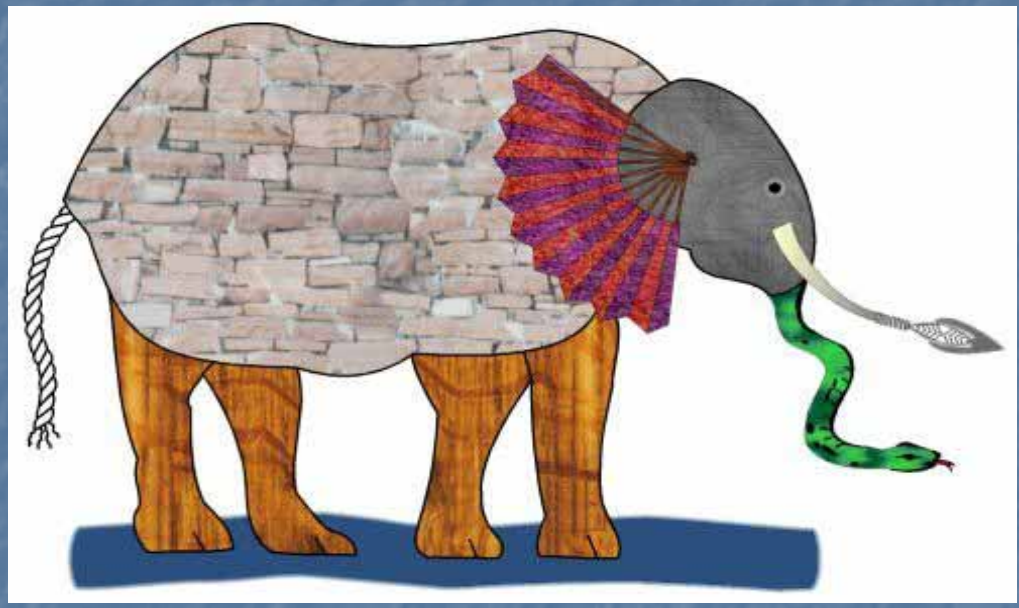
The Disunity of Computing



Pan-Computer Professionalism and the Tensions of Science and Trade

Dissertation Project

- "Technology, Information & Power: Administrative Technicians in Corporate America, 1917-2000"
  - Organizational & Institutional
  - Identity & Professionalism
  - Technology & Practice
- This paper based primarily on one of four main sections
  - "Professional Identity in Administrative Computing"

Methodology

- Primarily qualitative
  - With extensive use of published & unpublished survey data
- Wide variety of sources
  - Books, magazine, journals
    - Precis prepared of more than 3,000 articles
  - Consulting reports
  - Archival records
    - Organizations
    - Individuals
    - “New Institutionalism”

Informatics & Professionalism

"The School of Informatics will be foremost in the country to graduate professionals with formal preparation in Information Technology with subject area expertise."

- What is the profession?

Computers & Professionalism

- Different communities around a single technology

1. Computation and Computer Science
   - Professionalism as scientists and researchers
2. Punched Cards and Data Processing
   - Professionalism as accountants or managers
3. Pan-Computer Professionalism
   - Professionalism as “Computer People”
   - Implies existence of single field

Professional vs. Profession

- Everyone wants to be professional
  - This means having a profession
- Two things needed
  - Self-conscious group of practitioners to push professionalization process
  - A well defined occupation to professionalize
    - Creation of new occupations less studied
      - Hughes, 1958: “cultural mandate”
    - Many emerge around new technologies

The Classic Professions

- Slow emergence over centuries
  - Law
  - Medicine
- Key elements well studied
  - Foundation of national association
  - Definition of formal knowledge linked to practice
  - System to train and certify new members
  - Right to self regulation
  - Legal recognition of monopoly (licensing)
- Based on claims to serve public good

The Modern Professions

- Self-conscious professionalization in early 20th C
  - Public service professions
    - Social workers, Teachers, Librarians
  - Many other groups
    - e.g. hairdressers
- All won many of the key formal attributes
  - Specialist qualifications required for many jobs
  - Supported by state monopoly (licensing)

Professions Within Organizations

- General shift toward professionals within bureaucratic structures
  - Particularly true of more recent professions
    - Accountants
      - Most work within businesses
    - Engineers
      - Mandate covers tightly demarcated sphere
      - Advancement leads into management
- Co-evolution of occupation and corporate department
  - Professionalism often means upgrading of occupation and elevation on organization chart

Technicians

- Ethnographic & theoretical examinations by Stephen R. Barley
  - Often work as “buffers” for true professionals
  - May be “brokers” between technology and users
  - Strong occupational subcultures
- My “Managerial technicians”
  - Systems analysts, Office Managers, CIOs, etc.
  - Claim technical sphere within management itself
    - Expertise spanning technological means and organizational ends
    - Never entirely successful in bridging cultures

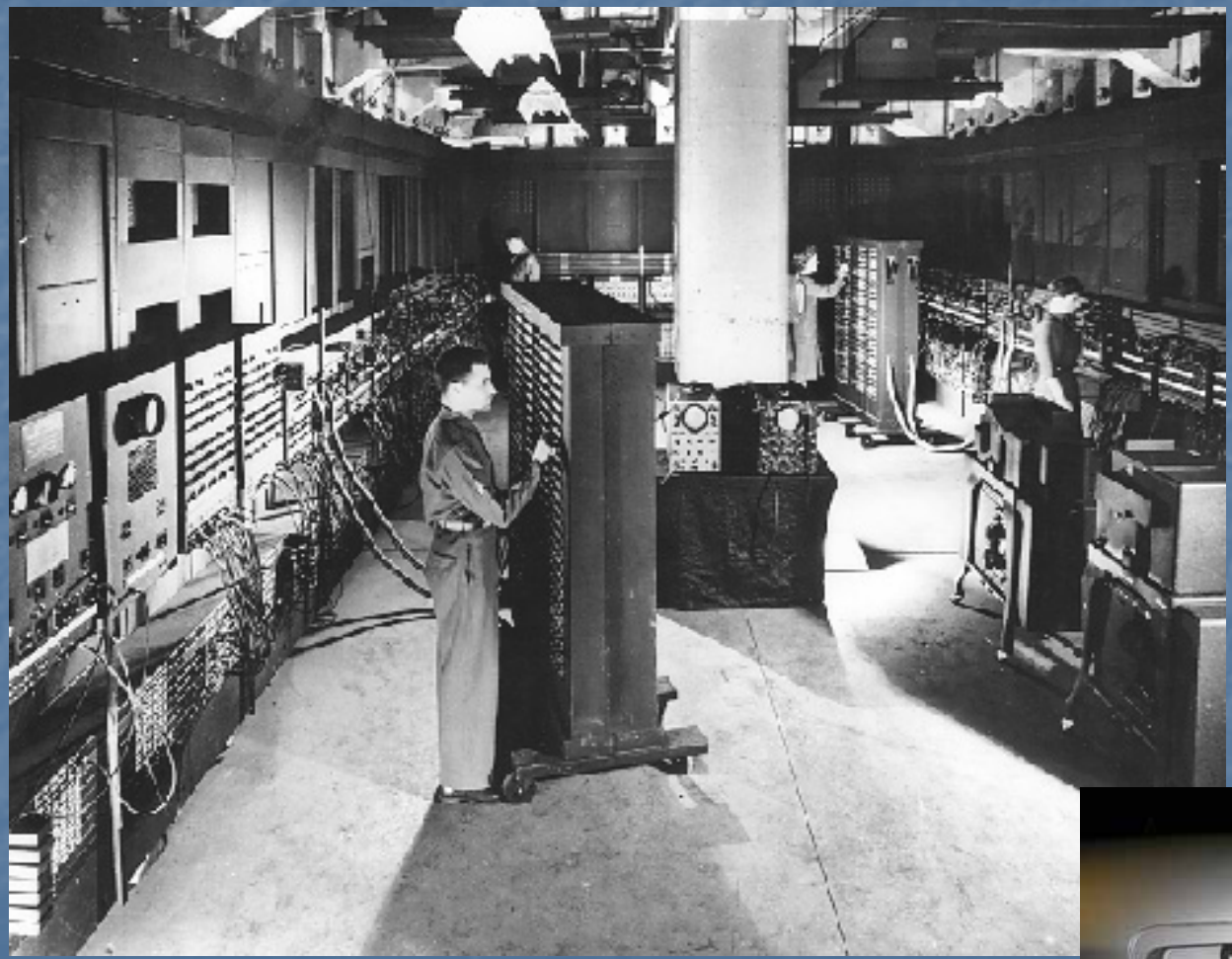
1: Computing & Computer Science

Scientific Professionalism

Origins of “Computing”

- A computer: someone who performs computations
  - Scientific tables
  - Calculations of orbits, etc.
- Obscure, low-status job
  - By hand or with mechanical calculator
  - Labor for graduate students and assistants

ENIAC – 1st Electronic Computer



Electronic Computing

- New market for in Cold War
  - IBM's first computer, the 701, called the "Defense Calculator"
  - Sold to aerospace firms and labs
  - $2 million for complete system
- Fits into R&D and engineering groups
  - Separate from administrative work
  - Performed by science graduates, often with Ph.Ds

Early Academic Computing

- Computer as tool – piece of lab equipment
  - Scientists may develop interest in
  - Universities set up computer centers
  - NSF(& later DARPA) supplies grants to buy machines
- NOT an area of study in its own right
  - Incidental to work in established disciplines
  - Electrical engineers interested
  - Numerical analysis specialists

The ACM

- Association for Computing Machinery
  - Founded 1947
- Journal of the ACM launched 1953
  - Theoretical
  - Focused on scientific programming

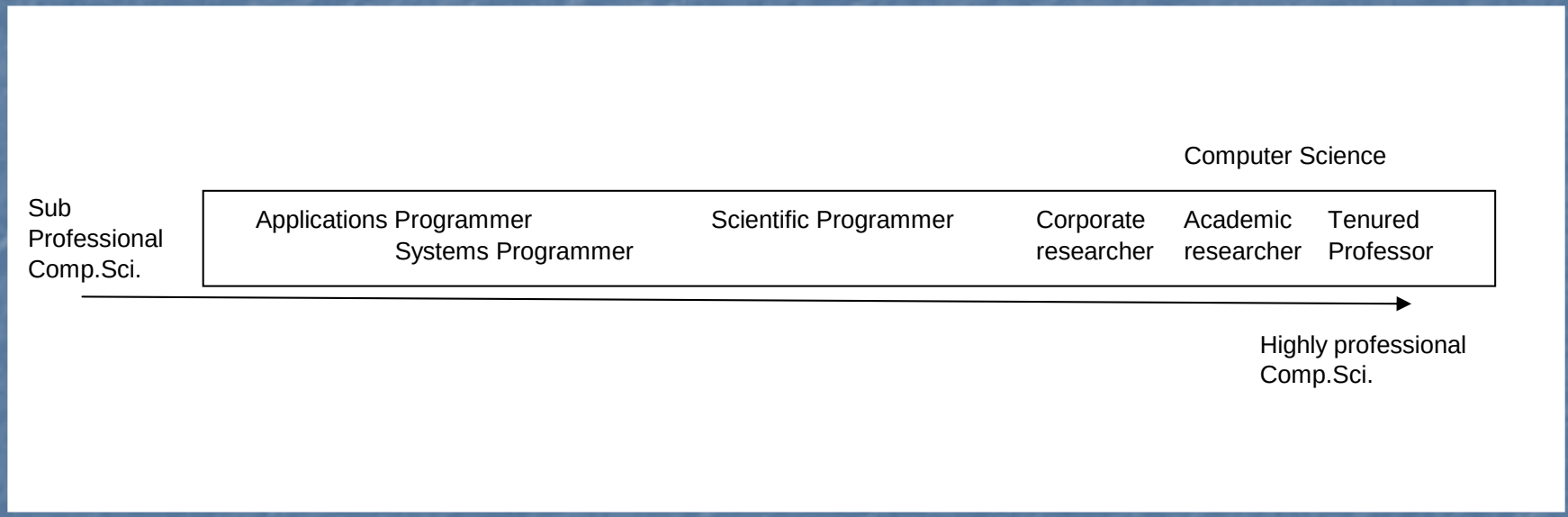
Computer Science

- Term coined circa 1959
  - First departments in mid-1960s
- A “science of the artificial”
  - Have to figure out the where the “science” is
- Focus on theory & rigor
  - Computer language principles
  - Theory of algorithms
  - Hardware architectures
  - Numerical analysis
- Long struggle for acceptance

Scientific Professionalism

- Thomas Gieryn – “boundary work”
- Control of own discipline
  - Separate Academic Departments
  - Specialist and advanced degrees
- Acceptance by academics
  - Research and publication
  - Examination and review by peers
- ACM fosters this
  - Produces model curricula
  - Representation in National Academy of Sciences

Academic Professionalism as Computer Scientists

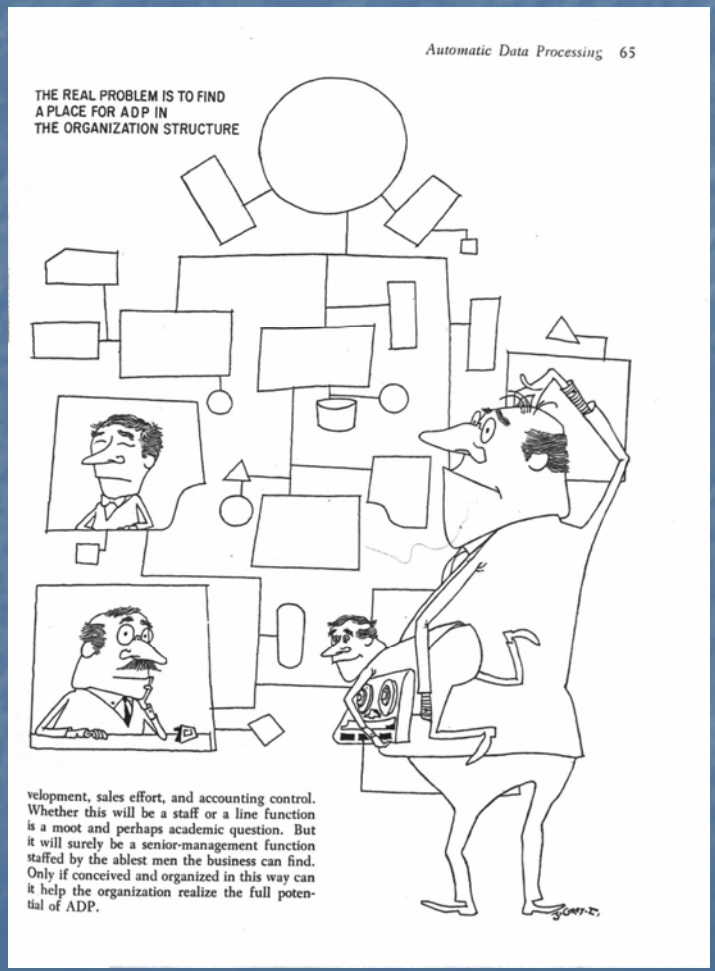


2: Punched Cards & Data Processing

Managerial Professionalism

The Computer Enters Business

Organizational Place Unclear



Automatic Data Processing 65

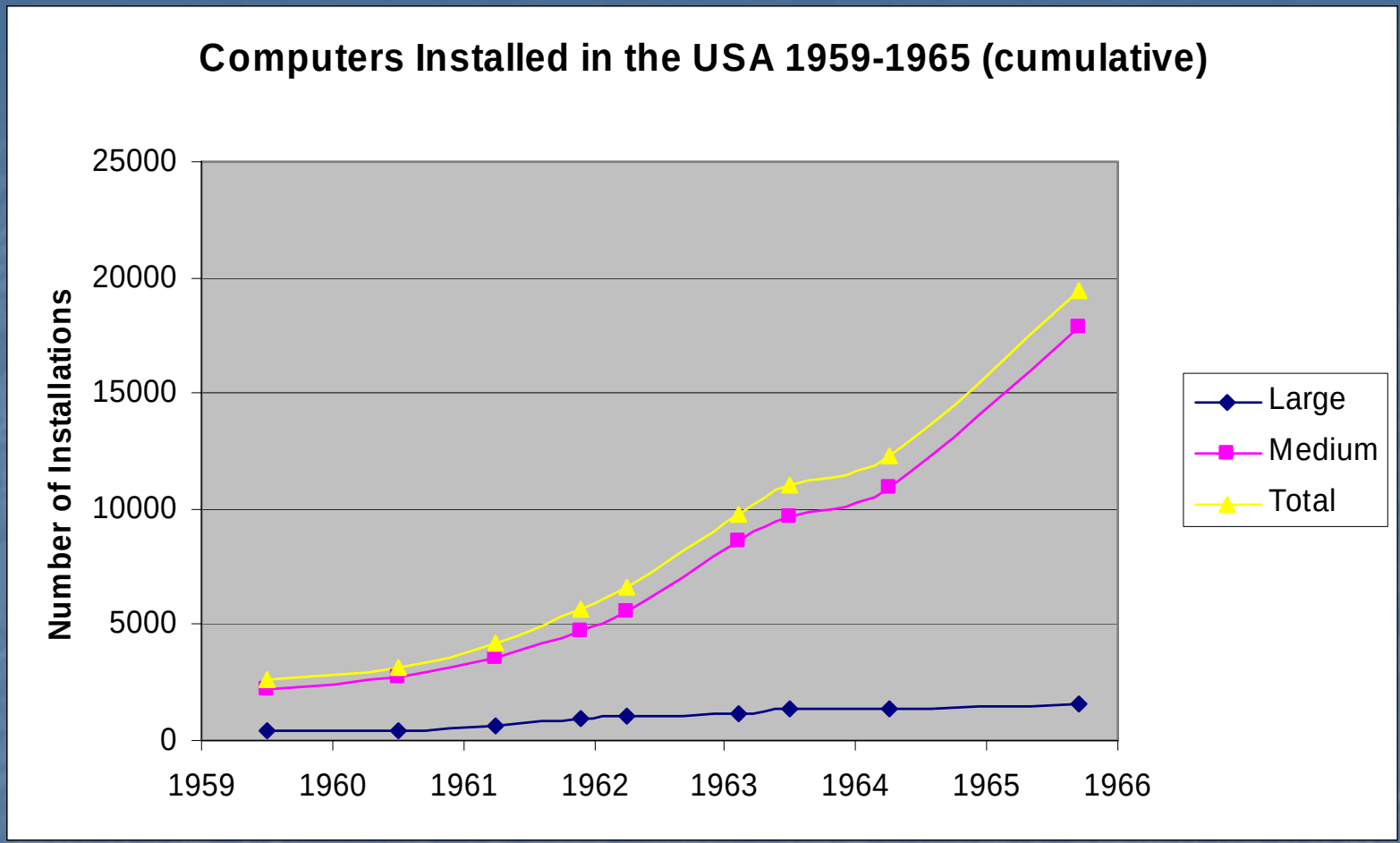
THE REAL PROBLEM IS TO FIND A PLACE FOR ADP IN THE ORGANIZATION STRUCTURE

velopment, sales effort, and accounting control. Whether this will be a staff or a line function is a moot and perhaps academic question. But it will surely be a senior-management function staffed by the ablest men the business can find. Only if conceived and organized in this way can it help the organization realize the full potential of ADP.

- Where to put computer department?
- What duties to assign it?
- Are they management experts or machine operators?

(Electronic) Data Processing

- New term
  - Traditional punched card machines, and
  - Use of computers for administrative purposes
- Ubiquitous through 1970s
  - Serves as name of department, occupation, activity and technology
- Emphasizes continuities
  - Good for IBM
  - Good for tabulating staff



In 1959 there are 45,000 punched card installations.

In 1962, IBM revenue from computer products overtakes that from punched card products

Data Processing Applications

Application	Percentage of data processing departments performing
Payroll and Wage Records	90%
Accounts Receivable	74%
Accounts Payable	66%
Cost Account, Gen. Expense Distribution	63%
Inventory Control	59%
Personnel Records	58%

Leading data processing applications in 1963

Evolution in Practice

- Fundamental continuities from punched card days
  - People and culture
  - Corporate departments
  - Technologies (punched cards still used)
- Data processing people want
  - Higher organizational position
  - “Professional” status in eyes of managers, accountants

THE HOPPER

Official Publication of the Machine Accountants Association

SEPTEMBER 1950 | CHICAGO, ILL. | VOL. I - NO. I

The Kickoff

Here is your first issue of THE HOPPER. It's your baby, designed to provide you with a means of expression, a printed forum, a voice, an ear. How good it will be, how well it will serve you, depends on you. We're kicking the ball to you. Now let's see you carry it by sending in your thoughts, ideas, suggestions, and the like, on anything that will strengthen and improve the MAA and the service it provides to its members, on anything that will help Machine Accountants in their efforts to serve Management more competently, more fully.

We feel THE HOPPER marks another important step forward in the progress of the machine accounting profession. As you know, the science of punched card accounting has expanded to the point where no one man can acquaint himself with all the complexities of the subject. It is the aim of THE HOPPER to keep you abreast of this ever-broadening field by presenting informative articles by specialists in the various technical phases of machine accounting.

I cannot stress too strongly the fact that each of you should take an active interest in MAA publications. If you will examine the articles that are available today on the subject of machine accounting I am sure you will agree that they are not what we need. They are too vague, too general, and all too often written without a full understanding of the punched card equipment used.

This is a condition which the MAA can remedy!

We have men in our own ranks who are capable of writing the kind of detailed, factual, helpful articles we need. Now we have THE HOPPER providing the opportunity for publication of such articles, the ideal means of getting your story before intelligent, interested readers.

Now it's up to you! THE HOPPER is designed to provide you with the opportunity to present your theories on machine accounting and also to show you what others in the profession are thinking and doing that may be of assistance to you in your own operation.

I feel confident that through continuing efforts in this direction all of us in the Machine Accountants Association will soon see the day when we will take an ever-increasing part in the thinking and planning of Management.

Robert L. Jenal

LOOKING AHEAD

After sounding out the membership and looking over all available facilities, we have arranged the following schedule for our general meetings. Throughout the fall, meetings will be held on the second Friday of each month at Henrici's in the Merchandise Mart, as follows:

October 13th
November 10th
December 8th

Dinner will be served promptly at 6:30 P.M.

The meetings will be adjourned prior to 9:30 P.M.

"The Hopper"

- Magazine of the (National) Machine Accountants Association
- First issue produced in 1950

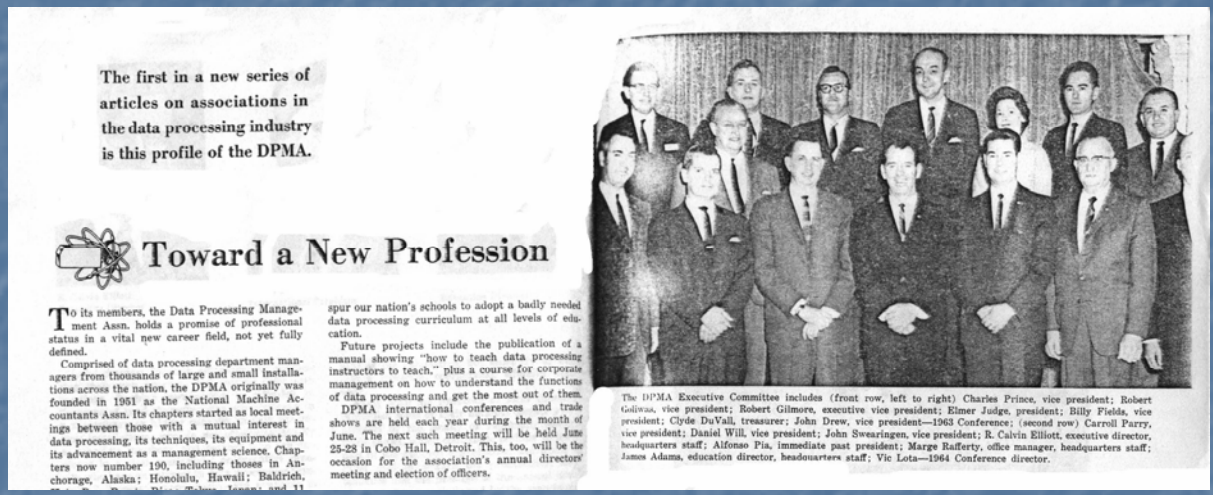
Machine Men

- Craft-based job
  - High school education
  - On-the-job training
  - Gradual progression from operator to chief
- Many aspire to managerial recognition
  - To shape systems as well as run them
  - Look up to accountants (their bosses)

Managers have Low Opinion

- According to Controller of Met Life addressing 1958 Conference,
  - “In the recent past such men were regarded by management in very much the same way as management regarded factory workers or automobile mechanics. In other words, they have been though of in large part, and to the extent they may have been given any though at all, was blue collar workers, or at the very least as having blue piping on their white collars.”
- Fixation on machinery means that they
  - 'put a lot of unnecessary frosting on a cake which was only half baked to start with.'

Data Processing Management Association



The first in a new series of articles on associations in the data processing industry is this profile of the DPMA.

Toward a New Profession

To its members, the Data Processing Management Assn. holds a promise of professional status in a vital new career field, not yet fully defined.

Comprised of data processing department managers from thousands of large and small installations across the nation, the DPMA originally was founded in 1951 as the National Machine Accountants Assn. Its chapters started as local meetings between those with a mutual interest in data processing, its techniques, its equipment and its advancement as a management science. Chapters now number 190, including thoses in Anchorage, Alaska; Honolulu, Hawaii; Baldrich,

spur our nation's schools to adopt a badly needed data processing curriculum at all levels of education.

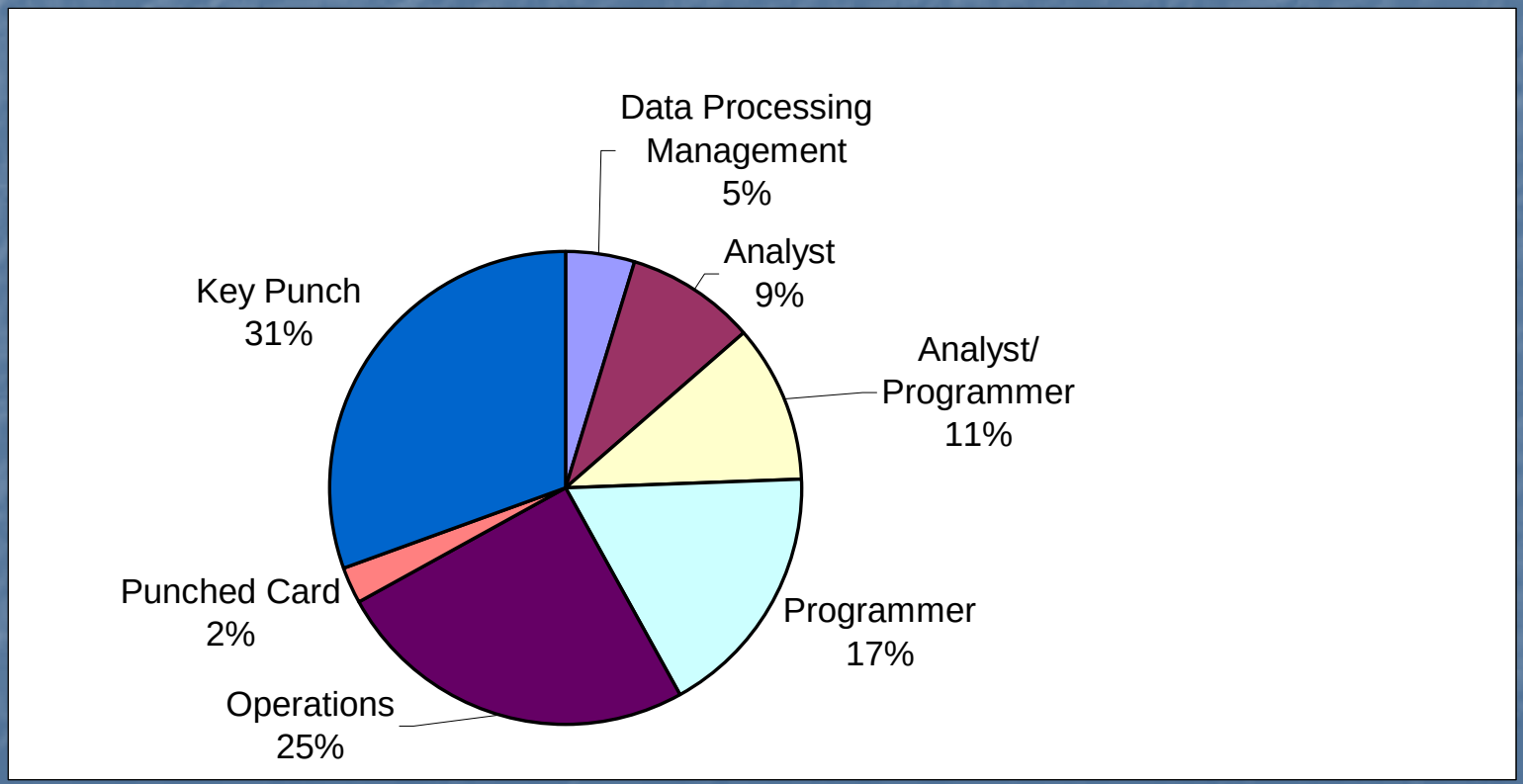
Future projects include the publication of a manual showing "how to teach data processing instructors to teach," plus a course for corporate management on how to understand the functions of data processing and get the most out of them.

DPMA international conferences and trade shows are held each year during the month of June. The next such meeting will be held June 25-28 in Cobo Hall, Detroit. This, too, will be the occasion for the association's annual directors' meeting and election of officers.

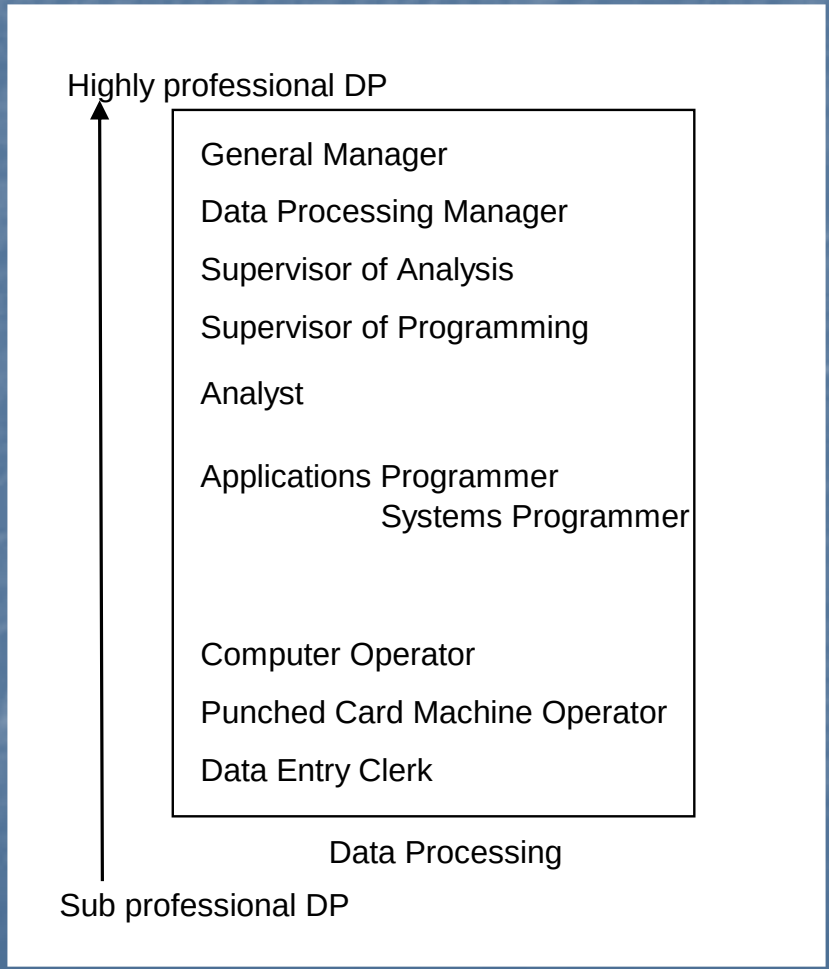
The DPMA Executive Committee includes (front row, left to right) Charles Prince, vice president; Robert Goliwas, vice president; Robert Gilmore, executive vice president; Elmer Judge, president; Billy Fields, vice president; Clyde DuVall, treasurer; John Drew, vice president—1963 Conference; (second row) Carroll Parry, vice president; Daniel Will, vice president; John Swearingen, vice president; R. Calvin Elliott, executive director, headquarters staff; Alfonso Pia, immediate past president; Marge Rafferty, office manager, headquarters staff; James Adams, education director, headquarters staff; Vic Lota—1964 Conference director.

- In 1962, the NMAA (National Machine Accounting Association) renames itself the
- DPMA (Data Processing Management Association
  - Leading computer-related association into 1970s
  - Core membership (70%) remains punched-card supervisors

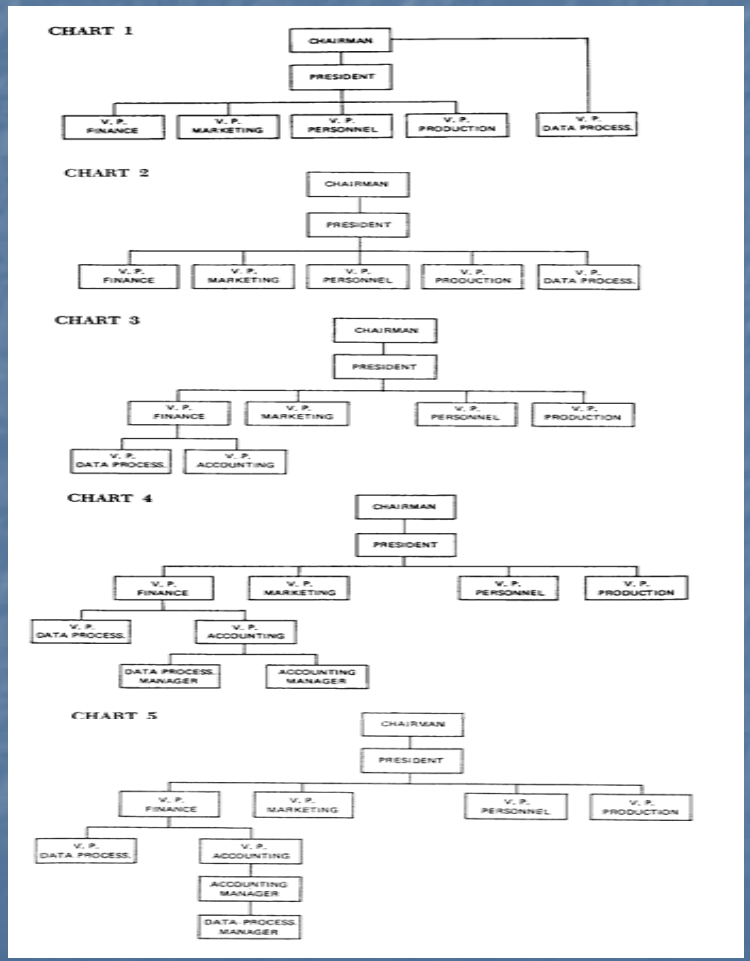
Data Processing Staff, 1971

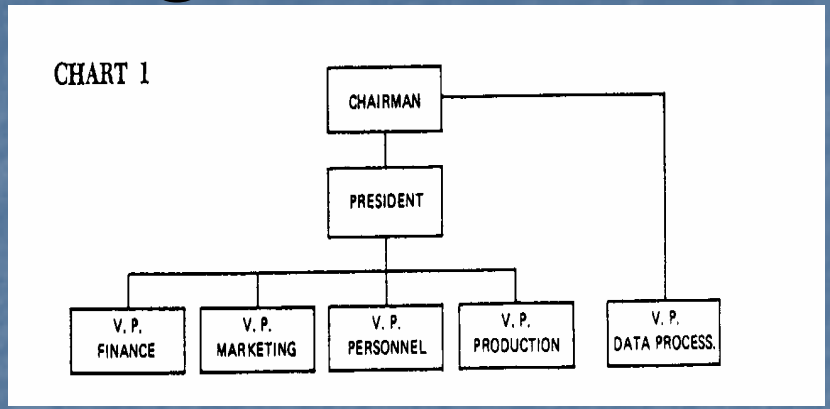


Data Processing Professionalism



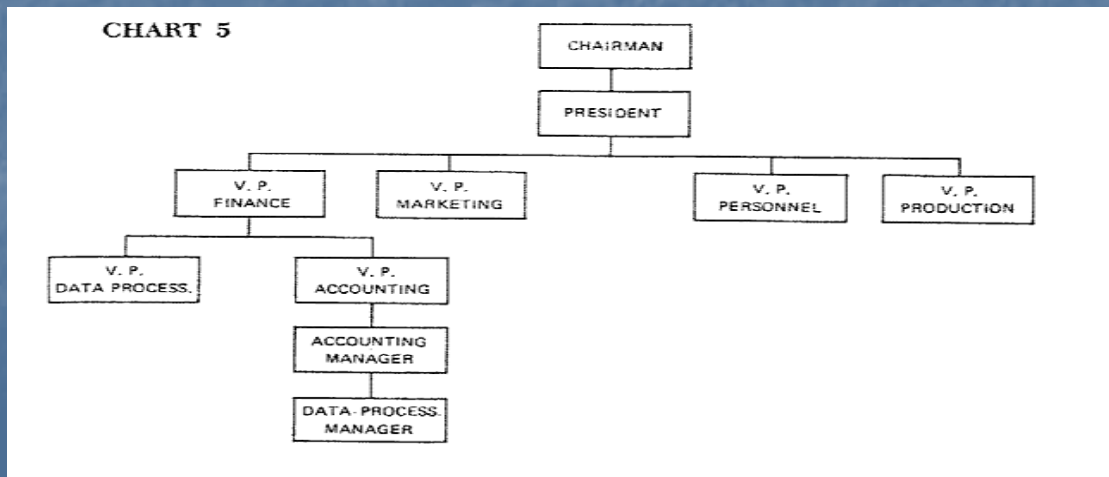
A Manifesto in Org Charts, 1969





Closeups: above is endpoint

Below is start point



DPMA Professionalism Program

- Career trajectory
  - Operator -> Programmer -> Analyst -> Manager
- On-going education programs
  - Seminars, films, textbook
- Volunteer work in community
  - Boy scout badge
  - High school students

Certificate in Data Processing

- Inspired by CPA qualification in accounting
- Original plans very ambitious (1962-1967)
  - 3 year experience requirement
  - Good character
  - College requirements amount to degree in DP
  - Main content areas include
    - Computers
    - Punched cards
    - “Systems” Technologies
    - Mathematics
    - Management
    - Accounting

Goals of CDP

- Key qualification of new profession
- Strengthen professional & technical qualifications of punched card supervisors for electronic age
  - Set them aside from machine operators
  - Prove competence in computer technology
- Tie together different data processing activities into profession
  - Give programmers something to aspire to

Falters in Practice

- Lack of college courses
  - Multiple choice test becomes substitute rather than complement from 1962-65
    - 7,000 people gain the certificate
  - Imposition of college requirements causes massive decline
    - 1967 applicants down 90% from 1965
- Certificate not attainable by existing members
  - Resent subsidizing professionalism of outsiders
- Degree requirements weakened (1968), later dropped
  - Limits external appeal

Plans for Further Certification

- RBP (Registered Business Programmer) launched in 1970
  - Registration less professional than certification
- Discussed for future introduction
  - Systems Analyst test
  - Systems programmer test

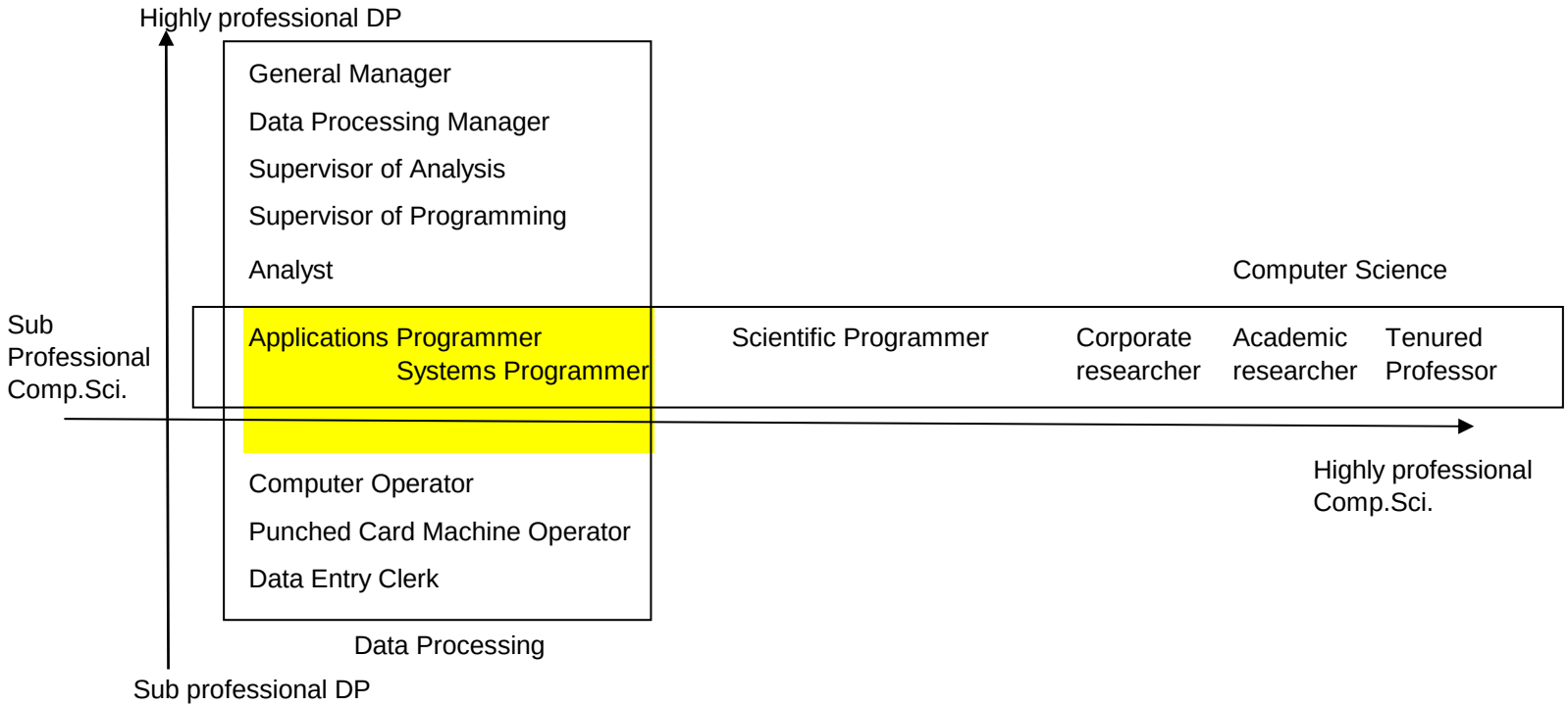
3: Tensions Develop

Status of Programmers

Two Communities Divided By a Common Technology

- Computing vs. Data Processing differed
  - In computer models used
  - Programming practices adopted
  - Background and skills of participants
  - Programming languages
  - Culture and status mechanisms
  - Kinds of organization working within
  - Concept of what is “professional”

Overlap Is Programmers



Limited Initial Contact

- Gradually become aware of each other in the 1960s
  - CDP misperceived by some as general certification for programmers
  - ACM has its own concept of professionalism
    - Working on first CS syllabus standards

Stigma 1: Machine Operator

- Most ACM leaders are contemptuous of DPMA and punched card staff (boundary work)
  - Call them “sorter operators”, “tape jockeys”
  - Uneducated, unscientific, vocationally oriented
- View DPMA certification program with contempt
  - Setting fixed base of knowledge will produce “sub-professional technicians”
- Managers are not professional

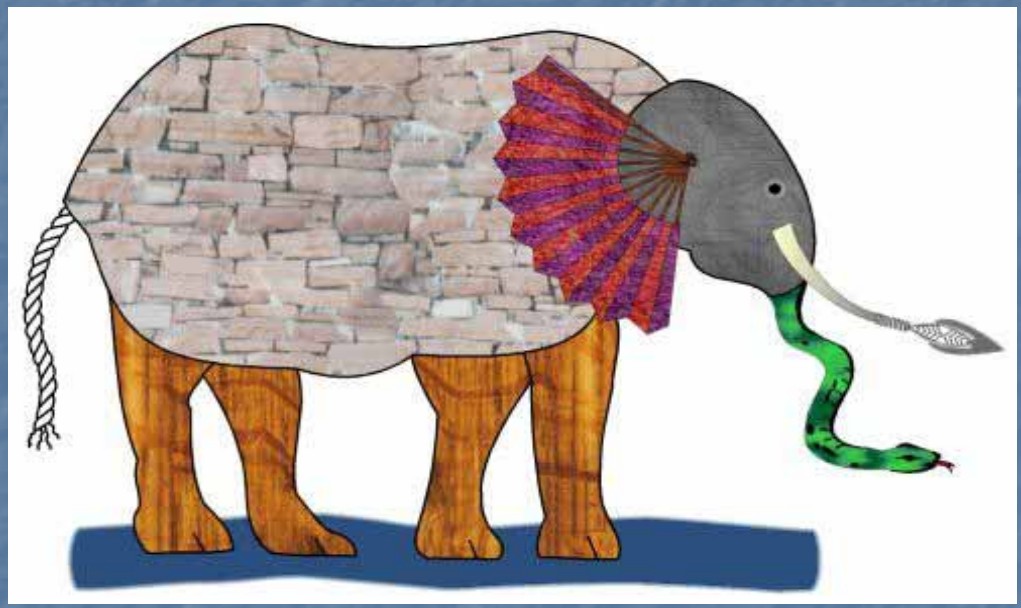
Stigma 2: Long Hair

- DPMA leaders dislike academics
  - Refer to as “long hairs”
  - Stigmatize as the “sweatshirt and sneaker” crowd
  - One leader speaking of Joint Computer Conference says
    - “In the long hair. In the Bell Laboratory computer people, they think that is wonderful, joint computer conference, and engineering people, once they are elected, you know, the long haired guys. They think that is where they belong.”
- Mostly just ignore them
  - Don’t see as part of same occupation

4: Pan-Computing Professionalism

Federal Professionalism

Making an Elephant



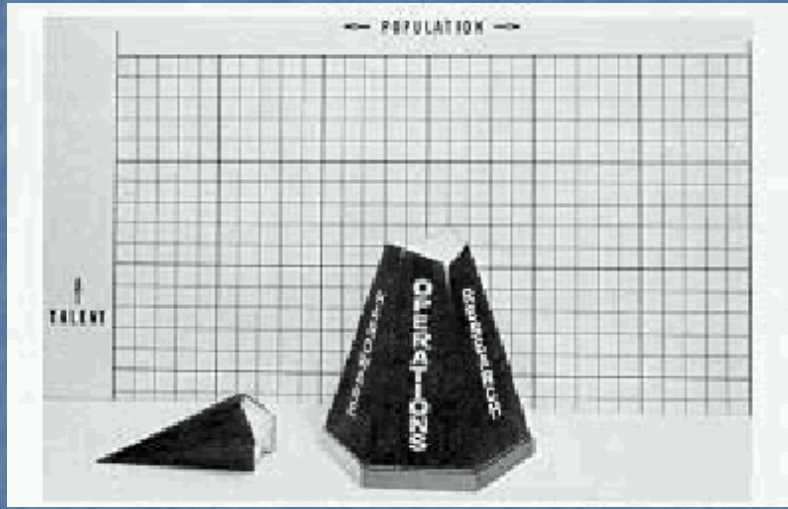
- The Computer Field
- Information Processing
- Computer People
- Computer Professionals

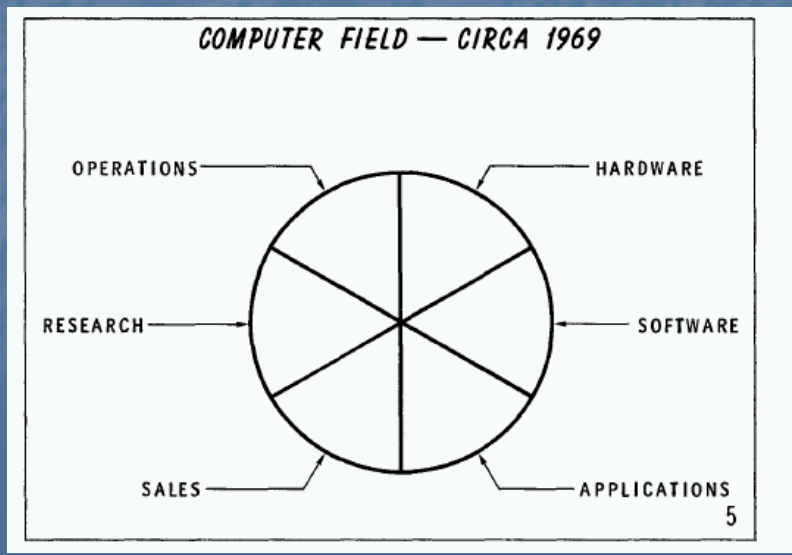
Pan-Computer Professionalists

- Small in numbers, but prominent
- Single cohort
  - All know each other
- Scientific backgrounds
  - Followed by exposure to “systems thinking”
  - And to some form of business management role
- Work in multiple roles
  - Often as independent consultants
  - Often as application experts for computer firms

One Graphic Vision

- Familiarity with all areas needed
  - Expert in at least two
- Presented at ACM SIG Computer Personnel Research, 1969
- by Bob Patrick, Independent computer consultant
  - Had worked for computer services firms
  - Consulted for IBM
  - Worked for RAND





“Federal” Profession is Possible

- Medicine is best example
  - Core education followed by
    - Residency in specialist field
    - Possible specialist examinations
      - Even additional specialist degrees
  - “Overhead” can be considerable
    - Dentists, psychiatrists and vets receive general training

Origins of Pan Computer Professionalism

- Overlapping Circles in Greater LA, 1950s
  - Aerospace firms
- Los Angeles ACM chapter
    - ACM Special Interest Group – Business Data Processing (SIGBDP) grows out of this
      - Origin of SIG structure
- SHARE user group
    - Managers of computation centers in corporations
- RAND Corporation

The “Rand Symposium”

- Sponsored by Fred Gruenberger of RAND
  - Scientific computation background
  - Starts newsletter covering computing and data processing
- Devotes himself to profession building
  - Education
  - Annual “Rand Symposium” for like-minded people

AFIPS

- American Federation of Information Processing Societies
  - Umbrella organization:
    ACM & IEEE Computer Society
- Serves as “money tree”
  - Runs leading computer industry expo
- DPMA is initially excluded
  - Then refuses to join
  - Long, bitter controversy, enters in 1975

PCP in the 1970s

- New cooperation between DPMA and ACM
  - PCP supporters lead ACM for much of 1970s
    - Walter Carlson, Dan McCracken, Herb Grosch
- ACM ruling council retains academic bias
  - Progress and reform proves slow
- Walter Carlson, 1970-1972 leader
  - Hopes for DPMA merger
  - Target increase 25K to 75K

Institute for Certification of Computer Professionals

- Certification effort spun out of DPMA
  - Set up in separate institute
    - Co-sponsored by ACM & several others
    - Starved of resources and support
  - Several new qualifications
    - Included Certificate in Computer Programming (1977)
      - Just 2,750 people attain by 1986
    - Still lingers on today...

Pan-Computer Professionalism
Very Broad in Scope

General Manager

Data Processing Manager				
Supervisor of Analysis	Information Retrieval	Computer-using Scientist		
Supervisor of Programming		Computer-using Manager		
Analyst				
Applications Programmer Systems Programmer	Scientific Programmer	Corporate researcher	Academic researcher	Tenured Professor
Computer Operator	Hardware Developers	Managers in computer firms		

Punched Card Machine Operator

Data Entry Clerk

Relevance

No Single Version Dominates

- Computer Science
  - remains marginal to rank-and-file programmers
  - Software Engineering grows as an alternative
    - Some efforts now to license and certify (IEEE CSDP)
- Data Processing
  - Certification fails, never becomes profession
  - Relationship between technical and managerial work very problematic
- Pan-Computing Professionalism
  - No overall professional identity of “computer people” takes hold
  - ACM/IEEE CS mix roles as academic society and pragmatic service to practitioners

Computing Does Well Anyway

- Both CS and corporate computing see continual growth from 50s to 90s in
  - Pay, prestige, public recognition, numbers
- Most organizational “practitioners” (circa 10 million) have little perceived need for profession
  - Vast majority have no computer science training
  - Certification is low-level, vendor specific
  - Few join any “professional” society
    - Proportionally much lower rate than in 1960s
- Does this mean traditional professionalism is no longer necessary?
  - Will it follow as change slows, conditions worsen?

What Is Informatics?

"The School of Informatics will be foremost in the country to graduate professionals with formal preparation in Information Technology with subject area expertise."

- What is the profession?

- Is this pan-computing professionalism reborn?
  - One profession or many?
  - What is the coherent core?
    - How can the overhead be justified?

Once Discipline or Many?

- Circulated by Gary Wiggins

  “Therefore, informatics is the discipline that covers the structure and the qualities of professional applications involving various academic disciplines known as computer science, information studies, information management, systems engineering, mathematics, statistics, human-computer interaction, medicine, linguistics, psychology, and cognitive science.”

- Source: He, Shaoyi. “Informatics: a brief survey.” The Electronic Library 2003, 21(2), 117-122. p. 118