- Information Quality Act (PL 106-544)
- [OMB Information Quality Bulletin for Peer Review](#)
- Report of the Planning Models Improvement Task Force
- [Engineer Circular 1105-2-412\(New!\)](#)
- [HQ Memo Policy Guidance on Certification of Ecosystem Output Models, Aug 08](#)
- [Ecosystem Restoration Model Library](#)



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Model Review Basics

- Definition - any model or analytical tool used to
 - ▶ Define problems and opportunities
 - ▶ Formulate alternatives
 - ▶ Evaluate effects
 - ▶ Support decision-making
- Planning models, not engineering models
- Review is cost-shared
- In-house or contracted



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Model Basics

Stages of Model Development

- Requirements stage
- Development stage
- External Testing
- Implementation

Model categories

- Corporate
- Regional/local
- Commercial off-the-shelf
- Models developed by others



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Certification vs. Approval for Use (Jodi's working definition)

- Certification (Corps Models)/Approval (Non-Corps Models)
 - ▶ Regional Models
 - ▶ Models to be used on multiple projects
 - ▶ Increased rigor of review for Certified/Approved Models
- Approval for Single Use
 - ▶ Single-use models
 - ▶ Review can be conducted as part of technical review for a specific project
 - ▶ Increased rigor of review for single-use models used on large, controversial projects



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Model Documentation

- Provided by model proponent/Home PDT
- Outline in EC 412 Appendix A, Table 2
- Documentation includes
 - ▶ Background
 - ▶ Theory, assumptions, analytical requirements, formulas
 - ▶ Software/hardware, testing/validation process,
 - ▶ Availability of input data, usefulness to support project analysis, tech support, training
- Software/spreadsheets should also be provided for review



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Model Certification Review Plan

- Requirement in EC 412 **Key requirement!**
- “Each certification action will require a certification review plan – akin to PMP”
- Suggested outline in Attachment 2 of EC 412
- Sample Certification Review Plans to be posted on ER Gateway, Tools



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Model Certification Review Plan

- PCX charged with development of Certification Review Plan
- ECO-PCX encourages PDT to develop first draft
- Must be coordinated with HQ
 - ▶ Thru appropriate RIT, log in with OWPR
 - ▶ Corporate models through PCoP, log in with OWPR



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Suggested Certification Review Plan Outline

- | | |
|--|--|
| 1. Purpose | 6. Description of Tasks |
| 2. References and Guidance | 7. Certification Review Team Composition |
| 3. Background | 8. Schedule of Deliverables |
| 4. Documentation to be provided by Model Proponent | 9. Cost Estimate |
| 5. Type/Scope of Review | |



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Checkpoint Meeting

- Discuss comments with model review team
- Invite Office of Water Project Review Subject Matter Expert (OWPR SME)
- PCX
- Model Proponent
- PDT

Key Milestone!



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Model Certification HQ Panel

- Harry Kitch, Chair
 - Sue Hughes
 - Wes Coleman
 - Lee Ware
 - OWPR Economics (vacant)
 - Mark Matusiak
 - Bruce Carlson
 - Dave Moser
 - Lillian Almodovar, IWR
 - Robert Bank, HQ Civil Works Engineering
-
- OWPR will assign a Subject Matter Expert to assess model recommendation



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Scheduling and Timing

Schedule

- Start SOW to Notice to Proceed – 8-12 weeks
- NTP to Final Model Review Report – 15-18 weeks
- Revise model – depends on PDT
- PCX recommendation to HQ – 4 weeks
- HQ review and certify - ?

Timing

- Requirements and/or development stage
- Identify models at (prior to) Feasibility Scoping Meeting
- Initiate model review prior to Alternative Formulations Briefing



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Model Certification Cost Range

In-house Review

- By subset of ATR team
- 3 reviewers extra time to review model
- \$30-50k

External Review

- Contract - \$80-150k/model
- PCX labor ~\$10-15k
- Model proponent labor
 - ▶ Prepare model documentation
 - ▶ Assist in Model Cert contract
 - ▶ Revise model and documentation



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How can the model proponent help?

- Identify models early (Review Plan or not later than FSM)
- Prepare model documentation
- Test/validate model
- Check software
- Identify expertise needed
- Be open to process
- Pool funds for multiple-use models



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ECO-PCX Model Certification Experience

- See certified/approved models on Ecosystem Restoration Gateway [Model Library](#)
- See Model Certification Status on ECO-PCX website
<http://el.erdc.usace.army.mil/ecocx/model.html>
- See Model Review Sample Charge Questions on ECO-PCX website
<http://el.erdc.usace.army.mil/ecocx/model.html>



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ECO-PCX Model Certification Experience

Status	#
Not recommended	2
Single-use Approval	6
Certified/Approved	3
Recommended for Single-use Approval	3
Recommended for Certification/Approval	2
Review Complete; awaiting recommendation - Single-Use Approval	13
Review Complete; awaiting recommendation - Certification	8
Review underway – Certification/Approval	1
Review underway – Single-use	1
Review requested, but not initiated	18

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Model Certification Resources

- HQ Website, Models
 - ▶ <http://www.usace.army.mil/CECW/PlanningCOP/Pages/models.aspx>
 - ▶ EC 1105-2-412
- ER Gateway, Tools
 - ▶ List of approved HSI Models, links to other models
 - ▶ <http://cw-environment.usace.army.mil/tools.cfm?CoP=Restore>
- ER Gateway, Learning
 - ▶ Webinar on Model Certification (5/5/09)
 - ▶ <http://cw-environment.usace.army.mil/webinar.cfm?CoP=Restore&Id=8>
- IWR is assisting with review of Ecosystem Planning Models – Shawn Komlos



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Improvements

- Development of Model Review Standard Operating Procedures in FY11
- HQ developed process for processing Model Review Recommendations
- Regular meetings of HQ Model Certification Panel
- ER Gateway Model Library
- Reaching out to virtual resources – Districts, ERDC, IWR, Universities, Industry



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Ecosystem planning models

LESSONS LEARNED



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Quality Models

- Describe model assumptions and theoretical basis
- Aggregation formulas
 - ▶ Type – arithmetic mean, geometric mean, additive, limiting factors
 - ▶ Provide supporting information
- Testing, Verification and Validation
- Version control
- Assumptions/supporting literature for relationship between physical parameters and quality



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Quality Models

- Identify applicable geographic range
- Development/documentation of more precise approach to data collection
- Performance measures
- Ability to handle risk and uncertainty analyses, sea level rise scenarios and climate change scenarios



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Spreadsheets

- Highlight input and output cells
- Lock editing on other cells
- Validation of input data
- Error checks
- Clear version number
- Spreadsheet tab with user information
- Calculation of annualized benefits (divide by # years in period of analysis)



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Application

Document application assumptions



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Assuring Quality of Planning Models

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14 June 2011

Wesley Coleman

Chief, Office of Water Project
Review, HQUSACE



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Model Quality Assurance FAQ's

- Watershed studies? (yes)
- Grandfathering? (no)
- Mitigation models? (yes)
- Models developed by others?
- What does “policy check” entail?



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FAQ's (cont.)

- What are typical time and cost estimates?
- When is the right time to start the process?
- Won't this requirement stifle innovation?
- Are standards lower for “approved” models than for “certified” models?
- Shouldn't models that have been in peer reviewed publications be automatic?



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