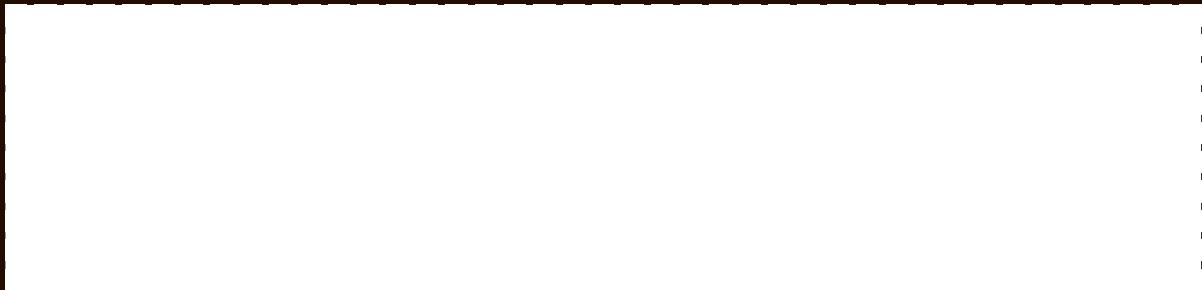


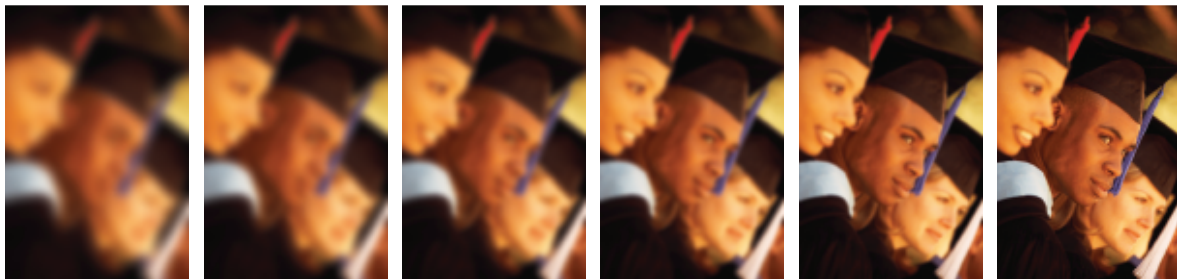
SUSTAINING THE
CHANGE



a follow-up report to the
Vision for Change



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“It is change, continuing change, inevitable change, that is the dominant factor in society today. No sensible decision can be made any longer without taking into account not only the world as it is, but the world as it will be....”

– Isaac Asimov

Introduction

1994

Then

Over a decade ago, the U.S. engineering community – including industry, academe, and government – collectively concluded that it was time to make a change in engineering education. They came to this conclusion for several reasons. First and foremost, industry leaders had for years been voicing concerns to the community that engineering graduates were not adequately prepared to function within modern American industry. They lacked the ability to team effectively, said industry leaders. They had little grasp of concepts such as customer service, environmental sensitivity, social responsibility, and continuous quality improvement. At the same time and just as strongly, these same concerns were expressed by forward-thinking educational leaders: Our graduates are facing a new engineering environment, and we must prepare them for it.

Once industry and academe realized that their concerns were the same, they began to mobilize through ABET, the organization responsible for setting the standards of engineering education. At the time, ABET's accreditation criteria and process were considerably rigid and prescriptive. Arguably, they left little room for the innovation needed to prepare graduates for the new working environment. Both inside and outside of ABET, the engineering community began to acknowledge this and soon started calling for change.

ABET responded to the call by instituting the Accreditation Process Review Committee, which in 1994 would hold three pivotal accreditation reform workshops. The Criteria, Participation, and Process Workshops involved all the major stakeholders in ABET. More than 125 people would participate, representing all facets of the engineering community – university presidents, deans, faculty, and administrators; industry leaders; private practitioners; professional and technical society liaisons and executive directors; ABET leaders, commissioners, and Board members; state engineering licensure and registration board members and National Council of Examiners for Engineering and Surveying leaders; and government researchers and regulators in the technical fields. The findings and recommendations of those workshops were captured in the *Vision for Change*, published by ABET in 1995 and circulated to the engineering community the same year.

Essentially, the workshop recommendations called for considerable change, change in the accreditation criteria, change in the accreditation process, and change in the people who carry out that process. By October 1995, those changes were already being instituted, beginning with revolutionary, new engineering accreditation criteria, approved for public comment by the ABET Board of Directors. ABET has been actively engaged in the change process ever since.

– Dilbert

“Change is good. You go first.”

Now

Ten years have passed since ABET first became engaged in change. All ABET commissions – Applied Science, Computing, Engineering, and Technology – now have outcomes-based criteria, and the Engineering Accreditation Commission is already seeing programs undergo their second-round evaluations with them. The accreditation process continues to evolve, incorporating both best practices and innovations. Participation in ABET is still a work in progress, with a more balanced industry-education representation, an active diversity task force, and a continued commitment to keeping only the best on the job.

In early 2002, ABET began gathering input to further gauge and guide the change. A longitudinal study was initiated through the Penn State Center for Studies in Higher Education, focusing on the preparedness of graduates educated under the Engineering Accreditation Commission's outcomes-based accreditation criteria. A special session at the 2002 ABET Annual Meeting was held to solicit constituents' feedback on a variety of important issues. In early 2003, an assessment of ABET's accreditation reform was made by the leaders of the 1994 Accreditation Reform Workshops. And in mid 2003, a retreat was held with participants from programs that had undergone two accreditation cycles under the new ABET criteria – and therefore had much insight to share – as well as industry leaders and ABET Board members and commissioners. In addition, substantial input has been gathered from many other ABET constituencies, including the ABET Industry Advisory Council, the National Electrical Engineering Department Heads Association, the American Society of Mechanical Engineers' Committee on Engineering Accreditation, the American Society for Engineering Education's Engineering Deans Institute, and the National Academy of Engineering.

From these input-gathering events, ABET has gained valuable information on the state of its accreditation reform movement and has collected many recommendations for the near and long-term future. In this report, *Sustaining the Change*, a follow-up report to the *Vision for Change*, we will outline these events and highlight the many recommendations produced by them.

ABET indeed intends this report to *sustain the change* sparked nearly a decade ago. It has been presented to our Board of Directors and to our commissions, and has already begun to make its way into our policies and directives. In addition, we continue to seek new ways to gather the input of our constituents and to report that input back to the community we serve. This report is but one step in the process.

ABET welcomes your comments and feedback on the findings contained herein. Please use any of the contacts below to reach us:

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ABET Town Meeting

November 2002

At the 2002 ABET Annual Meeting, a special session was held in order to gather feedback from ABET-accredited programs on three important topics in the Accreditation Reform Movement:

- The sustainability of continuous improvement processes.
- The challenges of creating clear reports and self-studies on those processes.
- The appropriate time to reexamine ABET criteria and to refine it based on lessons learned.

The following is feedback received from the session participants:

Sustainability of Continuous Improvement Process

(changes in criteria, process, and documentation)

Criteria

- + Process of ongoing participation is very meaningful.
- Potential for inconsistent evaluation among program evaluators.

Process

- + Promotes meaningful curriculum discussions.
- Enormous volume of work... How much needs to be included in assessment?

Documentation

- + Opportunity for institution to document what they are doing.
- Want less.... Higher quality.

Documentation in Reports and Self-Studies

(format, data, and record keeping)

What is working well?

- Opportunities to correct shortcomings after visit.
- ABET staff.
- Faculty are generating objectives and outcomes.

What needs to be improved?

- Need more specific tools for assessment.
- More specific tools for visits.
- Too much paperwork.

What are the "unknowns"?

- How will ABET evolve?
- Longitudinal data: Is it required?
- Impact on faculty reward system.

Time Line for Criteria Change

(major and minor changes, and how do we change them?)

Criteria Change Issues

- Consider standard program evaluator training and require observer visit.
- Need to initiate a plan to seek systematic input and to provide summary information on criteria and accreditation actions.

The Good

- Policy/procedure manual and self-study guide are clear.
- Objective/outcome differentiation.

The Bad

- Original materials in multiple manners.
- Universal definition of terms.

"The world hates change, yet it is the only thing that has brought progress."
- Charles F. Kettering

Accreditation Reform Workshop Leaders – 10 Years Later

September 2002

All six leaders of the Criteria, Participation, and Process Workshops reconvened after nearly a decade in order to gauge the progress of the accreditation reform they helped bring about in the early 1990s. After a full day of targeted discussions and brainstorming, the leaders formulated a set of observations, progress points, concerns, and recommendations:

The Leaders

M. Dayne Aldridge

Mercer University

Ira D. Jacobson

Embry-Riddle Aeronautical University

Elinor S. Pape

University of Texas, Arlington

Edward A. Parrish

Worcester Polytechnic Institute

George D. Peterson

ABET, Inc.

John W. Prados

University of Tennessee, Knoxville

with additional input from

Gloria M. Rogers

Rose-Hulman Institute of Technology

Observations

- ABET is viewed as a leader by other higher education accrediting organizations.
- ABET is sought by the international community for leadership in quality assurance of engineering education.
- A blurring of disciplinary boundaries is occurring that is incongruent with existing accreditation structures.
- Industry involvement in ABET has not changed significantly.

Progress Points

- There is growing acceptance of the value of the systematic engagement of external constituencies in improving program quality.
- There is a growing awareness of the value of outcomes-based assessment processes for improving program quality.
- There is increased faculty attention to student learning as a part of improving program quality.
- There is growing involvement of industry at the program level.

Progress Points

- ABET is evolving into an international force in setting the standards for evaluating and encouraging excellence in engineering education.
- ABET has endorsed the longitudinal, multi-year study of the impact of ABET's accreditation reform on engineering education, with particular focus on measurable changes in engineering school culture toward continuous quality improvement and employer satisfaction with engineering graduates.

“If we don't change direction soon, we'll end up where we're going.”
– Professor Irwin Corey

Concerns

- The apparent focus of programs on the quantity of data collected rather than the assessment of quality, which can create heavy workloads and the perception of accreditation as an onerous task.
- The sustainability of efforts at the campus level.
- The continuity and sustained commitment of leadership in ABET, institutions, and societies (climate v. culture).
- The role of professional societies in assuring the consistency and quality of the selection, training, and evaluation of program evaluators.

Recommendations

- Continue proactive training for program evaluators, team chairs, and engineering faculty and administrators preparing for visits. These efforts should emphasize the assessment of quality as opposed to the quantity of data collected.
- Continue careful evaluation of program evaluator and team chair performance, and establish a formal mechanism for counseling those who demonstrate less than effective performance and removing those who fail to improve.

Concerns

- The ability to maintain the momentum and movement toward the vision in the second cycle of visits and the evaluation of programs that have yet to be accredited under the new criteria.
- The confusion regarding processes that assure not only continuous quality improvement but also that ensure that minimum standards are met.
- The response of professional societies and ABET to the blurring of disciplines (e.g., the role of societies and programs in maintaining program criteria).

Recommendations

- Make no substantive changes in criteria and place a moratorium on approval of new program criteria pending a study of blurring disciplinary boundaries, conducted by a task force of energetic, visionary ABET volunteers.
- Review the basis for the traditional practice that commissioners and visiting teams include 50% industrial representation.
- Clarify the intent for having industry involvement in the accreditation process and, if necessary, propose alternative mechanisms for achieving this intent.

“It is evident that skepticism, while it makes no actual change in man, always makes him feel better.”
—H.L. Mencken

Sustainability Retreat

September 2003

During this retreat, deans and faculty from a widely representative slice of programs – small, large, public, private, liberal, technical – many of which had been evaluated more than once under ABET’s outcomes-based criteria, met with members of ABET’s Board of Directors, commissions, and Industry Advisory Council. The participants were asked to share with ABET their experiences with the new criteria and accreditation process, and to issue recommendations needed for ABET to sustain the change. All facets of the Accreditation Reform Movement were discussed, including criteria, training, assessment, consistency, accountability, communication, faculty involvement, industry participation, institutional support, global considerations, and new disciplinary challenges. Many recommendations were made, including the following:

Assessment Tools

- Better consistency with training for team chairs, program evaluators, and faculty.
- Create candidacy phase for new programs.
- ABET should benchmark with other professional accrediting agencies to look at minimum standards; will these standards increase over time if ABET is a continuous improvement agency?

Faculty Involvement

- In order to improve faculty attitudes toward students, ABET should highlight the importance of faculty attitudes toward students in the self-study report.
- ABET should develop a list of attributes of student involvement with faculty, professional organizations, and industry.
- During the site visit, the visiting team should discuss the effectiveness of advising with a cross-section of students.

Accreditation Process

- Self-study, assessment documentation, etc....limit the length of the reports.
- Greater role for faculty in exit interview.
- Consistency, professionalism, openness of visiting team members, including more trained faculty participating as program evaluators.
- Relatively less emphasis on program educational objectives, and more emphasis on remaining criteria.
- National forum on best practices.

Curriculum Content, Structure, and Delivery

- ABET should lead sharing of best practices of curricular content, structure, and delivery.
- ABET should close the gap between the structure of accreditation and the realities of emerging curricular content and structure.
- ABET should drive increased integration of curricular content to achieve effectiveness and efficiency of educational structure and delivery.

“He who rejects change is the architect of decay. The only human institution which rejects progress is the cemetery.”
– Harold Wilson

Environmental Factors

- ABET, in conjunction with (i.e., National Science Foundation (NSF), National Academy of Engineering (NAE), American Association of Engineering Societies (AAES), American Society for Engineering Education (ASEE)) should lead the organization of a public review of the future of U.S. engineering education in the global environment of the 21st century, addressing issues of competitiveness, national security, the public perception of engineering, and the emergence of new scientific and engineering disciplines.
- ABET should re-examine Engineering Criterion 3, Program Outcomes and Assessment, with the goal of re-defining engineering for the public in a global context.

Environmental Factors

- ABET, in conjunction with (i.e., NSF, NAE, AAES, ASEE) should lead an effort to increase recruiting of fully representative students by changing the public perception of engineering and by supporting the preparation of K-12 students for engineering study.
- In its annual review of engineering programs, ABET should identify and promote the public recognition of innovative and exemplary practices.
- ABET should examine its commission structure with the goal of encouraging and facilitating the review of emerging disciplinary programs.

Industry Involvement

- ABET should gather information about local industry advisory committee activity, and inventory and disseminate best practices of industry/academe collaboration to the entire ABET educational and industrial community.
- ABET should inform college/university administrators about the educational value of industrial experience for faculty members in furtherance of their research and classroom objectives.

Industry Involvement

- In support of the above, ABET should hold regional workshops for college/university provosts to promote the importance and value of industrial experience for engineering faculty members.
- ABET should inform industry of the specific value of collaboration with engineering faculty in furtherance of industry's short and long term objectives.

“Change is the law of life. And those who look only to the past or the present are certain to miss the future.”
– John F. Kennedy

Sustaining the Change

While there are a number of concerns, observations, and recommendations emerging from these input-gathering events, there are several common themes running throughout:

Communication and Leadership

Our constituents have told us time and time again that as the superintendent of applied science, computing, engineering, and technology education, ABET must take a more visible leadership role in these areas. Communication, the constituents say, must be the conduit of that leadership. There are strong recommendations for facilitating the sharing of best practices, holding more workshops, recognizing outstanding programs and faculty, and promoting accreditation and study in the ABET disciplines. Some desire more communication between ABET and industry. Some are suggesting a closer collaboration between ABET and other technical and scientific organizations. Whatever the specific recommendations are, they all center around increased leadership through communication.

ABET takes its role as a leader in quality assurance in technical education very seriously. From its presence overseas to its many initiatives here in the U.S. – technology education outreach, distance education, information technology – the organization is very active in the community it serves. However, it is clear from the input of our constituents that more emphasis must be placed at the program level; we must focus more closely on the institutions and programs we serve. There is already a communications plan in the works for ABET. This additional input will be used to ensure that it best fits the needs of all our constituents.

Accreditation Process

When any new process is instituted, there are bound to be wrinkles that need to be ironed. We have been hearing a lot about these from our constituents over the last decade, and have been doing our best to respond to them in an appropriate and timely manner. One of the most important initiatives to this end was begun in 2001 when the Accreditation Council was established. Made up of the Chairs and Vice Chairs of the commissions, the Adjunct Accreditation Directors, and the Accreditation Director, the council strives to standardize the accreditation process across commissions and to facilitate the process by sharing the best practices of each commission. The Accreditation Council has positively impacted the accreditation process in a number of ways and has affected virtually every part of that process from the self-study components to the visit agenda to the format and content of the criteria. Now that the council has become a permanent facet of ABET, we expect to see many more process improvements in the future.

Workload, documentation, and assessment tools continue to provide frustration for constituents. Sustaining the change relies on sustaining the level of commitment and enthusiasm – the level of momentum – both on campus and at ABET. We understand this and are working to continually improve it.

"I cannot say whether things will get better if we change; what I can say is they must change if they are to get better."
– Georg Christoph Lichtenberg

Consistency of Evaluations

This is arguably the most recurring concern expressed by all constituencies included in this report. It is apparent that while the new, outcomes-based criteria finally provide the opportunity for innovation and program individuality, they also appear to leave much interpretation open to program evaluators and faculty, many of whom, the constituents believe, have varying levels of sophistication and training in outcomes assessment.

There is serious concern among constituents that inconsistencies exist between and among program evaluators, particularly regarding their evaluation of the objectives and outcomes components of the ABET accreditation criteria. Although experienced in evaluating laboratories, curricula, and student work, and in interviewing faculty and students, program evaluators frequently are less familiar with outcomes assessment. The constituents believe that many of the program evaluators have not received appropriate training in outcomes assessment and that inconsistencies may exist among member society program evaluator training programs. The solution sought by these constituencies is one central training developer, provider, and manager: ABET.

ABET staff, Chairs and Vice Chairs of the ABET commissions, and members of the commissions' training committees have all been working diligently on a proposal to completely streamline, standardize, reenergize program evaluator training. This training would be both owned and operated by ABET, improving consistency, as well as freeing up valuable resources for our member societies. The next step in this important proposal is for the ABET Board of Directors to act and allocate resources.

Changing Environment of the ABET Professions

This is an extremely high-order concern for the ABET Board of Directors. Most of the top issues of the current ABET strategic plan regard the changing environment of the ABET professions. These issues include the blurring of boundaries among disciplines and the globalization of our professions.

Most of the concerns contained in this report echo those of our strategic plan. As recommendations, some seek the reorganization of ABET's commission structure. Others call to question the relevance of program-specific criteria. A few ask for a reexamination of the general accreditation criteria.

The ABET Board continues to examine these issues and their possible solutions through its strategic planning efforts. The feedback gathered in this report and the wealth of input gained at the 2003 ABET Annual Meeting, which focused on these topics, will be used to guide the Board as they navigate through these difficult issues.

The Next Chapter

ABET is beginning the next chapter in its accreditation reform movement. It is now time to focus on sustaining the change that began a decade ago. Our constituents have provided invaluable feedback on how to do this, and we intend to use it. Many thanks to those who participated in the activities reported here. ABET very much looks forward to another decade of working with our constituents to improve the quality of technical education for the 21st century.

“It is a bad plan that admits of no modification.”
— Publius Syrus

ABET MEMBER SOCIETIES

American Academy of Environmental Engineers (AAEE)
American Congress on Surveying and Mapping (ACSM)
American Council of Engineering Companies (ACEC)
American Industrial Hygiene Association (AIHA)
American Institute of Aeronautics and Astronautics, Inc. (AIAA)
American Institute of Chemical Engineers (AIChE)
American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME)
American Nuclear Society (ANS)
American Society for Engineering Education (ASEE)
American Society for Quality (ASQ)
American Society of Agricultural Engineers (ASAE)
American Society of Civil Engineers (ASCE)
American Society of Heating, Refrigerating, and Air-Conditioning
Engineers, Inc. (ASHRAE)
The American Society of Mechanical Engineers (ASME)
American Society of Safety Engineers (ASSE)
Biomedical Engineering Society (BMES)
CSAB, Inc.
Health Physics Society (HPS)
The Institute of Electrical and Electronics Engineers, Inc. (IEEE)
Institute of Industrial Engineers, Inc. (IIE)
Iron and Steel Society (ISS)
ISA-The Instrumentation, Systems, and Automation Society (ISA)
Materials Research Society (MRS)
The Minerals, Metals, and Materials Society (TMS)
National Council of Examiners for Engineering and Surveying (NCEES)
National Institute of Ceramic Engineers (NICE)
National Society of Professional Engineers (NSPE)
Society of Automotive Engineers (SAE)
Society of Manufacturing Engineers (SME)
Society for Mining, Metallurgy, and Exploration, Inc. (SME-AIME)
Society of Naval Architects and Marine Engineers (SNAME)
Society of Petroleum Engineers (SPE)