



## **CENE Assessment and Continuous Improvement Protocol**

This document is the guiding document for program Assessment and Continuous Improvement for the CENE programs and, as such, defines the processes and protocols that are to be used in capturing these data.

The CENE Assessment and Continuous Improvement Protocol has three entities:

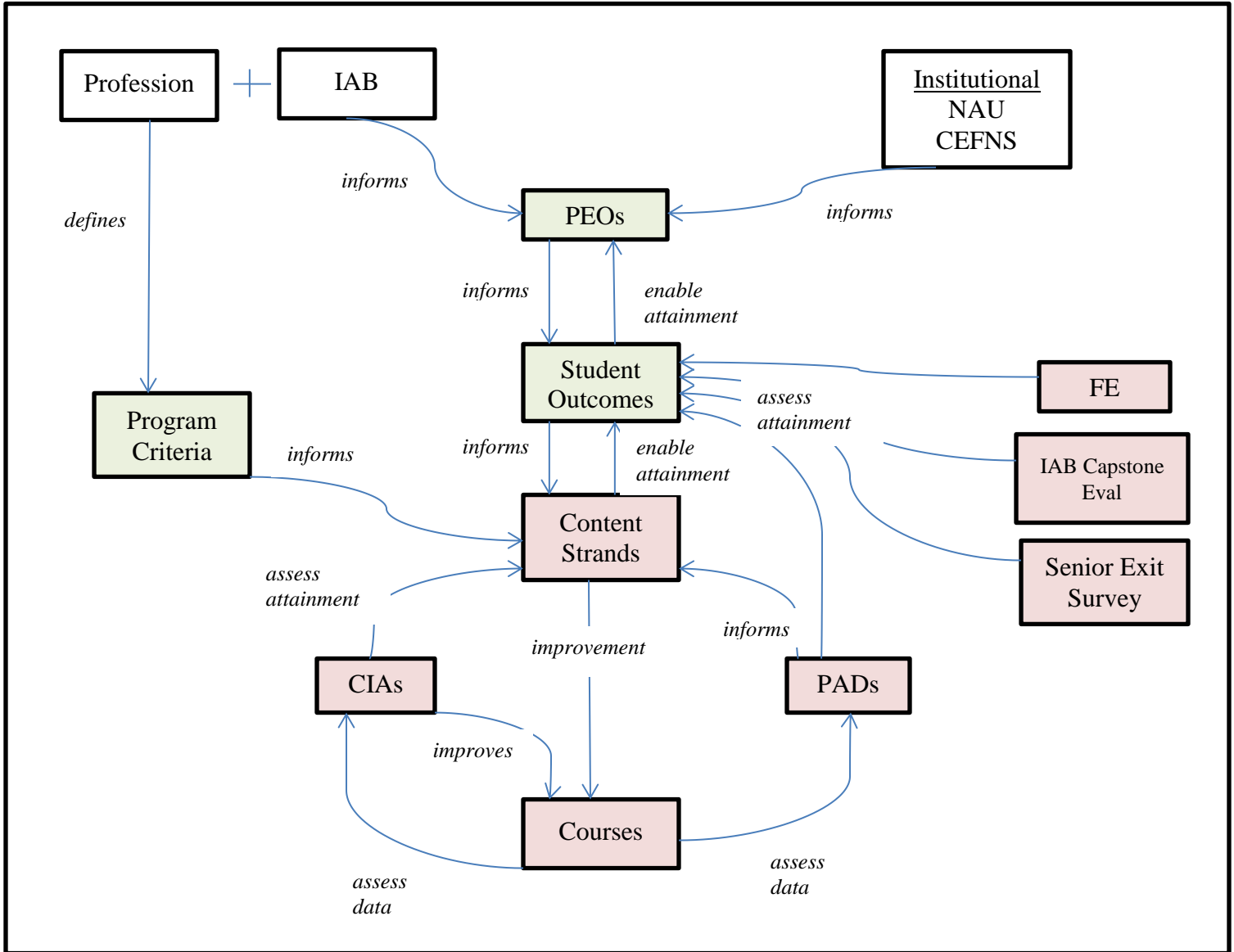
1. **Constituencies.** The applicable constituencies are: (1) members of the profession as represented by professional societies such as American Society of Civil Engineers (ASCE) and the Association of Environmental Engineers and Science Professors (AEESP), (2) the CENE Industrial Advisory Board (IAB), and (3) the institution of NAU and our college CEFNS.
2. **ABET-related criteria.** ABET-related criteria include Program Educational Objectives (PEOs) which state the skills that graduates will attain within 3-5 years of graduation, Student Outcomes A-K which define skills that students will attain upon graduation, and Program Criteria which are specific to each program and define relevant body-of-knowledge (BOK) content that are required in a program.
3. **Assessment and improvement tools.** These tools are defined by this document and include external tools such as FE Exam results, IAB Capstone Evaluations and the Senior Exit Survey, and internal tools such as the Content Strand Analyses, the Program Assessment Document (PAD) and the Course Improvement Audit (CIA) document.

The relationships between these entities are shown in Figure 1 below. Responsibilities of the CENE faculty relating to these relationships are as follows:

1. The CENE programs' faculty have direct interaction with the IAB and, in that role, are responsible for assuring that IAB interests are advanced within this Protocol. The faculty, by virtue of their role as NAU and CEFNS faculty, represent the institution and college and are responsible for assuring that these interests are advanced within this Protocol. Faculty have only indirect input into the role that the profession plays on defining program criteria (through their membership in professional societies), and have no direct responsibility in this area.
2. Program Criteria and Student Outcomes are defined by ABET and faculty have no responsibility in defining them. PEOs, however, are defined by the IAB and the faculty; this Protocol addresses those responsibilities.
3. Faculty have partial responsibility relating to external assessment/improvement tools via an oversight process that assures that the tools themselves are appropriate in their extent and use. Faculty have full responsibility for assurance that internal assessment/improvement tools (Content Strand Analyses, CIAs and PADs) are properly utilized as defined by this Protocol.

This Protocol defines faculty responsibilities relating to PEOs, Content Strand Analyses, CIAs and PADs, the FE Exam, the Senior Exit Survey and the IAB Capstone evaluations.

**Figure 1. CENE Assessment Program**



## **1. PEO Protocol**

PEOs are to be periodically reviewed for relevancy and revised as appropriate. No data collection for assessment purposes is required. The procedure used to review/revise the PEOs is as follows and reflects how the PEOs are supportive of the university's, college's, and departmental missions while remaining focused on the needs of our professions.

1. Faculty review current PEOs for relevancy and currency with respect to the constituencies served and create draft PEOs if revision is necessary.
2. Draft PEOs are reviewed by the IAB that also represent our constituencies. Additional revisions are made and a second draft is created.
3. The second draft is reviewed at a regular department meeting and either accepted or further revised. The process is repeated until approval by both faculty and IAB is reached.
4. Revised PEOs are published on the departmental website and in the catalog.
5. This process will occur every 3 years in the Fall.

## **2. Content Strand Analysis Protocol**

The purpose of the Content Strand Analyses is to assure that the courses that constitute the programs of study contain the appropriate subject matter as defined by the Program Criteria and serves as the primary mechanism for continuous improvement at the program level. Content Strand Analysis are performed in a group meeting of faculty responsible for courses taught in the Content Strand; the department Chair takes notes, makes all formal document changes and archives the information. Faculty are responsible for participating in all relevant meetings.

1. A Content Strand Analysis document is created for every course; this document lists the ABET A-K Outcomes (major and minor) for the course and the Course-Specific Student Learning Outcomes mapped to the ABET A-K Outcomes. For each Course-Specific Outcome, topical content taught in the course is listed for each. Additionally, required prerequisite content (either content or a course) are listed. Course syllabi reflect the information on the Content Strand documents.
2. In the Content Strand Analysis meeting, linked courses are systematically reviewed such that feedback/changes in any one course trigger an additional evaluation of all linked courses until stasis is attained. Course syllabi and the Course-ABET Outcomes map are revised as necessary by faculty and the Chair. Program changes are instituted if necessary by the Chair.
3. Content Strand Analyses are performed on a 3 year cycle in the Spring. More frequent analyses can be done if triggered by:
  - CIA recommendation for major course content change,
  - PAD data indicating that attainment of any ABET Outcome A-K is a concern, or
  - FE, IAB Capstone or Senior Exit Survey data indicating that ABET Outcome A-K attainment is a concern.

## **3. PAD Protocol**

The PAD process obtains quantitative data relating to ABET Outcomes A-K and is the primary mechanism for demonstrating ABET Outcome A-K attainment. A PAD example document is attached at the end of this document.

1. The PAD process is performed on a 3 year cycle; data are collected over 5.5 semesters and reviewed in the 6<sup>th</sup> semester (Spring).
2. Prior to the beginning of the cycle (or at the end of the previous cycle), courses are selected for data collection based upon a mapping of all required courses with ABET Outcomes A-K, a maximum of three courses are selected for each outcome.
3. A data collection schedule is created so that data is collected from each course three times over the 5.5 semester cycle period.
4. Prior to teaching a course identified to collect PAD data, the instructor must identify the assessment methods that will be used to obtain the ABET Outcome-specific data and prepare their gradesheets appropriately.
5. PAD data collection forms are created for each ABET Outcome A-K, course data are input into the forms which are archived. Faculty are responsible for assuring that required data are collected and archiving on the R drive. The ABET Coordinator and/or the Chair is responsible for collecting and analyzing data at the end of the cycle.

#### **4. FE Exam, Senior Exit Survey, IAB Capstone Evaluations Protocol**

These three tools are used as additional information to evaluate attainment of ABET Outcomes A-K.

1. Data are collected whenever they become available. FE Exam data are collected from NCEES reporting website; the ABET Coordinator and/or the Chair is responsible for collecting and analyzing these data at the end of every cycle. Data from the Senior Exit Survey and the IAB Capstone Evaluations are collected every semester. The Chair is responsible for administration of the Senior Exit Survey and its data analysis at the end of every cycle. The Capstone instructor is responsible for administration of the IAB Capstone Evaluations; the Chair is responsible for its data analysis.
2. Data are evaluated on a 3 year cycle in the Spring.
3. In addition to analysis of the data every three years, the tools themselves are reviewed on the same cycle, or earlier if a change is warranted (e.g., the FE Exam will be revised in January 2014 as an on-line only exam and content will change, therefore, the applicability of the FE Exam to specific ABET Outcomes will need to be reviewed for relevancy).
4. Additional tools may be considered for inclusion in this protocol with approval of the faculty.

#### **E. CIA Protocol**

The CIA constitutes the continuous-improvement loop at the course-level and consists of a qualitative reflective document prepared at the end of the semester in which the course was taught. All courses require a CIA document. The faculty teaching the courses are responsible for properly completing the forms and archiving them on the R drive. A CIA example document is attached at the end of this document.

1. Prior to the beginning of a semester and preparation of the syllabus, the previous CIA document is obtained from the R drive to identify recommendations for course improvement from the previous teaching of the course. Faculty have a responsibility to obtain this information whether or not they previously taught the course. These

recommendations are taken into account when preparing the course outline and determining which teaching methods will be used.

2. Upon completion of the course, the faculty member fills out a new CIA document for the course, moving the previous recommendations to Section A and commenting upon what was done to improve the course and its general effectiveness. New recommendations are added in Sections B and C of the form as needed. It is recognized that some courses need few or no changes at any given time, and recommendations need not be forced if not reasonably forthcoming.
3. The ABET Coordinator and/or Chair review the CIA documents at the end of the 3 year cycle to assure that program-related improvements can be made as required.

The timing for this Protocol is detailed in Table 1 below.

**Table 1. Cycle for Data Collection and Continuous Improvement**

	<b>Program Educational Objectives (PEO's)</b>	<b>Program-Level: ABET Student Outcomes A-K (PAD data) &amp; Content Strand Analyses</b>	<b>Program-Level: FE Exam, Senior Exit Surveys, IAB Capstone Evaluations</b>	<b>Course-Level: (CIA data)</b>
<b>Data Collection Schedule</b>	n/a	every year (PAD); as needed (Content Strand Analyses)	every year	every semester
<b>Next review / review every X yrs</b>	Fall 2013 / 3	Spring 2016 / 3	Spring 2016 / 3	Spring 2016 / 3
<b>Comments</b>	Anticipation of additional data collection cycle resulted in no review since 2008; attainment data collection halted when ABET re-defined this requirement. <i>Review to begin immediately this fall.</i>	Preparation of 2013 Self-Study constituted an end-of-cycle review; process considered acceptable and <i>no revisions of protocol necessary.</i>	All processes operating effectively; <i>no revisions of protocol necessary. Consider inclusion of IAB Student Forum data in future.</i>	Continuous process is operating effectively; <i>no revisions of protocol necessary.</i>

Results of the assessment cycle will be shared with:

- Faculty during the Fall faculty meeting,
- IAB during the Fall IAB meeting,

- Other constituents via the CENE website.

This document can be revised with consent of the CENE faculty.