Tools and Issues in Software History

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Software for Europe

Structure of Talk

- Overview of my papers relevant to software
  - Thoughts about relevance to overall project
- Framing of papers precirculated for discussion by organizers
  - Introduction to "Software in the 1960s"
  - Introduction to "The Chromium-Plated Tabulator"
  - Challenge of my work to "professionalism" theme & Ensmenger chapters

1: Overview of My Work in the Area

Creation of MIS/IS Concept

- "Inventing Information Systems: The Systems Men and the Computer" *Business History Review* 75:1 (Spring 2001): 15-61.
- Systems & Procedures movement → Systems Analysis within computing
- MIS as higher status vision of computing vs. data processing
- MIS as software system that never was

ADAPSO Papers

- "ADAPSO, Regulated Competition, and Professional Services: 1976-1986" *IEEE Annals of the History of Computing* 27:2 (April-June 2005): 89-93.
- "ADAPSO, Timesharing Firms and Software Companies, 1968-1975," *IEEE Annals of the History of Computing* 27:1 (January-March 2005): 67-73.
- "ADAPSO and the Service Bureau Industry, 1961-1968," *IEEE Annals of the History of Computing* 26:1 (January-March 2004): 78-85.

Word Processing

- "Remembering the Office of the Future: Word Processing and Office Automation before the Personal Computer," *IEEE Annals of the History of Computing* 28:4 (October-December 2006):6-31.
- Includes
  - History of WP concept
  - History of text editing capabilities
  - Minicomputer based WP systems
  - Creation of market for stand-alone WP
  - Shift to broader concept of "office automation"
  - Some user experiences

Data Base Management Systems

- "A Veritable Bucket of Facts: Origins of the Database Management System" in *The History and Heritage of Scientific and Technological Information Systems: Proceedings of the 2002 Conference* eds. W. Boyd Rayward & Mary Ellen Bowden (New Jersey: Information Today, 2004):73-78.
- Improved version, ACM SIGMOD Record, 2005
- German version forthcoming in Zuirch History of Knowledge Yearbook.
- Includes
  - Origin of DB concept
  - Early DBMS products
  - Role of CODASYL group
  - Some user experiences

Web Browsers & Email

- Protocols for Profit: Web Browsers and Email as Product and Infrastructure, in Aspray & Ceruzzi, *The Internet & American Business*

Search Engines & Portals

- "Building the Web's Missing Links: Portals and Search Engines" in *The Internet and American Business*, edited by William Aspray and Paul Ceruzzi, MIT Press, forthcoming 2007.

Mathematical Software

- Hired as consultant by SIAM for major grant on history of scientific computing
  - Ran subproject focused on mathematical software packages and libraries
- 23 career oral history interviews
  - All transcribed, most now online
- Some biographies and articles
- Four presentations on open source in mathematical software and its corporate origins in SHARE.
  - Currently writing up

2: Software in the 1960s as Concept, Service & Product

Origin Stories

- Superheroes
- Trickier for other things
  - SCOT & Safety Bicycles

Background

- Special issue of Annals
- Written on request of Burt Grad, prior to publication of MCK book
  - Asked for user perspective
- Always thought of as a minor publication

Concept of Software

- Concept forms during early- & mid- 1960s
  - Older ideas include program, routine, subroutine, application
- Software <> programs
  - Some early definitions include services,
- Dominant sense is for systems programs
  - Compilers, operating systems, etc.
- Implications for "software crisis" understanding

Analytical Categories

- Our analytical categories vs. historical actor's categories
  - To understand their world view, must stand outside it.
- Issue for software
  - What to call programs in the 1950s?
  - What to call application programs in the 1960s?
- Choice of language can expose or hide historical problems
  - Data processing vs administrative computing
  - Information

The SOFT in SOFT-EU

- Programs?
- Applications?
- Packaged, documented programs?
- Programs supplied as part of a commercial transaction?
- Programs sold as a product in their own right?

User View

- Dissertation work on computer use gave sources from viewpoint of DP managers
  - Publications aimed at potential customers
  - Discussion of strengths and weaknesses
- In house teams as main competitors for packaged software

Everything is Fuzzy!

- Product vs Service
  - Sale of add-on services
  - Subscription or lease models, upgrades, support contracts
- Software vs Programs
- Programming language vs Application SW
- Make vs. Buy
- Reused code vs SW library vs Package

Other Thoughts

- All software has users, even Algol
  - Software systems are layered
  - Programmers are people
  - Design embeds a view of an imaginary user
- System software extends hardware (not in paper)
  - So automatic programming increases demand for programmers
- Application systems are what matter to the outside world
  - Hardware & systems software matter in as much as they shape feasibility, cost, and characteristics of applications

3: The Chromium Plated Tabulator: Institutionalizing an Electronic Revolution

Structure of Paper

- Introduction
- (Arrival of the computer in business)
  - Selling a Revolution...
  - ...Buying a Computer
  - Doing the Same Things Faster
- (Data processing work & occupations)
  - Life in the Tab Room
  - Working the Computer
  - The Shock of the New Furniture
  - Systems Analysis & Flowcharting
  - Programming – The New Task
  - Punched Card Machine + Computer = Data Processing
  - Towards Data Processing Management
- Data Processing and the History of Computing
- Revolution Revisited

Storytelling & Choosing a Protagonist

- As with a novel, you need a cast of characters
  - During the narrative they interact, develop, reveal themselves
- Easy in a biography
- Hard when dealing with more diffuse topics
- My actors are members of specialized managerial/technical occupations
  - Created during the course of the story -- tricky
- Class-based (kind of)
- Importance of multi-faceted identities

"New Institutionalism in Organizational Analysis"

- Concept in organization sociology/theory
  - Importance of conformity to shared concept of legitimate organizational form
  - Evolution of org. structures among an institutional field, not individual firms
- Main object of study here is the creation of a new corporate institution: the data processing department
  - Justifies focus on general form, not specific firm or industry

Co-Evolution of Occupational Identities & Corporate Institutions

- Agency and collective action.
- DP managers seeks to improve position through solidarity, collective effort to show the world importance of what they do.
- Process driven by people.

(Electronic) Data Processing Concept

- 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

Continuity with Earlier Practice

- Continuity on hardware supply side long documented
- New continuities documented in
  - Applications
  - Practices
  - Identities
- New occupations formed out of old ones
  - Systems & procedures → Systems analyst
  - Punched card operator → Computer operator
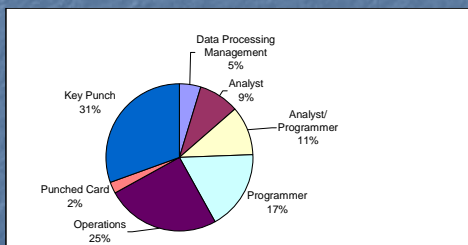 - Tab Supervisor → EDP supervisor

Programming as Only New DP Job

- Preparation of detailed logic diagrams based on high level design
- Combines elements of punched card machine analysis & operation
  - In punched card work, sequence of steps performed by human based on notes
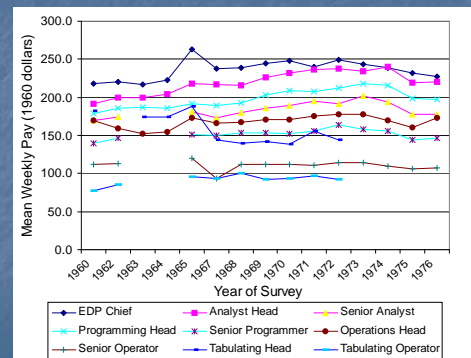
Data Processing Dept Org Chart
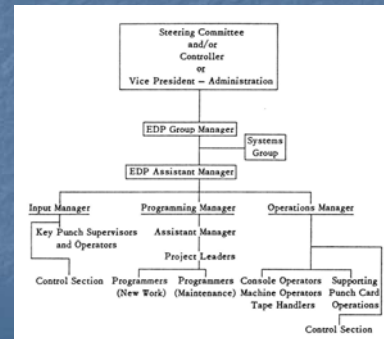
Data Processing Staff, 1971

DP Pay over Time

Hype of "Revolution"

- No time to wait and see if technology works
  - "Can You Afford the 'Practical' Approach to Electronics" (1956)
- "the ominous rumble you sense is the future coming at us.... The changes ahead appear to be similar in character but far beyond those effected by printing."

Rituals and Cultures

- Feasibility study
  - Provides apparent rational and quantitative basis for decision to order computer
  - Closer examination reveals absurdity of assumptions built into calculations
  - Study group become nucleus of new data processing team

Histories of Computings

- "The use of computer technology in a particular social space (such as the laboratory, office, or factory) cannot be addressed without also studying the earlier history of this setting, the people in it, and the objectives to which the machine is put. So, while coherent one-volume histories of the computer hardware industry and its technologies can be written, it seems unlikely that we can produce a single coherent narrative about the use of computers or of associated tasks such as analysis, programming, or operation." (CPT, 95)
- Michael Mahoney follows up on this idea in his essay "The Histories of Computing(s)"

4: Professionalism

Ensmenger – Who Are The Actors? Where is the occupation?

- Protagonists are (undefined and undifferentiated)
  - "programmers,"
  - "computer specialists,"
  - "aspiring computer professionals"
  - "computer people"
  - "software workers"
  - "the contemporary software industry"
  - "data processing personnel"
  - "the programming discipline"
- Also "traditional managers" who resent their autonomy. Never further defined.
- Final mention of "employers" who are unconvinced

Scientific Computation vs DP in Paderborn Paper

- Early evidence is ENIAC related
  - "Transformation of programmer from clerical worker to technical specialist..."
- Jumps to programming in general
  - In "Computer Boys" specifically to corporate politics
- Finishes with Software Engineering
  - Deskilling of programming – a la Braverman

Is Programming an Occupation?

- Clearly programming is not a profession
  - But is it even a single occupation?
- Perhaps not
  - Like writing, programming is an activity performed in multiple occupations
    - E.g. by graduate students in physics & engineering
- Big divisions
  - Systems vs. applications
  - Scientific vs. commercial
 - Real time vs. batch

Pangea Fallacy

- Ensmenger implies than an initial, undifferentiated mass of programmers of the 1950s splinters during the 1960s
  - Scientists & engineers threatened by less skilled entrants
  - Creation of "hierachy within the software professions" is the result
  - This is the origin of systems analysis
  - Routinization & deskilling of lesser programmers
  - "growing schism" from late 1950s between scientific and business programming (page 13)
  - "By the beginning of the 1960s, clearly discernible factions had emerged within the nascent programming discipline"

Actually

- Systems analysis has distinct & older origin within business
- Scientists & engineers are not a primary source of programmers for data processing work
  - Existing employees are retrained
- Scope of autonomy granted programmer in management literature actually increases from 1950s to 1960s
- Scientific (ACM) and business (DPMA) associations grow closer together during 1960s

CDP – Certifying Programmers?

- Ensmenger Annals paper: Certificate in Data Processing as a qualification for the "certified public programmer"
  - "by the end of 1965 almost 7,000 programmers had sat for the exam."
  - The CDP "failed to establish itself as a reliable mechanism for predicting programmer performance or ability"
- Actually, CDP was for DP supervisors & would-be supervisors
  - In 1963 less than 20 percent of applicants were called programmers or coders, and more than 40 percent had no programming experience whatsoever
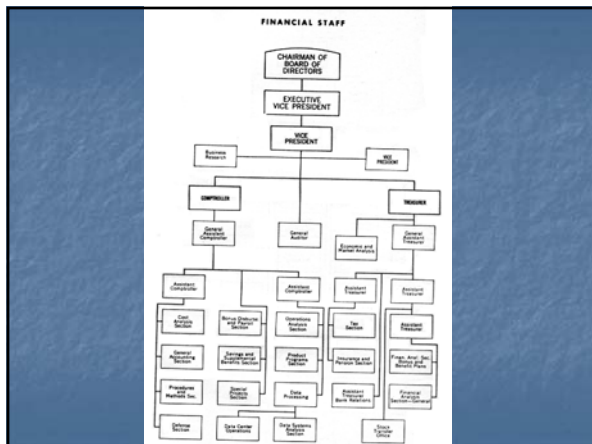
Were Programmers Professionalising?

- "Computer programmers in this period [late 1950s] seem to have been aware of their own ambiguous status, and worked to established the structures of professionalism: academic computer science curriculum, certification programs, and professional societies." – Computer Boys

My Response (Dissertation)

- Programming, an alternative to computing used by Nathan Ensmenger to guide his recent dissertation, is even more misleading. As a frame for the contested identity of computer specialists it proves both too narrow and too broad. It is too broad because it forces Ensmenger to claim that data processing managers, computer scientists and software engineering advocates were competing for the loyalty of a single "programming community." It is too narrow, because none of these groups were actually trying to produce a profession of programming. For each of them, programming was merely a small part of a much bigger professional construction rather than a profession in itself.
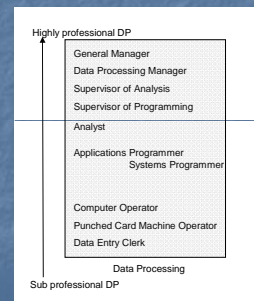
Too Close to SW Engineering Narrative

- Ensmenger believes that programmers in 1950s were widely seen as unmanageable genius wizards
  - But he has no sources from 1950s to support this
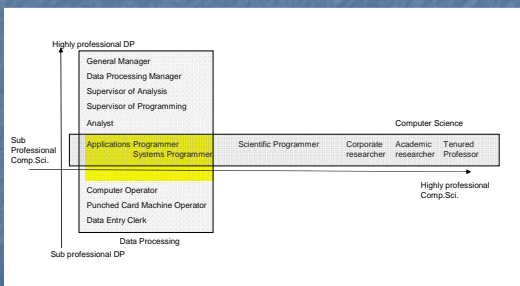 - Parroting self-interested narrative of later SW engineering enthusiasts

Academic Professionalism as Computer Scientists
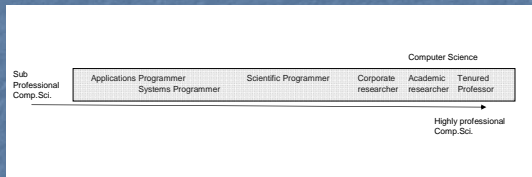
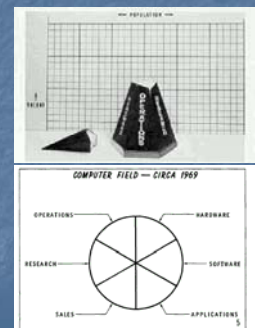## Data Processing Professionalism

Overlap Is Programmers

Pan Computing Professionalism

- 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

Software Engineering

- 4th vision of professionalism
  - Professional SW Engineer is technical project manager
  - Building SW systems, vs. running DP operations
  - Appealing in academic environment – reaction against focus of CS on theory and algorithms
  - Appealing inside engineering firms (eg Boeing)

For This Project

- What is the professionalization agenda within Algol
  - Institutionalization of Computer Science?
  - Upgrading of status of software within computer firms & research labs? (special case)
  - Internationalization of computing research?
- Complementary to work on data processing professionalism
  - But specifics will be very different