

BIOGRAPHICAL SKETCH

Give the following information for key professional personnel listed on page 2, beginning with the Principal Investigator/Program Director. Photocopy this page for each person.

NAME	TITLE	BIRTHDATE (Mo., Day, Yr.)	
Bruce G. Buchanan	Research Professor of Computer Science/	7-7-40	
EDUCATION (Begin with baccalaureate or other initial professional education and include postdoctoral training)			
INSTITUTION AND LOCATION	DEGREE (circle highest degree)	YEAR CONFERRED	FIELD OF STUDY
Ohio Wesleyan University	B.A.	1961	Mathematics
Michigan State University	M.A.	1966	Philosophy
Michigan State University	Ph.D.	1966	Philosophy

RESEARCH AND/OR PROFESSIONAL EXPERIENCE: Concluding with present position, list in chronological order previous employment, experience, and honors. Include present membership on any Federal Government Public Advisory Committee. List, in chronological order, the titles and complete references to all publications during the past three years and to representative earlier publications pertinent to this application. DO NOT EXCEED TWO PAGES.

Teaching and Professional Appointments

1981-present	Professor of Computer Science (Research) Stanford University Co-Principal Investigator (with E. Feigenbaum) of the Heuristic Programming Project since 1976.
1976-1981	Adjunct Professor, Computer Science Dept., Stanford
1972-1976	Research Computer Scientist, Computer Science Department, Stanford University
1966-1971	Research Associate, Artificial Intelligence Project, Stanford University
1965-1966	Instructor, Department of Philosophy Michigan State University

Professional Activities

- Editorial Board, Artificial Intelligence: An International Journal.
- Editorial Board, Journal of Automated Reasoning.
- Editorial Board, MIT Press series on Artificial Intelligence.
- Editorial Board, Addison-Wesley Press series on Expert Systems.
- Advisory Board, IEEE Transactions on Pattern Analysis and Machine Intelligence
- American Association for Artificial Intelligence -- Founding Committee, Program Committees, and Membership Chairman
- National Research Council Panel on Basic and Applied Research in Computer Science (1982-83)
- Teknowledge Inc. -- Co-Founder, Past President, Consulting Senior Scientist, Technology Advisory Board Member
- Comtex Scientific Corp. -- Scientific Advisory Board

Continued

- E.H. Shortliffe and B.G. Buchanan, "A Model of Inexact Reasoning in Medicine," Mathematical Biosciences, 23, 351, 1975.
- B.G. Buchanan and E.A. Feigenbaum, "DENDRAL and Meta DENDRAL: Their Applications Dimension," Artificial Intelligence, 11 (1.2), 5, 1978.
- E.H. Shortliffe, B.G. Buchanan, and E.A. Feigenbaum, "Knowledge Engineering for Medical Decision Making: A Review of Computer-Based Clinical Decision Aids," Proceedings of the IEEE, 67, 1207-1224, 1979.
- R.K. Lindsay, B.G. Buchanan, E.A. Feigenbaum, and J. Lederberg, Applications of Artificial Intelligence for Chemical Inference: The DENDRAL Project, New York: McGraw-Hill, 1980.
- B.G. Buchanan, "Research on Expert Systems," in J.E. Hayes, D. Michie, and Y.H. Pao (eds.), Machine Intelligence 10, New York: John Wiley, 1982.
- B.G. Buchanan, "Partial Bibliography of Work on Expert Systems," SIGART Newsletter No. 84, (Association for Computing Machinery), April, 1983
- Thomas G. Dietterich and B.G. Buchanan, "The Role of Experimentation in Theory Formation," In Proceedings of the International Workshop on Machine Learning June 1983, Univ. of Illinois at Urbana-Champaign, pp. 147-155.
- B.G. Buchanan, "Introduction to the Memo Series of the Stanford Artificial Intelligence Laboratory," AI MAGAZINE Vol. 4, No. 4, Winter 1983.
- B.G. Buchanan and E.H. Shortliffe, RULE-BASED EXPERT SYSTEMS: THE MYCIN EXPERIMENTS OF THE STANFORD HEURISTIC PROGRAMMING PROJECT. New York: Addison-Wesley, 1984.
- J.C. Kunz, E.H. Shortliffe, B.G. Buchanan, and E.A. Feigenbaum, "Computer-Assisted Decision Making in Medicine," Journal of Medicine and Philosophy 9:135-160, 1984.
- B.G. Buchanan, "Expert Systems," Journal of Automated Reasoning Vol. 1, No. 1, Winter 1985.
- D.C. Wilkins, B.G. Buchanan, and W.J. Clancey, "Inferring an Expert's Reasoning by Watching," Proceedings of the 1984 Conference on Intelligent Systems and Machines, 1984. (Also HPP Report 84-29)
- B.G. Buchanan, "Expert Systems: Toward Machines that Think." 1985 Yearbook of Science and the Future. Chicago: Encyclopaedia Britannica, Inc., 1984.
- Li-min Fu and B.G. Buchanan, "Enhancing Performance of Expert Systems by Automated Discovery of Meta-Rules," Proceedings of IEEE Conference on Applications of Expert Systems 1984. (Also HPP Report HPP 84-38)
- Li-Min Fu and B.G. Buchanan, "Learning Intermediate Knowledge in Constructing a Hierarchical Knowledge Base," to be presented at IJCAI-1985 and to appear in the conference proceedings.
- R.G. Smith, H.A. Winston, T.M. Mitchell, and B.G. Buchanan, "Representation and Use of Explicit Justifications for Knowledge Base Refinement," to be presented at IJCAI-85 and to appear in the conference proceedings.

BIOGRAPHICAL SKETCH

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NAME Lawrence M. Fagan	TITLE Senior Research Associate	BIRTHDATE (Mo., Day, Yr.) 1/22/51	
EDUCATION (Begin with baccalaureate or other initial professional education and include postdoctoral training)			
INSTITUTION AND LOCATION	DEGREE (circle highest degree)	YEAR CONFERRED	FIELD OF STUDY
Massachusetts Institute of Technology	B.S.	1973	Interdisciplinary Sci
Stanford University, Stanford, California	Ph.D.	1980	Computer Science
University of Miami, Miami, Florida	M.D.	1983	Medicine

RESEARCH AND/OR PROFESSIONAL EXPERIENCE: Concluding with present position, list in chronological order previous employment, experience, and honors. Include present membership on any Federal Government Public Advisory Committee. List, in chronological order, the titles and complete references to all publications during the past three years and to representative earlier publications pertinent to this application. DO NOT EXCEED TWO PAGES.

Professional Experience

- 1972 - 1973 Research Assistant, Architecture Machine Group, MIT, Cambridge, Mass.
 1973 - 1975 Research Associate; Systems Analyst, Program Verification Project, University of Southern California, Information Sciences Institute, Marina del Rey, Calif.
 1975 Teaching Assistant, Department of Computer Science, Stanford University
 1975 - 1979 Research Assistant, Heuristic Programming Project, Department of Computer Science, Stanford University, MYCIN Project: Diagnosis and therapy of infectious diseases. PUFF/VM: Expert System for intensive care units.
 1979-1980 Associate Scientist, The Institutes of Medical Sciences, Pacific Medical Center, San Francisco, Calif. (PUFF/VM Project)
 1980 Research Associate, Heuristic Programming Project, Department of Computer Science, Stanford University: ONCOCIN Project.
 1980 - 1981 Research Associate, Joint Appointment, Department of Medicine and Computer Science, Stanford University, Stanford, Calif. ONCOCIN Project.
 1981 - 1983 On leave: Ph.D to M.D. Program, University of Miami, Miami, Florida.
 July 1983 Senior Research Associate in Medicine, Department of Medicine, Stanford University.

Awards and Offices

- 1979 Paper of the Year - Medical Instrumentation
 1980 Chairman, Program Demonstration Sessions, Artificial Intelligence in Medicine Conference, Stanford University, Stanford, California
 1980 - Member, Executive Committee, Heuristic Programming Project
 1983 Co-director, Medical Information Sciences Program, Stanford University
 1983 National Liaison - SUMEX-AIM Computer National Resource for Artificial Intelligence in Medicine
 1983 - Project Director: ONCOCIN, Cancer protocol management system.

Publications

1. Wraith, S.M., Aikins, J.S., Buchanan, B.G., Clancey, W.J., Davis, R., Fagan, L.M. et al. Computerized consultation system for selection of antimicrobial therapy, *American Journal Hospital Pharmacy* 33:1304-1308, 1976.
2. Yu, V.L., Fagan, L.M., Wraith, S.M., et al. Antimicrobial selection by a computer - A blinded evaluation by infectious disease experts. *J. Amer. Med. Assoc.* 242:1279-1282, 1979.
3. Osborn, J.J., Fagan, L.M., Fallat, R., Kunz, J.C., McClung, D., Mitchell, R. Managing the data from respiratory measurements. *Med. Instrumentation*, 13(6), November 1979.

Biographical sketch, Lawrence M. Fagan - continued

4. Fagan, L.M.: Representing time-dependent relations in a medical setting. Ph.D. Thesis, Computer Science Department, Stanford University, 1980. (Thesis advisor: Edward Feigenbaum).
5. Fagan, L.M.: Measurement interpretation in the intensive care unit. Fifth Illinois Conference on Medical Information Systems, Champaign, Illinois, May 1979, pp. 253-262.
6. Fagan, L.M., Kunz, J.C., Feigenbaum, E.A. and Osborn, J.J.: A symbolic processing approach to measurement interpretation in the intensive care unit. Proc. Third Annual Symposium Computer Applications in Medical Care. Silver Spring, Maryland, October, 1979, pp. 30-33.
7. Fagan, L.M., Kunz, J.C., Feigenbaum, E.A., Osborn, J.J.: Representation of dynamic clinical knowledge: Measurement interpretation in the intensive care unit., 6th International Joint Conference on Artificial Intelligence, Tokyo, Japan, August 1979, pp. 260-262.
8. Fagan, L.M., Shortliffe, E.H. and Buchanan, B.G.: Computer-based medical decision making: From MYCIN to VM. Automedica 3(2), 1980, pp. 97-106. Also appears in "Readings in Medical Artificial Intelligence", (W. Clancey and E.H. Shortliffe, eds.) Addison-Wesley Publ. Co., 1984.
9. Kunz, J.C., Fallat, R.J., McClung, D.H., Osborn, J.J., Votteri, B.A., Nii, H.P., Aikins, J.S., Fagan, L.M., Feigenbaum, E.A.: A physiological rule based system for interpreting pulmonary function test results. Proc. Computers in Critical Care and Pulmonary Medicine, IEEE Press, 1979.
10. Fagan, L.M. Understanding Spoken Language. In "The Handbook of Artificial Intelligence" (A. Barr and E.A. Feigenbaum, eds.), Vol. 1, pp 323-362, Los Altos, California, 1981.
11. Shortliffe, E.H. and Fagan, L.M. Expert systems research: modeling the medical decision making process. In "An Integrated Approach to Monitoring" (J.S. Gravenstein, R.S. Newbower, A.K. Ream, and N.T. Smith, eds.), pp. 185-202, Woburn, MA. Butterworth's 1983.
12. Fagan, L.M., Kunz, J.C., Feigenbaum, E.A., Osborn, J.J. "Extensions to the Rule-Based Formalism for a Monitoring Task". In "Rule-Based Expert Systems: the MYCIN Experiments of the Stanford Heuristic Programming Project" (B. Buchanan and E.H. Shortliffe, eds.) Addison-Wesley, 1984.
13. Shortliffe, E.H. and Fagan, L.M. Artificial intelligence: the expert systems approach to medical consultation. Proceedings of the 6th Annual International Symposium on Computers in Critical Care and Pulmonary Medicine, 4-7 June 1984, Heidelberg, Germany.
14. Horvitz, E.J., Heckerman, D.E., Nathwani, B.N., and Fagan, L.M. Diagnostic Strategies in the Hypothesis-Directed PATHFINDER System. HPP Memo 84-13. First Conference on Artificial Intelligence Applications, Dec. 5-7, 1984, Denver, Colorado.
15. Blum, R.L., Walker, M.G., and Fagan, L.M. Minimycin: A Miniature Rule-Based System. To appear in M.D. Computing.
16. Preston, K., Jr., Fagan, L.M., Huang, H.K., and Pryor, T.A. Computing in Medicine. To appear in "Computer", 1984. (Centennial Issue).

Invited Talks

National Computer Conference, Los Angeles, CA 1978
 Artificial Intelligence in Medicine Workshop, 1979, 1980, 1983, 1984
 IEEE Chapter Biomedical Engineering, San Francisco, CA, 1980
 Computers in Medicine Conference, Stanford, CA, 1984
 Physicians and Computers Conference, Las Vegas, Nevada 1984
 Stanford University Obstetrics-Gynecology Grand Rounds, 1984

BIOGRAPHICAL SKETCH

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NAME Barbara Hayes-Roth	TITLE Sr. Research Associate	BIRTHDATE (Mo., Day, Yr.) 1/14/49	
EDUCATION (Begin with baccalaureate or other initial professional education and include postdoctoral training)			
INSTITUTION AND LOCATION	DEGREE (circle highest degree)	YEAR CONFERRED	FIELD OF STUDY
Boston University	A.B.	1971	Psychology
University of Michigan	M.S.	1973	Psychology
University of Michigan	Ph.D.	1974	Psychology

RESEARCH AND/OR PROFESSIONAL EXPERIENCE: Concluding with present position, list in chronological order previous employment, experience, and honors. Include present membership on any Federal Government Public Advisory Committee. List, in chronological order, the titles and complete references to all publications during the past three years and to representative earlier publications pertinent to this application. DO NOT EXCEED TWO PAGES.

Employment History:

1982-Present Senior Research Associate, Computer Science Department
Stanford University, Stanford, Ca.
1976-1982 Senior Psychologist/Computer Scientist, Information
Sciences Department, The Rand Corporation, Santa Monica, Ca.
1974-1976 Member of Technical Staff, Instructional Research Department
Bell Laboratories, Murray Hill, N.J.
1972-1974 Teaching Fellow, Department of Psychology
The University of Michigan, Ann Arbor, Mi.
1971 System Analyst, Department of Marketing Research
The Gillette Company, Boston, Ma.
1969-1971 Consultant and Programming Instructor
Cambridge Computer Associates, Cambridge, Ma.

Consulting History:

1984-Present AI Research Center
FMC Corporation, Santa Clara, Ca.
1985 AI Research Group
Martin-Marietta, Denver, Co.
1984-1985 Knowledge Systems Division
Perceptronics, Menlo Park, Ca.
1982-1985 Cognitive Interface Department
Hewlett-Packard, Palo Alto, Ca.
1979-1983 Cognitive Processes Panel
National Science Foundation, Washington, D.C.
1979-1980 Consulting Associate Professor
Psychology and Computer Science Departments, Stanford University,
Stanford, Ca.
1978 Summer Study Group on Educational Testing, Falmouth, Ma.
National Institute of Education, Washington, D.C.
1977-1979 Adjunct Assistant Professor
University of California, Los Angeles

Teaching Experience:

1979-1982 Cognitive Processes in Planning, Stanford University
1977 Thinking, University of California, Los Angeles
1972-1974 Artificial Intelligence, Learning and Memory, Psychology
as a Natural Science, Psychology Teaching Practicum,
Psychology Research Practicum
1969-1971 Computer Programming, Cambridge Computer Associates

Fellowships, Honors and Professional Memberships:

Phi Beta Kappa, 1971
National Institutes of Health Trainee, The University of Michigan, 1971-1972
National Science Foundation Fellow, The University of Michigan, 1972-1974
Nominated as Fellow to the Center for Advanced Studies in the
Behavioral Sciences, Stanford University, 1980
Member, American Association for Artificial Intelligence
Member, Cognitive Science Society

Publications and Technical Reports:

Hayes-Roth, B. A blackboard architecture for control, Artificial Intelligence
Journal, 1985, in press.
Hayes-Roth, B., and Hewett, M. Learning control heuristics in BB1.
Stanford University, Stanford, Ca. Report HPP-85-2.
Hayes-Roth, B. BB1: An environment for building blackboard systems
that control, explain, and learn about their own problem-solving
behavior. Stanford University, Stanford, Ca. Report HPP-84-16.
Hayes-Roth, B. A blackboard model of control. Heuristic Programming
Project, Stanford University, Stanford, Ca., Report HPP-83-38,
August, 1983
Hayes-Roth, B. An Overview of the Blackboard Architecture. Heuristic
Programming Project, Stanford University, Stanford, Ca., Report
HPP-83-30, February, 1983
Thorndyke, P.W., and Hayes-Roth, B. Differences in spatial knowledge acquired
from maps and navigation. Cognitive Psychology, 1982, 14, 560-589.
Hayes-Roth, B. A cognitive science approach to improving planning. Proceedings
of the Cognitive Science Society, Berkeley, 1981.
Hayes-Roth, B. Opportunism in consumer behavior. Proceedings of the Association
for Consumer Research, October, 1981.
Kanouse, D., and Hayes-Roth, B. Cognitive considerations in the design of
product warnings. In Barofsky, I., Mazis, M., and Morris, L.A. (Eds.),
Banbury Reports: Product Labeling and Health Risks, Cold Spring Harbor,
N.Y., 1980.
Hayes-Roth, B., and Hayes-Roth, F. A cognitive model of planning.
Cognitive Science, 1979, 3, 275-310.

BIOGRAPHICAL SKETCH

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NAME Harold Brown	TITLE Sr. Research Associate	BIRTHDATE (Mo., Day, Yr.)	
EDUCATION (Begin with baccalaureate or other initial professional education and include postdoctoral training)			
INSTITUTION AND LOCATION	DEGREE (circle highest degree)	YEAR CONFERRED	FIELD OF STUDY
University of Notre Dame	M.S.	1963	Mathematics
Ohio State University	Ph.D.	1966	Mathematics

RESEARCH AND/OR PROFESSIONAL EXPERIENCE: Concluding with present position, list in chronological order previous employment, experience, and honors. Include present membership on any Federal Government Public Advisory Committee. List, in chronological order, the titles and complete references to all publications during the past three years and to representative earlier publications pertinent to this application. DO NOT EXCEED TWO PAGES.

Experience:

- 1979 - Senior Research Associate, Member Heuristic Programming Project, Department of Computer Science, Stanford University
- 1977 - 1979 Senior Project Scientist, NASA-Ames Research Center Institute for Advanced Computation, Sunnyvale, CA
- 1974 - 1977 Research Associate, Member Heuristic Programming Project, Department of Computer Science, Stanford University
- 1977 Lecturer, Information Science Department, University of California, Santa Cruz, CA
- 1971 - 1972 Visiting Professor, Department of Computer Science,
1973 - 1974 Stanford University
- 1963 - 1975 Instructor, Assistant Professor, Assistant Chairman, Associate Professor, Professor, Mathematics Department, Ohio State University
- Winter 1971, Visiting Professor, Mathematics, Rhine. Westf. Tech.
1973, 1975 Hoch., Aachen
- 1964 - 1970 Director, Associate Director, NSF - SSTP
- 1967 - 1968 Visiting Member, Courant Institute of Mathematical Sciences, New York University
- 1960 - 1963 Assistant to the Chairman, Mathematics Department, University of Notre Dame

Professional Memberships:

American Association for Artificial Intelligence
Association for Computing Machinery
Institute of Electrical and Electronic Engineers

Representative Publications:

Brown, H.D. and Stefik, M. The partitioning of concerns in digital system design. Proceedings of the MIT Conference on Advanced Research in ULSI, 1981.

Brown, H.D., Tong, C., and Foyster, G. Environment for circuit design. Computer, vol. 16, no. 12, December 1983.

Brown, H.D., Yan, J. and Foyster, G. An expert system for assigning mask levels. HPP Report 83-39, October 1983.

BIOGRAPHICAL SKETCH

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NAME Hisako Penny Nii	TITLE Research Associate	BIRTHDATE (Mo., Day, Yr.)	
EDUCATION (Begin with baccalaureate or other initial professional education and include postdoctoral training)			
INSTITUTION AND LOCATION	DEGREE (circle highest degree)	YEAR CONFERRED	FIELD OF STUDY
Stanford University	M.S.	1973	Computer Science
Tufts University	B.S.	1962	Mathematics

RESEARCH AND/OR PROFESSIONAL EXPERIENCE: Concluding with present position, list in chronological order previous employment, experience, and honors. Include present membership on any Federal Government Public Advisory Committee. List, in chronological order, the titles and complete references to all publications during the past three years and to representative earlier publications pertinent to this application. DO NOT EXCEED TWO PAGES.

Experience:

- 1976 - present Research Associate, Heuristic Programming Project, Stanford University, Stanford, Ca.
- 1973 - 1975 Associate Investigator for Computer Science, HASP Project Systems Control, Inc., Palo Alto, California.
- 1967 - 1968 Systems Engineering Advisor, International Business Machines, World Trade Asia Corporation, Tokyo, Japan.
- 1962 - 1967 Research Staff Programmer, International Business Machines Corporation, Thomas J. Watson Research Center, Yorktown, New York
- 1965 - 1967 Project Leader, Electronic Coding Pad (ECP) System, Designed and developed a multi-language, conversational programming and debugging system using display terminals on satellite computers.
- 1965 - 1966 Assistant Manager, Man-Computer Interaction Group. Designed and implemented an interactive System/360 Assembly Language interpreter. Supervised projects in computer-aided project management, interactive PL/1, and graphic modeling.
- 1963 - 1964 Programmer. World's Fair Lexical Processing System, translation from Russian to English using special-purpose computer.
- 1962 - 1963 Programmer, miscellaneous applications ranging from text processing to linear programming problems.

Recent Publications

Nii, H. Penny. "Research on Blackboard Architectures at the Heuristic Programming Project", Heuristic Programming Project Memo HPP-85-24, May 1985. Also to appear in: "The Proceedings of the Workshop on AI and Distributed Problem Solving", 1985.

Feignebaum, E., H. Brown, B. Delagi, R. Gabriel, P. Nii, and T. Rindfleisch. "Advanced Architectures Project: Scope and Approach," Heuristic Programming Project Memo HPP-84-40, October, 1984.

Nii, H. Penny. "Signal-to-Symbol Transformation: Reasoning in the HASP/SIAP Program", Proc. of ICASSP'84.

Nii, H. Penny. "Signal-to-Symbol Transformation: A Summary of HASP/SIAP Case Study," Intellectual Leverage for the Information Society, Digest of Papers, Spring Comcon83, IEEE Catalog No. 83CH1856-4, pp. 120 - 125.

Nii, H. P., E. A. Feigenbaum, J. J. Anton, and A. J. Rockmore. "Signal-to-Symbol Transformation: HASP/SIAP Case Study", The Artificial Intelligence Magazine, Vol 3, No. 1, 1982.

Nii, H. P. An Introduction to Knowledge Engineering, Blackboard Model, and AGE, Heuristic Programming Project Memo HPP-80-29, Computer Science Dept., Stanford University, 1980.

Manuals

Aiello, N., H.P. Nii, and W.C. White. The Joy of AGE-ing: An Introduction of AGE-1 System, Heuristic Programming Project Memo HPP-81-23, Computer Science Dept., Stanford University, October 1981.

Aiello, N., H.P. Nii, and W.C. White. AGE System Reference Manual, Heuristic Programming Project Memo HPP-81-24, Computer Science Dept., Stanford University, October 1981.

Aiello, N. and Nii, H. P. BOWL: A Beginner's Program Using AGE, AGE Example Series: No. 1, Heuristic Programming Project Memo-81-26, 1980.

Aiello, N. and H.P. Nii. AGEPUFF: A Simple Event-Driven Program, AGE Example Series No. 2, Heuristic Programming Project Memo-81-25, 1981.

1.5. Current and Pending Support

The following lists the sources of current and pending support for key personnel in our proposal:

EDWARD H. SHORTLIFFE

CURRENT SUPPORT:

Agency: National Institutes of Health
ID Number: 5 P41 RR00785-12
Project Title: SU Medical Experimental Computer Resource (SUMEX)
Principal Investigators: Edward H. Shortliffe & Edward A. Feigenbaum
Amount Awarded: \$6,400,287
Period Covered: 8/1/81 - 7/31/86
Current Award: (8/1/84 - 7/31/85) \$1,108,929
Percent Effort Committed To Project: 10%

Agency: National Institutes of Health
ID Number: RR-01631
Project Title: Studies of the Dissemination of Consultation Systems
Principal Investigator: Edward H. Shortliffe
Amount Awarded: \$624,455
Period Covered: 7/1/83-6/30/86
Current Award: (7/1/84-6/30/85) \$222,511
Percent Effort Committed To Project: 30%

Agency: National Institutes of Health
ID Number: LM-04136
Project Title: Therapy-Planning Strategies for Consultation by Computer
Principal Investigator: Edward H. Shortliffe
Amount Awarded: \$211,851
Period Covered: 8/1/83- 7/31/86
Current Award: (8/1/84-7/31/85) \$69,875
Percent Effort Committed To Project: 5% (No salary)

Agency: National Science Foundation
ID Number: IST 83-12148
Project Title: Information Structure and Use in Knowledge-Based Expert Systems
Principal Investigators: Bruce G. Buchanan & Edward H. Shortliffe
Amount Awarded: \$330,138 (Total Costs)
Period Covered: 3/1/84-2/28/87
Current Award: (3/1/85-2/28/86) \$101,308 (Total Costs)
Percent Effort Committed To Project: 5%

Agency: National Institutes of Health
ID Number: 1 T32 LM07033
Project Title: Postdoctoral Training in Medical Information Science
Principal Investigator: Edward H. Shortliffe
Amount Awarded: \$903,718
Period Covered: 7/1/84-6/30/89
Current Award: (7/1/84-6/30/85) \$79,059
Percent Effort Committed To Project: 15% (No salary)

Current and Pending Support

Agency: Henry J. Kaiser Family Foundation
ID Number: None
Project Title: Henry J. Kaiser Faculty Scholar in General Internal Medicine
Principal Investigator: Edward H. Shortliffe
Amount Awarded: \$150,000
Period Covered: 7/1/83-6/30/86 (renewable until June 1988)
Current Award: (7/1/84-6/30/85) \$50,000
Percent Effort Committed To Project: Supports time on other projects;
provides 40% of salary plus unrestricted research funds

PENDING SUPPORT:

Agency: National Institutes of Health
ID Number: 1 RO1 LM04420-01
Project Title: Knowledge Management for Clinical Trial Advice Systems
Principal Investigator: Edward H. Shortliffe
Amount Requested: \$314,707
Period Covered: 7/1/85-6/30/88
Percent Effort Committed To Project: 5%

Agency: National Center for Health Services Research / National
Institutes of Health
ID Number: NCI/HS-05414
Project Title: Computer support for clinical research in the community
Principal Investigator: Edward H. Shortliffe
Amount Requested: \$1,578,840
Period Covered: 10/1/85-9/30/89
Percent Effort Committed To Project: 10%

APPLICATIONS IN PREPARATION: NONE

Current and Pending Support

EDWARD A. FEIGENBAUM

CURRENT SUPPORT:

Agency: National Institutes of Health
ID Number: 5 P41 RR00785-12
Project Title: SU Medical Experimental Computer Resource (SUMEX)
Principal Investigators: Edward H. Shortliffe & Edward A. Feigenbaum
Amount Awarded: \$6,400,287
Period Covered: 8/1/81 - 7/31/86
Current Award: (8/1/84 - 7/31/85) \$1,108,929
Percent Effort Committed To Project: 6%

Agency: Boeing Computing Services Company
ID Number: None
Project Title: Research on Blackboard Problem-Solving Systems
Principal Investigators: Edward A. Feigenbaum & Bruce G. Buchanan
Amount Awarded: \$225,000 (Total Costs)
Period Covered: 2/1/85 - 1/31/86
Percent Effort Committed To Project: 5%

Agency: Defense Advanced Research Projects Agency
ID Number: N00039-83-C-0136
Project Title: Heuristic Programming Project
Principal Investigators: Edward A. Feigenbaum & Bruce G. Buchanan
Amount Awarded: \$3,354,493 (Total Costs)
Period Covered: 10/1/82 - 9/30/85
Percent Effort Committed To Project: 10%

Agency: Defense Advanced Research Projects Agency
ID Number: MDA903-83-C-0188
Project Title: Research Computing Equipment Modernization
Principal Investigator: Edward A. Feigenbaum
Amount Awarded: \$2,565,000 (Total Costs)
Period Covered: 6/1/83 - 5/31/85
Percent Effort Committed To Project: 0% salary

Agency: Defense Advanced Research Projects Agency
ID Number: F30602-85-C-0012
Project Title: Expert Systems on Multiprocessor Architecture
Principal Investigator: Edward A. Feigenbaum
Amount Awarded: \$4,454,444 (Total Costs)
Period Covered: 3/14/85 - 3/13/89
Percent Effort Committed To Project: 19%

Agency: NASA-AMES Research Center
ID Number: NCC 2-220, S1
Project Title: Research on Advanced Knowledge-Based System Architectures
Principal Investigator: Edward A. Feigenbaum
Amount Awarded: \$265,000 (Total Costs)
Period Covered: 10/1/82 - 11/30/85
Percent Effort Committed To Project: 2%

Current and Pending Support

Agency: IBM; IBM/Stanford Joint Study
ID Number: None
Project Title: The Use of Design Models in the Diagnosis of Computer Hardware
Principal Investigator: Edward A. Feigenbaum
Amount Awarded: \$846,824 (Total Costs)
Period Covered: 6/1/80 - 5/31/85
Percent Effort Committed To Project: 2%

Agency: National Science Foundation
ID Number: MCS-8310236
Project Title: Applications of AI to Molecular Biology
Principal Investigator: Edward A. Feigenbaum
Amount Awarded: \$270,836 (Total Costs)
Period Covered: 11/1/83 - 10 /31/85
Current Award: (11/1/84 - 10/31/85) \$131,621 (Total Costs)
Percent Effort Committed To Project: 4% (no current salary support)

Agency: National Science Foundation
ID Number: MCS-8303142
Project Title: The Mechanization of Formal Reasoning (Computer Research)
Principal Investigator: Edward A. Feigenbaum
Amount Awarded: \$183,921 (Total Costs)
Period Covered: 7/15/83 - 6/30/85
Current Award: (7/1/84 - 6/30/85) \$98,657 (Total Costs)
Percent Effort Committed To Project: 2% (no current salary support)

PENDING SUPPORT:

Agency: Defense Advanced Research Projects Agency
ID Number: None
Project Title: Knowledge-Based Systems Research
Principal Investigators: Edward A. Feigenbaum & Bruce G. Buchanan
Amount Requested: \$4,464,793 (Total Costs)
Period Covered: 10/1/85 - 9/30/88
Percent Effort Committed To Project: 15%

APPLICATIONS IN PREPARATION: NONE

Current and Pending Support

BRUCE G. BUCHANAN

CURRENT SUPPORT:

Agency: National Institutes of Health
ID Number: 5 P41 RR00785-12
Project Title: SU Medical Experimental Computer Resource (SUMEX)
Principal Investigators: Edward H. Shortliffe & Edward A. Feigenbaum
Amount Awarded: \$6,400,287
Period Covered: 8/1/81 - 7/31/86
Current Award: (8/1/84 - 7/31/85) \$1,108,929
Percent Effort Committed To Project: 10%

Agency: NASA-Ames Research Center
ID Number: NCC02-274
Project Title: Research On Knowledge Representation
Principal Investigator: Bruce G. Buchanan
Amount Awarded: \$850,000 (Proposed Total Costs)
Period Covered: 10/1/83 - 9/30/88 (support level pending for future years)
Percent Effort Committed To Project: 10%

Agency: Defense Advanced Research Projects Agency
ID Number: N00039-83-C-0136
Project Title: Heuristic Programming Project
Principal Investigators: Edward A. Feigenbaum & Bruce G. Buchanan
Amount Awarded: \$3,354,493 (Total Costs)
Period Covered: 10/1/82 - 9/30/85
Percent Effort Committed To Project: 40%

Agency: National Science Foundation
ID Number: IST-83-12148
Project Title: Information Structure-Use Knowledge-Based Expert Systems
Principal Investigators: Bruce Buchanan & Edward H. Shortliffe
Amount Awarded: \$330,138 (Total Costs)
Period Covered: 3/15/84 - 2/28/87 (support level pending for future years)
Current Award: (3/1/85 - 2/28/86) \$101,308
Percent Effort Committed To Project: 5%

Agency: National Science Foundation
ID Number: PCM-84-02348
Project Title: Interpretation of NMR Data for Proteins Using AI Methods
Principal Investigators: Bruce Buchanan & Oleg Jardetzky
Amount Awarded: \$100,000 (Total Costs)
Period Covered: 11/1/84 - 10/31/86
Current Award: (11/1/84 - 10/31/85) \$50,000 (Total Costs)
Percent Effort Committed To Project: 0% (No salaries included in grant.)

Agency: NASA-Goddard Space Flight Center
ID Number: NAG-5-261
Project Title: Planning in Uncertain and Unforgiving Situations, and
Planning Physical Actions
Principal Investigators: Bruce G. Buchanan & Thomas O. Binford
Amount Awarded: \$127,837 (Total Costs) (level pending for future years)
Period Covered: 9/1/83 - 8/31/85
Percent Effort Committed To Project: 12%

Agency: Josiah Macy, Jr. Foundation
ID Number: None
Project Title: A Family of Intelligent Tutoring Programs for
Medical Diagnosis
Principal Investigator: Bruce G. Buchanan
Amount Awarded: \$503,415 (Total Costs)
Period Covered: 3/1/85 - 2/29/88
Percent Effort Committed To Project: 5%

Agency: International Business Machines
ID Number: None
Project Title: Attempts to Determine the User's Conceptualization System
Principal Investigator: Bruce G. Buchanan
Amount Awarded: \$165,000 (Total Costs)
Period Covered: 5/11/84 - 5/10/85
Percent Effort Committed To Project: 5%

Agency: Boeing Computing Services Company
ID Number: None
Project Title: Research on Blackboard Problem-Solving Systems
Principal Investigators: Edward A. Feigenbaum & Bruce G. Buchanan
Amount Awarded: \$225,000 (Total Costs)
Period Covered: 2/1/85 - 1/31/86
Percent Effort Committed To Project: 10%

Agency: Lawrence Livermore
ID Number: None
Project Title: Research on Intelligent Budget Planning and
Resource Management Systems
Principal Investigator: Bruce G. Buchanan
Amount Awarded: \$49,964 (Total Costs)
Period Covered: 12/14/84 - 9/30/85
Percent Effort Committed To Project: 3%

PENDING SUPPORT:

Agency: National Institutes of Health
ID Number: None
Project Title: Understanding and Critiquing Clinical Trials Literature
Principal Investigators: Bruce G. Buchanan & B.W. Brown
Amount Requested: \$340,316
Period Covered: 7/1/85 - 6/30/88
First Year: 7/1/85 - 6/30/86 \$107,505
Percent Effort Committed To Project: 5%

Agency: Office of Naval Research
ID Number: None
Project Title: Computer-Based Tutors for Explaining and Managing
the Process of Diagnostic Reasoning
Principal Investigator: Bruce G. Buchanan
Amount Requested: \$510,622 (Total Costs)
Period Covered: 3/15/85 - 3/14/88
Percent Effort Committed To Project: 5%

Current and Pending Support

Agency: Office of Naval Research

ID Number: None

Project Title: Expert Control of Problem-Solving Search

Principal Investigator: Bruce G. Buchanan

Amount Requested: \$725,899 (Total Costs)

Period Covered: 8/1/85 - 7/31/88

Percent Effort Committed To Project: 5%

Agency: Defense Advanced Research Projects Agency

ID Number: None

Project Title: Knowledge-Based Systems Research

Principal Investigators: Edward A. Feigenbaum & Bruce G. Buchanan

Amount Requested: \$4,464,793 (Total Costs)

Period Covered: 10/1/85 - 9/30/88

Percent Effort Committed To Project: 35%

APPLICATIONS IN PREPARATION: NONE

LAWRENCE M. FAGAN

CURRENT SUPPORT:

Agency: National Institutes of Health
ID Number: 5 P41 RR00785-12
Project Title: SU Medical Experimental Computer Resource (SUMEX)
Principal Investigators: Edward H. Shortliffe & Edward A. Feigenbaum
Amount Awarded: \$6,400,287
Period Covered: 8/1/81 - 7/31/86
Current Award: (8/1/84 - 7/31/85) \$1,108,929
Percent Effort Committed To Project: 5%

Agency: National Institutes of Health
ID Number: RR 01613
Project Title: Studies in the Dissemination of Consultation Systems
Principal Investigator: Edward H. Shortliffe
Amount Awarded: \$624,455
Period Covered: 7/1/83 - 6/30/86
Current Award: (7/1/84 - 6/30/85) \$222,511
Percent Effort Committed To Project: 16%

Agency: National Institutes of Health
ID Number: LM-04136
Project Title: Therapy-Planning Strategies for Consultation by Computer
Principal Investigator: Edward H. Shortliffe
Amount Awarded: \$211,851
Period Covered: 8/1/83-7/31/86
Current Award: (8/1/84-7/31/85) \$69,875
Percent Effort Committed To Project: 29%

Agency: National Institutes of Health
ID Number: 1 R23 LM04316
Project Title: Explanation of Computer-Assisted Therapy Plans
Principal Investigator: Lawrence M. Fagan
Amount Awarded: \$107,441
Period Covered: 2/1/85-1/31/88
Current Award: (2/1/85-1/31/86) \$37,500
Percent Effort Committed To Project: 50%

PENDING SUPPORT: NONE

APPLICATIONS IN PREPARATION: NONE

Current and Pending Support

THOMAS C. RINDFLEISCH

CURRENT SUPPORT:

Agency: National Institutes of Health
ID Number: 5 P41 RR00785-12
Project Title: SU Medical Experimental Computer Resource (SUMEX)
Principal Investigators: Edward H. Shortliffe & Edward A. Feigenbaum
Amount Awarded: \$6,400,287
Period Covered: 8/1/81 - 7/31/86
Current Award: (8/1/84 - 7/31/85) \$1,108,929
Percent Effort Committed To Project: 100%

PENDING SUPPORT:

Agency: Defense Advanced Research Projects Agency
ID Number: None
Project Title: Knowledge-Based Systems Research
Principal Investigators: Edward A. Feigenbaum & Bruce G. Buchanan
Amount Requested: \$4,464,793 (Total Costs)
Period Covered: 10/1/85 - 9/30/88
Percent Effort Committed to Project: 20%

APPLICATIONS IN PREPARATION: NONE

WILLIAM J. YEAGER

CURRENT SUPPORT:

Agency: National Institutes of Health

ID Number: 5 P41 RR00785-12

Project Title: SU Medical Experimental Computer Resource (SUMEX)

Principal Investigators: Edward H. Shortliffe & Edward A. Feigenbaum

Amount Awarded: \$6,400,287

Period Covered: 8/1/81 - 7/31/86

Current Award: (8/1/84 - 7/31/85) \$1,108,929

Percent Effort Committed To Project: 100%

PENDING SUPPORT: NONE

APPLICATIONS IN PREPARATION: NONE

Current and Pending Support

HAROLD BROWN

CURRENT SUPPORT:

Agency: Defense Advanced Research Projects Agency
ID Number: N00039-83-C-0136
Project Title: Heuristic Programming Project
Principal Investigators: Edward A. Feigenbaum & Bruce G. Buchanan
Amount Awarded: \$3,354,493 (Total Costs)
Period Covered: 10/1/82 - 9/30/85
Percent Effort Committed To Project: 100%

Agency: Defense Advanced Research Projects Agency
ID Number: F30602-85-C-0012
Project Title: Expert Systems on Multiprocessor Architecture
Principal Investigator: Edward A. Feigenbaum
Amount Awarded: \$4,454,444 (Total Costs)
Period Covered: 3/14/85 - 3/13/89
Percent Effort Committed To Project: 50%, beginning 10/85

PENDING SUPPORT:

Agency: National Institutes of Health
ID Number: 5 P41 RR00785-13
Project Title: SU Medical Experimental Computer Resource (SUMEX)
Principal Investigators: Edward H. Shortliffe & Edward A. Feigenbaum
Amount Awarded: \$6,400,287
Period Covered: 8/1/81 - 7/31/86
Pending Award: (8/1/85 - 7/31/86) \$1,281,295
Percent Effort Committed To Project: 10%

Agency: Defense Advanced Research Projects Agency
ID Number: None
Project Title: Knowledge-Based Systems Research
Principal Investigators: Edward A. Feigenbaum & Bruce G. Buchanan
Amount Requested: \$4,464,793 (Total Costs)
Period Covered: 10/1/85 - 9/30/88
Percent Effort Committed To Project: 10%

APPLICATIONS IN PREPARATION: NONE

HISAKO PENNY NII

CURRENT SUPPORT:

Agency: National Institutes of Health
ID Number: 5 P41 RR00785-12
Project Title: SU Medical Experiment Computer Resource (SUMEX)
Principal Investigators: Edward H. Shortliffe & Edward A. Feigenbaum
Amount Awarded: \$6,400,287
Period Covered: 8/1/81 - 7/31/86
Current Award: (8/1/84 - 7/31/85) \$1,108,929
Percent Effort Committed to Project: 40%

Agency: Defense Advanced Research Projects Agency
ID Number: N00039-83-C-0136
Project Title: Heuristic Programming Project
Principal Investigators: Edward A. Feigenbaum & Bruce G. Buchanan
Amount Awarded: \$3,354,493 (Total Costs)
Period Covered: 10/1/82 - 9/30/85
Percent Effort Committed To Project: 40%

Agency: Defense Advanced Research Projects Agency
ID Number: F30602-85-C-0012
Project Title: Expert Systems on Multiprocessor Architecture
Principal Investigator: Edward A. Feigenbaum
Amount Awarded: \$4,454,444 (Total Costs)
Period Covered: 3/14/85 - 3/13/89
Percent Effort Committed To Project: 50%, beginning 8/85

Agency: NASA-AMES Research Center
ID Number: NCC 2-220, S1
Project Title: Research on Advanced Knowledge-Based System Architectures
Principal Investigator: Edward A. Feigenbaum
Amount Awarded: \$265,000 (Total Costs)
Period Covered: 10/1/82 - 11/30/85
Percent Effort Committed To Project: 20%

PENDING SUPPORT:

Agency: Defense Advanced Research Projects Agency
ID Number: None
Project Title: Knowledge-Based Systems Research
Principal Investigators: Edward A. Feigenbaum & B.G. Buchanan
Amount Requested: \$4,464,793 (Total Costs)
Period Covered: 10/1/85 - 9/30/88
Percent Effort Committed to Project: 5%

APPLICATIONS IN PREPARATION: NONE

Current and Pending Support

BARBARA HAYES-ROTH

CURRENT SUPPORT:

Agency: Defense Advanced Research Projects Agency
ID Number: N00039-83-C-0136
Project Title: Heuristic Programming Project
Principal Investigators: Edward A. Feigenbaum & Bruce G. Buchanan
Amount Awarded: \$3,354,493 (Total Costs)
Period Covered: 10/1/82 - 9/30/85
Percent Effort Committed To Project: 75%

PENDING SUPPORT:

Agency: National Institutes of Health
ID Number: 5 P41 RR00785-13
Project Title: SU Medical Experimental Computer Resource (SUMEX)
Principal Investigators: Edward H. Shortliffe & Edward A. Feigenbaum
Amount Awarded: \$6,400,287
Period Covered: 8/1/81 - 7/31/86
Current Award: (8/1/85 - 7/31/86) \$1,281,295
Percent Effort Committed To Project: 15%

Agency: Defense Advanced Research Projects Agency
ID Number: None
Project Title: Knowledge-Based Systems Research
Principal Investigators: Edward A. Feigenbaum & Bruce G. Buchanan
Amount Requested: \$4,464,793 (Total Costs)
Period Covered: 10/1/85 - 9/30/88
Percent Effort Committed To Project: 50%

Agency: Office of Naval Research
ID Number: None
Project Title: Computer-Based Tutors for Explaining and Managing
The Process of Diagnostic Reasoning
Principal Investigator: Bruce G. Buchanan
Amount Requested: \$510,311 (Total Costs)
Period Covered: 3/15/85 - 3/14/88
Percent Effort Committed to Project: 25%

APPLICATIONS IN PREPARATION: NONE

CHARLOTTE JACOBS

CURRENT SUPPORT:

Agency: National Institutes of Health
ID Number: P01 CA34233-02
Project Title: Clinical and Laboratory Studies of the Malignant Lymphomas
Principal Investigator: Saul A. Rosenberg
Period Covered: 4/1/83 - 3/31/86
Current Award: (4/1/85 - 3/31/86) \$1,314,907
Percent Effort Committed To Project: 10%

Agency: National Institutes of Health
ID Number: CA09287-07
Project Title: Investigative Oncology
Principal Investigator: Saul A. Rosenberg
Period Covered: 9/1/78 - 8/31/88
Current Award: (9/1/84 - 8/31/85) \$92,580
Percent Effort Committed To Project: 3%

Agency: National Institutes of Health
ID Number: 1 R24-RR01631
Project Title: Studies in the Dissemination of Consultation Systems
Principal Investigator: Edward H. Shortliffe
Period Covered: 7/1/83 - 6/30/86
Current Award: (7/1/84 - 6/30/85) \$222,511
Percent Effort Committed To Project: 5%

Agency: National Institutes of Health
ID Number: CA25862-04
Project Title: Northern California Oncology Group
Principal Investigator: C. Norman Coleman
Period Covered: 8/1/83 - 7/31/86
Current Award: (8/1/84 - 7/31/85) \$104,483
Percent Effort Committed To Project: 3%

Agency: National Institutes of Health
ID Number: 1R01A2 CA33849
Project Title: Chemical Modifiers of Radiation Therapy and Chemotherapy
Principal Investigator: C. Norman Coleman
Period Covered: 5/1/84 - 4/30/87
Current Award: (5/1/85 - 4/30/86) \$184,256
Percent Effort Committed To Project: 10%

PENDING SUPPORT:

Agency: National Institutes of Health
ID Number: 1R01CA3771-01
Project Title: Modifiers of Cisplatin Nephrotoxicity
Principal Investigator: Charlotte Jacobs
Amount Requested: \$361,503
Period Covered: 7/1/85 - 6/30/88
Percent Effort Committed To Project: 30%

Current and Pending Support

Agency: Bristol Myers

ID Number: None

Project Title: Improvements in the Efficacy of Cisplatin Nephrotoxicity

Principal Investigator: Charlotte Jacobs

Amount Requested: \$347,658

Period Covered: 7/1/85 - 6/30/86

Percent Effort Committed To Project: 30%

Agency: National Institutes of Health

ID Number: 2 R25 CA21555-07A1

Project Title: Cancer Education Program

Principal Investigator: Charlotte Jacobs

Amount Requested: \$293,182

Period Covered: 7/1/85 - 6/30/90

Percent Effort Committed To Project: 25%

Agency: Bristol Myers

ID Number: None

Project Title: A Phase III Randomized Study Comparing High Dose
Bolus Platinol (DDP) and 96-Hour Continuous Infusion Fluorouracil
(5-FU) in Combination and as Single Agents in Advanced Squamous Cell
Carcinoma of the Head and Neck

Principal Investigator: Charlotte Jacobs

Amount Requested: \$21,600

Period Covered: 7/1/85 - 6/30/86

Percent Effort Committed To Project: 26%

APPLICATIONS IN PREPARATION: NONE