EDP Certification—Is it necessary?

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INTRODUCTION

There is a movement afoot within the computer industry which will have a great impact on EDP personnel. Much literature has been published which concerns itself with EDP personnel certification. The formation of the Institute for Certification of Computer Professionals (ICCP) in August, 1973, has certainly triggered a large amount of discussion within the EDP community. In reality, everyone seems to be for certification and the prestigious distinction of being called “Professional.” So it’s everyone to the bandwagon! At a glance, it appears that our EDP certification bandwagon is charging ahead—the certification movement is straining at the harness, the bandwagon is creating dust clouds and recklessly moving forward and the computer passengers are frantically waving for forward motion. In essence, everything is moving forward except for one thing, the wheels—and they are going backwards, thus indicating that the certification base has not been firmly established. Is this the true posture of the EDP profession and its certification movement? Before proceeding with a grand and glorious certification program, it might be well at this time to ask a few important questions. One of which might be “Is EDP certification necessary?”

Before addressing this question, we must first identify the problem of which certification is to be the remedy, i.e., is the problem to be solved related to licensure and the protection of the public or is it related to EDP personnel and their betterment? Also, what is the status of the EDP vocation in regards to the “Professional” movement? Are we ready for certification or for licensure? To sum up the entire situation—why certification?

Before answering any question on EDP certification, it will be helpful to define three terms used by the EDP community: base of knowledge, certification, and professionalism. Base of knowledge will be used in the content of this paper to express the basic skills required to satisfy a certain level of a standard job requirement.

The second term, certification, connotes the approving or verifying a base of knowledge that a person should know and understand for his vocation or job. The Webster dictionary states that to certify is “to attest as being true or as represented or as meeting a standard.” The key word in this phrase is “standard” . . . . To meet a standard. The question to ask here is . . . . What standard has been identified to certify an EDP individual? There are several factors which should be considered in certifying an individual, viz:

- Testing
- Personnel references
- Experience
- Communications, both verbal and written
- EDP contribution
- Education

As stated by Harris and Swearingen in their article in Data Management of October, 1973, certification is a continual cycle which is designed to establish and maintain a body of knowledge. The steps necessary to do this are depicted in Figure 1. Certification is built upon a body-of-knowledge foundation.

Finally, professionalism warrants a definition. This term is a difficult one to define. Before a definition can be given it will be useful to identify some attributes of a profession, such as:

1. a defined body of knowledge of high intellectual content acquired by training in depth,
2. defined standards of competence, and certification that the professional meets those standards,
3. a code of ethics,
4. at least one professional society aimed at advancing the welfare of its members,
5. the responsibility to society to perform in a competent and ethical manner,
6. the licensing of the members of the profession by the state to practice the profession,
7. the right and ability of the members of the profession to eject someone from the field for being incompetent or unethical.

For the purposes of this paper, the following will be used when defining the expression "EDP professional": one who is trained in the skills of EDP, competent in the use of EDP tools, orderly and ethical in his approach, and does his work within an established philosophy of EDP. Professionalism involves defining and maintaining a base of knowledge, certifying EDP personnel, and imposing licensure and implementing a policing agent for unethical behavior. Consequently, licensure is the next step after certification.
has become established. The steps to professionalism are shown in Figure 2.

CERTIFICATION VERSUS LICENSURE

There are two schools of thought dealing with certification. The key question is... Should certification include licensure? The primary concern is the public interest and well-being which may be affected by the EDP field and its endeavors. If public health and life are involved, then not only should the EDP professionals be certified but should also be licensed and policed by an agency tasked to protect the public. The ICCP has expressed its case by its title when the expression “Professionals” is used. The attainment of “Professional,” if licensure is involved, would require three major phases: identifying a base of knowledge, certification, and licensure. At such an early stage in the development of an EDP profession, it is felt that certification should take high priority since it comes before licensure. In general, the EDP community is not ready for licensure or scarcely ready for certification since a base of knowledge has not been defined or standardized. However, the EDP community must be prepared to eventually answer this question. If licensure is required, then should an individual become “blessed” by an agency before he can practice? Possibly, certification and licensure will evolve in the direction of the Certified Public Accountant (CPA) vice that of the doctor or lawyer. Certification as used in this paper will entail verifying that an individual has obtained a certain level of skills which have been identified via a base of knowledge. Hence, certification is only a portion or part of a profession as defined above.

WHY CERTIFICATION?

Those against certification usually give at least one of the following reasons:

1. The EDP vocation as a whole is not mature enough to be certified. Standards and skills cannot be identified because of the ever-changing nature of EDP.
2. To certify means that structure is imposed and, consequently, creativity is hampered.
3. The majority of the EDP community and the general public is not concerned about the status of being certified.
4. EDP skills should be considered as a tradesman vocation especially programming since it is becoming easier to learn and use.

The list could be extended to include many more excuses; however, the author does not feel that any of these arguments are particularly valid and only attempt to avoid the EDP certification problem, i.e., identifying a base of knowledge.

It is felt that certification is most urgently needed for several reasons, i.e.:

(1) The critical need for identification and maintenance of a standard base of knowledge.
(2) EDP systems are becoming very complicated and costly. The failure of the EDP vocation to design, develop and implement their systems successfully is a good indication that professional standards and a philosophy have not been identified and used.
(3) Technology of EDP, such as telecommunications, data base management techniques, and sophisticated hardware, has effected the use of computers in almost any imaginable area of our society and is becoming a major industry in our country.
(4) The general public, the users of computer products and services, and EDP employers must be protected from the technical incompetence which has crept into the EDP ranks.
(5) EDP individuals should be responsible for their work, especially when the general public’s privacy and well-being are at stake.

From the above discussion, there are three groups of people which would benefit from certification:

- the individual being certified
- the employer
- the general public

Advantages can be listed as follows for each group:

1. First and most importantly, certification will benefit EDP personnel since they should understand what standards must be satisfied to meet their basic job requirements. Thus, the individual would know what is expected of him. Used to its fullest, certification can be structured to form a career development program and, hence, be used to motivate and to give the employee a vocational goal. This approach requires a set of defined standards (tools of the trade) for

![Figure 1—Certification cycle and career development](From the collection of the Computer History Museum (www.computerhistory.org))
each type of job and a matching job description. Finally, job performance criteria should be identified to each job and be used to measure the individual's performance.

(2) Certification would certainly help the employer when hiring or promoting computer personnel. If certification were done properly, the employer could rely more on the credentials of the individual. If the nature of the work required the person to be bonded or to handle sensitive information, the employer would have some assurance of the individual's competency if he were certified. Also, employers are no longer fooled by the mysteries of the computer. They have been taken too many times by poorly defined and developed software systems, and have come to expect the data processing function to pay its way. EDP budgets are being cut because of the failures of their Management Information Systems and poorly managed resources.

(3) The public sector should be protected against incompetency within the EDP ranks. The question which should be asked is: "Is the public health and safety, property rights or schooling of the young affected by the software and hardware of the computer community? If the answer is "yes," licensure should be required as discussed above. The best answer to this question is public opinion. Should EDP experts be required to attest in court to the validity of a well designed system or program? A license would most definitely be required in this instance.

EFFORTS TOWARD EDP CERTIFICATION

As shown in Figure 1, the first step is to identify a body of knowledge including the definition of skills for each set of job descriptions. Next, such a body can be taught via curricular which can be controlled by accreditation standards. Once a body of knowledge has been identified and taught, testing and certification can be administered. Recertification can be given once a continuing education program has been identified. The cycle is reiterative since new jobs are continually being developed which require new or different skills.

JOB DEFINITIONS

For each job, skills must be identified and attached to each job description. Job descriptions should include:

1. reporting relationship of the position,
2. administrative responsibility,
3. technical or functional responsibility,
4. contacts made in the job,
5. supervision required in the job,
6. educational and experience qualifications,
7. specialized training and certification required

The first step toward job descriptions is to identify the job performance and to be able to measure such performance. Standard job descriptions have been identified by both the Civil Service Commission and the Association for Computer Programmers and Analysts (ACPA). The American Federation for Information Processing Societies (AFIPS) has been working on a set of job definitions and skill requirements, too. Much of this work has been performed by Dr. Ray Berger, director of Psychometrics, Inc. ACM has identified the skills necessary to meet the Information Analyst and Systems Designer job positions at the graduate and undergraduate levels. These descriptions are examples of two such jobs which have been identified with specific skills. Work which has been done by these three groups would be good guidelines for the computer community to follow when identifying EDP job definitions.

CURRICULA DEVELOPMENT AND ACCREDITATION STANDARDS

Since standard job definitions can be identified with their associated skills, curricula can be developed to teach these skills. ACM has worked in this area with their Curricula for Information Analysts and Systems Designers. It has also done a large amount of work in Curricula Development for Computer Science programs which have been used throughout the United States. The University of Maryland, the American University, and the University of Minnesota, among others, have played a valuable role in implementing all or portions of the ACM Curricula for Information Analysts and Systems Designers. A number of universities...
and colleges have used the ACM Curricula for Computer Science as a guideline. Accreditation standards for such curricula in data processing have not been given the proper attention and should be devised. The AFIPS's report, "Professionalism in the Computer Field," states, "At the present time, there are no accrediting agencies specifically looking at Computer Science and Data Processing departments in the colleges and universities." The article goes on to say, "The private EDP schools may seek accreditation by either the National Association of Trade and Technical Schools, the Accrediting Commission of Business Schools or the National Home Study Council. At the present time, a small minority of such schools are accredited by one of these three agencies." Since job skills and job definitions have not been totally identified and, subsequently, standardized, little can be expected by the accreditation community to attest to the curricula being developed by individual EDP schools. Hence, such an effort is certainly needed by the EDP field.

CERTIFICATION

Before August, 1973, only one organization, the Data Processing Management Association (DPMA), had become very involved with certification in the United States on a nation-wide scale. It sponsored two certification programs which were the Certificate in Data Processing (CDP) and the Registered Business Programmer (RBP) certificate. The CDP has proven itself as a tool for testing the entry level requirements of a data processing manager since its inception in 1962. It requires the applicant to answer 300 multiple choice questions in five general areas within 250 minutes. The areas of concentration are: data processing equipment, computer programming and software, principles of management, quantitative methods, and systems analysis and design. Over the past 10 years, about 14,000 EDP personnel have received the CDP certificate. The first CDP exam entailed only 100 questions. This certificate has slowly gained acceptance in many organizations such as Xerox, General Electric, Weyerhaeuser Co., Franklin Life Insurance Co. in Springfield, Illinois, State Farm Insurance, The Prudential Insurance Co. of America, and the U. S. Army Corps of Engineers ... just to mention a few.

The RBP examination started its career in 1969 and attempts to test the skills of a business programmer. This test has questions which are multiple choice but has not been as popular as the CDP exam because of three major reasons: (1) data processing managers have not fully supported the exam, (2) the RBP has not been advertised as much as the CDP, and (3) the RBP is a later test and has not become as established as the CDP.

In August, 1973, the Institute for Certification of Computer Professionals (ICCP) became legally established as a non-stock corporation in the state of Delaware. It was formed primarily to certify, develop and recognize EDP personnel. Initially, the certification tools to be used are the CDP and RBP which are being transferred to the ICCP from DPMA. The ICCP was formed from what was originally titled the Computer Foundation. The following professional societies are members of the ICCP:

Association for Computing Machinery
Data Processing Management Association
IEEE Computer Society
If the certification movement is approached properly, this organization could have a great impact on the EDP community in addition to the general public.

Other certification programs which exist in the United States but are mainly related to areas other than EDP are the Certified Data Educator (CDE), Certified Internal Auditor (CIA) and the Certified Public Accountant (CPA). Since these are not considered to be directly oriented to the computer vocation, a detailed explanation of each will not be given.

Other countries have made impressive strides in certification. The two leading countries are Japan and England. Japan has a certification program which is equivalent to the CDP and RBP but consists of one test. There are two parts to its test, i.e., Class I and Class II. Class I is similar to the CDP and Class II is similar to the RBP. This program is administered by the Ministry of International Trade and Industry (MITI) and only 7 percent of the applicants in each class pass (as opposed to the 40 percent pass-rate in the U. S.). The questions of the tests are published for future study. (In the U. S., the CDP and RBP questions are not published.)

The British Computing Society (BCS) has a certification program which is by far the most extensive of any mentioned in this paper and probably the most extensive program in the world! Its primary purpose is to test those computer applicants who wish to join the BCS as a member. The exam involves two parts, and each part contains two sections. Sections 1 and 2 of Part I each require six hours of exams in two of the following six areas:

**Part I. Section 1**

1. Appreciation and development of computing systems.
2. Representation of data in the computer.
3. Set theory and the elements of logic design.
4. Appreciation of analog and hybrid computing systems.
5. Elementary programming.
6. Introduction to techniques for computer applications.

**Part I. Section 2**

1. Fundamentals of computer technology.
2. Programming.
3. Data Processing.
4. Analysis and design of information processing systems.
5. Computational methods.
6. Analog and hybrid techniques.

After the candidate has passed Part I or its equivalent, he can use one of two methods for Part II. One method is to take two more three hour examinations, plus a three hour written essay and an oral examination. The other method is to submit a dissertation on original work done at an advanced level. Part I was first given in 1969 and Part II in 1970. About 40 percent of the BCS candidates passed the Part I in 1972. Only eight passed the Part II requirements in 1972 from a group of 26 candidates. An interesting point is that the BCS has seven grades of membership, viz, Fellows, Members, Licentiates, Associates, Affiliates, Students and Institutional Affiliates. As an example, the grade of "Fellow" carries the following requirements: "... age over 30, and eight years accepted experience in data processing, five years of which must be in a responsible position. Exceptional merit over and above the normal call of professional duty must be proved." Fellowship is (1) not normally considered until the applicant has been a member for at least one year and (2) granted only to members who can prove their professional activities justify acceptance as an authority in their particular field of data processing. The BCS exams are oriented toward scientific areas vice business data processing. One important decision which has been made by the BCS is the new ruling requiring that candidates applying for entry as members on the basis of experience and having had the required seven years must enroll as affiliate members. This must be done beginning December 31, 1973. Hence, those wishing to become members will eventually be required to take the examination because it has been recognized that years of experience do not necessarily equate to a certain level of knowledge. Finally, the BCS and Japanese exams have been governmentally implemented, and centrally coordinated. The U. S. certification movement has not been centralized until the recent formation of the ICCP.

**CONTINUING EDUCATION AND RECERTIFICATION**

Most universities and colleges offer some kind of continuing education program. However, since no set of standard skills and job definitions have been proposed, it is difficult to structure a meaningful program for continuing education in EDP. Presently, there does not exist a recertification program in the U. S. or abroad.

**CERTIFICATION AND CAREER DEVELOPMENT**

One other factor which should be considered once the certification cycle has been identified and executed is a career development program such as that discussed by Nancy Ayer. At this juncture of the certification problem, the primary goal should be oriented toward the EDP individual vice licensure. Figure 3 depicts an example of a proposed career structure with its career ladders. (For more detail on this structure, refer to the article, "Step-by-Step: A Career Structure for Systematic EDP Growth.") Such a program can be used to measure progress toward certification of an EDP individual within a company. In fact, if
such a program could be identified as a standard guideline, it would lend itself to helping the individual in planning his career and would provide a means for continuing his education and testing his on-the-job progress. Such a program is being identified by the ACM Special Interest Group of the Washington, D. C. Chapter, chaired by Paul Oyer of the Census Bureau. The career development structure being proposed contains 10 different groups of similar jobs, called “Families.” An example of a family is the computer operator series which in turn is composed of four levels of operators, i.e., Computer Operator I, II, III, and IV. Each level has a job description with specific skills identified. Further, each level has associated with it the performance expected from the employee. Progress of each employee could be measured by testing, job performance and the supervisor’s recommendations. Each level has a set of training courses identified to it, both those required and those that are optional. Once the employee has satisfied the requirements of his job level and has demonstrated his potential for advancement, he has two primary options available to him: (1) to continue in the same family at a higher level, or (2) to change to another family if an entry point exists. Such a career development structure requires five types of tests: (1) entry into a basic family for the first time, (2) entry into a higher level job within the same family, (3) performance and subject testing at the same level, (4) entry into a higher-level family from another organization, and (5) entry into a different family (e.g., operator to programmer). Such a career structure would lend itself to assisting the certification effort. This structure contains all the essential parts of certification as mentioned previously. It utilizes testing, personnel references, job performance and experience, communications, EDP contribution, and education. Another important point which this structure shows is that certification programs should consist of more than one or two types of certification. In this example, ten different types of certificates could be awarded, assuming each required certification. Entry level for an inexperienced computer person would not be involved in certifying an individual since he has no experience. In this case, aptitude of the individual should be tested. However, a career development program should not ignore the importance of screening those individuals who are not well adapted to the EDP field. If all areas are considered and included in a certification program, the career development framework would greatly benefit the individual, the employer and the general public. Greater success of implementing systems would be realized, thus reducing costs and personnel turnover.

FUTURE OF EDP CERTIFICATION

It is very difficult to give justice to such an all encompassing subject as Certification in such a short space. What has been given is a general view of the status of EDP certification and some ideas to be considered. The first step to take in any situation is to recognize the problem. The formation of the ICCP is the first important step to recognize the plight of the EDP community. The next step is to determine exactly where we are and what efforts have been taken to remedy the problem. Work is being done by the SIGCD of Washington, D. C. which will aid the computer community in this effort. Some very significant work has been done in the areas of job definition, particularly by AFIPS, ACM and ACPA. EDP curricula have been defined but its total validity is questionable since no standard has been formulated for job skills or even job types. Accreditation standards must become an important factor in certification. This can be done with the assistance of EDP societies, or more appropriately, with the assistance of ICCP. Much work has been done toward testing EDP personnel; however, job performance in the present job or in the next higher job has not been validated. More effort should be oriented toward the testing of oral and written capabilities of the individual. One aspect which the CDP and RBP tests do not attempt to do is to verify the oral and written competency of the applicant. Essay questions should be given for certain “families” or for all “Professionally” identified groups. If certain levels of competency are identified as in the BCS, certain levels of certification should be allowed. Possibly, the highest level of a certain professional family should be required to (1) do original work which will contribute to the EDP profession and (2) pass an oral exam on this original work. The written essay exam would prove the candidate’s ability to write and to logically approach a problem. Many universities and colleges require one or more comprehensive exams at the masters level and some even require such exams at the undergraduate level. Testing criteria could be identified to grade the oral and written exams. The CDP is certainly not the answer to EDP certification since there can be several different groups or “families” in the EDP field. The CDP has proven to be
very valuable when considering such aspects as administering a nation-wide test, verification of EDP questions, etc. Continuing education must be formulated to support the recertification step. Little has been done on identifying such a program. EDP personnel must be properly educated.

Once the problem has been identified and the present situation has been inventoried, the next major step is to set forth objectives and requirements. We must define "Professional" EDP areas and determine if certification is required before the individual can practice. The present status of EDP certification is such that licensure should not be considered until a framework with definitions has been built. The first priority to be satisfied is to give direction to the individual and, subsequently, to the computer vocational. Once this has been done, licensure and ethics can be confronted. The first priority must be met by the EDP universe or the public will place demands upon the EDP development program is implemented, it will aid EDP move would be premature since we have not defined or needed. Because of the dynamics of EDP, an individual can been built. The first priority to be satisfied is to give direction to the individual and will entail a centralized effort to establish a path toward a meaningful certification program. Also, a certificate current, EDP personnel should be required to achieve certification. Hopefully, this will revolve around the individual and will entail a centralized effort to establish a path toward a meaningful certification program. Also, of great importance is the forming of a career development structure which will enhance EDP certification. If a career development program is implemented, it will aid EDP personnel in keeping abreast of their area of expertise. It will motivate them to strive for the next higher level of certification. In the author's opinion, certification exams should not require the applicant to have a degree for two reasons: (1) people who have certain undergraduate degrees do not always out-perform those without a degree, and (2) experience if of a progressively concentrated nature should be accepted in lieu of certain types of formal schooling. Everyone should be required to pass their level of certification via the successful completion of an examination. If the programmer is considered a "Professional," the certification exam should be difficult enough that a college degree in a certain area of endeavor would greatly benefit the individual in passing the exam. Recertification is urgently needed. Because of the dynamics of EDP, an individual can quickly become obsolete. Any formulated certification program should address itself to this aspect. In order to keep a certificate current, EDP personnel should be required to take a "mini" exam to verify that the candidate is up-to-date in the field. Continuing education should support the recertification program and is necessary throughout the career of each person. Such areas as technology changes, management concepts, computer metrics, software enhancements, terminology, etc., must be covered in such a program. Licensure should not be imposed in the near future because the EDP community is not prepared. Even a base of knowledge has not yet been standardized.

Hopefully, the ICCP will be the answer to the EDP certification problem by defining all certification steps in detail and not just the testing aspect. Much coordination and research work remains to be done; if undertaken properly, a successful EDP certification program can be implemented. If the objective of the certification movement is oriented toward the individual, the answer is "yes" to the question, "EDP Certification—Is It Necessary?" If the objective is to license the EDP individual in the near future, the answer is "no."

In the late 50's and early 60's, the primary concern of the computer world was the sophistication and gadgetry of the computer hardware. Next followed the concern for the state-of-the-art in software, its capabilities, structure and ease of use. However, the 70's are pointing in the direction of computer peopleware and the ability of top management to ascertain the quality of these people. The thrills of hardware and software must come second to the needs of the EDP individual. The decade of the 70's should best be remembered as the "peopleware" era and not the "fourth generation" era.

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