CIP 2030: A Strategy for Engineering Management to be Reclassified as an Engineering Discipline

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Abstract

The National Center for Education Statistics started the Classification of Instructional Programs (CIP) in 1980 to facilitate the organization, collection, and reporting of fields of study and program completions. "Engineering/Industrial Management" was moved in 2000 from CIP 14 (Engineering) to CIP 15 (Engineering-related Technologies/Technicians). In so doing, the federal government changed engineering management from an Engineering field of study to an Engineering Technology field.

The fact that this change occurred in 2000 is well documented. What is not available is why the change was made. There are several important reasons that the engineering management community should attempt to reverse this change. This paper explores a strategy for how to request and influence a return to CIP 14. Making the change will not be easy.

We recommend the return of most engineering management programs to CIP 14.3001, the pre-2000 CIP code, which is still available for use by NCES and not assigned to any other discipline. This paper reports the results of activities targeted at learning more about the role that the Integrated Postsecondary Education Data System (IPEDS) keyholders and Technical Review Panels (TRP) play in the CIP code system, and begins laying out a strategy for influencing a reclassification.

Introduction

CIP stands for Classification of Instructional Programs, a coding system managed by the U.S. Department of Education [1]. NCES, the National Center for Education Statistics, is the agency that collects and manages the data [2]. CIP codes are used to classify educational programs for a wide variety of purposes, including which areas of study are considered to be engineering and which are considered STEM for government purposes. Before 2000, Engineering/Industrial Management was considered to be an 'Engineering' field of study with a CIP code of 14.3001, as shown in Exhibit 1. The initial two digits, 14, identify the discipline as an 'Engineering' field of study. In 2000, Engineering/Industrial Management's CIP code was changed to 15.1501 [3], as shown in Exhibit 2. The first two digits, 15, identify the discipline as an 'Engineering Technologies/Technicians' field of study (subsequently changed to 'Engineering/Engineering-Related Technologies/Technicians' in 2020). Simply stated, Engineering Management was declared an Engineering Technology field of study by the Department of Education in 2000. Most individuals in the Engineering Management community are unaware of this change.

It has been very difficult to identify why the change was made in 2000. The question was asked of several stakeholders in NCES, but the response was always along the lines of 'I wasn't there so I don't know'. The most common response to multiple inquiries was no reply. The change occurred over 20 years ago, and apparently the documentation as to why the change was made has not survived. Proposed CIP changes must be published in the Federal Register, soliciting feedback. A draft CIP 2000 was published in 1999 [5], but not in the Federal Register. The

proposed changes are shown in Exhibit 3; note that Engineering Management was to have remained in CIP 14.

Exhibit 1. Description of Engineering/Industrial Management CIP, 1980 – 1999 [4]

14. Engineering
    14.30 Engineering/Industrial Management
        14.3001 Engineering/Industrial Management. An instructional program that describes the application of engineering principles to the planning and operational management of enterprises and organizations, including budgeting, costing, quality control, efficient resource allocation and utilization, product production and distribution, human resource management, systems and plant maintenance, scheduling, storage and security, organization planning, acquisitions, and logistics.

Exhibit 2. Description of Engineering/Industrial Management CIP, 2000 – 2010 [6]

15. Engineering Technologies/Technicians
    15.15. Engineering-Related Fields
        15.1501 Engineering/Industrial Management. "A program that focuses on the application of engineering principles to the planning and operational management of industrial and manufacturing operations, and prepares individuals to plan and manage such operations. Includes instruction in accounting, engineering economy, financial management, industrial and human resources management, industrial psychology, management information systems, mathematical modeling and optimization, quality control, operations research, safety and health issues, and environmental program management."

Exhibit 3. Public Comment Draft, Engineering/Industrial Management CIP, 1999 [5]

14.30 Engineering/~~Industrial~~ Management. (See 14.3001)
    14.3001 Engineering/~~Industrial~~ Management. An instructional program that describes the application of engineering principles to the planning and operational management of enterprises and organizations, including budgeting, costing, quality control, efficient resource allocation and utilization, product production and distribution, human resource management, systems and plant maintenance, scheduling, storage and security, organization planning, acquisitions, and logistics. (Industrial Management, Moved to 15.0613)

We contacted the current NCES Survey Director for CIP codes and asked why the change was made in 2000 and what would be required to reverse the change. She replied in part, "Series 15 applies to Engineering Related Fields, while Series 14 is devoted strictly to Engineering. Since engineering management combines both the field of engineering and management, it best fits in Series 15" [7]. This correspondence has given us the impression that we will likely not be receiving support from within NCES.

Some EM programs reside within Technology departments or colleges. As an example, Indiana State University offers a B.S. in Engineering Technology Management, an M.S. in Technology Management, and a Ph.D. (in conjunction with Bowling Green State University, University of

Central Missouri, East Carolina University, and North Carolina A&T) in Technology Management, all housed in their Bailey College of Engineering & Technology [8]. Western Michigan University offers a B.S. in Engineering Management Technology and an M.S. in Engineering Management, housed in their College of Engineering and Applied Sciences [9]. Both universities (and others, including the University of South Carolina Upstate and the University of Tennessee at Chattanooga, for instance) have their undergraduate programs accredited by ABET using the Engineering Technology Accreditation Commission (ETAC) criteria. These universities use the 15.1501 code, which fits their programs. The 15.1501 code should continue for those programs which focus on engineering technology, are accredited by ETAC, or reside in Technology departments. However, most engineering management programs qualify as engineering programs [3]. A list of programs accredited by ABET is shown in Exhibit 4. Except for the MS offered by the Air Force Institute of Technology, degrees in Exhibit 4 are baccalaureate programs of study.

Exhibit 4. U.S. Institutions with a degree accredited by ABET
Engineering Accreditation Commission (EAC) or Engineering Technology Accreditation Commission (ETAC)

Institution	**Accredited Degree**	**CIP Code (College Navigator)**	**Accreditation**
Air Force Institute of Technology	Engineering Management (MS)	15.1501	EAC
Arizona State University	Engineering Management (BSE)	15.1501	EAC
California State University, Northridge	Engineering Management (BS)	15.1501	EAC
Clarkson University	Engineering and Management (BS)	15.1501	EAC
Gonzaga University	Engineering Management (BSEM)	14.0101	EAC
Missouri University of Science and Technology	Engineering Management (BS)	15.1501	EAC
Montana State University	Industrial and Management Systems Engineering (BS)	14.3501	EAC
Oklahoma State University	Industrial Engineering and Management (BS)	15.1501	EAC
North Dakota State University	Industrial Engineering and Management (BS)	14.3501	EAC
Rensselaer Polytechnic Institute	Industrial and Management Engineering (BS)	14.3501	EAC
South Dakota School of Mines and Technology	Industrial Engineering and Engineering Management (BS)	14.3501 for BS 15.1501 for MS in EM	EAC
Stevens Institute of Technology	Engineering Management (BE)	15.1501	EAC
The University of Arizona	Engineering Management (BSEMgt)	15.1501	EAC
University of Connecticut	Management and Engineering for Manufacturing (BS)	Unknown	EAC
University of the Pacific	Engineering Management (BS)	15.1501	EAC
Indiana State University	Engineering Technology Management (BS)	15.1501	ETAC
University of South Carolina Upstate	Engineering Technology Management (BS)	15.1501	ETAC
University of Tennessee at Chattanooga	Engineering Technology Management (BS)	15.1501	ETAC
Western Michigan University	Engineering Management Technology (BS)	15.1501	ETAC

Source: [amspub.abet.org/aps/name-search?searchType=institution], [https://nces.ed.gov/collegenavigator/]

Who Assigns CIP Codes?
Universities assign CIP codes to their academic programs and have processes in place for choosing or changing program CIP codes. Every institution has an IPEDS Keyholder who manages the information and codes that are forwarded to the Department of Education. Our research indicates that the process is different at each university and the offices involved or key stakeholders at each institution may have different titles or positions. Regardless of who assigns the codes, our interest lies in which CIP code is given to engineering management programs.

NCES has created the College Navigator (nces.ed.gov/collegenavigator/), which is an online tool to help the public find information about universities and the academic programs offered. The tool has many functionalities. The academic programs identified use the same organization and terminology as the CIP code listing, which helps to locate program CIP codes at various institutions (numerical CIP codes are not listed, but their descriptions are).

Asgarpoor and Vanek [10] conducted a survey of engineering management master's programs, with response from 84 EM programs in the USA. Using those programs plus universities with ABET accredited programs, we sampled a large portion of those programs and with the help of College Navigator, tracked their CIP codes. A total of 66 colleges and universities were investigated to determine if they had listed programs in "Engineering/Industrial Management".

Of the 66 institutions investigated, 44 (67%) had programs listed under "Engineering/ Engineering-related Technologies/Technicians". This demonstrates that those 44 programs are listed under CIP 15.1501. Deeper investigation is required to determine which codes are used by other programs, and sometimes multiple codes are used for different degrees within a university. For example, other codes used include 14.0101 (Engineering – General) and 14.3501 (Industrial Engineering).

CIP Change Process

Frequency
Historically, NCES publishes CIP codes every decade and has a website (https://nces.ed.gov/ipeds/cipcode/search.aspx?y=56) to electronically search CIP Codes. Currently, the options are for electronic search of 2010 and 2020 CIP codes. CIP 2000 can be searched using a different NCES search tool. While the codes are revised every 10 years, updates can be made if the need arises. For example, 22 new CIP codes were added to the STEM designated degree list in January of 2022 (including Business Analytics) [11].

Process
The next scheduled update is in 2030. The process used for updating the 2020 CIP included [1]:

- Catalog scan. This included scanning institutions that were not previously included, looking for new and emerging instructional programs.
- Review of "Other" titles. If a 6-digit CIP code ends in 99, it is an 'Other" code.
- Survey of IPEDS Keyholders to identify programs to add to the CIP.
- Technical Review Panels (TRP), which advise NCES, were contracted out to RTI International, a research institute, in about 2002.

- Federal Register Notice: notices are usually placed in the Federal Register, soliciting public feedback on draft changes.

There are two ways that the Engineering Management community can influence the CIP process: 1) via our IPEDS Keyholders and 2) via the Technical Review Panels. This paper commences solicitation from the EM community to identify their individual institution's IPEDS Keyholder and initiate discussions. Every college or university has an IPEDS Keyholder, though the person might be difficult to find within the institution. Our recommendation is to start with the Office of Institutional Research. Most IPEDS reports can be found through this office within the university.

We recommend that once engineering management programs identify who their IPEDS Keyholder is, the programs should be prepared to send them, where appropriate, a formal request to change the CIP code back to 14.3001. As mentioned previously, it is logical for Engineering Technology programs to stay with CIP 15.1501. We will need to synchronize the discussions to coincide with the beginning of the CIP 2030 review process. Historically, CIP 2020 started during the summer of 2017 [12] and the draft update was published in the Federal Register in December 2018 [13]. Reverse-engineering the timeline will give EM programs about three to four years to initiate the discussion and hopefully get some results.

We should note that RTI International (rti.org) coordinates meeting dates and topics of the Technical Review Panels (TRP). RTI identifies and invites potential panelists for participation and convenes the meetings. Summaries of the meetings are published on the IPEDS TRP website (https://edsurveys.rti.org/ipeds_trp/). NCES combines responses from IPEDS Keyholders with their own research on changes in academic programs. RTI then convenes TRPs to obtain feedback on proposed NCES changes. The TRPs traditionally do not suggest CIP code changes nor do they recommend additional CIP codes. [12]

Action Items in Process

Successful completion of this project will require time, patience, and strategy. Our research has made it apparent that the Federal agencies are not used to dealing with faculty members. As an example, in our correspondences, the current NCES Survey Director for CIP codes wrote, "Since I have been involved the with CIP (2007), no one has expressed concern over Engineer Management being included in Series 15" [7]. Neither are we, as faculty, accustomed to interacting with NCES.

The following is a list of action items that we believe are necessary to see this project to a successful completion.

Desired Outcome
The goal of this initiative is to reverse the CIP 2000 decision and return Engineering/Industrial Management to CIP 14.3001 for EM programs that are housed in Engineering Schools/Colleges and that follow an engineering-based curriculum. We recommend that NCES should keep the current code and description of CIP 15.1501 available for engineering technology programs. To reclaim CIP code 14.3001 for engineering management, grassroots strategies are needed to

expand our reach and recruit help, cooperation, and collaboration from EM academic professionals across the nation. Engineering Management program directors and department chairs must be contacted and personally invited to join this movement. There is power in numbers and the more individuals that are invested in this project, the higher the likelihood of its success. NCES has already defended the current status, so this initiative will face institutional headwinds. The time is right to begin gathering interest in making the change.

Identify IPEDS Keyholders at universities
IPEDS Keyholders play a critical role in the early part of this change process. All EM faculty, programs, departments, and professionals who see the worth and value of this endeavor will be asked to identify and contact IPEDS Keyholders at their respective institutions to start a dialog about this initiative. IPEDS Keyholders play an important role in initiating the process to reactivate the CIP 14.3001 code.

Create a template
To ensure consistency in message and process, a Master Letter to IPEDS keyholders should be composed to request reviving the 14.3001 code for engineering management programs. This letter will specify the reasons justifying the request. For example, one reason could be the growing number of EM programs nationally and internationally over the past two decades since the code was sunset. To ensure the letter is effective and worded such that Keyholders are agreeable to signing it, we recommend a team approach in writing, editing, and finalizing it. Once finalized, the Master Letter will be distributed to EM Academic Professionals who would, in turn, share it with their IPEDS Keyholders to collect their signatures. Electronic copies of the letters will be maintained to share with NCES when the formal request is made. It is possible to supplement this process by using an electronic petitioning technology such as Change.Org to distribute the letter and ask recipients to identify themselves, provide their title and contact information, and finally sign the petition in support of the CIP reverting to 14.3001.

Technical Review Panels
Based on expertise in a given topic, RTI International selects volunteers for TRPs. To be considered for future TRP meetings, a person needs to provide their contact information, recent resume, and areas of expertise for the RTI database. The authors can provide contact information for anyone who is interested. TRPs are organized for a wide variety of issues impacting higher education and TRP participants vary widely depending on the topic. Representatives tend to include state coordinators, federal representatives, education association members, researchers, and registrars. Meetings are held in Washington, D.C. Some IPEDS staff members who live and work in the vicinity also attend the panels.

Create a set of Lookouts
Proposed changes for CIP 2030 should be published in 2028-2029. We will need individuals looking for the Public Comment Draft. This should appear in the Federal Register, but might not (the CIP 2000 Draft did not appear in the Federal Register). We will need a few people looking for public comment drafts in Department of Education publications.

Conclusions & Recommendations

This paper recommends that CIP 14.3001 be reinstated, and engineering management programs that meet engineering criteria be reclassified with that code. CIP 15.1501 can remain and be used for engineering technology programs, such as those programs having an ABET ETAC accreditation. We need the support of the engineering management community, ASEE, ASEM, and other organizations that can add prominence to a unified voice.

As engineering managers, we must make our recommendations known, and influence the system in two places. Many of us will need to write to our IPEDS Keyholders, explaining the issue and requesting their input into NCES. A template letter needs to be written to assist in sending a similar message to Keyholders across the country. We also need to influence the Technical Review Panels. This is best brought about by volunteering to serve on future panels.

We continue to wait on further information. A Freedom of Information Act (FOIA) request was made – and accepted – requesting information as to why code 14.3001 was deleted from the CIP code list in the year 2000. A request for information was also sent to NCES via their "Ask the CIP Specialist". We patiently await replies.

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