

HUMAN FACTORS FOR SYSTEM DEVELOPMENT

	CONTENTS	PAGE
1.	GENERAL	1
2.	DEFINITIONS	1
3.	HUMAN FACTORS RECOMMENDATIONS	2
4.	SCOPE OF HUMAN FACTORS WORK	2
5.	REFERENCES	3

Appendixes

1. Human Factors Performance Aid
2. System Deliverable Documentation Cross-Reference
3. References
4. Glossary

1. GENERAL

1.01 Purpose: This Bell System Practice (BSP) addresses the need to apply human factors expertise when developing information systems. Details of human factors-related activities that should be considered within the system development process can be found in Appendix 1, Human Factors Performance Aid. Systems developed with a conscious application of human factors principles will be more successful in meeting user needs and, hence, corporate objectives, than systems developed without attention to human factors concerns.

1.02 Reason for Issue: This BSP is being issued to stress the importance of human factors considerations for information systems development. This section replaces Comptrollers M-Letters 460A, Personnel Subsystem Development (PSD) Overview and 461, PSD Management Guidelines. Whenever this section is reissued, the reason(s) for reissue will be given in this paragraph.

1.03 Applicability: This BSP is issued as a guideline. It can be applied to all Bell System entities responsible for the development of information systems, regardless of system size. It applies to the development of new systems as well as to those enhancements of existing systems which affect human performance.

1.04 Organization of This Practice: This practice consists of five parts:

- **Human Factors Recommendations:** Outlines the need for human factors support for system development, and provides recommendations related to staffing and project approval
- **Human Factors Performance Aid (Appendix 1):** Describes human factors work for each phase of system development
- **System Deliverable Documentation Cross-Reference (Appendix 2):** Shows the developmental components that are used as the primary source of information to produce each deliverable document
- **References (Appendix 3):** Provides references (Bell System documents, books, and articles) that cover the scope of human factors from theory to practice
- **Glossary (Appendix 4):** Defines the commonly used terms mentioned in the Human Factors Performance Aid.

2. DEFINITIONS

2.01 All terms and acronyms used in this BSP are defined in the *Glossary of System Development Terms and Acronyms*, Section 007-200-201. The definitions provided below and in Appendix 4 are limited to the basic terms particularly pertinent to this BSP.

2.02 Human Factors: Refers to the systematic application of psychological and physiological

NOTICE

Not for use or disclosure outside the
Bell System except under written agreement

considerations to a system development effort. This is done through the use of specialized analytic and design techniques. The purpose of good human factors design is to achieve optimum human/machine integration, system utilization, and human performance. The application of human factors is concerned with designing systems so that the interrelationships between human and machine components are consistent with human capabilities and limitations, and with the work to be done.

2.03 Personnel Subsystem (PSS): That portion of the total system involving the people who use, install, operate, and maintain the system. From a system development standpoint, this includes the design and development of work modules, procedures, supporting materials, and the training which enables people to interact within the system and to interface with the system at its boundaries. The PSS is designed and developed by performing a number of human factors activities during each phase of system development. Good human factors design assures the quality of the PSS.

3. HUMAN FACTORS RECOMMENDATIONS

3.01 Staffing: Each information system development project should be adequately supported by qualified human factors personnel. These personnel are responsible for contributing to system development in general, and for performing PSS design and development in particular. Personnel performing these functions may be part of the development team or a system development support group. The number of human factors personnel required will depend on the nature and size of the project and will be determined by the project manager.

3.02 Human factors-related activities are performed primarily by human factors specialists in PSS development and support organizations. However, a number of activities that may involve human factors considerations will be performed by development team members other than human factors personnel, such as data base and data communication designers. These developers must also be sensitive to those areas of systems analysis and design which, although not obvious, may influence human performance (eg, the design of data base structures that not only optimize computer processing, but also facilitate retrieval). If these development team members are not trained in human factors development work, they should seek support

from qualified human factors specialists. Ultimately, it is the project manager's responsibility to ensure that human factors-related activities are performed by qualified personnel.

3.03 Qualifications: Qualified human factors specialists should have training or experience in areas such as data gathering techniques, task analysis, human/machine interface design, work module design, and training design and development. To be most effective, they should also have education or training in Industrial Engineering or the Behavioral Sciences, plus training or experience in system development methodologies such as Total System Development (TSD) and Personnel Subsystem Development (PSD).

3.04 Project managers should ensure that inexperienced personnel receive appropriate human factors training and assistance on the job, as required.

3.05 Planning and Approval: All human factors-related activities should be properly planned, budgeted, and integrated into the system's development plan. Approval and funding procedures must consider both PSS and CSS development plans.

3.06 Human performance considerations must be addressed early in the system's development. Consequently, human factors expertise must be employed in the early phases as well as in the later phases (ie, beginning with the review of the proposal).

3.07 Users: Users can have a positive influence on the human factors design of the system that they will eventually "own." They are an essential source of information concerning the system's environment and its needs. Therefore, system users must participate in the system development effort as subject matter experts.

4. SCOPE OF HUMAN FACTORS WORK

4.01 A general overview of the human factors-related work performed during a system development effort is provided below. Specific tasks and activities are detailed in Appendix 1, Human Factors Performance Aid. The specific tasks and activities, and the way in which they are performed, should be based on cost/benefit evaluations. The extent of human factors work performed is a function

of each project and is determined by the project manager.

- (a) **Proposal:** Review the system proposal and make a general determination of the system's impact on human performance.
- (b) **Feasibility:** Determine user needs and evaluate alternative system solutions to meet these needs.
- (c) **Definition:** Assure that the system requirements reflect human factors considerations.
- (d) **Preliminary Design:** Allocate functions to people and machines. Define manual functions and analyze work activities.
- (e) **Detail Design:** Design work modules and human/machine interfaces. Establish test plans based on these standards.
- (f) **Implementation:** Prepare deliverable documentation that directly supports human performance. Test the Personnel Subsystem and make necessary changes based on test results. Develop training materials and test materials on actual users.
- (g) **Conversion:** Coordinate training and make sure field personnel are capable of operating the new system. Analyze results and make relevant recommendations for improvement.

- (h) **Performance Review:** Evaluate human performance and compare with expected performance stated in the Systems Requirements. Analyze performance-related deficiencies and make recommendations.

5. REFERENCES

5.01 The following BSPs will assist in developing a framework in which to implement the recommendations contained in this BSP. Extensive Bell System and non-Bell System references for performing human factors-related activities are contained in Appendix 3.

- (a) **Functional Roles in a Systems Environment (Section 007-200-310):** Describes the type of work performed by people to develop, operate, and support information systems
- (b) **Project Management (Section 007-208-310):** Describes the methods and procedures for managing projects
- (c) **Developmental Documentation (Section 007-227-310):** Describes the type of information recorded during the development of an information system
- (d) **Deliverable Documentation (Section 007-230-210):** Describes the manuals, performance aids, and other documents needed to operate, maintain, and support an information system.