

CECW-CP

Engineer Circular
No. 1105-2-407

31 May 2005

EXPIRES 30 JUNE 2007

Planning

PLANNING MODELS IMPROVEMENT PROGRAM: MODEL CERTIFICATION

1. Purpose. This circular establishes the process and the requirements for certification of planning models.

2. Applicability. This circular applies to all USACE elements, Major Subordinate Commands (MSCs), and district commands having Civil Works responsibility. This guidance applies to planning models as defined in Paragraph 5 of this Circular.

3. References.

- a. Engineer Regulation 1105-2-100, Planning Guidance Notebook, April 2000.
- b. Report of the Planning Models Improvement Task Force, September 2003
- c. U.S. Army Corps of Engineers Water Resources Planning: A New Opportunity for Service, The National Academy of Sciences, 2004.
- d. The Information Quality Act, Public Law No. 106-554, Section 515
- e. Office of Management and Budget. Final Information Quality Bulletin for Peer Review, Federal Register Vol. 70, No. 10, January 14 2005, pp 2664-2677
- g. U.S. Army Corps of Engineers, Director of Civil Works memo dated 25 Aug, 2003, Planning Centers of Expertise

4. Background. The Corps of Engineers Planning Models Improvement Program (PMIP) was established in 2003 to assess the state of planning models in the Corps and to make recommendations to assure that high quality methods and tools are available to enable informed decisions on investments in the Nation's water resources infrastructure and natural environment. The main objective of the PMIP is to carry out "a process to review, improve and validate analytical tools and models for U.S. Army Corps of Engineers (USACE) Civil Works business programs". In carrying out this initiative, a PMIP Task Force was established to examine planning model issues, assess the state of planning models in the Corps, and develop recommendations on improvements to planning models and related analytical tools. The PMIP Task Force collected the views of Corps leaders and recognized technical experts, and conducted investigations and numerous discussions and debates on issues related to planning models. It identified an array of model-related problems, conducted a survey of planning models, prepared papers on model-related issues, analyzed numerous options for addressing these issues, formulated recommendations, and wrote a final report that is the basis for the

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development of this Circular. The Task Force considered ongoing Corps initiatives to address planning capability, and built upon these where possible. Examples include several efforts under the Planning Excellence Program (training, specialized planning centers of expertise, modeling); the Science & Engineering Technology (SET) initiative (an EC on the SET initiative models is expected to be published in August 2005) and associated Technical Excellence Network (TEN), which endeavors to provide uniform Science and Engineering tools and practices to the Corps and share them throughout; and, recognition of existing Quality Assurance/Quality Control programs and internal technical review within the Districts.

5. Definitions.

a. Planning models - For the purposes of this Circular, planning models are defined as any models and analytical tools that planners use to define water resources management problems and opportunities, to formulate potential alternatives to address the problems and take advantage of the opportunities, to evaluate potential effects of alternatives and to support decision-making. It includes all models used for planning, regardless of their scope or source, as specified in the following sub-paragraphs. This Circular does not cover engineering models used in planning which will be certified under a separate process to be established under SET. Planning models are categorized according to their origins, as follows.

(1) Corporate models – developed by Corps laboratories/Field Operating Agencies (FOAs) which have nationwide applicability (HEC-FDA, IWR-PLAN, SBEACH, etc.)

(2) Regional/local models – typically developed at district offices for specific application to a particular local project/problem, could have regional applicability. This category includes all spreadsheets and software applications developed by the proponents for planning purposes as well as specific applications of commercially developed software (e.g., @RISK based applications).

(3) Commercial off-the-shelf (COTS) models – developed by private industry that may have applicability to Corps planning.

(4) Other Federal agencies models – developed by other Federal agencies that may have applicability to Corps planning.

b. Certified model. A planning model reviewed and certified by the appropriate Planning Center of Expertise (PCX) in accordance with the criteria and procedures specified in this Circular. Model certification is a corporate approval that the model is sound and functional.

c. Planning Centers of Expertise (PCXs). The PCXs were established in 2003 to enhance the Corps planning capability for inland navigation, deep-draft navigation, ecosystem restoration, hurricane and storm damage reduction, flood damage reduction and water reallocation. The PCXs are part of a national initiative to improve the quality

and effectiveness of the Corps water resources planning program. The PCXs will be responsible for the implementation of the certification process stated in this EC. (See Attachment 1 for a list of PCXs.)

d. **Proponents.** Model certification proponents are any districts, MSCs, Corps laboratories, or Headquarters that identify a need for certification. Headquarters will be the proponent for corporate models (national applicability) and models developed by other Federal agencies.

e. **Peer Support.** A means of assisting in the development of new models, or revision of existing certified models, that consists of ongoing involvement of expertise from inside and outside of the Corps and other technical/administrative support as appropriate.

6. **Policy.** Use of certified models for all planning activities is mandatory. This policy is applicable to all planning models currently in use, models under development and new models. District commanders are responsible for providing high quality, objective, defensible, and consistent planning products. Development of these products requires the use of tested and defensible models. National certification of planning models will result in significant efficiencies in the conduct of planning studies and enhance the capability to produce high quality products. The appropriate PCX will be responsible for model certification. The goal of certification is to establish that Corps planning products are theoretically sound, compliant with Corps policy, computationally accurate, based on reasonable assumptions and in compliance with the requirements of OMB Peer Review Bulletin (Reference 3f). The use of a certified model does not constitute technical review of the planning product. Independent technical review of the selection and application of the model and the input data is still the responsibility of the users. Once a model is certified, the PCXs will work with model developers and managers to ensure that documentation and training in model use are available and that model updates comply with certification requirements.

7. **Criteria for Model Certification.** The primary criterion identified for model certification is technical soundness. Technical soundness reflects the ability of the model to represent or simulate the processes and/or functions it is intended to represent. The performance metrics for this criterion are related to theory and computational correctness. In terms of the theory, the certified model should: 1) be based on validated and accepted “state of the art” theory; 2) incorporate Corps policies and requirements; 3) properly incorporate the conceptual theory into the software code; and, 4) clearly define the assumptions inherent in the model. In terms of computational correctness, the certified model should: 1) employ proper functions and mathematics to estimate functions and processes represented; and, 2) properly estimate and forecast the actual parameters it is intended to estimate and forecast. Other criteria for certification are efficiency, effectiveness, usability and clarity in presentation of results. A certified model will stand the tests of technical soundness based on theory and computational correctness, efficiency, effectiveness, usability and clarity in presentation of results. These criteria are discussed in more detail in Appendix D of reference 3b.

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8. Certification Process. As soon as a model need is identified, the proponents in coordination with the applicable PCXs will determine whether a model exists for their specific needs. If there is an existing model that meets the needs and requirements of the proponents and it had been previously certified by any PCX, use of the model is approved. PCXs, upon request, can recommend sources of training and technical support. If the existing model is not certified, the process described in Exhibit 1 will be used for certification. If no model is available to meet the needs and requirements, the proponents will decide whether to develop a new model (in-house or through a Corps laboratory), modify an existing one or purchase a commercial application. In these cases, the process to certify these models is described in paragraph 8 of this EC. Figure 1 summarizes the model certification process.

Exhibit 1 Certification Process for Existing Models	
Step 1	Proponent identifies model to be used for a national, regional, or local application.
Step 2	Proponent submits model and documentation to the appropriate PCX.
Step 3	<p>The PCX utilizes the following criteria to determine the appropriate level of review. The PCX has final approval on the level of review.</p> <p>Level 1 review is for highly complex models used in decision-making where there could be a high risk of making an incorrect investment decision (e.g., not justified, not optimal, etc.) that could result in major negative impacts.</p> <p>Level 2 review is for models of lesser complexity than Level 1 models with lower risks of making an incorrect investment decision that could result in minimum impacts.</p> <p>Level 3 review is for routine and non-complex models that have a minor impact on project decision-making</p> <p>Level 4 review is for current frequently used models that were developed by Corps Districts, Corps Labs and other agencies and contractors that have withstood historical informal reviews. The capabilities and limitations of these models are generally well understood. The review of frequently used existing products will include examination of the individual product’s review documentation to determine if the product warrants certification without a level 1 or 2 review.</p>

Exhibit 1 Certification Process for Existing Models	
Step 4	The PCX establishes a review team, selects team members, identifies the team leader, and defines the scope of review. A team selected from the roster of qualified reviewers maintained by the appropriate PCX, including external and internal reviewers, will conduct Level 1 and Level 2 reviews. Level 3 and Level 4 reviews may be conducted by Corps internal experts, but the review team, as deemed appropriate by the PCX, could include external individuals as well. Protocols and procedures for the model review process applicable to the model under review will be specified in the PMP and will reflect prevailing industry practices.
Step 5	The review team will provide to the PCX a consolidated documentation of review comments and recommendations. The review should adhere to the review charge and scope provided by the PCX. The PCX will strive for consensus, but one or more reviewers may not concur with the views of the majority. Matters of disagreement should be addressed forthrightly in the report. As a final recourse, a reviewer may choose to prepare a brief dissent describing the issues of contention and the arguments in support of the minority view. To encourage reviewers to express their views freely, review comments and recommendations will be provided to the PCX and proponent without attribution of specific comments to specific reviewers. The identity of reviewers will not be made available to the proponent or the public until after the review report is finalized. Feedback from the proponent and comments between the proponent, PCX and reviewers will not be released to the public. The decision on certification and final review comments and recommendations will be released to the public. Comments and recommendations will not be attributed to any specific reviewer.

Exhibit 1 Certification Process for Existing Models	
Step 6	Review comments are provided to the PCX within 90 days after submittal of the model for review to the review team. (Ninety (90) days is the estimated maximum time for review of models in Level 1. For models in other categories, the review time will be adjusted accordingly, and is expected to be less than 90 days.) The PCXs then assess whether the review team fulfilled the charge and scope provided. When the PCXs determine that the review charge and scope have been met, the comments are provided to the proponent for review and response. Feedback from the proponent, within 30 days after receipt of the comments, is transferred through the PCX back to the review team until all comments are either resolved or all parties reach an agreement on outstanding issues. The PCX will strive to resolve all comments, but not all comments may be resolved. The review team leader in consultation with the PCX will have the final call on comment resolution and product certification. The final decision on model certification must be made within 90 days after initial submittal of review comments to the proponent.
Step 7	The PCX certifies the product and provides recommendations. The PCX will furnish the Headquarters Planning Community of Practice Leader the documentation of the review, certification, and recommendations and coordinate with IWR to add the model to the National toolbox of certified models.

9. Development and Certification of New Models. New models will continue to be required, particularly in business programs that lack corporate or commercial models (i.e. deep draft navigation economics). No new model development should commence without engaging the appropriate PCX. The process described in the following subparagraphs applies for new models developed for Corps use.

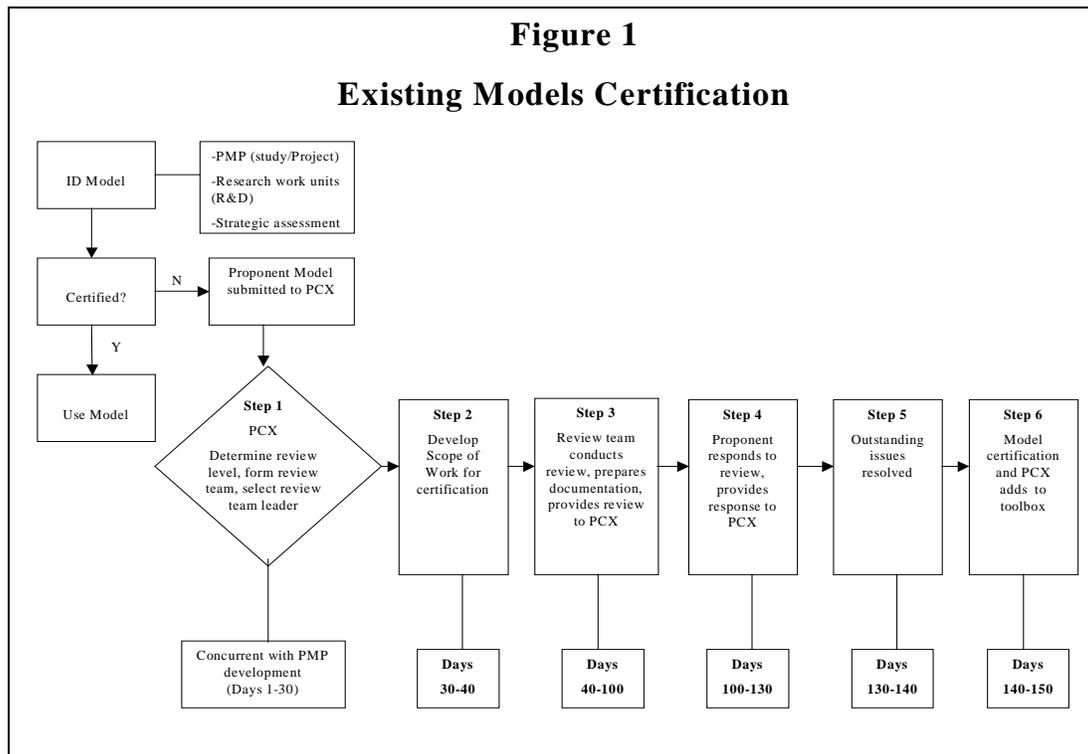
a. Upon identification of a new model requirement, the proponent shall contact the appropriate PCX to initiate a peer support process for the model development effort.

b. The PCX will provide peer support for new model efforts. The purpose of peer support is to provide proponents with early and ongoing advice, assistance, and review from experts in the development and initial application of models. Peer support could be provided from the PCXs, HQ, MSCs, districts, IWR, ERDC, and non-Corps individuals. The process will emphasize model development and model review to ensure that upon completion of the model, the development and peer review process utilized will lead to product certification. The PCX will provide or identify a list of experts to provide peer support to develop a new model or modify an existing model as required. The PCXs will identify and involve appropriate experts from academia, industry and other agencies as needed. Protocol and procedures for model development and review process will be specified in the PMP (for the new model to be developed) and will reflect prevailing industry practices.

c. Models currently under development will be considered as new models under this EC. Proponents should immediately contact the PCXs to initiate the model certification process in accordance with the procedures specified herein.

d. Proposed revisions of existing certified models will also follow the peer support process described herein.

10. Roles of PCXs. The PCXs are responsible for the implementation of the certification process as defined in this EC. Specifically, the PCXs are responsible for developing and maintaining a PMP, as defined in paragraph 14a of this Circular; for implementation of the certification process; for developing an initial inventory of models to be considered for certification and identifying appropriate level of certification; for identifying models to be eliminated from use; for setting priorities for certification; for establishing and maintaining rosters of qualified individuals, both external and internal to the Corps, to serve as model reviewers; for developing and approving the review charge and scope for each model; and, for developing a cost estimate for certification. The review charge and scope should guide the product reviewers and direct them to key issues, assumptions, routines, and aspects for review. The PCXs will provide IWR the information required to



incorporate the model in the National toolbox of certified models. The PCXs will produce an annual audit of processes, activities and accomplishments of the Program.

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11. Models Associated with Business Programs for which there is no Designated PCX. For models associated with business programs for which there is no officially designed PCX, such as recreation, the proponents should contact CECW-CP for additional information on how to proceed for model certification.

12. PMIP Administration.

a. Toolbox. The Institute for Water Resources (IWR), in coordination with the PCXs and CECW-CP, will be the lead internal organization for creating and maintaining an up-to-date corporate toolbox of certified planning models with basic information about the models and URL links to the PCXs and model developers' websites. CECW-CP, the PCXs and IWR will define the information required for the toolbox of certified models. The PCXs will provide the information to IWR as soon as the models are certified. The toolbox will be maintained at a site accessible to all Corps planners for ready reference.

b. Annual Review. A standing committee will be established to include representatives from Headquarters, IWR, ERDC and outside experts to conduct an annual review of the certification process and the PMIP. The review will include an audit of at least two model certifications issued by each PCX to assure adherence to the process described in this EC. Each PCX will prepare an annual report of model review activities to include information agreed upon in the PMP for the Program. The report should include a brief assessment of "state of the technology" issues to ensure that Corps planning efforts reflect best business practices. It should also include an annual strategic assessment of modeling and technology needs.

13. Funding mechanisms. Funding for model certification will be secured from various sources depending on the model category. For corporate models with National applicability, Headquarters will finance the costs associated with certification. For models that have specific study/local applicability, the proponent (normally a district) will cover the costs of certification. The cost of certification will be considered when developing the PMP for a particular study, if the use of a model that requires certification is planned. For models of regional application, the MSCs could consider sharing the costs of certification among the districts that would use the model. Financing required for the administration of the PMIP by each PCX, other than the costs associated with model certification, will be included in the annual budget request for each PCX.

14. Implementation.

a. Project Management Plan (PMP). Each PCX will develop a PMP for implementation of the requirements of this EC in coordination with other PCXs. Draft PMPs will be submitted to Headquarters (CECW-CP) within 120 days of the issuance of this Circular for review and consolidation into a programmatic PMP to ensure National consistency in the implementation of the program.

b. Training. PCXs will ensure that training on the use of certified models is available.

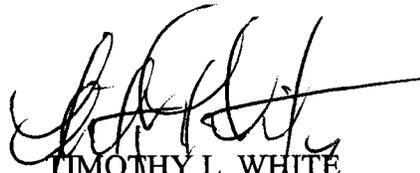
c. **Communication.** The PCXs will coordinate with the Planning Community of Practice to facilitate communication among model users, promote the toolbox, the training opportunities available, corporate models in development and future direction of the Program.

d. **Schedule.** The PMIP Task Force identified some of the models currently in use by the field (see Appendix E of reference 3.b.). Headquarters will select two of the nationally applicable models (corporate models) in this list to test the certification process stated in this Circular. Protocols for review to be developed by a Headquarters team will be used for the test. The results of this test, the protocols for review, and recommendations for modifications to the process, expected to be available by the end of FY 06, will be incorporated into the programmatic PMP.

e. The processes stated in this Circular are to start immediately. Recognizing that it will take time to develop the toolbox of certified models for field use, the requirement to use only certified models shall be effective upon certification of particular models or no later than 18 months from the approval of the programmatic PMP, whichever comes first. In the meantime, proponents will continue to use available models that must be reviewed through the ITR process. For new models under development or ongoing revisions to existing models, proponents should contact the PCXs immediately to initiate the certification process.

FOR THE COMMANDER:

Appendix A
Planning Centers of Expertise


TIMOTHY L. WHITE
Colonel, Corps of Engineers
Executive Director of Civil Works

APPENDIX A
Planning Centers of Expertise

National Center / Website	Director	Technical POC
Inland Navigation http://outreach.lrh.usace.army.mil/default.asp	<u>Theodore “Tab” Brown</u> CELRD-PDS-P (513/684-2974)	<u>Dave Weekly</u> CELRH-NC (304/399-6955) and <u>Paul Hanley:</u> CELRD-PDS-P (513/684-3598)
Deep Draft Navigation http://www.sam.usace.army.mil/ddncx/	<u>Wilbert Paynes</u> CESAD-CM-P (404/562-5220)	<u>Ken Claseman</u> CESAM-PD-FE (251/694-3840)
Flood Damage Reduction (Site under development)	<u>Robert Mooney</u> CESPDPD-TP (415/977-8171)	<u>Clark Frentzen</u> CESPDPD-TP (415-977-8164)
Hurricane and Storm Damage Prevention http://www.nad.usace.army.mil/ click on Regional Business Center click on Storm Damage	<u>Joe Vietri</u> CENAD-PM (718/765-7070)	<u>Larry Cocchieri</u> CENAD-CM-PP (718/765-7071)
Ecosystem Restoration http://el.erdc.usace.army.mil/ecocx/	<u>Rayford Wilbanks</u> CEMVD-PD-N (601/634-5847)	<u>Dr. Dave Vigh</u> CEMVD-RB-T (601/634-5854)
Water Management and Reallocation (Site under development)	<u>JoAnn Duman</u> CESWD-PDS-P (469/487-7065)	<u>Sam Arrowood</u> CESWD-PES-P (469)487-7069