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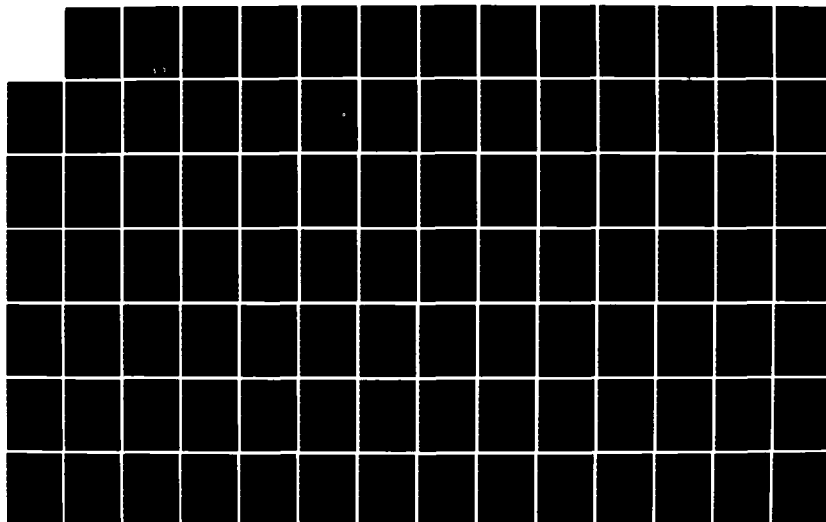
TEST AND EVALUATION MASTER PLAN (TEMP) FOR THE NAVY
OCCUPATIONAL HEALTH I. (U) R-K RESEARCH AND SYSTEM
DESIGN MALIBU CALIF 24 APR 85 N00014-84-C-0601

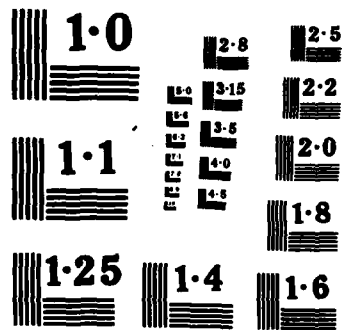
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R-K RESEARCH AND SYSTEM DESIGN

April 24, 1985

Commanding Officer, Naval Medical
Research & Development Command
ATTN: Code N00075
NMC-NCR
Bethesda, MD 20814-5044

Re: Contract N00014-84-C-0601

Dear Sir:

Under the work statement for Phase I of Contract N00014-84-C-0601, the Contractor was tasked to develop a Test and Evaluation Master Plan (TEMP) for the Navy Occupational Health Information Management System (NOHIMS) that addresses nine areas of system functioning: (1) responsiveness to Navy needs and requirements; (2) design suitability; (3) efficiency; (4) enhancement of medical monitoring; (5) use of the NOHIMS database for legal evidence; (6) usability of NOHIMS; (7) cost analysis; (8) transferability of NOHIMS; and (9) NOHIMS as an aid to research. The Final Report for Phase I of this contract, being submitted herewith, is comprised of the following set of documents:

Test and Evaluation Master Plan (TEMP) for the Navy Occupational Health Information Management System (NOHIMS)

- Appendix A - Structured Interviews for Medical Care Provider Users
- Appendix B - Structured Interview for Industrial Users (Industrial Hygienists/Work Center Supervisors)
- Appendix C - Structured Interview for Data Entry Personnel
- Appendix D - Structured Interview for Contracted NOHIMS Developers
- Appendix E - Structured Interview for NHRC NOHIMS Developers
- Appendix F - Structured Interview for NHRC Interim System Developers
- Appendix G - Structured Interview for Test Site Administrators/System Managers
- Appendix H - Structured Interview for Higher Level Navy Management
- Appendix I - Structured Interview for NEHC Project Management Team
- Appendix J - Structured Interview for Navy Legal Counsel and
- Appendix K - Structured Interview for NHRC/Bremerton ADP Personnel

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Cont'd

Appendix L - Stated Navy Goals and Objectives,
Appendix M - System Description and Design Features,
Appendix N - Standard Reports,
Appendix O - Data Collection Forms/Sources,
Appendix P - Medical Monitoring and Care Goals,
Appendix Q - Information Needs for Legal Purposes,
Appendix R - Development Costs and Intended Benefits,
Appendix S - Description of Government-Owned Occupational,
Health Information Systems,
Appendix T - Description of Commercially Available Occupa-
tional Health Information Systems, and
Appendix U - Description of Navy Interim Occupational Health
Information System.

Annotated Bibliography of Publications dealing with Occupational
Health and Medical Information Systems, Cost Analysis Procedures,
Evaluation Methodology, and Related Legal Issues

Preliminary Outline for the Phase II Final Report of the Test and
Evaluation of the Navy Occupational Health Information Manage-
ment System (NOHIMS)

Distribution of this unclassified Phase I Final Report, following
instructions in the above-reference contract, is as follows:

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Respectfully submitted,

Diane M. Ramsey-Klee, Ph.D.
Diane M. Ramsey-Klee, Ph.D.
Director

**TEST AND EVALUATION MASTER PLAN (TEMP)
FOR THE
NAVY OCCUPATIONAL HEALTH INFORMATION MANAGEMENT SYSTEM (NOHIMS)**

- I. To describe and compare the NOHIMS system design to stated Navy goals and objectives and to the goals and objectives of system developers and/or users.

A. Required data:

1. Description of stated Navy goals.
2. General description of system features which meet Navy goals.
3. Subjective assessment by various groups as to how well NOHIMS has met/meets the stated Navy goals.
4. Description of goals as seen by system developers.
5. Description of goals as seen by system users.
6. Subjective assessment by various groups as to how well NOHIMS met/meets their personal and group goals.

B. Sources:

1. Conference proceedings, reports, Navy files, and interviews with appropriate personnel.
2. System documentation.
- 3-6. Interviews with appropriate personnel to define goals and assess how well NOHIMS has met/meets the goals.

C. Methods:

1. Research using checklist (Appendix L) and interviews with system developers, Navy management, and NEHC project management team using structured interview (Appendices E, F, H & I).
2. Review of system documentation in light of goals defined in 1.
- 3-6. Structured interview with system developers, NEHC project management team, users, administrators, and system managers (Appendices A, B & E-I). Compile list of goals as seen by users and developers. Group subjective assessments of how well goals have been/are being met by appropriate categories such as management, developers, medical users, non-medical users, and researchers.

D. Measures:

- 1-2. Not applicable.
3. For each goal defined, percentage of persons interviewed who felt that goal was/is met, by appropriate groups and total. Percentage of persons interviewed who felt that NOHIMS has met/is meeting stated and perceived goals very well, by appropriate groups and total.
- 4-5. Not applicable.
6. Same as 3.

II. To describe the NOHIMS system design, features, automated reports, output, and data collection forms/sources.

A. Required data:

1. Description of programming structure and language used.
2. Description of system hardware configuration.
3. Description of system options.
4. Description of system features and functions.
5. Description of system users.
6. Description of reports/output generated by the system.
7. Description of data collection forms/sources.
8. Description of system documentation and job aids.

B. Sources:

- 1-2. Interviews with appropriate sources.
3. System documentation.
4. System documentation and interviews with appropriate sources.
5. Interviews with appropriate sources.
6. NOHIMS Systems Decision Paper, files of system developers, system documentation, and interviews with appropriate sources.
- 7-8. System documentation.

C. Methods:

1. Interviews with system developers using structured interview (Appendix D).
2. Interviews with system developers and appropriate ADP personnel using structured interview (Appendices E & K).
3. Research using checklist (Appendix M).
4. Research using checklist (Appendix M) and interviews with system developers using structured interview (Appendix D).
5. Interviews with system developers, test site administrators, and system managers using structured interview (Appendices E & G).
6. Research using checklist (Appendix N).
Interviews with users, test site administrators, and system managers using structured interview (Appendices A, B & G).
7. Research using checklist (Appendix O).
8. Research using checklist (Appendix M).

D. Measures:

Not applicable.

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III. To evaluate the NOHIMS system design by describing the software quality attributes, operational characteristics, security features, available system support, scenarios, organizational requirements, and minimum hardware requirements of NOHIMS and by describing the suitability of NOHIMS to the information processing needs of the medical and industrial departments.

A. Required data:

1. Description of software quality attributes.
2. Description of features that make NOHIMS user friendly.
3. Subjective assessment of user friendliness of NOHIMS.
4. Description of data manipulation tasks.
5. Description of information retrieval capabilities.
6. Description of security features.
7. Subjective assessment of adequacy of security features.
8. Description of hardware and software support requirements.
9. Description of available system support.
10. Description of system scenarios required to maintain system.
11. Description of organizational requirements.
12. Description of minimum hardware requirements.
13. Description of features/capabilities that make NOHIMS suitable to Navy information needs.
14. Subjective assessment of suitability of NOHIMS to Navy needs.
15. Subjective assessment of overall performance of NOHIMS.

B. Sources:

- 1-2. System documentation and interviews with appropriate sources.
3. Interviews with appropriate sources.
- 4-6. System documentation and interviews with appropriate sources.
- 7-8. Interviews with appropriate sources.
- 9-11. System documentation and interviews with appropriate sources.
12. Interviews with appropriate sources.
13. System documentation and interviews with appropriate sources.
- 14-15. Interviews with appropriate sources.

C. Methods:

- 1-2. Review of documentation using checklist (Appendix M) and interviews with system developers using structured interview (Appendix D).
3. Interviews with system users, test site administrators, and system managers using structured interview (Appendices A-C & G).
- 4-6. Review of system documentation using checklist (Appendix M) and interviews with system developers using structured interview (Appendix D).

III. C. Methods: (Cont.)

7. Interviews with system developers, administrators, NEHC project management team, system managers, and users using structured interview (Appendices A,B,E,G,H & I).
8. Interviews about software support with contracted system developers using structured interview (Appendix D). Interviews about hardware support with NOHIMS system developers and ADP personnel using structured interview (Appendices E & K).
9. Review of system documentation (Appendix M) and interviews with NOHIMS system developers and ADP personnel using structured interview (Appendices E & K).
10. Review of system documentation using checklist (Appendix M) and interviews with system developers, ADP personnel, and system managers using structured interview (Appendices C-E,G & K).
11. Review of system documentation (Appendix M) and interviews with system developers using structured interview (Appendices D & E).
12. Interviews with system developers using structured interview (Appendix D).
13. Review of system documentation (Appendix M) and interviews with system developers, users, administrators, and NEHC project management team using structured interview (Appendices A,B & E-I).
14. Interviews with system developers, users, administrators, and NEHC project management team using structured interview (Appendices A,B & E-I).
15. Interviews with system managers, test site administrators, and users using structured interview (Appendices A-C & G).

D. Measures:

- 1-2. Not applicable.
3. Percentage of persons interviewed who felt that system was user friendly.
- 4-6. Not applicable.
7. Percentage of persons interviewed who felt that system security was adequate.
- 8-13. Not applicable.
14. Percentage of persons interviewed who felt that NOHIMS adequately met the information processing needs of the Navy.
15. Percentage of responses to the various questions regarding performance of the NOHIMS system found in Appendices A-C and G. A weight will be assigned to each response, and an overall average score for each question and for the entire questionnaire will be calculated for the respondents as a whole and by appropriate subgroups such as medical users, non-medical users, management, etc.

IV. To design operational testing scenarios and evaluate operational tests on the two existing NOHIMS configurations.

A. Required data:

1. Description of appropriate operational tests that can be performed.
2. Results of operational testing.

B. Sources:

1. Interviews with appropriate sources.
2. System testing.

C. Methods:

1. Interviews with system developers and system managers to determine appropriate scenarios using structured interview (Appendices D, E & G).
2. Perform operational tests at two test sites.

D. Measures:

1. Not applicable.
2. To be determined.

V. To assess the usefulness of NOHIMS in medical monitoring and care.

A. Required data:

1. Description of goals for medical monitoring and care as defined by stated Navy goals.
2. Description of goals for medical monitoring and care as defined by system developers and users.
3. Description of NOHIMS features that are applicable to medical monitoring and care.
4. Subjective assessment by various groups as to how well NOHIMS has met/is meeting medical monitoring and care goals.
 - a. Assessment of effect of availability of accurate medical records on quality of patient care.
 - b. Assessment of usefulness of standard and user-defined reports in providing medical care.
 - c. Assessment of influence of standard and user-defined reports on quality of patient care.
 - d. Assessment of the increase in communication between major departments in the occupational health arena because of NOHIMS.
5. Objective assessment of how well medical monitoring and care goals are being met by NOHIMS.
 - a. Assessment of increased compliance with Navy standards of care.
 - b. Assessment of improvement in patient-specific objectives/outcomes.

B. Sources:

1. Conference proceedings, reports, Navy files, and interviews with appropriate sources.
2. Interviews with appropriate sources.
3. System documentation and interviews with appropriate sources.
4. Interviews with appropriate sources.
5. Tests performed using NOHIMS and/or proceedings of a blue ribbon panel of experts.

C. Methods:

1. Research using checklist (Appendix P) and interviews with system developers, medical users, and NEHC project management team using structured interview (Appendices A,E & I).
2. Interviews with system developers, key medical users, and NEHC project management team using structured interview (Appendices A,E & I).
3. Research and interviews with system developers using checklist based on items 1 and 2.
4. Interviews with system developers, users, and NEHC project management team using structured interview (Appendices A,B,E & I).
5. Use of NOHIMS-generated reports to determine if Navy medical surveillance program standards are being met. Convene a group of physicians for quality of care review to examine selected cases to determine appropriateness of care provided or not provided.

V. D. Measures:

1-3. Not applicable.

4. a. Percentage of persons interviewed who felt that NOHIMS is meeting the medical monitoring and care goals very well.
 - b. Percentage of persons interviewed who felt that the availability of an accurate medical record had a beneficial effect on the quality of patient care.
 - c. Percentage of persons interviewed who felt that the standard and user-defined reports were useful in providing medical care.
 - d. Percentage of persons interviewed who felt that the standard and user-defined reports had a beneficial effect on the quality of patient care.
 - e. Percentage of persons interviewed who felt that NOHIMS has improved communication between departments.
5. a. Compliance with medical surveillance program:
- (1) Percentage of workers needing physical examination who received examination within 30 days.
 - (2) Frequency of days since last periodic examination.
 - (3) Percentage of workers requiring particular test/procedure who had particular test/procedure performed.
 - (4) Percentage of workers not requiring particular test/procedure who had particular test/procedure performed.
 - (5) Percentage of workers with abnormal examination/test who had follow-up visit.
 - (6) Frequency of days from abnormal examination/test result to follow-up visit.
 - (7) Frequency of reasons why physical examinations or follow-up visits were not in accord with Navy standards, as determined by a panel of experts.
- b. Improvement in patient-specific objectives/outcomes:
- (1) Months from initial base-line examination to identification of abnormal diagnoses.
 - (2) Days to notification of patient regarding abnormal tests/findings.

VI. To evaluate the usefulness of NOHIMS as a database for legal evidence.

A. Required Data:

1. Description of information required for legal purposes in the area of occupational health cases.
2. Professional assessment of how well NOHIMS database matches legal needs.
3. Description of court cases where precedent of using computer-stored records has been established, if any.
4. Objective assessment of the ability of NOHIMS to provide required information, and the required turn-around time for legal interrogatories or FOIA requests.

B. Sources:

- 1-2. Interviews with appropriate sources.
3. Published articles and legal case histories.
4. Interviews with appropriate sources and system testing.

C. Methods:

1. Interviews with appropriate legal personnel using structured interview (Appendix J).
2. Appropriate legal personnel will read an overview of NOHIMS. Interview these legal personnel using a structured interview (Appendix J).
3. Research using a checklist (Appendix Q).
4. Design sample interrogatory(ies), based on interviews with appropriate personnel in legal department (Appendix J), and determine ability and time required to provide information.

D. Measures:

1. Not applicable.
2. Percentage of persons interviewed who report that the NOHIMS database is adequate for use as a legal database.
3. Not applicable.
4. Percentage of required information which can be provided. Days required to provide information.

VII. To briefly describe the usefulness of NOHIMS as an aid to epidemiologic research.

A. Required data:

1. Description of NOHIMS features and capabilities that will aid in epidemiologic research.
2. Brief description of epidemiologic uses of NOHIMS database.

B. Sources:

Interviews with appropriate sources.

C. Methods:

Interviews with system developers using structured interview (Appendix E).

D. Measures:

Not applicable.

VIII. To assess the usefulness of NOHIMS in administrative functions.

A. Required Data:

1. Description of the administrative uses of NOHIMS.
2. Assessment of the degree to which NOHIMS has increased or reduced required paperwork.
3. Assessment of the effect of NOHIMS on the standardization of reports and forms.
4. Assessment of the usefulness and adequacy of the standard administrative reports generated by NOHIMS for administrative purposes.
5. Assessment of the usefulness and adequacy of user-defined report capability and/or interactive query capability in administrative functions.
6. Assessment of usefulness of timely and perpetual access to administrative data.

B. Sources:

- 1-6. Interviews with appropriate sources.

C. Methods:

1. Interviews with system developers and administrators using structured interview (Appendices E, G & H).
- 2-6. Interviews with administrators at varying levels of administration using structured interview (Appendices G & H).

D. Measures:

1. Not applicable.
2. Percentage of persons interviewed who say that NOHIMS reduced the amount of paperwork and percentage who say it increased the amount of paperwork.
3. Percentage of persons interviewed who felt that NOHIMS had a beneficial effect on standardization of reports and forms.
4. Percentage of persons interviewed who felt that standard administrative reports were useful; percentage who felt reports were adequate.
5. Percentage of persons interviewed who felt that user-defined report capability and interactive query capability were useful in administrative functions; percentage who felt the capabilities were adequate.
6. Percentage of persons interviewed who felt that timely and perpetual access to administrative data was useful.

IX. To evaluate the transferability and adaptability of NOHIMS to other Navy sites.

A. Required data:

1. Discussion of the applicability of NOHIMS to other settings.
2. Description of features which make NOHIMS flexible and easily adaptable to needs at other Navy sites.
3. Description of implementation process at the North Island NARF and Occupational Health Unit, and the Bremerton Naval Shipyard.
4. Assessment of how well NOHIMS adapted to the information processing needs of the two test sites.
5. Assessment of acceptability of the system to administrators, work center supervisors, industrial hygienists, safety specialists, and/or care providers at the two test sites.
6. Subjective assessment of transferability of NOHIMS to other Navy sites.

B. Sources:

1. Interviews with appropriate sources.
2. System documentation and interviews with appropriate sources.
- 3-6. Interviews with appropriate sources.

C. Methods:

1. Interviews with system developers and NEHC project management team (Navy personnel responsible for transfer of NOHIMS to other sites) and appropriate higher level Navy management using structured interview (Appendices E, H & I).
2. Research using checklist (Appendix M) and interviews with system developers using structured interview (Appendix D).
- 3-4. Interviews with system developers, users, system managers, and administrators at the two test sites using structured interview (Appendices A, B, E & G).
5. Interviews with system users and test site administrators using structured interview (Appendices A, B & G).
6. Interviews with system developers, users, administrators, system managers, and NEHC project management team using structured interview (Appendices A, B, E & G-I).

D. Measures:

Not applicable.

X. To briefly analyze the development costs and intended benefits of NOHIMS.

A. Required data:

1. Brief description of NOHIMS development costs.
2. Brief description of intended benefits of NOHIMS.
3. Comparison of development costs of NOHIMS to intended benefits.

B. Sources:

1. Navy files, contractor files, and NOHIMS Systems Decision Paper.
2. NOHIMS Mission Elements Needs Statement, NOHIMS Systems Decision Paper, OPNAVINST 5100.23B, and interviews with appropriate sources.
3. Data from items 1 and 2.

C. Methods:

1. Research using checklist (Appendix R).
2. Research using checklist (Appendix R) and interviews with system developers, users, system managers, administrators, NEHC project management team, and legal personnel using structured interview (Appendices A,B & D-J).
3. Analysis of data from items 1 and 2.

D. Measures:

Not applicable.

XI. To briefly compare NOHIMS to other government-owned automated occupational health information systems.

A. Required data:

1. Brief description of government-owned systems.
2. Assessment of suitability of government-owned systems to Navy needs.
3. Description of advantages and disadvantages of NOHIMS design compared to government-owned systems.

B. Sources:

1. NOHIMS Systems Decision Paper, files of system developers, and, if necessary, interviews with appropriate sources.
2. NOHIMS Systems Decision Paper, files of system developers, and, if necessary, interviews with appropriate sources.
3. Data from items 1 and 2.

C. Methods:

- 1-2. Review of sources using checklist (Appendix S) and interviews with system developers and NEHC project management team using structured interview (Appendices E & I).
3. Analysis of data gathered for items 1 and 2.

D. Measures:

Not applicable.

XII. To briefly compare NOHIMS to other commercially available automated occupational health information systems.

A. Required data:

1. Brief description of commercially available systems.
2. Assessment of suitability of commercially available systems to Navy needs.
3. Description of advantages and disadvantages of NOHIMS design compared to commercially available systems.

B. Sources:

1. NOHIMS Systems Decision Paper, published articles, files of system developers, commercial system documentation, and, if necessary, interviews with appropriate sources.
2. NOHIMS Systems Decision Paper, published articles, files of system developers, commercial system documentation, and, if necessary, interviews with appropriate sources.
3. Data from items 1 and 2.

C. Methods:

- 1-2. Review of sources using checklist (Appendix T) and interviews with system developers and NEHC project management team using structured interview (Appendices E & I).
3. Analysis of data gathered for items 1 and 2.

D. Measures:

Not applicable.

XIII. To briefly compare NOHIMS to the Navy interim occupational health information system.

A. Required data:

1. Brief description of interim system.
2. Assessment of suitability of interim system to Navy needs.
3. Description of advantages and disadvantages of NOHIMS design compared to interim system.

B. Sources:

1. Files of system developers, system documentation, NOHIMS Systems Decision Paper, and interviews with appropriate sources.
2. Interviews with appropriate sources.
3. Data from items 1 and 2.

C. Methods:

1. Review of sources using checklist (Appendix U) and interviews with developers of interim system and of NOHIMS using structured interview (Appendices E & F).
2. Interviews with developers of interim system, NOHIMS system developers, and NEHC project management team using structured interview (Appendices E, F, & I).
3. Analysis of data gathered for items 1 and 2.

D. Measures:

Not applicable.

APPENDIX A

STRUCTURED INTERVIEW FOR
MEDICAL CARE PROVIDER USERS

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Person Interviewed: _____

Name of Activity: _____

Location of Activity: _____

Telephone Number: _____

Site of Interview: _____

Date of Interview: _____

Name of Interviewer: _____

The first questions we will be asking you have to do with your goals for NOHIMS and your assessment of how well they are being met.

PERCEIVED GOALS FOR NOHIMS/ASSESSMENT OF HOW WELL PERCEIVED GOALS FOR NOHIMS WERE MET

1. My personal goals for NOHIMS are/were to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

_____.

2. I consider NOHIMS in its present state to be meeting these goals

very well/
somewhat well/
somewhat not well/
not well.

3. The specific goals that NOHIMS is not meeting very well are to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

_____.

4. The reasons that NOHIMS is not meeting the goal(s) are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____
_____.

5. The goals that have been only partially achieved are to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

_____.

6. The reasons that NOHIMS has only partially achieved these goals are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____
_____.

The next questions deal specifically with medical monitoring and care goals.

MEDICAL MONITORING AND CARE GOALS/ASSESSMENT OF HOW WELL MEDICAL MONITORING AND CARE GOALS ARE BEING MET

1. It is my understanding that the specific goals for NOHIMS in the area of medical monitoring and care are/were to improve

quality of care:

patient management:

- diagnostic tests/
- database acquisition/
- treatment planning/
- problem identification/
- feedback to physician regarding achievement of desired outcomes/
- patient compliance with physician orders because of comprehensiveness/continuity of care/
- quality of care review procedures/
- research information collection/
- training activities/
- record accuracy/
- earlier diagnosis of abnormal conditions/
- earlier notification of patient abnormalities/
- communication/
- automated medical testing/

access to care:

- patient follow-up/
- appointment scheduling/
- record contents/
- record availability/
- visit registration/
- medical reports/

resource utilization:

health manpower utilization/availability:

- medical - technical personnel/
- clerical personnel/
- use of paramedical personnel/
- all personnel/

patient services:

- fewer unnecessary visits/
- fewer redundant laboratory tests/
- better referral/

management aspects of health care:

improve management and operations of the facility by:

- provision of management with information and analytical tools for:

- utilization review procedures/
- manpower scheduling/
- budgeting and planning/
- long-range manpower planning/
- long-range facility planning/
- regional/Navy-wide health planning/
- administrative reports/

(Continued)

compliance with monitoring programs/Navy set standards of care:
periodic physical examinations/
protective equipment/
asbestos surveillance program.

2. I consider NOHIMS in its present state to be meeting these medical monitoring and care goals

very well/
somewhat well/
somewhat not well/
not well.

3. The specific goals NOHIMS is not meeting very well are

improvement in the quality of care/
improvement in access to care/
improvement in resource utilization/
improvement in management and operations/
improvement in compliance with monitoring programs/
other: _____.

4. The reasons that NOHIMS is not meeting these goal(s) are

NOHIMS lacks essential function(s)
Specify: _____/
feature(s) are not implemented
Specify: _____/
feature(s) are not implemented well
Specify: _____/
other: _____.

5. The goals that have been only partially achieved are

improvement in quality of care/
improvement in access to care/
improvement in resource utilization/
improvement in management and operations/
improvement in compliance and monitoring programs/
other: _____.

6. The reasons that NOHIMS has only partially achieved these goal(s) are

NOHIMS lacks essential function(s)
Specify: _____/
feature(s) are not implemented
Specify: _____/
feature(s) are not implemented well
Specify: _____/
other: _____.

7. The effect of NOHIMS has been to

increase/maintain/decrease
the quality of care.

8. The effect of NOHIMS has been to
increase/maintain/decrease
the access to care.
9. The effect of NOHIMS has been to
increase/maintain/decrease
resource utilization.
10. The effect of NOHIMS has been to
increase/maintain/decrease
compliance with monitoring programs.
11. The effects of NOHIMS generally have been because of
increased patient care services provided/
more appropriate services provided/
improved follow-up of patients with abnormal
findings or tests/
improved communication between departments/
increased availability of the medical record/
more accurate medical records/
availability of patient-specific summary reports/
availability of on-line look-up of patient-specific data/
availability of user-defined reports/
improved manpower scheduling/
improved patient compliance/
improved quality of care review procedures/
earlier diagnosis and notification of problems/
improved appointment scheduling/
other: _____.
12. Since NOHIMS was implemented, communication between industrial
hygienists and medical personnel has
improved/
been maintained/
deteriorated.
13. If communication has changed, this is generally because of
availability of reports generated by NOHIMS/
less need for direct communication/
more accurate or complete data/
other: _____.
- ~~14. (Industrial users only) Since NOHIMS was implemented, communication
between industrial hygienists/safety specialists and work center
supervisors has
improved/
been maintained/
deteriorated.~~

~~15. (Industrial users only) If communication has changed, this is generally because of~~

~~availability of reports generated by NOHIMS/
less need for direct communication/
more accurate or complete data/
other: _____~~

16. The effect of the availability of an accurate medical record on the quality of patient care has been

very beneficial/
somewhat beneficial/
no effect/
somewhat detrimental/
very detrimental.

17. The effect of the availability of an individual's exposure history at the time of the physical examination has been

very beneficial/
somewhat beneficial/
no effect/
somewhat detrimental/
very detrimental.

18. The effects of NOHIMS on medical monitoring and care have been evaluated through measurements which are

subjective judgment

Specify who: _____/

counting/

objective measures such as surveys and questionnaires/

other: _____/

no measurements done.

19. Evaluation measurement methods used include

examination of the medical record for accuracy and completeness/

examination of the medical record for appropriateness/

checking of the diagnostic test pattern/

assessment of patients' response to treatment/

assessment of patient compliance/

assessment of quality of care review/

evaluation of research contributions/

evaluation of missed appointments/

evaluation of timeliness of physical examinations/

evaluation of availability of medical record/

evaluation of manpower utilization/

evaluation of time taken for specific tasks/

checking appropriateness of laboratory tests done/

checking adequacy of protective equipment issued/

checking adequacy of follow-up on abnormal findings

or tests/

other: _____.

20. Results of measurements conducted are

(NOTE: Questions on usefulness of reports are found in Component 7,
"USE AND USEFULNESS OF INFORMATION RETRIEVAL CAPABILITIES.")

Next, we would like to discuss the implementation process at your site and your assessment of the suitability and transferability of NOHIMS.

IMPLEMENTATION PROCESS AT TEST SITES

Implementation Process

- ~~1. (NHRC system developers and test site administrators only) Who was involved in the implementation of NOHIMS at the (your) test site(s)? What degree of involvement did each of these people have?~~
 - a.
 - b.
 - c.
 - d.
 - e.
 - f.
 - g.
 - h.
- ~~2. (NHRC system developers and test site administrators only) In what areas of the implementation were each of these people involved? What total amount of time did each of these people spend on the implementation of NOHIMS?~~
 - a.
 - b.
 - c.
 - d.
 - e.
 - f.
 - g.
 - h.
3. In what areas of the implementation were you directly involved? What total amount of time did you spend on the implementation of NOHIMS?
- ~~4. (NHRC system developers and test site administrators only) What steps were involved in implementing NOHIMS at the (your) test site(s)?~~
5. From your perspective, what problems were encountered during the implementation of NOHIMS? How were these problems resolved/handled?
6. Was staff morale affected by the installation of NOHIMS?
Was this effect a positive or negative one?
Was the effect temporary?

Operational Procedures

7. What are the current data collection procedures for NOHIMS? What changes were required in previous standard data collection procedures in order to accommodate NOHIMS?

Who collects the data?

Who verifies the data?

At what points in the process are data collected?

~~8. What are the current data entry procedures for NOHIMS data?~~

~~Who enters the data?~~

~~What is the backlog for data entry?~~

9. What are the current data retrieval procedures?

Who requests retrieval of data from NOHIMS?

Who retrieves the data from NOHIMS?

How long does it take to get the requested information?

10. What are the current uses of reports/data generated by NOHIMS? What changes were required in previous standard operating procedures in order to utilize the reports/data generated by NOHIMS?

Are reports/computer-generated data available to the physician when he/she sees the patient?

Do the data collection instruments support/replace/exist in addition to the previously used forms/records?

Does the computer-generated report support/replace/exist in addition to the paper medical record?

Are NOHIMS reports used to identify workers requiring physical examinations?

Are NOHIMS reports used to monitor compliance with Navy standards?

Is NOHIMS used to produce/collect data for management reports?

Operational Procedures (Cont.)

~~11. What is the hardware configuration at the (your) test site(s)?~~

~~What type and how many terminals are there?~~

~~What type and how many printers are there?~~

~~What type of communications equipment is used?~~

~~What type of processor is used?~~

~~Where are these devices located?~~

~~Are remote terminals and printers used on a regular basis?~~

~~12. What physical security features have been implemented at the (your) test site(s)?~~

~~Are there cipher locks on doors?~~

~~Is there a log book for people entering the computer room?~~

~~Is there a record of batch programs?~~

~~13. (NHRC system developers and test site administrators only) Is NOHIMS
a development of a previous automated system at the test site(s)?
replacement of a previous automated system? supplement to an
existing manual system? replacement of a manual system?
a completely new data collection and processing system?~~

14. What problems do you encounter/are encountered in day-to-day operations of NOHIMS? How are/were these problems resolved/handled?

Assessment of Adaptability of NOHIMS to Needs of Test Site(s)

15. How well do you feel NOHIMS has been integrated into the day-to-day procedures of the (your) test site(s)?

very well/
somewhat well/
somewhat poorly/
poorly.

16. How well do you feel that NOHIMS has responded to the particular needs of the (your) test site(s)?

very well/
somewhat well/
somewhat poorly/
poorly.

17. Were there needs specific to the (your) test site(s) that NOHIMS could not meet? If so, what were those needs?

SUITABILITY OF NOHIMS TO NAVY INFORMATION PROCESSING NEEDS

1. The features/capabilities of NOHIMS that make it especially suitable to Navy information processing needs are

the required information is collected:

personnel data/
hazardous materials characteristics/
presence of hazardous materials/
data on health of workers:
 illness and injuries/
 sick leave/absenteeism/
 routine examinations/
 test and procedure results/
 medical histories/
 mortality data/
individual exposures/exposure history/
data on accidents/incidents/
occupational histories/
other: _____/

data can be retrieved in the required formats:

tables of hazardous materials/
lists of workers with exposures/
lists of workers requiring physical examinations/
medical encounter reports/
medical summary reports/
management reports/
other: _____/

data can be manipulated in required ways:

number of surveys conducted/
number of individuals exposed to hazard/
number of examinations conducted/
number of laboratory tests done/
number of radiographs done/
number of asbestos examinations conducted/
list of those with ordered but unresulted tests/
other: _____/

other: _____.

2. My assessment of the suitability of NOHIMS to Navy information collection needs is that NOHIMS is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

3. My assessment of the suitability of NOHIMS to Navy information retrieval needs is that NOHIMS is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

4. My assessment of the suitability of NOHIMS to Navy information manipulation needs is that NOHIMS is
- very suitable/
 - somewhat suitable/
 - somewhat unsuitable/
 - very unsuitable.
5. Areas in which NOHIMS could be changed to make it more suitable to Navy information processing needs include
- collect additional information
 - Specify: _____/
 - improve/create new retrieval capabilities
 - Specify: _____/
 - improve/create new manipulation capabilities
 - Specify: _____/
 - other: _____.
6. Overall, my assessment of the adequacy of NOHIMS for Navy information processing needs is that NOHIMS is
- very adequate/
 - adequate/
 - somewhat adequate/
 - somewhat inadequate/
 - inadequate/
 - very inadequate.

ASSESSMENT OF TRANSFERABILITY OF NOHIMS TO OTHER NAVY INDUSTRIAL SITES

1. My assessment of the suitability of NOHIMS to the information processing needs of other Navy industrial sites is that NOHIMS is
very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.
2. My opinion of the flexibility and adaptability of NOHIMS is that NOHIMS is
adequately flexible and adaptable/
somewhat adequately flexible and adaptable/
somewhat inadequately flexible and adaptable/
inadequately flexible and adaptable/
to be transferred to other Navy industrial sites.
3. Areas in which NOHIMS needs to be more flexible and adaptable include:
4. My assessment of the ease of transfer of NOHIMS to other Navy industrial sites is that the process will be
difficult/
somewhat difficult/
somewhat easy/
easy.
5. The specific problems I foresee in transferring NOHIMS to other Navy industrial sites are that
6. It is my opinion that the acceptability of NOHIMS among users at other Navy industrial sites will be
very high/
high/
somewhat high/
somewhat low/
low/
very low.

Now we are going to ask you to give us your opinion on certain specific aspects of NOHIMS. The first set of questions concerns the use and usefulness of NOHIMS' information retrieval capabilities.

USE AND USEFULNESS OF INFORMATION RETRIEVAL CAPABILITIES

Standard Reports

1. The standard reports that NOHIMS produces which I receive/use regularly are

Industrial Hygiene Survey Report/
Report of Individual Exposures/
Patient Data Sheet/
Medical certification report/
Monthly Compliance Report/
Navy management reports:
 Report of Occupational Health Services (6260/1)/
 Medical Services and Outpatient Morbidity Report (6300/1)/
Encounter Report/
Patient Summary/
Status Report/
Flowcharts/
other: _____/
none (go to 9 if none).

2. These reports are used in my work to

provide direct patient care/
plan workloads/
communicate with others/
prepare required reports/
other: _____/
not used.

3. The reports are used

daily/	quarterly/
weekly/	semi-annually/
semi-monthly/	annually/
monthly/	never.

4. The information produced in these reports

more than adequately meets my needs/
adequately meets my needs/
less than adequately meets my needs/
is not relevant to my work.

5. The information produced in these reports is

very useful/
somewhat useful/
not useful.

6. (Medical users only) Specifically, in the day-to-day provision of medical care, the standard medical reports are

very useful/
somewhat useful/
not useful/
not used.

7. (Medical users only) The effect of the standard medical reports on the quality of medical care has been

very beneficial/
somewhat beneficial/
no effect/
somewhat detrimental/
very detrimental.

8. Additional information/reports I would find helpful include:

User-defined Information Retrieval Capabilities

9. The user-defined information retrieval capabilities I have used are

Interactive Flowcharts/
Report Generator runs/
interactive query function in OHS/
on-line look-up/
other: _____/
none (go to next interview section if none).

10. I consider the ability to generate user-defined reports to be

very useful/
somewhat useful/
not useful.

11. I generate a special user-defined report

daily/	quarterly/
weekly/	semi-annually/
semi-monthly/	annually/
monthly/	never.

12. The information I usually retrieve using specially generated reports is used

in direct patient care/
for resource management/
to assess quality of care/
in research/
other: _____.

13. (Medical users only) In the day-to-day provision of medical care, the user-defined reports are

very useful/
somewhat useful/
not useful/
not used.

14. (Medical users only) The effect of the user-defined reports on the quality of patient care has been
- very beneficial/
 - somewhat beneficial/
 - no effect/
 - somewhat detrimental/
 - very detrimental.
15. I do on-line look-up/interactive query of patient/worker data
- often during the day/
 - daily/
 - several times during the week/
 - weekly/
 - several times during the month/
 - other: _____/
 - never.
16. I do on-line look-up/interactive query with the
- medical component/
 - industrial component/
 - both components/
 - neither component.
17. I consider the ability to do on-line look-up/interactive query of patient/worker records to be
- very useful/
 - somewhat useful/
 - not useful.
18. The information I usually retrieve using on-line look-up/interactive query is
- review of previous patient encounters/
 - lab results/
 - patient-specific exposures/
 - shop-specific exposures/
 - survey-specific information/
 - verify or look up administrative information/
 - other: _____.

The next questions deal with the user friendliness of NOHIMS.

ASSESSMENT OF USER FRIENDLINESS

1. It was

very easy/
somewhat easy/
somewhat difficult/
very difficult/

for me to learn to use NOHIMS.

☐ Have not learned to use NOHIMS (then go to next interview section).

2. I am

very confident/
somewhat confident/
somewhat unsure/
very unsure/

of my ability to work with NOHIMS.

3. It is

easier/
somewhat easier/
not different/
somewhat more difficult/
more difficult/

to use NOHIMS than other automated systems I have used.

☐ Not used other systems.

4. Please rate the following features of NOHIMS in terms of their helpfulness in using NOHIMS.

	<u>Very Helpful</u>	<u>Somewhat Helpful</u>	<u>Not Helpful</u>
a. Screen displays	_____	_____	_____
b. System prompts/menus	_____	_____	_____
c. System messages	_____	_____	_____
d. Help text/assistance functions	_____	_____	_____
e. Report formats	_____	_____	_____
f. Techniques for looking up an individual	_____	_____	_____
g. Agency unit look-up	_____	_____	_____
h. Environment look-up	_____	_____	_____
i. Survey data look-up	_____	_____	_____
j. Hazardous agent look-up	_____	_____	_____
k. Directory item look-up	_____	_____	_____

5. Improvements I would like to see to make NOHIMS easier to use include

6. Overall, I feel that NOHIMS is

very user friendly/
somewhat user friendly/
somewhat user unfriendly/
very user unfriendly.

The last specific features we would like you to evaluate are the security features of NOHIMS.

ADEQUACY OF SECURITY FEATURES

1. In my opinion, the sign on/off security procedures are
very adequate/
somewhat adequate/
somewhat inadequate/
very inadequate/
to prevent unauthorized persons from accessing NOHIMS.
2. In my opinion, the various security levels (by device, by user classification, through passwords for specific options) are
very adequate/
somewhat adequate/
somewhat inadequate/
very inadequate/
to prevent persons from accessing areas of NOHIMS for which they are not authorized.
3. In my opinion, the confidentiality warnings on input and output documents are
very adequate/
somewhat adequate/
somewhat inadequate/
very inadequate/
to maintain the confidentiality of patient/worker data.
4. The security protection features provided by NOHIMS are
fully utilized/
loosely utilized/
ignored/
bypassed.
5. In general, the security protection provided by NOHIMS is
insufficient/
somewhat insufficient/
somewhat sufficient/
sufficient.
6. If insufficient or somewhat insufficient, the areas of protection which are lacking include:
7. In general, the security protection provided by NOHIMS is
unnecessary/
somewhat unnecessary/
somewhat necessary/
necessary.

8. If unnecessary or somewhat unnecessary, the areas which should be removed or changed include:

These last sections deal with your assessment of the overall performance, acceptability, and benefits of NOHIMS.

ASSESSMENT OF SYSTEM PERFORMANCE

1. NOHIMS has given no/some/many problems in the area of
reliability/
downtime/
communication lines/
man-machine interface/
other: _____.
2. A noticeable (to the user) failure happens about _____/
_____ and that number has been
improving/
steady/
getting worse.
3. The number of failures/errors for NOHIMS is
acceptable/
somewhat acceptable/
somewhat unacceptable/
unacceptable.
4. When there is heavy usage of the computer system, then there will be
a noticeable slowdown/
an annoying slowdown/
a terrible slowdown/
no effect.
5. Data entry is
never/
rarely/
occasionally/
often/
delayed by system response time.
6. The time required to obtain a display of data is usually
fast/
somewhat fast/
somewhat slow/
slow.
7. When a NOHIMS failure occurs, it affects the day-to-day provision
of medical care because
work procedures must be changed/
reports usually used in care are not available/
on-line look-ups cannot be done/
medical charts are held up in data entry/
survey data are held up in entry/
other: _____/
no effect.

8. When a NOHIMS failure occurs, it affects the administration of the occupational health unit because

work procedures must be changed/
reports usually used are not available/
on-line look-ups cannot be done/
medical charts are held up in data entry/
survey data are held up in entry/
data entry gets backlogged/
other: _____/

no effect.

9. NOHIMS has

no/
one or two/
a few/
several/
many/

major "bugs" in the software that affect system performance.

These are: _____

_____.

10. I have used or been exposed to NOHIMS for _____ months.

ACCEPTABILITY OF NOHIMS TO USERS

1. In general, I feel that NOHIMS
adequately/
somewhat adequately/
somewhat inadequately/
inadequately/
performs the functions that are required in my work.
2. Generally, I feel that NOHIMS is
reliable/
somewhat reliable/
somewhat unreliable/
unreliable.
3. Generally, I feel that NOHIMS
is/
is somewhat/
is somewhat not/
is not/
user friendly and easy to operate.
4. In general, the data collection forms are
acceptable/
somewhat acceptable/
somewhat unacceptable/
unacceptable/
to me.
5. In general, I think that the data collection forms are
acceptable/
somewhat acceptable/
somewhat unacceptable/
unacceptable/
to the patient/worker.
6. I feel that the changes in procedures required by NOHIMS are
acceptable/
somewhat acceptable/
somewhat unacceptable/
unacceptable.
7. I feel that NOHIMS
is an aid in/
is somewhat of an aid in/
has no effect on/
is somewhat of a hindrance in/
is a hindrance in/
the provision of care to the patient/worker.

8. (Medical users only) I feel that NOHIMS has
significantly disrupted/
somewhat disrupted/
not disrupted/
traditional patterns of clinical thinking and/or patient management.
9. NOHIMS has affected my workload by
significantly increasing my workload/
somewhat increasing my workload/
somewhat decreasing my workload/
significantly decreasing my workload/
changing the nature of my workload/
no effect on my workload.
10. NOHIMS features that have been incorporated into my everyday work
procedures include
data collection forms/
data entry/
on-line look-up/interactive query/interactive flowcharts/
display of standard reports/
printed standard reports/
report generation/
other: _____/
none.
11. These features have made my job
much easier/
somewhat easier/
no effect/
somewhat harder/
much harder.
12. These features have made me
less productive/
about as productive/
more productive.
13. Generally, I feel that system users can perform their jobs
more efficiently and effectively/
somewhat more efficiently and effectively/
to the same level of efficiency and effectiveness/
somewhat less efficiently and effectively/
less efficiently and effectively/
because of NOHIMS.
14. In general, my assessment of how well people have adapted to
NOHIMS is that they have adapted
well/
somewhat well/
somewhat poorly/
poorly.

15. Overall, NOHIMS is

acceptable/
somewhat acceptable/
somewhat unacceptable/
unacceptable.

16. If NOHIMS is unacceptable or somewhat unacceptable, what changes need to be made in order to make it acceptable?

less data have to be collected/
more data have to be collected/
data have to be collected at more points/
changes to data collection forms are required/
data have to be stored longer/
more hardware is required/
more communication gear is required/
more software is required/
changes to present software are required/
new report formats are required/
new reports are required/
inquiry capability is required/
more inquiry capability is required/
more system support is required/
more training is required/

other: _____/

other: _____/

other: _____

PERCEIVED BENEFITS OF NOHIMS

1. In my opinion, the benefits of NOHIMS have been

increased quality of care provided to the worker/patient through:
fewer unnecessary tests and ancillary services/
fewer unnecessary examinations/visits/
appropriateness of tests performed/
reduced waiting time/
more accurate patient medical record/
timely and perpetual access to data/
earlier diagnosis of illnesses/conditions/
earlier notification of abnormal test results/findings/
base-line data on the health of an employee/
increased compliance with monitoring programs/
reduction in occupational exposures to hazardous agents/
improved workplace monitoring/
better identification of possible hazards/
better identification of workers exposed/
safer working conditions/
improved job certification program/
increased confidence of workers/
improved communication between those concerned with
the occupational health of the worker/
increased productivity of staff/clinics/
increased efficiency in the use of resources/
savings in manpower/
reduction in the cost of providing services/
improved planning and budgeting/
more accurate administrative reports/
more accurate/available database for research efforts/
other health care benefits: _____

other monitoring benefits: _____

other administrative benefits: _____

other benefits: _____

2. Of those mentioned, the most significant benefit of NOHIMS is

3. The costs of implementing and operating NOHIMS

clearly exceed or outweigh the benefits/
somewhat exceed or outweigh the benefits/
equal the benefits/

or the benefits

somewhat exceed or outweigh the costs/
clearly exceed or outweigh the costs.

YOUR STRUCTURED APPRAISAL OF THE PERFORMANCE OF THE
NAVY OCCUPATIONAL HEALTH INFORMATION MANAGEMENT SYSTEM (NOHIMS)

Contained in the following pages are 22 statements reflecting possible attitudes or opinions that users of NOHIMS might hold. You are being asked to carefully read each of these statements and then to place an "X" in the blank that most nearly reflects your opinion of NOHIMS, indicating the extent to which you agree or disagree with each statement. PLEASE EXPRESS AN OPINION ON EACH STATEMENT EVEN IF YOU HAVE NEVER THOUGHT ABOUT THIS SUBJECT BEFORE IN JUST THIS WAY.

The intent of this short exercise is to systematically explore what your subjective attitudes and opinions are concerning the impact of NOHIMS on your department. Your responses will remain anonymous and will be used only in the aggregate to provide a composite picture of the benefits that have accrued from NOHIMS in your department. Thank you for your cooperation and valued assistance.

SITE:

APPRAISAL OF THE PERFORMANCE OF NOHIMS

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Neutral Opinion</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
1. Worker/patient-related information is more accessible and available more quickly with NOHIMS.	_____	_____	_____	_____	_____
2. As a result of NOHIMS, I am able to do a better job.	_____	_____	_____	_____	_____
3. The performance of NOHIMS falls short of what I expected.	_____	_____	_____	_____	_____
4. I could never go back to using the old manual record system now that I have been using NOHIMS.	_____	_____	_____	_____	_____
5. NOHIMS catches more human errors than the old manual system did.	_____	_____	_____	_____	_____
6. In my opinion, NOHIMS should not have been implemented at this activity.	_____	_____	_____	_____	_____
7. I rarely have to wait for necessary worker/patient information because the NOHIMS system is down.	_____	_____	_____	_____	_____
8. In general, NOHIMS is better than the old manual system of record keeping.	_____	_____	_____	_____	_____
9. NOHIMS has some major problems that need correction.	_____	_____	_____	_____	_____
10. If there were budget cuts at this activity, I would rather see other services that I need cut before I lost NOHIMS.	_____	_____	_____	_____	_____

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Neutral Opinion</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
11. NOHIMS has "goofed" up worker/patient records more times than I care to remember.	_____	_____	_____	_____	_____
12. I truly feel that the quality of care has been improved as a result of NOHIMS.	_____	_____	_____	_____	_____
13. From an administrative point of view, NOHIMS provides timely data for making management decisions that were not available with the previous manual system.	_____	_____	_____	_____	_____
14. Scheduling and staffing patterns have been improved since the advent of NOHIMS.	_____	_____	_____	_____	_____
15. NOHIMS does not benefit me much personally.	_____	_____	_____	_____	_____
16. Worker/patient satisfaction seems to be running higher since NOHIMS was introduced.	_____	_____	_____	_____	_____
17. I can see how NOHIMS can be a boon to other users.	_____	_____	_____	_____	_____
18. With NOHIMS, I am able to get more done in a day.	_____	_____	_____	_____	_____
19. The records produced by NOHIMS are more amenable to review and better meet Navy standards.	_____	_____	_____	_____	_____
20. The confidentiality of the worker's/patient's record is more vulnerable with NOHIMS than it was with the manual system.	_____	_____	_____	_____	_____

21. I don't care much what NOHIMS costs to operate, we need it to handle our workload efficiently.

Year	1990	1991	1992	1993	1994
1990	1990	1991	1992	1993	1994
1991	1991	1992	1993	1994	1995
1992	1992	1993	1994	1995	1996
1993	1993	1994	1995	1996	1997
1994	1994	1995	1996	1997	1998
1995	1995	1996	1997	1998	1999
1996	1996	1997	1998	1999	2000
1997	1997	1998	1999	2000	2001
1998	1998	1999	2000	2001	2002
1999	1999	2000	2001	2002	2003
2000	2000	2001	2002	2003	2004
2001	2001	2002	2003	2004	2005
2002	2002	2003	2004	2005	2006
2003	2003	2004	2005	2006	2007
2004	2004	2005	2006	2007	2008
2005	2005	2006	2007	2008	2009
2006	2006	2007	2008	2009	2010
2007	2007	2008	2009	2010	2011
2008	2008	2009	2010	2011	2012
2009	2009	2010	2011	2012	2013
2010	2010	2011	2012	2013	2014
2011	2011	2012	2013	2014	2015
2012	2012	2013	2014	2015	2016
2013	2013	2014	2015	2016	2017
2014	2014	2015	2016	2017	2018
2015	2015	2016	2017	2018	2019
2016	2016	2017	2018	2019	2020
2017	2017	2018	2019	2020	2021
2018	2018	2019	2020	2021	2022
2019	2019	2020	2021	2022	2023
2020	2020	2021	2022	2023	2024
2021	2021	2022	2023	2024	2025
2022	2022	2023	2024	2025	2026
2023	2023	2024	2025	2026	2027
2024	2024	2025	2026	2027	2028
2025	2025	2026	2027	2028	2029
2026	2026	2027	2028	2029	2030
2027	2027	2028	2029	2030	2031
2028	2028	2029	2030	2031	2032
2029	2029	2030	2031	2032	2033
2030	2030	2031	2032	2033	2034
2031	2031	2032	2033	2034	2035
2032	2032	2033	2034	2035	2036
2033	2033	2034	2035	2036	2037
2034	2034	2035	2036	2037	2038
2035	2035	2036	2037	2038	2039
2036	2036	2037	2038	2039	2040
2037	2037	2038	2039	2040	2041
2038	2038	2039	2040	2041	2042
2039	2039	2040	2041	2042	2043
2040	2040	2041	2042	2043	2044
2041	2041	2042	2043	2044	2045
2042	2042	2043	2044	2045	2046
2043	2043	2044	2045	2046	2047
2044	2044	2045	2046	2047	2048
2045	2045	2046	2047	2048	2049
2046	2046	2047	2048	2049	2050
2047	2047	2048	2049	2050	2051
2048	2048	2049	2050	2051	2052
2049	2049	2050	2051	2052	2053

23. I am a system developer _____
user

3

APPENDIX B

STRUCTURED INTERVIEW FOR
INDUSTRIAL USERS
(Industrial Hygienists)

Person Interviewed: _____

Name of Activity: _____

Location of Activity: _____

Telephone Number: _____

Site of Interview: _____

Date of Interview: _____

Name of Interviewer: _____

The first questions we will be asking you have to do with your goals for NOHIMS and your assessment of how well they are being met.

PERCEIVED GOALS FOR NOHIMS/ASSESSMENT OF HOW WELL PERCEIVED GOALS FOR NOHIMS WERE MET

1. My personal goals for NOHIMS are/were to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

_____.

2. I consider NOHIMS in its present state to be meeting these goals

very well/
somewhat well/
somewhat not well/
not well.

3. The specific goals that NOHIMS is not meeting very well are to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

_____.

4. The reasons that NOHIMS is not meeting the goal(s) are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____
_____.

5. The goals that have been only partially achieved are to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

_____.

6. The reasons that NOHIMS has only partially achieved these goals are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____
_____.

MEDICAL MONITORING AND CARE GOALS/ASSESSMENT OF HOW WELL MEDICAL MONITORING
AND CARE GOALS ARE BEING MET

1. It is my understanding that the specific goals for NOHIMS in the
area of medical monitoring and care are/were to improve

quality of care:

patient management:

diagnostic tests/
database acquisition/
treatment planning/
problem identification/
feedback to physician regarding achievement
of desired outcomes/

patient compliance with physician orders because
of comprehensiveness/continuity of care/

quality of care review procedures/
research information collection/
training activities/
record accuracy/
earlier diagnosis of abnormal conditions/
earlier notification of patient abnormalities/
communication/
automated medical testing/

access to care:

patient follow-up/
appointment scheduling/
record contents/
record availability/
visit registration/
medical reports/

resource utilization:

health manpower utilization/availability:

medical - technical personnel/
clerical personnel/
use of paramedical personnel/
all personnel/

patient services:

fewer unnecessary visits/
fewer redundant laboratory tests/
better referral/

management aspects of health care:

improve management and operations of the facility by:

provision of management with information and
analytical tools for:

utilization review procedures/
manpower scheduling/
budgeting and planning/
long-range manpower planning/
long-range facility planning/
regional/Navy-wide health planning/
administrative reports/

(Continued)

compliance with monitoring programs/Navy set standards of care:
periodic physical examinations/
protective equipment/
asbestos surveillance program.

2. I consider NOHIMS in its present state to be meeting these medical monitoring and care goals

very well/
somewhat well/
somewhat not well/
not well.

3. The specific goals NOHIMS is not meeting very well are

improvement in the quality of care/
improvement in access to care/
improvement in resource utilization/
improvement in management and operations/
improvement in compliance with monitoring programs/
other: _____.

4. The reasons that NOHIMS is not meeting these goal(s) are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____.

5. The goals that have been only partially achieved are

improvement in quality of care/
improvement in access to care/
improvement in resource utilization/
improvement in management and operations/
improvement in compliance and monitoring programs/
other: _____.

6. The reasons that NOHIMS has only partially achieved these goal(s) are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____.

7. The effect of NOHIMS has been to

increase/maintain/decrease
the quality of care.

8. The effect of NOHIMS has been to
increase/maintain/decrease
the access to care.
9. The effect of NOHIMS has been to
increase/maintain/decrease
resource utilization.
10. The effect of NOHIMS has been to
increase/maintain/decrease
compliance with monitoring programs.
11. The effects of NOHIMS generally have been because of
increased patient care services provided/
more appropriate services provided/
improved follow-up of patients with abnormal
findings or tests/
improved communication between departments/
increased availability of the medical record/
more accurate medical records/
availability of patient-specific summary reports/
availability of on-line look-up of patient-specific data/
availability of user-defined reports/
improved manpower scheduling/
improved patient compliance/
improved quality of care review procedures/
earlier diagnosis and notification of problems/
improved appointment scheduling/
other: _____
12. Since NOHIMS was implemented, communication between industrial
hygienists and medical personnel has
improved/
been maintained/
deteriorated.
13. If communication has changed, this is generally because of
availability of reports generated by NOHIMS/
less need for direct communication/
more accurate or complete data/
other: _____.
14. (Industrial users only) Since NOHIMS was implemented, communication
between industrial hygienists/safety specialists and work center
supervisors has
improved/
been maintained/
deteriorated.

15. (Industrial users only) If communication has changed, this is generally because of

availability of reports generated by NOHIMS/
less need for direct communication/
more accurate or complete data/
other: _____.

- ~~16. The effect of the availability of an accurate medical record on the quality of patient care has been~~

~~very beneficial/
somewhat beneficial/
no effect/
somewhat detrimental/
very detrimental.~~

- ~~17. The effect of the availability of an individual's exposure history at the time of the physical examination has been~~

~~very beneficial/
somewhat beneficial/
no effect/
somewhat detrimental/
very detrimental.~~

18. The effects of NOHIMS on ~~medical monitoring and care~~^{communication} have been evaluated through measurements which are

subjective judgment

Specify who: _____/

counting/

objective measures such as surveys and questionnaires/

other: _____/

no measurements done.

19. Evaluation measurement methods used include

~~examination of the medical record for accuracy and completeness/
examination of the medical record for appropriateness/
checking of the diagnostic test pattern/
assessment of patients' response to treatment/
assessment of patient compliance/
assessment of quality of care review/
evaluation of research contributions/
evaluation of missed appointments/
evaluation of timeliness of physical examinations/
evaluation of availability of medical record/
evaluation of manpower utilization/
evaluation of time taken for specific tasks/
checking appropriateness of laboratory tests done/
checking adequacy of protective equipment issued/
checking adequacy of follow up on abnormal findings or tests/
other: _____.~~

20. Results of measurements conducted are

(NOTE: Questions on usefulness of reports are found in Component 7,
"USE AND USEFULNESS OF INFORMATION RETRIEVAL CAPABILITIES.")

Next, we would like to discuss the implementation process at your site and your assessment of the suitability and transferability of NOHIMS.

IMPLEMENTATION PROCESS AT TEST SITES

Implementation Process

- ~~1. (NHRC system developers and test site administrators only) Who was involved in the implementation of NOHIMS at the (your) test site(s)? What degree of involvement did each of these people have?~~
 - a.
 - b.
 - c.
 - d.
 - e.
 - f.
 - g.
 - h.
- ~~2. (NHRC system developers and test site administrators only) In what areas of the implementation were each of these people involved? What total amount of time did each of these people spend on the implementation of NOHIMS?~~
 - a.
 - b.
 - c.
 - d.
 - e.
 - f.
 - g.
 - h.
3. In what areas of the implementation were you directly involved? What total amount of time did you spend on the implementation of NOHIMS?
- ~~4. (NHRC system developers and test site administrators only) What steps were involved in implementing NOHIMS at the (your) test site(s)?~~
5. From your perspective, what problems were encountered during the implementation of NOHIMS? How were these problems resolved/handled?
6. Was staff morale affected by the installation of NOHIMS?
Was this effect a positive or negative one?
Was the effect temporary?

Operational Procedures

7. What are the current data collection procedures for NOHIMS? What changes were required in previous standard data collection procedures in order to accommodate NOHIMS?

Who collects the data?

Who verifies the data?

At what points in the process are data collected?

8. What are the current data entry procedures for NOHIMS^{hygiene} data?

Who enters the data?

What is the backlog for data entry?

9. What are the current data retrieval procedures?

Who requests retrieval of data from NOHIMS?

Who retrieves the data from NOHIMS?

How long does it take to get the requested information?

10. What are the current uses of reports/data generated by NOHIMS? What changes were required in previous standard operating procedures in order to utilize the reports/data generated by NOHIMS?

~~Are reports/computer generated data available to the physician when he/she sees the patient?~~

Do the data collection instruments support/replace/exist in addition to the previously used forms/records?

~~Does the computer generated report support/replace/exist in addition to the paper medical record?~~

Are NOHIMS reports used to identify workers requiring physical examinations?

Are NOHIMS reports used to monitor compliance with Navy standards?

Is NOHIMS used to produce/collect data for management reports?

Operational Procedures (Cont.)

- ~~11. What is the hardware configuration at the (your) test site(s)?~~
~~What type and how many terminals are there?~~
~~What type and how many printers are there?~~
~~What type of communications equipment is used?~~
~~What type of processor is used?~~
~~Where are these devices located?~~

~~Are remote terminals and printers used on a regular basis?~~
- ~~12. What physical security features have been implemented at the (your) test site(s)?~~
~~Are there cipher locks on doors?~~
~~Is there a log book for people entering the computer room?~~
~~Is there a record of batch programs?~~
- ~~13. (NHRC system developers and test site administrators only) Is NOHIMS~~
~~a development of a previous automated system at the test site(s)?~~
~~replacement of a previous automated system? supplement to an~~
~~existing manual system? replacement of a manual system?~~
~~a completely new data collection and processing system?~~
14. What problems do you encounter/are encountered in day-to-day operations of NOHIMS? How are/were these problems resolved/handled?

Assessment of Adaptability of NOHIMS to Needs of Test Site(s)

15. How well do you feel NOHIMS has been integrated into the day-to-day procedures of the (your) test site(s)?
- very well/
somewhat well/
somewhat poorly/
poorly.
16. How well do you feel that NOHIMS has responded to the particular needs of the (your) test site(s)?
- very well/
somewhat well/
somewhat poorly/
poorly.
17. Were there needs specific to the (your) test site(s) that NOHIMS could not meet? If so, what were those needs?

SUITABILITY OF NOHIMS TO NAVY INFORMATION PROCESSING NEEDS

1. The features/capabilities of NOHIMS that make it especially suitable to Navy information processing needs are

the required information is collected:

personnel data/
hazardous materials characteristics/
presence of hazardous materials/
data on health of workers:
 illness and injuries/
 sick leave/absenteeism/
 routine examinations/
 test and procedure results/
 medical histories/
 mortality data/
individual exposures/exposure history/
data on accidents/incidents/
occupational histories/
other: _____/

data can be retrieved in the required formats:

tables of hazardous materials/
lists of workers with exposures/
lists of workers requiring physical examinations/
medical encounter reports/
medical summary reports/
management reports/
other: _____/

data can be manipulated in required ways:

number of surveys conducted/
number of individuals exposed to hazard/
number of examinations conducted/
number of laboratory tests done/
number of radiographs done/
number of asbestos examinations conducted/
list of those with ordered but unresulted tests/
other: _____/

other: _____.

2. My assessment of the suitability of NOHIMS to Navy information collection needs is that NOHIMS is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

3. My assessment of the suitability of NOHIMS to Navy information retrieval needs is that NOHIMS is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

4. My assessment of the suitability of NOHIMS to Navy information manipulation needs is that NOHIMS is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

5. Areas in which NOHIMS could be changed to make it more suitable to Navy information processing needs include

collect additional information

Specify: _____/

improve/create new retrieval capabilities

Specify: _____/

improve/create new manipulation capabilities

Specify: _____/

other: _____/

6. Overall, my assessment of the adequacy of NOHIMS for Navy information processing needs is that NOHIMS is

very adequate/
adequate/
somewhat adequate/
somewhat inadequate/
inadequate/
very inadequate.

ASSESSMENT OF TRANSFERABILITY OF NOHIMS TO OTHER NAVY INDUSTRIAL SITES

1. My assessment of the suitability of NOHIMS to the information processing needs of other Navy industrial sites is that NOHIMS is
very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.
2. My opinion of the flexibility and adaptability of NOHIMS is that NOHIMS is
adequately flexible and adaptable/
somewhat adequately flexible and adaptable/
somewhat inadequately flexible and adaptable/
inadequately flexible and adaptable/
to be transferred to other Navy industrial sites.
3. Areas in which NOHIMS needs to be more flexible and adaptable include:
4. My assessment of the ease of transfer of NOHIMS to other Navy industrial sites is that the process will be
difficult/
somewhat difficult/
somewhat easy/
easy.
5. The specific problems I foresee in transferring NOHIMS to other Navy industrial sites are that
6. It is my opinion that the acceptability of NOHIMS among users at other Navy industrial sites will be
very high/
high/
somewhat high/
somewhat low/
low/
very low.

Now we are going to ask you to give us your opinion on certain specific aspects of NOHIMS. The first set of questions concerns the use and usefulness of NOHIMS' information retrieval capabilities.

USE AND USEFULNESS OF INFORMATION RETRIEVAL CAPABILITIES

Standard Reports

1. The standard reports that NOHIMS produces which I receive/use regularly are

Industrial Hygiene Survey Report/
Report of Individual Exposures/
Patient Data Sheet/
Medical certification report/
Monthly Compliance Report/
Navy management reports:
 Report of Occupational Health Services (6260/1)/
 Medical Services and Outpatient Morbidity Report (6300/1)/
Encounter Report/
Patient Summary/
Status Report/
Flowcharts/
other: _____/

none (go to 9 if none).

2. These reports are used in my work to

provide direct patient care/
plan workloads/
communicate with others/
prepare required reports/
other: _____/
not used.

3. The reports are used

daily/	quarterly/
weekly/	semi-annually/
semi-monthly/	annually/
monthly/	never.

4. The information produced in these reports

more than adequately meets my needs/
adequately meets my needs/
less than adequately meets my needs/
is not relevant to my work.

5. The information produced in these reports is

very useful/
somewhat useful/
not useful.

~~6. (Medical users only) Specifically, in the day to day provision of medical care, the standard medical reports are~~

~~very useful/~~
~~somewhat useful/~~
~~not useful/~~
~~not used.~~

~~7. (Medical users only) The effect of the standard medical reports on the quality of medical care has been~~

~~very beneficial/
somewhat beneficial/
no effect/
somewhat detrimental/
very detrimental.~~

8. Additional information/reports I would find helpful include:

User-defined Information Retrieval Capabilities

9. The user-defined information retrieval capabilities I have used are

Interactive Flowcharts/
Report Generator runs/
interactive query function in OHS/
on-line look-up/
other: _____/

none (go to next interview section if none).

10. I consider the ability to generate user-defined reports to be

very useful/
somewhat useful/
not useful.

11. I generate a special user-defined report

daily/	quarterly/
weekly/	semi-annually/
semi-monthly/	annually/
monthly/	never.

12. The information I usually retrieve using specially generated reports is used

in direct patient care/
for resource management/
to assess quality of care/
in research/
other: _____.

~~13. (Medical users only) In the day to day provision of medical care, the user defined reports are~~

~~very useful/
somewhat useful/
not useful/
not used.~~

~~14. (Medical users only) The effect of the user defined reports on the quality of patient care has been~~

~~very beneficial/
somewhat beneficial/
no effect/
somewhat detrimental/
very detrimental.~~

15. I do on-line look-up/interactive query of patient/worker data

often during the day/
daily/
several times during the week/
weekly/
several times during the month/
other: _____/
never.

16. I do on-line look-up/interactive query with the

medical component/
industrial component/
both components/
neither component.

17. I consider the ability to do on-line look-up/interactive query of patient/worker records to be

very useful/
somewhat useful/
not useful.

18. The information I usually retrieve using on-line look-up/interactive query is

review of previous patient encounters/
lab results/
patient-specific exposures/
shop-specific exposures/
survey-specific information/
verify or look up administrative information/
other: _____.

The next questions deal with the user friendliness of NOHIMS.

ASSESSMENT OF USER FRIENDLINESS

1. It was

very easy/
somewhat easy/
somewhat difficult/
very difficult/

for me to learn to use NOHIMS.

☐ Have not learned to use NOHIMS (then go to next interview section).

2. I am

very confident/
somewhat confident/
somewhat unsure/
very unsure/

of my ability to work with NOHIMS.

3. It is

easier/
somewhat easier/
not different/
somewhat more difficult/
more difficult/

to use NOHIMS than other automated systems I have used.

☐ Not used other systems.

4. Please rate the following features of NOHIMS in terms of their helpfulness in using NOHIMS.

	<u>Very Helpful</u>	<u>Somewhat Helpful</u>	<u>Not Helpful</u>
a. Screen displays	_____	_____	_____
b. System prompts/menus	_____	_____	_____
c. System messages	_____	_____	_____
d. Help text/assistance functions	_____	_____	_____
e. Report formats	_____	_____	_____
f. Techniques for looking up an individual	_____	_____	_____
g. Agency unit look-up	_____	_____	_____
h. Environment look-up	_____	_____	_____
i. Survey data look-up	_____	_____	_____
j. Hazardous agent look-up	_____	_____	_____
k. Directory item look-up	_____	_____	_____

5. Improvements I would like to see to make NOHIMS easier to use include

6. Overall, I feel that NOHIMS is

very user friendly/
somewhat user friendly/
somewhat user unfriendly/
very user unfriendly.

The last specific features we would like you to evaluate are the security features of NOHIMS.

ADEQUACY OF SECURITY FEATURES

1. In my opinion, the sign on/off security procedures are
very adequate/
somewhat adequate/
somewhat inadequate/
very inadequate/
to prevent unauthorized persons from accessing NOHIMS.
2. In my opinion, the various security levels (by device, by user classification, through passwords for specific options) are
very adequate/
somewhat adequate/
somewhat inadequate/
very inadequate/
to prevent persons from accessing areas of NOHIMS for which they are not authorized.
3. In my opinion, the confidentiality warnings on input and output documents are
very adequate/
somewhat adequate/
somewhat inadequate/
very inadequate/
to maintain the confidentiality of patient/worker data.
4. The security protection features provided by NOHIMS are
fully utilized/
loosely utilized/
ignored/
bypassed.
5. In general, the security protection provided by NOHIMS is
insufficient/
somewhat insufficient/
somewhat sufficient/
sufficient.
6. If insufficient or somewhat insufficient, the areas of protection which are lacking include:
7. In general, the security protection provided by NOHIMS is
unnecessary/
somewhat unnecessary/
somewhat necessary/
necessary.

8. If unnecessary or somewhat unnecessary, the areas which should be removed or changed include:

These last sections deal with your assessment of the overall performance, acceptability, and benefits of NOHIMS.

ASSESSMENT OF SYSTEM PERFORMANCE

1. NOHIMS has given no/some/many problems in the area of
reliability/
downtime/
communication lines/
man-machine interface/
other: _____.
2. A noticeable (to the user) failure happens about _____/
_____ and that number has been
improving/
steady/
getting worse.
3. The number of failures/errors for NOHIMS is
acceptable/
somewhat acceptable/
somewhat unacceptable/
unacceptable.
4. When there is heavy usage of the computer system, then there will be
a noticeable slowdown/
an annoying slowdown/
a terrible slowdown/
no effect.
5. Data entry is
never/
rarely/
occasionally/
often/

delayed by system response time.
6. The time required to obtain a display of data is usually
fast/
somewhat fast/
somewhat slow/
slow.
- ~~7. When a NOHIMS failure occurs, it affects the day to day provision
of medical care because

work procedures must be changed/
reports usually used in care are not available/
on line look ups cannot be done/
medical charts are held up in data entry/
survey data are held up in entry/
other+ _____/
no effect.~~

8. When a NOHIMS failure occurs, it affects the administration of the occupational health unit because

work procedures must be changed/
reports usually used are not available/
on-line look-ups cannot be done/
medical charts are held up in data entry/
survey data are held up in entry/
data entry gets backlogged/
other: _____/
no effect.

9. NOHIMS has

no/
one or two/
a few/
several/
many/

major "bugs" in the software that affect system performance.

These are: _____

_____.

10. I have used or been exposed to NOHIMS for _____ months.

ACCEPTABILITY OF NOHIMS TO USERS

1. In general, I feel that NOHIMS

adequately/
somewhat adequately/
somewhat inadequately/
inadequately/

performs the functions that are required in my work.

2. Generally, I feel that NOHIMS is

reliable/
somewhat reliable/
somewhat unreliable/
unreliable.

3. Generally, I feel that NOHIMS

is/
is somewhat/
is somewhat not/
is not/

user friendly and easy to operate.

4. In general, the data collection forms are

acceptable/
somewhat acceptable/
somewhat unacceptable/
unacceptable/

to me.

~~5. In general, I think that the data collection forms are~~

~~acceptable/
somewhat acceptable/
somewhat unacceptable/
unacceptable/~~

~~to the patient/worker~~

6. I feel that the changes in procedures required by NOHIMS are

acceptable/
somewhat acceptable/
somewhat unacceptable/
unacceptable.

7. I feel that NOHIMS

is an aid in/
is somewhat of an aid in/
has no effect on/
is somewhat of a hindrance in/
is a hindrance in/

the provision of care to the patient/worker.

~~8. (Medical users only) I feel that NOHIMS has~~

~~significantly disrupted/~~

~~somewhat disrupted/~~

~~not disrupted/~~

~~traditional patterns of clinical thinking and/or patient management~~

9. NOHIMS has affected my workload by

significantly increasing my workload/

somewhat increasing my workload/

somewhat decreasing my workload/

significantly decreasing my workload/

changing the nature of my workload/

no effect on my workload.

10. NOHIMS features that have been incorporated into my everyday work procedures include

data collection forms/

data entry/

on-line look-up/interactive query/interactive flowcharts/

display of standard reports/

printed standard reports/

report generation/

other: _____/

none.

11. These features have made my job

much easier/

somewhat easier/

no effect/

somewhat harder/

much harder.

12. These features have made me

less productive/

about as productive/

more productive.

13. Generally, I feel that system users can perform their jobs

more efficiently and effectively/

somewhat more efficiently and effectively/

to the same level of efficiency and effectiveness/

somewhat less efficiently and effectively/

less efficiently and effectively/

because of NOHIMS.

14. In general, my assessment of how well people have adapted to NOHIMS is that they have adapted

well/

somewhat well/

somewhat poorly/

poorly.

15. Overall, NOHIMS is

acceptable/
somewhat acceptable/
somewhat unacceptable/
unacceptable.

16. If NOHIMS is unacceptable or somewhat unacceptable, what changes need to be made in order to make it acceptable?

less data have to be collected/
more data have to be collected/
data have to be collected at more points/
changes to data collection forms are required/
data have to be stored longer/
more hardware is required/
more communication gear is required/
more software is required/
changes to present software are required/
new report formats are required/
new reports are required/
inquiry capability is required/
more inquiry capability is required/
more system support is required/
more training is required/

other: _____/

other: _____/

other: _____

PERCEIVED BENEFITS OF NOHIMS

1. In my opinion, the benefits of NOHIMS have been

increased quality of care provided to the worker/patient through:
fewer unnecessary tests and ancillary services/
fewer unnecessary examinations/visits/
appropriateness of tests performed/
reduced waiting time/
more accurate patient medical record/
timely and perpetual access to data/
earlier diagnosis of illnesses/conditions/
earlier notification of abnormal test results/findings/
base-line data on the health of an employee/
increased compliance with monitoring programs/
reduction in occupational exposures to hazardous agents/
improved workplace monitoring/
better identification of possible hazards/
better identification of workers exposed/
safer working conditions/
improved job certification program/
increased confidence of workers/
improved communication between those concerned with
the occupational health of the worker/
increased productivity of staff/clinics/
increased efficiency in the use of resources/
savings in manpower/
reduction in the cost of providing services/
improved planning and budgeting/
more accurate administrative reports/
more accurate/available database for research efforts/
other health care benefits: _____

other monitoring benefits: _____

other administrative benefits: _____

other benefits: _____

2. Of those mentioned, the most significant benefit of NOHIMS is

3. The costs of implementing and operating NOHIMS

clearly exceed or outweigh the benefits/
somewhat exceed or outweigh the benefits/
equal the benefits/

or the benefits

somewhat exceed or outweigh the costs/
clearly exceed or outweigh the costs.

YOUR STRUCTURED APPRAISAL OF THE PERFORMANCE OF THE
NAVY OCCUPATIONAL HEALTH INFORMATION MANAGEMENT SYSTEM (NOHIMS)

Contained in the following pages are 22 statements reflecting possible attitudes or opinions that users of NOHIMS might hold. You are being asked to carefully read each of these statements and then to place an "X" in the blank that most nearly reflects your opinion of NOHIMS, indicating the extent to which you agree or disagree with each statement. PLEASE EXPRESS AN OPINION ON EACH STATEMENT EVEN IF YOU HAVE NEVER THOUGHT ABOUT THIS SUBJECT BEFORE IN JUST THIS WAY.

The intent of this short exercise is to systematically explore what your subjective attitudes and opinions are concerning the impact of NOHIMS on your department. Your responses will remain anonymous and will be used only in the aggregate to provide a composite picture of the benefits that have accrued from NOHIMS in your department. Thank you for your cooperation and valued assistance.

SITE:

APPRAISAL OF THE PERFORMANCE OF NOHIMS

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Neutral Opinion</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
1. Worker/patient-related information is more accessible and available more quickly with NOHIMS.	_____	_____	_____	_____	_____
2. As a result of NOHIMS, I am able to do a better job.	_____	_____	_____	_____	_____
3. The performance of NOHIMS falls short of what I expected.	_____	_____	_____	_____	_____
4. I could never go back to using the old manual record system now that I have been using NOHIMS.	_____	_____	_____	_____	_____
5. NOHIMS catches more human errors than the old manual system did.	_____	_____	_____	_____	_____
6. In my opinion, NOHIMS should not have been implemented at this activity.	_____	_____	_____	_____	_____
7. I rarely have to wait for necessary worker/patient information because the NOHIMS system is down.	_____	_____	_____	_____	_____
8. In general, NOHIMS is better than the old manual system of record keeping.	_____	_____	_____	_____	_____
9. NOHIMS has some major problems that need correction.	_____	_____	_____	_____	_____
10. If there were budget cuts at this activity, I would rather see other services that I need cut before I lost NOHIMS.	_____	_____	_____	_____	_____

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Neutral Opinion</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
11. NOHIMS has "goofed" up worker/patient records more times than I care to remember.	_____	_____	_____	_____	_____
12. I truly feel that the quality of care has been improved as a result of NOHIMS.	_____	_____	_____	_____	_____
13. From an administrative point of view, NOHIMS provides timely data for making management decisions that were not available with the previous manual system.	_____	_____	_____	_____	_____
14. Scheduling and staffing patterns have been improved since the advent of NOHIMS.	_____	_____	_____	_____	_____
15. NOHIMS does not benefit me much personally.	_____	_____	_____	_____	_____
16. Worker/patient satisfaction seems to be running higher since NOHIMS was introduced.	_____	_____	_____	_____	_____
17. I can see how NOHIMS can be a boon to other users.	_____	_____	_____	_____	_____
18. With NOHIMS, I am able to get more done in a day.	_____	_____	_____	_____	_____
19. The records produced by NOHIMS are more amenable to review and better meet Navy standards.	_____	_____	_____	_____	_____
20. The confidentiality of the worker's/patient's record is more vulnerable with NOHIMS than it was with the manual system.	_____	_____	_____	_____	_____

	<u>Strongly</u> <u>Agree</u>	<u>Agree</u>	<u>Neutral</u> <u>Opinion</u>	<u>Disagree</u>	<u>Strongly</u> <u>Disagree</u>
21. I don't care much what NOHIMS costs to operate, we need it to handle our workload efficiently.	_____	_____	_____	_____	_____
22. If NOHIMS were to be taken out, I would be willing to make a reasonable effort to get it back in service.	_____	_____	_____	_____	_____

The purpose of the following two questions is to provide classification information for the statistical analysis of responses to the questionnaire. Please mark all categories that apply to you.

23. I am a system developer _____
 user _____

24. My function is clerical _____
 medical:
 professional _____
 ancillary _____
 industrial:
 hygienist/safety specialist _____
 work center supervisor _____
 administrative _____
 other: _____.

APPENDIX B

STRUCTURED INTERVIEW FOR
INDUSTRIAL USERS
(Work Center Supervisors)

Person Interviewed: _____

Name of Activity: _____

Location of Activity: _____

Telephone Number: _____

Site of Interview: _____

Date of Interview: _____

Name of Interviewer: _____

The first questions we will be asking you have to do with your goals for NOHIMS and your assessment of how well they are being met.

PERCEIVED GOALS FOR NOHIMS/ASSESSMENT OF HOW WELL PERCEIVED GOALS FOR NOHIMS WERE MET

1. My personal goals for NOHIMS are/were to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

_____.

2. I consider NOHIMS in its present state to be meeting these goals

very well/
somewhat well/
somewhat not well/
not well.

3. The specific goals that NOHIMS is not meeting very well are to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

_____.

4. The reasons that NOHIMS is not meeting the goal(s) are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____
_____.

5. The goals that have been only partially achieved are to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

_____.

6. The reasons that NOHIMS has only partially achieved these goals are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____
_____.

MEDICAL MONITORING AND CARE GOALS/ASSESSMENT OF HOW WELL MEDICAL MONITORING
AND CARE GOALS ARE BEING MET

1. It is my understanding that the specific goals for NOHIMS in the
area of medical monitoring and care are/were to improve

quality of care:

patient management:

diagnostic tests/
database acquisition/
treatment planning/
problem identification/
feedback to physician regarding achievement
of desired outcomes/

patient compliance with physician orders because
of comprehensiveness/continuity of care/

quality of care review procedures/
research information collection/
training activities/
record accuracy/
earlier diagnosis of abnormal conditions/
earlier notification of patient abnormalities/
communication/
automated medical testing/

access to care:

patient follow-up/
appointment scheduling/
record contents/
record availability/
visit registration/
medical reports/

resource utilization:

health manpower utilization/availability:

medical - technical personnel/
clerical personnel/
use of paramedical personnel/
all personnel/

patient services:

fewer unnecessary visits/
fewer redundant laboratory tests/
better referral/

management aspects of health care:

improve management and operations of the facility by:

provision of management with information and
analytical tools for:

utilization review procedures/
manpower scheduling/
budgeting and planning/
long-range manpower planning/
long-range facility planning/
regional/Navy-wide health planning/
administrative reports/

(Continued)

compliance with monitoring programs/Navy set standards of care:
periodic physical examinations/
protective equipment/
asbestos surveillance program.

2. I consider NOHIMS in its present state to be meeting these medical monitoring and care goals

very well/
somewhat well/
somewhat not well/
not well.

3. The specific goals NOHIMS is not meeting very well are

improvement in the quality of care/
improvement in access to care/
improvement in resource utilization/
improvement in management and operations/
improvement in compliance with monitoring programs/
other: _____.

4. The reasons that NOHIMS is not meeting these goal(s) are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____.

5. The goals that have been only partially achieved are

improvement in quality of care/
improvement in access to care/
improvement in resource utilization/
improvement in management and operations/
improvement in compliance and monitoring programs/
other: _____.

6. The reasons that NOHIMS has only partially achieved these goal(s) are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____.

7. The effect of NOHIMS has been to

increase/maintain/decrease
the quality of care.

8. The effect of NOHIMS has been to
increase/maintain/decrease
the access to care.
- ~~9. The effect of NOHIMS has been to
increase/maintain/decrease
resource utilization.~~
10. The effect of NOHIMS has been to
increase/maintain/decrease
compliance with monitoring programs.
11. The effects of NOHIMS generally have been because of
increased patient care services provided/
more appropriate services provided/
improved follow-up of patients with abnormal
findings or tests/
improved communication between departments/
increased availability of the medical record/
more accurate medical records/
availability of patient-specific summary reports/
availability of on-line look-up of patient-specific data/
availability of user-defined reports/
improved manpower scheduling/
improved patient compliance/
improved quality of care review procedures/
earlier diagnosis and notification of problems/
improved appointment scheduling/
other: _____.
- ~~12. Since NOHIMS was implemented, communication between industrial
hygienists and medical personnel has
improved/
been maintained/
deteriorated.~~
- ~~13. If communication has changed, this is generally because of
availability of reports generated by NOHIMS/
less need for direct communication/
more accurate or complete data/
other: _____.~~
14. (Industrial users only) Since NOHIMS was implemented, communication
between industrial hygienists/safety specialists and work center
supervisors has
improved/
been maintained/
deteriorated.

15. (Industrial users only) If communication has changed, this is generally because of

availability of reports generated by NOHIMS/
less need for direct communication/
more accurate or complete data/
other: _____

- ~~16. The effect of the availability of an accurate medical record on the quality of patient care has been~~

~~very beneficial/
somewhat beneficial/
no effect/
somewhat detrimental/
very detrimental.~~

- ~~17. The effect of the availability of an individual's exposure history at the time of the physical examination has been~~

~~very beneficial/
somewhat beneficial/
no effect/
somewhat detrimental/
very detrimental.~~

18. The effects of NOHIMS on medical monitoring and care have been evaluated through measurements which are

subjective judgment

Specify who: _____

counting/

objective measures such as surveys and questionnaires/

other: _____

no measurements done.

19. Evaluation measurement methods used include

examination of the medical record for accuracy and completeness/
examination of the medical record for appropriateness/
checking of the diagnostic test pattern/
assessment of patients' response to treatment/
assessment of patient compliance/
assessment of quality of care review/
evaluation of research contributions/
evaluation of missed appointments/
evaluation of timeliness of physical examinations/
evaluation of availability of medical record/
evaluation of manpower utilization/
evaluation of time taken for specific tasks/
checking appropriateness of laboratory tests done/
checking adequacy of protective equipment issued/
checking adequacy of follow-up on abnormal findings or tests/
other: _____

~~20 Results of measurements conducted are~~

~~_____

_____~~

~~(NOTE: Questions on usefulness of reports are found in Component 7,
"USE AND USEFULNESS OF INFORMATION RETRIEVAL CAPABILITIES.")~~

Next, we would like to discuss the implementation process at your site and your assessment of the suitability and transferability of NOHIMS.

IMPLEMENTATION PROCESS AT TEST SITES

Implementation Process

- ~~1. (NHRC system developers and test site administrators only) Who was involved in the implementation of NOHIMS at the (your) test site(s)? What degree of involvement did each of these people have?~~
 - a.
 - b.
 - c.
 - d.
 - e.
 - f.
 - g.
 - h.
- ~~2. (NHRC system developers and test site administrators only) In what areas of the implementation were each of these people involved? What total amount of time did each of these people spend on the implementation of NOHIMS?~~
 - a.
 - b.
 - c.
 - d.
 - e.
 - f.
 - g.
 - h.
3. In what areas of the implementation were you directly involved? What total amount of time did you spend on the implementation of NOHIMS?
- ~~4. (NHRC system developers and test site administrators only) What steps were involved in implementing NOHIMS at the (your) test site(s)?~~
5. From your perspective, what problems were encountered during the implementation of NOHIMS? How were these problems resolved/handled?
6. Was ~~staff~~^{worker} morale affected by the installation of NOHIMS?
Was this effect a positive or negative one?
Was the effect temporary?

Operational Procedures

7. What are the current data collection procedures for NOHIMS? What changes were required in previous standard data collection procedures in order to accommodate NOHIMS?
- Who collects the data?
- Who verifies the data?
- At what points in the process are data collected?
8. What are the current data entry procedures for NOHIMS data?
- Who enters the data?
- What is the backlog for data entry?
9. What are the current data retrieval procedures?
- Who requests retrieval of data from NOHIMS?
- Who retrieves the data from NOHIMS?
- How long does it take to get the requested information?
10. What are the current uses of reports/data generated by NOHIMS? What changes were required in previous standard operating procedures in order to utilize the reports/data generated by NOHIMS?
- ~~Are reports/computer generated data available to the physician when he/she sees the patient?~~
- ~~Do the data collection instruments support/replace/exist in addition to the previously used forms/records?~~
- ~~Does the computer generated report support/replace/exist in addition to the paper medical record?~~
- Are NOHIMS reports used to identify workers requiring physical examinations?
- Are NOHIMS reports used to monitor compliance with Navy standards?
- ~~Is NOHIMS used to produce/collect data for management reports?~~

Operational Procedures (Cont.)

11. What is the hardware configuration at the (your) test site(s)?
What type and how many terminals are there?
What type and how many printers are there?
What type of communications equipment is used?
What type of processor is used?
Where are these devices located?
Are remote terminals and printers used on a regular basis?
12. What physical security features have been implemented at the (your) test site(s)?
Are there cipher locks on doors?
Is there a log book for people entering the computer room?
Is there a record of batch programs?
13. (NHRC system developers and test site administrators only) Is NOHIMS a development of a previous automated system at the test site(s)? replacement of a previous automated system? supplement to an existing manual system? replacement of a manual system? a completely new data collection and processing system?
14. What problems do you encounter/are encountered in day-to-day operations of NOHIMS? How are/were these problems resolved/handled?

Assessment of Adaptability of NOHIMS to Needs of Test Site(s)

15. How well do you feel NOHIMS has been integrated into the day-to-day procedures of the (your) test site(s)?
very well/
somewhat well/
somewhat poorly/
poorly.
16. How well do you feel that NOHIMS has responded to the particular needs of the (your) test site(s)?
very well/
somewhat well/
somewhat poorly/
poorly.
17. Were there needs specific to the (your) test site(s) that NOHIMS could not meet? If so, what were those needs?

SUITABILITY OF NOHIMS TO NAVY INFORMATION PROCESSING NEEDS

1. The features/capabilities of NOHIMS that make it especially suitable to Navy information processing needs are

the required information is collected:

personnel data/
hazardous materials characteristics/
presence of hazardous materials/
data on health of workers:
 illness and injuries/
 sick leave/absenteeism/
 routine examinations/
 test and procedure results/
 medical histories/
 mortality data/
individual exposures/exposure history/
data on accidents/incidents/
occupational histories/
other: _____/

data can be retrieved in the required formats:

tables of hazardous materials/
lists of workers with exposures/
lists of workers requiring physical examinations/
medical encounter reports/
medical summary reports/
management reports/
other: _____/

data can be manipulated in required ways:

number of surveys conducted/
number of individuals exposed to hazard/
number of examinations conducted/
number of laboratory tests done/
number of radiographs done/
number of asbestos examinations conducted/
list of those with ordered but unresulted tests/
other: _____/

other: _____.

2. My assessment of the suitability of NOHIMS to Navy information collection needs is that NOHIMS is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

3. My assessment of the suitability of NOHIMS to Navy information retrieval needs is that NOHIMS is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

4. My assessment of the suitability of NOHIMS to Navy information manipulation needs is that NOHIMS is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

5. Areas in which NOHIMS could be changed to make it more suitable to Navy information processing needs include

collect additional information

Specify: _____/

improve/create new retrieval capabilities

Specify: _____/

improve/create new manipulation capabilities

Specify: _____/

other: _____/

6. Overall, my assessment of the adequacy of NOHIMS for Navy information processing needs is that NOHIMS is

very adequate/
adequate/
somewhat adequate/
somewhat inadequate/
inadequate/
very inadequate.

ASSESSMENT OF TRANSFERABILITY OF NOHIMS TO OTHER NAVY INDUSTRIAL SITES

1. My assessment of the suitability of NOHIMS to the information processing needs of other Navy industrial sites is that NOHIMS is
very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.
- ~~2. My opinion of the flexibility and adaptability of NOHIMS is that NOHIMS is
adequately flexible and adaptable/
somewhat adequately flexible and adaptable/
somewhat inadequately flexible and adaptable/
inadequately flexible and adaptable/
to be transferred to other Navy industrial sites.~~
- ~~3. Areas in which NOHIMS needs to be more flexible and adaptable include:~~
4. My assessment of the ease of transfer of NOHIMS to other Navy industrial sites is that the process will be
difficult/
somewhat difficult/
somewhat easy/
easy.
5. The specific problems I foresee in transferring NOHIMS to other Navy industrial sites are that
6. It is my opinion that the acceptability of NOHIMS among ^{individuals} ~~users~~ at other Navy industrial sites will be
very high/
high/
somewhat high/
somewhat low/
low/
very low.

Now we are going to ask you to give us your opinion on three specific aspects of NOHIMS---the usefulness of reports, user friendliness, and the adequacy of security.

USE AND USEFULNESS OF INFORMATION RETRIEVAL CAPABILITIES

Standard Reports

1. The standard reports that NOHIMS produces which I receive/use regularly are

Industrial Hygiene Survey Report/
Report of Individual Exposures/
Patient Data Sheet/
Medical certification report/
Monthly Compliance Report/
Navy management reports:
 Report of Occupational Health Services (6260/1)/
 Medical Services and Outpatient Morbidity Report (6300/1)/
Encounter Report/
Patient Summary/
Status Report/
Flowcharts/
other: _____/
none (go to 9 if none).

2. These reports are used in my work to

provide direct patient care/
plan workloads/
communicate with others/
prepare required reports/
other: _____/
not used.

3. The reports are used

daily/	quarterly/
weekly/	semi-annually/
semi-monthly/	annually/
monthly/	never.

4. The information produced in these reports

more than adequately meets my needs/
adequately meets my needs/
less than adequately meets my needs/
is not relevant to my work.

5. The information produced in these reports is

very useful/
somewhat useful/
not useful.

~~6. (Medical users only) Specifically, in the day to day provision of medical care, the standard medical reports are~~

~~very useful/~~
~~somewhat useful/~~
~~not useful/~~
~~not used.~~

~~7. (Medical users only) The effect of the standard medical reports
on the quality of medical care has been~~

~~very beneficial/
somewhat beneficial/
no effect/
somewhat detrimental/
very detrimental.~~

8. Additional information/reports I would find helpful include:

User-defined Information Retrieval Capabilities

~~9. The user-defined information retrieval capabilities I have used are~~

~~Interactive Flowcharts/
Report Generator runs/
interactive query function in OHS/
on-line look-up/
other: _____/
none (go to next interview section if none).~~

~~10. I consider the ability to generate user-defined reports to be~~

~~very useful/
somewhat useful/
not useful.~~

~~11. I generate a special user-defined report~~

~~daily/ quarterly/
weekly/ semi-annually/
semi-monthly/ annually/
monthly/ never.~~

~~12. The information I usually retrieve using specially generated
reports is used~~

~~in direct patient care/
for resource management/
to assess quality of care/
in research/
other: _____.~~

~~13. (Medical users only) In the day-to-day provision of medical care,
the user-defined reports are~~

~~very useful/
somewhat useful/
not useful/
not used.~~

14. (Medical users only) The effect of the user-defined reports on the quality of patient care has been

very beneficial/
somewhat beneficial/
no effect/
somewhat detrimental/
very detrimental.

15. I do on-line look-up/interactive query of patient/worker data

often during the day/
daily/
several times during the week/
weekly/
several times during the month/
other: _____/
never.

16. I do on-line look-up/interactive query with the

medical component/
industrial component/
both components/
neither component.

17. I consider the ability to do on-line look-up/interactive query of patient/worker records to be

very useful/
somewhat useful/
not useful.

18. The information I usually retrieve using on-line look-up/interactive query is

review of previous patient encounters/
lab results/
patient-specific exposures/
shop-specific exposures/
survey-specific information/
verify or look up administrative information/
other: _____

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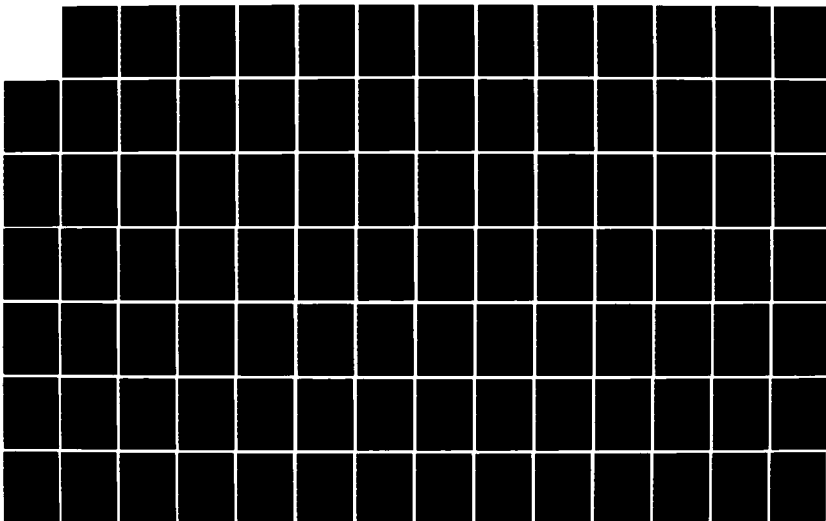
TEST AND EVALUATION MASTER PLAN (TEMP) FOR THE NAVY
OCCUPATIONAL HEALTH I. (U) R-K RESEARCH AND SYSTEM
DESIGN MALIBU CALIF 24 APR 85 N00014-84-C-0601

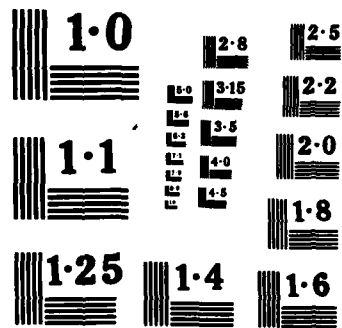
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UNCLASSIFIED

F/G 9/2

NL





If you have not had any hands-on experience with NOHIMS, go to the next interview section.

ASSESSMENT OF USER FRIENDLINESS

1. It was

very easy/
somewhat easy/
somewhat difficult/
very difficult/

for me to learn to use NOHIMS.

☐ Have not learned to use NOHIMS (then go to next interview section).

2. I am

very confident/
somewhat confident/
somewhat unsure/
very unsure/

of my ability to work with NOHIMS.

3. It is

easier/
somewhat easier/
not different/
somewhat more difficult/
more difficult/

to use NOHIMS than other automated systems I have used.

☐ Not used other systems.

4. Please rate the following features of NOHIMS in terms of their helpfulness in using NOHIMS.

	<u>Very Helpful</u>	<u>Somewhat Helpful</u>	<u>Not Helpful</u>
a. Screen displays	_____	_____	_____
b. System prompts/menus	_____	_____	_____
c. System messages	_____	_____	_____
d. Help text/assistance functions	_____	_____	_____
e. Report formats	_____	_____	_____
f. Techniques for looking up an individual	_____	_____	_____
g. Agency unit look-up	_____	_____	_____
h. Environment look-up	_____	_____	_____
i. Survey data look-up	_____	_____	_____
j. Hazardous agent look-up	_____	_____	_____
k. Directory item look-up	_____	_____	_____

5. Improvements I would like to see to make NOHIMS easier to use include

6. Overall, I feel that NOHIMS is

very user friendly/
somewhat user friendly/
somewhat user unfriendly/
very user unfriendly.

ADEQUACY OF SECURITY FEATURES

1. In my opinion, the sign on/off security procedures are

very adequate/
somewhat adequate/
somewhat inadequate/
very inadequate/

to prevent unauthorized persons from accessing NOHIMS.

2. In my opinion, the various security levels (by device, by user classification, through passwords for specific options) are

very adequate/
somewhat adequate/
somewhat inadequate/
very inadequate/

to prevent persons from accessing areas of NOHIMS for which they are not authorized.

3. In my opinion, the confidentiality warnings on input and output documents are

very adequate/
somewhat adequate/
somewhat inadequate/
very inadequate/

to maintain the confidentiality of patient/worker data.

~~4. The security protection features provided by NOHIMS are~~

~~fully utilized/
loosely utilized/
ignored/
bypassed.~~

5. In general, the security protection provided by NOHIMS is

insufficient/
somewhat insufficient/
somewhat sufficient/
sufficient.

6. If insufficient or somewhat insufficient, the areas of protection which are lacking include:

~~7. In general, the security protection provided by NOHIMS is~~

~~unnecessary/
somewhat unnecessary/
somewhat necessary/
necessary.~~

~~0. If unnecessary or somewhat unnecessary, the areas which should be removed or changed include:~~

These last sections deal with your assessment of the overall performance, acceptability, and benefits of NOHIMS.

ASSESSMENT OF SYSTEM PERFORMANCE

1. NOHIMS has given no/some/many problems in the area of

reliability/
downtime/
communication lines/
man-machine interface/
other: _____.

- ~~2. A noticeable (to the user) failure happens about _____
and that number has been~~

~~improving/
steady/
getting worse.~~

3. The number of ~~failures~~/errors for NOHIMS is

acceptable/
somewhat acceptable/
somewhat unacceptable/
unacceptable.

- ~~4. When there is heavy usage of the computer system, then there will be
a noticeable slowdown/
an annoying slowdown/
a terrible slowdown/
no effect.~~

5. Data entry is

never/
rarely/
occasionally/
often/

delayed by system response time.

6. The time required to obtain a display of data is usually

fast/
somewhat fast/
somewhat slow/
slow.

7. When a NOHIMS failure occurs, it affects the day-to-day provision of medical care because

work procedures must be changed/
reports usually used in care are not available/
on-line look-ups cannot be done/
medical charts are held up in data entry/
survey data are held up in entry/
other: _____
no effect.

8. When a NOHIMS failure occurs, it affects the administration of the occupational health unit because

work procedures must be changed/
reports usually used are not available/
on-line look-ups cannot be done/
medical charts are held up in data entry/
survey data are held up in entry/
data entry gets backlogged/
other: _____/

no effect.

9. NOHIMS has

no/
one or two/
a few/
several/
many/

major "bugs" in the software that affect system performance.

These are: _____

_____.

10. I have used or been exposed to NOHIMS for _____ months.

ACCEPTABILITY OF NOHIMS TO USERS

1. In general, I feel that NOHIMS
adequately/
somewhat adequately/
somewhat inadequately/
inadequately/
performs the functions that are required in my work.
2. Generally, I feel that NOHIMS is
reliable/
somewhat reliable/
somewhat unreliable/
unreliable.
3. Generally, I feel that NOHIMS
is/
is somewhat/
is somewhat not/
is not/
user friendly and easy to operate.
4. In general, the data collection forms are
acceptable/
somewhat acceptable/
somewhat unacceptable/
unacceptable/
to me.
5. In general, I think that the data collection forms are
acceptable/
somewhat acceptable/
somewhat unacceptable/
unacceptable/
to the patient/worker.
6. I feel that the changes in procedures required by NOHIMS are
acceptable/
somewhat acceptable/
somewhat unacceptable/
unacceptable.
7. I feel that NOHIMS
is an aid in/
is somewhat of an aid in/
has no effect on/
is somewhat of a hindrance in/
is a hindrance in/
the provision of care to the patient/worker.

~~8. (Medical users only) I feel that NOHIMS has~~

~~significantly disrupted/
somewhat disrupted/
not disrupted/~~

~~traditional patterns of clinical thinking and/or patient management.~~

9. NOHIMS has affected my workload by

significantly increasing my workload/
somewhat increasing my workload/
somewhat decreasing my workload/
significantly decreasing my workload/
changing the nature of my workload/
no effect on my workload.

~~10. NOHIMS features that have been incorporated into my everyday work
procedures include~~

~~data collection forms/
data entry/
on-line look-up/interactive query/interactive flowcharts/
display of standard reports/
printed standard reports/
report generation/
other: _____/
none.~~

~~11. These features have made my job~~

~~much easier/
somewhat easier/
no effect/
somewhat harder/
much harder.~~

~~12. These features have made me~~

~~less productive/
about as productive/
more productive.~~

~~13. Generally, I feel that system users can perform their jobs~~

~~more efficiently and effectively/
somewhat more efficiently and effectively/
to the same level of efficiency and effectiveness/
somewhat less efficiently and effectively/
less efficiently and effectively/~~

~~because of NOHIMS.~~

14. In general, my assessment of how well people have adapted to
NOHIMS is that they have adapted

well/
somewhat well/
somewhat poorly/
poorly.

15. Overall, NOHIMS is

acceptable/
somewhat acceptable/
somewhat unacceptable/
unacceptable.

16. If NOHIMS is unacceptable or somewhat unacceptable, what changes need to be made in order to make it acceptable?

less data have to be collected/
more data have to be collected/
data have to be collected at more points/
changes to data collection forms are required/
data have to be stored longer/
more hardware is required/
more communication gear is required/
more software is required/
changes to present software are required/
new report formats are required/
new reports are required/
inquiry capability is required/
more inquiry capability is required/
more system support is required/
more training is required/

other: _____/
other: _____/
other: _____/

PERCEIVED BENEFITS OF NOHIMS

1. In my opinion, the benefits of NOHIMS have been

increased quality of care provided to the worker/patient through:
fewer unnecessary tests and ancillary services/
fewer unnecessary examinations/visits/
appropriateness of tests performed/
reduced waiting time/
more accurate patient medical record/
timely and perpetual access to data/
earlier diagnosis of illnesses/conditions/
earlier notification of abnormal test results/findings/
base-line data on the health of an employee/
increased compliance with monitoring programs/
reduction in occupational exposures to hazardous agents/
improved workplace monitoring/
better identification of possible hazards/
better identification of workers exposed/
safer working conditions/
improved job certification program/
increased confidence of workers/
improved communication between those concerned with
the occupational health of the worker/
increased productivity of staff/clinics/
increased efficiency in the use of resources/
savings in manpower/
reduction in the cost of providing services/
improved planning and budgeting/
more accurate administrative reports/
more accurate/available database for research efforts/
other health care benefits: _____

other monitoring benefits: _____

other administrative benefits: _____

other benefits: _____

2. Of those mentioned, the most significant benefit of NOHIMS is

3. The costs of implementing and operating NOHIMS

clearly exceed or outweigh the benefits/
somewhat exceed or outweigh the benefits/
equal the benefits/

or the benefits

somewhat exceed or outweigh the costs/
clearly exceed or outweigh the costs.

YOUR STRUCTURED APPRAISAL OF THE PERFORMANCE OF THE
NAVY OCCUPATIONAL HEALTH INFORMATION MANAGEMENT SYSTEM (NOHIMS)

Contained in the following pages are 22 statements reflecting possible attitudes or opinions that users of NOHIMS might hold. You are being asked to carefully read each of these statements and then to place an "X" in the blank that most nearly reflects your opinion of NOHIMS, indicating the extent to which you agree or disagree with each statement. PLEASE EXPRESS AN OPINION ON EACH STATEMENT EVEN IF YOU HAVE NEVER THOUGHT ABOUT THIS SUBJECT BEFORE IN JUST THIS WAY.

The intent of this short exercise is to systematically explore what your subjective attitudes and opinions are concerning the impact of NOHIMS on your department. Your responses will remain anonymous and will be used only in the aggregate to provide a composite picture of the benefits that have accrued from NOHIMS in your department. Thank you for your cooperation and valued assistance.

SITE:

APPRAISAL OF THE PERFORMANCE OF NOHIMS

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Neutral Opinion</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
1. Worker/patient-related information is more accessible and available more quickly with NOHIMS.	_____	_____	_____	_____	_____
2. As a result of NOHIMS, I am able to do a better job.	_____	_____	_____	_____	_____
3. The performance of NOHIMS falls short of what I expected.	_____	_____	_____	_____	_____
4. I could never go back to using the old manual record system now that I have been using NOHIMS.	_____	_____	_____	_____	_____
5. NOHIMS catches more human errors than the old manual system did.	_____	_____	_____	_____	_____
6. In my opinion, NOHIMS should not have been implemented at this activity.	_____	_____	_____	_____	_____
7. I rarely have to wait for necessary worker/patient information because the NOHIMS system is down.	_____	_____	_____	_____	_____
8. In general, NOHIMS is better than the old manual system of record keeping.	_____	_____	_____	_____	_____
9. NOHIMS has some major problems that need correction.	_____	_____	_____	_____	_____
10. If there were budget cuts at this activity, I would rather see other services that I need cut before I lost NOHIMS.	_____	_____	_____	_____	_____

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Neutral Opinion</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
11. NOHIMS has "goofed" up worker/patient records more times than I care to remember.	_____	_____	_____	_____	_____
12. I truly feel that the quality of care has been improved as a result of NOHIMS.	_____	_____	_____	_____	_____
13. From an administrative point of view, NOHIMS provides timely data for making management decisions that were not available with the previous manual system.	_____	_____	_____	_____	_____
14. Scheduling and staffing patterns have been improved since the advent of NOHIMS.	_____	_____	_____	_____	_____
15. NOHIMS does not benefit me much personally.	_____	_____	_____	_____	_____
16. Worker/patient satisfaction seems to be running higher since NOHIMS was introduced.	_____	_____	_____	_____	_____
17. I can see how NOHIMS can be a boon to other users.	_____	_____	_____	_____	_____
18. With NOHIMS, I am able to get more done in a day.	_____	_____	_____	_____	_____
19. The records produced by NOHIMS are more amenable to review and better meet Navy standards.	_____	_____	_____	_____	_____
20. The confidentiality of the worker's/patient's record is more vulnerable with NOHIMS than it was with the manual system.	_____	_____	_____	_____	_____

Strongly
Disagree

21. I don't care much what NOHIMS costs to operate, we need it to handle our workload efficiently.

22. If NOHIMS were to be taken out, I would be willing to make a reasonable effort to get it back in service.

The purpose of the following two questions is to provide classification information for the statistical analysis of responses to the questionnaire. Please mark all categories that apply to you.

23. I am a system developer

user

24. My function is clerical

medical:

professional

ancillary

industrial:

hygienist/safety
specialist

work center

supervisor

administrative

other:

APPENDIX C

STRUCTURED INTERVIEW FOR
DATA ENTRY PERSONNEL

Person Interviewed: _____

Name of Activity: _____

Location of Activity: _____

Telephone Number: _____

Site of Interview: _____

Date of Interview: _____

Name of Interviewer: _____

The first questions ask you to evaluate the user friendliness of NOHIMS.

ASSESSMENT OF USER FRIENDLINESS

1. It was

very easy/
somewhat easy/
somewhat difficult/
very difficult/

for me to learn to use NOHIMS.

☐ Have not learned to use NOHIMS (then go to next interview section).

2. I am

very confident/
somewhat confident/
somewhat unsure/
very unsure/

of my ability to work with NOHIMS.

3. It is

easier/
somewhat easier/
not different/
somewhat more difficult/
more difficult/

to use NOHIMS than other automated systems I have used.

☐ Not used other systems.

4. Please rate the following features of NOHIMS in terms of their helpfulness in using NOHIMS.

	<u>Very Helpful</u>	<u>Somewhat Helpful</u>	<u>Not Helpful</u>
a. Screen displays	_____	_____	_____
b. System prompts/menus	_____	_____	_____
c. System messages	_____	_____	_____
d. Help text/assistance functions	_____	_____	_____
e. Report formats	_____	_____	_____
f. Techniques for looking up an individual	_____	_____	_____
g. Agency unit look-up	_____	_____	_____
h. Environment look-up	_____	_____	_____
i. Survey data look-up	_____	_____	_____
j. Hazardous agent look-up	_____	_____	_____
k. Directory item look-up	_____	_____	_____

5. Improvements I would like to see to make NOHIMS easier to use include

6. Overall, I feel that NOHIMS is

very user friendly/
somewhat user friendly/
somewhat user unfriendly/
very user unfriendly.

Next, we will be asking you to assess the performance of NOHIMS.

ASSESSMENT OF SYSTEM PERFORMANCE

1. NOHIMS has given no/some/many problems in the area of
reliability/
downtime/
communication lines/
man-machine interface/
other: _____.
2. A noticeable (to the user) failure happens about _____/
_____ and that number has been
improving/
steady/
getting worse.
3. The number of failures/errors for NOHIMS is
acceptable/
somewhat acceptable/
somewhat unacceptable/
unacceptable.
4. When there is heavy usage of the computer system, then there will be
a noticeable slowdown/
an annoying slowdown/
a terrible slowdown/
no effect.
5. Data entry is
never/
rarely/
occasionally/
often/

delayed by system response time.
6. The time required to obtain a display of data is usually
fast/
somewhat fast/
somewhat slow/
slow.
- ~~7. When a NOHIMS failure occurs, it affects the day to day provision
of medical care because

work procedures must be changed/
reports usually used in care are not available/
on line look ups cannot be done/
medical charts are held up in data entry/
survey data are held up in entry/
other: _____/
no effect.~~

8. When a NOHIMS failure occurs, it affects the administration of the occupational health unit because

work procedures must be changed/
reports usually used are not available/
on-line look-ups cannot be done/
medical charts are held up in data entry/
survey data are held up in entry/
data entry gets backlogged/
other: _____/
no effect.

9. NOHIMS has

no/
one or two/
a few/
several/
many/

major "bugs" in the software that affect system performance.

These are: _____

_____.

10. I have used or been exposed to NOHIMS for _____ months.

YOUR STRUCTURED APPRAISAL OF THE PERFORMANCE OF THE
NAVY OCCUPATIONAL HEALTH INFORMATION MANAGEMENT SYSTEM (NOHIMS)

Contained in the following pages are 22 statements reflecting possible attitudes or opinions that users of NOHIMS might hold. You are being asked to carefully read each of these statements and then to place an "X" in the blank that most nearly reflects your opinion of NOHIMS, indicating the extent to which you agree or disagree with each statement. PLEASE EXPRESS AN OPINION ON EACH STATEMENT EVEN IF YOU HAVE NEVER THOUGHT ABOUT THIS SUBJECT BEFORE IN JUST THIS WAY.

The intent of this short exercise is to systematically explore what your subjective attitudes and opinions are concerning the impact of NOHIMS on your department. Your responses will remain anonymous and will be used only in the aggregate to provide a composite picture of the benefits that have accrued from NOHIMS in your department. Thank you for your cooperation and valued assistance.

SITE:

APPRAISAL OF THE PERFORMANCE OF NOHIMS

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Neutral Opinion</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
1. Worker/patient-related information is more accessible and available more quickly with NOHIMS.	_____	_____	_____	_____	_____
2. As a result of NOHIMS, I am able to do a better job.	_____	_____	_____	_____	_____
3. The performance of NOHIMS falls short of what I expected.	_____	_____	_____	_____	_____
4. I could never go back to using the old manual record system now that I have been using NOHIMS.	_____	_____	_____	_____	_____
5. NOHIMS catches more human errors than the old manual system did.	_____	_____	_____	_____	_____
6. In my opinion, NOHIMS should not have been implemented at this activity.	_____	_____	_____	_____	_____
7. I rarely have to wait for necessary worker/patient information because the NOHIMS system is down.	_____	_____	_____	_____	_____
8. In general, NOHIMS is better than the old manual system of record keeping.	_____	_____	_____	_____	_____
9. NOHIMS has some major problems that need correction.	_____	_____	_____	_____	_____
10. If there were budget cuts at this activity, I would rather see other services that I need cut before I lost NOHIMS.	_____	_____	_____	_____	_____

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Neutral Opinion</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
11. NOHIMS has "goofed" up worker/patient records more times than I care to remember.	_____	_____	_____	_____	_____
12. I truly feel that the quality of care has been improved as a result of NOHIMS.	_____	_____	_____	_____	_____
13. From an administrative point of view, NOHIMS provides timely data for making management decisions that were not available with the previous manual system.	_____	_____	_____	_____	_____
14. Scheduling and staffing patterns have been improved since the advent of NOHIMS.	_____	_____	_____	_____	_____
15. NOHIMS does not benefit me much personally.	_____	_____	_____	_____	_____
16. Worker/patient satisfaction seems to be running higher since NOHIMS was introduced.	_____	_____	_____	_____	_____
17. I can see how NOHIMS can be a boon to other users.	_____	_____	_____	_____	_____
18. With NOHIMS, I am able to get more done in a day.	_____	_____	_____	_____	_____
19. The records produced by NOHIMS are more amenable to review and better meet Navy standards.	_____	_____	_____	_____	_____
20. The confidentiality of the worker's/patient's record is more vulnerable with NOHIMS than it was with the manual system.	_____	_____	_____	_____	_____

	<u>Strongly</u> <u>Agree</u>	<u>Agree</u>	<u>Neutral</u> <u>Opinion</u>	<u>Disagree</u>	<u>Strongly</u> <u>Disagree</u>
21. I don't care much what NOHIMS costs to operate, we need it to handle our workload efficiently.	_____	_____	_____	_____	_____
22. If NOHIMS were to be taken out, I would be willing to make a reasonable effort to get it back in service.	_____	_____	_____	_____	_____

The purpose of the following two questions is to provide classification information for the statistical analysis of responses to the questionnaire. Please mark all categories that apply to you.

23. I am a system developer _____

user _____

24. My function is clerical _____

medical:

professional _____

ancillary _____

industrial:

hygienist/safety
specialist _____

work center
supervisor _____

administrative _____

other: _____.

APPENDIX D

STRUCTURED INTERVIEW FOR
CONTRACTED NOHIMS DEVELOPERS

Person Interviewed: _____

Name of Activity: _____

Location of Activity: _____

Telephone Number: _____

Site of Interview: _____

Date of Interview: _____

Name of Interviewer: _____

PROGRAMMING STRUCTURE AND LANGUAGE USED

1. The system routines for the medical component of NOHIMS were written by
 - a vendor/
 - consultants/
 - research personnel/
 - clinical personnel/
 - professional programmers.
2. The system routines for the industrial component of NOHIMS were written by
 - a vendor/
 - consultants/
 - research personnel/
 - clinical personnel/
 - professional programmers.
3. Their operation was verified by
 - the vendor/
 - consultants/
 - research personnel/
 - clinical personnel/
 - professional data processing staff.

through

 - a formal check-out procedure/
 - pilot operation/
 - routine operational use.
4. The principal programming language is
 - Assembler/
 - FORTRAN/
 - COBOL/
 - PL/1/
 - MUMPS/
 - Other: _____.
5. The programming structure is
 - incremental/
 - hierarchical/
 - structured programming.
6. The routines were designed and written for
 - this application/
 - general medical purposes/
 - general commercial purposes/
 - general occupational health purposes.

7. The software is now being
further developed/maintained/understood/ignored
by the local staff/
further developed/maintained/ignored by the
authors.
8. The file system is characterized by
sequential files/
tabular files/
indexed files/
direct access (random files)/
linked records/
hierarchical direct access B-tree files.
9. The files are
compressed/fixed length/variable length.
File space is dynamically/pre-allocated.
10. NOHIMS uses
foreground interactive processing/
equal foreground/background processing/
background/batch processing/
for most of its processing.

~~CURRENT HARDWARE CONFIGURATION AND MINIMUM REQUIREMENTS FOR HARDWARE~~

Current Hardware Configuration

1. The processing capability is provided through the following computer(s)

No.	Manufacturer	Model	Size	Year Installed
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

2. The computing services are provided through a
vendor: _____
associated organization: _____
in-house.

3. The equipment is rented/leased/purchased.

4. Maintenance is by vendor/in-house.

5. Approximately _____% of the processing capability is used for NOHIMS.

6. Approximately _____(% or actual) of the file capability is used for NOHIMS.

	No.	Type	Model
7a. The files are stored on	_____	_____	_____
	_____	_____	_____
b. Communication equipment includes	_____	_____	_____
	_____	_____	_____
c. Other important equipment is	_____	_____	_____
	_____	_____	_____
d. Archival storage is	_____	_____	_____
	_____	_____	_____

8. Hardcopy terminals are

No.	Type	Char./line	U/L case	Speed	Mechanism	Reliability
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____

9. Softcopy terminals are

No.	Type	Screen	Char./ line	U/L case	Speed	Lines/ screen	Relia- bility	Character resolution
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____

10. Currently production occupies _____ % of the machine,
and development _____ %.

11. Of the production load

_____ % is data entry,
_____ % is file maintenance,
_____ % is data analysis and
_____ % is report preparation.

12. The operating system was designed and written
for this application and/or institution/
for general medical purposes/
for general commercial purposes.

13. It is now being

further developed/maintained/understood/ignored
by the local staff/
further developed/maintained/ignored
by the original supplier.

Minimum Hardware Requirements

14. The minimum hardware configuration that could support NOHIMS is

Processor: _____

Terminals: _____

File Storage: _____

Communications Equipment: _____

SYSTEM DESCRIPTION (OPTIONS, FEATURES, AND FUNCTIONS)

1. What are the primary system options in the medical component of NOHIMS? What is the function of each of these options? What suboptions are available under each system option?

Registration: _____

Enter Medical Data: _____

Display Medical Data: _____

Print Medical Data: _____

System Maintenance: _____

COSTAR Report Generator: _____

Mailbox: _____

Occupational Health Information: _____

2. What are the main functions and features of each of the options in the medical component of NOHIMS?

Registration: Patient Registration/Edit

Can patients already entered in the database be adequately identified in order to avoid duplicate registrations?

Can patients be identified with ambiguous entries?

Are patient names searched by phonetics?

Can a patient unit number be assigned by the system? by the clinic?

Can the sequence of registration entry items be altered to add new items? delete items? require items? not require items? change the sequence of prompts? change the name of the prompts? provide range checking?

Can the possible responses to the items in the registration sequence be changed?

What are the limits on the number of items that can be entered for a patient during registration?

Are items that are not applicable skipped automatically?

Is there any limitation to the kinds of data that can be entered during registration?

Are there conventions which minimize the keystrokes required at each prompt?

Are the entries made displayed on the screen during data entry? Does the screen display during data entry duplicate the input documents?

Can the user redisplay the data entered to be certain that all entries are correct?

Can the display of registration items be formatted in any manner desired?

Are there any features that verify the entry of data?

What requirements are there for the input documents for registration?

What methods can be used to enter data such as keypunch, optical scanning, bar code reading, CRT entry, or direct machine interface?

Can data be kept historically for selected data items?

Can incorrect entries be edited before filing?

Can the user select the specific data item that needs editing?

Is the patient registration information filed in the background while registration proceeds?

Is there help text for the registration sequence?

Can help text for the registration sequence be changed?

Describe any additional features of this option.

Enter Medical Data: Encounter

What defines an encounter for NOHIMS?

Can more than one encounter be entered on a given day?

Can an encounter be entered if a patient has not been registered?

Can the prompt sequence for the header of the encounter be altered to change the sequence? add items? delete items? perform range checking? change prompt names? require items? not require items?

Does the patient record need to be identified for each encounter entered into the database?

Can possible responses to the items in the header sequence be changed?

Is there help text for the encounter header entry sequence?

Can help text for the encounter header entry sequence be changed?

Can the providers of care for the encounters be entered in a table that is referred to by the prompt sequence? Can changes be made to this table?

Is there any limitation to the types of data that can be entered during the header portion of the encounter?

Can the sequence for entering data during the body portion of the encounter be altered?

Is there any limitation to the types of data that can be entered during the body portion of the encounter?

Can the items to be entered during the body portion of the encounter be augmented to assign abnormal statuses? assign other statuses?

Can lab results be entered during encounter entry?

Can a panel of tests be specified? Can the individual tests be specified?

Is help text available for the entry of data in the body of the encounter?

Are the entry procedures the same for each class of data item?

What is the minimum amount of information required to enter data in the system? Is there more than one way to enter a particular item?

Are there any short-cut methods to enter the data?

Are there conventions that minimize the keystrokes required at each prompt?

Does a data item have to be predefined in NOHIMS before it can be entered?

Can free text be associated with codes?

Can additional codes be added to the directory?

Can features of these codes be changed at will?

Can NOHIMS be told to automatically prompt for text?

Can NOHIMS be told to require that a modifier be entered?

Can special input/output formats be specified for selected data items?

What restrictions are there on the short name of a code?

What restrictions are there on the long name of a code?

What is the significance of the COSTAR code? the COSTAR taxonomy?

What functions does the modifier play? How is it useful in the NOHIMS application?

Can codes be blocked from encounter entry?

What other input conditions can be set for codes entered during encounter entry?

Can flowcharts be triggered by the entry of a code in the patient's medical record?

Does NOHIMS perform range checking on results and findings? What criteria can be specified for range checking?

Are the entries made displayed on the screen during entry? Does the screen display during entry duplicate the input documents?

Can changes be made to the information already entered for a patient while in the encounter option?

What methods can be used to enter data such as keypunch, optical scanning, bar code reading, CRT entry, or direct machine interface?

What requirements are there for the input documents for encounter entry?

Are all codes to be entered into NOHIMS precoded on the data collection forms? Who codes data that are not precoded?

Are there any features that verify entry of the data? Does the COSTAR code have a check digit?

Is the information entered during encounter entry filed in the background/using transaction processing/batch processing? When are the input data reflected in the files?

Can another encounter be entered while data are being filed to a patient record?

Describe any additional features of this option.

Enter Medical Data: Medical Edit

Can the patient record to be edited be identified with an ambiguous entry?

Can the patient record to be edited be identified by name? by social security number? by unit number?

Is the patient record to be edited displayed before editing is done?

Can all data items be edited? be deleted?

Can the user select the specific item that needs editing?

What is the format for editing a data item?

Is editing done on-line or with a special batch program? When are changes reflected in the files?

Is an item which is deleted actually removed from the patient record?

Are old results and free text associated with codes that have been edited actually removed from the patient record?

Is an audit trail of all entry errors maintained?

Does editing an encounter affect the display of the encounter?

When a correction is made, are all previously derived reports/ fields automatically corrected or are changes entered in the file only?

Can an entire encounter be deleted?

Can a generic edit be accomplished such as deleting all laboratory codes?

Are the edits made displayed on the screen during editing?

Are there any features that verify the editing of data?

What requirements are there for the input documents for editing an encounter?

Describe any additional features of this option.

Enter Medical Data: Lab Results

Can the patient for whom lab results are to be entered be identified with an ambiguous entry?

Can the patient for whom lab results are to be entered be identified by name? by social security number? by unit number?

Does the patient record need to be identified for each lab result entered?

How is the proper lab test to be resulted identified?

Can lab results be entered for a date that does not have an encounter?

Can lab results be entered for a test that has not been recorded in the encounter?

Are there short cuts to entering lab results data?

Can panels of tests be resulted as a group? can individual tests be resulted?

Do all tests in a panel have to be resulted at the same time?

Are there any features that verify the entry of data? Is range checking performed on the lab results entry?

What limitations are there on the format for entering lab results data?

Can free text be entered with a lab result?

Can NOHIMS interpret lab results? What criteria are used to interpret the results? Can these criteria be changed easily?

Can lab results be edited once they are filed?

Is the filing of lab results done in the background?

Does NOHIMS keep track of the status of a lab test (ordered/ pending/resulted)?

Are there conventions that minimize the keystrokes required at each prompt?

Are the entries made displayed on the screen during entry?
Does the screen display during entry duplicate the input documents?

Is there any limit to the number of lab tests that can be entered for a given patient on a given day?

Can more than one lab result be entered for a lab test on the same day (repeat tests)?

Can special input/output sequences be used for tests with several components such as urinalysis and pulmonary function tests?

Is there help text for the lab results entry? Is it specific for each lab test?

Can an incorrectly entered lab test be deleted in this option?

What requirements are there for the input documents for the laboratory results?

Can lab results be automatically entered from machines or other systems?

Can NOHIMS automatically generate orders for laboratory tests?

Describe any additional features of this option.

Display Medical Data*

Print Medical Data*

* Please see the Information Retrieval Capabilities section of the structured interviews for questions on these two system options.

System Maintenance

Please see the Security Features section of the structured interviews for questions on security functions. See the Software Quality Attributes and Operational Characteristics sections of the structured interviews for questions on error recovery procedures and error diagnostics.

Can the functions of the background filing job (Monitor) be controlled without programming intervention?

Does NOHIMS display information regarding the filing status of the data?

Can a variety of terminal types be used with NOHIMS?

Can the codes in the directory be printed and/or displayed for review?

Can the user select the directory codes to be printed/displayed by division? by other criteria?

Can the user specify the order in which the codes are printed/displayed?

What is the format of the directory print/display? Can this format be altered without programming intervention?

Can the specifications for a particular code be reviewed?

Can the specifications for a particular code be altered?

Can a code be added to the directory? deleted from the directory?

Can patient records be archived to tape? retrieved from tape? to and from other media?

What selection criteria may be used to define the patient records that are to be archived? retrieved from the archive?

Is there a zip code directory? Can the zip code directory be updated?

Can a 9-digit zip code be entered in the directory?

Can jobs run on the system be queued to run at a particular time of day on a particular date?

Can the job queue be altered without programming intervention?

Can a job be deleted from the job queue?

Does the system provide a profile of current users of the system? What information is included in this profile?

Can a user be given the ability to review the specifications of a code without being given the ability to alter the directory?

Is there help text for the system maintenance procedures?

Describe any additional features of this module.

Mailbox

Can NOHIMS store messages for other users of the system?

Can a message be sent to all users? to a selected group of users?

Is there any limitation to the length of a message?

Can a message be edited before it is stored? after it is stored?

Does NOHIMS note the time and day that a message was sent?

Does NOHIMS tell you if you have mail?

Does NOHIMS keep track of whether you have read your mail?

Can NOHIMS tell you if others have read the mail you sent?

Can a hardcopy of a message be produced?

Can mail be selectively deleted? by the receiver? by the sender? by the system manager?

Is there any limitation to the number of messages that can be sent/stored at any one time?

Is there help text for the mailbox procedures?

Describe any additional features of this module.

Occupational Health Information

Can the data in the industrial component of NOHIMS be accessed from the medical component? by the user? by the system for reports?

Can restrictions be placed on the access to the industrial component?

Describe any additional features of this module.

3. What system interfaces/relationships does NOHIMS have with other Navy and/or non-Navy data systems?

Does NOHIMS access and display information derived from intra- and extra-Navy databases such as demographic data from personnel databases, safety department databases, and hazard/toxic chemical databases?

Does NOHIMS incorporate or replace existing central Asbestos Medical Surveillance Program (AMSP) and HEaring Conservation Management Information System (HECMIS) databases?

Does NOHIMS utilize historic data contained in AMSP and HECMIS databases?

4. What are the primary options in the industrial component of NOHIMS? What is the function of each of these options? What suboptions are available under each system option?

Agency: _____

Personnel: _____

Environments: _____

Surveys: _____

Hazardous Agent Table: _____

System Maintenance: _____

5. What are the main functions and features of each of the options in the industrial component of NOHIMS?

INDUSTRIAL COMPONENT OF NOHIMS

PRIMARY INFORMATION TOPICS

The Industrial Component is concerned with the collection, control, coordination and manipulation of the five specific major topical areas of information as given below.

The design of this component specifically attempts to record, maintain and assess the inter-relationship of these data in order to provide automated capabilities that satisfy the industrial related information objectives of the NOHIMS system.

1. The Industrial organization (Agency).
2. The employees and other personnel within the organization (Personnel).
3. The work environments local to the organization (Environments).
4. The contents, concentration measurements, configuration and use of materials, agents and conditions of the work environments (Surveys).
5. The collection and application of information related to the monitoring, usage and health care aspects of chemical substances, biological elements and physical phenomena (Hazardous Agent Table).

The following interrogatory scenarios solicit and chronicle the pertinent technical, functional and methodological attributes and features that are incorporated in the Industrial component as they apply to:

1. Each of the above major topics.
 - a. Purpose and usage.
 - b. Identifier entry, edit, update, filing, availability, retrieval and display functions.
 - c. Associated data item entry, edit, update, filing, availability, retrieval and display functions.
 - d. Transaction handling.
 - e. Inter-relation to other major topic data.
 - f. Special features.
2. System objective specific functions.
 - a. Objective description.
 - b. Initiation, subject and/or data item identification and selection.
 - c. Data or transaction entry, edit, update and filing.
 - d. Retrieval, organization and display.
 - e. Special features.
3. System Security Functions.
4. System Tables, Directory and Utility Maintenance.
5. System Error Recovery.

AGENCY FUNCTIONS and INFORMATION

PURPOSE: Describe the primary objectives that the system functions, as a whole, are designed to provide, achieve or support in this topic area.

IDENTIFIERS: Include explanations or comments as required.

Can a local or ad hoc organizational structure be defined for use?

Defined by whom? <general user/system manager/system implementor/ADP professional>

Can one or more geographical locations (sites) local to the industry be defined within the organizational definition?

With user-specific identifiers?

With additional user-selected acronyms?

Can the hierarchical levels and associated titles of the organizational structure be defined?

With user-specific title identifiers?

Can the association between hierarchical level and work unit be defined?

Can it represent the true relationship of work units at each hierarchical level?

Can it represent the true relationship of work units at hierarchical levels above and below any specified level?

Can each individual work unit be defined?

With user-specific identifiers?

With additional acronyms or user-specific codes?

Is the site location of the work unit associated with it?

Can a work unit reside at more than one site?

ASSOCIATED DATA: Provide a list of data items that are intrinsically solicited relative to the AGENCY topic or identifiers. Include any necessary description.

UPDATE CAPABILITY:

Can the original organizational definition be altered, updated, expanded, deleted and generally manipulated?

Are alterations that are made reflected throughout the applicable elements of the hierarchical structure?

Is there an update capability for individual work unit name, acronym or code identifiers?

Historical retention of previous identifiers?

Additional work unit definition capability?

For all existing work units at any hierarchical level?

Historical retention of the previous configuration of the augmented work unit?

Can individual work units be deleted or de-activated?

Historical retention of the unit identifiers and their location within the organizational hierarchy?

Can the hierarchical structure levels be increased?

Historical retention of the previous configuration?

Can the hierarchical level title identifiers be changed?

Historical retention of the previous title identifiers?

Can a work unit be relocated in the hierarchical structure?

Historical retention of previous configuration?

By whom can the above tasks be done? <general user/system manager/system implementor/ADP professional>

Does the update, deletion or alteration of the agency structure or identifier configuration require any system software or hardware modifications?

Describe all necessary modification requirements and indicate by whom they are to be performed.

Can the associated intrinsic data items be entered, updated and generally manipulated by the user?

Is a historical record of <each/ some/ specific> altered data item retained?

Can additional user defined data items be included in topical data groups in an ad hoc manner?

Describe the item definition capability.

Does the user have the same general update capabilities with ad hoc data items as with intrinsic data items?

EDITING:

Are identifier entries and changes edited for content, construction and applicable omission or duplication restraints by <entry process/ a background process/ a batch process/ no process>?

Are data item entries and changes edited for content, construction and applicable omission or duplication restraints by <entry process/ a background process/ a batch process/ no process>?

Describe other pertinent edit processes or considerations that are applied to these data.

FILING:

Are identifier entries and alterations filed by a <foreground/ background/ batch> process?

Are data item or data groups filed by a <foreground/ background/ batch> process?

Describe any additional features of AGENCY entry, editing, update, deletion or general management of these functions.

RETRIEVAL & DISPLAY: Agency Identifiers/data items

Responses to the following questions are not to include the capabilities of general "Query", "Data Base" or "Report Generator" functions that may be present in the system. Only capabilities available in the "normal" entry, edit, update and display functions are solicited here.

Unless otherwise noted, it is assumed that data and groups of data that are retrievable in the manner indicated can also be displayed to the user in that manner or made available to any other applicable task concerned with the agency and agency data.

- Can any work unit at all hierarchical levels be retrieved?
- All work units under a specific unit at the next descendent hierarchical level?
 - All work units under a specific unit at all descending hierarchical levels in cascade order?
 - All work units within the organization in cascade order?
 - All work units at any specific hierarchical level?
 - A specific group of work units at the same hierarchical level?
 - A specific group of work units and their respective descendent work units?
 - A random user specified set of individual work units?

Can a specific site be selected for retrieval of work units?
Can sites be specified by acronym or ambiguous entry?

Can retrieval include work units at all applicable sites?

Can retrieval of work units be accomplished by ambiguous identifier entry?

Does the system construct a selection list of all possible subject candidates for an ambiguous identifier entry?
Is multiple selection from the candidate list allowed if applicable to the task?
Is selection of all entries of a candidate list allowed if applicable to the task?

Does the retrieval of agency elements intrinsically include pertinent names, acronyms, code, titles and site data?
List items included.

For applicable tasks, can retrieval optionally include pertinent identifiers and/or data items from other major topic data areas?

Provide a list of topics and data that can be included.
Identify the specific tasks or functions where this is allowed.

Can such retrieval include any desired "agency" associated data item or data group in an ad hoc manner?
Describe the means of data item selection if selection is allowed.
Identify the specific tasks or functions where this is allowed.

Describe any additional features of retrieval of AGENCY associated system elements.

The AGENCY data contains or directly references:

Work environments associated with an agency work unit?
Personnel assigned to an agency work unit?
Survey data associated with an agency work unit?

The AGENCY data contains or directly references what other primary or pertinent data areas within the system? Describe.

Example response to AGENCY usage:

<<<Ex. evaluation finding follows:

To provide a local reference for the placement, movement, termination and other transactions related to personnel and work environments.

To provide a local means of collective and individual identification and selection of personnel.

To identify and relate the local authority over work environments and personnel.

To provide an optimum intrinsic adaptation capability.>>>

PERSONNEL FUNCTIONS and INFORMATION

PURPOSE: Describe the primary objectives that the system functions, as a whole, are designed to provide, achieve or support in this topic area.

IDENTIFIERS: Include explanations or comments as required.

Is there an intrinsic limit to the number of personnel that may be defined?

Can each person be identified by actual name?

By social security number?

By a local employee or pay number?

By any user-defined ad hoc identifier scheme?

AGENCY UNIT AND ENVIRONMENT ASSIGNMENT:

Can each person be assigned to any agency unit?

Can each person be assigned to any work environment that is associated with the assigned agency unit?

Assigned to work environments associated with other agency units?

Assigned to multiple work environments?

Is duration or proportion of time a person is associated with each agency unit and work environment maintained?
In an historical fashion?

ASSOCIATED DATA: Provide a list of data items that are intrinsically solicited relative to the "PERSONNEL" topic or identifiers. Include any necessary description.

EXPOSURE AND MEDICAL MONITORING REQUIREMENTS DATA:

Does the system maintain the association between a person and the actual survey information for each applicable work environment?

Are all applicable hazardous agents, concentration measurement data and surveyed conditions considered in the summarization of personnel medical monitoring requirement and exposure information?

Are all applicable agent-specific mandatory requirements considered also?

Are user-specified recommendations or local requirements considered?

Are sex, age and previously established medical factors and conditions considered?

Is a list of specific medical requirements established for each person?

Listing of physical examination elements, laboratory testing and other medical procedures required?

Are relevant or applicable elements of medical, work and family history noted?

List any other applicable medically oriented information that is or may optionally be included.

Is a list of applicable hazardous agents and materials summarized?

Does it include measured concentration data for each agent?

Does the system provide a selection and report capability for the exposure data and medical requirements summary?

For an individual or a user-specified ad hoc selection of individuals?

For personnel associated with user-selected agency units and/or work environments?

For a given personnel data item criterion?

Can it be produced at any user-desired frequency?

Can it provide notification of requirements to both the applicable agency authority and the person?

Does it historically record medical action taken, results, cancellation and no-response dispositions for the medical requirements produced?

List any additional attributes, capabilities or elements of consideration that are applicable to the personnel exposure and medical requirements information area.

UPDATE CAPABILITY:

Can an original name, social security number, employee number or user-defined personnel identifier be updated?

Is the previous identifier historically maintained?

Can any associated intrinsic data items be entered, updated and generally manipulated by the user?

Is an historical record of <each/some/specific> altered data item retained?

Can the personnel to agency unit and work environment relationships be established, altered and terminated by the user at any time?

Historical retention of the previous relationship?

Can the induction, assignment, termination and within agency transfer transactions involving personnel be accomplished by both a manual foreground interactive process and a background transaction file processing task?

Are the effects of additional and updated environment, survey and exposure information that may be made throughout the system immediately reflected in the personnel medical information?

Are alterations that are made reflected throughout the applicable elements of associated functions?

By whom can the above tasks be done? <general user/system manager/system implementor/ADP professional>

Does the update, deletion or alteration of any personnel identifier configuration require any system software or hardware modifications?
Describe all necessary modification requirements and indicate by whom they are to be performed.

EDITING:

Are identifier entries and changes edited for content, construction and applicable omission or duplication restraints by <entry process/background process/batch process/no process>?

Are data item entries and changes edited for content, construction and applicable omission or duplication restraints by <entry process/background process/batch process/no process>?

Describe other pertinent edit processes or considerations that are applied to these data.

FILING:

Are identifier entries and alterations filed by a <foreground/background/batch> process?

Are data item or data groups filed by a <foreground/background/batch> process?

Describe any additional features of PERSONNEL entry, editing, update, deletion or general management of these functions.

RETRIEVAL & DISPLAY: Work environment identifiers/data items

Responses to the following questions are not to include the capabilities of general "Query", "Data Base" or "Report Generator" functions that may be present in the system. Only capabilities available in the "normal" entry, edit, update and display functions are solicited here.

Unless otherwise noted, it is assumed that data and groups of data that are retrievable in the manner indicated can also be displayed to the user in that manner or made available to any other applicable task concerned with the agency and agency data.

Can any individual be retrieved?

By name entry?

By social security number entry?

By employee number or other user-adopted identification scheme?

By the association of a person to an agency unit?

By the association of a person to a work environment?

Can retrieval of target personnel be accomplished by specific agency unit, work environment or ambiguous name identifier entry?

Does the system construct a selection list of all possible subject candidates for an agency unit, work environment or ambiguous identifier entry?

Is multiple selection from the candidate list allowed if applicable to the task?

Is selection of all entries of a candidate list allowed if applicable to the task?

Can the retrieval of personnel rosters and data be done for any configuration of agency unit identification data?
For any configuration of environment descriptor data?

For applicable tasks, can retrieval optionally include exposure, medical requirements and disposition information?
Provide a list of other topics and data that can be included.
Identify the specific tasks or functions where this is allowed.

Describe any additional features of retrieval of PERSONNEL associated system elements.

The PERSONNEL data contains or directly references:

Agency units associated with a person?

Work environments assigned to a person?

Exposure data and medical health care requirements for a person?

The PERSONNEL data contains or directly references what other primary or pertinent data areas within the system? Describe.

WORK ENVIRONMENT FUNCTIONS and INFORMATION

PURPOSE: Describe the primary objectives that the system functions, as a whole, are designed to provide, achieve or support in this topic area.

IDENTIFIERS: Include explanations or comments as required.

Can local physical location and area descriptors be used in the definition of an environment?

Can an occupation be defined as an environment?

Can an event, episode, accident or ad hoc incident be defined as an environment?

Can a hierarchical description such as a specific area within a room within a building be defined as an environment?
To what hierarchical depth?
What restrictions apply?

Can multiple descriptors be used to define an environment?
How many?
Can each such descriptor be an ad hoc text?
What restrictions apply?

Is there an intrinsic limit to the number of environments that may be defined?

Can an environment be defined for and assigned to:
Any agency unit?
Any ad hoc selection of agency units?
Any individual person?
Any ad hoc selection of personnel?
All personnel within any agency unit?
Any ad hoc selection of personnel within an agency unit or units?
Personnel having a specific occupation?
Personnel working in more than one occupation?
Agency units and/or personnel involved in or associated with any specific event, accident, exposure episode or other ad hoc user-defined incidents?

ASSOCIATED DATA: Provide a list of data items that are intrinsically solicited relative to the WORK ENVIRONMENT topic or identifiers. Include any necessary description.

UPDATE CAPABILITY:

Can an original environment definition be altered, updated, expanded, deleted and generally manipulated?

Does the update, deletion or alteration of any environment identifier configuration require any system software or hardware modifications?
Describe all necessary modification requirements and indicate by whom they are to be performed.

Can any associated intrinsic data items be entered, updated and generally manipulated by the user?
Is a historical record of <each/ some/ specific> altered data item retained?

Can the environment to agency unit and/or personnel relationship be established, altered or terminated by the user at any time?
Historical retention of the previous relationship?

Are alterations that are made reflected throughout the applicable elements of associated functions?

By whom can the above tasks be done? <general user/system manager/system implementor/ADP professional>

EDITING:

Are identifier entries and changes edited for content, construction and applicable omission or duplication restraints by <entry process/background process/batch process/no process>?

Are data item entries and changes edited for content, construction and applicable omission or duplication restraints by <entry process/background process/batch process/no process>?

Describe other pertinent edit processes or considerations that are applied to these data.

FILING:

Are identifier entries and alterations filed by a <foreground/background/batch> process?

Are data item or data groups filed by a <foreground/background/batch> process?

Describe any additional features of WORK ENVIRONMENT entry, editing, update, deletion or general management of these functions.

RETRIEVAL & DISPLAY: Work environment identifiers/data items

Responses to the following questions are not to include the capabilities of general "Query", "Data Base" or "Report Generator" functions that may be present in the system. Only capabilities available in the "normal" entry, edit, update and display functions are solicited here.

Unless otherwise noted, it is assumed that data and groups of data that are retrievable in the manner indicated can also be displayed to the user in that manner or made available to any other applicable task concerned with the agency and agency data.

- Can any environment be retrieved individually?
 - All environments used by a specific agency unit?
 - All environments assigned to a specific person?
 - All environments for a specific survey?
 - Can user-selection of individual environments be accomplished from the above group retrieval?
- Can retrieval of environments be accomplished by ambiguous identifier entry?
- Can retrieval of environments be accomplished for all environments containing an incomplete set of descriptors; such as, retrieval of all environments containing a specific building number where the building number may have been only one element of a description?
 - Can this type of retrieval be done using any number or combination of user-specified descriptors?
- Does the system construct a selection list of all possible subject candidates for an incomplete or ambiguous identifier entry?
 - Is multiple selection from the candidate list allowed if applicable to the task?
 - Is selection of all entries of a candidate list allowed if applicable to the task?
- Can environment retrieval include any associated agency unit identification data?
 - Can the identification data of persons within the agency unit and who are associated with the environment also be included?
- For applicable tasks, can retrieval optionally include pertinent identifiers and/or data items from other major data areas?
 - Provide a list of topics and data that can be included.
 - Identify the specific tasks or functions where this is allowed.
- Describe any additional features of retrieval of WORK ENVIROMENT associated system elements.

The WORK ENVIRONMENT data contains or directly references:

Agency units associated with an environment?
Personnel assigned to an environment?
Survey data associated with the environment?

The WORK ENVIRONMENT data contains or directly references what other primary or pertinent data areas within the system? Describe.

SURVEY FUNCTIONS and INFORMATION

PURPOSE: Describe the primary objectives that the system functions, as a whole, are designed to provide, achieve or support in this topic area.

IDENTIFIERS: Include explanations or comments as required.

Can local conventions for indexing or referencing be used to identify a survey?

List any constraints which affect the configuration of a survey reference.

Is there an intrinsic limit to the number of surveys that may be defined?

Can a survey be defined for and associated with:
Any environment?
Any number of environments?
Any type of environment?

ASSOCIATED DATA: Provide a list of data items that are intrinsically solicited relative to the SURVEY topic or identifiers. Include any necessary description.

UPDATE CAPABILITY:

Can an original survey data content be altered, updated, expanded, deleted and generally manipulated?

Does the update, deletion or alteration of any survey reference or content configuration require any system software or hardware modifications?
Describe all necessary modification requirements and indicate by whom they are to be performed.

Can any associated intrinsic data items be entered, updated and generally manipulated by the user?
Is a historical record of <each/ some/ specific> altered data item retained?

Can the survey-to-environment relationship be established, altered or terminated by the user at any time?
Historical retention of the previous relationship?

Are alterations that are made reflected throughout the applicable elements of associated functions?

By whom can the above tasks be done? <general user/system manager/system implementor/ADP professional>

EDITING:

Are identifier entries and changes edited for content, construction and applicable omission or duplication restraints by <entry process/background process/batch process/no process>?

Are data item entries and changes edited for content, construction and applicable omission or duplication restraints by <entry process/background process/batch process/no process>?

Describe other pertinent edit processes or considerations that are applied to these data.

FILING:

Are identifier entries and alterations filed by a <foreground/background/batch> process?

Are data item or data groups filed by a <foreground/background/batch> process?

Describe any additional features of SURVEY data entry, editing, update, deletion or general management of these functions.

RETRIEVAL & DISPLAY: Survey reference identifiers/data items.

Responses to the following questions are not to include the capabilities of general "Query", "Data Base" or "Report Generator" functions that may be present in the system. Only capabilities available in the "normal" entry, edit, update and display functions are solicited here.

Unless otherwise noted, it is assumed that data and groups of data that are retrievable in the manner indicated can also be displayed to the user in that manner or made available to any other applicable task concerned with the survey and survey data.

Can any survey be retrieved individually?
All surveys for a specific agency unit?
All surveys for an environment?
Can user-selection of individual surveys be accomplished from the above group retrieval?

Can all components of the survey, agent sample data, material inventory data or primary survey data be displayed selectively?

For applicable tasks, can retrieval optionally include pertinent identifiers and/or data items from other major data areas?
Provide a list of topics and data that can be included.

Describe any additional features of retrieval of SURVEY associated system elements.

The SURVEY data contains or directly references:

Environments associated with a survey?

Hazardous agent identification associated with the survey?

Products containing hazardous agents associated with the survey?

The SURVEY data contains or directly references what other primary or pertinent data areas within the system? Describe.

HAZARDOUS AGENT TABLE and FUNCTIONS

PURPOSE: Describe the primary objectives that the system functions, as a whole, are designed to provide, achieve or support in this topic area.

IDENTIFIERS: Include explanations or comments as required.

Is there an intrinsic limit to the number of agents that may be defined?

Can each agent be identified by actual name?

By one or more synonymous names? How many are allowed?

By one or more agent number or code configurations?

By any user-defined ad hoc identifier scheme?

ASSOCIATED DATA: Provide a list of data items that are intrinsically solicited relative to the HAZARDOUS AGENT topic or identifiers. Include any necessary description.

EXPOSURE AND MEDICAL MONITORING REQUIREMENTS DATA:

Does the system maintain the association between an agent and the current medical examination requirements for personnel exposed to or association with the agent?

Does the system maintain other pertinent medical information for each agent?

List the other medical data that is maintained.

Are hazardous agent concentration and exposure limits maintained?

For more than one authority such as PEL, TLV, NIOSH etc.?

List the authorities included.

For more than one sampling scale?

For TWA, ACTION LEVEL, STEL and CEILING limits?

List all that are included.

Can agent sampling, handling and disposal procedures be maintained for each agent in the system?

List any additional attributes, capabilities or elements of consideration that are applicable to the agent exposure and medical requirements information.

UPDATE CAPABILITY:

Can the original agent name and/or synonyms be updated?

Can any associated intrinsic data items be entered, updated and generally manipulated by the user?

Is an historical record of <each/some/specific> altered data item retained?

Are alterations that are made reflected throughout the applicable elements of associated functions?

By whom can the above tasks be done? <general user/system manager/system implementor/ADP professional>

Does the update, deletion or alteration of any hazardous agent identifier configuration or data item require any system software or hardware modifications?

Describe all necessary modification requirements and indicate by whom they are to be performed.

EDITING:

Are agent identifier entries and changes edited for content, construction and applicable omission or duplication restraints by <entry process/background process/batch process/no process>?

Are data item entries and changes edited for content, construction and applicable omission or duplication restraints by <entry process/background process/batch process/no process>?

Describe other pertinent edit processes or considerations that are applied to these data.

FILING:

Are identifier entries and alterations filed by a <foreground/background/batch> process?

Are data item or data groups filed by a <foreground/background/batch> process?

Describe any additional features of HAZARDOUS AGENT entry, editing, update, deletion or general management of these functions.

RETRIEVAL & DISPLAY: Hazardous Agent identifiers/data items

Responses to the following questions are not to include the capabilities of general "Query", "Data Base" or "Report Generator" functions that may be present in the system. Only capabilities available in the "normal" entry, edit, update and display functions are solicited here.

Unless otherwise noted, it is assumed that data and groups of data that are retrievable in the manner indicated can also be displayed to the user in that manner or made available to any other applicable task concerned with the agent and agent data.

Can any individual agent be retrieved?

By name entry?

By entry of a synonym?

By entry of any applicable numeric or alphanumeric code configuration?

Can retrieval of target agent data be accomplished by ambiguous name or synonym identifier entry?

Does the system construct a selection list of all possible subject candidates for an ambiguous identifier entry?

Is multiple selection from the candidate list allowed if applicable to the task?

Is selection of all entries of a candidate list allowed if applicable to the task?

For applicable tasks, can retrieval optionally include exposure limit and medical requirement information?

Can a location or "in use by" list for each agent be included?

Provide a list of other topics and data that can be included. Identify the specific tasks or functions where this is allowed.

Describe any additional features of retrieval of HAZARDOUS AGENT associated system elements.

The HAZARDOUS AGENT data contains or directly references:

Work environments containing the agent?

Exposure data and medical health care requirements for the agent?

The HAZARDOUS AGENT data contains or directly references what other primary or pertinent data areas within the system? Describe.

SYSTEM MAINTENANCE:

Are routines available to augment, edit and otherwise alter, as necessary, tables, data directories and other intrinsic system control or support schema?

Is there a method for verification of application data file pointers, counters, cross-referencing and other critical file attributes?

Describe the applicable files and extent of verification.

Can the verification be done at any time?

Is there a method for the automated correction of filing discrepancies available?

Is there an error log, trap or other recording of the occurrence of a software error?

Is the recording available at any time?

Is there a log or indicator of hardware failure occurrence during critical disc filing actions or other operations that have the potential to corrupt the system routine execution or data files?

Are maintenance functions available to archive or remove specified out-of-date or historical data from the data base?

Describe any additional features of SYSTEM MAINTENANCE associated operation.

INDUSTRIAL COMPONENT OF NOHIMS

GLOSSARY

Agency: Any organization as a whole.

Agent: Any chemical, compound, material, product, condition or physical phenomenon.

Ambiguous entry: Refers to a partial or incomplete user response to a system request for subject identification or selection information such that more than one subject may possess the entered configuration.

Directory: A general scheme by which either specific or ad hoc subject data and data item information may be introduced, named, defined, identified, retrieved and manipulated in the system by applicable tasks.

Environment: Any identifiable physical location, area, space, condition, circumstance, incident or episode that contains or represents a real or potential hazard or risk when inhabited by or associated with a worker.

Hazard: Any known or unknown real or potential risk to the general short or long term health of a worker.

Identifier: The information necessary to retrieve, select or make known a unique subject or data group.

Local: Actual "real world" or "as is now used" conventions, configurations, procedures or terminology.

Personnel: Any civilian or military employee, contractor, visitor or other person that is under the authority of or by circumstance is considered to be within an area of responsibility of an agency.

Retrieval: To identify, select and make available the desired subject information.

Subject: The intended person, place, object, topic, data item or task of current interest.

Table: A stored collection and arrangement of known information on one or more subject areas.

Unit: Any unique organizational element or work unit identifiable within an agency.

SOFTWARE QUALITY ATTRIBUTES

1. Does NOHIMS allow performance of all required tasks?
 - What functions is NOHIMS required to perform?
 - Does NOHIMS allow performance of identification tasks?
 - Does NOHIMS allow performance of entry tasks?
 - Does NOHIMS allow performance of review tasks?
 - Does NOHIMS allow performance of editing tasks?
 - Does NOHIMS allow performance of information retrieval tasks?
 - Does NOHIMS allow performance of system maintenance tasks?
2. Is NOHIMS a reliable system?
 - Is the data retrieval consistent?
 - Can the user corrupt the database intentionally or unintentionally?
 - Can the system resolve extraneous input?
3. What error recovery procedures does NOHIMS have?
 - What system functions aid in recovering data if an error occurs or if the system crashes?
 - What inherent abilities does NOHIMS have to insure the integrity of the database, such as Monitor in the medical component which does "housekeeping" chores before halting?
 - What system features prevent program and data "crashes"?
4. What back-up procedures are required to prevent data loss?
 - How often should the database be copied to disk?
 - How often should the database be copied to magnetic tape?
 - What procedures/functions are used to restore the database from a back-up?
 - How easy is it to restore the database from a back-up?
5. What features make the source program code efficient?
 - How much of the system memory does NOHIMS require to operate?
 - What features minimize this requirement?
6. How portable and hardware independent is NOHIMS?
 - Can NOHIMS be configured on a portable system?
 - Is a particular hardware configuration required to operate NOHIMS?
7. How maintainable is the NOHIMS software?
 - Does NOHIMS require ongoing software support?
 - Is system support required to maintain the integrity of the database?

OPERATIONAL CHARACTERISTICS

User Friendly Features

1. How well does NOHIMS present its operational capabilities to the user?

While selecting system options, is the screen display clear and helpful?

Are the system prompts well worded and informative? Are they easy to understand?

Are data displays and reports presented in easily readable and understood formats?

Are there messages from NOHIMS that tell the user how the system interpreted the entries?

Are there messages from NOHIMS that tell the user what the system is doing, such as "Please wait while filing"?

2. Is NOHIMS "menu driven" at all selection levels?

Are the option menu displays well organized and easy to read?

3. What user on-line assistance functions does NOHIMS have?

Can the user ask for help text at system selection prompts?

At what selection levels does NOHIMS have help text?

Is it easy to ask the system for help text?

Is there more than one level of detail of help text?

Is the help text easily readable and understood? Is the help text concise?

Does the help text contain examples?

Is the help text specific to the NOHIMS application? Does it need to be specific to the NOHIMS application?

Can the help text messages be changed without programming intervention?

Are there other on-line assistance functions?

Are there supporting job aids and operations manuals?

4. What error diagnostic features and debugging aids does NOHIMS have?

Is there an error log, trap, or other recording of the occurrence of a software error?

Is there an error log or other indicator of hardware failure occurrence during critical filing actions or other operations that could potentially corrupt the system routine execution or data files?

What information is recorded in the error log(s)? How is the log organized?

How accessible is the information in the error log(s)? Is it available at any time? to any user?

How long is the error log maintained by NOHIMS? Can old or corrected errors be deleted from the log without programming intervention? Who can delete them?

Can a user document errors obtained while using NOHIMS in a file for later review by a system manager?

Can system functions be tested without affecting the live database?

5. What database manager utilities does NOHIMS have?

Data Manipulation Tasks

6. What is the average entry time per input form?

7. What are the add, save, change, and delete procedures?

8. Does NOHIMS have a search in context capability?

What are the limitations on its ability to search in context?

Can searches be performed on segments of a patient/worker name?

Does the system have an alphabetic look-up function for directory items?

9. What are the general filing procedures for NOHIMS?

Are they the same for both the medical and industrial components?

10. Can data and routines be downloaded to magnetic tape?

How is this accomplished?

INFORMATION RETRIEVAL CAPABILITIES

1. What system options in the medical component of NOHIMS are involved with information retrieval?

Display Registration Data/
Display Medical Data/
Print Medical Data/
COSTAR Report Generator/
ad hoc interactive query/
other: _____

2. What are the main functions and features of each of the options involved with information retrieval in the medical component of NOHIMS?

Registration: Display Registration

Can the patient to be displayed be identified with an ambiguous entry?

Can the patient be identified by name? by social security number? by unit number?

Are patient names searched by phonetics?

Can the display of registration items be formatted in any manner desired?

Can changes be made to the registration record while in this option?

Describe any additional features of this option.

Display Medical Data

Can patients for whom data are to be displayed be identified with ambiguous entries?

Can patients for whom data are to be displayed be identified by name? by social security number? by unit number?

Does the patient to be displayed need to be identified for each display request?

Can all the data for a given encounter be retrieved in a report format?

Does NOHIMS display a list of encounters entered for the patient?

What is the format for the Encounter Report? Can this format be changed without programming intervention?

What data elements are included in the Encounter Report? Which of their associated elements (results, statuses, text, etc.) are displayed?

Can the user request the display of a single data item?

Are the registration data displayed with the encounter data?

Can the user select to display an encounter on a particular date?

Can the user select to display the most recent encounter? the first encounter? the nth encounter? from any encounter, the previous encounter?

Can the user request the display of all encounters that contain a particular item?

Can the user request the display of more than one encounter with the same request (e.g., the last N encounters)?

Can the user select the encounters to be displayed by the type of encounter? site of the encounter? provider of care for the encounter? characteristics of patients? other nondate-related criteria?

Will the system produce reports that summarize data across encounters? Can the encounters to be summarized be specified?

What is the format of these summary reports? Can this format be altered without programming intervention?

What data elements are included in the summary reports? Which of the associated data (results, statuses, text, etc.) are also displayed?

Can a single data item or set of data items be displayed across encounters? Can the user select which data item or which set of data items?

Can the user choose to limit the associated data items that are displayed in the summary reports?

Can the ability to display reports be restricted to certain devices? to certain classes of users? to certain users?

Is there help text for the display medical data procedures?

Can the registration data display be reviewed while in this option?

Can the information in the displays be edited while in this option?

Can both hardcopy and softcopy reports be obtained?

Describe any additional features of this module.

Print Medical Data

Will NOHIMS automatically print reports for all patients scheduled to be seen on a given day? Which reports can be printed?

Can the user specify which reports for which patients are to be printed?

Can reports be printed for those patients that were entered in a particular batch? within the last N days? Which reports can be printed in this manner?

Can the user specify the order of print of the reports?
Can the printing of reports be interrupted? restarted?
Can the user indicate which device to print the reports on in order to free terminals?
Can the requests for report printouts be stored, to be used again at a later date?
Can the ability to print medical reports be restricted to certain devices? to certain classes of users? to certain users?
Is there help text for the print medical data procedures?
Describe any additional features of this module.

COSTAR Report Generator

Can listings of data items or the data associated with data items (results, statuses, text, etc.) be produced?
Can tabulations of data items or the data associated with data items (results, statuses, text, etc.) be produced?
Can reports be generated for every patient in the database? for every encounter in the database?
Can subsets of patients be selected for reports? Can patients be selected on patient characteristics? encounter characteristics? dates of encounters? other criteria?
Can subsets of encounters be selected for reports? Can encounters be selected on patient characteristics? encounter characteristics? dates of encounters? other criteria?
What is the format of the listings and tabulations generated by NOHIMS? Can this format be altered without programming intervention?
What does a user need to know about the directory codes in order to use the report generator?
Can the user define selection criteria for individual data items such as last, most recent, number of, etc.?
Are there any restrictions on the data items that can be listed at any one time? tabulated at any one time?
Will NOHIMS generate 2-way tables? 3-way tables? 4-way tables?
Can individual items be selected for reports? Can classes of items be selected for reports? Can items be selected by associated data such as status, presence/absence of free text, presence/absence of results?
Will NOHIMS compute percentages for the tabulation tables? Can the user specify the denominator? Can more than one denominator be defined?
Will NOHIMS compute deviations from the mean for the tabulation tables?

Will NOHIMS compute chi square values for the tabulation tables? calculate t statistics? perform analysis of variance?

Does NOHIMS compute actuarial statistics such as survival rates, morbidity rates, or mortality rates?

Does NOHIMS produce graphic representations of data produced in reports such as histograms and trend lines?

What time-saving features does the report generator have to shorten the search through the database?

Can data in reports be printed in patient name alphabetic order?

Can data in reports be printed in encounter date order?

Can the user create a set of report specifications?

Can the report specifications be stored for later use?

Can the report specifications be edited? Can these be saved under a new name?

Can the user select which report specification is to be altered or must each specification be edited or accepted?

Can report specifications be deleted?

Can a list of available report specifications be displayed?

Can a user select to run a report from the report specifications stored in NOHIMS?

Can a report specification file be renamed?

Are there any limits on what a report specification file can be named?

Does NOHIMS keep track of when changes were last made to a report specification file?

Does NOHIMS store data generated by the report runs for future printing/use?

Can files stored during report runs be deleted?

Can a user specify a particular time on a particular date to run a report?

Can more than one report be run at a time?

Can the report runs be linked to run one after the other?

Does running a report tie up any terminals/printers?

Can both hardcopy and softcopy output be produced?

Does NOHIMS have an interactive query capability?

Is there help text for the report generator procedures?

Can mailing labels be generated by the system? Can they be printed in zip code order? alphabetic order?

Can mailing labels be printed for a subset of patients?

Describe any additional features of this module.

3. What are the information retrieval functions in the industrial component of NOHIMS?

ad hoc interactive query/
report generation/
display of data/
printing of data/
other: _____

4. What are the main functions and features of the ad hoc interactive query function in the industrial component of NOHIMS?

Syntax

Does the query utilize a custom syntax to describe the desired sequence and topics to be retrieved?

Indicate the identifiers and data item areas that are accessible via the query syntax.

Agency identifiers?
Agency data items?
Personnel identifiers?
Personnel data items?
Environment identifiers?
Environment data items?
Hazardous Agent identifiers?
Hazardous Agent Table data items?
Survey identifiers?
IHS Survey and Occupational Hazard Data Sheet data items?

Identifiers (Include explanations or comments as required.)

Indicate which topic identifiers are directly selectable via the query syntax.

Agency units?
Environments?
Personnel?
Hazardous Agents?
Surveys?

Can as many topic identifiers as desired be specified in an ad hoc fashion?

Does the query have the full capability for identification and selection of each topic that is provided in the normal topic area functions?

Can the query assume an "all available" set of topic identifiers at any topic area identifier selection point?

Are there any topic area identifiers that cannot be specified via the query operation?

Data Items

Can the user select specific data items for each applicable topic area?

Can a data item be subjected to user-specified conditional testing?

- Can testing include comparison to a given numeric value?
- Can testing include comparison to a given numeric interval?
- Can testing be done for the presence of a data item?
- Can testing be done for the absence of a data item?
- Can testing include comparison to a given literal value?
- Can testing include a search of the data item content for a given single or multi-word literal?
- Can testing include comparison to an associated table of values where applicable to the data item?

Process

Is the construction of a query syntax set an interactive process?

Can a query syntax set be filed and reused whenever required?

Is the execution of a query syntax set a foreground process?

Can the output information of a query task be directed to either a terminal screen or a printer as required?

Is the query operation available to the general user if permitted by the system security attributes for the user?

Describe any additional retrieval features of the QUERY function or operation.

5. Please see the interview section on System Description for questions on the industrial component's display and printing of data and generation of standard reports.

SECURITY FEATURES

1. What are the features of the medical component of NOHIMS that maintain the confidentiality of patient information?

Are system users identified in some form by NOHIMS?

Is there a user identification sequence to sign onto NOHIMS? Is the identification sequence echoed such that it is displayed or may be viewed at the sign-on device? Can the display of the identification sequence be masked or overstruck?

Can access to various options be restricted by device? by class of user? by user?

Can options and special functions be protected by a password?

Does NOHIMS report security breaches? disconnect users who breach or attempt to breach security?

Can users no longer qualified to access NOHIMS be deleted from the access list?

Does NOHIMS have an automatic time out for unattended terminals?

Are data fields masked? Are patient names kept separately from data files?

Do data collection forms contain confidentiality warnings?

Do reports generated by NOHIMS contain confidentiality warnings?

Can occupational health information be accessed from the medical component of NOHIMS?

Can medical data be accessed from the industrial component of NOHIMS?

Who/what controls the security features?

2. What are the security features of the industrial component of NOHIMS?

Terminal Device Security

It is assumed that access to the computer system via a local or remote terminal device is controlled by the established conventions of the operating system. The following questions are directed only to the application-supported security functions that provide control over terminal device and personnel access to the application capabilities.

Terminal Device Access

Can a user's access to specific functions be determined and delimited by the particular terminal device or communication access line in use? Describe.

Can the device access be altered as required?

Can the associated function access for the device be altered as required? By whom?

Is there a unique identification sequence assigned to each individual user?

Does the user identification delimit access to specific functions? Describe.

Is the identification sequence echoed such that it is displayed or may be viewed at the sign-on device?

Can the identification sequence be altered as required?

Can the associated functional access be altered as required?

Is there an access control required to execute the system maintenance functions that define or alter the terminal and/or user identification access attributes?

Describe any additional features of SECURITY-associated system operation.

SOFTWARE SUPPORT REQUIREMENTS

1. What and how many support personnel are required to maintain the NOHIMS software?

_____ ADP personnel:
_____ managers/
_____ operators/
_____ programmers/
_____ system analysts/
_____ outside consultants/
_____ vendors

2. What functions must be performed by the support personnel?

system back-ups/
investigating and correcting system errors/
directory updates/
software updates/
archival of records to tape/
changing report parameters

3. What is the estimated amount of support manhours required per month to maintain the system?

SYSTEM SCENARIOS TO MAINTAIN THE SYSTEM

1. What prime time system maintenance functions must be performed during the day on a daily basis?

be certain that Monitor is running in the
background before entering data/
review error logs/
investigate common or new errors/
other: _____

2. What system maintenance functions must be performed during the off-shift on a regular basis? How often must these tasks be performed?

system back-ups on a daily/weekly/monthly basis/
recreate alphabetic directory on a daily/weekly/
monthly/as needed basis/
other: _____

3. How often must patient files be archived to tape?

monthly/
quarterly/
annually/
as needed

ORGANIZATIONAL REQUIREMENTS

1. What requirements are there for users of NOHIMS to have MUMPS programming skills?
none required/
minimal amount of knowledge required/
moderate amount of knowledge required/
extensive knowledge required.
2. What requirements are there for system managers of NOHIMS to have programming skills?
none required/
minimal amount of knowledge required/
moderate amount of knowledge required/
extensive knowledge required.
3. What requirements are there for system managers of NOHIMS to comprehend NOHIMS source code?
none required/
minimal amount of comprehension required/
moderate amount of knowledge required/
extensive knowledge required.
4. Describe in full-time equivalents (FTEs) the staff required to operate a NOHIMS installation.
____ FTE(s) of data collection personnel
____ FTE(s) of data entry personnel
____ FTE(s) of system managers
____ FTE(s) of administrative personnel
____ FTE(s) of support personnel
5. Describe the requirements for the configuration of the installation area.
What are the electrical/power source requirements?
What are the lighting requirements?
What are the communications requirements?
What are the heating/cooling requirements?
What are the space and room dimension requirements?
What furniture/equipment is required (excluding system hardware) such as desks, chairs, and file cabinets?

APPROPRIATE SCENARIOS FOR SYSTEM TESTING

1. Should NOHIMS features and functions be tested using the examples contained in the operational manuals, using contrived test data, live data, or some combination thereof?
2. What features and functions of NOHIMS should be operationally tested to be certain that NOHIMS can perform expected tasks?

Should a hazardous agent table be created? What data are required in a hazardous agent table?

Should data from an industrial survey(ies) be entered into NOHIMS? What data are gathered in an industrial survey?

Should data from a physical examination(s) be entered into NOHIMS? What data are gathered in a physical examination?

Should one/several of the following be generated by NOHIMS? What data are required in NOHIMS and what parameters must be known in order to generate these items?

Notification of individual exposures

List of patients requiring physical examinations

Patient Data Sheet

Patient Summary

Encounter Report

Flowcharts

Reports for the 6260/1 management report

Medical certification report

Should one or more user-defined reports be generated by NOHIMS? What should be the content of these reports? What information is required to be in NOHIMS in order to generate these reports?

Should one or more queries into the database be performed? What should be the content of the queries?

What other features and functions should be operationally tested? What information is required in order to perform these tests?

3. How will the results of these tests be evaluated?

What criteria will be used to evaluate the performance of NOHIMS?

What level of performance will be considered satisfactory?

How many times will a given test be performed? by how many different users?

FEATURES THAT MAKE NOHIMS FLEXIBLE AND ADAPTABLE

1. What features of the medical component of NOHIMS make it flexible and adaptable to the various needs of other Navy industrial sites?

Is NOHIMS directory driven? Can codes be added or deleted from the directory?

Can parameters for the codes be set and/or changed? What parameters can be set? Which of these can be changed?

Can data other than directory codes be entered in a patient record?

Is there a limit to the kinds or amounts of information that can be coded/entered?

Can registration entry, medical encounter entry, and lab results entry be done in any order? at the same time? at different times?

Can the entry sequences for registration and for medical encounter entry be altered?

Can an already existing numbering scheme be used for identifying patient records? Can the social security number be used as the unit number?

Can a patient be looked up by either name, unit number, or social security number?

Is there a choice as to how codes can be entered in order to balance ease of data entry with ease of use by providers?

Can standard report formats and content be specified and/or altered?

Can the user create ad hoc reports? in any format desired? with any content desired? Does the system have an interactive query function?

Can the above choices or changes be made without requiring programming intervention? Are there system maintenance functions which perform these tasks?

What requirements are there for encounter and laboratory results input documents?

What features make the medical component easy to learn and use?

Does NOHIMS have on-line assistance functions? Is it menu driven?

What supporting documentation and job aids are there to help the user?

What system support is required to maintain the system? Is this support readily available?

Can a variety of hardware configurations support the system? Can NOHIMS accommodate a variety of terminal/cursor types?

2. What features of the industrial component of NOHIMS make it flexible and adaptable to the various needs of other Navy industrial sites?

Is NOHIMS directory driven? Can codes be added or deleted from the directory?

Can parameters for the codes be set and/or changed? What parameters can be set? Which of these can be changed?

Can data other than directory codes be entered in a file?

Can user-specific identifiers be defined and used?

Can a worker be identified by either name, social security number, or local employee number/pay number?

Can data other than directory codes be entered in a worker record?

Is there a choice as to how codes can be entered in order to balance ease of data entry with ease of use by industrial hygienists?

Is there a limit to the kinds or amounts of data that can be entered into the files?

Can organizational structures be defined to suit the site?

Can a variety of entities be defined as environments?

Can local conventions for indexing or referencing be used to identify a survey?

Can tables of hazards and medical care standards be defined/alterd?

Can standard report formats and content be specified and/or altered?

Can the user create ad hoc reports? in any format desired? with any content desired? Does the system have an interactive query function?

Can the above choices or changes be made without requiring programming intervention? Are there system maintenance functions which perform these tasks?

What requirements are there for input documents?

What features make the industrial component easy to learn and use?

Does NOHIMS have on-line assistance functions? Is it menu driven?

What supporting documentation and job aids are there to help the user?

What system support is required to maintain the system? Is this support readily available?

Can a variety of hardware configurations support the system? Can NOHIMS accommodate a variety of terminal/cursor types?

PERCEIVED BENEFITS OF NOHIMS

1. In my opinion, the benefits of NOHIMS have been

increased quality of care provided to the worker/patient through:
fewer unnecessary tests and ancillary services/
fewer unnecessary examinations/visits/
appropriateness of tests performed/
reduced waiting time/
more accurate patient medical record/
timely and perpetual access to data/
earlier diagnosis of illnesses/conditions/
earlier notification of abnormal test results/findings/
base-line data on the health of an employee/
increased compliance with monitoring programs/
reduction in occupational exposures to hazardous agents/
improved workplace monitoring/
better identification of possible hazards/
better identification of workers exposed/
safer working conditions/
improved job certification program/
increased confidence of workers/
improved communication between those concerned with
the occupational health of the worker/
increased productivity of staff/clinics/
increased efficiency in the use of resources/
savings in manpower/
reduction in the cost of providing services/
improved planning and budgeting/
more accurate administrative reports/
more accurate/available database for research efforts/
other health care benefits: _____

other monitoring benefits: _____

other administrative benefits: _____

other benefits: _____

2. Of those mentioned, the most significant benefit of NOHIMS is

3. The costs of implementing and operating NOHIMS

clearly exceed or outweigh the benefits/
somewhat exceed or outweigh the benefits/
equal the benefits/

or the benefits

somewhat exceed or outweigh the costs/
clearly exceed or outweigh the costs.

APPENDIX E

STRUCTURED INTERVIEW FOR
NHRC NOHIMS DEVELOPERS

Person Interviewed: _____

Name of Activity: _____

Location of Activity: _____

Telephone Number: _____

Site of Interview: _____

Date of Interview: _____

Name of Interviewer: _____

The first questions we will be asking you have to do with the goals and benefits of NOHIMS and your assessment of how well the goals are being met.

STATED NAVY GOALS FOR NOHIMS/ASSESSMENT OF HOW WELL NAVY GOALS FOR NOHIMS WERE MET

1. It is my understanding that the intended Navy primary goals for NOHIMS are/were to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

2. The stated Navy goals came about in response to

administrative direction/
legal obligations/
need felt by medical staff/
need felt by medical research/
public demand/
political pressure/
organized group pressure/
worker demand/
other: _____

3. I consider NOHIMS in its present state to be meeting these Navy goals

very well/
somewhat well/
somewhat not well/
not well.

4. The specific goals that NOHIMS is not meeting very well are to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

5. The reasons that NOHIMS is not meeting the goal(s) are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____

6. The goals that have been only partially achieved are to

meet OSHA requirements/

improve medical surveillance/

improve workplace monitoring/

provide data for epidemiologic analysis/

improve patient care/

improve coordination between departments/

provide management data/

improve access to care/

improve manpower utilization/

improve resources utilization/

provide data for legal functions/

other: _____

7. The reasons that NOHIMS has only partially achieved these goals are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____

PERCEIVED GOALS FOR NOHIMS/ASSESSMENT OF HOW WELL PERCEIVED GOALS FOR NOHIMS WERE MET

1. My personal goals for NOHIMS are/were to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

_____.

2. I consider NOHIMS in its present state to be meeting these goals

very well/
somewhat well/
somewhat not well/
not well.

3. The specific goals that NOHIMS is not meeting very well are to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

_____.

4. The reasons that NOHIMS is not meeting the goal(s) are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____
_____.

5. The goals that have been only partially achieved are to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

6. The reasons that NOHIMS has only partially achieved these goals are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____

The next questions deal specifically with medical monitoring and care goals.

MEDICAL MONITORING AND CARE GOALS/ASSESSMENT OF HOW WELL MEDICAL MONITORING
AND CARE GOALS ARE BEING MET

1. It is my understanding that the specific goals for NOHIMS in the
area of medical monitoring and care are/were to improve

quality of care:

patient management:

- diagnostic tests/
- database acquisition/
- treatment planning/
- problem identification/
- feedback to physician regarding achievement
of desired outcomes/
- patient compliance with physician orders because
of comprehensiveness/continuity of care/
- quality of care review procedures/
- research information collection/
- training activities/
- record accuracy/
- earlier diagnosis of abnormal conditions/
- earlier notification of patient abnormalities/
- communication/
- automated medical testing/

access to care:

- patient follow-up/
- appointment scheduling/
- record contents/
- record availability/
- visit registration/
- medical reports/

resource utilization:

health manpower utilization/availability:

- medical - technical personnel/
- clerical personnel/
- use of paramedical personnel/
- all personnel/

patient services:

- fewer unnecessary visits/
- fewer redundant laboratory tests/
- better referral/

management aspects of health care:

improve management and operations of the facility by:

provision of management with information and
analytical tools for:

- utilization review procedures/
- manpower scheduling/
- budgeting and planning/
- long-range manpower planning/
- long-range facility planning/
- regional/Navy-wide health planning/
- administrative reports/

(Continued)

compliance with monitoring programs/Navy set standards of care:
periodic physical examinations/
protective equipment/
asbestos surveillance program.

2. I consider NOHIMS in its present state to be meeting these medical monitoring and care goals

very well/
somewhat well/
somewhat not well/
not well.

3. The specific goals NOHIMS is not meeting very well are

improvement in the quality of care/
improvement in access to care/
improvement in resource utilization/
improvement in management and operations/
improvement in compliance with monitoring programs/
other: _____.

4. The reasons that NOHIMS is not meeting these goal(s) are

NOHIMS lacks essential function(s)
Specify: _____/
feature(s) are not implemented
Specify: _____/
feature(s) are not implemented well
Specify: _____/
other: _____.

5. The goals that have been only partially achieved are

improvement in quality of care/
improvement in access to care/
improvement in resource utilization/
improvement in management and operations/
improvement in compliance and monitoring programs/
other: _____.

6. The reasons that NOHIMS has only partially achieved these goal(s) are

NOHIMS lacks essential function(s)
Specify: _____/
feature(s) are not implemented
Specify: _____/
feature(s) are not implemented well
Specify: _____/
other: _____.

7. The effect of NOHIMS has been to

increase/maintain/decrease
the quality of care.

8. The effect of NOHIMS has been to
increase/maintain/decrease
the access to care.
9. The effect of NOHIMS has been to
increase/maintain/decrease
resource utilization.
10. The effect of NOHIMS has been to
increase/maintain/decrease
compliance with monitoring programs.
11. The effects of NOHIMS generally have been because of
increased patient care services provided/
more appropriate services provided/
improved follow-up of patients with abnormal
findings or tests/
improved communication between departments/
increased availability of the medical record/
more accurate medical records/
availability of patient-specific summary reports/
availability of on-line look-up of patient-specific data/
availability of user-defined reports/
improved manpower scheduling/
improved patient compliance/
improved quality of care review procedures/
earlier diagnosis and notification of problems/
improved appointment scheduling/
other: _____.
- ~~12. Since NOHIMS was implemented, communication between industrial
hygienists and medical personnel has
improved/
been maintained/
deteriorated.~~
- ~~13. If communication has changed, this is generally because of
availability of reports generated by NOHIMS/
less need for direct communication/
more accurate or complete data/
other: _____.~~
- ~~14. (Industrial users only) Since NOHIMS was implemented, communication
between industrial hygienists/safety specialists and work center
supervisors has
improved/
been maintained/
deteriorated.~~

~~15. (Industrial users only) If communication has changed, this is generally because of~~

~~availability of reports generated by NOHIMS/
less need for direct communication/
more accurate or complete data/
other: _____.~~

~~16. The effect of the availability of an accurate medical record on the quality of patient care has been~~

~~very beneficial/
somewhat beneficial/
no effect/
somewhat detrimental/
very detrimental.~~

~~17. The effect of the availability of an individual's exposure history at the time of the physical examination has been~~

~~very beneficial/
somewhat beneficial/
no effect/
somewhat detrimental/
very detrimental.~~

18. The effects of NOHIMS on medical monitoring and care have been evaluated through measurements which are

subjective judgment

Specify who: _____/

counting/

objective measures such as surveys and questionnaires/

other: _____/

no measurements done.

19. Evaluation measurement methods used include

examination of the medical record for accuracy and completeness/

examination of the medical record for appropriateness/

checking of the diagnostic test pattern/

assessment of patients' response to treatment/

assessment of patient compliance/

assessment of quality of care review/

evaluation of research contributions/

evaluation of missed appointments/

evaluation of timeliness of physical examinations/

evaluation of availability of medical record/

evaluation of manpower utilization/

evaluation of time taken for specific tasks/

checking appropriateness of laboratory tests done/

checking adequacy of protective equipment issued/

checking adequacy of follow-up on abnormal findings

or tests/

other: _____.

20. Results of measurements conducted are

(NOTE: Questions on usefulness of reports are found in Component 7,
"USE AND USEFULNESS OF INFORMATION RETRIEVAL CAPABILITIES.")

PERCEIVED BENEFITS OF NOHIMS

1. In my opinion, the benefits of NOHIMS have been

increased quality of care provided to the worker/patient through:
fewer unnecessary tests and ancillary services/
fewer unnecessary examinations/visits/
appropriateness of tests performed/
reduced waiting time/
more accurate patient medical record/
timely and perpetual access to data/
earlier diagnosis of illnesses/conditions/
earlier notification of abnormal test results/findings/
base-line data on the health of an employee/
increased compliance with monitoring programs/
reduction in occupational exposures to hazardous agents/
improved workplace monitoring/
better identification of possible hazards/
better identification of workers exposed/
safer working conditions/
improved job certification program/
increased confidence of workers/
improved communication between those concerned with
the occupational health of the worker/
increased productivity of staff/clinics/
increased efficiency in the use of resources/
savings in manpower/
reduction in the cost of providing services/
improved planning and budgeting/
more accurate administrative reports/
more accurate/available database for research efforts/
other health care benefits: _____

other monitoring benefits: _____

other administrative benefits: _____

other benefits: _____

2. Of those mentioned, the most significant benefit of NOHIMS is

3. The costs of implementing and operating NOHIMS

clearly exceed or outweigh the benefits/
somewhat exceed or outweigh the benefits/
equal the benefits/

or the benefits

somewhat exceed or outweigh the costs/
clearly exceed or outweigh the costs.

Next, we would like to discuss the implementation process at the test sites and your assessment of the suitability and transferability of NOHIMS.

IMPLEMENTATION PROCESS AT TEST SITES

Implementation Process

1. (NHRC system developers and test site administrators only) Who was involved in the implementation of NOHIMS at the ~~(your)~~ test site(s)? What degree of involvement did each of these people have?
 - a.
 - b.
 - c.
 - d.
 - e.
 - f.
 - g.
 - h.
2. (NHRC system developers and test site administrators only) In what areas of the implementation were each of these people involved? What total amount of time did each of these people spend on the implementation of NOHIMS?
 - a.
 - b.
 - c.
 - d.
 - e.
 - f.
 - g.
 - h.
3. In what areas of the implementation were you directly involved? What total amount of time did you spend on the implementation of NOHIMS?
4. (NHRC system developers and test site administrators only) What steps were involved in implementing NOHIMS at the ~~(your)~~ test site(s)?
5. From your perspective, what problems were encountered during the implementation of NOHIMS? How were these problems resolved/handled?
6. Was staff morale affected by the installation of NOHIMS?
Was this effect a positive or negative one?
Was the effect temporary?

Operational Procedures

7. What are the current data collection procedures for NOHIMS? What changes were required in previous standard data collection procedures in order to accommodate NOHIMS?

Who collects the data?

Who verifies the data?

At what points in the process are data collected?

8. What are the current data entry procedures for NOHIMS data?

Who enters the data?

What is the backlog for data entry?

9. What are the current data retrieval procedures?

Who requests retrieval of data from NOHIMS?

Who retrieves the data from NOHIMS?

How long does it take to get the requested information?

10. What are the current uses of reports/data generated by NOHIMS? What changes were required in previous standard operating procedures in order to utilize the reports/data generated by NOHIMS?

Are reports/computer-generated data available to the physician when he/she sees the patient?

Do the data collection instruments support/replace/exist in addition to the previously used forms/records?

Does the computer-generated report support/replace/exist in addition to the paper medical record?

Are NOHIMS reports used to identify workers requiring physical examinations?

Are NOHIMS reports used to monitor compliance with Navy standards?

Is NOHIMS used to produce/collect data for management reports?

Operational Procedures (Cont.)

11. What is the hardware configuration at the ~~(your)~~ test site(s)?

What type and how many terminals are there?

What type and how many printers are there?

What type of communications equipment is used?

What type of processor is used?

Where are these devices located?

Are remote terminals and printers used on a regular basis?

12. What physical security features have been implemented at the ~~(your)~~ test site(s)?

Are there cipher locks on doors?

Is there a log book for people entering the computer room?

Is there a record of batch programs?

13. (NHRC system developers and test site administrators only) Is NOHIMS a development of a previous automated system at the test site(s)? replacement of a previous automated system? supplement to an existing manual system? replacement of a manual system? a completely new data collection and processing system?

14. What problems do you encounter/are encountered in day-to-day operations of NOHIMS? How are/were these problems resolved/handled?

Assessment of Adaptability of NOHIMS to Needs of Test Site(s)

15. How well do you feel NOHIMS has been integrated into the day-to-day procedures of the ~~(your)~~ test site(s)?

very well/
somewhat well/
somewhat poorly/
poorly.

16. How well do you feel that NOHIMS has responded to the particular needs of the ~~(your)~~ test site(s)?

very well/
somewhat well/
somewhat poorly/
poorly.

17. Were there needs specific to the ~~(your)~~ test site(s) that NOHIMS could not meet? If so, what were those needs?

SUITABILITY OF NOHIMS TO NAVY INFORMATION PROCESSING NEEDS

1. The features/capabilities of NOHIMS that make it especially suitable to Navy information processing needs are

the required information is collected:

personnel data/
hazardous materials characteristics/
presence of hazardous materials/
data on health of workers:
 illness and injuries/
 sick leave/absenteeism/
 routine examinations/
 test and procedure results/
 medical histories/
 mortality data/
individual exposures/exposure history/
data on accidents/incidents/
occupational histories/
other: _____/

data can be retrieved in the required formats:

tables of hazardous materials/
lists of workers with exposures/
lists of workers requiring physical examinations/
medical encounter reports/
medical summary reports/
management reports/
other: _____/

data can be manipulated in required ways:

number of surveys conducted/
number of individuals exposed to hazard/
number of examinations conducted/
number of laboratory tests done/
number of radiographs done/
number of asbestos examinations conducted/
list of those with ordered but unresulted tests/
other: _____/

other: _____.

2. My assessment of the suitability of NOHIMS to Navy information collection needs is that NOHIMS is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

3. My assessment of the suitability of NOHIMS to Navy information retrieval needs is that NOHIMS is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

4. My assessment of the suitability of NOHIMS to Navy information manipulation needs is that NOHIMS is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

5. Areas in which NOHIMS could be changed to make it more suitable to Navy information processing needs include

collect additional information

Specify: _____/

improve/create new retrieval capabilities

Specify: _____/

improve/create new manipulation capabilities

Specify: _____/

other: _____/

6. Overall, my assessment of the adequacy of NOHIMS for Navy information processing needs is that NOHIMS is

very adequate/
adequate/
somewhat adequate/
somewhat inadequate/
inadequate/
very inadequate.

APPLICABILITY OF NOHIMS TO OTHER NAVY INDUSTRIAL SITES

1. How do the information processing needs of the other Navy industrial sites that will be receiving NOHIMS differ from the information processing needs of the test sites? Are the two test sites representative of the other sites?

no difference/

different data collection requirements

Specify: _____/

different reporting requirements

Specify: _____/

other difference(s)

Specify: _____

2. Can NOHIMS be adapted to a variety of Navy industrial settings and sites such as air rework facilities, shipyards, and public works centers? Are there aspects of NOHIMS that would make it unsuitable for any of these various environments?

3. Is NOHIMS applicable to Navy industrial settings of varying sizes? What limitations/requirements does NOHIMS have that relate to the size of the application environment?

4. What organizational changes are required at a new site in order for NOHIMS to perform successfully? For example, what changes to normal operating methods and procedures are required? What changes in terminology? Will this present problems at other Navy industrial sites?

5. What changes in the patterns of information exchange and communication will NOHIMS cause at a new site? Will this present problems at other Navy industrial sites?

ASSESSMENT OF TRANSFERABILITY OF NOHIMS TO OTHER NAVY INDUSTRIAL SITES

1. My assessment of the suitability of NOHIMS to the information processing needs of other Navy industrial sites is that NOHIMS is
very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.
2. My opinion of the flexibility and adaptability of NOHIMS is that NOHIMS is
adequately flexible and adaptable/
somewhat adequately flexible and adaptable/
somewhat inadequately flexible and adaptable/
inadequately flexible and adaptable/
to be transferred to other Navy industrial sites.
3. Areas in which NOHIMS needs to be more flexible and adaptable include:
4. My assessment of the ease of transfer of NOHIMS to other Navy industrial sites is that the process will be
difficult/
somewhat difficult/
somewhat easy/
easy.
5. The specific problems I foresee in transferring NOHIMS to other Navy industrial sites are that
6. It is my opinion that the acceptability of NOHIMS among users at other Navy industrial sites will be
very high/
high/
somewhat high/
somewhat low/
low/
very low.

The next sections deal with design features of NOHIMS.

CURRENT HARDWARE CONFIGURATION AND MINIMUM REQUIREMENTS FOR HARDWARE

Current Hardware Configuration

1. The processing capability is provided through the following computer(s)

No.	Manufacturer	Model	Size	Year Installed
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

2. The computing services are provided through a

vendor: _____

associated organization: _____

in-house.

3. The equipment is rented/leased/purchased.

4. Maintenance is by vendor/in-house.

5. Approximately _____% of the processing capability is used for NOHIMS.

6. Approximately _____(% or actual) of the file capability is used for NOHIMS.

	No.	Type	Model
7a. The files are stored on	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
b. Communication equipment includes	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
c. Other important equipment is	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
d. Archival storage is	_____	_____	_____
	_____	_____	_____
	_____	_____	_____

8. Hardcopy terminals are

No.	Type	Char./line	U/L case	Speed	Mechanism	Reliability
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____

9. Softcopy terminals are

No.	Type	Screen	Char./ line	U/L case	Speed	Lines/ screen	Relia- bility	Character resolution
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____

10. Currently production occupies _____% of the machine,
and development _____%.

11. Of the production load

_____ % is data entry,
_____ % is file maintenance,
_____ % is data analysis, and
_____ % is report preparation.

12. The operating system was designed and written
for this application and/or institution/
for general medical purposes/
for general commercial purposes.

13. It is now being

further developed/maintained/understood/ignored
by the local staff/
further developed/maintained/ignored
by the original supplier.

Minimum Hardware Requirements

14. The minimum hardware configuration that could support NONIMS is

Processor: _____

Terminals: _____

File Storage: _____

Communications Equipment: _____

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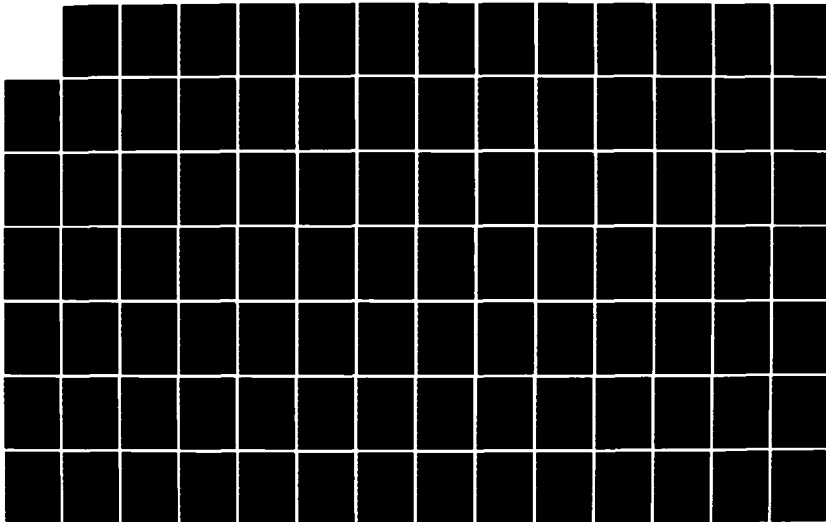
TEST AND EVALUATION MASTER PLAN (TEMP) FOR THE NAVY
OCCUPATIONAL HEALTH I... (U) R-K RESEARCH AND SYSTEM
DESIGN MALIBU CALIF 24 APR 85 N00014-84-C-0601

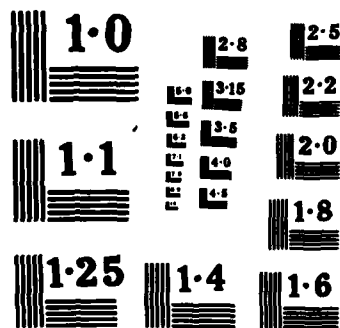
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HARDWARE SUPPORT REQUIREMENTS

1. What and how many support personnel are required to maintain the NOHIMS hardware?

_____ ADP personnel:
_____ managers/
_____ operators/
_____ programmers/
_____ system analysts/
_____ outside consultants/
_____ vendors

2. What functions must be performed by the support personnel?

periodic maintenance/
system back-ups/
repack disks/
repairs

3. What is the estimated amount of support manhours required per month to maintain the system?

AVAILABLE SYSTEM SUPPORT

1. What kind of system support is available for initial training of NOHIMS users?

NOHIMS training module/
outside consultants/
on-site trainers/
off-site trainers/
system managers/
audio-visual packages/
outside training seminars/
users groups/
other: _____

2. What kind of system support is available for ongoing and update training of NOHIMS users?

NOHIMS training module/
outside consultants/
on-site trainers/system managers/
off-site trainers/
audio-visual packages/
outside training seminars/
users groups/
other: _____

3. What kind of system support is available for the NOHIMS hardware?

outside consultants/
in-house consultants/programmers/analysts/
technical "hotline" to _____/
on-site support/system managers/other _____/
outside training seminars/
users groups/
other: _____

4. What kind of system support is available for the NOHIMS software?

NOHIMS system maintenance module/
outside consultants/
in-house consultants/programmers/analysts/
technical "hotline" to _____/
on-site support/system managers/other _____/
outside training seminars/
users groups/
other: _____

5. What kind of documentation and job aids are there that support system operation?

documentation for data entry

Specify: _____/

documentation for data retrieval

Specify: _____/

documentation for system maintenance

Specify: _____/

job aids that support documentation

Specify: _____/

other: _____

SYSTEM SCENARIOS TO MAINTAIN THE SYSTEM

1. What prime time system maintenance functions must be performed during the day on a daily basis?

be certain that Monitor is running in the
background before entering data/
review error logs/
investigate common or new errors/
other: _____

2. What system maintenance functions must be performed during the off-shift on a regular basis? How often must these tasks be performed?

system back-ups on a daily/weekly/monthly basis/
recreate alphabetic directory on a daily/weekly/
monthly/as needed basis/
other: _____

3. How often must patient files be archived to tape?

monthly/
quarterly/
annually/
as needed

ORGANIZATIONAL REQUIREMENTS

1. What requirements are there for users of NOHIMS to have MUMPS programming skills?
none required/
minimal amount of knowledge required/
moderate amount of knowledge required/
extensive knowledge required.
2. What requirements are there for system managers of NOHIMS to have programming skills?
none required/
minimal amount of knowledge required/
moderate amount of knowledge required/
extensive knowledge required.
3. What requirements are there for system managers of NOHIMS to comprehend NOHIMS source code?
none required/
minimal amount of comprehension required/
moderate amount of knowledge required/
extensive knowledge required.
4. Describe in full-time equivalents (FTEs) the staff required to operate a NOHIMS installation.
_____ FTE(s) of data collection personnel
_____ FTE(s) of data entry personnel
_____ FTE(s) of system managers
_____ FTE(s) of administrative personnel
_____ FTE(s) of support personnel
5. Describe the requirements for the configuration of the installation area.
What are the electrical/power source requirements?
What are the lighting requirements?
What are the communications requirements?
What are the heating/cooling requirements?
What are the space and room dimension requirements?
What furniture/equipment is required (excluding system hardware) such as desks, chairs, and file cabinets?

The following questions ask you to evaluate the adequacy of the security features of NOHIMS.

ADEQUACY OF SECURITY FEATURES

1. In my opinion, the sign on/off security procedures are
very adequate/
somewhat adequate/
somewhat inadequate/
very inadequate/
to prevent unauthorized persons from accessing NOHIMS.
2. In my opinion, the various security levels (by device, by user classification, through passwords for specific options) are
very adequate/
somewhat adequate/
somewhat inadequate/
very inadequate/
to prevent persons from accessing areas of NOHIMS for which they are not authorized.
3. In my opinion, the confidentiality warnings on input and output documents are
very adequate/
somewhat adequate/
somewhat inadequate/
very inadequate/
to maintain the confidentiality of patient/worker data.
4. The security protection features provided by NOHIMS are
fully utilized/
loosely utilized/
ignored/
bypassed.
5. In general, the security protection provided by NOHIMS is
insufficient/
somewhat insufficient/
somewhat sufficient/
sufficient.
6. If insufficient or somewhat insufficient, the areas of protection which are lacking include:
7. In general, the security protection provided by NOHIMS is
unnecessary/
somewhat unnecessary/
somewhat necessary/
necessary.

8. If unnecessary or somewhat unnecessary, the areas which should be removed or changed include:

The answers to the following questions on system testing will help us to design appropriate operational test scenarios for NOHIMS.

APPROPRIATE SCENARIOS FOR SYSTEM TESTING

1. Should NOHIMS features and functions be tested using the examples contained in the operational manuals, using contrived test data, live data, or some combination thereof?
2. What features and functions of NOHIMS should be operationally tested to be certain that NOHIMS can perform expected tasks?

Should a hazardous agent table be created? What data are required in a hazardous agent table?

Should data from an industrial survey(ies) be entered into NOHIMS? What data are gathered in an industrial survey?

Should data from a physical examination(s) be entered into NOHIMS? What data are gathered in a physical examination?

Should one/several of the following be generated by NOHIMS? What data are required in NOHIMS and what parameters must be known in order to generate these items?

Notification of individual exposures

List of patients requiring physical examinations

Patient Data Sheet

Patient Summary

Encounter Report

Flowcharts

Reports for the 6260/1 management report

Medical certification report

Should one or more user-defined reports be generated by NOHIMS? What should be the content of these reports? What information is required to be in NOHIMS in order to generate these reports?

Should one or more queries into the database be performed? What should be the content of the queries?

What other features and functions should be operationally tested? What information is required in order to perform these tests?

3. How will the results of these tests be evaluated?

What criteria will be used to evaluate the performance of NOHIMS?

What level of performance will be considered satisfactory?

How many times will a given test be performed? by how many different users?

Next, we would like you to describe the NOHIMS users.

DESCRIPTION OF SYSTEM USERS

FOR EACH NOHIMS TEST SITE:

1. Who are the hands-on clerical users of NOHIMS? (Examples: receptionists, medical record room personnel, and data entry technicians.) Which NOHIMS options do they use?

	<u>Name</u>	<u>Job Title and Function</u>	<u>NOHIMS Options Used</u>
a.			
b.			
c.			
d.			

2. Who are the hands-on medical/professional users of NOHIMS? (Examples: MDs, PAs, NPs, nurses, occupational health technicians.) Which NOHIMS options do they use?

	<u>Name</u>	<u>Job Title and Function</u>	<u>NOHIMS Options Used</u>
a.			
b.			
c.			
d.			

3. Who are the hands-on industrial/professional users of NOHIMS? (Examples: industrial hygienists and safety specialists.) Which NOHIMS options do they use?

	<u>Name</u>	<u>Job Title and Function</u>	<u>NOHIMS Options Used</u>
a.			
b.			
c.			
d.			

4. Who are the hands-on ancillary users of NOHIMS? (Examples: laboratory, radiology, and audiology technicians and corpsmen.)
Which NOHIMS options do they use?

<u>Name</u>	<u>Job Title and Function</u>	<u>NOHIMS Options Used</u>
a.		
b.		
c.		
d.		

5. Who are the hands-on administrative users of NOHIMS? (Examples: clinic directors and department chiefs.)
Which NOHIMS options do they use?

<u>Name</u>	<u>Job Title and Function</u>	<u>NOHIMS Options Used</u>
a.		
b.		
c.		
d.		

6. Who are the NOHIMS system manager(s)?

<u>Name</u>	<u>Job Title and Function</u>
a.	
b.	
c.	

7. Who are the other hands-on users of NOHIMS? (Examples: researchers.)

<u>Name</u>	<u>Job Title and Function</u>	<u>NOHIMS Options Used</u>
a.		
b.		
c.		

The next two sections deal with uses for NOHIMS: as an aid to epidemiologic research and in administrative functions.

NOHIMS AS AN AID TO EPIDEMIOLOGIC RESEARCH

1. The epidemiologic research functions that I see NOHIMS being useful for include
identifying populations at risk/cohorts/
identifying workers exposed, exposure levels, and
length of exposure/
determining medical effects of exposures/
detecting disease trends/outbreaks/
identifying common risk factors among exposed workers/
other: _____.
2. The kinds of data required for these investigations include
demographic data/
worker exposure histories, including type of hazard/
degree of severity/time of exposure/duration of
exposure/
worker occupational histories/
worker medical histories/
physical examination data:
presenting complaints/symptoms/
test results/
diagnoses/
mortality data/
other: _____.
3. The features/capabilities of NOHIMS that will be useful in epidemiologic research include
cross-referencing ability/
ability to analyze data at varying levels (individual,
selected groups, or population)/
reference tables/
ad hoc information retrieval capabilities/
other: _____.
4. My assessment of the adequacy of NOHIMS for conducting epidemiologic research is that NOHIMS is
very adequate/
adequate/
somewhat adequate/
somewhat inadequate/
inadequate/
very inadequate.
5. If NOHIMS is not at least adequate, the limitations/problems that I see with NOHIMS are
inability/limited ability to manipulate database
Specify: _____/
required data are not collected
Specify: _____/
data are collected improperly/not standardized
Specify: _____/
other: _____.

USES IN ADMINISTRATIVE FUNCTIONS/ASSESSMENT OF USEFULNESS OF NOHIMS IN
ADMINISTRATIVE FUNCTIONS

1. The administrative functions that I see NOHIMS being useful for include

determining environmental differential pay decisions/
increasing standardization of reports/
increasing standardization of data collection forms/
reducing paperwork/
generating administrative reports/
providing timely and perpetual access to administrative data/
manpower/resource planning/
time and motion studies/
maintaining equipment lists/
managing inspection requirements/
other: _____.

2. The kinds of data required for these functions include

hazard exposures/
service utilization data/
manpower/resource utilization data/
other: _____.

3. The features/capabilities of NOHIMS that will be useful in administrative functions include

standard report generation capabilities/
on-line look-up/interactive query functions/
ad hoc report generation capabilities/
other: _____.

- ~~4. My assessment of how NOHIMS has affected the amount of required paperwork is that NOHIMS has~~

~~greatly increased the amount of paperwork/
somewhat increased the amount of paperwork/
no effect/
somewhat decreased the amount of paperwork/
greatly decreased the amount of paperwork.~~

- ~~5. It is my opinion that in terms of standardizing reports and forms NOHIMS has had~~

~~a beneficial effect/
a somewhat beneficial effect/
no effect/
a somewhat detrimental effect/
a detrimental effect.~~

- ~~6. My assessment of the usefulness of having timely and perpetual access to administrative data with NOHIMS is that it is~~

~~useful/
somewhat useful/
somewhat not useful/
not useful.~~

The last three sections ask questions about the alternatives to NOHIMS--- the government-owned, commercially available, and Navy interim systems.

SUITABILITY OF GOVERNMENT-OWNED OCCUPATIONAL HEALTH INFORMATION SYSTEMS TO NAVY NEEDS

1. What government-owned occupational health information systems exist?
What is their current development status?

Department of Transportation---Voluntary Employee Injury/
Illness Reporting System (VEIIRS)/
Coast Guard---acquired contract services to study problem/
Environmental Protection Agency---Injury Reporting and
Information System (IRIS)/
U.S. Army---has initiated system development efforts/
U.S. Air Force---Computerized Occupational Health Program
currently awaiting development funds/
Other: _____.

2. For each system, check off the features/capabilities required by Navy information processing needs that the government-owned systems have.

	DOT VEIIRS	Coast Guard	EPA IRIS	U.S. Army	U.S. Air Force
Required information is collected:					
personnel data					
hazardous materials characteristics					
presence of hazardous materials					
data on health of workers:					
illness and injuries					
sick leave/absenteeism					
routine examinations					
test results					
procedures					
medical histories					
mortality data					
individual exposures/ exposure history					
data on accidents/incidents					
occupational histories					
other					

	DOT VEIIRS	Coast Guard	EPA IRIS	U.S. Army	U.S. Air Force
Data can be retrieved in required formats:					
tables of hazardous materials					
lists of workers with exposures					
lists of workers requiring physical examinations					
medical encounter reports					
medical summary reports					
management reports					
other					
Data can be manipulated in required ways:					
number of surveys conducted					
number of persons exposed to hazard					
number of examinations conducted					
number of laboratory tests done					
number of radiographs done					
number of asbestos examinations conducted					
list of those with ordered but unresulted tests					
other					
Other					
Not familiar with system					

3. My assessment of the suitability of each of the government-owned systems to Navy information collection needs is that they are

	DOT VEIIRS	Coast Guard	EPA IRIS	U.S. Army	U.S. Air Force
Very suitable					
Somewhat suitable					
Somewhat unsuitable					
Very unsuitable					

4. My assessment of the suitability of each of the government-owned systems to Navy information retrieval needs is that they are

	DOT VEIIRS	Coast Guard	EPA IRIS	U.S. Army	U.S. Air Force
Very suitable					
Somewhat suitable					
Somewhat unsuitable					
Very unsuitable					

5. My assessment of the suitability of each of the government-owned systems to Navy information manipulation needs is that they are

	DOT VEIIRS	Coast Guard	EPA IRIS	U.S. Army	U.S. Air Force
Very suitable					
Somewhat suitable					
Somewhat unsuitable					
Very unsuitable					

6. Overall, my assessment of the adequacy of each of the government-owned systems to Navy information processing needs is that they are

	DOT VEIIRS	Coast Guard	EPA IRIS	U.S. Army	U.S. Air Force
Very adequate					
Adequate					
Somewhat adequate					
Somewhat inadequate					
Inadequate					
Very inadequate					

**SUITABILITY OF COMMERCIALLY AVAILABLE OCCUPATIONAL HEALTH INFORMATION SYSTEMS
TO NAVY NEEDS**

1. What commercial occupational health information systems are available?

Computerized Occupational Health and Environmental
Surveillance System (COHESS)/

FLOW GEMINI [Flow General's Medical Information
Needs for Industry] (FG)/

DEChealth (DEC)/

Other: _____

Other: _____

2. For each system, check off the features/capabilities required by Navy information processing needs that the commercial systems have.

	COHESS	FG	DEC	Other	Other
Required information is collected:					
personnel data					
hazardous materials characteristics					
presence of hazardous materials					
data on health of workers:					
illness and injuries					
sick leave/absenteeism					
routine examinations					
test results					
procedures					
medical histories					
mortality data					
individual exposures/ exposure history					
data on accidents/incidents					
occupational histories					
other					

	COHESS	FG	DEC	Other	Other
Data can be retrieved in required formats:					
tables of hazardous materials					
lists of workers with exposures					
lists of workers requiring physical examinations					
medical encounter reports					
medical summary reports					
management reports					
other					
Data can be manipulated in required ways:					
number of surveys conducted					
number of persons exposed to hazard					
number of examinations conducted					
number of laboratory tests done					
number of radiographs done					
number of asbestos examinations conducted					
list of those with ordered but unresulted tests					
other					
Other					
Not familiar with system					

6. Overall, my assessment of the adequacy of each of the *commercial* systems to Navy information processing needs is that they are

	COHESS	FG	DEC	Other	Other
Very adequate					
Adequate					
Somewhat adequate					
Somewhat inadequate					
Inadequate					
Very inadequate					

**DESCRIPTION OF NAVY INTERIM OCCUPATIONAL HEALTH INFORMATION SYSTEM/SUITABILITY
OF NAVY INTERIM OCCUPATIONAL HEALTH INFORMATION SYSTEM TO NAVY NEEDS**

1. Check off the features/capabilities required by Navy information processing needs that the Navy interim system has.

	Navy Interim System
Required information is collected:	
personnel data	
hazardous materials characteristics	
presence of hazardous materials	
data on health of workers:	
illness and injuries	
sick leave/absenteeism	
routine examinations	
test results	
procedures	
medical histories	
mortality data	
individual exposures/ exposure history	
data on accidents/incidents	
occupational histories	
other	

	Navy Interim System
Data can be retrieved in required formats:	
tables of hazardous materials	
lists of workers with exposures	
lists of workers requiring physical examinations	
medical encounter reports	
medical summary reports	
management reports	
other	
Data can be manipulated in required ways:	
number of surveys conducted	
number of persons exposed to hazard	
number of examinations conducted	
number of laboratory tests done	
number of radiographs done	
number of asbestos examinations conducted	
list of those with ordered but unresulted tests	
other	
Other	
Not familiar with interim system*	

* If not familiar with the interim system, go to the next interview section.

2. What are the software quality attributes of the interim system?

Does the interim system allow performance of all required tasks?

identification tasks/
entry tasks/
review tasks/
editing tasks/
information retrieval tasks/
system maintenance tasks.

Is the interim system reliable?

What error recovery procedures does the interim system have?

What back-up procedures are required to prevent data loss?

What features make the source program code efficient?

How portable and hardware independent is the interim system?

How maintainable is the interim system software?

3. What are the operational characteristics of the interim system?

How well does the interim system present its operational capabilities to the user?

Is the interim system "menu driven" at all selection levels?

What user on-line assistance functions does the interim system have?

What error diagnostic features and debugging aids does the interim system have?

What database manager utilities does the interim system have?

What is the average entry time per input form?

What are the add, save, change, and delete procedures?

Does the interim system have a search in context capability?

What are the general filing procedures for the interim system?

Can data and routines be downloaded to magnetic tape?

4. What security features does the interim system have?

5. What are the software support requirements for the interim system?

What and how many support personnel are required to maintain the interim system software?

What functions must be performed by the support personnel?

What is the estimated amount of support manhours required per month to maintain the interim system?

6. What system support is available for the interim system?
- What kind of support is available for the initial training of users?
- What kind of support is available for ongoing and update training of users?
- What kind of support is available for technical concerns?
- What kind of documentation and job aids are there that support system operations?
7. What system scenarios are required to maintain the interim system?
- What prime time maintenance functions must be performed during the day on a daily basis?
- What system maintenance functions must be performed during the off-shift on a regular basis? How often must these tasks be performed?
- How often must patient files be archived?
8. What are the organizational requirements of the interim system?
- What requirements are there for users of the interim system to have programming skills? for system managers?
- What requirements are there for system managers to understand source code?
- What staff is required to operate an interim system installation?
- What requirements are there for the installation area?
9. What is the minimum hardware configuration that could support the interim system?
10. My assessment of the suitability of the Navy interim system to Navy information collection needs is that it is
- very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.
11. My assessment of the suitability of the Navy interim system to Navy information retrieval needs is that it is
- very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

12. My assessment of the suitability of the Navy interim system to Navy information manipulation needs is that it is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

13. Overall, my assessment of the adequacy of the Navy interim system to Navy information processing needs is that it is

very adequate/
adequate/
somewhat adequate/
somewhat inadequate/
inadequate/
very inadequate.

APPENDIX F

STRUCTURED INTERVIEW FOR
NHRC INTERIM SYSTEM DEVELOPERS

Person Interviewed: _____

Name of Activity: _____

Location of Activity: _____

Telephone Number: _____

Site of Interview: _____

Date of Interview: _____

Name of Interviewer: _____

The first questions we will be asking you have to do with the goals and benefits of NOHIMS and your assessment of how well the goals are being met.

STATED NAVY GOALS FOR NOHIMS/ASSESSMENT OF HOW WELL NAVY GOALS FOR NOHIMS WERE MET

1. It is my understanding that the intended Navy primary goals for NOHIMS are/were to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

2. The stated Navy goals came about in response to

administrative direction/
legal obligations/
need felt by medical staff/
need felt by medical research/
public demand/
political pressure/
organized group pressure/
worker demand/
other: _____

3. I consider NOHIMS in its present state to be meeting these Navy goals

very well/
somewhat well/
somewhat not well/
not well.

4. The specific goals that NOHIMS is not meeting very well are to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

5. The reasons that NOHIMS is not meeting the goal(s) are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____/

6. The goals that have been only partially achieved are to

meet OSHA requirements/

improve medical surveillance/

improve workplace monitoring/

provide data for epidemiologic analysis/

improve patient care/

improve coordination between departments/

provide management data/

improve access to care/

improve manpower utilization/

improve resources utilization/

provide data for legal functions/

other: _____/

7. The reasons that NOHIMS has only partially achieved these goals are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____/

PERCEIVED GOALS FOR NOHIMS/ASSESSMENT OF HOW WELL PERCEIVED GOALS FOR NOHIMS WERE MET

1. My personal goals for NOHIMS are/were to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

_____.

2. I consider NOHIMS in its present state to be meeting these goals

very well/
somewhat well/
somewhat not well/
not well.

3. The specific goals that NOHIMS is not meeting very well are to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

_____.

4. The reasons that NOHIMS is not meeting the goal(s) are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____
_____.

5. The goals that have been only partially achieved are to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

_____.

6. The reasons that NOHIMS has only partially achieved these goals are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____

_____.

PERCEIVED BENEFITS OF NOHIMS

1. In my opinion, the benefits of NOHIMS have been

increased quality of care provided to the worker/patient through:
fewer unnecessary tests and ancillary services/
fewer unnecessary examinations/visits/
appropriateness of tests performed/
reduced waiting time/
more accurate patient medical record/
timely and perpetual access to data/
earlier diagnosis of illnesses/conditions/
earlier notification of abnormal test results/findings/
base-line data on the health of an employee/
increased compliance with monitoring programs/
reduction in occupational exposures to hazardous agents/
improved workplace monitoring/
better identification of possible hazards/
better identification of workers exposed/
safer working conditions/
improved job certification program/
increased confidence of workers/
improved communication between those concerned with
the occupational health of the worker/
increased productivity of staff/clinics/
increased efficiency in the use of resources/
savings in manpower/
reduction in the cost of providing services/
improved planning and budgeting/
more accurate administrative reports/
more accurate/available database for research efforts/
other health care benefits: _____

other monitoring benefits: _____

other administrative benefits: _____

other benefits: _____

2. Of those mentioned, the most significant benefit of NOHIMS is

3. The costs of implementing and operating NOHIMS

clearly exceed or outweigh the benefits/
somewhat exceed or outweigh the benefits/
equal the benefits/

or the benefits

somewhat exceed or outweigh the costs/
clearly exceed or outweigh the costs.

The next questions ask you to assess how suitable NOHIMS is to Navy needs.

SUITABILITY OF NOHIMS TO NAVY INFORMATION PROCESSING NEEDS

1. The features/capabilities of NOHIMS that make it especially suitable to Navy information processing needs are

the required information is collected:

personnel data/
hazardous materials characteristics/
presence of hazardous materials/
data on health of workers:
 illness and injuries/
 sick leave/absenteeism/
 routine examinations/
 test and procedure results/
 medical histories/
 mortality data/
individual exposures/exposure history/
data on accidents/incidents/
occupational histories/
other: _____/

data can be retrieved in the required formats:

tables of hazardous materials/
lists of workers with exposures/
lists of workers requiring physical examinations/
medical encounter reports/
medical summary reports/
management reports/
other: _____/

data can be manipulated in required ways:

number of surveys conducted/
number of individuals exposed to hazard/
number of examinations conducted/
number of laboratory tests done/
number of radiographs done/
number of asbestos examinations conducted/
list of those with ordered but unresulted tests/
other: _____/

other: _____.

2. My assessment of the suitability of NOHIMS to Navy information collection needs is that NOHIMS is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

3. My assessment of the suitability of NOHIMS to Navy information retrieval needs is that NOHIMS is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

4. My assessment of the suitability of NOHIMS to Navy information manipulation needs is that NOHIMS is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

5. Areas in which NOHIMS could be changed to make it more suitable to Navy information processing needs include

collect additional information

Specify: _____/

improve/create new retrieval capabilities

Specify: _____/

improve/create new manipulation capabilities

Specify: _____/

other: _____

6. Overall, my assessment of the adequacy of NOHIMS for Navy information processing needs is that NOHIMS is

very adequate/
adequate/
somewhat adequate/
somewhat inadequate/
inadequate/
very inadequate.

This last section will have you describe the design features of the Navy interim system and the suitability of it to Navy needs.

**DESCRIPTION OF NAVY INTERIM OCCUPATIONAL HEALTH INFORMATION SYSTEM/SUITABILITY
OF NAVY INTERIM OCCUPATIONAL HEALTH INFORMATION SYSTEM TO NAVY NEEDS**

1. Check off the features/capabilities required by Navy information processing needs that the Navy interim system has.

	Navy Interim System
Required information is collected:	
personnel data	
hazardous materials characteristics	
presence of hazardous materials	
data on health of workers:	
illness and injuries	
sick leave/absenteeism	
routine examinations	
test results	
procedures	
medical histories	
mortality data	
individual exposures/ exposure history	
data on accidents/incidents	
occupational histories	
other	

	Navy Interim System
Data can be retrieved in required formats:	
tables of hazardous materials	
lists of workers with exposures	
lists of workers requiring physical examinations	
medical encounter reports	
medical summary reports	
management reports	
other	
Data can be manipulated in required ways:	
number of surveys conducted	
number of persons exposed to hazard	
number of examinations conducted	
number of laboratory tests done	
number of radiographs done	
number of asbestos examinations conducted	
list of those with ordered but unresulted tests	
other	
Other	
Not familiar with interim system*	

* If not familiar with the interim system, go to the next interview section.

2. What are the software quality attributes of the interim system?

Does the interim system allow performance of all required tasks?

identification tasks/
entry tasks/
review tasks/
editing tasks/
information retrieval tasks/
system maintenance tasks.

Is the interim system reliable?

What error recovery procedures does the interim system have?

What back-up procedures are required to prevent data loss?

What features make the source program code efficient?

How portable and hardware independent is the interim system?

How maintainable is the interim system software?

3. What are the operational characteristics of the interim system?

How well does the interim system present its operational capabilities to the user?

Is the interim system "menu driven" at all selection levels?

What user on-line assistance functions does the interim system have?

What error diagnostic features and debugging aids does the interim system have?

What database manager utilities does the interim system have?

What is the average entry time per input form?

What are the add, save, change, and delete procedures?

Does the interim system have a search in context capability?

What are the general filing procedures for the interim system?

Can data and routines be downloaded to magnetic tape?

4. What security features does the interim system have?

5. What are the software support requirements for the interim system?

What and how many support personnel are required to maintain the interim system software?

What functions must be performed by the support personnel?

What is the estimated amount of support manhours required per month to maintain the interim system?

6. What system support is available for the interim system?
- What kind of support is available for the initial training of users?
- What kind of support is available for ongoing and update training of users?
- What kind of support is available for technical concerns?
- What kind of documentation and job aids are there that support system operations?
7. What system scenarios are required to maintain the interim system?
- What prime time maintenance functions must be performed during the day on a daily basis?
- What system maintenance functions must be performed during the off-shift on a regular basis? How often must these tasks be performed?
- How often must patient files be archived?
8. What are the organizational requirements of the interim system?
- What requirements are there for users of the interim system to have programming skills? for system managers?
- What requirements are there for system managers to understand source code?
- What staff is required to operate an interim system installation?
- What requirements are there for the installation area?
9. What is the minimum hardware configuration that could support the interim system?
10. My assessment of the suitability of the Navy interim system to Navy information collection needs is that it is
- very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.
11. My assessment of the suitability of the Navy interim system to Navy information retrieval needs is that it is
- very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

12. My assessment of the suitability of the Navy interim system to Navy information manipulation needs is that it is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

13. Overall, my assessment of the adequacy of the Navy interim system to Navy information processing needs is that it is

very adequate/
adequate/
somewhat adequate/
somewhat inadequate/
inadequate/
very inadequate.

APPENDIX G

STRUCTURED INTERVIEW FOR
TEST SITE ADMINISTRATORS/SYSTEM MANAGERS
(Test Site Administrators)

Person Interviewed: _____

Name of Activity: _____

Location of Activity: _____

Telephone Number: _____

Site of Interview: _____

Date of Interview: _____

Name of Interviewer: _____

The first questions we will be asking you have to do with your goals for NOHIMS and your assessment of how well they are being met.

PERCEIVED GOALS FOR NOHIMS/ASSESSMENT OF HOW WELL PERCEIVED GOALS FOR NOHIMS WERE MET

1. My personal goals for NOHIMS are/were to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

_____.

2. I consider NOHIMS in its present state to be meeting these goals

very well/
somewhat well/
somewhat not well/
not well.

3. The specific goals that NOHIMS is not meeting very well are to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

_____.

4. The reasons that NOHIMS is not meeting the goal(s) are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____
_____.

5. The goals that have been only partially achieved are to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

6. The reasons that NOHIMS has only partially achieved these goals are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____

The next questions deal with the implementation process at your test site and your assessment of the suitability and transferability of NOHIMS.

IMPLEMENTATION PROCESS AT TEST SITES

Implementation Process

1. (NHRC system developers and test site administrators only) Who was involved in the implementation of NOHIMS at the your test site(s)? What degree of involvement did each of these people have?
 - a. e.
 - b. f.
 - c. g.
 - d. h.
2. (NHRC system developers and test site administrators only) In what areas of the implementation were each of these people involved? What total amount of time did each of these people spend on the implementation of NOHIMS?
 - a. e.
 - b. f.
 - c. g.
 - d. h.
3. In what areas of the implementation were you directly involved? What total amount of time did you spend on the implementation of NOHIMS?
4. (NHRC system developers and test site administrators only) What steps were involved in implementing NOHIMS at the your test site(s)?
5. From your perspective, what problems were encountered during the implementation of NOHIMS? How were these problems resolved/handled?
6. Was staff morale affected by the installation of NOHIMS?
 - Was this effect a positive or negative one?
 - Was the effect temporary?

Operational Procedures

7. What are the current data collection procedures for NOHIMS? What changes were required in previous standard data collection procedures in order to accommodate NOHIMS?

Who collects the data?

Who verifies the data?

At what points in the process are data collected?

8. What are the current data entry procedures for NOHIMS data?

Who enters the data?

What is the backlog for data entry?

9. What are the current data retrieval procedures?

Who requests retrieval of data from NOHIMS?

Who retrieves the data from NOHIMS?

How long does it take to get the requested information?

10. What are the current uses of reports/data generated by NOHIMS? What changes were required in previous standard operating procedures in order to utilize the reports/data generated by NOHIMS?

Are reports/computer-generated data available to the physician when he/she sees the patient?

Do the data collection instruments support/replace/exist in addition to the previously used forms/records?

Does the computer-generated report support/replace/exist in addition to the paper medical record?

Are NOHIMS reports used to identify workers requiring physical examinations?

Are NOHIMS reports used to monitor compliance with Navy standards?

Is NOHIMS used to produce/collect data for management reports?

Operational Procedures (Cont.)

- ~~11. What is the hardware configuration at the (your) test site(s)?~~
~~What type and how many terminals are there?~~
~~What type and how many printers are there?~~
~~What type of communications equipment is used?~~
~~What type of processor is used?~~
~~Where are these devices located?~~

~~Are remote terminals and printers used on a regular basis?~~
12. What physical security features have been implemented at the your test site(s)?
- Are there cipher locks on doors?
- Is there a log book for people entering the computer room?
- Is there a record of batch programs?
13. (NHRC system developers and test site administrators only) Is NOHIMS a development of a previous automated system at the test site(s)? replacement of a previous automated system? supplement to an existing manual system? replacement of a manual system? a completely new data collection and processing system?
14. What problems do you encounter/are encountered in day-to-day operations of NOHIMS? How are/were these problems resolved/handled?

Assessment of Adaptability of NOHIMS to Needs of Test Site(s)

15. How well do you feel NOHIMS has been integrated into the day-to-day procedures of the your test site(s)?
- very well/
somewhat well/
somewhat poorly/
poorly.
16. How well do you feel that NOHIMS has responded to the particular needs of the your test site(s)?
- very well/
somewhat well/
somewhat poorly/
poorly.
17. Were there needs specific to the your test site(s) that NOHIMS could not meet? If so, what were those needs?

SUITABILITY OF NOHIMS TO NAVY INFORMATION PROCESSING NEEDS

1. The features/capabilities of NOHIMS that make it especially suitable to Navy information processing needs are

the required information is collected:

personnel data/
hazardous materials characteristics/
presence of hazardous materials/
data on health of workers:
 illness and injuries/
 sick leave/absenteeism/
 routine examinations/
 test and procedure results/
 medical histories/
 mortality data/
individual exposures/exposure history/
data on accidents/incidents/
occupational histories/
other: _____/

data can be retrieved in the required formats:

tables of hazardous materials/
lists of workers with exposures/
lists of workers requiring physical examinations/
medical encounter reports/
medical summary reports/
management reports/
other: _____/

data can be manipulated in required ways:

number of surveys conducted/
number of individuals exposed to hazard/
number of examinations conducted/
number of laboratory tests done/
number of radiographs done/
number of asbestos examinations conducted/
list of those with ordered but unresulted tests/
other: _____/

other: _____.

2. My assessment of the suitability of NOHIMS to Navy information collection needs is that NOHIMS is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

3. My assessment of the suitability of NOHIMS to Navy information retrieval needs is that NOHIMS is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

4. My assessment of the suitability of NOHIMS to Navy information manipulation needs is that NOHIMS is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

5. Areas in which NOHIMS could be changed to make it more suitable to Navy information processing needs include

collect additional information

Specify: _____/

improve/create new retrieval capabilities

Specify: _____/

improve/create new manipulation capabilities

Specify: _____/

other: _____/

6. Overall, my assessment of the adequacy of NOHIMS for Navy information processing needs is that NOHIMS is

very adequate/
adequate/
somewhat adequate/
somewhat inadequate/
inadequate/
very inadequate.

ASSESSMENT OF TRANSFERABILITY OF NOHIMS TO OTHER NAVY INDUSTRIAL SITES

1. My assessment of the suitability of NOHIMS to the information processing needs of other Navy industrial sites is that NOHIMS is
very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.
2. My opinion of the flexibility and adaptability of NOHIMS is that NOHIMS is
adequately flexible and adaptable/
somewhat adequately flexible and adaptable/
somewhat inadequately flexible and adaptable/
inadequately flexible and adaptable/
to be transferred to other Navy industrial sites.
3. Areas in which NOHIMS needs to be more flexible and adaptable include:
4. My assessment of the ease of transfer of NOHIMS to other Navy industrial sites is that the process will be
difficult/
somewhat difficult/
somewhat easy/
easy.
5. The specific problems I foresee in transferring NOHIMS to other Navy industrial sites are that
6. It is my opinion that the acceptability of NOHIMS among users at other Navy industrial sites will be
very high/
high/
somewhat high/
somewhat low/
low/
very low.

Now we would like to ask you about who actually uses NOHIMS.

DESCRIPTION OF SYSTEM USERS

FOR EACH NOHIMS TEST SITE:

1. Who are the hands-on clerical users of NOHIMS? (Examples: receptionists, medical record room personnel, and data entry technicians.) Which NOHIMS options do they use?

<u>Name</u>	<u>Job Title and Function</u>	<u>NOHIMS Options Used</u>
a.		
b.		
c.		
d.		

2. Who are the hands-on medical/professional users of NOHIMS? (Examples: MDs, PAs, NPs, nurses, occupational health technicians.) Which NOHIMS options do they use?

<u>Name</u>	<u>Job Title and Function</u>	<u>NOHIMS Options Used</u>
a.		
b.		
c.		
d.		

3. Who are the hands-on industrial/professional users of NOHIMS? (Examples: industrial hygienists and safety specialists.) Which NOHIMS options do they use?

<u>Name</u>	<u>Job Title and Function</u>	<u>NOHIMS Options Used</u>
a.		
b.		
c.		
d.		

4. Who are the hands-on ancillary users of NOHIMS? (Examples: laboratory, radiology, and audiology technicians and corpsmen.)
Which NOHIMS options do they use?

<u>Name</u>	<u>Job Title and Function</u>	<u>NOHIMS Options Used</u>
a.		
b.		
c.		
d.		

5. Who are the hands-on administrative users of NOHIMS? (Examples: clinic directors and department chiefs.)
Which NOHIMS options do they use?

<u>Name</u>	<u>Job Title and Function</u>	<u>NOHIMS Options Used</u>
a.		
b.		
c.		
d.		

6. Who are the NOHIMS system manager(s)?

<u>Name</u>	<u>Job Title and Function</u>
a.	
b.	
c.	

7. Who are the other hands-on users of NOHIMS? (Examples: researchers.)

<u>Name</u>	<u>Job Title and Function</u>	<u>NOHIMS Options Used</u>
a.		
b.		
c.		

The next sections ask you to evaluate specific aspects of NOHIMS. The first section is on the use and usefulness of NOHIMS' information retrieval capabilities.

USE AND USEFULNESS OF INFORMATION RETRIEVAL CAPABILITIES

Standard Reports

1. The standard reports that NOHIMS produces which I receive/use regularly are

Industrial Hygiene Survey Report/
Report of Individual Exposures/
Patient Data Sheet/
Medical certification report/
Monthly Compliance Report/
Navy management reports:
 Report of Occupational Health Services (6260/1)/
 Medical Services and Outpatient Morbidity Report (6300/1)/
Encounter Report/
Patient Summary/
Status Report/
Flowcharts/
other: _____/
none (go to 9 if none).

- 2 These reports are used in my work to

provide direct patient care/
plan workloads/
communicate with others/
prepare required reports/
other: _____/
not used.

3. The reports are used

daily/	quarterly/
weekly/	semi-annually/
semi-monthly/	annually/
monthly/	never.

4. The information produced in these reports

more than adequately meets my needs/
adequately meets my needs/
less than adequately meets my needs/
is not relevant to my work.

5. The information produced in these reports is

very useful/
somewhat useful/
not useful.

- ~~6. (Medical users only) Specifically, in the day to day provision of medical care, the standard medical reports are~~

~~very useful/~~
~~somewhat useful/~~
~~not useful/~~
~~not used.~~

~~7. (Medical users only) The effect of the standard medical reports on the quality of medical care has been~~

~~very beneficial/
somewhat beneficial/
no effect/
somewhat detrimental/
very detrimental.~~

8. Additional information/reports I would find helpful include:

User-defined Information Retrieval Capabilities

9. The user-defined information retrieval capabilities I have used are

Interactive Flowcharts/
Report Generator runs/
interactive query function in OHS/
on-line look-up/
other: _____/
none (go to next interview section if none).

10. I consider the ability to generate user-defined reports to be

very useful/
somewhat useful/
not useful.

11. I generate a special user-defined report

daily/	quarterly/
weekly/	semi-annually/
semi-monthly/	annually/
monthly/	never.

12. The information I usually retrieve using specially generated reports is used

in direct patient care/
for resource management/
to assess quality of care/
in research/
other: _____.

~~13. (Medical users only) In the day to day provision of medical care, the user defined reports are~~

~~very useful/
somewhat useful/
not useful/
not used.~~

~~14. (Medical users only) The effect of the user defined reports on the quality of patient care has been~~

~~very beneficial/
somewhat beneficial/
no effect/
somewhat detrimental/
very detrimental~~

15. I do on-line look-up/interactive query of patient/worker data

often during the day/

daily/

several times during the week/

weekly/

several times during the month/

other: _____/

never.

16. I do on-line look-up/interactive query with the

medical component/

industrial component/

both components/

neither component.

17. I consider the ability to do on-line look-up/interactive query of patient/worker records to be

very useful/

somewhat useful/

not useful.

18. The information I usually retrieve using on-line look-up/interactive query is

review of previous patient encounters/

lab results/

patient-specific exposures/

shop-specific exposures/

survey-specific information/

verify or look up administrative information/

other: _____.

The next questions deal with the user friendliness of NOHIMS.

ASSESSMENT OF USER FRIENDLINESS

1. It was

very easy/
somewhat easy/
somewhat difficult/
very difficult/

for me to learn to use NOHIMS.

☐ Have not learned to use NOHIMS (then go to next
interview section).

2. I am

very confident/
somewhat confident/
somewhat unsure/
very unsure/

of my ability to work with NOHIMS.

3. It is

easier/
somewhat easier/
not different/
somewhat more difficult/
more difficult/

to use NOHIMS than other automated systems I have used.

☐ Not used other systems.

4. Please rate the following features of NOHIMS in terms of their
helpfulness in using NOHIMS.

	<u>Very Helpful</u>	<u>Somewhat Helpful</u>	<u>Not Helpful</u>
a. Screen displays	_____	_____	_____
b. System prompts/menus	_____	_____	_____
c. System messages	_____	_____	_____
d. Help text/assistance functions	_____	_____	_____
e. Report formats	_____	_____	_____
f. Techniques for looking up an individual	_____	_____	_____
g. Agency unit look-up	_____	_____	_____
h. Environment look-up	_____	_____	_____
i. Survey data look-up	_____	_____	_____
j. Hazardous agent look-up	_____	_____	_____
k. Directory item look-up	_____	_____	_____

5. Improvements I would like to see to make NOHIMS easier to use include

6. Overall, I feel that NOHIMS is

very user friendly/
somewhat user friendly/
somewhat user unfriendly/
very user unfriendly.

The last specific features we would like you to evaluate are the security features.

ADEQUACY OF SECURITY FEATURES

1. In my opinion, the sign on/off security procedures are
very adequate/
somewhat adequate/
somewhat inadequate/
very inadequate/
to prevent unauthorized persons from accessing NOHIMS.
2. In my opinion, the various security levels (by device, by user classification, through passwords for specific options) are
very adequate/
somewhat adequate/
somewhat inadequate/
very inadequate/
to prevent persons from accessing areas of NOHIMS for which they are not authorized.
3. In my opinion, the confidentiality warnings on input and output documents are
very adequate/
somewhat adequate/
somewhat inadequate/
very inadequate/
to maintain the confidentiality of patient/worker data.
4. The security protection features provided by NOHIMS are
fully utilized/
loosely utilized/
ignored/
bypassed.
5. In general, the security protection provided by NOHIMS is
insufficient/
somewhat insufficient/
somewhat sufficient/
sufficient.
6. If insufficient or somewhat insufficient, the areas of protection which are lacking include:
7. In general, the security protection provided by NOHIMS is
unnecessary/
somewhat unnecessary/
somewhat necessary/
necessary.

8. If unnecessary or somewhat unnecessary, the areas which should be removed or changed include:

The next topic we would like to discuss is the uses of and the usefulness of NOHIMS in administrative functions.

USES IN ADMINISTRATIVE FUNCTIONS/ASSESSMENT OF USEFULNESS OF NOHIMS IN ADMINISTRATIVE FUNCTIONS

1. The administrative functions that I see NOHIMS being useful for include
determining environmental differential pay decisions/
increasing standardization of reports/
increasing standardization of data collection forms/
reducing paperwork/
generating administrative reports/
providing timely and perpetual access to administrative data/
manpower/resource planning/
time and motion studies/
maintaining equipment lists/
managing inspection requirements/
other: _____.
2. The kinds of data required for these functions include
hazard exposures/
service utilization data/
manpower/resource utilization data/
other: _____.
3. The features/capabilities of NOHIMS that will be useful in administrative functions include
standard report generation capabilities/
on-line look-up/interactive query functions/
ad hoc report generation capabilities/
other: _____.
4. My assessment of how NOHIMS has affected the amount of required paperwork is that NOHIMS has
greatly increased the amount of paperwork/
somewhat increased the amount of paperwork/
no effect/
somewhat decreased the amount of paperwork/
greatly decreased the amount of paperwork.
5. It is my opinion that in terms of standardizing reports and forms NOHIMS has had
a beneficial effect/
a somewhat beneficial effect/
no effect/
a somewhat detrimental effect/
a detrimental effect.
6. My assessment of the usefulness of having timely and perpetual access to administrative data with NOHIMS is that it is
useful/
somewhat useful/
somewhat not useful/
not useful.

In the last sections we would like to hear your assessment of the overall performance, acceptability, and benefits of NOHIMS.

ASSESSMENT OF SYSTEM PERFORMANCE

1. NOHIMS has given no/some/many problems in the area of
reliability/
downtime/
communication lines/
man-machine interface/
other: _____.
2. A noticeable (to the user) failure happens about _____/
_____ and that number has been
improving/
steady/
getting worse.
3. The number of failures/errors for NOHIMS is
acceptable/
somewhat acceptable/
somewhat unacceptable/
unacceptable.
4. When there is heavy usage of the computer system, then there will be
a noticeable slowdown/
an annoying slowdown/
a terrible slowdown/
no effect.
5. Data entry is
never/
rarely/
occasionally/
often/
delayed by system response time.
6. The time required to obtain a display of data is usually
fast/
somewhat fast/
somewhat slow/
slow.
7. When a NOHIMS failure occurs, it affects the day-to-day provision
of medical care because
work procedures must be changed/
reports usually used in care are not available/
on-line look-ups cannot be done/
medical charts are held up in data entry/
survey data are held up in entry/
other: _____/
no effect.

8. When a NOHIMS failure occurs, it affects the administration of the occupational health unit because

work procedures must be changed/
reports usually used are not available/
on-line look-ups cannot be done/
medical charts are held up in data entry/
survey data are held up in entry/
data entry gets backlogged/
other: _____/
no effect.

9. NOHIMS has

no/
one or two/
a few/
several/
many/

major "bugs" in the software that affect system performance.

These are: _____

_____.

10. I have used or been exposed to NOHIMS for _____ months.

ACCEPTABILITY OF NOHIMS TO USERS

1. In general, I feel that NOHIMS
adequately/
somewhat adequately/
somewhat inadequately/
inadequately/
performs the functions that are required in my work.
2. Generally, I feel that NOHIMS is
reliable/
somewhat reliable/
somewhat unreliable/
unreliable.
3. Generally, I feel that NOHIMS
is/
is somewhat/
is somewhat not/
is not/
user friendly and easy to operate.
4. In general, the data collection forms are
acceptable/
somewhat acceptable/
somewhat unacceptable/
unacceptable/
to me.
5. In general, I think that the data collection forms are
acceptable/
somewhat acceptable/
somewhat unacceptable/
unacceptable/
to the patient/worker.
6. I feel that the changes in procedures required by NOHIMS are
acceptable/
somewhat acceptable/
somewhat unacceptable/
unacceptable.
7. I feel that NOHIMS
is an aid in/
is somewhat of an aid in/
has no effect on/
is somewhat of a hindrance in/
is a hindrance in/
the provision of care to the patient/worker.

~~8. (Medical users only) I feel that NOHIMS has~~

~~significantly disrupted/
somewhat disrupted/
not disrupted/~~

~~traditional patterns of clinical thinking and/or patient management~~

9. NOHIMS has affected my workload by

significantly increasing my workload/
somewhat increasing my workload/
somewhat decreasing my workload/
significantly decreasing my workload/
changing the nature of my workload/
no effect on my workload.

10. NOHIMS features that have been incorporated into my everyday work procedures include

data collection forms/
data entry/
on-line look-up/interactive query/interactive flowcharts/
display of standard reports/
printed standard reports/
report generation/
other: _____/
none.

11. These features have made my job

much easier/
somewhat easier/
no effect/
somewhat harder/
much harder.

12. These features have made me

less productive/
about as productive/
more productive.

13. Generally, I feel that system users can perform their jobs

more efficiently and effectively/
somewhat more efficiently and effectively/
to the same level of efficiency and effectiveness/
somewhat less efficiently and effectively/
less efficiently and effectively/

because of NOHIMS.

14. In general, my assessment of how well people have adapted to NOHIMS is that they have adapted

well/
somewhat well/
somewhat poorly/
poorly.

15. Overall, NOHIMS is

acceptable/
somewhat acceptable/
somewhat unacceptable/
unacceptable.

16. If NOHIMS is unacceptable or somewhat unacceptable, what changes need to be made in order to make it acceptable?

less data have to be collected/
more data have to be collected/
data have to be collected at more points/
changes to data collection forms are required/
data have to be stored longer/
more hardware is required/
more communication gear is required/
more software is required/
changes to present software are required/
new report formats are required/
new reports are required/
inquiry capability is required/
more inquiry capability is required/
more system support is required/
more training is required/

other: _____/

other: _____/

other: _____

PERCEIVED BENEFITS OF NOHIMS

1. In my opinion, the benefits of NOHIMS have been

increased quality of care provided to the worker/patient through:
fewer unnecessary tests and ancillary services/
fewer unnecessary examinations/visits/
appropriateness of tests performed/
reduced waiting time/
more accurate patient medical record/
timely and perpetual access to data/
earlier diagnosis of illnesses/conditions/
earlier notification of abnormal test results/findings/
base-line data on the health of an employee/
increased compliance with monitoring programs/
reduction in occupational exposures to hazardous agents/
improved workplace monitoring/
better identification of possible hazards/
better identification of workers exposed/
safer working conditions/
improved job certification program/
increased confidence of workers/
improved communication between those concerned with
the occupational health of the worker/
increased productivity of staff/clinics/
increased efficiency in the use of resources/
savings in manpower/
reduction in the cost of providing services/
improved planning and budgeting/
more accurate administrative reports/
more accurate/available database for research efforts/
other health care benefits: _____

other monitoring benefits: _____

other administrative benefits: _____

other benefits: _____

2. Of those mentioned, the most significant benefit of NOHIMS is

3. The costs of implementing and operating NOHIMS

clearly exceed or outweigh the benefits/
somewhat exceed or outweigh the benefits/
equal the benefits/

or the benefits

somewhat exceed or outweigh the costs/
clearly exceed or outweigh the costs.

YOUR STRUCTURED APPRAISAL OF THE PERFORMANCE OF THE
NAVY OCCUPATIONAL HEALTH INFORMATION MANAGEMENT SYSTEM (NOHIMS)

Contained in the following pages are 22 statements reflecting possible attitudes or opinions that users of NOHIMS might hold. You are being asked to carefully read each of these statements and then to place an "X" in the blank that most nearly reflects your opinion of NOHIMS, indicating the extent to which you agree or disagree with each statement. PLEASE EXPRESS AN OPINION ON EACH STATEMENT EVEN IF YOU HAVE NEVER THOUGHT ABOUT THIS SUBJECT BEFORE IN JUST THIS WAY.

The intent of this short exercise is to systematically explore what your subjective attitudes and opinions are concerning the impact of NOHIMS on your department. Your responses will remain anonymous and will be used only in the aggregate to provide a composite picture of the benefits that have accrued from NOHIMS in your department. Thank you for your cooperation and valued assistance.

SITE:

APPRAISAL OF THE PERFORMANCE OF NOHIMS

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Neutral Opinion</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
1. Worker/patient-related information is more accessible and available more quickly with NOHIMS.	_____	_____	_____	_____	_____
2. As a result of NOHIMS, I am able to do a better job.	_____	_____	_____	_____	_____
3. The performance of NOHIMS falls short of what I expected.	_____	_____	_____	_____	_____
4. I could never go back to using the old manual record system now that I have been using NOHIMS.	_____	_____	_____	_____	_____
5. NOHIMS catches more human errors than the old manual system did.	_____	_____	_____	_____	_____
6. In my opinion, NOHIMS should not have been implemented at this activity.	_____	_____	_____	_____	_____
7. I rarely have to wait for necessary worker/patient information because the NOHIMS system is down.	_____	_____	_____	_____	_____
8. In general, NOHIMS is better than the old manual system of record keeping.	_____	_____	_____	_____	_____
9. NOHIMS has some major problems that need correction.	_____	_____	_____	_____	_____
10. If there were budget cuts at this activity, I would rather see other services that I need cut before I lost NOHIMS.	_____	_____	_____	_____	_____

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Neutral Opinion</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
11. NOHIMS has "goofed" up worker/patient records more times than I care to remember.	_____	_____	_____	_____	_____
12. I truly feel that the quality of care has been improved as a result of NOHIMS.	_____	_____	_____	_____	_____
13. From an administrative point of view, NOHIMS provides timely data for making management decisions that were not available with the previous manual system.	_____	_____	_____	_____	_____
14. Scheduling and staffing patterns have been improved since the advent of NOHIMS.	_____	_____	_____	_____	_____
15. NOHIMS does not benefit me much personally.	_____	_____	_____	_____	_____
16. Worker/patient satisfaction seems to be running higher since NOHIMS was introduced.	_____	_____	_____	_____	_____
17. I can see how NOHIMS can be a boon to other users.	_____	_____	_____	_____	_____
18. With NOHIMS, I am able to get more done in a day.	_____	_____	_____	_____	_____
19. The records produced by NOHIMS are more amenable to review and better meet Navy standards.	_____	_____	_____	_____	_____
20. The confidentiality of the worker's/patient's record is more vulnerable with NOHIMS than it was with the manual system.	_____	_____	_____	_____	_____

APPENDIX G

STRUCTURED INTERVIEW FOR
TEST SITE ADMINISTRATORS/SYSTEM MANAGERS
(System Managers)

Person Interviewed: _____

Name of Activity: _____

Location of Activity: _____

Telephone Number: _____

Site of Interview: _____

Date of Interview: _____

Name of Interviewer: _____

The first questions we will be asking you have to do with your goals for NOHIMS and your assessment of how well they are being met.

PERCEIVED GOALS FOR NOHIMS/ASSESSMENT OF HOW WELL PERCEIVED GOALS FOR NOHIMS WERE MET

1. My personal goals for NOHIMS are/were to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

_____.

2. I consider NOHIMS in its present state to be meeting these goals

very well/
somewhat well/
somewhat not well/
not well.

3. The specific goals that NOHIMS is not meeting very well are to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

_____.

4. The reasons that NOHIMS is not meeting the goal(s) are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____
_____.

5. The goals that have been only partially achieved are to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

_____.

6. The reasons that NOHIMS has only partially achieved these goals are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____
_____.

The next questions deal with the implementation process at your test site and your assessment of the transferability of NOHIMS.

IMPLEMENTATION PROCESS AT TEST SITES

Implementation Process

1. (NHRC system developers and test site administrators only) Who was involved in the implementation of NOHIMS at the your test site(s)? What degree of involvement did each of these people have?
 - a. e.
 - b. f.
 - c. g.
 - d. h.
2. (NHRC system developers and test site administrators only) In what areas of the implementation were each of these people involved? What total amount of time did each of these people spend on the implementation of NOHIMS?
 - a. e.
 - b. f.
 - c. g.
 - d. h.
3. In what areas of the implementation were you directly involved? What total amount of time did you spend on the implementation of NOHIMS?
4. (NHRC system developers and test site administrators only) What steps were involved in implementing NOHIMS at the your test site(s)?
5. From your perspective, what problems were encountered during the implementation of NOHIMS? How were these problems resolved/handled?
6. Was staff morale affected by the installation of NOHIMS?
 - Was this effect a positive or negative one?
 - Was the effect temporary?

Operational Procedures

7. What are the current data collection procedures for NOHIMS? What changes were required in previous standard data collection procedures in order to accommodate NOHIMS?

Who collects the data?

Who verifies the data?

At what points in the process are data collected?

8. What are the current data entry procedures for NOHIMS data?

Who enters the data?

What is the backlog for data entry?

9. What are the current data retrieval procedures?

Who requests retrieval of data from NOHIMS?

Who retrieves the data from NOHIMS?

How long does it take to get the requested information?

10. What are the current uses of reports/data generated by NOHIMS? What changes were required in previous standard operating procedures in order to utilize the reports/data generated by NOHIMS?

Are reports/computer-generated data available to the physician when he/she sees the patient?

Do the data collection instruments support/replace/exist in addition to the previously used forms/records?

Does the computer-generated report support/replace/exist in addition to the paper medical record?

Are NOHIMS reports used to identify workers requiring physical examinations?

Are NOHIMS reports used to monitor compliance with Navy standards?

Is NOHIMS used to produce/collect data for management reports?

Operational Procedures (Cont.)

~~11. What is the hardware configuration at the (your) test site(s)?~~

~~What type and how many terminals are there?~~

~~What type and how many printers are there?~~

~~What type of communications equipment is used?~~

~~What type of processor is used?~~

~~Where are these devices located?~~

~~Are remote terminals and printers used on a regular basis?~~

12. What physical security features have been implemented at the your test site(s)?

Are there cipher locks on doors?

Is there a log book for people entering the computer room?

Is there a record of batch programs?

13. ~~(NHRC system developers and test site administrators only)~~ Is NOHIMS a development of a previous automated system at the test site(s)? replacement of a previous automated system? supplement to an existing manual system? replacement of a manual system? a completely new data collection and processing system?

14. What problems do you encounter/are encountered in day-to-day operations of NOHIMS? How are/were these problems resolved/handled?

Assessment of Adaptability of NOHIMS to Needs of Test Site(s)

15. How well do you feel NOHIMS has been integrated into the day-to-day procedures of the your test site(s)?

very well/
somewhat well/
somewhat poorly/
poorly.

16. How well do you feel that NOHIMS has responded to the particular needs of the your test site(s)?

very well/
somewhat well/
somewhat poorly/
poorly.

17. Were there needs specific to the your test site(s) that NOHIMS could not meet? If so, what were those needs?

ASSESSMENT OF TRANSFERABILITY OF NOHIMS TO OTHER NAVY INDUSTRIAL SITES

1. My assessment of the suitability of NOHIMS to the information processing needs of other Navy industrial sites is that NOHIMS is
very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.
2. My opinion of the flexibility and adaptability of NOHIMS is that NOHIMS is
adequately flexible and adaptable/
somewhat adequately flexible and adaptable/
somewhat inadequately flexible and adaptable/
inadequately flexible and adaptable/
to be transferred to other Navy industrial sites.
3. Areas in which NOHIMS needs to be more flexible and adaptable include:
4. My assessment of the ease of transfer of NOHIMS to other Navy industrial sites is that the process will be
difficult/
somewhat difficult/
somewhat easy/
easy.
5. The specific problems I foresee in transferring NOHIMS to other Navy industrial sites are that
6. It is my opinion that the acceptability of NOHIMS among users at other Navy industrial sites will be
very high/
high/
somewhat high/
somewhat low/
low/
very low.

Now we would like to ask you about who actually uses NOHIMS.

DESCRIPTION OF SYSTEM USERS

FOR EACH NOHIMS TEST SITE:

1. Who are the hands-on clerical users of NOHIMS? (Examples: receptionists, medical record room personnel, and data entry technicians.) Which NOHIMS options do they use?

	<u>Name</u>	<u>Job Title and Function</u>	<u>NOHIMS Options Used</u>
a.			
b.			
c.			
d.			

2. Who are the hands-on medical/professional users of NOHIMS? (Examples: MDs, PAs, NPs, nurses, occupational health technicians.) Which NOHIMS options do they use?

	<u>Name</u>	<u>Job Title and Function</u>	<u>NOHIMS Options Used</u>
a.			
b.			
c.			
d.			

3. Who are the hands-on industrial/professional users of NOHIMS? (Examples: industrial hygienists and safety specialists.) Which NOHIMS options do they use?

	<u>Name</u>	<u>Job Title and Function</u>	<u>NOHIMS Options Used</u>
a.			
b.			
c.			
d.			

4. Who are the hands-on ancillary users of NOHIMS? (Examples: laboratory, radiology, and audiology technicians and corpsmen.)
Which NOHIMS options do they use?

<u>Name</u>	<u>Job Title and Function</u>	<u>NOHIMS Options Used</u>
a.		
b.		
c.		
d.		

5. Who are the hands-on administrative users of NOHIMS?
(Examples: clinic directors and department chiefs.)
Which NOHIMS options do they use?

<u>Name</u>	<u>Job Title and Function</u>	<u>NOHIMS Options Used</u>
a.		
b.		
c.		
d.		

6. Who are the NOHIMS system manager(s)?

<u>Name</u>	<u>Job Title and Function</u>
a.	
b.	
c.	

7. Who are the other hands-on users of NOHIMS? (Examples: researchers.)

<u>Name</u>	<u>Job Title and Function</u>	<u>NOHIMS Options Used</u>
a.		
b.		
c.		

The next sections ask you to evaluate specific aspects of NOHIMS. The first section is on the use and usefulness of NOHIMS' information retrieval capabilities.

USE AND USEFULNESS OF INFORMATION RETRIEVAL CAPABILITIES

Standard Reports

1. The standard reports that NOHIMS produces which I receive/use regularly are

Industrial Hygiene Survey Report/
Report of Individual Exposures/
Patient Data Sheet/
Medical certification report/
Monthly Compliance Report/
Navy management reports:
 Report of Occupational Health Services (6260/1)/
 Medical Services and Outpatient Morbidity Report (6300/1)/
Encounter Report/
Patient Summary/
Status Report/
Flowcharts/
other: _____/
none (go to 9 if none).

2. These reports are used in my work to

provide direct patient care/
plan workloads/
communicate with others/
prepare required reports/
other: _____/
not used.

3. The reports are used

daily/	quarterly/
weekly/	semi-annually/
semi-monthly/	annually/
monthly/	never.

4. The information produced in these reports

more than adequately meets my needs/
adequately meets my needs/
less than adequately meets my needs/
is not relevant to my work.

5. The information produced in these reports is

very useful/
somewhat useful/
not useful.

~~6. (Medical users only) Specifically, in the day to day provision of medical care, the standard medical reports are~~

~~very useful/~~
~~somewhat useful/~~
~~not useful/~~
~~not used.~~

~~7. (Medical users only) The effect of the standard medical reports
on the quality of medical care has been~~

~~very beneficial/
somewhat beneficial/
no effect/
somewhat detrimental/
very detrimental.~~

8. Additional information/reports I would find helpful include:

User-defined Information Retrieval Capabilities

9. The user-defined information retrieval capabilities I have used are

Interactive Flowcharts/
Report Generator runs/
interactive query function in OHS/
on-line look-up/
other: _____/
none (go to next interview section if none).

10. I consider the ability to generate user-defined reports to be

very useful/
somewhat useful/
not useful.

11. I generate a special user-defined report

daily/	quarterly/
weekly/	semi-annually/
semi-monthly/	annually/
monthly/	never.

12. The information I usually retrieve using specially generated reports is used

in direct patient care/
for resource management/
to assess quality of care/
in research/
other: _____.

~~13. (Medical users only) In the day to day provision of medical care,
the user defined reports are~~

~~very useful/
somewhat useful/
not useful/
not used.~~

~~14. (Medical users only) The effect of the user defined reports on the quality of patient care has been~~

~~very beneficial/
somewhat beneficial/
no effect/
somewhat detrimental/
very detrimental.~~

15. I do on-line look-up/interactive query of patient/worker data
often during the day/
daily/
several times during the week/
weekly/
several times during the month/
other: _____/
never.

16. I do on-line look-up/interactive query with the
medical component/
industrial component/
both components/
neither component.

17. I consider the ability to do on-line look-up/interactive query of
patient/worker records to be
very useful/
somewhat useful/
not useful.

18. The information I usually retrieve using on-line look-up/interactive query is
review of previous patient encounters/
lab results/
patient-specific exposures/
shop-specific exposures/
survey-specific information/
verify or look up administrative information/
other: _____.

The next questions deal with the user friendliness of NOHIMS.

ASSESSMENT OF USER FRIENDLINESS

1. It was

very easy/
somewhat easy/
somewhat difficult/
very difficult/

for me to learn to use NOHIMS.

☐ Have not learned to use NOHIMS (then go to next interview section).

2. I am

very confident/
somewhat confident/
somewhat unsure/
very unsure/

of my ability to work with NOHIMS.

3. It is

easier/
somewhat easier/
not different/
somewhat more difficult/
more difficult/

to use NOHIMS than other automated systems I have used.

☐ Not used other systems.

4. Please rate the following features of NOHIMS in terms of their helpfulness in using NOHIMS.

	<u>Very Helpful</u>	<u>Somewhat Helpful</u>	<u>Not Helpful</u>
a. Screen displays	_____	_____	_____
b. System prompts/menus	_____	_____	_____
c. System messages	_____	_____	_____
d. Help text/assistance functions	_____	_____	_____
e. Report formats	_____	_____	_____
f. Techniques for looking up an individual	_____	_____	_____
g. Agency unit look-up	_____	_____	_____
h. Environment look-up	_____	_____	_____
i. Survey data look-up	_____	_____	_____
j. Hazardous agent look-up	_____	_____	_____
k. Directory item look-up	_____	_____	_____

5. Improvements I would like to see to make NOHIMS easier to use include

6. Overall, I feel that NOHIMS is

very user friendly/
somewhat user friendly/
somewhat user unfriendly/
very user unfriendly.

The last specific features we would like you to evaluate are the security features.

ADEQUACY OF SECURITY FEATURES

1. In my opinion, the sign on/off security procedures are
very adequate/
somewhat adequate/
somewhat inadequate/
very inadequate/
to prevent unauthorized persons from accessing NOHIMS.
2. In my opinion, the various security levels (by device, by user classification, through passwords for specific options) are
very adequate/
somewhat adequate/
somewhat inadequate/
very inadequate/
to prevent persons from accessing areas of NOHIMS for which they are not authorized.
3. In my opinion, the confidentiality warnings on input and output documents are
very adequate/
somewhat adequate/
somewhat inadequate/
very inadequate/
to maintain the confidentiality of patient/worker data.
4. The security protection features provided by NOHIMS are
fully utilized/
loosely utilized/
ignored/
bypassed.
5. In general, the security protection provided by NOHIMS is
insufficient/
somewhat insufficient/
somewhat sufficient/
sufficient.
6. If insufficient or somewhat insufficient, the areas of protection which are lacking include:
7. In general, the security protection provided by NOHIMS is
unnecessary/
somewhat unnecessary/
somewhat necessary/
necessary.

8. If unnecessary or somewhat unnecessary, the areas which should be removed or changed include:

In the next sections we would like to hear your assessment of the overall performance and benefits of NOHIMS.

ASSESSMENT OF SYSTEM PERFORMANCE

1. NOHIMS has given no/some/many problems in the area of
reliability/
downtime/
communication lines/
man-machine interface/
other: _____.
2. A noticeable (to the user) failure happens about _____/
_____ and that number has been
improving/
steady/
getting worse.
3. The number of failures/errors for NOHIMS is
acceptable/
somewhat acceptable/
somewhat unacceptable/
unacceptable.
4. When there is heavy usage of the computer system, then there will be
a noticeable slowdown/
an annoying slowdown/
a terrible slowdown/
no effect.
5. Data entry is
never/
rarely/
occasionally/
often/
delayed by system response time.
6. The time required to obtain a display of data is usually
fast/
somewhat fast/
somewhat slow/
slow.
7. When a NOHIMS failure occurs, it affects the day-to-day provision
of medical care because
work procedures must be changed/
reports usually used in care are not available/
on-line look-ups cannot be done/
medical charts are held up in data entry/
survey data are held up in entry/
other: _____/
no effect.

8. When a NOHIMS failure occurs, it affects the administration of the occupational health unit because

work procedures must be changed/
reports usually used are not available/
on-line look-ups cannot be done/
medical charts are held up in data entry/
survey data are held up in entry/
data entry gets backlogged/

other: _____/
no effect.

9. NOHIMS has

no/
one or two/
a few/
several/
many/

major "bugs" in the software that affect system performance.

These are: _____

_____.

10. I have used or been exposed to NOHIMS for _____ months.

PERCEIVED BENEFITS OF NOHIMS

1. In my opinion, the benefits of NOHIMS have been

increased quality of care provided to the worker/patient through:
fewer unnecessary tests and ancillary services/
fewer unnecessary examinations/visits/
appropriateness of tests performed/
reduced waiting time/
more accurate patient medical record/
timely and perpetual access to data/
earlier diagnosis of illnesses/conditions/
earlier notification of abnormal test results/findings/
base-line data on the health of an employee/
increased compliance with monitoring programs/
reduction in occupational exposures to hazardous agents/
improved workplace monitoring/
better identification of possible hazards/
better identification of workers exposed/
safer working conditions/
improved job certification program/
increased confidence of workers/
improved communication between those concerned with
the occupational health of the worker/
increased productivity of staff/clinics/
increased efficiency in the use of resources/
savings in manpower/
reduction in the cost of providing services/
improved planning and budgeting/
more accurate administrative reports/
more accurate/available database for research efforts/
other health care benefits: _____

other monitoring benefits: _____

other administrative benefits: _____

other benefits: _____

2. Of those mentioned, the most significant benefit of NOHIMS is

3. The costs of implementing and operating NOHIMS

clearly exceed or outweigh the benefits/
somewhat exceed or outweigh the benefits/
equal the benefits/

or the benefits

somewhat exceed or outweigh the costs/
clearly exceed or outweigh the costs.

These questions pertain to what functions are required to maintain the system.

SYSTEM SCENARIOS TO MAINTAIN THE SYSTEM

1. What prime time system maintenance functions must be performed during the day on a daily basis?

be certain that Monitor is running in the
background before entering data/
review error logs/
investigate common or new errors/
other: _____

2. What system maintenance functions must be performed during the off-shift on a regular basis? How often must these tasks be performed?

system back-ups on a daily/weekly/monthly basis/
recreate alphabetic directory on a daily/weekly/
monthly/as needed basis/
other: _____

3. How often must patient files be archived to tape?

monthly/
quarterly/
annually/
as needed

Finally, the answers to the following questions on system testing will help us to design appropriate operational test scenarios for NOHIMS.

APPROPRIATE SCENARIOS FOR SYSTEM TESTING

1. Should NOHIMS features and functions be tested using the examples contained in the operational manuals, using contrived test data, live data, or some combination thereof?
2. What features and functions of NOHIMS should be operationally tested to be certain that NOHIMS can perform expected tasks?

Should a hazardous agent table be created? What data are required in a hazardous agent table?

Should data from an industrial survey(ies) be entered into NOHIMS? What data are gathered in an industrial survey?

Should data from a physical examination(s) be entered into NOHIMS? What data are gathered in a physical examination?

Should one/several of the following be generated by NOHIMS? What data are required in NOHIMS and what parameters must be known in order to generate these items?

Notification of individual exposures

List of patients requiring physical examinations

Patient Data Sheet

Patient Summary

Encounter Report

Flowcharts

Reports for the 6260/1 management report

Medical certification report

Should one or more user-defined reports be generated by NOHIMS? What should be the content of these reports? What information is required to be in NOHIMS in order to generate these reports?

Should one or more queries into the database be performed? What should be the content of the queries?

What other features and functions should be operationally tested? What information is required in order to perform these tests?

3. How will the results of these tests be evaluated?

What criteria will be used to evaluate the performance of NOHIMS?

What level of performance will be considered satisfactory?

How many times will a given test be performed? by how many different users?

YOUR STRUCTURED APPRAISAL OF THE PERFORMANCE OF THE
NAVY OCCUPATIONAL HEALTH INFORMATION MANAGEMENT SYSTEM (NOHIMS)

Contained in the following pages are 22 statements reflecting possible attitudes or opinions that users of NOHIMS might hold. You are being asked to carefully read each of these statements and then to place an "X" in the blank that most nearly reflects your opinion of NOHIMS, indicating the extent to which you agree or disagree with each statement. PLEASE EXPRESS AN OPINION ON EACH STATEMENT EVEN IF YOU HAVE NEVER THOUGHT ABOUT THIS SUBJECT BEFORE IN JUST THIS WAY.

The intent of this short exercise is to systematically explore what your subjective attitudes and opinions are concerning the impact of NOHIMS on your department. Your responses will remain anonymous and will be used only in the aggregate to provide a composite picture of the benefits that have accrued from NOHIMS in your department. Thank you for your cooperation and valued assistance.

SITE:

APPRAISAL OF THE PERFORMANCE OF NOHIMS

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Neutral Opinion</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
1. Worker/patient-related information is more accessible and available more quickly with NOHIMS.	_____	_____	_____	_____	_____
2. As a result of NOHIMS, I am able to do a better job.	_____	_____	_____	_____	_____
3. The performance of NOHIMS falls short of what I expected.	_____	_____	_____	_____	_____
4. I could never go back to using the old manual record system now that I have been using NOHIMS.	_____	_____	_____	_____	_____
5. NOHIMS catches more human errors than the old manual system did.	_____	_____	_____	_____	_____
6. In my opinion, NOHIMS should not have been implemented at this activity.	_____	_____	_____	_____	_____
7. I rarely have to wait for necessary worker/patient information because the NOHIMS system is down.	_____	_____	_____	_____	_____
8. In general, NOHIMS is better than the old manual system of record keeping.	_____	_____	_____	_____	_____
9. NOHIMS has some major problems that need correction.	_____	_____	_____	_____	_____
10. If there were budget cuts at this activity, I would rather see other services that I need cut before I lost NOHIMS.	_____	_____	_____	_____	_____

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Neutral Opinion</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
11. NOHIMS has "goofed" up worker/patient records more times than I care to remember.	_____	_____	_____	_____	_____
12. I truly feel that the quality of care has been improved as a result of NOHIMS.	_____	_____	_____	_____	_____
13. From an administrative point of view, NOHIMS provides timely data for making management decisions that were not available with the previous manual system.	_____	_____	_____	_____	_____
14. Scheduling and staffing patterns have been improved since the advent of NOHIMS.	_____	_____	_____	_____	_____
15. NOHIMS does not benefit me much personally.	_____	_____	_____	_____	_____
16. Worker/patient satisfaction seems to be running higher since NOHIMS was introduced.	_____	_____	_____	_____	_____
17. I can see how NOHIMS can be a boon to other users.	_____	_____	_____	_____	_____
18. With NOHIMS, I am able to get more done in a day.	_____	_____	_____	_____	_____
19. The records produced by NOHIMS are more amenable to review and better meet Navy standards.	_____	_____	_____	_____	_____
20. The confidentiality of the worker's/patient's record is more vulnerable with NOHIMS than it was with the manual system.	_____	_____	_____	_____	_____

APPENDIX H

STRUCTURED INTERVIEW FOR
HIGHER LEVEL NAVY MANAGEMENT

Person Interviewed: _____

Name of Activity: _____

Location of Activity: _____

Telephone Number: _____

Site of Interview: _____

Date of Interview: _____

Name of Interviewer: _____

The first questions we will be asking you have to do with the goals and benefits of NOHIMS and your assessment of how well the goals are being met.

STATED NAVY GOALS FOR NOHIMS/ASSESSMENT OF HOW WELL NAVY GOALS FOR NOHIMS WERE MET

1. It is my understanding that the intended Navy primary goals for NOHIMS are/were to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

_____.

2. The stated Navy goals came about in response to

administrative direction/
legal obligations/
need felt by medical staff/
need felt by medical research/
public demand/
political pressure/
organized group pressure/
worker demand/
other: _____

_____.

3. I consider NOHIMS in its present state to be meeting these Navy goals

very well/
somewhat well/
somewhat not well/
not well.

4. The specific goals that NOHIMS is not meeting very well are to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

_____.

5. The reasons that NOHIMS is not meeting the goal(s) are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____/

6. The goals that have been only partially achieved are to

meet OSHA requirements/

improve medical surveillance/

improve workplace monitoring/

provide data for epidemiologic analysis/

improve patient care/

improve coordination between departments/

provide management data/

improve access to care/

improve manpower utilization/

improve resources utilization/

provide data for legal functions/

other: _____/

7. The reasons that NOHIMS has only partially achieved these goals are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____/

PERCEIVED GOALS FOR NOHIMS/ASSESSMENT OF HOW WELL PERCEIVED GOALS FOR NOHIMS WERE MET

1. My personal goals for NOHIMS are/were to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

_____.

2. I consider NOHIMS in its present state to be meeting these goals

very well/
somewhat well/
somewhat not well/
not well.

3. The specific goals that NOHIMS is not meeting very well are to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

_____.

4. The reasons that NOHIMS is not meeting the goal(s) are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____
_____.

5. The goals that have been only partially achieved are to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

6. The reasons that NOHIMS has only partially achieved these goals are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____

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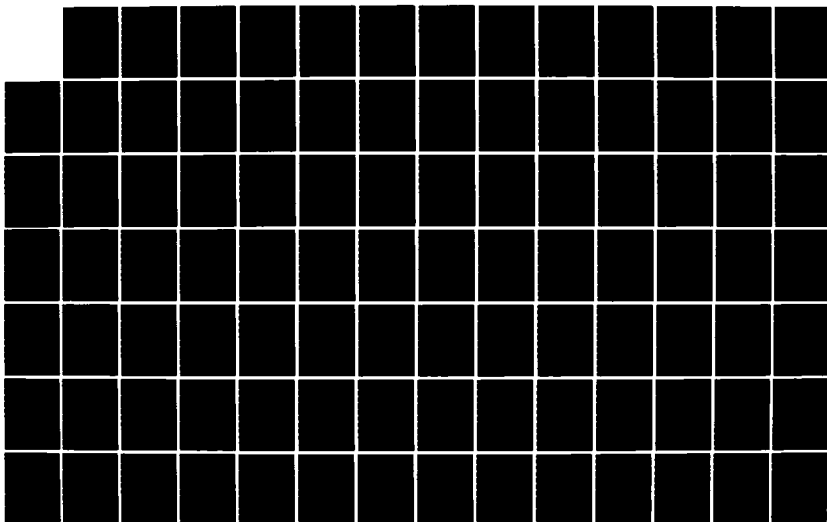
TEST AND EVALUATION MASTER PLAN (TEMP) FOR THE NAVY
OCCUPATIONAL HEALTH I. (U) R-K RESEARCH AND SYSTEM
DESIGN MALIBU CALIF 24 APR 85 N00014-84-C-0601

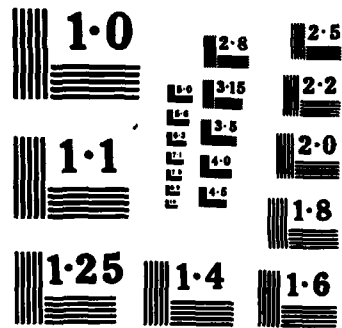
4/3

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NL





PERCEIVED BENEFITS OF NOHIMS

1. In my opinion, the benefits of NOHIMS have been

increased quality of care provided to the worker/patient through:
fewer unnecessary tests and ancillary services/
fewer unnecessary examinations/visits/
appropriateness of tests performed/
reduced waiting time/
more accurate patient medical record/
timely and perpetual access to data/
earlier diagnosis of illnesses/conditions/
earlier notification of abnormal test results/findings/
base-line data on the health of an employee/
increased compliance with monitoring programs/
reduction in occupational exposures to hazardous agents/
improved workplace monitoring/
better identification of possible hazards/
better identification of workers exposed/
safer working conditions/
improved job certification program/
increased confidence of workers/
improved communication between those concerned with
the occupational health of the worker/
increased productivity of staff/clinics/
increased efficiency in the use of resources/
savings in manpower/
reduction in the cost of providing services/
improved planning and budgeting/
more accurate administrative reports/
more accurate/available database for research efforts/
other health care benefits: _____

other monitoring benefits: _____

other administrative benefits: _____

other benefits: _____

2. Of those mentioned, the most significant benefit of NOHIMS is

3. The costs of implementing and operating NOHIMS

clearly exceed or outweigh the benefits/
somewhat exceed or outweigh the benefits/
equal the benefits/

or the benefits

somewhat exceed or outweigh the costs/
clearly exceed or outweigh the costs.

Now we would like to ask you about the suitability of NOHIMS and an assessment of some of its features.

SUITABILITY OF NOHIMS TO NAVY INFORMATION PROCESSING NEEDS

1. The features/capabilities of NOHIMS that make it especially suitable to Navy information processing needs are

the required information is collected:

personnel data/
hazardous materials characteristics/
presence of hazardous materials/
data on health of workers:
 illness and injuries/
 sick leave/absenteeism/
 routine examinations/
 test and procedure results/
 medical histories/
 mortality data/
individual exposures/exposure history/
data on accidents/incidents/
occupational histories/
other: _____/

data can be retrieved in the required formats:

tables of hazardous materials/
lists of workers with exposures/
lists of workers requiring physical examinations/
medical encounter reports/
medical summary reports/
management reports/
other: _____/

data can be manipulated in required ways:

number of surveys conducted/
number of individuals exposed to hazard/
number of examinations conducted/
number of laboratory tests done/
number of radiographs done/
number of asbestos examinations conducted/
list of those with ordered but unresulted tests/
other: _____/

other: _____.

2. My assessment of the suitability of NOHIMS to Navy information collection needs is that NOHIMS is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

3. My assessment of the suitability of NOHIMS to Navy information retrieval needs is that NOHIMS is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

4. My assessment of the suitability of NOHIMS to Navy information manipulation needs is that NOHIMS is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

5. Areas in which NOHIMS could be changed to make it more suitable to Navy information processing needs include

collect additional information

Specify: _____/

improve/create new retrieval capabilities

Specify: _____/

improve/create new manipulation capabilities

Specify: _____/

other: _____/

6. Overall, my assessment of the adequacy of NOHIMS for Navy information processing needs is that NOHIMS is

very adequate/
adequate/
somewhat adequate/
somewhat inadequate/
inadequate/
very inadequate.

The next two sections deal with the applicability and transferability of NOHIMS to other Navy industrial sites.

APPLICABILITY OF NOHIMS TO OTHER NAVY INDUSTRIAL SITES

1. How do the information processing needs of the other Navy industrial sites that will be receiving NOHIMS differ from the information processing needs of the test sites? Are the two test sites representative of the other sites?
no difference/
different data collection requirements
Specify: _____/
different reporting requirements
Specify: _____/
other difference(s)
Specify: _____
2. Can NOHIMS be adapted to a variety of Navy industrial settings and sites such as air rework facilities, shipyards, and public works centers? Are there aspects of NOHIMS that would make it unsuitable for any of these various environments?
3. Is NOHIMS applicable to Navy industrial settings of varying sizes? What limitations/requirements does NOHIMS have that relate to the size of the application environment?
4. What organizational changes are required at a new site in order for NOHIMS to perform successfully? For example, what changes to normal operating methods and procedures are required? What changes in terminology? Will this present problems at other Navy industrial sites?
5. What changes in the patterns of information exchange and communication will NOHIMS cause at a new site? Will this present problems at other Navy industrial sites?

ASSESSMENT OF TRANSFERABILITY OF NOHIMS TO OTHER NAVY INDUSTRIAL SITES

1. My assessment of the suitability of NOHIMS to the information processing needs of other Navy industrial sites is that NOHIMS is
very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.
2. My opinion of the flexibility and adaptability of NOHIMS is that NOHIMS is
adequately flexible and adaptable/
somewhat adequately flexible and adaptable/
somewhat inadequately flexible and adaptable/
inadequately flexible and adaptable/
to be transferred to other Navy industrial sites.
3. Areas in which NOHIMS needs to be more flexible and adaptable include:
4. My assessment of the ease of transfer of NOHIMS to other Navy industrial sites is that the process will be
difficult/
somewhat difficult/
somewhat easy/
easy.
5. The specific problems I foresee in transferring NOHIMS to other Navy industrial sites are that
6. It is my opinion that the acceptability of NOHIMS among users at other Navy industrial sites will be
very high/
high/
somewhat high/
somewhat low/
low/
very low.

The next questions ask you to assess the adequacy of the security features of NOHIMS.

ADEQUACY OF SECURITY FEATURES

1. In my opinion, the sign on/off security procedures are
very adequate/
somewhat adequate/
somewhat inadequate/
very inadequate/
to prevent unauthorized persons from accessing NOHIMS.
2. In my opinion, the various security levels (by device, by user classification, through passwords for specific options) are
very adequate/
somewhat adequate/
somewhat inadequate/
very inadequate/
to prevent persons from accessing areas of NOHIMS for which they are not authorized.
3. In my opinion, the confidentiality warnings on input and output documents are
very adequate/
somewhat adequate/
somewhat inadequate/
very inadequate/
to maintain the confidentiality of patient/worker data.
- ~~4. The security protection features provided by NOHIMS are~~
~~fully utilized/~~
~~loosely utilized/~~
~~ignored/~~
~~bypassed.~~
5. In general, the security protection provided by NOHIMS is
insufficient/
somewhat insufficient/
somewhat sufficient/
sufficient.
6. If insufficient or somewhat insufficient, the areas of protection which are lacking include:
7. In general, the security protection provided by NOHIMS is
unnecessary/
somewhat unnecessary/
somewhat necessary/
necessary.

8. If unnecessary or somewhat unnecessary, the areas which should be removed or changed include:

The next questions are about the administrative uses and usefulness of NOHIMS.

USES IN ADMINISTRATIVE FUNCTIONS/ASSESSMENT OF USEFULNESS OF NOHIMS IN ADMINISTRATIVE FUNCTIONS

1. The administrative functions that I see NOHIMS being useful for include
determining environmental differential pay decisions/
increasing standardization of reports/
increasing standardization of data collection forms/
reducing paperwork/
generating administrative reports/
providing timely and perpetual access to administrative data/
manpower/resource planning/
time and motion studies/
maintaining equipment lists/
managing inspection requirements/
other: _____.
2. The kinds of data required for these functions include
hazard exposures/
service utilization data/
manpower/resource utilization data/
other: _____.
3. The features/capabilities of NOHIMS that will be useful in administrative functions include
standard report generation capabilities/
on-line look-up/interactive query functions/
ad hoc report generation capabilities/
other: _____.
4. My assessment of how NOHIMS has affected the amount of required paperwork is that NOHIMS has
greatly increased the amount of paperwork/
somewhat increased the amount of paperwork/
no effect/
somewhat decreased the amount of paperwork/
greatly decreased the amount of paperwork.
5. It is my opinion that in terms of standardizing reports and forms NOHIMS has had
a beneficial effect/
a somewhat beneficial effect/
no effect/
a somewhat detrimental effect/
a detrimental effect.
6. My assessment of the usefulness of having timely and perpetual access to administrative data with NOHIMS is that it is
useful/
somewhat useful/
somewhat not useful/
not useful.

APPENDIX I

STRUCTURED INTERVIEW FOR
NEHC PROJECT MANAGEMENT TEAM

Person Interviewed: _____

Name of Activity: _____

Location of Activity: _____

Telephone Number: _____

Site of Interview: _____

Date of Interview: _____

Name of Interviewer: _____

STATED NAVY GOALS FOR NOHIMS/ASSESSMENT OF HOW WELL NAVY GOALS FOR NOHIMS
WERE MET

1. It is my understanding that the intended Navy primary goals for NOHIMS are/were to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

_____.

2. The stated Navy goals came about in response to

administrative direction/
legal obligations/
need felt by medical staff/
need felt by medical research/
public demand/
political pressure/
organized group pressure/
worker demand/
other: _____

_____.

3. I consider NOHIMS in its present state to be meeting these Navy goals

very well/
somewhat well/
somewhat not well/
not well.

4. The specific goals that NOHIMS is not meeting very well are to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

_____.

5. The reasons that NOHIMS is not meeting the goal(s) are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____/

6. The goals that have been only partially achieved are to

meet OSHA requirements/

improve medical surveillance/

improve workplace monitoring/

provide data for epidemiologic analysis/

improve patient care/

improve coordination between departments/

provide management data/

improve access to care/

improve manpower utilization/

improve resources utilization/

provide data for legal functions/

other: _____/

7. The reasons that NOHIMS has only partially achieved these goals are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____/

PERCEIVED GOALS FOR NOHIMS/ASSESSMENT OF HOW WELL PERCEIVED GOALS FOR NOHIMS WERE MET

1. My personal goals for NOHIMS are/were to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

_____.

2. I consider NOHIMS in its present state to be meeting these goals

very well/
somewhat well/
somewhat not well/
not well.

3. The specific goals that NOHIMS is not meeting very well are to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

_____.

4. The reasons that NOHIMS is not meeting the goal(s) are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____
_____.

5. The goals that have been only partially achieved are to

meet OSHA requirements/
improve medical surveillance/
improve workplace monitoring/
provide data for epidemiologic analysis/
improve patient care/
improve coordination between departments/
provide management data/
improve access to care/
improve manpower utilization/
improve resources utilization/
provide data for legal functions/
other: _____

6. The reasons that NOHIMS has only partially achieved these goals are

NOHIMS lacks essential function(s)

Specify: _____/

feature(s) are not implemented

Specify: _____/

feature(s) are not implemented well

Specify: _____/

other: _____

MEDICAL MONITORING AND CARE GOALS/ASSESSMENT OF HOW WELL MEDICAL MONITORING AND CARE GOALS ARE BEING MET

1. It is my understanding that the specific goals for NOHIMS in the area of medical monitoring and care are/were to improve

quality of care:

patient management:

- diagnostic tests/
- database acquisition/
- treatment planning/
- problem identification/
- feedback to physician regarding achievement of desired outcomes/
- patient compliance with physician orders because of comprehensiveness/continuity of care/
- quality of care review procedures/
- research information collection/
- training activities/
- record accuracy/
- earlier diagnosis of abnormal conditions/
- earlier notification of patient abnormalities/
- communication/
- automated medical testing/

access to care:

- patient follow-up/
- appointment scheduling/
- record contents/
- record availability/
- visit registration/
- medical reports/

resource utilization:

health manpower utilization/availability:

- medical - technical personnel/
- clerical personnel/
- use of paramedical personnel/
- all personnel/

patient services:

- fewer unnecessary visits/
- fewer redundant laboratory tests/
- better referral/

management aspects of health care:

improve management and operations of the facility by:

- provision of management with information and analytical tools for:

- utilization review procedures/
- manpower scheduling/
- budgeting and planning/
- long-range manpower planning/
- long-range facility planning/
- regional/Navy-wide health planning/
- administrative reports/

(Continued)

compliance with monitoring programs/Navy set standards of care:
periodic physical examinations/
protective equipment/
asbestos surveillance program.

2. I consider NOHIMS in its present state to be meeting these medical monitoring and care goals

very well/
somewhat well/
somewhat not well/
not well.

3. The specific goals NOHIMS is not meeting very well are

improvement in the quality of care/
improvement in access to care/
improvement in resource utilization/
improvement in management and operations/
improvement in compliance with monitoring programs/
other: _____.

4. The reasons that NOHIMS is not meeting these goal(s) are

NOHIMS lacks essential function(s)
Specify: _____/
feature(s) are not implemented
Specify: _____/
feature(s) are not implemented well
Specify: _____/
other: _____.

5. The goals that have been only partially achieved are

improvement in quality of care/
improvement in access to care/
improvement in resource utilization/
improvement in management and operations/
improvement in compliance and monitoring programs/
other: _____.

6. The reasons that NOHIMS has only partially achieved these goal(s) are

NOHIMS lacks essential function(s)
Specify: _____/
feature(s) are not implemented
Specify: _____/
feature(s) are not implemented well
Specify: _____/
other: _____.

7. The effect of NOHIMS has been to

increase/maintain/decrease
the quality of care.

8. The effect of NOHIMS has been to
increase/maintain/decrease
the access to care.
9. The effect of NOHIMS has been to
increase/maintain/decrease
resource utilization.
10. The effect of NOHIMS has been to
increase/maintain/decrease
compliance with monitoring programs.
11. The effects of NOHIMS generally have been because of
increased patient care services provided/
more appropriate services provided/
improved follow-up of patients with abnormal
findings or tests/
improved communication between departments/
increased availability of the medical record/
more accurate medical records/
availability of patient-specific summary reports/
availability of on-line look-up of patient-specific data/
availability of user-defined reports/
improved manpower scheduling/
improved patient compliance/
improved quality of care review procedures/
earlier diagnosis and notification of problems/
improved appointment scheduling/
other: _____
- ~~12. Since NOHIMS was implemented, communication between industrial
hygienists and medical personnel has~~
~~improved/~~
~~been maintained/~~
~~deteriorated.~~
- ~~13. If communication has changed, this is generally because of~~
~~availability of reports generated by NOHIMS/~~
~~less need for direct communication/~~
~~more accurate or complete data/~~
~~other: _____~~
- ~~14. (Industrial users only) Since NOHIMS was implemented, communication
between industrial hygienists/safety specialists and work center
supervisors has~~
~~improved/~~
~~been maintained/~~
~~deteriorated.~~

~~15. (Industrial users only) If communication has changed, this is generally because of~~

~~availability of reports generated by NOHIMS/
less need for direct communication/
more accurate or complete data/
other: _____.~~

16. The effect of the availability of an accurate medical record on the quality of patient care has been

very beneficial/
somewhat beneficial/
no effect/
somewhat detrimental/
very detrimental.

17. The effect of the availability of an individual's exposure history at the time of the physical examination has been

very beneficial/
somewhat beneficial/
no effect/
somewhat detrimental/
very detrimental.

18. The effects of NOHIMS on medical monitoring and care have been evaluated through measurements which are

subjective judgment

Specify who: _____/

counting/

objective measures such as surveys and questionnaires/

other: _____/

no measurements done.

19. Evaluation measurement methods used include

examination of the medical record for accuracy and completeness/

examination of the medical record for appropriateness/

checking of the diagnostic test pattern/

assessment of patients' response to treatment/

assessment of patient compliance/

assessment of quality of care review/

evaluation of research contributions/

evaluation of missed appointments/

evaluation of timeliness of physical examinations/

evaluation of availability of medical record/

evaluation of manpower utilization/

evaluation of time taken for specific tasks/

checking appropriateness of laboratory tests done/

checking adequacy of protective equipment issued/

checking adequacy of follow-up on abnormal findings or tests/

other: _____.

20. Results of measurements conducted are

(NOTE: Questions on usefulness of reports are found in Component 7,
"USE AND USEFULNESS OF INFORMATION RETRIEVAL CAPABILITIES.")

PERCEIVED BENEFITS OF NOHIMS

1. In my opinion, the benefits of NOHIMS have been

increased quality of care provided to the worker/patient through:
fewer unnecessary tests and ancillary services/
fewer unnecessary examinations/visits/
appropriateness of tests performed/
reduced waiting time/
more accurate patient medical record/
timely and perpetual access to data/
earlier diagnosis of illnesses/conditions/
earlier notification of abnormal test results/findings/
base-line data on the health of an employee/
increased compliance with monitoring programs/
reduction in occupational exposures to hazardous agents/
improved workplace monitoring/
better identification of possible hazards/
better identification of workers exposed/
safer working conditions/
improved job certification program/
increased confidence of workers/
improved communication between those concerned with
the occupational health of the worker/
increased productivity of staff/clinics/
increased efficiency in the use of resources/
savings in manpower/
reduction in the cost of providing services/
improved planning and budgeting/
more accurate administrative reports/
more accurate/available database for research efforts/
other health care benefits: _____

other monitoring benefits: _____

other administrative benefits: _____

other benefits: _____

2. Of those mentioned, the most significant benefit of NOHIMS is

3. The costs of implementing and operating NOHIMS

clearly exceed or outweigh the benefits/
somewhat exceed or outweigh the benefits/
equal the benefits/

or the benefits

somewhat exceed or outweigh the costs/
clearly exceed or outweigh the costs.

SUITABILITY OF NOHIMS TO NAVY INFORMATION PROCESSING NEEDS

1. The features/capabilities of NOHIMS that make it especially suitable to Navy information processing needs are

the required information is collected:

personnel data/
hazardous materials characteristics/
presence of hazardous materials/
data on health of workers:
 illness and injuries/
 sick leave/absenteeism/
 routine examinations/
 test and procedure results/
 medical histories/
 mortality data/
individual exposures/exposure history/
data on accidents/incidents/
occupational histories/
other: _____/

data can be retrieved in the required formats:

tables of hazardous materials/
lists of workers with exposures/
lists of workers requiring physical examinations/
medical encounter reports/
medical summary reports/
management reports/
other: _____/

data can be manipulated in required ways:

number of surveys conducted/
number of individuals exposed to hazard/
number of examinations conducted/
number of laboratory tests done/
number of radiographs done/
number of asbestos examinations conducted/
list of those with ordered but unresulted tests/
other: _____/

other: _____.

2. My assessment of the suitability of NOHIMS to Navy information collection needs is that NOHIMS is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

3. My assessment of the suitability of NOHIMS to Navy information retrieval needs is that NOHIMS is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

4. My assessment of the suitability of NOHIMS to Navy information manipulation needs is that NOHIMS is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

5. Areas in which NOHIMS could be changed to make it more suitable to Navy information processing needs include

collect additional information

Specify: _____/

improve/create new retrieval capabilities

Specify: _____/

improve/create new manipulation capabilities

Specify: _____/

other: _____

6. Overall, my assessment of the adequacy of NOHIMS for Navy information processing needs is that NOHIMS is

very adequate/
adequate/
somewhat adequate/
somewhat inadequate/
inadequate/
very inadequate.

APPLICABILITY OF NOHIMS TO OTHER NAVY INDUSTRIAL SITES

1. How do the information processing needs of the other Navy industrial sites that will be receiving NOHIMS differ from the information processing needs of the test sites? Are the two test sites representative of the other sites?

no difference/

different data collection requirements

Specify: _____/

different reporting requirements

Specify: _____/

other difference(s)

Specify: _____

2. Can NOHIMS be adapted to a variety of Navy industrial settings and sites such as air rework facilities, shipyards, and public works centers? Are there aspects of NOHIMS that would make it unsuitable for any of these various environments?

3. Is NOHIMS applicable to Navy industrial settings of varying sizes? What limitations/requirements does NOHIMS have that relate to the size of the application environment?

4. What organizational changes are required at a new site in order for NOHIMS to perform successfully? For example, what changes to normal operating methods and procedures are required? What changes in terminology? Will this present problems at other Navy industrial sites?

5. What changes in the patterns of information exchange and communication will NOHIMS cause at a new site? Will this present problems at other Navy industrial sites?

ASSESSMENT OF TRANSFERABILITY OF NOHIMS TO OTHER NAVY INDUSTRIAL SITES

1. My assessment of the suitability of NOHIMS to the information processing needs of other Navy industrial sites is that NOHIMS is
very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.
2. My opinion of the flexibility and adaptability of NOHIMS is that NOHIMS is
adequately flexible and adaptable/
somewhat adequately flexible and adaptable/
somewhat inadequately flexible and adaptable/
inadequately flexible and adaptable/
to be transferred to other Navy industrial sites.
3. Areas in which NOHIMS needs to be more flexible and adaptable include:
4. My assessment of the ease of transfer of NOHIMS to other Navy industrial sites is that the process will be
difficult/
somewhat difficult/
somewhat easy/
easy.
5. The specific problems I foresee in transferring NOHIMS to other Navy industrial sites are that
6. It is my opinion that the acceptability of NOHIMS among users at other Navy industrial sites will be
very high/
high/
somewhat high/
somewhat low/
low/
very low.

ADEQUACY OF SECURITY FEATURES

1. In my opinion, the sign on/off security procedures are
very adequate/
somewhat adequate/
somewhat inadequate/
very inadequate/
to prevent unauthorized persons from accessing NOHIMS.
2. In my opinion, the various security levels (by device, by user classification, through passwords for specific options) are
very adequate/
somewhat adequate/
somewhat inadequate/
very inadequate/
to prevent persons from accessing areas of NOHIMS for which they are not authorized.
3. In my opinion, the confidentiality warnings on input and output documents are
very adequate/
somewhat adequate/
somewhat inadequate/
very inadequate/
to maintain the confidentiality of patient/worker data.
4. The security protection features provided by NOHIMS are
fully utilized/
loosely utilized/
ignored/
bypassed.
5. In general, the security protection provided by NOHIMS is
insufficient/
somewhat insufficient/
somewhat sufficient/
sufficient.
6. If insufficient or somewhat insufficient, the areas of protection which are lacking include:
7. In general, the security protection provided by NOHIMS is
unnecessary/
somewhat unnecessary/
somewhat necessary/
necessary.

8. If unnecessary or somewhat unnecessary, the areas which should be removed or changed include:

SUITABILITY OF GOVERNMENT-OWNED OCCUPATIONAL HEALTH INFORMATION SYSTEMS TO
NAVY NEEDS

1. What government-owned occupational health information systems exist?
What is their current development status?

Department of Transportation---Voluntary Employee Injury/
Illness Reporting System (VEIIRS)/
Coast Guard---acquired contract services to study problem/
Environmental Protection Agency---Injury Reporting and
Information System (IRIS)/
U.S. Army---has initiated system development efforts/
U.S. Air Force---Computerized Occupational Health Program
currently awaiting development funds/
Other: _____.

2. For each system, check off the features/capabilities required by Navy
information processing needs that the government-owned systems have.

	DOT VEIIRS	Coast Guard	EPA IRIS	U.S. Army	U.S. Air Force
Required information is collected:					
personnel data					
hazardous materials characteristics					
presence of hazardous materials					
data on health of workers:					
illness and injuries					
sick leave/absenteeism					
routine examinations					
test results					
procedures					
medical histories					
mortality data					
individual exposures/ exposure history					
data on accidents/incidents					
occupational histories					
other					

	DOT VEIIRS	Coast Guard	EPA IRIS	U.S. Army	U.S. Air Force
Data can be retrieved in required formats:					
tables of hazardous materials					
lists of workers with exposures					
lists of workers requiring physical examinations					
medical encounter reports					
medical summary reports					
management reports					
other					
Data can be manipulated in required ways:					
number of surveys conducted					
number of persons exposed to hazard					
number of examinations conducted					
number of laboratory tests done					
number of radiographs done					
number of asbestos examinations conducted					
list of those with ordered but unresulted tests					
other					
Other					
Not familiar with system					

3. My assessment of the suitability of each of the government-owned systems to Navy information collection needs is that they are

	DOT VEIIRS	Coast Guard	EPA IRIS	U.S. Army	U.S. Air Force
Very suitable					
Somewhat suitable					
Somewhat unsuitable					
Very unsuitable					

4. My assessment of the suitability of each of the government-owned systems to Navy information retrieval needs is that they are

	DOT VEIIRS	Coast Guard	EPA IRIS	U.S. Army	U.S. Air Force
Very suitable					
Somewhat suitable					
Somewhat unsuitable					
Very unsuitable					

5. My assessment of the suitability of each of the government-owned systems to Navy information manipulation needs is that they are

	DOT VEIIRS	Coast Guard	EPA IRIS	U.S. Army	U.S. Air Force
Very suitable					
Somewhat suitable					
Somewhat unsuitable					
Very unsuitable					

6. Overall, my assessment of the adequacy of each of the government-owned systems to Navy information processing needs is that they are

	DOT VEIIRS	Coast Guard	EPA IRIS	U.S. Army	U.S. Air Force
Very adequate					
Adequate					
Somewhat adequate					
Somewhat inadequate					
Inadequate					
Very inadequate					

**SUITABILITY OF COMMERCIALLY AVAILABLE OCCUPATIONAL HEALTH INFORMATION SYSTEMS
TO NAVY NEEDS**

1. What commercial occupational health information systems are available?

Computerized Occupational Health and Environmental
Surveillance System (COHESS)/

FLOW GEMINI [Flow General's Medical Information
Needs for Industry] (FG)/

DEHealth (DEC)/

Other: _____

Other: _____

2. For each system, check off the features/capabilities required by Navy information processing needs that the commercial systems have.

	COHESS	FG	DEC	Other	Other
Required information is collected:					
personnel data					
hazardous materials characteristics					
presence of hazardous materials					
data on health of workers:					
illness and injuries					
sick leave/absenteeism					
routine examinations					
test results					
procedures					
medical histories					
mortality data					
individual exposures/ exposure history					
data on accidents/incidents					
occupational histories					
other					

	COHESS	FG	DEC	Other	Other
Data can be retrieved in required formats:					
tables of hazardous materials					
lists of workers with exposures					
lists of workers requiring physical examinations					
medical encounter reports					
medical summary reports					
management reports					
other					
Data can be manipulated in required ways:					
number of surveys conducted					
number of persons exposed to hazard					
number of examinations conducted					
number of laboratory tests done					
number of radiographs done					
number of asbestos examinations conducted					
list of those with ordered but unresulted tests					
other					
Other					
Not familiar with system					

3. My assessment of the suitability of each of the commercial systems to Navy information collection needs is that they are

	COHESS	FG	DEC	Other	Other
Very suitable					
Somewhat suitable					
Somewhat unsuitable					
Very unsuitable					

4. My assessment of the suitability of each of the commercial systems to Navy information retrieval needs is that they are

	COHESS	FG	DEC	Other	Other
Very suitable					
Somewhat suitable					
Somewhat unsuitable					
Very unsuitable					

5. My assessment of the suitability of each of the commercial systems to Navy information manipulation needs is that they are

	COHESS	FG	DEC	Other	Other
Very suitable					
Somewhat suitable					
Somewhat unsuitable					
Very unsuitable					

6. Overall, my assessment of the adequacy of each of the commercial systems to Navy information processing needs is that they are

	COHESS	FG	DEC	Other	Other
Very adequate					
Adequate					
Somewhat adequate					
Somewhat inadequate					
Inadequate					
Very inadequate					

SUITABILITY OF NAVY INTERIM OCCUPATIONAL HEALTH INFORMATION SYSTEM TO NAVY NEEDS

1. My assessment of the suitability of the Navy interim system to Navy information collection needs is that it is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

2. My assessment of the suitability of the Navy interim system to Navy information retrieval needs is that it is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

3. My assessment of the suitability of the Navy interim system to Navy information manipulation needs is that it is

very suitable/
somewhat suitable/
somewhat unsuitable/
very unsuitable.

4. Overall, my assessment of the adequacy of the Navy interim system to Navy information processing needs is that it is

very adequate/
adequate/
somewhat adequate/
somewhat inadequate/
inadequate/
very inadequate.

☐ Not familiar with interim system.

APPENDIX J

STRUCTURED INTERVIEW FOR
NAVY LEGAL COUNSEL

Person Interviewed: _____

Name of Activity: _____

Location of Activity: _____

Telephone Number: _____

Site of Interview: _____

Date of Interview: _____

Name of Interviewer: _____

INFORMATION REQUIRED FOR NAVY LEGAL PURPOSES

1. The legal purposes for which data stored in NOHIMS could be used are

workers' compensation determinations/
tort claims actions/
Veterans Administration disability procedures/
Navy medical boards/
other: _____.

2. The types of data required for the above legal purposes are

protection used/
hazardous exposures/
physical examination data/
job histories/
medical histories/
illness and injury data/
mortality data/
demographic data/
other: _____.

3. Specific data elements required are

4. To be useful in Navy litigations, the data stored in NOHIMS must be supported by

the industrial hygiene survey stored in _____/
the paper medical record stored in the patient's chart/
elsewhere/
the medical data entry document stored in the patient's
chart/elsewhere/
both the paper medical record and the data entry document
stored in the patient's chart/elsewhere/
a physician's signature on the paper medical record/
computer-generated report/data entry document/
an industrial hygienist's signature on the industrial
hygiene survey/computer-generated report/
procedures of the ordinary course of business/
other: _____.

5. To be useful in Navy litigations, the data stored in NOHIMS must be formatted

in any manner/

other: _____/

other: _____.

6. The kinds of information about NOHIMS that are required to prove the legal foundation of NOHIMS include

description of computer hardware/physical plant/

description of data entry procedures/

description of software:

features that assure input accuracy/

features that protect the integrity of the database/

security features/

other: _____/

other: _____.

7. The accuracy of the medical record must be verified by

dual entry/

review of data entered/

batch verification/

internal check digits/controls/

not required/

other: _____.

8. Describe any additional requirements.

ASSESSMENT OF HOW WELL NOHIMS MEETS NAVY LEGAL NEEDS

1. What obligations does the Navy have to respond to discovery requests and subpoenas for NOHIMS-generated data? Is it more likely that the paper medical record will be requested or subpoenaed?

2. a. Could NOHIMS standard operating procedures be construed as meeting the requirements that records admissible as evidence in legal proceedings be made in the ordinary course of business?

b. If not, why not?

3. a. Are there adequate witnesses who can provide legal foundation for computer-stored records (i.e., witnesses with relevant educational and occupational background who can testify to the type of computer used, the physical plant, procedures used, software integrity, and security features)?

b. Who, specifically, could currently provide this function?

c. Would their testimony on the characteristics of NOHIMS be adequate to prove legal foundation?

4. Would a sampling of the NOHIMS database be accepted as representative of the entire database?

5. What is your assessment of the effect of NOHIMS on the number of Navy legal claims, if any, and why?

decrease, because of reduction in errors/improved patient care/improved compliance with Navy/OSHA standards/
proof of compliance with Navy/OSHA standards/

other: _____/

increase, because of easier access to records/proof of non-compliance with Navy/OSHA standards/highlighting of errors/

other: _____/

no effect/

no opinion/cannot say

6. What is your overall assessment of the adequacy of NOHIMS for use as a legal database?

very adequate/
adequate/
somewhat adequate/
somewhat inadequate/
inadequate/
very inadequate

APPROPRIATE SCENARIOS FOR TESTING OF LEGAL INTERROGATORIES

3. What specific time frame is usually required for obtaining data for these typical cases?

PERCEIVED BENEFITS OF NOHIMS

1. In my opinion, the benefits of NOHIMS have been

increased quality of care provided to the worker/patient through:
fewer unnecessary tests and ancillary services/
fewer unnecessary examinations/visits/
appropriateness of tests performed/
reduced waiting time/
more accurate patient medical record/
timely and perpetual access to data/
earlier diagnosis of illnesses/conditions/
earlier notification of abnormal test results/findings/
base-line data on the health of an employee/
increased compliance with monitoring programs/
reduction in occupational exposures to hazardous agents/
improved workplace monitoring/
better identification of possible hazards/
better identification of workers exposed/
safer working conditions/
improved job certification program/
increased confidence of workers/
improved communication between those concerned with
the occupational health of the worker/
increased productivity of staff/clinics/
increased efficiency in the use of resources/
savings in manpower/
reduction in the cost of providing services/
improved planning and budgeting/
more accurate administrative reports/
more accurate/available database for research efforts/
other health care benefits: _____

other monitoring benefits: _____

other administrative benefits: _____

other benefits: _____

2. Of those mentioned, the most significant benefit of NOHIMS is

3. The costs of implementing and operating NOHIMS

clearly exceed or outweigh the benefits/
somewhat exceed or outweigh the benefits/
equal the benefits/

or the benefits

somewhat exceed or outweigh the costs/
clearly exceed or outweigh the costs.

APPENDIX K

STRUCTURED INTERVIEW FOR
NHRC/BREMERTON ADP PERSONNEL

Person Interviewed: _____

Name of Activity: _____

Location of Activity: _____

Telephone Number: _____

Site of Interview: _____

Date of Interview: _____

Name of Interviewer: _____

CURRENT HARDWARE CONFIGURATION ~~AND MINIMUM REQUIREMENTS FOR HARDWARE~~

Current Hardware Configuration

1. The processing capability is provided through the following computer(s)

No.	Manufacturer	Model	Size	Year Installed
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

2. The computing services are provided through a
 vendor: _____
 associated organization: _____
 in-house.

3. The equipment is rented/leased/purchased.
 4. Maintenance is by vendor/in-house.
 5. Approximately ____% of the processing capability is used for NOHIMS.
 6. Approximately ____(% or actual) of the file capability is used for NOHIMS.

	No.	Type	Model
7a. The files are stored on	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
b. Communication equipment includes	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
c. Other important equipment is	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
d. Archival storage is	_____	_____	_____
	_____	_____	_____
	_____	_____	_____

- ~~8. Hardcopy terminals are~~

No.	Type	Char./line	U/L case	Speed	Mechanism	Reliability
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____

9. Softcopy terminals are

No.	Type	Screen	Char./ line	U/L case	Speed	Lines/ screen	Relia- bility	Character resolution
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____

10. Currently production occupies _____% of the machine,
and development _____%.

11. Of the production load

_____ % is data entry,
_____ % is file maintenance,
_____ % is data analysis, and
_____ % is report preparation.

12. The operating system was designed and written
for this application and/or institution/
for general medical purposes/
for general commercial purposes.

13. It is now being

further developed/maintained/understood/ignored
by the local staff/
further developed/maintained/ignored
by the original supplier.

Minimum Hardware Requirements

14. The minimum hardware configuration that could support NOHIMS is

Processor: _____

Terminals: _____

File Storage: _____

Communications Equipment: _____

HARDWARE SUPPORT REQUIREMENTS

1. What and how many support personnel are required to maintain the NOHIMS hardware?

_____ ADP personnel:
_____ managers/
_____ operators/
_____ programmers/
_____ system analysts/
_____ outside consultants/
_____ vendors

2. What functions must be performed by the support personnel?

periodic maintenance/
system back-ups/
repack disks/
repairs

3. What is the estimated amount of support manhours required per month to maintain the system?

AVAILABLE SYSTEM SUPPORT

~~1. What kind of system support is available for initial training of NOHIMS users?~~

~~NOHIMS training module/
outside consultants/
on-site trainers/
off-site trainers/
system managers/
audio-visual packages/
outside training seminars/
users groups/
other: _____~~

~~2. What kind of system support is available for ongoing and update training of NOHIMS users?~~

~~NOHIMS training module/
outside consultants/
on-site trainers/system managers/
off-site trainers/
audio-visual packages/
outside training seminars/
users groups/
other: _____~~

3. What kind of system support is available for the NOHIMS hardware?

outside consultants/
in-house consultants/programmers/analysts/
technical "hotline" to _____/
on-site support/system managers/other _____/
outside training seminars/
users groups/
other: _____

~~4. What kind of system support is available for the NOHIMS software?~~

~~NOHIMS system maintenance module/
outside consultants/
in-house consultants/programmers/analysts/
technical "hotline" to _____/
on-site support/system managers/other _____/
outside training seminars/
users groups/
other: _____~~

5. What kind of documentation and job aids are there that support system operation?

documentation for data entry

Specify: _____/

documentation for data retrieval

Specify: _____/

documentation for system maintenance

Specify: _____/

job aids that support documentation

Specify: _____/

other: _____

SYSTEM SCENARIOS TO MAINTAIN THE SYSTEM

1. What prime time system maintenance functions must be performed during the day on a daily basis?

be certain that Monitor is running in the
background before entering data/
review error logs/
investigate common or new errors/
other: _____

2. What system maintenance functions must be performed during the off-shift on a regular basis? How often must these tasks be performed?

system back-ups on a daily/weekly/monthly basis/
recreate alphabetic directory on a daily/weekly/
monthly/as needed basis/
other: _____

3. How often must patient files be archived to tape?

monthly/
quarterly/
annually/
as needed

APPENDIX L - STATED NAVY GOALS AND OBJECTIVES

1. Identify the stated Navy goals.

Coordinate occupational safety and health programs
with current OSHA requirements and DoD directives
Provide a comprehensive workplace monitoring and personnel
medical surveillance program

Other: _____

_____.

2. Identify the stated Navy objectives to achieve these goals.

Generate a table of potentially hazardous materials used,
handled, stored, or produced in the workplace
Periodically survey the workplace for the presence of
hazardous materials and measure their concentration
Determine an employee's fitness to begin or continue to
perform a job safely and effectively
Provide base-line data on the health of an employee against
which the possible effects of occupational exposures
can be measured
Identify individuals exposed to hazards in the workplace
Insure that potentially exposed individuals are examined
periodically
Provide medical personnel with exposure history and a list
of recommended tests and procedures
Store and retrieve medical and environmental data
Generate management reports
Compile standardized information for epidemiologic analysis
Improve patient care
Increase communication between industrial hygienists and
medical personnel
Increase communication between hygienists and work center
supervisors
Provide accurate medical information on individuals for use
in legal functions

Other: _____
_____.

POTENTIAL SOURCES:

OPNAVINST 5100.23B
NOHIMS MENS
NOHIMS Systems Decision Paper
Files of NHRC system developers
Conference proceedings

APPENDIX M - SYSTEM DESCRIPTION AND DESIGN FEATURES

1. Overall organization of NOHIMS.

- Components
- Computer programming structure
- Language used
- System conventions

2. Description of modules of the industrial component.

Agency module	}	Function of the module
Personnel module		Suboptions
Environmental module		Who uses the module
Survey module		
Hazard module		
Maintenance module		
Interactive query function		

3. Description of modules of the medical component.

Background of COSTAR	}	
Description of primary modules		
Registration module		Function of the module
Enter Medical Data module		Suboptions
Display Medical Data module		Who uses the module
Print Medical Data module		
Report Generator		
System Maintenance		
Mailbox		
Occupational Health Information		

4. Identify software quality attributes.

- Usability
- Error recovery procedures
- Efficiency of source program code
- Portability and independence of hardware
- Maintainability

5. Identify operational characteristics.

- Presentation to users
- Menus
- User on-line assistance functions
 - ? and ↑L functions
- Error diagnostics features
 - Error messages
 - Error logs
- Debugging aids
- Database manager utilities
- Data manipulation tasks
 - Average time per entry form
 - Add, save, change, and delete procedures
 - Search in context
 - General filing procedures
 - Downloading to magnetic tape

6. Identify information retrieval capabilities.

- Standard form report procedures
 - Industrial Hygiene Survey Report
 - Report of Individual Exposures
 - Patient Data Sheet
 - Medical certification report
 - Monthly Compliance Report
 - Navy Management Reports
 - Report of Occupational Health Services
 - Medical Services and Outpatient Morbidity Report
 - Medical Encounter Report
 - Flowcharts
- Ad hoc information retrieval procedures
 - Industrial query procedures
 - Interactive flowchart procedures
 - Patient Summary procedures
 - User-defined list and tabulation reports
- Ad hoc information retrieval capabilities
 - Graphics capabilities
 - Word processing functions

7. Identify security features.

- Security levels
 - Device restrictions
 - Password protection of options
 - Job classification restrictions on options
 - Restrictions on access between components
 - Confidentiality warnings on data collection forms
 - Confidentiality warnings on printed reports
 - Restrictions for specific files
 - Identification cards/badges
 - Physical restrictions (closed/locked doors)
 - Violations of security are reported by the system
- Sign on/off procedures
- Program and data crash prevention
- Emergency back-up procedures

8. Identify scenarios required to maintain system.

- Prime time daily requirements
- Off-shift tasks
- Archival tape generation

9. Identify organizational requirements.

- MUMPS programming knowledge
- NOHIMS source code comprehension
- Personnel staffing description
- Installation area configuration

10. Identify and describe the documentation available for system support.

- Industrial component program documentation
- Industrial component user documentation
- Medical component program documentation
- Medical component user documentation
- Job aids
- Data collection procedures

11. Identify the features in the medical component that make it flexible and adaptable to varied settings.

- Directory-driven system
- Ability to add codes to the directory
- Ability to change code parameters
- Ability to alter registration entry sequence and content
- Partial ability to alter medical encounter header entry sequence and content
- Free entry portion of the medical encounter
- Lab results may be entered at the time of the encounter entry or at a later date
- Choice of assigning a unit number or using own scheme
- Can look up patients by name or unit number
- Ability to enter specific codes or free text entry
- Can define parameters of patient summary report
- Can define parameters for flowcharts
- Can create interactive flowcharts to own specifications
- Can create own encounter forms
- Can assign statuses to codes while entering data
- Can define lab results and physical findings result checking parameters
- Choice of COSTAR code/long name/short name entry
- System maintenance functions that eliminate need for programming to make above changes

12. Identify the features in the industrial component that make it flexible and adaptable to varied settings.

- Directory-driven system
- Can define organizational structures to fit setting
- Can employ user-specific identifiers
- Can define various entities as environments
- Can define own data items
- Interactive query function

13. Check off the features/capabilities required by Navy information processing needs that NOHIMS has.

	NOHIMS
Required information is collected:	
personnel data	
hazardous materials characteristics	
presence of hazardous materials	
data on health of workers:	
illness and injuries	
sick leave/absenteeism	
routine examinations	
test results	
procedures	
medical histories	
mortality data	
individual exposures/ exposure history	
data on accidents/incidents	
occupational histories	
other	

	NOHIMS
Data can be retrieved in required formats:	
tables of hazardous materials	
lists of workers with exposures	
lists of workers requiring physical examinations	
medical encounter reports	
medical summary reports	
management reports	
other	
Data can be manipulated in required ways:	
number of surveys conducted	
number of persons exposed to hazard	
number of examinations conducted	
number of laboratory tests done	
number of radiographs done	
number of asbestos examinations conducted	
list of those with ordered but unresulted tests	
other	
Other	

POTENTIAL SOURCES:

System documentation

APPENDIX N - STANDARD REPORTS

1. Identify the reports that NOHIMS generates automatically.

Industrial Hygiene Survey Report
Report of Individual Exposures
Patient Data Sheet
Medical certification report
Monthly Compliance Report
Report of Occupational Health Services
Medical Services and Outpatient Morbidity Report
Medical Encounter Report
Patient Summary
Status Report
Flowcharts

Other: _____

_____.

2. Identify the intended receiver(s) of each of the above reports.

Industrial hygienists
Safety specialists
Work center supervisors
Occupational physicians
Occupational nurses
Occupational technicians
Administrators
Management
Research personnel

Other: _____

_____.

3. Identify the intended function(s) of each of the above reports.

Communication
Administration
Monitor compliance with programs
Medical care

Other: _____

_____.

POTENTIAL SOURCES:

Systems Decision Paper
Files of NHRC system developers
Files of Contractor system developers
System documentation

APPENDIX O - DATA COLLECTION FORMS/SOURCES

1. Identify the data collection forms/sources used to enter data into NOHIMS.

Industrial Hygiene Survey Form
Personnel Extract File (PEF)
Patient Registration Form
Physical Exam Data Sheet Encounter Form (PEDS)
Physical Examination Findings Form (PEX)
Asbestos Surveillance Form (NAVMED 6260/5)
Medical History (MEDHX)
Occupational History (OCCHX)
Tests and Procedures
 EKG results
 Reference Audiogram (DD 2215)
 Hearing Conservation Data (DD 2216)
 Pulmonary Function Test results on the 600 form
 Report of Radiologic Consultation
 Hematology results (549)
 Chemistry test results (including SMAC panel results)
 Heavy Metal Test results (557)
 Urinalysis results (550)
 Miscellaneous (including 551)

Other: _____
_____.

2. Identify the specific data elements collected by the forms for medical and industrial components.

A. Patient Identification

1) I.D. number	Social Security number or unit number with check digit, or sequence number, or both family number
2) name	full or abbreviated to ____ characters, soundex
3) duty station	
4) work phone	
5) sex	
6) date of birth or age	
7) marital status	
8) ethnic background	
9) education	level years
10) occupation/job	free text
title	coded
11) work center supervisor	
12) building number	
13) shop number	
14) date this information was collected/updated	

B. History of present illness or reason for physical examination
is/is not stored

- 1) chief complaint or reason coded
 for examination
 date of onset
 severity
 symptoms coded/descriptive
 detail: location, spread
 onset type
 quality
 frequency
 associated with . . .
 preceded by . . ., time
 relieved, made worse by . . .
 other: _____
- 2) active problems
 date of onset
 date of entry
 problem name
 problem code
 severity
 status (acute, chronic, preventive)
- 3) risk factors
 smoking
 alcohol
 accidents
- 4) collector of information identified

C. Past medical history is/is not stored

- 1) family history
 family detail for
 parents
 spouse
 children
 grandparents
 siblings
 number of children, size of household
 relationship
 year of birth
 health status
 chronic diseases
 familial diseases
 specific diseases
 cause of death
 age at death
- 2) past diseases
 coded as problem list
 description
 retention: all diseases
 specific diseases only
 chronic diseases
 time _____
 date of onset
 diagnosis: coded
 final date

- C. 3) past hospitalizations
 number
 type of operation or illness
 date
 location
 operative reports
 discharge summaries for hospitalizations
 full or abstracted
- 4) previous diagnostic tests (PPD, cholesterol, etc.)
 name
 code
 retention: time _____
 all
 _____ most recent
- 5) immunizations
 name
 code
 retention: time _____
 effective period
 all
 _____ most recent
- 6) allergies
 medicines negatives indicated
 name
 code
 environmental agents
 name
 code
- 7) current medications
 name
 code
 prescribed for _____ (problem)
 quantity
 frequency
- 8) past medications Rx
 quantity, frequency,
 patient compliance
- 9) diet type, detail,
 patient compliance
- 10) psychiatric
 general attitudinal
 detail
- 11) nutritional
 type of diet: coded/descriptive
 risks
- 12) collector of information identified

D. Social history is/is not stored

place of birth
size of household
number of children
level of education, type
 highest or current grade
census tract, block
length of residence
collector of information identified

E. Review of systems is/is not stored

system name
positive findings
 extent of detail: summary/complete
 coded
 related to problems
 overall impression
collector of information identified

F. Physical examination data are/are not stored

retention of data: last/all
date
height
weight
sex
ethnic background
risk factors
 smoking
 alcohol
 accidents
impression
vital signs
hazard surveillances
collector of information identified

G. Objective findings of past medical history are/are not stored
retention of data: last/all, time _____

- 1) routine laboratory orders, panel or specific, findings
- 2) special laboratory orders, findings
- 3) Xrays orders, anatomical site, report conclusion
- 4) EKGs, other cardiac tests orders, findings
- 5) EEGs, other neurological tests orders, findings
- 6) pulmonary function tests orders, findings
- 7) audiometric tests orders, findings
- 8) other medical tests: renal function, gastrointestinal, etc.
- 9) past memos orders, findings, consultations, comments to providers, suggestions to patient
- 10) source of order, etc. identified

H. Problem list is/is not stored

active problems (up to _____)
date of onset (prior to visit)
date of entry
problem name, code
diagnosis name, code if possible
severity
status

temporary problems

inactive problems
date of onset
date of entry
problem name, code
diagnosis name, code
merged with problem _____
final date
retention _____

I. Plans, diagnostic orders are/are not stored

- 1) routine laboratory orders, panel or specific
- 2) special laboratory orders
- 3) Xray orders anatomical site
- 4) EKGs, other cardiac test orders
- 5) EEGs, other neurological test orders
- 6) audiometric test orders
- 7) pulmonary function test orders
- 8) other medical tests: renal function, gastrointestinal, etc.
- 9) physician identified

J. Plans, therapeutic orders are/are not stored

1) medications	Rx quantity, frequency type, detailed
2) diet	
3) patient education	
4) physical therapy	
5) occupational therapy	
6) activity orders:	coded/descriptive
7) nursing or home care orders	
8) protective equipment	
9) physician identified	

K. Disposition

referral	type, to whom

L. Follow-up data are/are not stored

1) routine laboratory	findings
2) special laboratory	findings
3) Xrays	report, conclusion
4) EKGs, other cardiac tests	findings
5) EEGs, other neuro- logical tests	findings
6) pulmonary function tests	findings
7) audiometric tests	findings
8) other medical tests:	renal function, gastrointestinal, etc. findings
9) medications	patient compliance general, by Rx
10) diet	patient compliance
11) reassessment of problems	delete, merge problems
12) prognosis	recovery time functional effectiveness long-term care requirement
13) physician identified	

M. Progress notes are/are not stored

encounter forms	coded/free form
acute	
chronic	for all/most/some diseases

other: _____
physician identified

N. Patient services management is/is not provided

- 1) schedules for patient visits
- 2) no-show rates, cancellation rates
- 3) visit reminders for patient fixed interval/
 dependent on diagnostic
 results
- 4) staff schedules according to demand
- 5) auxiliary service schedules
- 6) chart review schedules
- 7) patient compliance, promptness, etc.

O. Practice information is/is not provided

- 1) providers at encounter MD/nurse/PA/technician/
 other: _____
- 2) encounter duration and
 frequency
- 3) use of other facilities hospital/ER
- 4) audit-oriented data _____

P. Occupational history information is/is not stored

- 1) occupational injuries/illnesses
 refusal of employment due to health
 specific problems on the job
 compensation received for injuries/illnesses
- 2) environmental history
 changes in residences due to health
 environmental exposures
 dusts/chemicals
 herbicides/pesticides
 equipment used
 hobbies and crafts
 exposures
 habits
- 3) work history kept overall all jobs/
 for each job
 administrative data
 employer
 location of employer
 duration of employment
 job titles and duties
 specific job-related health problems/injuries
 co-worker job-related health problems/injuries
 health hazards
 exposures
 degree and duration of exposures
 protective equipment used

Q. Industrial hygiene data are/are not stored

- 1) agency data
 - organizational structure of facility
 - names of levels and entities
- 2) personnel data
 - worker identification data
 - demographic data
 - worker titles
 - workplace assignments (locations)
 - occupational history
 - safety training history
 - protective equipment issued
 - absenteeism
- 3) environmental data
 - workplace environments (physical locations of units within an agency)
 - current workplace assignments
 - industrial accidents
- 4) survey data
 - environments surveyed
 - specific chemicals/agents present
 - methods of measurement
 - concentrations
 - usage rates
 - protective equipment used
- 5) hazard data
 - hazardous agents used
 - agent characteristics
 - threshold limit values
 - exposure limits and action levels
 - agent synonyms
 - medical monitoring requirements
 - Chemical Abstract Service number
 - agent classification

POTENTIAL SOURCES:

System documentation

APPENDIX S - DESCRIPTION OF GOVERNMENT-OWNED OCCUPATIONAL HEALTH INFORMATION SYSTEMS

1. Describe the system features for each government-owned system.

Programming structure
 Language used
 System options
 System conventions
 Report/output generated by system
 Data input sources

For each system, check off the features/capabilities required by Navy information processing needs that the government-owned systems have.

	DOT VEIIRS	Coast Guard	EPA IRIS	U.S. Army	U.S. Air Force
Required information is collected:					
personnel data					
hazardous materials characteristics					
presence of hazardous materials					
data on health of workers:					
illness and injuries					
sick leave/absenteeism					
routine examinations					
test results					
procedures					
medical histories					
mortality data					
individual exposures/ exposure history					
data on accidents/incidents					
occupational histories					
other					

	DOT VEIIRS	Coast Guard	EPA IRIS	U.S. Army	U.S. Air Force
Data can be retrieved in required formats:					
tables of hazardous materials					
lists of workers with exposures					
lists of workers requiring physical examinations					
medical encounter reports					
medical summary reports					
management reports					
other					
Data can be manipulated in required ways:					
number of surveys conducted					
number of persons exposed to hazard					
number of examinations conducted					
number of laboratory tests done					
number of radiographs done					
number of asbestos examinations conducted					
list of those with ordered but unresulted tests					
other					
Other					

2. What are the software quality attributes of each government-owned system?

Does the government-owned system allow performance of all required tasks?

identification tasks/
entry tasks/
review tasks/
editing tasks/
information retrieval tasks/
system maintenance tasks/

Is the government-owned system reliable?

What error recovery procedures does the government-owned system have?

What back-up procedures are required to prevent data loss?

What features make the source program code efficient?

How portable and hardware independent is the government-owned system?

How maintainable is the government-owned system software?

3. What are the operational characteristics of each government-owned system?

How well does the government-owned system present its operational capabilities to the user?

Is the system "menu driven" at all selection levels?

What user on-line assistance functions does the government-owned system have?

What error diagnostic features and debugging aids does the government-owned system have?

What database manager utilities does the government-owned system have?

What is the average entry time per input form?

What are the add, save, change, and delete procedures?

Does the government-owned system have a search in context capability?

What are the general filing procedures for the government-owned system?

Can data and routines be downloaded to magnetic tape?

4. What security features does each government-owned system have?

5. What are the software support requirements for each government-owned system?
 - What and how many support personnel are required to maintain the government-owned system software?
 - What functions must be performed by the support personnel?
 - What is the estimated amount of support man-hours required per month to maintain the system?
6. What system support is available for each government-owned system?
 - What kind of support is available for the initial training of users?
 - What kind of support is available for ongoing and update training of users?
 - What kind of support is available for technical concerns?
 - What kind of documentation and job aids are there that support system operations?
7. What system scenarios are required to maintain each government-owned system?
 - What prime time maintenance functions must be performed during the day on a daily basis?
 - What system maintenance functions must be performed during the off-shift on a regular basis? How often must these tasks be performed?
 - How often must patient files be archived?
8. What are the organizational requirements of each government-owned system?
 - What requirements are there for users of the government-owned system to have programming skills? for system managers?
 - What requirements are there for system managers to understand source code?
 - What staff is required to operate a government-owned system installation?
 - What requirements are there for the installation area?
9. What is the minimum hardware configuration that could support each government-owned system?

POTENTIAL SOURCES:

NOHIMS Systems Decision Paper
Files of NHRC system developers

APPENDIX P - MEDICAL MONITORING AND CARE GOALS

1. Identify the goals for NOHIMS in the area of medical monitoring and care.

Increase compliance with Navy set standards of care
Increase quality of patient care
Increase access to care
Improve health resource management
Earlier diagnosis and notification of patient abnormalities
Increase communication between medical, industrial, and
work environments to improve care provided to patient

Other: _____

_____.

2. Identify the specific objectives for NOHIMS in order to achieve the above goals.

Improve timely provision of physical examinations
Improve timely follow-up of abnormal findings/tests
Provide timely feedback for the various departments
Maintain a more accurate medical record
Prevent loss of medical records
Provide summary medical reports
Automate medical testing
Diagnose abnormal conditions earlier
Support quality of care review procedures
Improve scheduling
Eliminate unnecessary visits/tests
Improve appropriateness of tests performed
Reduce waiting time

POTENTIAL SOURCES:

NOHIMS MENS
NOHIMS Systems Decision Paper
Files of NHRC system developers
Conference proceedings

APPENDIX Q - INFORMATION NEEDS FOR LEGAL PURPOSES

1. Identify court cases that have used a computerized medical record for evidence.
2. Identify the essential elements required to be in the medical record in order for it to be adequate as evidence.
3. Identify other conditions that must be met in order to use a computerized record as evidence.
 - supporting documentation for entries
 - database integrity
 - ordinary course of business
 - standard operating procedures
 - other: _____
4. Identify the types of lawsuits where the computerized medical record was used as evidence. (Are there examples of occupational health claims?)

POTENTIAL SOURCES:

Legal case histories
Published articles

APPENDIX R - DEVELOPMENT COSTS AND INTENDED BENEFITS

1. Identify development costs of NOHIMS.

Contractor Labor	\$
NHRC Labor	\$
Test Site Labor	\$
Equipment:	
NHRC	\$
Test Sites	\$
Other Costs	\$
Fringe Benefits on Labor	\$
Total Direct Costs	\$
Indirect Costs based on:	\$
TOTAL DEVELOPMENT COSTS	\$

2. List the intended benefits of NOHIMS.

- Health manpower savings
- Reduce cost of providing services
- Management benefits
 - Productivity increases
 - Efficient use of resources
- Increase quality of care provided
 - Fewer unnecessary tests and ancillary services
 - Fewer unnecessary examinations/visits
 - Reduce waiting time
- More accurate patient record
- Timely and perpetual access to data
- Increase compliance with monitoring programs
- Earlier diagnosis of illnesses/conditions
- Earlier notification of abnormal test results and findings
- Better workplace monitoring
- Increase communication between departments
- Provide information for planning
- Provide more accurate management reports
- Provide more accurate information for research
- Better identify workers exposed in workplace
- Better identify hazardous workplaces
- Provide base-line data on the health of an employee

POTENTIAL SOURCES:

- OPNAVINST 5100.23B
- NOHIMS MENS
- NOHIMS Systems Decision Paper
- Files of system developers

**APPENDIX T - DESCRIPTION OF COMMERCIALY AVAILABLE OCCUPATIONAL HEALTH
INFORMATION SYSTEMS**

1. Describe the system features for each commercial system.

Programming structure
Language used
System options
System conventions
Report/output generated by system
Data input sources

For each system, check off the features/capabilities required by Navy
information processing needs that the commercial systems have.

	COHESS	FG	DEC	Other	Other
Required information is collected:					
personnel data					
hazardous materials characteristics					
presence of hazardous materials					
data on health of workers:					
illness and injuries					
sick leave/absenteeism					
routine examinations					
test results					
procedures					
medical histories					
mortality data					
individual exposures/ exposure history					
data on accidents/incidents					
occupational histories					
other					

	COHESS	FG	DEC	Other	Other
Data can be retrieved in required formats:					
tables of hazardous materials					
lists of workers with exposures					
lists of workers requiring physical examinations					
medical encounter reports					
medical summary reports					
management reports					
other					
Data can be manipulated in required ways:					
number of surveys conducted					
number of persons exposed to hazard					
number of examinations conducted					
number of laboratory tests done					
number of radiographs done					
number of asbestos examinations conducted					
list of those with ordered but unresulted tests					
other					
Other					

2. What are the software quality attributes of each commercial system?

Does the commercial system allow performance of all required tasks?

- identification tasks/
- entry tasks/
- review tasks/
- editing tasks/
- information retrieval tasks/
- system maintenance tasks/

Is the commercial system reliable?

What error recovery procedures does the commercial system have?

What back-up procedures are required to prevent data loss?

What features make the source program code efficient?

How portable and hardware independent is the commercial system?

How maintainable is the commercial system software?

3. What are the operational characteristics of each commercial system?

How well does the commercial system present its operational capabilities to the user?

Is the system "menu driven" at all selection levels?

What user on-line assistance functions does the commercial system have?

What error diagnostic features and debugging aids does the commercial system have?

What database manager utilities does the commercial system have?

What is the average entry time per input form?

What are the add, save, change, and delete procedures?

Does the commercial system have a search in context capability?

What are the general filing procedures for the commercial system?

Can data and routines be downloaded to magnetic tape?

4. What security features does each commercial system have?

5. What are the software support requirements for each commercial system?
 - What and how many support personnel are required to maintain the commercial system software?
 - What functions must be performed by the support personnel?
 - What is the estimated amount of support man-hours required per month to maintain the system?
6. What system support is available for each commercial system?
 - What kind of support is available for the initial training of users?
 - What kind of support is available for ongoing and update training of users?
 - What kind of support is available for technical concerns?
 - What kind of documentation and job aids are there that support system operations?
7. What system scenarios are required to maintain each commercial system?
 - What prime time maintenance functions must be performed during the day on a daily basis?
 - What system maintenance functions must be performed during the off-shift on a regular basis? How often must these tasks be performed?
 - How often must patient files be archived?
8. What are the organizational requirements of each commercial system?
 - What requirements are there for users of the commercial system to have programming skills? for system managers?
 - What requirements are there for system managers to understand source code?
 - What staff is required to operate a commercial system installation?
 - What requirements are there for the installation area?
9. What is the minimum hardware configuration that could support each commercial system?

POTENTIAL SOURCES:

NOHIMS Systems Decision Paper
Commercial system documentation
Published articles
Files of NHRC system developers

**APPENDIX U - DESCRIPTION OF NAVY INTERIM OCCUPATIONAL HEALTH INFORMATION
SYSTEM**

1. Describe the system features.

Programming structure
Language used
System options
System conventions
Report/output generated by system
Data input sources

Check off the features/capabilities required by Navy information processing needs that the Navy interim system has.

	Navy Interim System
Required information is collected:	
personnel data	
hazardous materials characteristics	
presence of hazardous materials	
data on health of workers:	
illness and injuries	
sick leave/absenteeism	
routine examinations	
test results	
procedures	
medical histories	
mortality data	
individual exposures/ exposure history	
data on accidents/incidents	
occupational histories	
other	

	Navy Interim System
Data can be retrieved in required formats:	
tables of hazardous materials	
lists of workers with exposures	
lists of workers requiring physical examinations	
medical encounter reports	
medical summary reports	
management reports	
other	
Data can be manipulated in required ways:	
number of surveys conducted	
number of persons exposed to hazard	
number of examinations conducted	
number of laboratory tests done	
number of radiographs done	
number of asbestos examinations conducted	
list of those with ordered but unresulted tests	
other	
Other	

2. What are the software quality attributes of the interim system?

Does the interim system allow performance of all required tasks?

- identification tasks/
- entry tasks/
- review tasks/
- editing tasks/
- information retrieval tasks/
- system maintenance tasks/

Is the interim system reliable?

What error recovery procedures does the interim system have?

What back-up procedures are required to prevent data loss?

What features make the source program code efficient?

How portable and hardware independent is the interim system?

How maintainable is the interim system software?

3. What are the operational characteristics of the interim system?

How well does the interim system present its operational capabilities to the user?

Is the system "menu driven" at all selection levels?

What user on-line assistance functions does the interim system have?

What error diagnostic features and debugging aids does the interim system have?

What database manager utilities does the interim system have?

What is the average entry time per input form?

What are the add, save, change, and delete procedures?

Does the interim system have a search in context capability?

What are the general filing procedures for the interim system?

Can data and routines be downloaded to magnetic tape?

4. What security features does the interim system have?

5. What are the software support requirements for the interim system?
What and how many support personnel are required to maintain the interim system software?
What functions must be performed by the support personnel?
What is the estimated amount of support man-hours required per month to maintain the system?
6. What system support is available for the interim system?
What kind of support is available for the initial training of users?
What kind of support is available for ongoing and update training of users?
What kind of support is available for technical concerns?
What kind of documentation and job aids are there that support system operations?
7. What system scenarios are required to maintain the interim system?
What prime time maintenance functions must be performed during the day on a daily basis?
What system maintenance functions must be performed during the off-shift on a regular basis? How often must these tasks be performed?
How often must patient files be archived?
8. What are the organizational requirements of the interim system?
What requirements are there for users of the interim system to have programming skills? for system managers?
What requirements are there for system managers to understand source code?
What staff is required to operate an interim system installation?
What requirements are there for the installation area?
9. What is the minimum hardware configuration that could support the interim system?

POTENTIAL SOURCES:

NOHIMS Systems Decision Paper
Interim system documentation
Files of NHRC system developers

**ANNOTATED BIBLIOGRAPHY OF PUBLICATIONS DEALING
WITH OCCUPATIONAL HEALTH AND MEDICAL
INFORMATION SYSTEMS, COST ANALYSIS
PROCEDURES, EVALUATION METHODOLOGY,
AND RELATED LEGAL ISSUES**

The purpose of this selective bibliography is to provide a sense of the scope of the literature relevant to the subject matter of interest in this project to test and evaluate the Navy Occupational Health Information Management System (NOHIMS). The intent has been to describe the contents of each reference in sufficient detail so that a decision could be made whether or not to obtain a copy of the complete article. There may be important omissions in this compilation of references because of the limitations of time and contract resources. However, the hope is that this annotated bibliography will provide a foundation upon which others can build in order to maintain a comprehensive and up-to-date guide to the pertinent literature on this subject.

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Barnett, G.O. The application of computer-based medical-record systems in ambulatory practice. The New England Journal of Medicine, June 21, 1984, 310(25), 1643-1650.

The author of this paper presents support for the gradual replacement of manual medical record systems with computer-based systems. He states as limitations of manual record systems the following:

1. The record can be physically unavailable because of loss or use by another practitioner.
2. The information can be poorly organized and illegible, making retrieval difficult.
3. Transcription errors can occur because the same information is required in several places in the medical record.
4. Quality of care and clinical studies are cumbersome and require many hours of searching by trained personnel.

The author describes the characteristics of a computer-based record system, which he bases largely on his experience with COSTAR. These characteristics are the following:

1. A computer-based record system should be comprehensive and should have no duplication of entry.
2. In most systems, data are collected on an "encounter form," which is prestructured. These forms allow both coded forms of data and narrative text.
3. There are two types of reporting functions: the first is immediate recall through inquiry at the terminal, and the second is the variety of reports available through the system.
4. A good computer-based system should provide a special query language that nonprogrammers can use to retrieve and analyze data and print ad hoc reports.
5. A good system should also provide new advances in quality assurance.

The implementation issues discussed by this author are cost justification and physician acceptance. Cost justification is difficult because there is little quantitative information available on the costs and benefits of manual versus automated systems, and because there are many functions made possible by an automated system which were formerly impossible with a manual system. The main objections physicians seem to have toward an automated medical record system are that it will impose limitations on how data are recorded and maintained, that data may be less secure, and that the system may disrupt staff working habits. The author suggests that these attitudes will only be overcome as automated systems are made more reliable and easier to use, and as physicians gain a better understanding of their potential advantages.

Barnett, G.O., McLatchey, J., Smith, M.M., Morgan, M.M., Zielstorff, R.D., Shusman, D., Piggins, J., Beaman, P.D., Barrett, S.M., & Colloff, E. COSTAR--1981. In H.G. Heffernan (Ed.), Proceedings of the Fifth Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1981. Pp. 86-87.

This article reviews the current (as of 1981) status of COSTAR and identifies the factors which have facilitated and inhibited implementations at various sites.

Objectives which make COSTAR an attractive technology are as follows:

1. COSTAR consists of a comprehensive set of relatively independent components.
2. The medical structure and content of COSTAR are defined by the individual practice, without requiring extensive programming.
3. There is active support of COSTAR.
4. COSTAR can be implemented on a variety of computer systems.

Among the major problems which have been encountered thus far are:

1. Programming errors and functional limitations existed in the early versions of COSTAR.
2. The start-up effort required of personnel in the medical practice has been greater than desired.
3. COSTAR is a complex system, and there is sometimes inadequate documentation.
4. The cost of the required computer hardware has been greater than anticipated.

Barnett, G.O., Zielstorff, R.D., Piggins, J., McLatchey, J., Morgan, M.M., Barrett, S.M., Shusman, D., Brown, K., Weidman-Dahl, F., & McDonnell, G. COSTAR: A comprehensive medical information system for ambulatory care. In B.I. Blum (Ed.), Proceedings of the Sixth Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1982. Pp. 8-18.

This paper describes COSTAR--Computer-Stored Ambulatory Record--which is designed to replace the traditional paper medical record with a comprehensive, centralized, and integrated information system. Aside from describing COSTAR itself, the authors discuss implementation issues of COSTAR, and criteria and issues involved in the evaluation of COSTAR. One of the most common pitfalls in introducing a computer-based information system is underestimating the magnitude and complexity of the effort required in the implementation phase.

Beck, D.D., & Pugh, W.M. Specifications for a Navy Occupational Health Information Monitoring System (NOHIMS): II. A functional overview. San Diego, CA: Naval Health Research Center, Report No. 82-6, 1982.

The objective of the Navy Occupational Health Information Monitoring System (NOHIMS) is to provide an information system that will coordinate the components of the Navy's occupational health program in order to meet the requirements of the Occupational Safety and Health Act of 1970. The present report develops in greater detail the design concepts introduced in an earlier report (No. 81-36), providing more specific information on the content of the personnel, environmental, and medical databases contained in NOHIMS. In addition, an overview of the functional specifications for NOHIMS is presented.

Belk, H.D., Sussman, N., & Bonney, T.B. The Alcoa Health Information System. Journal of Occupational Medicine, 1982, 24(10), 815-818.

This paper describes the health information system envisioned by a team at the Aluminum Company of America. It includes a broad definition of the objectives, scope, and requirements of a computer-based program.

The Alcoa HIS will consist of four major data files. The Medical File will contain all medical/health data acquired from the time of the preemployment medical history and examination through active employment until retirement or work termination. The Industrial Hygiene File will incorporate all industrial hygiene information concerning workplace exposures to chemical, physical, and biological agents. The Job History File will include complete work histories for the length of each worker's employment as well as pertinent demographic information for all participating employees. The Materials Inventory will contain and keep current a complete inventory of all chemical substances and physical and biological agents used or produced as products or by-products within the company.

The authors believe that the Alcoa HIS will permit development of an adequate, accessible health information base and will allow health personnel to evaluate systematically associations between work, work exposures, and changes in employee health. The system will enable medical and industrial hygiene personnel to divert their manual recordkeeping efforts to increased activities in preventive medical programs and health education. As a result, health personnel will become more efficient and effective in carrying out their responsibilities for the health and well-being of all employees.

Bonnett, J.C., & Pell, S. Du Pont's health surveillance systems. Journal of Occupational Medicine, 1982, 24(10), 819-823.

Du Pont maintains a comprehensive occupational health program that combines medical surveillance, industrial hygiene, toxicology, and epidemiology. This discussion is limited to information about those elements of the employee health protection program that have been made more useful and effective by computerization.

Real-time source data collection and conventional data processing are combined in this system. Some advantages the authors see of a source data entry system are the following:

1. On-line data validation.
2. Maintenance of confidentiality.
3. More accurate encoding of data.
4. Encoding of data directly from testing equipment.
5. Provision of a flexible base for future improvements.
6. Elimination of manual recording and of the need for keypunching.

Further discussed in this article is the file structure of the system and the sources of data for each file.

Bowie, J. Design of a user-defined patient medical summary. In J.T. O'Neill (Ed.), Proceedings of the Fourth Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1980. Pp. 1353-1361.

One of the major features of COSTAR, and systems like COSTAR which contain on-line medical records, is their ability to modify the classical "encounter oriented" presentation of data and display summaries of medical items organized by problems or classes of data. The COSTAR Status Report is an example of this type of summary output. The header of the status report gives basic patient identification and demographic information. The remainder of the report presents an index of the patient's medical history grouped by medical areas or divisions. The order of these divisions is fixed, as is the data format within each division.

User acceptance of the Status Report has not always been satisfactory. In the fall of 1979, The MITRE Corporation held a meeting of COSTAR designers, implementors, and users to discuss the implementation of a new patient output report. The result of the meeting was a preliminary specification of the Patient Summary report, a medical output document which would summarize a medical record in a user-defined format and structure. The majority of this paper discusses the issues brought forth at the design meeting and describes the resulting implementation of the Patient Summary.

Four decisions formed the basic design criteria of the Patient Summary:

1. The order of data presentation should be user-definable.
2. The format of the data lines should be user-definable.
3. The amount of data to be printed should be user-definable.
4. A new data presentation, the data matrix, should be developed.

The Patient Summary is now in regular use in a number of COSTAR sites. Its customization features have been used extensively in these practices to meet the varied demands of medical providers. In the opinion of these practitioners, the Patient Summary has successfully met its design criteria.

Brannigan, V.M., & Dayhoff, R.E. Liability for personal injuries caused by defective medical computer programs. American Journal of Law & Medicine, 1981, 7(2), 123-144.

During the past ten years, the use of computer programs in medicine has become increasingly prevalent. As these programs proliferate, however, their potential to injure patients also increases. Although the question of liability for personal injuries caused by defective medical computer programs has not been addressed by the courts, it is inevitable that this question will arise in a judicial forum.

In this article, the authors examine the questions a court will face when addressing this novel cause of action. They attempt to resolve some of these questions by exploring the relevant characteristics of medical computer programs and examining their relationship to the tort law doctrines of negligence and strict products liability. The authors conclude that medical computer programs will be treated as products by the courts, subjecting their manufacturers to strict liability in tort for any defects in the program that cause injury. As a result, the authors contend, hospitals are likely to face a new source of liability for patient injuries if, under the particular circumstances, they are deemed to be the manufacturer or the distributor of a medical computer program that causes an injury.

Can computers keep us healthy? Navy Lifeline, September/October 1982, 18-20.

This article reviews the capabilities of the prototype Navy Occupational Health Information Monitoring System (NOHIMS) at its state of development in mid-1982. The advantages of this computer-based system over the inadequate manual system in use previously are described by an industrial hygienist, an occupational health physician, and Navy epidemiologists and researchers. The NOHIMS database consists of three major types of information: information about employees--names, ages, where they have worked, and what job duties they have performed; environmental hazard data; and confidential medical data on each worker. The data in the NOHIMS database are referred to a number of reference tables to determine if a worker has been overexposed to any substances in the workplace, to document what medical exams are required for various exposures, and to flag any abnormal lab test results to help the physician interpret medical findings and decide if a particular worker is fit to keep working. The major tangible benefits of NOHIMS are a series of regular reports that are more current, informative, and useful than previously available.

Comparison of medical surveillance at the North Island Naval Air Rework Facility before and after implementation of the interim Navy Occupational Health Information Monitoring System. San Diego, CA: Naval Health Research Center, 1982.

The purpose of this study was to provide an evaluation of the effectiveness and impact of the semi-automated interim Navy Occupational Health Information Monitoring System (NOHIMS) on operational procedures by making a pre- and post-comparison of medical surveillance at a selected naval facility, the North Island Naval Air Rework Facility (NARF), using established criteria of optimal medical testing for workers exposed to hazardous environments. The study covered five consecutive months--the month prior to introduction of NOHIMS (February 1982) and the four subsequent months.

The following findings resulted from this study:

1. Prior to implementation of the interim NOHIMS, few of the workers at the NARF exposed to the four substances that require monitoring (acrylonitrile, asbestos, benzene, and lead) received the medical test(s) required because of their exposure.
2. After the implementation of the interim NOHIMS, more workers received the required medical tests even though there was no increase in the total number of tests performed. In fact, there was a decrease in total number of tests performed.
3. As a result of the interim NOHIMS, proportionately more medical tests were being performed on workers with critical exposures.
4. As a result of the interim NOHIMS, proportionately fewer medical tests were being performed on workers with no exposure to any hazards.

Computerized Occupational Health Program (COHP): Feasibility study. Brooks AFB, TX: USAF Occupational and Environmental Health Laboratory, June 1982.

This study was conducted to determine the most feasible method of managing occupational and environmental health data to support all elements of the U.S. Air Force's Occupational Health Program. In order to document the findings and provide the best practicable solutions, the feasibility study was comprised of the following components:

1. Background review.
2. Occupational health capability and requirements determinations.
3. Current methods review.
4. Alternative methods determination.
5. Cost of alternatives.
6. Evaluation of alternatives.

This paper presents the study findings and recommendations. Based on an analysis of 14 hardware alternatives weighed against 11 criteria, including cost, a decentralized computer system built on an expansion to the ADPS 59 (UCA/ASDC) hardware was considered to be the best choice. It was concluded that custom development of COHP software would be more cost effective than purchasing and modifying off-the-shelf software.

Congleton, M.W., Glogower, F.D., Ramsey-Klee, D.M., & Roberts, A.S. Navy Mental Health Information System (NAMHIS): A psychiatric application of COSTAR. In G.S. Cohen (Ed.), Proceedings of the Eighth Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1984. Pp. 437-441.

The Navy Mental Health Information System, NAMHIS, is a comprehensive, automated recordkeeping and reporting system designed to meet the needs of clinicians and administrators in Outpatient Navy Mental Health Clinics. The public domain version of the COmputer-STored Ambulatory Record (COSTAR) was extensively modified to fulfill the software requirements of NAMHIS and covers the following five system functions: Patient Registration, Encounter Data, Patient History, Mental Status Examination, and Reporting capability. Data collection forms have been developed, along with standardized reports of individual patient/clinician consultations.

A software package of approximately 50 psychodiagnostic tests written in the MUMPS language has been developed by the Veterans Administration and is available from the VA. It is planned to interface this psychological testing module with NAMHIS so that selected psychological tests can be rapidly scored by computer and reports generated for use by clinicians in the mental health clinic setting.

Conklin, G.S., Craig, T.J., Vickers, R., McCleery, G., & Mehl, B. Of computers in medical care and quality assurance: Why do systems fail? And what can be done? In B.I. Blum (Ed.), Proceedings of the Sixth Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1982. Pp. 423-424.

This paper is an introduction to a panel discussion held by the authors, the purposes of which were to explore the application of computers in medical care from the standpoints of system developers, implementors, and users of data; present some thoughts on the quality assurance/clinical service interface; and propose strategies for insuring a smooth clinical system implementation.

Two major pitfalls in system acceptance offered in the introduction are developers, implementors, and users who consider only a fragment of a need outside of their organizational context within which a system will operate, and concern by clinicians that data generated by the system are often used insensitively by evaluators who attempt to render judgments on clinical care without knowledge of the many and complex issues surrounding medical decisions.

Included with the introduction are abstracts of the topics presented by some of the authors:

Raymond Vickers--"Problems Encountered in Orienting Physician Users to an EDP Drug Ordering and Monitoring System."

Gerald McCleery--"Hospital Information Systems: Why Staff Don't Always Embrace the Revolution."

Bernard Mehl--"Quality Assurance and the Computer: Drug Therapy Monitoring in General Hospital Settings."

Drexler, J.A., Jr., Jones, A.P., & Gunderson, E.K.E. (Eds.). Problems and strategies of implementing Navy occupational health and safety programs. Seattle, WA: Battelle Human Affairs Research Centers, and San Diego, CA: Naval Health Research Center, June 1979.

A conference on Navy occupational health was held at Battelle Human Affairs Research Centers, Seattle, Washington on January 29-30, 1979. This publication presents the proceedings of that conference. The conference was designed to provide a forum in which issues of implementing Navy occupational health and safety programs could be addressed from a number of perspectives. The conference objectives were to consider organizational factors in the implementation of Navy occupational health programs, to address issues of cost effectiveness in Navy occupational health programs, and to facilitate the development of a meaningful research program in this area. Participants included operations and line managers, safety experts, industrial hygienists, epidemiologists, behavioral researchers, and physicians. Individual perspectives, viewpoints, and goals were diverse and often contradictory. The threads that bound the participants together were a deep commitment to improved occupational health care in the Navy and a clear conviction that the current occupational health program faces serious difficulties.

The conference demonstrated the wealth of available expertise that can be brought to bear immediately on the Navy's current occupational health problems. It also pinpointed several areas that require extensive research and development. Among the major areas in the latter group were epidemiological studies to identify additional hazardous agents in the work environment, development of environmental monitoring techniques, the design of training and reward systems that will increase compliance with sound occupational health practices, and the design of future work environments to minimize occupational health risks.

Eagan, G.D., & Grier, R.S. Automated medical information system of the Los Alamos Scientific Laboratory. In J.T. O'Neill (Ed.), Proceedings of the Fourth Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1980. Pp. 343-346.

The Medical Information System (MIS) at the Los Alamos Scientific Laboratory automates the acquisition, storage, and retrieval of medical information concerning 9,000 project-connected personnel. MIS incorporates an on-line, interactive medical history questionnaire, mark-sense form processing, and automated coronary risk assessment in the medical evaluation process. Also, MIS has created the ability for long-term study and comparison of employee health as well as made the physician's time more effective.

The MIS software is written in MUMPS and runs on a Digital Equipment Corporation PDP 11/40 processor. Because core memory is divided into 26 different partitions, up to 26 separate jobs can be running simultaneously. This allows two telecommunication links to operate continuously as well as provide dial-up access to the system.

Elmer, C., & Coleman, D.L. Monsanto's Medical and Environmental Health Information (MEHI) system. Journal of Occupational Medicine, 1982, 24(10), 788-790.

Monsanto's MEHI system was originated in 1977 by the Department of Medicine and Environmental Health in recognition of an existing corporate need for storage and ready retrieval of information being collected on personnel locations, materials in the workplace, exposure levels, toxicity, and personnel health. It consists of a family of seven systems, each independent but capable of being integrated with and drawing information from the others.

Four of the systems are described in this paper as follows:

1. The Materials System, which identifies the total corporate inventory of materials in manufacturing environments, pinpoints their properties, published biological effects, process relationships, and regulations.
2. The Occupational Exposure System, which comprises two modules, one of which maintains industrial hygiene measurements from both personal and area monitoring and is integrated with the second module that contains the work histories of all employees.
3. The Medical System, which contains health histories and all ongoing health determinations derived from questionnaires, physical examinations, clinic visits, and external medical events.
4. The Statistical Data Analysis/Epidemiology System, which contains no entered information but provides tables and programs, as well as data search and correlating routines that may be used to identify trends in exposure or health, or to make statistical evaluations of employee groups compared with nonexposed employees and the public.

Fiddleman, R.H. Who uses COSTAR and why. In H.G. Heffernan (Ed.), Proceedings of the Fifth Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1981. Pp. 88-90.

By late 1980, The MITRE Corporation was receiving numerous requests for information about the characteristics of the COSTAR community. In order to answer these requests, a survey of COSTAR users and vendors was conducted in January 1981. This paper presents the results of that survey. According to the author, the results clearly showed that COSTAR is a flexible, adaptable system, used by a wide variety of organizations. At the time of the survey, COSTAR was primarily being used as a medical record/accounts receivable/scheduling system, but there were numerous other patterns of usage. The results also indicated that the number of installations had grown moderately since October 1980, when MITRE listed the installations known to it. Also, it was clear that most organizations used the installation and programming service of a COSTAR vendor or support group.

Fiddleman, R.H. Proliferation of COSTAR--A status report. In B.I. Blum (Ed.), Proceedings of the Sixth Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1982. Pp. 175-178.

In early 1979, the National Center for Health Services Research (NCHSR) was faced with the problem of how to transfer the Computer-Stored Ambulatory Record (COSTAR) system from a research setting to a widespread operational setting. The dissemination strategy postulated by NCHSR was based on the use of commercial COSTAR vendors as the main dissemination agents along with a dissemination contractor--The MITRE Corporation--who could perform a variety of software documentation, technical assistance, and information dissemination tasks. The vendors were expected to enhance the software, as well as install and support it. This has occurred. The number of COSTAR installations is growing, and most installations use COSTAR vendors for support. The vendors, as hoped, have made numerous creative changes to the software.

It is unclear at this time (1982) whether the system (in its current form) will be widely disseminated. The 74% growth rate in COSTAR installations over the last fifteen months (preceding November of 1982) is encouraging to the author, especially considering that the rate of system dissemination is typically slow during the initial dissemination period, and then rapidly increases once the system's benefits become well known. The actual number of installations is small, however, in comparison to the number of potential users. The author states that only time will tell if the major objective of the dissemination effort, the widespread proliferation of COSTAR, will be met.

Fiddleman, R.H., & Kerlin, B.D. Preliminary assessment of COSTAR V at the North (San Diego) County Health Services project. McLean, VA: The MITRE Corporation, MITRE Technical Report MTR-79W00404 (Revision 1), February 1980.

This report describes the process of installing the Computer-Stored Ambulatory Record system (COSTAR V) at the North County Health Services (NCHS) project in San Marcos, California, and presents cost and performance information after three months of system operations. The COSTAR V project at NCHS was a demonstration effort designed to provide detailed information about this system's flexibility, costs, benefits, and performance characteristics when used in a rural community health clinic environment. Lessons learned during the installation effort at NCHS include:

1. When used as a total medical/management information system, COSTAR V will impact on virtually everyone's job.
2. A time-consuming part of the installation effort involves updating COSTAR V directories.
3. The major issues involving the organization's use of COSTAR V should be resolved before detailed design work begins.
4. In planning the time and costs of the installation effort, particular attention should be paid to COSTAR V's ability to meet the organization's billing and accounts receivable needs.
5. Two-person months of MUMPS programming should be planned for writing billing programs and special data entry programs (e.g., lab test results, if these are complex).
6. Training is an ongoing process and is best performed by first having the staff review appropriate sections of the COSTAR User Manuals, and then conducting brief overview presentations followed by practice sessions at terminals.
7. The adequacy of the encounter form design can only be known by its use.
8. On-site technical support at the start of patient registration and encounter form usage is essential.
9. Users should consult with a COSTAR V expert to determine if the Report Generator is capable of producing periodic, special format reports; special MUMPS programs may have to be written or special features may have to be added to the Report Generator to meet the user's needs.

All of the preceding comments pertain to a complex operating environment, as typified by NCHS. The less complex the operating environment, the simpler the installation effort. System implementation at NCHS proved to be particularly challenging because of NCHS's network of dispersed clinics linked to the central computer in San Marcos by sophisticated telecommunications equipment, desire to fully automate the medical record, multiplicity of third-party carriers, and complexity of accounts receivable requirements.

Finucane, R.D. General Foods Medical and Environmental Health Systems (MEHS). Journal of Occupational Medicine, 1982, 24(10), 794-798.

In 1976 General Foods determined that an automated means was required to track employee exposure, to comply with Occupational Safety and Health Administration regulations, to perform epidemiological studies, and to schedule examinations. They chose the Amoco Health Environmental Management System (HEMS). This paper focuses on the application of HEMS at General Foods.

The author first describes the specific modifications made to the system to make it suitable for use at General Foods. He then describes the strengths and weaknesses of the resultant system.

Strengths:

1. Utilizing an existing system greatly decreased start-up costs and enabled them to become operational three or four years earlier than if they had developed their own system.
2. The use of an optical scanner facilitates input and improves the confidentiality and accuracy of data.
3. The medical history capability is relatively strong.
4. The industrial hygiene form is adaptable. Its use does not require a trained professional. It will accept information from personal monitoring equipment or time-weighted averages from walk-through surveys.
5. Programming for the reporting of medical examinations and laboratory results provides for ease of communication with an employee's private physician.
6. Data contained within the system are accessible on-line, thus providing very timely access to the information.
7. The capability to input laboratory data via magnetic tape has greatly decreased routine paperwork and computer processing time.

Weaknesses:

1. Modifications to the optical scanner forms require costly programming.
2. The lack of a batch update capability using tape input for walk-through survey, audiogram, and morbidity and mortality studies forces rather costly manual input of forms.
3. The laboratory input as originally designed required manual input on an Opscan form.
4. Prior to modification of the system, the entire medical history had to be repeated each year or at each examination.
5. Operating the system effectively outside the Amoco environment requires both medical and computer expertise. Additionally, due to the size and complexity of the system, ongoing maintenance and operation are difficult and require continuous contact with the original designers.

Finucane, R.D., & McDonagh, T.J. Medical Information Systems Roundtable. Journal of Occupational Medicine, 1982, 24(10), 781-782.

According to these authors, the basic force behind the development of computer-based occupational health information systems is the need to manage more effectively the data growth that occupational health programs have experienced. To be maximally effective, they say, the computerized health information system should incorporate as a minimum the following types of information:

1. Detailed worker and job histories and demographic data.
2. An inventory of potential exposures and their possible associated adverse health effects related to specific workplace location.
3. Work site exposure data.
4. Employee medical information collected throughout the worker's career, or if available, throughout his/her entire life.

A well-designed computerized health information system should improve the effectiveness and efficiency of the program's health professionals, create a database for population studies, provide a comprehensive management reporting system, and support company regulatory affairs programs and compliance activities. More specifically, it should allow for the following:

1. Standardized consistent recordkeeping procedures and data collection, thus improving the overall quality of health records.
2. A database of continuous health and exposure information on employees that will facilitate epidemiologic studies.
3. Facilitation and improvement of procedures for the collection and interpretation of workplace exposure monitoring data and the identification of the need for additional environmental controls.
4. Efficient handling and analysis of the large amounts of data generated in occupational health programs via electronic data management technology.
5. Support of administrative professional activities within the medical department on a day-to-day basis.
6. An effective reporting system that will allow both health professionals and company management to evaluate potential problems and the effectiveness of programs.
7. Enhancement of the response capabilities of the company to external and internal inquiries and allegations about health-related matters.

Flagle, C.D. Chairman's introduction: Some terminology of evaluation. In B.I. Blum (Ed.), Proceedings of the Sixth Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1982. Pp. 439-440.

As techniques for evaluation of health care technology evolve and the context of evaluation moves from clinical to institutional and societal levels, a terminology associated with the techniques has emerged.

The terms formative and summative evaluation are used to recognize the difference in evaluation procedures appropriate to early development and later application. Formative evaluation is the prerogative of the developer in the evolution of a product. Once implemented in the context of its intended application, summative evaluation is appropriate, that is, evaluation against the intended service objective of the development.

The terms structure, process, and outcome distinguish the classes of variables to be identified. Physical and human resources involved are examples of structural variables. Volume of service, costs, accuracy, and productivity are all process variables, and changed health status and levels of dependency are outcome variables.

Internal and external validity warn of the pitfalls in evaluation. Internal validity may be threatened by changes that may occur during the evaluation, or by a bias in the selection of subjects for an evaluative experiment. External validity is the validity of extending the inference from a particular study to the population in general.

Cost/benefit and cost/effectiveness analysis typify the struggle for rational criteria for evaluation. The objective of cost/effectiveness analysis is to determine the alternative technology or modality that achieves the specified effect at lowest cost. Cost/benefit analysis implies comparison of programs, each with its own set of costs and benefits.

The author concludes that proper understanding of this terminology will allow evaluators to better appreciate and critique evaluations of systems.

Garrett, L.E., Stead, W.W., Hammond, W.E., McDonald, C.J., & Buecher, M. A method of handling subjective and physical data: Experience with two systems. In B.I. Blum (Ed.), Proceedings of the Sixth Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1982. Pp. 232-235.

The future usage of automated medical records in part depends upon the development of a user-acceptable format for the storage of subjective and physical data which allows these data to be clinically usable, while remaining formalized to the degree that the data may be used for retrospective analysis in research or quality assurance. The authors of this paper describe their attempt at developing such a system of nomenclature.

The authors identified four types of data which must be stored: (1) purely numerical with or without units, (2) data usually associated with numerical responses but which can be associated with descriptive textual phrases, (3) those parameters which have a consistent textual response, and (4) those descriptive terms which have an associated textual phrase that is inconsistent but has the same purpose as the phrase found in the third group.

The use of data within a medical record is directly dependent upon the data structure of the system's dictionary. The actual storage of data is dependent upon the internal configuration of the data file. Therefore, as long as the system's dictionary can provide the response limitations necessary, transfer of a nomenclature set into the system's data should only require dictionary modification. A useful nomenclature set should be compatible with dictionaries of different formats.

The system of nomenclature described in this paper has been effectively used in one system and was easily adaptable to a second system. Though the nomenclature is somewhat different from that used routinely by providers, it was found to be acceptable by the users, although certain modifications were recommended.

Garrett, R.W. Environmental tracking at Eli Lilly and Company. Journal of Occupational Medicine, 1982, 24(10), 836-839.

Eli Lilly and Company is developing a computer-based employee-environmental tracking system. This paper presents an overview of this new program, the Worker Exposure Inventory System (WEIS). The system will provide information on the who, what, when and where of employee exposure or potential exposure. It utilizes a location code to identify the where; a process, job or area (P/J/A) chemical inventory to describe the what; and monthly time reporting to describe the who and when.

The backbone of WEIS will be the Industrial Medicine database. This is the database that will link records of employees with those of the chemicals to which they have been potentially exposed and of the severity and frequency of the potential exposures. This database will be composed initially of two files: the Work Environment Inventory or P/J/A Inventory file, and the Degree of Hazard file. During the next phase of the project two more files--Monitored Exposure file and an Environmental Elements file--will be added to this database.

There are other portions of the system which will be needed. One is the addition of a file containing information on the employee's exposure to chemical substances by P/J/A code to the Industrial Relations database. To facilitate access to the information contained in the Industrial Medicine database, a series of cross-reference files, or secondary indexes, will be needed. A number of directories, used to translate codes from the database into descriptive terms, will also be required to support WEIS.

Reports can be produced using virtually any combination of data elements. The system is being designed so that the industrial hygienists can produce their own reports on an ad hoc basis.

Gavin, J.H. SunHealth--A flexible IBM oriented system for both large and small organizations. In R.E. Dayhoff (Ed.), Proceedings of the Seventh Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1983. P. 393.

Sun Information Services Corporation (SIS) and Sun Oil Co. recognized the need for a comprehensive yet flexible occupational health and safety system and jointly developed SunHealth. SunHealth is modular in design and contains the following functional units:

1. Medical records.
2. Audiometrics.
3. Occupational illness and injury.
4. Materials/agents inventory.
5. Industrial hygiene.
6. Material Safety Data Sheet (MSDS).
7. Safety training.
8. Employee work history.

SunHealth can be installed on an IBM mainframe owned by the customer, or optionally can be used on the SIS National Timesharing Network.

Gunderson, E.K. Epidemiological uses of an occupational health information system. In W. van Eimeren, R. Engelbrecht, & C.D. Flagle (Eds.), Third International Conference on System Science in Health Care. New York: Springer-Verlag, 1984. Pp. 294-297.

This paper describes key functions and features of the Navy Occupational Health Information Management System (NOHIMS) and the epidemiological uses of the system. The primary functions performed by NOHIMS include the following: identifying individuals exposed to workplace hazards, scheduling exposed workers for periodic examinations, providing medical personnel with exposure histories and a list of recommended tests and procedures, storing and retrieving medical and environmental data, generating management reports, and compiling standardized information for epidemiologic analyses.

NOHIMS consists of two principal subsystems--an occupational health information component and a medical information component--which can operate as separate, stand-alone systems or can be merged into a unified system. The occupational component was created specifically for NOHIMS and contains six primary modules: (1) Agency data, (2) Personnel data, (3) Environment data, (4) Survey data, (5) Hazard data, and (6) Maintenance functions. The medical component of NOHIMS is an existing software package called COSTAR (Computer-STORED Ambulatory Record), the most widely used software for medical applications in the United States.

Both components of NOHIMS are written in ANSI Standard MUMPS. The MUMPS language facilitates the great flexibility inherent in the NOHIMS design and the extensive cross-referencing capability that gives NOHIMS unique utility for epidemiologic investigations.

A current Navy study provides an example of an epidemiologic approach to investigating agranulocytosis or neutropenia, using total white blood cell (WBC) count as a measure of neutropenia. Possible etiologic agents implicated as causes of neutropenia are benzene, phosphorus, and inorganic arsenic. In this example, NOHIMS would allow for the successful control of an occupationally related disorder that could predispose to more serious disease by linking two crucial concepts: (1) rapid and complete case identification, and (2) accurate exposure measurements.

Hagstrom, R.M., Dougherty, W.E., English, N.B., Lochhead, T.J., & Schriver, R.C. SmithKline environmental health surveillance system. Journal of Occupational Medicine, 1982, 24(10), 799-803.

In 1980, SmithKline Corporation's Environmental Health and Safety staff initiated development of a computerized system to process and analyze information from corporation-wide medical surveillance and industrial hygiene programs. This paper describes the resulting system.

There are four sources of data for the system: cause-of-death data from death certificates, biochemical and hematological screening tests, regularly administered health questionnaires, and reports of accidents and injuries. Job codes were developed to identify employees by major division or product, by department, by group within a department, and, in some cases, by specific task within a group. The construction of the codes allows identification of persons with identical or very similar jobs at one site, at different sites, or in different departments.

The critical portion of the system is the Employee Master File, which defines cohorts and contains demographic data and job codes. This file will contain information on employees who receive medical surveillance and also on those who are not screened. The Employee Master File and Update System provide for input from both manual and computerized personnel systems. A computer program utilizing the Statistical Analysis System (SAS) software package was written to accomplish analyzing the periodic laboratory screening data. As of the publication date, the authors were still exploring ways to relate the data from the health surveillance system files with the industrial hygiene data.

Hattwick, M.A., & Hart, R.J. Medical exegesis: Getting the most out of a computer based information system. In B.I. Blum (Ed.), Proceedings of the Sixth Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1982. Pp. 172-174.

Medical information systems are naturally evolving from isolated, to integrated, to intelligent forms. COSTAR is the first generally available example

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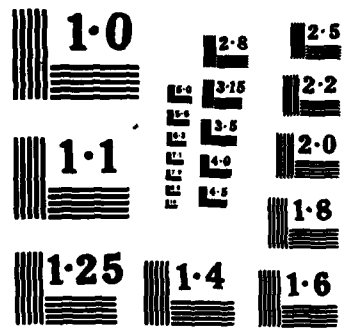
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of an integrated medical record system--one which simultaneously allows management of financial, administrative, and clinical information. Effective and efficient use of an integrated information system can be improved by following four basic principles:

1. Use the system for your most important tasks. The system must be inserted between the user and his/her goal, and not merely used in parallel.
2. Interact with the computer. The more the user interacts with the information system, the more he/she will be able to identify and improve incomplete, misleading, or erroneous parts of the system.
3. Exploit the epiphenomenon created by using and interacting with the system. To obtain maximum benefit from a system, one must take advantage of the multiple usefulness of the data.
4. Educate the system, and yourself. The third generation of medical computers will be intelligent systems. To be effective in modifying a physician's behavior, the computer must actively point out specific things that are being overlooked.

COSTAR is evolving into an intelligent information system which actively contributes to improved patient care. By following these principles, the authors claim to have increased the efficiency of patient encounters by 15 to 20%, and increased the extent to which they achieve their patient care goals by at least 25%.

Hermansen, L. NOHIMS users' guide: Introduction and OHS options. San Diego, CA: Naval Health Research Center, Report No. 84-23, 1984.

The Navy Occupational Health Information Management System (NOHIMS) will help coordinate various components of the Navy's occupational health program. This users' guide describes the various options available in the environmental component of NOHIMS, their uses, and rules for operation of the system. The six primary modules include Agency Data, Personnel Data, Environmental Data, Survey Data, Hazard Data, and Maintenance. Operations within each module are described in detail.

Hillman, D.W. A Computerized Occupational Health and Environmental Surveillance System. Journal of Occupational Medicine, 1982, 24(10), 785-787.

In 1975, Diamond Shamrock Corporation developed a Computerized Occupational Health and Environmental Surveillance System (COHESS). COHESS can be defined as a computerized vehicle that codes, stores, and reproduces, according to program, data on employee health, the work environment, and potential hazards therein for surveillance purposes.

The design and implementation of COHESS are such that information has been segmented into that which is people-related, including all health and personal monitoring; places-related, including all grid locations and area monitoring data; and things-related, including all materials. As a result, information can be obtained from the system in terms of employees, work areas, materials, health data, or monitoring data. Correlations can also be developed.

The principal features of COHESS are a Data Element Dictionary that specifically codes each health item input to the system; a Forms Table that handles any source input document, with flexibility to change data format without reprogramming; and a grid system that links workplace, employee, and environment. The utilization of output is open ended and includes reports, statistics, and epidemiological studies.

The ultimate objective is the surveillance of the health status of employee populations, in relation to their work environment, in order to detect the most subtle changes at the earliest possible moment. Although some items--for example, the grids--are innovative, the system has been designed to accommodate all health/safety and environmental information categories any employer might collect.

Hillman, G. ECHOES: IBM's Environmental, Chemical and Occupational Evaluation System. Journal of Occupational Medicine, 1982, 24(10), 827-835.

ECHOES, the Environmental, Chemical and Occupational Evaluation System, is a computer-based tool designed to help collect, store, retrieve, and summarize data related to health and the environment. The data-processing concept under which ECHOES was developed is one in which a database type of file organization is employed. There are two multifunctional physical databases that make up the principal components of the system, the Chemical Database and the Employee Database.

The Chemical Database is an extract of an on-line, easy-to-use, terminal-based set of programs known as the Chemical Data System. The Chemical Data System is a computerized repository of information about substances the company uses in the manufacture and maintenance of its products. Since 1978, a powerful on-line retrieval system has been operational, enabling users to access the most recent data entered. Using a retrieval system based on APL (A Programming Language), authorized individuals can query the Chemical Data System for information on specific or multiple substances.

The second basic component of ECHOES is the Employee Database. Information contained in this part of the system pertains to individual employees and includes demographic data, occupational and medical histories, and medical examination data. Entry of new or additional information to ECHOES will cause an automatic review of the Employee Database to determine if an employee's exposures require the scheduling of a medical examination.

Hohenemser, C., Kates, R.W., & Slovic, P. The nature of technological hazard. Science, 22 April 1983, 220, 379-384.

In this paper, technological hazards are evaluated in terms of quantitatively expressed physical, biological, and social descriptors. For each hazard a profile is constructed that considerably extends the conventional definition of risk. The profile, which is termed hazardousness, was understood in pilot experiments on perception and appeared to capture a large fraction of lay people's concern with hazard. It also suggests an orderly method for establishing priorities for the management of hazards.

Information systems used in support of occupational health programs (a post-graduate seminar presented at the American Occupational Health Conference, Anaheim, CA, April 30, 1979). Chicago, IL: American Occupational Medical Association, 1979.

This publication is a compilation of four papers presented in 1979 at the American Occupational Health Conference. The first of these papers by A.A. Whyte, BioTechnology, Inc., was entitled "Occupational health and safety information systems." The second paper, "The Du Pont medical examination system," was presented by F.L. Knowles of E.I du Pont de Nemours & Company. "Amoco's health/environment management system" was the third paper given by P.S. Kerr, Amoco Computer Services Company. In conclusion, D.W. Hillman, Diamond Shamrock Corporation, described his company's system called COHESS in a paper entitled, "An occupational health/environmental surveillance system." Handouts that were distributed at the conference are included in this publication.

Jennings, D.P., Fulton, D., & Roy, E. A COSTAR-based veterinary medical information system. In G.S. Cohen (Ed.), Proceedings of the Eighth Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1984. Pp. 467-469.

During early 1982, the Mississippi State University College of Veterinary Medicine formed a task group to determine the most expeditious way to implement a college-wide computerized veterinary medical information and communication system. This group recommended that COSTAR make up the nucleus for developing such a system.

The following goals were adopted for the College's computerized system:

1. Facilitate patient care by improving the availability, accessibility, and timeliness of retrieval, legibility, and organization of medical information.
2. Enhance the financial viability of the Animal Health Center by providing a comprehensive billing system with accompanying accounting reports.

3. Facilitate Animal Health Center administration by providing data retrieval and analysis capability required by management for day-to-day operation, budgeting, and planning.
4. Provide communication and processing support for administrative and ancillary services.
5. Provide the capability to generate standardized and user-specified reports on any elements of the database.
6. Provide the capability of population medical/management records which merges with individual animal data of the Animal Health Center.
7. Provide processing capabilities to utilize a problem-oriented knowledge base for facilitating "diagnosis" and "case management."
8. Provide applications software support for approved remote practice sites.

All goals but 6 and 7 will be achieved through the implementation of COSTAR. Those goals relating to population animal medicine records and problem-oriented diagnosis/case management are being developed through alternative software.

Joiner, R.L. Medical Information Systems Roundtable. In H.G. Heffernan (Ed.), Proceedings of the Fifth Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1981. Pp. 1057-1060.

Representatives of industry met in Chicago in early February of 1981 to discuss health and medical information systems in a roundtable conducted by the Committee on Medical Information Systems of the American Occupational Medical Association. The purpose of the roundtable was to report on the state-of-the-art of health information systems in industry so that companies just beginning to develop systems or contemplating the development of a system could see what has been accomplished to date. This paper is a reporting of the proceedings of that roundtable.

A series of common factors are remarkably consistent from system to system, whether the program began with in-house development or with the purchase of an existing system and modifications to suit company philosophy. Flexibility, modularization, interaction, economy, innovation, and corporate commitment are essential elements in developing functional systems. Development and implementation costs are dependent on the operating philosophy adopted for the system; the choices at each dichotomy can mean substantial differences in overall costs because of delimiting or expanding system capabilities.

The present systems are sophisticated and amazingly complete in their capabilities. However, the difficult questions that remain to be answered about health information systems are philosophical and legal in nature and have little

to do with system design or redesign. These include endpoints, quantity and quality of data, multiple exposure risk assessment, worker migration from company to company, and similar questions.

Joyner, R.E., & Pack, P.H. The Shell Oil Company's computerized Health Surveillance System. Journal of Occupational Medicine, 1982, 24(10), 812-814.

Development of the separate modules of the Shell Health Surveillance System (HSS) began in 1973 and was completed in 1979. The HSS is composed of six data modules linked together to form an information network. These databases operate in an Information Management System (IMS) database environment in an interactive mode. The modules are as follows: personal attributes, biometrics, morbidity, mortality, work histories, and exposure monitoring. The requirements which were addressed through design considerations were confidentiality, quality assurance, reliability, retrieval flexibility, expandability, and cost competitiveness.

The authors report that the implementation of the system in the manufacturing plants has proceeded smoothly, due primarily to general recognition of the need for recording medical and industrial hygiene information and making it available to the company. The system has met user expectations and has operated at costs less than forecast. They anticipate system maintenance costs will approximate 35% of the system life-cycle costs, which is significantly below the 60% range for typical commercial systems.

Judd, S.H. Occupational Health Information System (OHIS). Journal of Occupational Medicine, 1982, 24(10), 806-808.

Standard Oil Company of California's Occupational Health Information System (OHIS) is a computer-based system designed to manage data relevant to the effects of occupational exposures on employee health. In brief, each job is assigned an "environ" code. Each employee's current job assignment is recorded with its environ code in a data file. Jobs are tracked by adding the environ code to payroll reporting and personnel records. Each new assignment is recorded in the same file. Exposures associated with each job are recorded by environ code in a separate file.

Changes in exposure are tracked by field evaluations and by an inventory maintained for known hazardous agents present in the workplace. Occupational injuries and illnesses, biomedical test results, and lost-time sickness and injury are also recorded. OHIS uses personnel data from existing payroll earnings and personnel record systems, minimizing data entry and duplication of computerized data. Retrospective data can be included when available.

Kaplan, B., Maxwell, J.A., Conklin, G.S., Fischer, P.J., & Harbort, B. Systems analysis, project management, and evaluation: Are quantitative methods enough? In R.E. Dayhoff (Ed.), Proceedings of the Seventh Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1983. Pp. 674-676.

Important aspects of good systems analysis and evaluation are frequently considered "soft" or "unscientific" because they are neither quantitative nor quantifiable. However, according to this group of authors, system requirements can be determined and system impacts assessed on a sound, scientific basis by combining quantitative and qualitative methods. This approach goes beyond the usual interviewing of a few key users, and documenting of such quantitative features as work flow, amount of data handled, timing of reports, speed of information retrieval, and cost-benefit ratios.

"Qualitative methods" refer to methods of gathering and analyzing information that (1) utilize detailed, context-embedded descriptions of activities and settings, and (2) inductively develop categories of description and analysis based on the perceptions of participants in the setting being studied rather than employing the prior categories of the researcher. These methods include interviews, observation, open-ended questionnaires, analysis of reports and other documents, and some forms of unobtrusive data collection. Research and evaluation designs can effectively combine qualitative and quantitative methods, as long as the strengths and requirements of each type are recognized.

The authors describe in four short essays how qualitative and quantitative methods can be combined to take advantage of the strengths of each. They agree that, in project design, implementation, evaluation, and management, quantitative methods are not enough.

Kerlin, B.D. COSTAR: History of survival. In H.G. Heffernan (Ed.), Proceedings of the Fifth Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1981. Pp. 91-92.

COSTAR's (Computer-STOREd Ambulatory Record) history of survival is the topic of this brief paper. Although COSTAR incorporates an accounts receivable/billing package, the financial function was considered necessary but secondary in importance to the automated medical record. The intangible benefits of potentially improved patient care through the automated medical record are understandably not as attractive to the commercial marketplace as the direct benefits of an efficient billing system. Without federal funding from NCHSR (National Center for Health Services Research), therefore, COSTAR might never have come into existence.

The COSTAR software reflects a mix of skill levels and changing staff. "Bugs" were reported in the software; different versions existed at the demonstration sites. Without federal funding and encouragement from NCHSR, COSTAR might never have survived the early field experience.

NCHSR took the lead in funding a nonprofit organization--The MITRE Corporation--to promote the transfer of COSTAR into the marketplace by

1. Consolidating the software.
2. Debugging the software.
3. More fully documenting the system.
4. Disseminating information to potential vendors.
5. Providing limited technical assistance to selected vendors.

At present (1981), the barriers to technology transfer of COSTAR V have been partially overcome. Twenty-four vendors are marketing COSTAR. The COSTAR community is growing and a User's Group has been formed. Without federal funding, encouragement, and leadership from NCHSR, however, COSTAR might be on the "endangered species" list.

Kerlin, B., & Green, P. COSTAR: An overview and annotated bibliography.
McLean, VA: The MITRE Corporation, MITRE Technical Report MTR-80W179
(Revision 1), November 1980.

COSTAR is an automated medical/management information system designed for adaptation to a wide range of settings. In its history of over a decade, the COSTAR system has undergone many changes, and several versions of the software exist. The most recent version is COSTAR V, a general purpose, flexible system which can be tailored to diverse ambulatory care settings.

This publication briefly summarizes the functions and highlights of COSTAR V--past, present, future--and directs the reader to relevant reports and journal articles for more detailed information. Although this document focuses on COSTAR V, a few articles pertaining to an earlier version of COSTAR are also cited because the topic, quality assurance, is virtually timeless.

This report has been prepared and is being distributed by The MITRE Corporation as a COSTAR clearinghouse activity, one of several technology transfer tasks under a contract from the National Center for Health Services Research, Public Health Service, Department of Health and Human Services.

Kjerulff, K.H. Measuring attitudes toward computers. In G.S. Cohen (Ed.), Proceedings of the Eighth Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1984. Pp. 528-535.

The primary purpose of this study was to examine the degree to which attitudes toward computers were related to adaptation to computerization. Two questionnaires were developed, one to measure general attitudes toward computers (ACG) and the second to measure attitudes toward the medical information system which was being implemented (ATMIS). The ACG was a significant predictor of the change scale, which was a measure of adaptation to the computer system.

The ACG was also a significant predictor of desire for additional training. The ATMIS significantly predicted individual's overall evaluation of training and self-rated competence at working with the MIS. The ATMIS was also strongly related to concurrent measures of job satisfaction and adaptation to the MIS.

The author feels that, clearly, attitude is related to response to computers, but it depends upon how it is measured. Attitudes toward computers in general was predictive of adaptation to the MIS, while the scale designed to assess attitudes toward the MIS was more reflective of concurrent measures of adaptation. Both scales were predictive of different aspects of perceptions of training. The author concludes, therefore, that attitudes toward computers are related to a variety of relevant measures of response to computers, but these relationships will vary depending upon how the attitudes are measured.

Kjerulff, K.H., Counte, M.A., Salloway, J.C., & Campbell, B.C. Who can't get no satisfaction? Reactions to medical information system training. In R.E. Dayhoff (Ed.), Proceedings of the Seventh Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1983. Pp. 668-672.

This paper presents the results of a questionnaire given to a group of Medical Information System (MIS) users concerning their perceptions of the training they received. The questionnaire focused on perceived adequacy of the training received and felt competence utilizing the MIS after training. A variety of information gathered from the MIS users prior to and shortly after training was also related to perceptions of training. The results indicate, according to the authors, that the employees who were more satisfied with their training were subsequently more positive toward the MIS and toward the changes the MIS created in their jobs. Users who were high on Cognitive Structure (a personality measure) indicated that they wished to have more training, but felt competent at working with the MIS. The more educated employees perceived themselves as being more competent at working with the MIS.

Kuhn, I.M., & Wiederhold, G. The evolution of ambulatory medical record systems in the U.S. In H.G. Heffernan (Ed.), Proceedings of the Fifth Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1981. Pp. 80-85.

This paper is an overview of the developments in Automated Ambulatory Medical Record Systems (AAMRS) from 1975 to the present (1981). A summary of findings from a 1975 state-of-the-art review is presented with the current findings of a follow-up study of the AAMRS.

The studies revealed that effective automated medical record systems have been developed for ambulatory care settings and that they are now in the process of being transferred to other sites or users, either privately or as a commercial product. Since 1975 there have been no significant advances in system design. However, progress has been substantial in terms of achieving production

goals. Even though a variety of systems are commercially available, the authors conclude that there is a continuing need for research and development to improve the effectiveness of the systems in use today.

Kuhn, I.M., Wiederhold, G., Rodnick, J.E., Ramsey-Klee, D.M., Benett, S., & Beck, D.D. Automated ambulatory medical record systems in the U.S. Stanford, CA: Department of Computer Science, Stanford University, Report No. STAN-CS-82-928, August 1982.

This report presents an overview of the developments in Automated Ambulatory Medical Record Systems (AAMRS) from 1975 to 1982. A summary of findings from a 1975 state-of-the-art review is presented along with the current findings of a follow-up study of a selected number of the AAMRS operating in 1981-1982.

The sites and systems visited in the follow-up study included the following:

1. Computer-Stored Ambulatory Record (COSTAR) system at North End Community Health Center, Boston, MA; and North (San Diego) County Health Services, San Marcos, CA.
2. The Medical Record (TMR), Duke University, Durham, NC.
3. Regenstrief Medical Information System (RMIS), Regenstrief Institute, Indianapolis, IN.
4. Arthritis Research Information Office Network, Arthritis Center, Wichita, KS.
5. Family Practice Medical Information System (FMIS), Community Electrocardiographic Interpretative Service (CEIS), Denver, CO.

The studies revealed that effective automated medical record systems have been developed for ambulatory care settings and that they are now in the process of being transferred to other sites or users, either privately or as a commercial product. Since 1975 there have been no significant advances in system design. However, progress has been substantial in terms of achieving production goals. Even though a variety of systems are commercially available, there is a continuing need for research and development to improve the effectiveness of the systems in use today.

Kuritz, S.J. The Ford Motor Company Environmental Health Surveillance System. Journal of Occupational Medicine, 1982, 24(10), 844-847.

Ford's Environmental Health Surveillance System (EHSS) is a complex interaction of several subsystems which are designed to encompass the basic components of an occupational health and safety surveillance system: (1) exposure data, (2) health and safety status/effects data, and (3) worker status/history data. The subsystems used in EHSS are the following: the Materials and Toxicology (MATS) and Industrial Hygiene subsystems that provide exposure data; Medical Records and Surveillance, Biological Monitoring, Mortality, and projected Safety which provide health and safety effects data; Work History which provides

work histories; and Epidemiology which coordinates the effective use of all of the subsystems. The highlights of each of the subsystems are described in this paper.

Magerlein, J.M., Yager, C.A., & Cernik, J.J. Occupational Health Surveillance System (OHSS) at The Upjohn Company. Journal of Occupational Medicine, 1982, 24(10), 809-811.

To provide accurate, up-to-date, and accessible information on employee health and exposures, The Upjohn Company has developed an Occupational Health Surveillance System (OHSS). This paper describes the components and uses of the system.

Three distinct categories of information define the three major components of OHSS. The Employee Medical Module is the repository of all information pertaining to the health status of the employee. This information, collected primarily from clinic visits and surveillance examinations, is used to provide medical care, to construct medical histories, and to provide data for population studies.

The second major component, the Agents Database, is a comprehensive collection of data on all of the agents used within The Upjohn Company. It focuses on workplace-related elements that could affect the health of the employee. Data stored in the Agents Database include synonyms, chemical and physical properties, and emergency procedures.

The Employee Medical Module and Agents Database provide basic information to support company operations related to occupational health and safety. Only by linking the two components is it possible to relate information on workplace hazards to information pertaining to employee health. Providing this link is the function of Worker Exposure Tracking (WET), the third major OHSS component. The integration of the WET information with the other two components of OHSS permits studies that analyze the short- and long-term effects of exposure to agents.

McLatchey, J., Barnett, G.O., McDonnell, G., Piggins, J., Zielstorff, R.D., Weidman-Dahl, F., Hoffer, E., & Hupp, J.A. The capturing of more detailed medical information in COSTAR. In R.E. Dayhoff (Ed.), Proceedings of the Seventh Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1983. Pp. 329-332.

A heavy reliance on the use of narrative text to record information in the COSTAR medical record has made automated analysis of the data difficult. Front-end microprocessors and new data capturing mechanisms have made it possible to develop methods which facilitate entry of medical data in codable form. A prototype of such a system developed at the Laboratory of Computer Science is described by the authors of this paper.

The key to improved data capture suggested by the authors is to make the process more acceptable to the physician, which must involve an interface that can capture more precise data with little additional work or effort by the physician. The authors felt the following were necessary criteria for continued acceptance by the physician users:

1. Entry of data not delayed by system response time.
2. Reliable hardware.
3. Position in menu hierarchy obvious to user.
4. Easy selection of terms from menus.
5. Allow text to be appended to any item.
6. Allow user to record to any desired level of precision.
7. Allow order and form of presentation to be site-definable.

To create such a system, the authors relied upon the newly developed "mouse/window environment." These systems allow the user to view each menu within its own workspace known as a "window." Selection of an item from the window-menu causes a new window of choices to be displayed without completely overwriting the previous window. Windows may be overlapped in such a way that the path of all previous selections is visibly apparent. The mouse is a small hand-held device that can be moved across a flat surface to affect cursor movement on the terminal screen. The device was found by study groups to be the most natural and precise form of speedy menu selection. The authors conclude that these technical advances and their prototype system have opened the way for new user interfaces to be designed to further encourage physicians to use medical information systems.

Möhr, J.R., Sawinski, R., Kluge, A., & Alle, W. On selecting commercial information systems. In G.S. Cohen (Ed.), Proceedings of the Eighth Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1984. Pp. 170-174.

This paper describes the selection of a laboratory information system by the University of Heidelberg. The authors felt that the method of assessment should allow evaluation of such characteristics and features as technical and functional adequacy, reliability of the vendor, costs, and compatibility with local conditions, but also avoid the common drawback of a fair extent of subjectivity. The assessment method chosen was "multilevel assessment."

Multilevel assessment consists of establishing a hierarchical system of criteria which are checked for completeness and lack of redundancies and contradictions. These criteria are weighted by distributing a total of points among the criteria. In a subsequent step, each system variant is graded for each criterion. This subjective grading results in projection of every system feature onto a single scale. Subjectivity can be controlled by using the Delphi technique. The composite value of an assessed system is determined by adding the products of grades and weights for each system. The authors further present evidence to support their contention that the method is comprehensive, reproducible, valid, and economical.

O'Neill, P., Volkert, J.J., & Koop, G.O. COMET: A system for micro, mini and mainframe environments. In R.E. Dayhoff (Ed.), Proceedings of the Seventh Annual Symposium on Computer Applications in Medical Care. Silver Spring, Md: IEEE Computer Society Press, 1983. Pp. 394-396.

The Creative Occupational Medical and Environmental Tracking (COMET) system, which was developed in MUMPS and designed to be transportable from one computer to another, can now be operated on hardware ranging from micros, to large minis, and even IBM mainframes. This has particular advantages in occupational health applications where distributed processing and system networks may present distinct advantages. Individual departments or plants can install a system at minimal cost to meet their specific needs with the potential to evolve a corporate-wide system which may include a variety of micros, minis, or mainframe computers.

In the COMET system, data are organized in three modules that provide occupational health tracking: personnel information, medical information, and industrial hygiene/toxicology information. A unique feature is the on-line capture and storage of data through a questionnaire driver. The driver is a user-friendly computer program enabling the composition and editing of questionnaires or data collection instruments to cover any information needs. COMET also offers more than 30 reports in standard formats that can be tailored to each user's requirements.

Oppenheim, A.G. Facilitating a public health information system in California. In B.I. Blum (Ed.), Proceedings of the Sixth Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1982. Pp. 157-161.

The State of California is assisting local government in the development of automated health information systems. The Computer-Stored Ambulatory Record (COSTAR) has gained the widest acceptance among systems being implemented. Several important COSTAR features have led to its growing acceptance in California. COSTAR can be used for registering patients and scheduling future appointments, for creating patient medical and treatment records, for billing patients and tracking accounts receivable, and for generating extremely complete reports on patient characteristics and clinical activities. The system's flexibility and adaptability, along with the fact that COSTAR's billing and accounts receivable components have the potential for substantially increasing provider revenues, have made COSTAR attractive to County Boards of Supervisors as well as county health departments.

Certain aspects of the system have created difficulties, however, COSTAR systems are expensive, and only a few brands of computers are suitable for COSTAR operation. There is a shortage of COSTAR vendors in California, and there is a similar shortage of programmers trained in MUMPS, the programming language used in COSTAR. Also, a large amount of time is required to obtain the necessary financial resources to implement a COSTAR system and the implementation itself takes time.

Despite the problems mentioned above, COSTAR is an extremely powerful health information system, with substantial advantages. California's Department of Health Services is interested in determining the applicability of the COSTAR system to the State's local health jurisdictions on a demonstration basis. There are current installations of COSTAR by local governments in San Diego County, Santa Barbara County, Ventura County, Riverside County, Fresno County, Santa Cruz County, and the City of Berkeley.

Osburn, A.E., Neches, N.M., Shissler, G.E., & Kittredge, D. Enhancement to COSTAR with a problem oriented record structure and decision making support functions. In H.G. Heffernan (Ed.), Proceedings of the Fifth Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1981. Pp. 124-128.

The guiding design goal for the COSTAR enhancements described in this paper has been development of a package which can interactively derive and communicate the Knowledge Content from accumulating clinical data to a provider in order to support decisions he/she makes during the health care management process. This goal has been realized through implementation of a Problem-Oriented Record Structure which is automatically created from clinical data entered into the system. The Problem-Oriented Record Structure provides an interpretive frame of reference for clinical data, and facilitates automatic derivation from the results of decisions made by providers of a knowledge about features supporting identified health problems. This knowledge is used, in turn, for automated decision support functions during interactive data entry sessions. While it is felt by the authors that the development thus far is significant, they also feel that the most important feature of the system is the framework which it provides as a foundation for future development.

OSHA medical surveillance requirements and NIOSH recommendations for employees exposed to toxic substances and other work hazards (prepared for the NASA Occupational Health Office). Falls Church, VA: BioTechnology, Inc., January 1980.

This report was prepared by BioTechnology for the National Aeronautics and Space Administration (NASA) and was approved for distribution by BioTechnology. Permission was also given by NASA's Occupational Health Office. This publication summarizes OSHA Medical Surveillance Requirements of the Occupational Safety and Health Act as set forth in General Industry Standards, 29 CFR 1910.1000 and recommendations taken from NIOSH criteria documents. Specific relevant sources for this summary are shown in the first column accompanying each chemical name.

Piggins, J., McLatchey, J., Zielstorff, R., Barrett, S., Smith, M., Weidman-Dahl, F., Brown, K., & Barnett, G.O. Considerations in designing and implementing enhancements to COSTAR. In B.I. Blum (Ed.), Proceedings of the Sixth Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1982. Pp. 182-186.

This paper describes recent experience in implementing two major COSTAR enhancements, namely a patient-specific encounter form and an order entry and dispatch subsystem. A number of points to be considered in regard to planning and implementing such enhancements are raised, and the relative success of these two enhancements at one particular site is discussed.

As illustrated by the authors' experience in implementing the Patient-Specific Encounter Form and Message Switching subsystems, enhancements to COSTAR can require a significant amount of time and effort in terms of initial design, programming effort, and subsequent modification. Careful and thorough analysis of existing workflow patterns and the potential impact of the proposed enhancement on those patterns is essential. Flexibility of program design is also important, since experience with a new feature in day-to-day operation may well lead to further requests for modifications. Overall, the concepts embodied in the Patient-Specific Encounter Form and Message Switching subsystems have proven viable and have made a positive contribution to COSTAR operation at Pease Air Force Base, the site of their implementation.

Pryor, D.B., Barnett, G.O., Gardner, R.M., McDonald, C., & Stead, W.W. Measuring the value of information systems. In G.S. Cohen (Ed.), Proceedings of the Eighth Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1984. Pp. 26-28.

This paper is a publication of the opening comments given at a panel discussion whose purpose was to improve the quality of investigations designed to measure the value of an information system. The key questions around which the discussion was focused were the following:

1. Does an information system allow the medical community to do anything that would otherwise be impossible without an automated system; what is the greatest value of a patient database?
2. Can an information system save money or time in the patient care process; how can the cost of the data collection and storage be justified and make the system self-supporting?
3. How are observations made from a database validated; what are the limitations of drawing inferences from nonrandomized studies and how can they be minimized?
4. How can management information systems improve the practice of patient care and how are these improvements measured?
5. How does an information system impact on interactions between members of the health care team and how is this measured?

The remainder of the paper describes the systems each panel member was involved in evaluating.

Pugh, W.M., & Beck, D.D. Preliminary specifications for a Navy Occupational Health Information Monitoring System (NOHIMS). San Diego, CA: Naval Health Research Center, Report No. 81-36, 1981.

The objective of the Navy Occupational Health Information Monitoring System (NOHIMS) development project is to provide an information system that will coordinate the components of the Navy's occupational health program in order to meet the requirements of the Occupational Safety and Health Act of 1970, thus helping to provide a safe and healthful working environment for employees in Navy industrial facilities. This report describes the initial phases of the design and development of NOHIMS. The system is being designed and developed by the Naval Health Research Center (NHRC), San Diego, to insure that not only environmental health data are included but also that the data obtained can be used for epidemiological analyses.

Initial work on this project involved a comprehensive systems analysis of the recordkeeping and reporting requirements of a typical naval industrial facility--the North Island Naval Air Rework Facility (NARF) located at the Naval Air Station, San Diego. Preliminary specifications for collecting, processing, and displaying medical and environmental data within a prototype system were developed. In the design of this prototype system, extensive consultation was conducted with personnel from the Naval Regional Medical Centers in San Diego and Pearl Harbor because the regional medical centers are viewed as the primary users of the system.

Pugh, W.M., Beck, D.D., & Ramsey-Klee, D.M. An overview of the Navy Occupational Health Information Monitoring System (NOHIMS). MUG Quarterly (Proceedings of the 1983 MUMPS Users' Group Meeting), Spring 1983, XIII(1), 129-135. Also, San Diego, CA: Naval Health Research Center, Report No. 83-8, 1983.

The Navy employs hundreds of thousands of workers (both civilian and military) who are scattered across the country, involved in a variety of diverse industrial operations, and exposed to multiple health risks from an array of chemicals and other agents. In order to provide a safe and healthful work environment for these workers as required by the Occupational Safety and Health Act of 1970, the Navy has developed the Navy Occupational Health Information Monitoring System (NOHIMS) and is currently implementing a pilot system at the Naval Air Rework Facility, San Diego. NOHIMS has been designed to insure that (1) all individuals exposed to hazardous agents within a facility are identified, (2) all exposed individuals are given periodic examinations, (3) examinations include those tests and procedures needed for prudent monitoring, (4) the environmental information which led to the decision to monitor or not to monitor an individual is recorded, and (5) sufficient data for epidemiological studies are retained in a readily accessible form.

In order to provide the information needed to coordinate the components of the Navy's occupational health program, NOHIMS utilizes a database consisting of several types of data entered into the system on an ongoing basis and a set of reference tables that makes it possible to interpret the significance of a

particular element of data. Once raw data have been compared to standard reference points, it becomes possible to compile various reports and to exchange this information on a timely basis.

NOHIMS consists of two subsystems: (1) an industrial tracking component, and (2) a medical information component. The medical information component consists of COSTAR--the Computer-Stored Ambulatory Record system. Each of these two components of NOHIMS can also operate as a stand-alone system. Because of the vast flexibility inherent in the design of NOHIMS and its extensive cross-referencing capability, it is possible to ask a virtually unlimited number of questions of the system.

Rappaport, W. FLOW GEMINI: A proven occupational health information system. In R.E. Dayhoff (Ed.), Proceedings of the Seventh Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1983. Pp. 391-392.

Nine major United States and Canadian corporations are now using FLOW GEMINI, a highly flexible and comprehensive software system for the storage, retrieval, and analysis of occupational health data. The functional components are scheduling, industrial hygiene surveillance, and medical surveillance. The software components are a database management system, a data dictionary, a data descriptor editor, a report program generator, a query language, several statistical package options, and an external system interface. FLOW GEMINI is available to run on a customer's own computer, as a time-sharing system on Flow General's computer, or as a service.

An unusual degree of confidentiality and security is achieved in the system via the separate control of access to the system's functions and access to the data. FLOW GEMINI's Report Generation System includes many standard reports. Its Report Program Generator and query language are easy-to-use, highly flexible tools for developing new standard and ad hoc reports.

Rappaport, W., & Steen, C. FLOW GEMINI: An occupational health information system. In H.G. Heffernan (Ed.), Proceedings of the Fifth Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1981. Pp. 1061-1065.

This paper describes key functions and features of the FLOW GEMINI occupational health information system. The system performs a comprehensive set of functions to support monitoring of employee health and workplace conditions for industries in which there are potential health and safety hazards. To support monitoring of employee and workplace conditions, FLOW GEMINI performs the following functions: scheduling, medical and industrial hygiene surveillance, reporting, statistical analysis, and reference. A database manager is used so that each user can adapt the system to its own environment and to changing corporate and regulatory requirements. The Report Generator System offers flexibility in accessing, querying, analyzing, and displaying items from the

database. The Report Generator System contains a Program Generator with a high-level language, designed for use by nonprogrammers, which generates a FORTRAN program for the production of a report. The Report Generator also has query language capability.

Reed, L.J., & Solomon, M.E. DEChealth: A comprehensive occupational health information system. In B.I. Blum (Ed.), Proceedings of the Sixth Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1982. Pp. 144-147.

DEChealth, the DECmed Occupational Health System, developed by an interdisciplinary team of occupational health professionals and computer engineers, is designed to provide an information management tool in the industrial setting. The authors describe four aspects of the system: environmental tracking, industrial hygiene, health services, and reporting and statistical analysis.

The environmental tracking mechanism provides snapshot views of the workplace. The industrial hygiene portion of the system collects quantitative and qualitative information pertaining to the actual sampling of the work environment. It is these data which are integrated with the employee and medical modules to facilitate the determination of the effects of the workplace on employee health.

The health services subsystem provides for the storage of medical histories, physical examinations, laboratory results, and other relevant medical information pertaining to each employee throughout the course of his/her employment. This medical information is then used in conjunction with the environmental tracking and industrial hygiene data to develop a centralized storehouse of health and exposure information. Flexibility is provided for by allowing the user to define all questionnaires, lab tests, and the components of an examination.

The reporting and statistical analysis module provides for the retrieval and integration of all this systematically stored data. Together, the environmental and medical reporting functions provide a means of scanning, correlating, comparing, profiling, sensing, and probing the comprehensive database for evaluation by occupational health professionals.

Robinson, H., & Wood, L.W. The New York Telephone Company medical information system. Journal of Occupational Medicine, 1982, 24(10), 840-843.

The New York Telephone Company has developed a system they call Health Care Management (HCM). Basically, HCM is the application of business management methods to health care. They have arbitrarily divided HCM into three levels of management. Level I management occurs in response to acute departures from an individual's health norm, and constitutes that kind of disease care for which most physicians are trained. Its objective is to restore the norm, either the old one or a new one, as rapidly and as cost effectively as possible. Level II

management, also oriented to the individual employee, is the management of wellness by working with the employee to set long-range health objectives and to work out strategies to reach those objectives. Level III handles the management of the population and the system.

The New York Telephone Company MIS is being developed to satisfy the needs of HCM. It is a computer-based system utilizing the MUMPS programming language. The development is taking place in three phases which are discussed in this article:

1. The replacement of the medical chart by "user friendly" data input and display programs and a report-writing ability.
2. The grafting of a degree of intelligence onto the system by writing application programs for the diagnosis of Level II health entities requiring management and the automatic scheduling of employee appointments based on demographics and medical findings.
3. The ability to run comprehensive statistical programs to evaluate HCM and provide the information for decision making on the control of medically related costs.

Rossi, D.A., Cox, J.D., & Seger, M.J. Computerization of medical and exposure records in the semiconductor industry. Journal of Occupational Medicine, 1982, 24(10), 859-862.

An interdisciplinary team of occupational health professionals and computer engineers at Digital Equipment Corporation have developed a computerized system for maintaining employee medical and exposure records. The Industrial Health Monitoring System (IHMS) was designed to meet the occupational and public health needs of employees engaged in semiconductor manufacturing operation where potential exposure to hazardous chemicals and physical agents exists.

The system consists of a 3-tier continuum of input and output screens that creates a hierarchical information network composed of an historical environmental profile, industrial hygiene and health services activities, and summary and detailed reports. A main menu lists the major functional components, allowing the user to enter or retrieve data by selecting from the main menu screen a single function, and by continuing the process through one or more dependent submenus until the data entry or retrieval is completed.

To date the development of computerized recordkeeping in the system has been limited to medical and exposure data. Future plans include development and implementation of independently driven modules, such as hearing conservation and audiometry, radiation, and hazardous waste manifest programs.

Schauffler, H.H., & Koran, R.E. A methodology for estimating costs and benefits of medical information systems. In G.S. Cohen, (Ed.), Proceedings of the Eighth Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1984. Pp. 152-155.

Accurate and timely information regarding the costs and benefits of automated medical information systems (MIS) is important to decision makers in the Tri-Service Medical Information Systems (TRIMIS) Program Office, DoD, as well as to administrators in civilian hospitals and clinics. A methodology for conducting an economic analysis of an MIS is described. Included are methods for identifying and estimating system benefits and system costs, calculating the incremental life-cycle net benefit or cost, and testing the sensitivity of the results of the analysis to changes in benefit and economic assumptions.

The authors conclude that the methodology for evaluation, as described in the paper, has been tested and has proven itself useful to program managers. It provides managers with much needed information on the costs and benefits associated with the purchase, installation, and operation of a medical information system and presents that information in a manner that is accurate, understandable, and useful for decision making.

Schteingart, R., Wachenchauzer, R., Jamschon, R., Uman, G., Visciglio, H., Donovan, K., D'Adamo, G., & Panuncio, C. Development of an integrated medical record system at a large hospital using COSTAR as a designing tool. In B.I. Blum (Ed.), Proceedings of the Sixth Annual Symposium on Computer Applications in Medical Care. Silver Spring, Md: IEEE Computer Society Press, 1982. Pp. 166-171.

This paper describes the design, programming, and implementation of an integrated information system in Sanatorio Guemes, a private hospital in Buenos Aires, Argentina. Advantages and disadvantages of using COSTAR in a hospital with 850 beds and 2,500 daily outpatient visits are pointed out, and the new system designed on the basis of COSTAR functionality is described.

The authors conclude that the public domain version of COSTAR is an invaluable tool that can be used to analyze the feasibility of a computer-based medical record system. Changes have to be made, however, in order to meet the requirements specified by the hospital and to design a widely accepted system.

They conclude also that when changes are made in a large system, in order to minimize hardware costs and to interface with previously programmed systems, it is possible that redesigning of files and rewriting of programs will be necessary. However, the use of COSTAR specifications allows the hospital to decrease software development costs and time, and to obtain a made-to-measure system that can grow gradually.

Smith, F.R., Gutierrez, R.R., & McDonagh, T.J. Exxon's Health Information System. Journal of Occupational Medicine, 1982, 24(10), 824-826.

There are five modules in Exxon's Health Information System (HIS): Substance Monitoring, Employee Tracking, Medical Surveillance, Reporting, and Epidemiology. The Substance Monitoring and Employee Tracking modules are useful in identifying potential employee exposure to specific substances as well as level and duration of exposure. On the basis of this information, employees can be scheduled by means of the Medical Surveillance module for both medical examinations and toxic hazard training. The Medical Surveillance module also schedules routine health maintenance examinations and collects medical histories information on life-style habits, physical examination results, laboratory reports, and morbidity and mortality data.

The Reporting module provides analytical data from Substance Monitoring, Employee Tracking, and Medical Surveillance for use by Exxon's health professionals. Summaries can be generated by individual, by groups of individuals, by substance, by process, by post, by craft, by specific location, or by groups of locations.

A higher level, more analytically oriented system to help perform epidemiologic studies is also being developed by Exxon. The Generalized Epidemiology System (GES) utilizes data received from HIS and is a flexible system that can accommodate varying data requirements encountered in epidemiologic studies. Through the use of detailed programs, the epidemiologist can add, modify, process, and report on data in a variety of ways and with little or no assistance from a programmer/analyst.

Soto, R.J., Kalan, D.A., Tordoff, R., Falbo, L.L., Galatowitsch, J., & Smith, L.W. Data base management system for tracking occupational health. In J.T. O'Neill (Ed.), Proceedings of the Fourth Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1980. Pp. 333-338.

An Occupational Health Information System (OHIS) which is a data base management system for tracking occupational health has been developed by S. C. Johnson & Son, Inc. A primary feature is its ability to correlate employee workplace environment with health. Hardware implementation of OHIS is on a minicomputer. Application programs were written in ANSI Standard MUMPS language. OHIS is comprised of three basic modules that contain Personnel, Medical, and Industrial Hygiene/Toxicology information. Each module contains information that has been integrated into one data base. The Personnel module is comprised of demographic information collected and updated by the Corporate Personnel Department. The Medical module utilizes an interactive terminal-driven questionnaire subsystem and multiphasic testing subsystem that are selectively assessed by authorized users. The backbone of OHIS is a dictionary of all possible data elements which contain parameter abbreviation, name, grouping, and normal values. A final medical report includes a medical history summary, physical findings and x-ray interpretation, highlighted and normal test findings, computer interpretations, and a final 1-page summary of problem and health risk

information. Workplace environment information is captured and reported by the questionnaire driver. This questionnaire is designed to define (1) monitoring conditions, (2) sample analysis, (3) measurement results, and (4) personal protective equipment. These data provide a means of assigning environmental measurements in a work area to the appropriate employees.

Stallard, C.W., Jr. The SOHIO health information system: A system for data collection and computer processing in an occupational health program. Journal of Occupational Medicine, 1982, 24(10), 853-858.

This paper describes the SOHIO health information system, which is based on the concept of "profiling" coupled with code systems and data processing. The principal element of the system is the Medical Summary Sheet, which encapsules virtually all of the information about an employee. The data elements included on the Medical Summary Sheet are primary, secondary, and tertiary identifiers; Job Exposure Table codes; Qualification and Surveillance Program codes; and Medical Profile codes. The author describes in detail the derivation and uses of these identifiers and codes.

Also described is the file system used in SOHIO's health information system. The system consists of six basic files: (1) the master file containing employee data and all demographic identifiers along with the medical profile and the job exposure table, (2) the coded diagnostic entries, (3) a job exposure inventory, (4) master code inventory which lists all chemicals present in the company, (5) industrial hygiene data, and (6) toxicological information file.

Stewart, W.W., Allen, J.W., Bilella, J., & O'Neill, P. ETHOS, a health surveillance data base system. In B.I. Blum (Ed.), Proceedings of the Sixth Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1982. Pp. 135-138.

The basic purpose of a health surveillance system is to detect changes in an employee's health status. These changes may uncover health threats from newly introduced or existing industrial/consumer substances. Stewart-Todd Associates has provided employee health monitoring services to a variety of industries for over 10 years. From these experiences the company developed a computerized health surveillance system called ETHOS. ETHOS was developed on an IBM System/38 with the QUERY capability. The computer program has four modules: Personnel/Administrative, Medical, Industrial Hygiene, and Safety. Advanced features of ETHOS include its adaptability to a variety of users' requirements, flexible data input structure, and reports that highlight trends for individuals or groups. Several companies in unrelated industries use ETHOS on a time-sharing basis. The storage of their employee data plus the reporting capabilities of ETHOS permit accumulation of a large employee data base. Such a data base is a valuable resource for detecting adverse health effects to employees or substantiating claims of a substance's harmlessness.

Sugano, D.S. Worker tracking--A complex but essential element in health surveillance systems. Journal of Occupational Medicine, 1982, 24(10), 783-784.

This author believes that the overall effectiveness and usefulness of an occupational health surveillance system are to a great extent determined by the system's ability to track the work experience of individual employees throughout the course of their employment. He states that it should be possible to extract or reconstruct from the database three general kinds of information: (1) the type(s) of hazards to which an employee may be exposed, (2) the degree or severity of that exposure, and (3) the time and duration of such exposure.

In existing health surveillance systems, three basic methods for defining worker exposure groups appear to be in use. These are the following: (1) grouping by job description or title, (2) grouping by work location, and (3) grouping by process or activity unit. Most companies attempt to identify worker exposure groups by a combination of two of these three methods of classification.

The author feels that four basic qualities that all systems should possess are (1) uniformity within exposure groups, (2) accuracy of classifying workers into proper exposure groups, (3) adequacy (e.g., are the job assignments or work locations of an individual employee reviewed frequently enough to ensure proper classification into the appropriate exposure groups?), and (4) cost-effectiveness. Each employer is perhaps best able to make the complex trade-offs between these and other criteria for an adequate worker tracking mechanism. Once the technical specifications have been determined by industrial hygienists and epidemiologists, the job of defining the type of worker tracking system that will be most cost-effective or practicable with respect to money, manpower, and organizational constraints becomes considerably easier.

Torrance, J.L., Torrance, G.W., & Covvey, H.D. A "cookbook" cost analysis procedure for medical information systems. In R.E. Dayhoff (Ed.), Proceedings of the Seventh Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1983. Pp. 621-624.

The authors have developed a costing procedure for medical information systems, incorporating state-of-the-art costing methods (opportunity costs, annuity method for one-time costs, reciprocal allocation for overhead costs, etc.) in a "cookbook" format. To use the procedure, one simply fills out a series of forms--the Mac-Tor EZ-Cost Forms. The authors have field tested the procedure and the forms by applying them to the costing of a cardiovascular database system. Although the entire procedure, forms, and application could not be presented in so brief a paper, the authors summarize the major features and encourage interested readers to write for more detailed material.

Walter, D.F. Control Data Corporation's occupational health and safety system. Journal of Occupational Medicine, 1982, 24(10), 848-852.

This paper describes Control Data Corporation's model for an Employer Health Affairs system. The modules of the system reflect the major types of interaction with health-related data. The Employee Personnel Data Module is the source of data needed for all of the other modules. Records from all modules flow into an integrated database. Thus, the modules may be put in place separately, with the capability of extracting integrated information being applied to whichever modules are present.

The main topic of this paper is the Medical Services Module (MSM). The MSM contains five files. The Question Pool file contains responses to questions and performs condition checks. The Logic file contains all logical interconnections among data elements. The Output Text file contains all output text. The Client Profile file contains client demographic information, company name, data on locations, responsible individuals, and other information. The Employee Record file contains all data collected by MSM. In addition to describing the system itself, the author also describes the implementation of a representative screening examination and gives an example of tailoring MSM to a client's requirements.

Watson, B.L. Medical data and computer generated evidence. In R.E. Dayhoff (Ed.), Proceedings of the Seventh Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1983. Pp. 633-638.

The author presents a history of the use of automated medical records and associated data in litigation in the United States. His major conclusions are as follows:

Computerized records are now treated as similar to--if not identical with--other, more traditional records for purposes of discovery and subpoena. Although a discovering party may be required to develop and utilize its own program to access a particular subset of data, cooperation on the part of the records' custodian is clearly appropriate when the discovery has been judicially compelled or agreed to by the parties.

On the other hand, material prepared expressly for litigation (e.g., a compilation of medical billing or service records involving a particular provider) should be protected by the work product doctrine. The introduction of computer printouts as evidence in an administrative or judicial proceeding depends upon an adequate foundation regarding the process of recording the data at issue and the software utilized to select these records, and support for or challenge to this foundation should form the core of any controversy over admission of these records.

Finally, the projection of the characteristics of a large population of records through random sampling has been supported in the billing context by a sufficient number of judicial decisions, and will receive more widespread appli-

cation in the future, particularly in quality of care review. While providers at risk through the application of these procedures may focus their assault upon the randomness of the sample and its margin of error, the better course for us all is likely to include genuine efforts to improve the quality of care, to increase the efficiency of its delivery, and to police billing honesty.

Whyte, A.A. Information requirements of the National Aeronautics and Space Administration's safety, environmental health, and occupational medicine program. Falls Church, VA: BioTechnology, Inc., Contract NASW-3119, May 1978.

The information requirements of the Safety, Environmental Health, and Occupational Medicine Programs at the National Aeronautics and Space Administration were studied to assess the need for a computerized information system. A survey of the internal and external reporting and recordkeeping procedures of these programs was conducted at Headquarters and five National Aeronautics and Space Administration Centers. This report describes these reporting and recordkeeping procedures and the major problems associated with them. The impact of probable future requirements on existing information systems was evaluated. This report also presents the benefits of combining the safety and health information systems into one computerized system and recommendations for the development and scope of that system.

Wolkonsky, P. Computerized recordkeeping in an occupational health system: The Amoco system. Journal of Occupational Medicine, 1982, 24(10), 791-793.

Standard Oil Company (Indiana) has developed a comprehensive computerized occupational health recordkeeping system that has been in use throughout the consolidated company for six years. The system's primary focus is the storage and retrieval of a large database. It permits analyses of the data that can provide correlations among disease and medical findings, work history and environmental exposure, accident information, and demographic factors such as social and workplace history.

The primary focus of this paper is on the measures taken to ensure the integrity and security of the data contained in the system. To ensure the integrity of the data, a complex series of edit checks is performed as the data are entered. The first-level check ascertains that the data are complete. The second-level check assures that all tests designated as required have been done. The third check tests the value of a numeric result against a clinically normal range and a clinically impossible range.

Extensive safeguards have been built into the system to prevent access by unauthorized individuals. In addition to sign-on codes and secret passwords, each terminal is hard-wired to return information only if the requesting terminal is one authorized to process the data requested. Data are stored in several files, with the social security number the only common data element, and that number is scrambled. The data are stored in a numerical format so that without

access to a Translation and Code Table, or TACT file, information cannot be determined by the entry in the data file. The data are stored in a specific order in the internal records so that an unauthorized interrogator would have to be familiar, not only with the programming itself, but also with the layouts of the internal records in order to identify individual results. All input forms and subsequent sensitive reports are kept under lock and key in secure medical departments.

Zielstorff, R.D., Barrett, S.M., Weidman-Dahl, F., & Barnett, G.O. An integrated program for user training: Experience with COSTAR. In B.I. Blum (Ed.), Proceedings of the Sixth Annual Symposium on Computer Applications in Medical Care. Silver Spring, MD: IEEE Computer Society Press, 1982. Pp. 520-524.

COSTAR (Computer-Stored Ambulatory Record) is a flexible, complex medical record system involving users of diverse backgrounds and interests. The challenge is to provide at the implementation site a training program and appropriate support tools so that each user is able to learn the different COSTAR capabilities and to function appropriately in the new system. Training programs that the authors developed for two different sites and implemented one year apart are described in this paper. Experience gained at the first site resulted in the development of an integrated program for the second site. Effectiveness of each program is discussed, and user reactions to each program are presented.

From their experiences, the authors conclude that an integrated orientation program founded on a general overview of the system and including review of procedures, demonstration of programs, one-on-one practice sessions at the terminal, and functionally oriented compact user guides seem effective in orienting workers of various backgrounds to a complex medical information system such as COSTAR. The drawbacks to this approach are the number of sessions required by such a program (since each work category is oriented separately), the consequent burden on trainers (which might be alleviated by training local trainers to conduct some of the sessions), and the necessity for user compliance in the program (since each component builds on the material previously given).

PRELIMINARY OUTLINE FOR THE PHASE II FINAL REPORT
OF THE TEST AND EVALUATION OF THE
NAVY OCCUPATIONAL HEALTH INFORMATION MANAGEMENT SYSTEM (NOHIMS)

I. Description of System Goals and Objectives

A. Background and description of stated primary goals of Navy

1. Coordinate Navy's occupational safety and health programs with current OSHA requirements and DOD directives
2. Provide a comprehensive workplace monitoring and personnel medical surveillance plan

B. Background and description of stated objectives to meet primary goals

1. Generate a table of potentially hazardous materials used, handled, stored, or produced in the workplace
2. Periodically survey the workplace for the presence of hazardous materials and measure their concentration
3. Determine an employee's fitness to begin or continue to perform a job safely and effectively
4. Provide base-line data on the health of an employee against which the possible effects of occupational exposures can be measured
5. Identify individuals exposed to hazards in the workplace and the level of exposure
6. Insure that potentially exposed persons are examined periodically
7. Provide medical personnel with exposure history and a list of recommended tests and procedures
8. Store and retrieve medical and environmental data, including composite summaries of work force physical examination results
9. Generate management reports, including workload summaries
10. Compile standardized information for epidemiologic analysis
11. Improve patient care
12. Increase communication between industrial hygienists and medical personnel
13. Increase communication between hygienists and work supervisors
14. Provide accurate medical information on individuals for use in legal functions

C. Description of system goals as perceived by system developers and users

II. Description of NOHIMS

A. Overall organization of NOHIMS

1. Components of system and their purposes
2. Computer programming structure and software language used

B. Description of industrial component of NOHIMS

1. Agency data module
2. Personnel data module
3. Environmental data module
4. Survey data module
5. Hazard data module
6. Maintenance module

II. Description of NOHIMS (Cont.)

C. Description of medical component of NOHIMS

1. Background of COSTAR system
2. Description of primary modules
 - a. Registration module
 - b. Enter medical data module
 - c. Display medical data module
 - d. Print medical data module
 - e. Report generator
 - f. System maintenance
 - g. Mailbox
 - h. Occupational health information

D. Description of reports generated by NOHIMS and their uses

1. Industrial Hygiene Survey Report used by industrial hygienists, safety specialists, and the work center supervisors
2. Report of individual exposures used by physicians
3. Patient Data Sheet, a summary report, used by physicians
4. Medical certification report generated by physicians for work center supervisors
5. Monthly Compliance Report used to monitor compliance with required medical surveillance program
6. Navy management reports
 - a. Semi-annual Report of Occupational Health Services (NAVMED 6260/1)
 - b. Medical Services and Outpatient Morbidity Report (NAVMED 6300/1)
 - c. Other reports
7. Standard medical reports
 - a. Encounter Report
 - b. Patient Summary
 - c. Status Report
 - d. Flowcharts
8. User-defined reports as generated by system users

E. Description of data collection forms/sources

1. Industrial Hygiene Survey Form
2. Personnel Extract File (PEF)
3. Patient Registration Form
4. Physical Exam Data Sheet Encounter Form (PEDS)
5. Physical Examination Findings (PEX)
6. Asbestos Surveillance Form (NAVMED 6260/5)
7. Medical History (MEDHX)
8. Occupational History (OCCHX)
9. Tests and procedures
 - a. EKG results
 - b. Reference Audiogram (DD 2215)
 - c. Hearing Conservation Data (DD 2216)
 - d. Pulmonary Function Test results on the 600 form
 - e. Report of Radiologic Consultation
 - f. Hematology results (549)
 - g. Chemistry test results (including SMAC panel results)
 - h. Heavy Metal Test results (557)
 - i. Urinalysis results (550)
 - j. Miscellaneous (including 551 for reporting miscellaneous lab test results such as VDRL)

III. Evaluation of How Well NOHIMS Meets Stated and Perceived Goals and Objectives

- A. Evaluation of how well NOHIMS meets stated goals and objectives of Navy**
- B. Evaluation of how well NOHIMS meets goals and objectives perceived by system developers and users**

IV. Evaluation of NOHIMS System Design

A. Description of software quality attributes

- 1. Usability
- 2. Reliability and error recovery procedures
- 3. Program and data "crash" prevention
- 4. Emergency back-up procedures
- 5. Efficiency of source program code
- 6. Portability and hardware independence
- 7. Maintainability

B. Description of operational characteristics

- 1. User friendliness
 - a. How well does system present its operational capabilities to the user
 - b. "Menu" driven
 - c. User on-line assistance functions
 - d. Error diagnostics
 - e. Debugging aids
 - f. Database manager utilities
- 2. Data manipulation tasks
 - a. Average entry time per input form
 - b. Add, save, change, and delete procedures
 - c. Search in context capability
 - d. General filing procedures
 - e. Downloading to magnetic tape
- 3. Information retrieval
 - a. Standard form report procedures
 - b. Ad hoc report preparation procedures
 - c. Scope of ad hoc retrieval capability
 - d. Query response time (maximum and minimum)
 - e. Graphics capabilities
 - f. Word processing functions

C. Description of security features

- 1. Security levels
 - a. Password levels
 - b. Access to system functions controlled by job classification of user
 - c. Access to system functions definable for each terminal
- 2. Sign on/off procedures

IV. Evaluation of NOHIMS System Design (Cont.)

- D. Description of hardware and software support requirements
- E. Assessment of available system support
 - 1. Training (initial and update) availability
 - 2. Technical "hot line" and on-site support
 - 3. Documentation, job aids
- F. Scenario description to maintain system
 - 1. Prime time daily requirements
 - 2. Off-shift tasks
 - 3. Archival tape generation
- G. Description of organizational requirements
 - 1. MUMPS programming knowledge
 - 2. NOHIMS source code comprehension
 - 3. Personnel staffing description
 - 4. Installation area configuration
- H. Description of minimum hardware requirements
 - 1. Host computer configuration
 - 2. Remote workstation description
 - 3. Telecommunication requirements
- I. Assessment of suitability of NOHIMS to the information processing needs of medical and industrial departments served by the system
 - 1. Required information is collected
 - 2. Data can be retrieved in required formats
 - 3. Data can be manipulated in required ways

V. Operational Testing of the System

- A. Results of system integration testing
- B. Testing against the operating manual
 - 1. Description of scenarios
 - a. Registration
 - b. PEDS/PEX entry
 - c. Asbestos encounter entry
 - d. History entry
 - e. Report generator
 - 2. Results of testing

V. Operational Testing of the System (Cont.)

C. Testing against the functional description

1. Description of scenarios
 - a. Create a hazardous agent table
 - b. Add information from industrial surveys
 - c. Generate a notification of individual exposures
 - d. Generate list of patients requiring physical exams
 - e. Generate a Patient Data Sheet for the patients with scheduled examinations
 - f. Print patient summaries for patients to be examined
 - g. Enter data from physical examinations
 - h. Generate semi-annual 6260/1 report
 - i. Generate user-defined reports
 - j. Queries into industrial and medical databases
 - k. Generate a medical certification report
2. Results of testing

D. Evaluation of operational testing results

VI. Evaluation of Uses of NOHIMS

A. Medical monitoring and care goals

1. Compliance with Navy set standards of care
 - a. Compliance with medical surveillance program standards
 - b. Appropriateness of tests/examinations performed
 - c. Appropriateness of follow-up tests/examinations
 - d. Appropriate issuance of protective equipment
2. Availability of an accurate patient record and its influence on the quality of patient care
3. Improvement in patient-specific objectives/outcomes including earlier diagnosis and notification of patient abnormalities
4. Automated medical testing (pulmonary function, audiometry)
5. Availability of summary patient reports and user-defined reports and their influence on quality of patient care
6. Increased communication between medical care providers and hygienists and between hygienists and work supervisors

B. Appropriateness of computer-stored records for legal evidence as defined by Navy legal counsel

1. Description of current status of computer-stored records as legal evidence
2. Uses for accurate medical information on individuals
 - a. Workers' compensation determinations
 - b. Tort claims actions
 - c. Veterans Administration disability procedures
 - d. Navy medical boards
3. Analysis of NOHIMS system design in light of above requirements

VI. Evaluation of Uses of NOHIMS (Cont.)

C. Brief description of NOHIMS as an aid to epidemiologic research

1. Brief description of epidemiology uses of the NOHIMS database
 - a. Identify populations at risk/cohorts
 - b. Identify workers exposed, exposure levels, and length of exposure
 - c. Determine medical effects of exposures
 - d. Detect disease trends/outbreaks
 - e. Identify common risk factors among exposed workers
2. Features/capabilities that make NOHIMS useful in epidemiologic research

D. Administrative uses/benefits of NOHIMS

1. Description of administrative uses/benefits
 - a. Increased standardization of reports and forms
 - b. Reduced paperwork
 - c. Generation of administrative reports
 - d. Timely and perpetual access to administrative data
 - e. Manpower/resource planning
 - f. Environmental differential pay decisions
2. Assessment of usefulness and adequacy of NOHIMS in administrative functions

E. Assessment of other potential uses

VII. Evaluation of Transferability of NOHIMS to Other Navy Industrial Sites

A. Applicability of NOHIMS to other settings

B. Description of features that make NOHIMS flexible and adaptable to varied settings and uses

1. Directory-driven system
2. Degree to which data entry procedures are modifiable
3. User-defined capabilities
4. Ease of use and learning
5. Documentation, job aids
6. System support
7. Built-in hardware flexibility

C. Assessment of implementation at the North Island NARF and OHU clinic; and Bremerton naval shipyard by system developers, managers, and users

1. Brief description of system as used at the sites
2. Description of time and support required to implement system
3. Difficulties encountered in implementing system
4. Adaptability of system to specific needs of the sites
5. Acceptability of system to hygienists, safety specialists, and care providers

D. Assessment of transferability of NOHIMS to other Navy industrial sites

VIII. Brief Economic Analysis of NOHIMS

- A. Description of development costs of system
- B. Description of perceived benefits of system
- C. Comparison of development costs of system to perceived benefits

IX. Brief Comparison of NOHIMS to Currently Available Occupational Health Information Systems

- A. Comparison to other government-owned occupational health information systems
 - 1. Brief overview of features in government systems
 - 2. Assessment of suitability of government-owned systems to meet Navy needs
 - 3. Description of advantages and disadvantages of NOHIMS design compared to government-owned systems
- B. Comparison to other commercially available occupational health information systems
 - 1. Brief overview of features in commercially available systems
 - 2. Assessment of suitability of commercially available systems to meet Navy needs
 - 3. Description of advantages and disadvantages of NOHIMS design compared to commercially available systems
- C. Comparison to Navy interim occupational health system
 - 1. Brief overview of features of interim system
 - 2. Assessment of suitability of interim system to meet Navy needs
 - 3. Description of advantages and disadvantages of NOHIMS design compared to interim system

X. Summary and Conclusions of Evaluation of NOHIMS

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