



Lessons Learned from the Implementation of Board Certification in the Medical Profession

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Background

For over two decades, the American Society of Civil Engineers (ASCE) pursued its “Raise the Bar (RTB)” initiative, for the purpose of better preparing civil engineers to attain the Civil Engineering Body of Knowledge and enter professional practice. The ultimate goal of this initiative was to change state licensure laws, such that a master’s degree or equivalent (augmented by appropriate work experience) would become the academic prerequisite for licensure as a professional engineer in the U.S. In support of this goal, ASCE and NCEES partnered to promote RTB-compliant professional licensing legislation in several states. Despite these efforts, no U.S. licensing jurisdiction adopted such legislation, largely due to opposition from other engineering professional societies [1].

Acknowledging this lack of progress, the ASCE Board of Direction formally initiated a major change in the direction of the RTB initiative in March 2018 [2]. Specifically, the Board—

- Directed that the ASCE Raise the Bar Committee cease new legislative efforts to require a master’s degree for PE licensure.
- Authorized the creation of a task committee to examine the feasibility of using *credentialing* as a means of advancing the RTB initiative.

It is important to note that *the Board did not change its underlying commitment to the Raise the Bar initiative* in March 2018. Rather, the Board reconfirmed its twenty-year commitment to properly preparing civil engineers to meet the ever-increasing challenges of professional practice by formally approving the following problem statement [2]:

ASCE has determined there is a gap between the Civil Engineering Body of Knowledge and the current educational and experiential requirements for professional licensure in civil engineering. Additional education and relevant experience are required for the future civil engineer. Otherwise, civil engineering is at risk of losing relevance and its place as a learned profession.

The Board’s new approach, subsequently rebranded as the “Engineer Tomorrow” initiative, was to explore the use of Society-administered credentialing, rather than just licensure, as its principal mechanism for raising the bar. The Board assigned responsibility for the “Engineer Tomorrow” initiative to the Raise the Bar Committee—subsequently renamed the Committee on Preparing the Future Civil Engineer (CPFCE)—and its Task Committee on Credentialing to Raise the Bar—subsequently renamed the Task Committee on Credentialing (TCC). The TCC was charged to “Develop a plan identifying how ASCE can best utilize an internal credentialing program to validate fulfillment of the Civil Engineering Body of Knowledge (CEBOK), including a timeline for implementation, an estimated budget, and a marketing plan to promote a credentialing program(s) to members and owners [3][6].”

The TCC began its work in July 2018. Also starting in July 2018 but working independently of the TCC, the authors of this paper supported the TCC’s work by (1) analyzing the credentialing system used in the medical profession and (2) using this model as the basis for a proposed civil engineering credentialing system. A draft of the authors’ paper was provided to the leaders of the CEPCE and the TCC in January 2019, and the paper was published in June 2019 [4].

In its interim report [5], presented to the ASCE Board in July 2019 [6], the TCC proposed a framework modeled on the U.S medical profession. Consistent with the medical model, the TCC’s interim report calls for a comprehensive ASCE-administered credentialing system superimposed upon the existing U.S. licensure system as a mechanism for validating fulfillment of the CEBOK. This framework is thoroughly explained in the TCC’s interim report and the authors’ supportive paper. Figures 1 and 2, extracted from the TCC’s interim report, show the close parallels between the medical profession’s model and the TCC’s proposed model.*

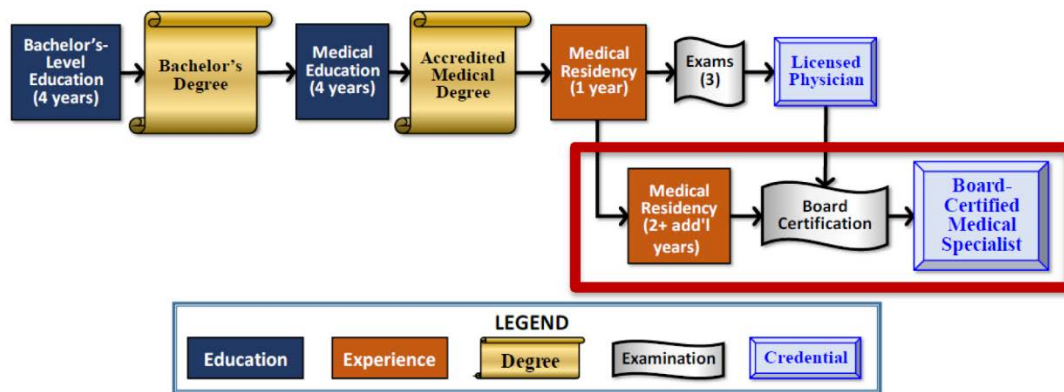


Figure 1. Path to medical licensure and board certification in the U.S.

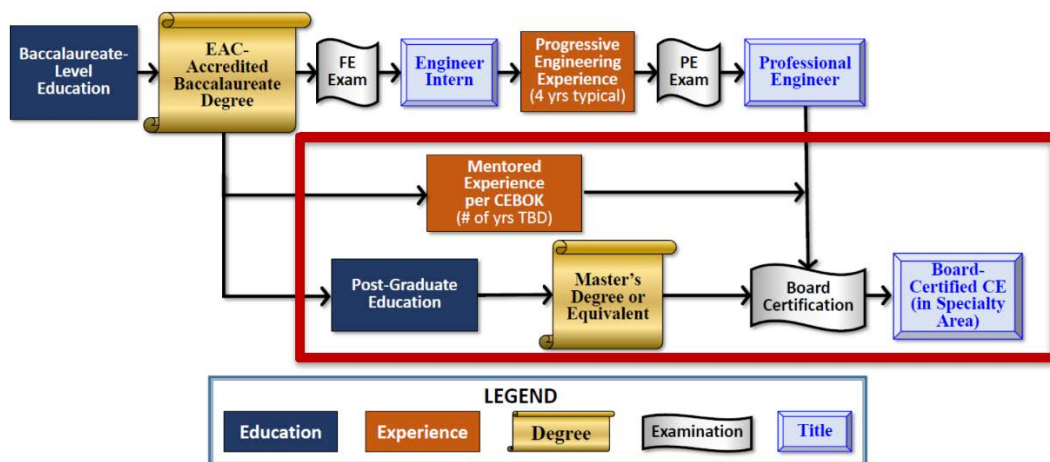


Figure 2. Proposed civil engineering board certification process in the U.S.

* Figures 1 and 2 are based on a *critical path method (CPM) paradigm*, with parallel branches representing concurrent activities—as opposed to a *flowchart paradigm*, in which parallel branches represent alternative pathways.

At their July 2019 meeting, the Board responded favorably to the TCC's proposal and directed them to develop an implementation plan for the new credentialing system [6]. To emphasize the critical importance of attaining the CEBOK for the practice of civil engineering at the professional level, the Board approved a substantial revision to ASCE Policy Statement 465 (PS465) at their October 2019 meeting [7]. Key policy statements in the revised PS465 [8] that are especially relevant to the TCC's new credentialing system include --

- “The American Society of Civil Engineers (ASCE) supports the attainment of the Civil Engineering Body of Knowledge (CEBOK) as a requirement for exercising responsible charge in the practice of civil engineering.”
- “Licensure constitutes a legal authority to practice engineering, however, the requirements for licensure do not ensure attainment of the CEBOK.”
- “To promote attainment of the CEBOK, ASCE supports . . . implementing board certification to validate attainment of the CEBOK, including technical depth in a civil engineering specialty.”

PS465 concludes with a strong and concise summary of ASCE's rationale for action:

ASCE, the acknowledged leader of the civil engineering profession, has a responsibility to establish the standards of the civil engineering profession and to fulfill its mission to protect the public health, safety, and welfare. This responsibility includes the establishment of: (1) a CEBOK to describe the knowledge, skills and attitudes necessary for responsible charge in the practice of civil engineering; and (2) a credentialing system to recognize individuals who meet this standard.

Purpose

In this paper, we expand upon our earlier analysis by examining more closely the implementation of specialty certification by the medical profession. Specifically, the purposes of this paper are (1) to analyze why and how the medical profession's system of board certification was developed and implemented and (2) to offer recommendations to the civil engineering profession based on our analysis.

Scope

After presenting a brief history of the evolution of the medical profession's model for licensing and specialty certification, we provide evidence of the success of the medical profession's model and identify the reasons for the successful implementation of their system. We also review the current issues facing the medical profession with their medical credentialing system. Based on this analysis, we offer our conclusions and recommendations to the civil engineering profession as it considers implementing the certification of specialty areas within the civil engineering profession.

Disclaimer

Although two of the authors of this paper are corresponding members of the ASCE Committee on Preparing the Future Civil Engineer (CPFCE), we have developed this paper independently, for the purpose of contributing to the future deliberations of the CPFCE and its TCC. Thus, this paper reflects only the authors' personal perspectives and should not be regarded as an official product of either the CPFCE or its TCC.

Brief History of Credentialing in the Medical Profession

In considering the use of board certification as a tool for advancing the civil engineering profession, we begin with a brief examination of why and how credentialing was developed and implemented by the medical profession.* It is important to understand that the medical credentialing system in the U.S. is composed of two major components—*medical licensure*, administered by state licensing boards, and *medical specialty certification*, administered directly by the profession.

Medical Licensure

The United States uses a state-based system for medical licensure. The 10th Amendment of the United States Constitution authorizes the states to establish laws and regulations protecting the health, safety and general welfare of their citizens. Thus, it is the responsibility of the individual states to regulate the practice of medicine. Rather than being an inherent right of an individual, the ability to practice medicine in the United States is considered a privilege granted by a state government [9].

Attempts to license medical practitioners date to the colonial era. These early laws were haphazard and often unenforced. Most of the laws regulating the practice of medicine disappeared by the 1830s before re-emerging after the Civil War (1861-65) as the basis for modern medical regulation. One milestone in this development was the establishment of state medical boards. The North Carolina Medical Board, established in 1859, is the oldest continuously operating board in the United States. An important development among the early licensing boards was the creation of the Illinois Board of Health in 1876. It established the template for the modern state medical board. This included setting minimum qualifications for the practice of medicine, issuing a medical license to physicians and revoking or rescinding a physician's medical license. Medical licensing laws spread throughout the United States in the last quarter of the 19th century. As a result, the 50 states, the District of Columbia and the U.S. territories have enacted laws and regulations that govern the practice of medicine by licensed physicians within their borders. The goal is to protect the public from unprofessional, improper and incompetent actions. *All physicians who practice medicine in the U.S. are licensed* [10].

* For the purpose of this analysis, the term "medical profession" refers only to the body of individuals who work as Doctors of Medicine. It does not refer to other health care professionals, such as Registered Nurses, Nurse Practitioners, and Physician's Assistants.

All state medical boards issue licenses for the general practice of medicine. That is, *state licenses are undifferentiated, meaning physicians in the United States are not licensed based upon their specialty or practice focus*, and certification in a medical specialty is not absolutely required in order to obtain a license to practice medicine [9]. Thus, being licensed does not indicate whether a doctor is qualified to practice in a particular medical specialty.

Today, to become a *licensed physician*, a candidate must [11]:

- (1) complete bachelor's-level premedical education at a college or university (typically 4 years);
- (2) earn a medical degree from an accredited medical school (typically 4 years);
- (3) complete one year of medical residency experience; and
- (4) pass the three-part U.S. Medical Licensing Examination to obtain an unrestricted license to practice medicine from a state.

This medical licensure system is depicted graphically in Figure 3 below [4]. The medical specialty certification system builds upon this licensure system.

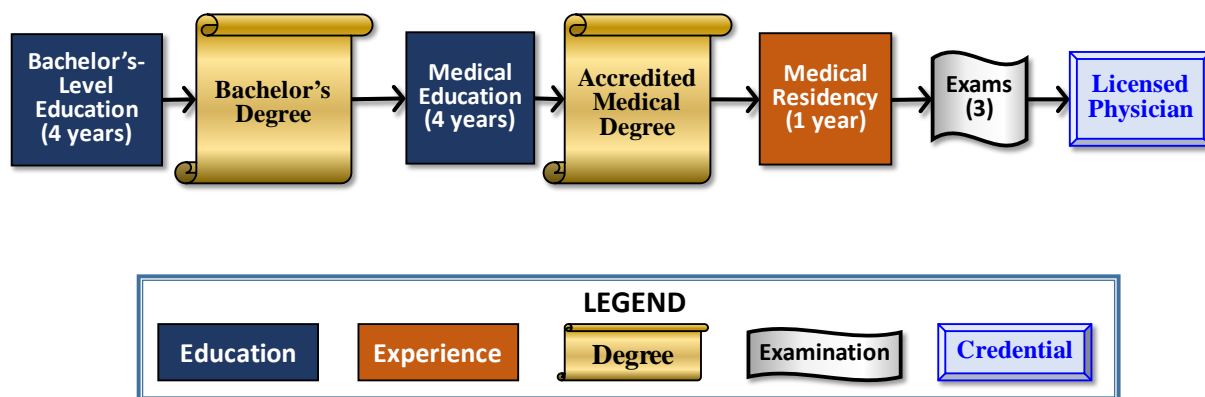


Figure 3. Credentialing process for a licensed physician in the U.S.

Medical Specialty Certification

The concept of a specialty board was first proposed in 1908 by Derrick T. Vail, MD, in his presidential address to the American Academy of Ophthalmology and Otolaryngology [23]. The period immediately after World War I saw more and more doctors calling themselves specialists. One response to this unregulated phenomenon was the establishment of the medical residency system as the recognized pathway to specialization [12].

As doctors began to narrow the focus of their care to specific areas of clinical medicine, they developed “professional societies” to support their work. These professional societies encouraged the development of “boards” to define specialty qualifications and to issue credentials that would assure colleagues and the public of the specialists’ qualifications. The first specialty board, the American Board for Ophthalmic Examinations, was chartered in 1917 [13]. Since that time there has been a steady proliferation of specialties and specialty boards.

The intent of these boards was summed up by the American Medical Association of Dermatology in 1933 [14]:

[T]he Board will undoubtedly gain quickly the recognition of the profession . . . One of the things that is not needed in medicine is more confusion in medical education, such as would be caused by the states undertaking to set up standards for specialists. Volunteer certifying boards like the Board of Dermatology seem to be the proper solution of certification of specialists.

Advocates for such boards saw them as beneficial in numerous ways beyond merely issuing certificates of qualification [15]:

- Elevation of standards of clinical practice in specialty niches.
- Education of the public and other professionals about the growing capabilities of specialists.
- Protection of the public from unqualified practitioners.
- Establishment of requirements for education and training in specialty medicine.
- Development of educational resources for the preparation of specialists.
- Oversight of the examination processes tied to the granting of specialty certification.

From a historical perspective, it is noteworthy that *the primary impetus for advancing specialty certification came from the medical profession itself* (and its medical professionals), as opposed to an external governmental or non-governmental organization or the public. This is clear from reading the history of the very first specialty board [16]:

*By 1916, the dangers posed to the public by rogue specialists had led several state medical boards to consider the development of specialty medical licenses. However, the complexities related to such a proposal contributed to the state medical boards' decisions to focus their efforts on the general medical license, which was the required legal credential for practicing medicine in the United States, and to decline the pursuit of specialty licensing. **In the absence of state regulatory action, the profession took action** [emphasis added]. Voluntary member organizations formed in many specialties, including ophthalmology, to offer education, community, and advocacy for physicians who focused their clinical work in that discipline. These organizations began discussions about standards for specialty-based training and for physicians who professed specialty expertise, as well as methods of determining whether such standards are met. Recognizing that consequential decisions about what was intended to be an important credential are best made by bodies distinct from these member organizations, the specialty societies placed these responsibilities in a separate organization: the specialty board.*

In the early decades of the twentieth century, attention focused on creating a certifying agency in every specialty of medicine and surgery. In 1933 representatives from the American Medical Association (AMA) and several other major medical societies formed the Advisory Board for

Medical Specialties [17]. Following its formation in 1933, the Advisory Board for Medical Specialties functioned as a federation of individual specialty boards. In 1970 the organization's name changed to the American Board of Medical Specialties (ABMS). The ABMS assesses the knowledge, skills, and judgment of physicians according to the standards of practice set by the profession and grants board certification to those meeting and remaining current with the requirements. It authoritatively defines the medical specialties and their subspecialties [11].

ABMS is currently comprised of 24 certifying boards that certify physicians in 40 different medical specialties and 87 medical subspecialties [11]. Examples of medical specialties include Anesthesiology, Dermatology, Internal Medicine, Radiology, and Urology. Some examples of subspecialties of Internal Medicine are Cardiology, Endocrinology, Hematology, Infectious Disease, and Rheumatology. To become a *board-certified medical specialist*, a candidate must become a licensed physician, as described above; complete a full-time experience in an accredited residency training program in a medical specialty (typically 2 additional years); and pass an exam created and administered by the certification board associated with the candidate's specialty [17]. After passing this exam, the individual is certified as a specialist and a diplomate of the specialty board.

The credentialing process for a board-certified medical specialist is shown in Figure 4 below [4].* A comparison of this diagram with Figure 3 illustrates how the specialty certification process is simply appended to the licensure process.

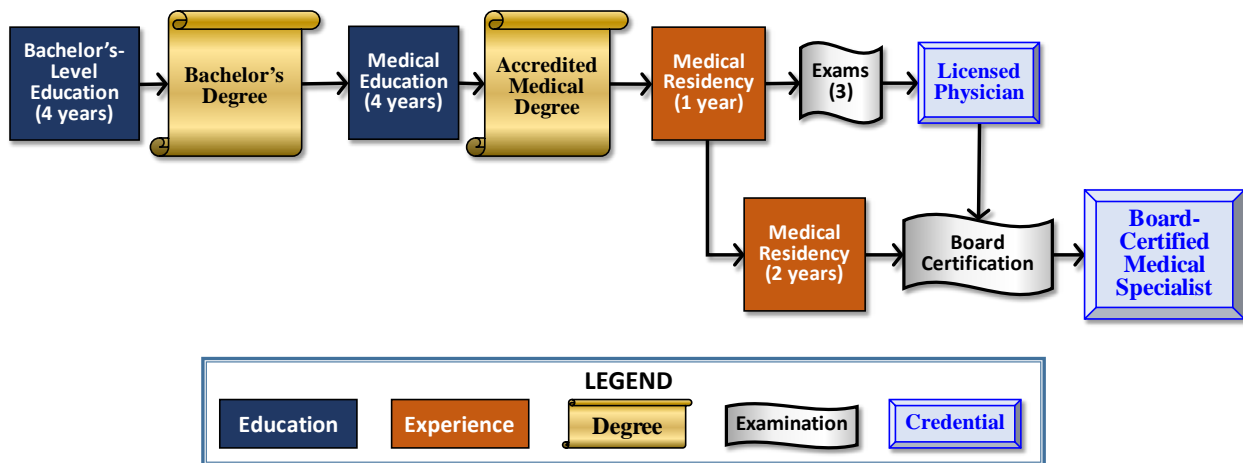


Figure 4. Credentialing process for a board-certified medical specialist in the U.S.

* Note that the diagram in Figure 4 is based on a *critical path method (CPM) paradigm*, with parallel branches representing concurrent activities—as opposed to a *flowchart paradigm*, in which parallel branches represent alternative pathways.

A candidate for certification in a *subspecialty* must attain certification in the associated medical specialty; complete a full-time experience in an accredited residency program in the medical subspecialty (typically 3 years); and successfully complete an assessment of knowledge and clinical judgment in the subspecialty discipline. As outlined above, the time required for preparation to practice medicine as a licensed physician is typically five years beyond the bachelor's degree, while the preparation time for a board-certified medical specialist is typically seven years beyond the bachelor's degree—or about ten years if a subspecialty is also pursued.

Indicators of Success

While it may be obvious to users of medical services that the medical credentialing system has been successful, objective indicators of its success can also be identified. Many of these will be discussed more thoroughly in a subsequent section of this paper.

Some indicators of success include the following:

- Approximately 82% of all licensed physicians in the U.S. are board-certified medical specialists [19].
- Many of the remaining 18% who are not board certified are in the process of completing their (1) required specialty training or (2) mandatory post-training waiting period [21].
- Approximately 92% of mid-career licensed physicians (40 to 49 years old) in the U.S. are board-certified medical specialists [19].
- The demand for specialty certification by licensed physicians continues to grow [18], [28].
- The importance of medical specialty certification is widely recognized by medical professionals [21]; the public [22], [23]; hospitals (the major employer of physicians) [24]; insurance companies [25],[26]; state governments [27]; and the U.S. military [29].
- The number of recognized medical specialty boards has kept growing since 1917—with the most recent approved in 1991 [18].
- The number of different subspecialty certifications continues to grow—with the most recent approved in 2018 [18].

Reasons for Successful Implementation

Based on our analysis, the six primary reasons for the successful implementation of the medical profession's credentialing system are as follows:

1. The primary driver for the implementation of specialty certification was the medical profession itself.
2. The focus of specialty certification is to validate the competency required for professional practice in a medical specialty area.
3. The specialty areas of the medical profession are clearly defined.
4. The medical specialty certification system started small and then grew steadily over time.

5. The medical profession accommodates medical generalists by allowing for certification in family practice, internal medicine, pediatrics, and geriatrics.
6. The specialty certification system requires continuing professional development and periodic recertification after initial board certification.

Primary Driver—the Medical Profession Itself

As noted above, the primary impetus for advancing specialty certification came *from the medical profession itself*, not from an external governmental or non-governmental organization or from the general public. The board certification movement emerged from the profession's concern for the quality of care and its need to ensure continuing competence in the medical specialties [23] [31]. State medical boards were unable to fulfill this need, because they were unwilling to take on the complexities related to administering specialty medical licensure. Thus, certification was conceived as a higher-level qualification, conferred not by a governmental entity, but by a professional society [30]. In this paradigm, the medical license represents fulfillment of the legal requirement for initial entry into practice, while certification represents attainment of the minimum professional competence required for practice in a specialty area [30].

In effect, the medical profession recognized that the standard for licensure as a physician was not sufficient to protect public health, safety, and welfare; therefore, the profession superimposed its board certification system upon the existing U.S. physician licensure system to fulfill this need. In short, medical licensure is necessary but not sufficient to protect public safety—a conclusion that is fully recognized by both the profession and the public. As noted above, 82% of all licensed physicians in the U.S. are board-certified medical specialists; and in a recent national Gallup poll, 98% of the respondents believed physicians should go through the process of board certification [31].

Another reason that the medical profession took the lead in developing specialty certification was the realization that certification provides a means for ensuring that practicing professionals keep up with technological advances [12] [32]. Throughout the 20th century, technological advances were instrumental in the emergence of new specialty and subspecialty areas. It stands to reason, then, that specialty and subspecialty certification standards would continue to evolve to address new technological advances and thus ensure that practicing professionals remain current.

In a broader sense, specialty certification has contributed to clearer definition of occupational specialties throughout the health care profession. As specialty boards have more fully defined the competencies required of board-certified medical specialists, the profession has been better able to define the assistance and expertise required of other health care professionals, such as Registered Nurses, Nurse Practitioners, Physician Assistants, and Surgical Assistants.

Competency

Another reason for the success of the medical profession's credentialing process is its focus on *competency*.^{*} As noted by Holden, "Board certification has no legal status, and yet is widely accepted by the medical profession as the recognizable index of *minimal professional competence* [emphasis added] to practice medicine in the specialty areas [33]."

The ABMS clearly distinguishes between licensure and certification, stating that "Certification by an ABMS Member Board is a distinct process from licensure; and serves the purpose of identifying for the public, state licensure agencies and employers, those individuals who successfully meet the *standards of practice* set by the profession for that specialty [11].

The ABMS defines licensure as a "mandatory credential granted by a state licensing board providing legal permission to practice medicine [11]." This definition clearly associates licensure with initial entry into medical practice. The ABMS further qualifies this in stating that licensure "indicates that a physician has met the requirements to ensure that public health, safety, and/or welfare are *reasonably* [emphasis added] protected [11]."

The ABMS defines board certification as a "voluntary credential granted by an ABMS Member Board confirming a physician's advanced knowledge, training, and skills in a specialty or subspecialty that specific clinical, professional, and ethical *standards are being met* [emphasis added] to provide patient care [11]." The concept of meeting standards equates to competency, and the "specific clinical, professional and ethical standards" are the recognized body of knowledge of a medical specialty area, as defined by the profession.

The standards for initial board certification are high and rigorously enforced. The ABMS specifies that, before physicians can become board certified, they must [34]:

- Finish four years of premedical education in a college or university;
- Earn a medical degree (MD, DO or other credential approved by an ABMS Member Board) from a qualified medical school;
- Complete three to five years of full-time experience in a residency training program accredited by the Accreditation Council for Graduate Medical Education (ACGME);
- Provide letters of attestation from their program director and/or faculty;
- Obtain an unrestricted medical license to practice medicine in the United States or Canada; and
- Pass a written and, in some cases, an oral examination created and administered by an ABMS Member Board.

^{*} We emphasize this point, because in the ongoing ASCE discussion of credentialing, some have argued that specialty certification must necessarily be focused on *mastery*, rather than *competency*.

Furthermore, member boards must integrate learning and assessment of the following six core competencies throughout the process for initial certification [35]:

- Practice-based Learning and Improvement
- Patient Care and Procedural Skills
- Systems-based Practice
- Medical Knowledge
- Interpersonal and Communication Skills
- Professionalism

Clearly Defined

Another critical factor in the success of the medical profession's credentialing system is the clear delineation of the specialty and subspecialty areas. This delineation provides distinct, mutually agreeable boundaries for the professional domains of medical specialists. Indeed, a primary reason for the development of board certification and the specialty boards "was to identify the boundaries and the content areas that defined specific specialties [13]."

The ABMS Guide to Medical Specialties [11] provides the name and descriptions of (1) each of its 24 member boards, (2) the specialty certifications for each of these member boards, and (3) the subspecialty certifications associated with each specialty. In addition, the ABMS Board Certification Report [18] provides the eligibility requirements for initial certification in each specialty and the requirements for maintaining these certifications.

Each specialty board has public documents that detail the exact relationship between their specialties and subspecialties. For example, the American Board of Internal Medicine's "Policies and Procedures for Certification" [54] explains the precise relationship between an internist (3 years of an internal medicine residency after 4 years of medical school), a cardiologist (an additional 3 years of residency after an internal medicine residency), and the electrophysiologist (an additional 2 years of residency after a cardiology residency). Even this complex relationship is defined very clearly, precisely, and uniquely by the medical profession.

In addition to the ABMS, the Accreditation Council for Graduate Medical Education (ACGME) is a key organization for identifying the content and the boundaries that define the medical specialties and subspecialties. ACGME is the body responsible for accrediting all specialty and subspecialty programs for physicians in the United States. The ACGME was founded in 1981 as a federation of several key medical organizations to include ABMS, American Medical Association (AMA), Association of American Medical Colleges (AAMC), American Osteopathic Association (AOA), American Association of Colleges of Osteopathic Medicine (AACOM), and the Council of Medical Specialty Societies (CMSS)— each of which appoints members to the ACGME's board of directors. Accreditation is achieved through a peer-review process overseen by volunteer physicians on 30 review committees [55].

To accomplish its annual reviews of residency programs, the ACGME publishes institutional requirements [56], common program requirements [57], and specialty and subspecialty program requirements for all medical residency programs. These documents serve as the basis for establishing and updating the curricula of residency programs—and for writing the examinations used to evaluate physicians seeking a specific specialty and subspecialty certification. For examples of the ACGME’s detailed program-specific requirements’ documents, see [58], [59], [60], and [61].

We conclude that the medical profession has clearly defined the medical specialty areas and explicitly delineated the boundaries between them. And by institutionalizing these specialties through the ABMS and the ACGME, the specialties have been widely accepted and implemented by the medical profession.

Steady Growth

One might think that the formal definition and institutionalization of specialty areas might lead to stagnation and resistance to change within the professional domain. But, in fact, the establishment and long-term development of specialty and subspecialty areas has been highly dynamic and responsive to the ever-growing body of professional medical knowledge—as demonstrated by the historical development of both specialty boards and the specialty areas they govern.

The board certification process started with a small number of specialty areas and grew at a fairly steady rate from the incorporation of the first specialty board, the American Board for Ophthalmic Examinations, in 1917 to the incorporation of the most recent and twenty-fourth board, the American Board of Medical Genetics and Genomics, in 1980. The American Board of Medical Specialties was formed in 1933. As new specialty boards are incorporated, they must apply to become member boards of the ABMS; and the time period between board incorporation and acceptance by the ABMS can often extend to several years. The most recent addition was the American Board of Medical Genetics and Genomics which became an ABMS member board in 1991. Figure 5 shows the growth of the member boards from 1910 to the present.

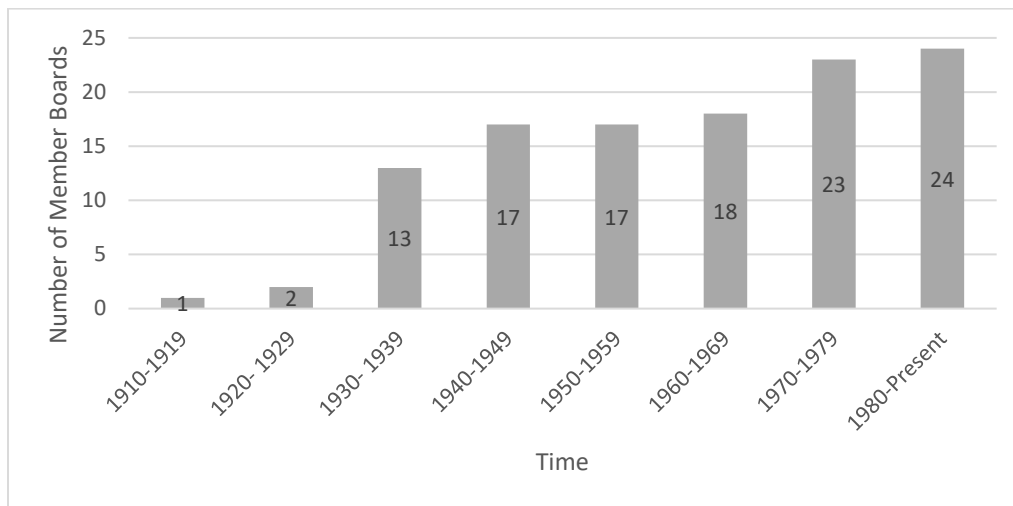


Figure 5. Growth of Member Boards in the ABMS (based on date of incorporation) [18]

Although no new boards have been incorporated since 1980, the medical profession has continued to evolve, and this growth is reflected by the continuing growth in the medical specialties and subspecialties. As noted above, there are 40 medical specialty areas and 87 subspecialties.

The most recently established specialty area is Laboratory Genetics in Genomics—one of three specialties currently certified by the American Board of Medical Genetics and Genomics. Established in 2019, this specialty area resulted from the merger of two previous specialties— (1) Clinical Cytogenetics and Genomics and (2) Clinical Molecular Genetics and Genomics. This merger demonstrates the flexibility and adaptability of the medical profession’s system for delineating and developing specialty areas over time. Figure 6 depicts the cumulative growth of medical specialty certification.

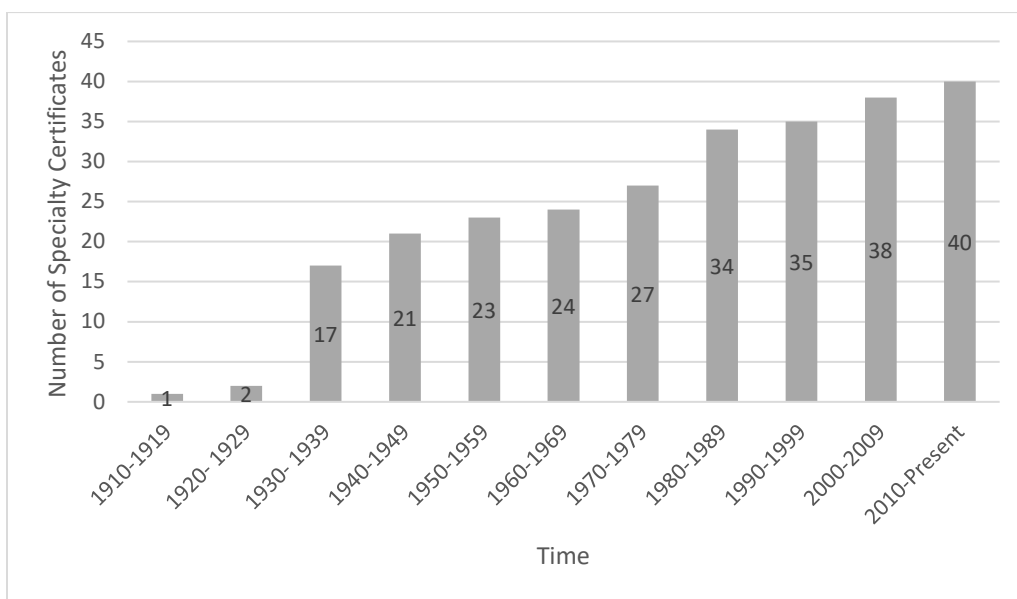


Figure 6. Cumulative growth of Specialty Certification within the American Board of Medical Specialties (based on date first issued) [18]

The dynamic and flexible nature of the board certification model and process is also illustrated by the medical profession’s use of subspecialty certificates, which were formally recognized in 1972. Subspecialties are defined as components of a specialty. Subspecialty certificates may only be granted to specialists who have been certified by one or more boards in an area of specialty certification [18]. The ABMS Guide to Medical Specialties from 2019 [11] lists 87 subspecialties with the most recent additions of Micrographic Dermatologic Surgery (2019) and Complex Family Planning (2019).

Although subspecialties were formally recognized by the ABMS in 1972, medical specialties began issuing subspecialty certificates in 1941, when the ABIM created the subspecialties for cardiovascular disease, gastroenterology, and pulmonary disease [18].

To show the growth of medical subspecialty certification, the dates in Figure 7 are based on the year the subspecialty was approved by the ABMS or the year it was first issued if it was issued before 1972, when subspecialty certification was first recognized by the ABMS. Furthermore, although there are 87 subspecialties, many specialties offer some of the same subspecialties. For

example, the subspecialty, Sleep Medicine, appears within six specialties, namely, Anesthesiology, Family Medicine, Internal Medicine, Otolaryngology-Head and Neck Surgery, Pediatrics, and Psychiatry and Neurology, and were incorporated into the specialties at different times. In this sense, the definition of subspecialties provides a highly effective mechanism for managing the inevitable overlaps between the professional domains of the various specialty areas. Figure 7 depicts the cumulative growth of the subspecialties, as offered by the member boards and associated specialties.

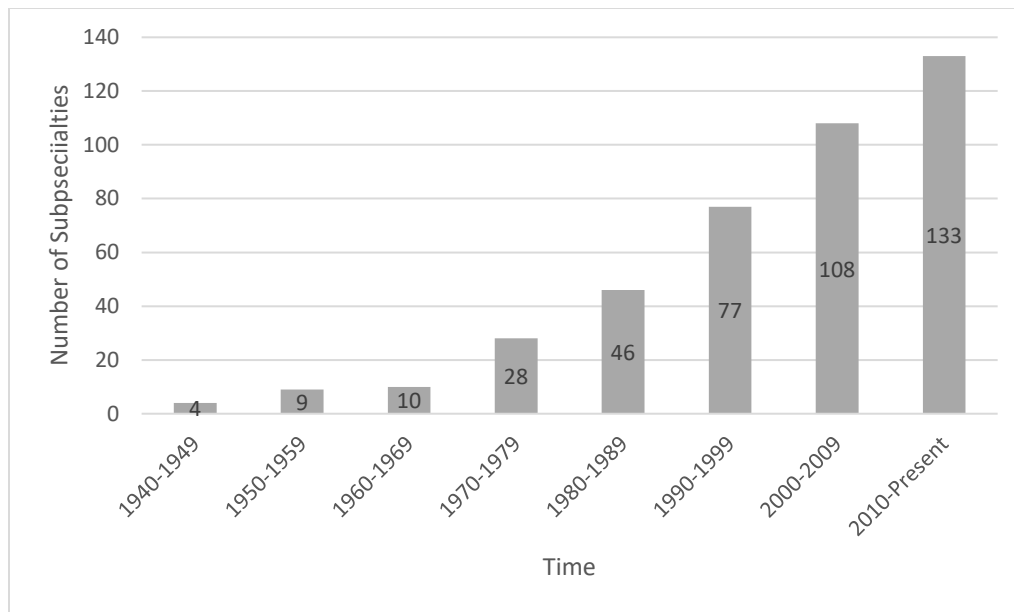


Figure 7. Cumulative growth of Subspecialty Certification within the American Board of Medical Specialties (based on date approved or first issued if before 1972) [18]

The ABMS Board Certification Report [18] contains complete details on the incorporation of boards, first issuances of certificates for specialties and subspecialties, and changes throughout the history of the board certification process. This history clearly demonstrates how the flexibility and adaptability of the medical profession's system for delineating specialty and subspecialty areas has contributed to the long-term success of medical board certification.

Medical Generalists

For the first part of the twentieth century, most medical care was accomplished by medical generalists, commonly called general practitioners (GPs). As of 1940, 76% of all physicians in the U.S. were general practitioners [36]. The general practitioners performed surgery, delivered babies, and treated most medical conditions. Their patients included all family members from infants to the elderly. While general practitioners were licensed physicians, they were not generally certified by any specialty board. Their medical training typically consisted of four years of medical school and one year of a rotating internship in a hospital [10].

As previously discussed, the second part of the twentieth century brought profound changes in medical education and practice, i.e., a major shift from general practice to specialty practice. One-year rotating internships gradually disappeared, replaced by multi-year residencies in the

specialties. What became of the many GPs who provided most of the nation’s earlier patient care? In short, the medical profession integrated the GPs into the medical board certification system. The rationale for the certification of medical generalists was the same as for the other medical specialists: the GPs needed to acquire and maintain an ever-increasing body of medical knowledge and skills required for professional practice.

The medical generalists of today, often called Primary Care Physicians (PCPs), are certified by three different specialty boards [18]:

- General internists by the American Board of Internal Medicine (ABIM) since 1937.
- General pediatricians by the American Board of Pediatrics (ABP) since 1934
- Family practitioners by the American Board of Family Medicine (ABFM) since 1970.
- Geriatric physicians by the ABIM or the ABFM, both since 1988.

These specialties require a minimum of three years of residency training after the candidate earns a medical degree from an accredited medical school [18]. Each of these specialties has a specific patient focus: adults (internists), children (pediatricians), families (family physicians), and the elderly (geriatricians). In addition to these board-certified PCPs, there are still a small percentage of PCPs who are general practitioners, i.e., practicing with a state license but without a board certification. Table 1 shows the distribution of PCPs in each category, as of 2010 [37].

Table 1. Practicing Primary Care Physicians in the U.S., 2010.

Specialty	Practicing Primary Care Physicians
Family Practice	79,831
Geriatrics	2,999
General Practice (not board certified)	9,557
General Internal Medicine	71,487
General Pediatrics	44,933
TOTAL	208,807

We conclude that, in a relatively short period of time, medical generalists have been successfully incorporated into the medical specialty certification system, and that this change has been supported by the medical profession [38]. Incorporation of medical generalists has contributed to the success of the medical specialty certification system by raising the standard of care in pediatrics, family practice, geriatrics, and internal medicine.

Continuing Professional Development and Recertification

Over time, to address concerns surrounding relevancy in practice and continuing technological advances, ABMS member boards have considered time-limited certification and the requirement to recertify at specified intervals. The ABFM required recertification every seven years from its outset in 1972; the American Board of Surgery changed its standards to require recertification in

1976; and the ABIM began time-limited certification in 1990 [13]. By 2002, all of the ABMS boards had agreed on the requirement for recertification [13].

However, this recertification requirement has become increasingly controversial, and the medical profession is now grappling with the distinction between recertification and continued professional development (CPD). This issue is further complicated by the development of a relatively new concept called *maintenance of certification* (MOC)— a system the combines continuous professional development and periodic recertification. The controversy surrounding recertification and MOC is discussed more thoroughly in the next section of this paper.

Current Issues Related to the Medical Profession’s Credentialing Process

Based on our analysis, there are five significant current issues related to the medical profession’s credentialing process:

1. The cost of initial certification for the individual physician is high.
2. Recertification requirements and processes have changed over time and are inconsistent.
3. The cost of recertification is high.
4. There are exceptions to board certification for hospital privileging.
5. Ongoing legal actions are undermining some aspects of the credentialing process.

Initial Cost of Certification

Becoming a board-certified medical professional requires an extensive investment, in terms of both cost and time. There are costs associated with schooling, residency, licensing, and certification.

In addition to the required schooling, the total cost of the United States Medical Licensing Exam (USMLE) is \$3,485 as outlined in Table 2 below [39][40].

Table 2. Cost of the USMLE

Exam	Cost
Step 1	\$645
Step 2, Clinical Knowledge	\$645
Step 2, Clinical Skills	\$1,300
Step 3	\$895
TOTAL	\$3,485

Certification costs vary by specialty and subspecialty. All specialties require an application fee and computer-based testing (CBT) fee, and many require an oral examination fee. Table 3 below contains costs for initial certification in several specialties governed by the American Board of Physician Specialties [41].

Table 3. Cost of Initial Certification

Specialty	Application Fee	CBT Exam Fee	Oral Exam Fee	Total Cost
Anesthesiology	\$750	\$1,400	\$1,600	\$3,750
Family Medicine	\$750	\$1,950	N/A	\$2,700
Internal Medicine	\$750	\$1,950	N/A	\$2,700

For primary certification in orthopedic surgery from the American Osteopathic Board of Orthopedic Surgery, the written exam fee is \$1,650, and the clinical exam fee is \$3,250, for a total of \$4,900.

Given these high costs of initial certification and the demand for board certified medical professionals, one might think that hospitals would cover or partially subsidize the cost of board certification. However, as Freed, et.al noted, “most hospitals do not offer surgeons (89%) or nonsurgical subspecialists (89%) economic incentives or rewards for board certification [31].” Thus, in most cases the cost of board certification falls on the individual medical professional.

In addition to the monetary costs, there is a significant time investment for medical specialists, including four years of medical school and three to five years in a residency training program accredited by the Accreditation Council for Graduate Medical Education (ACGME) [34].

Despite these costs, medical professionals continue to pursue specialty certification at steady rates, as shown in Table 4, largely because of the salary and professional benefits inherent in a career as a board-certified specialist, including privileges at hospitals.

Table 4. New Specialty and Subspecialty Certificates Issued [18], [43], [44], [45]

Year	New Specialty Certificates	New Subspecialty Certificates
2015	28,231	12,008
2016	28,549	13,049
2017	32,377	11,983
2018	30,408	13,800

Changing and Inconsistent Recertification Requirements

As can be expected with a wide range of medical specialties, recertification requirements vary—and this lack of standardization can cause confusion. Initially most boards offered lifetime board certification status, requiring no specific recertification [16], and relied on the state licensing requirements for any continuing education obligations. Seeing the need for a systematic, profession-driven system to ensure high-quality medical care over time, when the American Board of Family Medicine (ABFM) formed in 1970, it offered only time-limited certification and required recertification. By 1990 all boards had converted from permanent board certification to time-limited certification [17]. Initially, the programs were relatively simple, requiring primarily

a refresher exam. For example, the American Board of Internal Medicine deployed their Continuous Professional Development Program in 1996 [17].

Ten years later, in 2000, the 24 member boards of the ABMS approved a plan to move from recertification to maintenance of certification (MOC)—a more comprehensive process for assessing and improving physician performance and patient safety [31]. These additional requirements included various performance improvement projects and data reporting before a physician could even take the re-certification exam [17]. In 2014, the American Board of Internal Medicine doubled the requirements for maintenance of certification and stipulated that physicians who did not meet the requirements of the expanded program would be essentially stripped of their certification status [17].

Although all MOC programs measure the same six competencies required for initial certification, the specific activities used to measure these competencies [34] and the timeframes during which the activities must occur [18] vary considerably by specialty.

Cost of Recertification

The medical profession's decentralized approach to MOC presents significant challenges, most notably differences in the costs of MOC for different specialties. Although the recertification exam fees are reasonable—\$1,099 for all recertification exams administered by the American Board of Physician Specialties [46]—this does not include any other costs associated with continuing medical education or the time for completing the required activities. The ABIM has higher fees, including a \$132 annual program fee, a \$650 specialty exam fee, a \$1,200 exam fee for each subspecialty, a \$130 biennial knowledge check-in fee for the specialty, and a \$240 biennial knowledge check-in fee for each subspecialty.

One physician reported that it cost \$10,108.05 for his 2013 recertification in internal medicine by the ABIM. This cost included examination fees and travel to a conference, where he participated in a pre-conference MOC questions review [47]. He reported taking two weeks of vacation leave to study and prepare and at least 60 hours of data entry time recording his Lifelong Learning and Self-Assessment [47].

The most significant example of the substantial cost for MOC involved the ABIM, which as noted above, greatly expanded the MOC requirements for its over 250,000 board-certified medical professionals [48]. Based on these new standards, Sandhu, Dudley, and Kazi performed a cost analysis of the ABIM's MOC program and included the cost of a physician's time [48]. They concluded that the *average* cost per internist to satisfy the requirements of the MOC program over the next ten years will be \$23,607 [48].

Exceptions to Board Certification for Hospital Privileging

Another significant challenge for medical board certification is that hospitals are under no legal obligation to use certification as the basis for granting privileges to physicians. As result, hospital requirements for board-certified physicians vary widely [31]. Freed, Dunham, and Singer conducted an extensive survey on the "Use of Board Certification and Recertification in Hospital Privileging" and reported some significant concerns [31]:

- Only approximately 60% of hospitals required board certification at some point during a surgeon's, surgical specialist's and nonsurgical subspecialist's tenure.
- Only 5% required board certification at the point of initial privileging.
- Approximately 25% reported that their certification policy varied for recent graduates.
- More than 75% reported making exceptions to certification policies.
- Approximately 33% do not require surgeons and nonsurgical sub-specialists ever to be board certified to receive hospital privileges.
- Most hospitals that make exceptions to their board certification requirements relax their policies for physicians with a certain number of years of service to the institution.

As L.D. Britt asserts in his invited critique of the study concerning the use of board certification and recertification in hospital privileging, “the fact that any appreciable number of hospitals have chosen not to use board certification as a method for assessing physician competency is problematic” [31]. It is problematic for two distinct reasons. First, board certification is the standard established by the profession and it is a straight-forward, direct process for maintaining standards of competency for medical professionals. Second, as Britt also notes, this calls into question how these hospitals are assessing physician competence. A clear standard exists and yet it is not being applied universally.

Ongoing Legal Actions

The increased requirements and associated costs for recertification have had significant legal ramifications, including at least five class action lawsuits seeking an end to MOC based on various issues such as antitrust, conspiracy, monopoly, and restraint of trade [17], [51], [52].

The California class action lawsuit against the American Board of Orthopedic Surgery (ABOS) and the American Board of Medical Specialties (ABMS) alleges the abuse of a monopolistic hold over the board certification process to charge physicians exorbitant prices for recertification [52]. Three other federal class action lawsuits against the American Board of Internal Medicine (ABIM), the American Board of Radiology, and the American Board of Psychiatry and Neurology seek to end MOC [51]. One of the suits filed on behalf of approximately 100,000 internists claims that the American Board of Internal Medicine illegally ties its initial certification to MOC [51].

The controversy over increasing MOC requirements and costs, especially with the changes implemented in 2014, led to immediate adjustments by the boards, especially the American Board of Internal Medicine. These adjustments included counting conventional continuing medical education credits (which are often also used for license maintenance), imposing a cap on some program fees, changing how physicians undergoing maintenance of certification are reported on websites, and suspending some of the additional assessments [17]. Additional adjustments to MOC requirements are ongoing. However, despite the ongoing adjustments to MOC programs, the legal actions persist, and their impacts on the future of MOC are uncertain.

Conclusions and Recommendations for the Civil Engineering Profession

As ASCE moves forward with the implementation of a specialty certification system in conjunction with its Engineer Tomorrow initiative, the Society can glean the following conclusions from the experiences of the medical profession, as discussed above:

1. The overall structure of the medical credentialing system is fully applicable to the civil engineering profession. As in the medical profession, there is a gap between the standards for engineering licensure and full attainment of the professional body of knowledge. Thus, as in the medical profession, state-administered licensure can serve as the legal authority to practice engineering, while specialty certification administered by the profession can be used to validate CEBOK attainment—which includes competency in a specialty area.
2. Consistent with this overall structure, state medical licensing boards do not offer licensure in any medical specialty areas. However, in the engineering profession, *some* state boards do offer licensure in *some* civil engineering specialty areas—specifically structural and geotechnical engineering. This inconsistency between the medical and engineering licensure systems may constitute a significant challenge for ASCE’s implementation of a specialty certification system that augments engineering licensure consistently across all licensing jurisdictions.
3. The focus of medical specialty certification on validating *competency* is also fully applicable to civil engineering. The ASCE Board has directed that the purpose of the new civil engineering specialty certification system is to validate *attainment of the CEBOK*—a level that clearly corresponds to competency, rather than mastery.
4. The medical certification system is administered by an independent organization—the ABMS—“because credentialing organizations inevitably have to make tough decisions, including setting high standards, and thus need to be insulated from the politics of government or the advocacy of dues-funded membership organizations [53].” This justification for an independent credentialing body is fully applicable to civil engineering as well.
5. In many early discussions about implementing specialty certification in civil engineering, skeptics have repeatedly asked, “Where is the market demand for certification?” But the historical experience of the medical profession suggests that this question is misguided. The development and implementation of specialty certification in the medical profession was driven, not by market forces, but by the profession itself. The profession’s principal motivation was to improve its standard of care by ensuring that practitioners were fully competent to practice in their specialty areas. Market demand for specialty certification only emerged later, after the certification system was in place and its added value had become apparent to health care organizations and consumers of medical services.
6. In a sense, the medical profession implemented specialty certification as a means of clearly defining the medical specialty areas and delineating the boundaries between them.

The civil engineering profession would benefit from this same process of clarifying and delineating its specialties.

7. The medical specialty certification system started small—with the creation of just a few certification boards—and then grew steadily over time. As the system expanded, it had the flexibility to create new certification boards, to create new specialty and subspecialty areas, and to subdivide or merge existing areas. ASCE can take comfort in recognizing that its new certification system need not be implemented across all possible specialty areas on Day One; rather, it can start small and grow over time, provided that the organizational structure has the flexibility to accommodate dynamic growth.
8. The medical profession has benefited immensely from incorporating medical generalists into its specialty certification system—primarily because certification has increased the level of professional competency in pediatrics, family medicine, geriatrics, and internal medicine. Similarly, ASCE can define General Civil Engineering as a specialty area to promote a higher level of technical competency among civil engineering generalists.
9. The assessments embedded within the medical profession’s specialty certification system add value through their rigor. Ultimately, specialty certification works when it increases the quality of services offered by the profession.
10. Over the long term, the medical profession has discovered that acceptance of specialty certification by members of the professional community can be compromised by excessively high cost and by recertification requirements that are perceived to be too onerous or too inconsistent. To some extent, the controversies regarding recertification have been exacerbated by the manner in which this process was implemented—specifically (1) recertification was appended to the original certification system after it had been in operation for many years and (2) the standards for recertification have become increasingly demanding over time.

Consistent with these conclusions, we offer the following recommendations for ASCE’s implementation of civil engineering specialty certification:

1. Adopt the overall structure of the medical credentialing system, with state-administered licensure serving as the legal authority to practice engineering and specialty certification, administered by the profession, serving as the basis for validating CEBOK attainment.
2. Strongly discourage the ongoing trend toward increased specialty licensure, particularly in structural engineering.
3. Ensure that the standards for civil engineering specialty certification are focused on *competency*, rather than *mastery*.
4. Administer specialty certification through an independent organization equivalent to the ABMS. Ensure that this organization and its processes have the flexibility to accommodate expansion and adaptation of specialty and subspecialty areas over time.

5. Do not expect that market demand will drive the creation of a specialty certification system. The medical profession's experience demonstrates that the profession itself must drive this process, and market demand will follow when the value added by specialty certification becomes evident to employers, clients, and the public.
6. Formally and authoritatively define the civil engineering specialty areas (and, if necessary, subspecialty areas) and their relationship to the civil engineering discipline, and institutionalize this relationship in ASCE policy. Give careful attention to the initial delineation of the specialty areas, but also be prepared to modify these definitions over time (as noted in 4 above).
7. In developing the system, start small and build over time.
8. Ensure that General Civil Engineering is included as a specialty area.
9. In designing the specialty certification system, ensure that the costs (in both money and preparation time) paid by candidates for certification are reasonable.
10. Ensure that the standards for specialty certification are sufficiently rigorous that they add measurable value through the increased competency of board-certified professionals.
11. In designing the specialty certification system, pay particular attention to the very controversial issue of recertification. If recertification will be part of the system, it should be incorporated from the start, and its standards should be established and publicized from the start. MOC and continuing education requirements, if included, must be perceived as reasonable and consistent. If recertification or MOC is appended to a certification system that has already been established and in operation for some time, dissatisfaction is inevitable.

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