

# THE VISION FOR CHANGE

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A SUMMARY REPORT  
OF THE  
ABET/NSF/INDUSTRY WORKSHOPS



**SPONSORED BY:**

THE ACCREDITATION BOARD FOR  
ENGINEERING AND TECHNOLOGY  
THE NATIONAL SCIENCE FOUNDATION  
THE ABET INDUSTRY ADVISORY COUNCIL

## **ABET PARTICIPATING BODIES**

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American Academy of Environmental Engineers (AAEE)  
American Congress on Surveying and Mapping (ACSM)  
American Institute of Aeronautics and Astronautics, Inc. (AIAA)  
American Institute of Chemical Engineers (AIChE)  
American Nuclear Society (ANS)  
American Society of Agricultural Engineers (ASAE)  
American Society of Civil Engineers (ASCE)  
American Society for Engineering Education (ASEE)  
American Society of Heating, Refrigerating,  
and Air-Conditioning Engineers, Inc. (ASHRAE)  
The American Society of Mechanical Engineers (ASME)  
Institute of Industrial Engineers, Inc. (IIE)  
The Institute of Electrical and Electronics Engineers, Inc. (IEEE)  
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)

### **ABET ASSOCIATE BODY**

Instrument Society of America (ISA)

### **ABET AFFILIATE BODIES**

American Consulting Engineers Council (ACEC)  
American Institute of Mining, Metallurgical and Petroleum Engineers (AIME)  
American Society for Nondestructive Testing, Inc. (ASNT)  
American Society of Safety Engineers (ASSE)  
Society of Plastics Engineers (SPIE)



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*Copies of the Criteria, Participation and Process Workshop Reports can be obtained by calling the ABET Publication office at (410) 347-7727.*

## ABET VISION STATEMENT

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In concert with its member societies, ABET is responsible for establishing standards, procedures, and an environment that will encourage the highest quality for engineering, engineering technology, and engineering-related education through accreditation so that each graduate possesses the skills necessary for lifelong learning and productive contribution to society, the economy, employers, and the profession.

In fulfilling this responsibility, ABET will seek to:

**A**ssure high quality, encourage continuous improvement, and foster innovation in engineering, engineering technology, and engineering-related education through accreditation.

**I**mprove understanding of the accreditation process and broaden involvement and participation in ABET activities.

**E**stablish processes for mutual recognition of ABET-accredited programs and corresponding programs in other countries and assist global agencies in developing accreditation processes.

**F**oster cooperative efforts of public and private employers with academe to identify and support needed educational improvements.

**R**epresent the profession in educational areas, in concert with its members societies, and sponsor appropriate forums, conferences, and studies which benefit the entire spectrum of engineering, engineering technology, and engineering-related education.

**H**elp make the studies represented by ABET programs attractive to every student and prospective student.

**A**ssist the profession in defining ABET program areas and their alternative educational paths.



**ABET** is a federation of 27 engineering professional technical societies that represent more than 1.8 million engineers. ABET's main objective and responsibility is the maintenance and improvement of the quality of education in engineering, engineering technology, and engineering related-areas. Through its accreditation commissions, committees, and Board of Directors, ABET addresses current and future issues, implements studies, and develops policies, some of which become part of the criteria used by the accreditation commissions to evaluate engineering programs in their respective fields.

## ACCREDITATION PROCESS REVIEW COMMITTEE STATEMENT

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May 18, 1995

Colleagues:

In his 1991 report to the ABET Board, John Prados, then President of ABET, focused on a fundamental challenge facing ABET and engineering education. This challenge was brought forcibly to ABET's attention by a strong and consistent message from leaders of American industry that the concepts such as customer focus, continuous quality improvement, and environmental sensitivity are essential to industry survival in today's global economy. The message was equally strong from forward-looking educational leaders: that engineering education must change significantly to support this new environment, and that ABET's rigid application of the accreditation criteria created a significant barrier to the needed innovation.

Pre World War II engineering education was a highly practical subject with little application of mathematics beyond elementary calculus and with emphasis on design codes and structured methodologies. This traditional approach proved inadequate and engineering education underwent a profound paradigm shift toward a stronger education in mathematics, basic sciences, and engineering sciences.

With the close of the Cold War, engineering education is undergoing yet another paradigm shift, one that does not abandon the solid mathematical and scientific base of today's curricula, but introduces engineering subjects in ways that actively engage students in team efforts to address engineering problems typical of a quality-oriented, industrial environment.

In 1992, ABET established the Accreditation Process Review Committee (APRC) to advise on how to increase flexibility in the engineering accreditation criteria, while maintaining a strong emphasis on educational quality; and, to suggest ways to make it easier to recruit outstanding engineers from industry and education to lead the ABET accreditation process.

From the findings of a series of consensus-building workshops, ABET is now poised to reform its criteria and processes in a manner designed to overcome many of the barriers that tended to stifle educational innovation. ABET is proposing a drastic downsizing of the criteria, a re-orientation of its accreditation philosophy, and constructive interaction with its constituency.

The Accreditation Process Review Committee is pleased to submit this workshop summary report for your review. ABET has taken a bold step and has set out to provide positive reinforcement to the paradigm shift. But, as you know, ABET is us: the professional societies, industry, and academe. We encourage you to take an active role in supporting ABET's initiatives to respond to the new engineering education paradigm.

For the Committee,

Bruce C. Coles  
Chairman of the Board and CEO  
Stone and Webster

Charles M. Vest, President  
Massachusetts Institute of Technology

## FOREWARD

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Today industry and government leaders, as well as visionary educators are calling for a change in engineering education, much like the profound change that took place in the decade after World War II. Engineering education must evolve to better prepare graduates to serve as the technical leaders in all aspects of tomorrow's rapidly changing world. A new emphasis on teamwork, and a new awareness of economic, social, and environmental concerns will mark the leaders of the 21st century.

In this call for curriculum restructure ABET too is called upon to develop a major accreditation reform to support and encourage these curriculum changes. To guide these efforts, ABET established the **Accreditation Process Review Committee (APRC)** composed of educational and industrial leaders as well as members of the ABET Board and its Engineering Accreditation Commission (EAC).

The APRC identified three major barriers to change in the accreditation process: excessively long and detailed accreditation criteria, a complicated and user-unfriendly accreditation process, and a difficulty in attracting technically-active mid career professionals from the broad spectrum of the profession to serve as leaders in accreditation.

ABET, with support from the **National Science Foundation** and industries represented in the **ABET Industry Advisory Council** structured three consensus-building workshops, one for each area identified by the APRC. The Criteria, Participation, and Process Workshops involved all the major stakeholders in the ABET accreditation process. Participants from major industries, a broad spectrum of educational institutions, the professional societies that comprise ABET, the State Professional Registration Boards, the ABET Engineering Accreditation Commission and the ABET Board were invited to take part in this effort to develop an accreditation model for the future. We offer our thanks to the NSF, the ABET Industry Advisory Council, Belcan Engineering, E. I. DuPont de Nemours & Company, Exxon Co., Lutron, and Stone & Webster, to the members of the APRC and to the individual workshop chairs.

Unsurprisingly, participants in each workshop found solutions that cut across the workshop boundaries and impacted one or both of the other workshop areas. A Synthesis Workshop will bring us back together to consider some of these combinations of solutions.

The ideas and approaches generated in these workshops are the beginning of a new process for accreditation. ABET, its commissions, and its Board together with the professional societies, engineering educational institutions, and engineering employers are working in partnership to develop and actualize this **Vision For Change**.

George D. Peterson  
ABET Executive Director

John W. Prados  
APRC Chair

# THE CRITERIA REFORM WORKSHOP

## A NEW PARADIGM FOR ENGINEERING EDUCATION AND ACCREDITATION

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*"The current accreditation criteria are too long and by their very nature encourage a rigid, bean-counting approach that stifles innovation."*

*"The criteria should avoid rigid standards as a basis for accreditation in order to prevent standardization or ossification of engineering education and to encourage well planned experimentation."*

*"A revised accreditation criteria should maintain a strong focus on quality, and professional preparation, while offering flexibility for major innovations in curricular design and delivery methods, and be applicable to a diverse spectrum of institutional missions and goals."*

May 21-22, 1994, New York, NY.....

**C**riteria Reform Workshop participants representing a cross section of the stakeholders in engineering accreditation examined both the general and program criteria. They agreed that the existing criteria are too lengthy, unnecessarily prescriptive and cumbersome, and despite the stated objectives of promoting innovation, the criteria are believed to stifle attempts by institutions to develop innovative programs.

On that basis, over a period of two days, the participants analyzed fundamental questions such as what the minimum criteria should specify, what critical elements the new criteria should address, whether program criteria are necessary, and, if so, what limitations should be placed on program criteria.

The participants reached overall consensus on the desirability of new criteria that are more flexible and less restrictive, and agreed that the Engineering Accreditation Commission should

move towards some form of outcomes assessment.

### **R**ecommendations for action:

**E**ngineering accreditation should be based on ongoing institutional processes for defining educational objectives, evaluating achievement of objectives, and improvement of educational effectiveness, with periodic external audits of the process by ABET.

**C**riteria should specify a limited set of education objectives for any engineering program and a limited "floor" of curricular content. Complete objectives, curricula to achieve them, and processes to evaluate achievement would be defined by the institution.

**EAC** should provide advice to institutions attempting to define the needed measurements and outcomes.

**ABET** must properly train team chairs and evaluators to consistently evaluate program objectives.

**N**ew criteria must be constrained in specificity to no more than three years of an engineering program.

**P**rogram criteria could still be specified by the responsible professional societies but would be restricted to curricular issues (subject areas, but not credit hours) and, possibly, faculty qualifications.

**C**riteria should include a core, consisting of a knowledge base and an experience base. This core should uniformly define what it takes to become an engineer and what constitutes the minimum content of an engineering curriculum. It should also ensure a broad education that emphasizes the basics, encourages lifelong learning, and inculcates desirable experiences and capabilities.

# THE PARTICIPATION WORKSHOP

## *THE RIGHT PEOPLE DOING THE RIGHT JOBS*

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*"It is difficult to attract technically-active, mid-career professionals from industry or education to participate as leaders in accreditation. Participation requires excessive time demands, resulting from the nature and complexity of the accreditation process. There is a lack of recognition for accreditation work in the structure of many major industrial employers and research universities. Lengthy service on professional society committees is usually required before one is invited to serve in an accreditation leadership role. This in turn limits the diversity of the evaluator and team chair pools."*

*June 11-12, 1994 New Orleans, LA ....*

**P**articipants were charged with developing recommendations to achieve increased participation in ABET service by technically active, mid career professionals from industry, government, and the broad spectrum of educational institutions, including those from research universities. Central to this charge is the need to increase participation by women and underrepresented minorities. These participants, representing industries of varying size, government, the professional societies and a variety of institutions, concurred that the critical actions to reform the accreditation process will take place at the interfaces between the major stakeholder groups; ABET and the academic institutions; the societies and the engineering employers, industry and government. Cooperation is needed to get the "right people doing the right jobs."

## **R**ecommendations for action:

**ABET** should take the lead role in working with the professional societies to recruit, select, train and evaluate outstanding professionals from the engineering schools, industry, and government as accreditation visitors and team chairs.

**ABET** should develop materials to support industry, professional society, and university efforts to explain the value of accreditation.

**ABET** should provide guidelines to professional societies regarding diversity, representation, quality and leadership of evaluators.

**ABET** should undertake a major effort to convince the leadership of academic institutions and engineering employers to encourage and reward ABET service by the kind of people they would want to evaluate their own organizations.

**Industry** and academic leaders should work to modify the reward systems to credit ABET participation. Examples include release time, promotion credit, and continuing education credit.

**ABET** should invite deans/department heads to identify appropriate evaluator candidates.

**Universities** must recognize that if they want good evaluations, they must encourage ABET participation by the kinds of faculty members they would want to visit their schools. Deans and department heads must make their best people aware of the importance of this work as a contribution to the institution, to their own professional growth, and to the profession.

# ACCREDITATION PROCESS REFORM WORKSHOP

## *A CONTINUOUS QUALITY IMPROVEMENT PROCESS*

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*“Develop a simple non-adversarial accreditation process grounded in the philosophy of continuous quality improvement, that is efficient and productive for all volunteers, and for institutions seeking accreditation.”*

*August 13-14, 1994, Atlanta, GA .....*

The workshop brought together 58 invited participants from the EAC, the ABET Board, a majority of the professional engineering societies, and a variety of academic institutions and industrial firms.

They examined the engineering accreditation processes and explored a wide range of process modifications. They sought to develop a process that would be appropriate for quality individuals making subjective assessments in concurrence with an institution's own goals and assessments efforts. The participants were encouraged to explore radical changes.

There was a general consensus that the accreditation process be constructive for the institution and educational for all participants.

## Recommendations for action:

ABET should continue to use a single term of accreditation for all programs, with interim reports or focused visits as needed to assess any problem areas identified in the general review. Ongoing liaison between the institution and a designated EAC member (normally the team chair) would continue throughout the term of accreditation.

The team chair for a general review would be appointed 18 months before the visit to allow consultation with the institution regarding the most useful format for the self-study and the composition of the visiting team.

Institutional Self Study Volumes I and II should be downsized as much as possible as the criteria and process are changed.

Team chair should be empowered to work with the dean to customize the documentation requirements in keeping with the institution's circumstances and needs.

Under certain circumstances an interim visit could be conducted solely by the team chair.

Before departure, the team would leave a written report of findings with the institution and state its tentative recommendations, subject to revision as problem areas are corrected. ABET would provide a process to resolve disagreements between the institution and the team.



## VISION FOR CHANGE

### *PROGRESS*

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Since the conclusion of the three ABET/NSF Industry Workshops, ABET has moved forward to implement some of the recommendations. ABET, its commissions, Board, and committees continue to analyze the Workshop recommendations and develop plans for full integration of those recommendations within the ABET process. Since many of the recommendations and actions cut across the boundaries of criteria, process, and participation, full adoption is tempered by the need to better integrate the results and achieve synthesis across the stakeholder groups. Critical actions to reform the accreditation process will take place at the interfaces between the major stakeholder groups. A Synthesis Workshop, the logical follow-up to these Workshops, is planned to provide an opportunity for ABET to meet once again with representatives from the professional societies, industry, and government.

Recommendations relating to the accreditation process, enhanced participation, improved education and dissemination are already in effect; other recommendations, such as the simplified criteria, will progress through the normal process of comment, review, and Board approval.

### **P**rogress:

The ABET Engineering Accreditation Commission (EAC) has implemented the Focused Interim Visit, in which only those areas of deficiency are revisited and the institution no longer needs to complete the full Self Study documentation for such visits.

The EAC visiting team leaves a summary of deficiencies with the institution, and provides a timely window of opportunity in which the institution may correct those deficiencies.

EAC has appointed an ad hoc committee to implement the Reduction of Institutional Self Study Volumes I and II.

The EAC Criteria Committee has developed proposed simplified accreditation criteria.

The EAC Policy and Procedures Committee, together with the Workshops Chairs, has developed a proposed implementation plan for the simplified accreditation criteria. Implementation would take place over a period of time designed to lessen abrupt changes for the institutions.

The EAC has begun a process whereby the Past EAC Chair and the EAC Director can provide advice to institutions planning program changes.

ABET has established the Educational Services and Information Department. This department will take a proactive position in the training of evaluators and team chairs, as well as provide a liaison point between ABET and its constituencies.

## **THE ABET/NSF/INDUSTRY WORKSHOPS**

### **A VISION FOR CHANGE**

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**ABET** established the Accreditation Process Review Committee to guide ABET's efforts in the restructuring of its accreditation process. The ABET Industry Advisory Council, a standing committee of the ABET Board of Directors, has a charge which includes providing ABET leadership with access to industrial view points on issues of accreditation...and reactions to proposed ABET programs and policies as they relate to industry and government. These committees working in parallel reached many of the same conclusions. Both committees provided valuable input.

#### **ABET ACCREDITATION PROCESS REVIEW COMMITTEE**

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