TIER II STANDARD FOR COMPUTER INFORMATION SYSTEMS SPECIALISTS

INTRODUCTION

1. This grade level standard illustrates the application of the ICSC Master Standard (Tier I) to a specific field of work of the United Nations common system: **Computer information systems specialists**. It is divided into three sections:

- Definition of coverage;
- Summary factor rating chart;
- Grade level descriptions of typical duties and factor-by-factor evaluation rationales.

2. The Tier II standard for Computer information systems specialists was developed in consultation with the representatives of the organizations and the staff taking into account existing organizational structures and jobs within the United Nations common system. It constitutes a revision of an earlier Tier II Standard titled Electronic data processing specialists which had been promulgated by the ICSC in 1982. The revision was proposed by CCAQ Sub-Committee on Job Classification at its sixteenth session (New York, 1987), in order reflect the changes and developments taking place in this rapidly evolving field of work. The standard was revised by a working group of the Geneva-based organizations, under the leadership of WHO. The participants were job classification and technical specialists from UNHCR, ILO, WHO, ITU, WIPO and GATT. The revisions focused on new CCOG definitions, the distinction between General Service and Professional work, the development of indicators of complexity which are explained at grade levels P-2 through P-4 and the consistent application of the Master Standard. A detailed review of the proposed standard was conducted at the seventeenth session of the CCAQ Sub-Committee on Job classification (Geneva, April 1988). The final draft of the standard was presented to and endorsed by CCAQ at its sixty-ninth session (New York, July 1988).

3. The standard was promulgated by the Chairman of the International Civil Service Commission by delegated authority of the Commission on 8 August 1988.

I - DEFINITION OF COVERAGE

4. This section serves to confirm the appropriateness of the job to the occupational category and field of work. The coverage of the standard is defined by reference to (a) the Common Classification of Occupational Groups (CCOG) narrative description of the field of work; (b) a listing or description of occupations specifically excluded from the standard; (c) further clarification of the distinctions between Professional and General Service work in the field of work; and (d) technical, organizational or other issues which are specific to the field of work.

A. Inclusions - CCOG definitions

5. This field of work pertains to the computer-based information systems, methodologies and their supporting technologies; and on the clients or users of the systems and services. It is defined by the Common Classification of Occupational Groups (CCOG) as follows:

1.A.05. Computer information systems specialists

Provide planning, developmental, operational, programming, management, and other specialized technical support for the management of the Organization's information and its flow by means of computer processing and communications technologies.

1.A.05.a. Management information systems specialists

Monitor and recommend new analytical techniques to users; analyse existing procedures, information flows and users' information needs; analyse and recommend policies concerning informatics and telematics, including making recommendations to assist in the long-range planning of strategies, systems, resources and standards; monitor and perform research on advanced methodologies; perform training on management-information systems applications and management of computing resources; conduct analyses of management problems to determine the role of information systems; perform feasibility studies for new information systems and informatics technologies; perform technical evaluations of information systems and services.

1.A.05.b. Systems development specialists

Analyse and determine short- and long-term information requirements of users; develop design and implementation approaches; evaluate the cost-benefit of alternative approaches using mainframe, mini-microcomputers and networks; build data models; specify and program pilot and final versions of systems; test, debug and document systems and application programs; solve problems of integration of hardware; plan and design upgrades to software tools to improve development and performance of application; plan and coordinate development and re-design of

applications; and provide training and "trouble-shooting" services.

1.A.05.c. Office automation specialists

Analyse office functions; evaluate hardware and software products for their technical feasibility and cost benefit; recommend standards for hardware and software acquisition in relation to long-range needs and capability requirements; advise on implementation strategies; monitor performance and identify enhancement possibilities for existing office systems, procedures and practices; provide advice and assistance to users of office automation systems; and provide user training on software packages and the end-user equipment and applications.

1.A.05.d. Database administration specialists

Plan and organize the structure and development of large-scale, multiple application, organization-wide databases; coordinate and enforce standards and data security for the common definition of data structures; responsible for data integrity and recovery and restart procedures; install and maintain data management software; identify opportunities for more efficient use of existing data and for expanded user access to existing applications utilization; and provide technical assistance and training to systems development specialists.

1.A.05.e. Computer communications and network specialists

Assess and estimate technical requirements, feasibility, cost-benefit, and data flow volumes for movement of data of various formats among a variety of locations and devices; analyse and program data conversion; evaluate, select, install, maintain, "trouble-shoot" and upgrade networks and telecommunications facilities; analyse, design, develop and monitor security, performance and compatibility of supporting computer network and communication software and hardware; coordinate and maintain integrity of local area network based services; plan and coordinate upgrade of telecommunications facilities in accordance with international standards.

1.A.05.f. Computer system programming and performance specialists

Analyse and design hardware and software system architecture; monitor system performance, utilization, and cost effectiveness; assess new releases and upgrades for operating software and equipment; program and coordinate conversions and installations of upgrades/new releases; design and write system programs for specific system architecture; and evaluate and implement technological improvements to hardware and software.

1.A.05.g. Computing centre production specialists

Manage the operations of a computing centre including computer, tape library, data storage facilities, maintaining production job stream, and production processing and distribution; monitor

the performance and reliability of equipment and recommend replacement or modification of existing hardware and facilities control physical security of data processing and storage facilities including standby and recovery procedures; plan and test back-up facilities in the event of computer equipment failure and coordinate the institution of re-run procedures; assign priorities for data processing operational services, and establish procedures for and control the maintenance of operational data, incidence logs and statistics.

6. This standard has been established on the basis of jobs in well-established and well-populated occupations within the United Nations common system organizations. It does not, however, illustrate exhaustively all possible kinds or combinations of work. Where substantive functions cannot be classified under this Tier II standard, Tier I (Master Standard) will be applied; the Tier II standard will provide guidance in the application of the Master Standard to such work.

B. Exclusions

7. This standard does not cover posts in which the following types of activities are paramount:

(a) using a computer to solve scientific, technical, mathematical or economic problems, when application of the knowledge of one of these disciplines is the paramount requirement e.g., statisticians (1.M.02), library and information specialists (1.C.03.), or economists (1.E.) who use a computer in the course of their work;

(b) using a computer to solve administration and management problems, conduct studies or design systems, when application of the knowledge of administrative techniques is the more important requirement, e.g. Methods and procedure specialists (1.A.02.b.).

C. Guidelines for distinguishing between Professional versus General Service work

8. In the field of computer information systems some work may be non-Professional. If comparison with the CCOG definitions above does not clearly identify a particular post as Professional, the work should be analysed in relation to the CCOG definitions for **computer information systems-related** (these are provided in annex III for each of reference) and to the Guidelines for distinguishing between categories. It should also be compared to the definition of Professional work approved by the Commission, as found in Section VII of the CCOG.

D. Issues and problems in the field

9. In the development, testing, use and revision of this standard, some issues have been identified that are problematic to this field of work. These are listed below to assist classifiers in

understanding this field of work and in applying this standard. A glossary of terms has also been included in annex II.

Categorization of posts

10. As stated below there have been considerable changes in this field of work due to rapidly evolving technologies. Whereas, in the past, some jobs because of their requisite knowledge, level of difficulty, etc., were appropriately categorized in the Professional category (e.g., programming), the introduction of new technologies and tools, as well as the desirable evolution of greater user understanding of, and involvement in, the development of computer-driven systems, has created a larger range of levels of expertise. Tasks which were once carried out exclusively by Professional level specialists can now be performed by support staff utilizing more accessible software and hardware. Moreover, well-established computer systems may not require the same level of expertise as once was required for their ongoing operation and adjustment.

Complexity of systems

11. Similar functions performed in different organizations will vary in complexity with a subsequent impact on grade levels. The P-2, P-3 and P-4 levels of this standard outline increasing levels of difficult work on the basis of primarily five considerations:

- scope of the creativity required;
- user environment;
- work controls;
- technologies and tools involved;
- multiplicity, intricacy and interconnection of the applications.

12. A consideration at the P-5 and D-1 levels is the importance of the automation processes to the Organization, reflected in part by the financial and human resources committed to the activity and also, by the importance of the computer and communications system to achieve the legislated objectives of the Organization.

Technological development

13. This field of work is currently undergoing rapid change in technologies. For the most part, this standard does not refer to any present state-of-the-art but is sufficiently generic to measure work within the foreseeable technical environment.

II - GRADE LEVEL DESCRIPTIONS AND EVALUATION RATIONALES

P-2 GRADE LEVEL

A. Description of typical duties

Work at this level is carried out with a higher-level Professional and involves the planning, design, development, implementation and maintenance of computer information systems; the responsibility for independently completing portions of work related to specific speciality areas, such as undertaking parts of feasibility studies, analysing and modifying existing applications, maintaining systems software, designing and writing computer programs, etc. In relation to the higher levels, the nature of the work is characterized as:

- Pre-determined, that is precedents exist which can be modified or adapted.

- Defined, that is manual systems are operating reasonably well, the life cycle of work processes are documented, and the specifications and needs have been defined.

- Self-controlled, that is technical approaches are primarily the responsibility of the specialist with limited coordination and problem-solving with others (e.g., other specialists, users, vendors), and there is limited user-control over the final product.

- Less technical, that is involving simpler language and access methods, and more limited machine complexity.

- Less complex, that is applications are independent and solutions are straightforward with limited interface with other applications.

The responsibilities of the job require that it's incumbent:

- Assist in preparing specifications and designing information systems and applications, e.g., define controls and document system structures, design files and tests; prepare cost estimates, etc.; undertake analysis of well defined modules within the systems and design and implement small, stand-alone systems (individual user routines).

- Maintain assigned portions of systems, providing operational support to users, analysing and implementing systems and program changes that result from programme or technological advances.

- Write and develop computer programs designed to run in a batch or interactive environment which may interface with existing systems; ensures data security and integrity.

- Update and maintain documentation and related technical and procedural manuals.

- Install systems software programs; assist users in the development of ad hoc on-line inquiries and in the development and use of small applications based on standard application packages.

- Conduct training sessions and demonstrations of systems for users, draft training materials and user documentation, and train users in information/data systems.

- Assist higher level staff in assessing new technology, e.g., running practical tests.

- Advise users on the most suitable hardware and software for different tasks; maintain and enhance software.

B. Factor rating rationales

I. PROFESSIONAL KNOWLEDGE

H. Theoretical knowledge

Knowledge at the first university degree level in a discipline which cultivates the prerequisite and relevant analytical skills.

V. Practical experience

A minimum of two years' application of theoretical knowledge in the specialized area of assignment.

D. Language knowledge

One language is required to communicate with colleagues and clients.

II. DIFFICULTY OF WORK

H. Individual contribution

Assignments include a range of duties involving analysis (of user needs, specifications, feasibility of specific applications, etc.) making optimal use of technology and equipment.

V. Complexity of work assigned

Assignments involve new applications which perform a limited scope of functions (e.g., high level language computer programs) or significant modifications of established functions that require in-depth application of techniques to accomplish intricate manipulation of data.

III. INDEPENDENCE OF WORK

H. Guidelines

Specifications, equipment manuals, software documentation and previous applications.

V. Supervisory controls

Approaches to new assignments are typically defined by the supervisor and technical consultation is available on request. Completed work is reviewed for soundness and accuracy.

IV. WORK RELATIONSHIPS

Internal

H. Skill

To clarify specifications, to ascertain equipment availability and capacity.

V. Importance

Contacts are with other specialists (system analysts, computer technicians, programmers) and users for the purpose of clarifying needs, conducting training, determining costs, etc.

External

H. Skill

Professional exchange of information with colleagues in the professional community on such questions as use of language and software and with vendors to collect/exchange information on technology.

V. Importance

To facilitate understanding and to remain up-to-date on technological changes and innovations.

V. SUPERVISORY RESPONSIBILITY

H. Responsibility for support staff

May oversee temporarily the work of small numbers of support staff in the course of assignments.

V. Responsibility for Professional staff

May participate in the orientation of new staff.

VI. IMPACT OF WORK

H. Effect on work

Decisions directly affect the completion of individual assignments.

V. Consequences of errors

Errors, if undetected, would typically result in damage to the quality of work done through portions of the computer systems, The result is a loss of staff and computer time, i.e., on the work of the users. Such errors impact on the work of the users.

P-3 GRADE LEVEL

A. Description of typical duties

Work at this level involves a range of assignments related to planning, designing, developing, implementing, and maintaining computer information systems and applications; responsibility for the design and maintenance of such systems and applications; and supporting the design and implementation of the most complex systems. In relation to the lower levels, the work is characterized as:

- Original, that is, applications are innovative or involve major modifications.

- Undefined, that is, specifications must be developed and there is increased operation and implementation and consultation with diverse users who have conflicting objectives and needs.

- User- or other- controlled, that is, technical approaches are developed in consultation/coordination with others, (e.g., other specialists, users, vendors) and the user control increases, e.g., on-line interactive systems or user-developed programs; technical, that is, involving a range of hardware and software tools and the interface of these various tools; programming in high level languages involving complex validity checks and processing; complex, that is, there are varied and numerous programs and applications that are interrelated, requiring extensive interfacing with other applications and systems.

The responsibilities of the job require that it's incumbent:

- Participate as a member of a development team in feasibility studies and systems analysis for complex automation projects; undertake feasibility studies, systems analysis and design for specific systems and for components of the more complex systems of the Organization, translating user needs into new applications, integrating existing modules, developing local enhancements, etc.

- Be responsible for the operation, maintenance, trouble-shooting and local enhancement/extensions of automated systems; monitor transactions to measure the performance and continuing effectiveness of assigned systems; work with systems software personnel to resolve operational problems.

- Develop and maintain computer programs which require integration of many interrelated systems and program elements; write computer programs to extract and transfer data from other databases; ensure smooth data flow and be responsible for security measures to protect confidentiality; direct others who write computer programs.

- Develop strategy for specific applications and participate in developing overall strategy for, major systems.

- Develop training materials, technical and user documentation, and publicity information; train staff in information/data systems.

- Perform cost-benefit analysis of different hardware/software and identify technology hardware/software for purchase.

B. Factor rating rationales

I. PROFESSIONAL KNOWLEDGE

H. Theoretical knowledge

Knowledge at the first university degree level in a discipline which cultivates the prerequisite and relevant analytical skill.

V. Practical experience required

Professional experience at the national level for at least six years, or alternatively two years at the national and a minimum of three years at the international level, as well as experience in the application of appropriate techniques and programming languages.

D. Language knowledge

Two languages are required to communicate extensively throughout the Organization.

II. DIFFICULTY OF WORK

H. Individual contribution

Work at this level involves creating, maintaining, updating and correcting and improving complex applications; providing technical advice on those applications and resolving problems related hereto.

V. Complexity of work assigned

Assignments require intricate manipulation of data, involve several component parts and require resolving problems of integration and interface.

III. INDEPENDENCE OF WORK

H. Application of guidelines

Work at this level requires interpretation and adaptation of guidelines to accommodate new applications; adaptation of technological innovations to meet the Organization's needs.

V. Supervisory control

New types of assignments are developed with more senior specialists. Work is typically reviewed only upon completion of project milestones and by users to validate the meeting of needs.

IV. WORK RELATIONSHIPS

Internal

H. Skill

Contacts are for the purpose of obtaining assistance of other specialists as required to solve exceptionally complex problems, persuading others to accept modifications of specifications, and users to accept limitations or modifications of the applications; providing advice in regard to application; advising users of requirements or capabilities and clarifies requirements; and obtaining assistance in non-routine matters, e.g., special scheduling or meeting unconventional user requirements.

V. Importance

With users within the Organization and with other specialists (system analysts, operations supervisors, etc.).

External

H. Skill

Professional exchange of information with colleagues in the professional community on such questions as use of language and software and with vendors to collect/exchange information on technology.

V. Importance

To facilitate understanding and to remain up-to-date on technological changes and innovations.

V. SUPERVISORY RESPONSIBILITY

H. Responsibility for support staff

May oversee the work of support staff in the course of assignments.

V. Responsibility for Professional staff

May lead work groups or instruct lower level specialists on a temporary, project basis.

VI. IMPACT OF WORK

H. Effect on work

Decisions directly affect the processing work of the user and the services provided by the unit; decisions affect internal structures of the applications related to accomplishing part of the Organization's objectives and functions; proposes developments and changes.

V. Consequence of error

Organization's operations rely significantly on computer performance so that errors (in development or processing) would delay or prevent programme implementation; errors require re-working of the applications, and result in misinformation for users, missed deadlines and inadequate service.

P-4 GRADE LEVEL

A. Description of typical duties

Work at this level includes responsibility for the design, implementation, and maintenance of major and complex information systems and applications, which involve complex analyses and are of importance to the accomplishment of the Organization's objectives and functions. This level is the project leader/manager for such developmental and maintenance work which involves coordination/interface with users and other specialists. It is expected that this level will participate in planning and scheduling projects within the Organization's overall development activities. In relation to the lower levels, work is characterized as:

- Conceptual, that is, conceiving the strategy and master plan for the design and implementation.

- Developmental, that is, the need for original systems must be identified to the user/Organization, then developed and integrated with existing systems.

- Controlling, that is, considerable coordination and collaboration with others (e.g., specialists, users, vendors) is involved.

- Highly technical, that is, involving full mastery and use of the range of technologies available.

- Highly complex, that is, there are varied and numerous independent applications that must be integrated into uniform systems, requiring the development of linkages and interfaces, e.g., various offices and duty stations of the Organization, on-line access by external users.

The responsibilities of the job require that its incumbent:

- Identify the need for new systems (or responds to requests from users), conducting feasibility studies and translating user needs into systems and applications that can be integrated with existing systems/technology.

- Undertake systems analysis, determining costs of development and eventual operations of the system(s)/applications; prepare design specifications for programming; may carry out the most complex programming tasks and correct/revise programs written by others.

- Oversee the development of file and database structures and record formats, ensuring that all design aspects are addressed and that control and security mechanisms are established.

- Plan schedules and execute implementation work and systems tests.

- Direct/undertake the preparation of complete systems documentation and user operating procedures.

- Determine the need and be responsible for testing, assessing and evaluating new products and technologies, and advise on relevance and suitability; provide expertise and leadership on technological changes for the Organization; propose strategies and plan for introducing technological changes and oversee implementation.

- Develop, implement and monitor standards and guidelines for the Organization, e.g., database and programming standards, quality control, security and control mechanisms.

- Participate in defining and resolving problems of system's integration (intra/inter-organization).

- Evaluate the continued effectiveness, suitability, and performance of automated systems, technologies, etc., and prepare technical reports on performance.

- Be responsible for the liaison with users on all aspects or during all phases of development; provide technical guidance to others involved in the automation activities and ensure the resolution of problems to meet deadlines.

- Prepare technical and user documentation for entire systems and interdependent applications; prepare training materials and detailed technical presentations; conduct courses for users.

- May supervise specialists and support staff and perform the supervisory responsibilities, including the preparation of performance appraisals.

B. Factor rating rationales

I. PROFESSIONAL KNOWLEDGE

H. Theoretical knowledge

Knowledge at the advanced university degree level is required to design and implement the projects assigned to this level.

V. Practical experience required

A minimum of eight years of professional experience which includes experience in the application of techniques appropriate to the Organization's operations and the area of assignment, and at least three years of international experience.

D. Language knowledge

Two languages are required to communicate extensively throughout the Organization.

II. DIFFICULTY OF WORK

H. Individual contribution

Work at this level involves leading projects to automate or improve critical operations of the Organization and adapting processes as necessary to achieve computerization.

V. Complexity of work assigned

Computer projects involve complex processes that are not well-defined but are critical to the achievement of the Organization's objectives. Assignments typically require a broad scope of analysis - of user processes and of informatics applications. Defining user processes requires intricate analysis of interrelationship and a depth of understanding of complex subject matters.

III. INDEPENDENCE OF WORK

H. Guidelines

Guidelines require extensive applications to accommodate new and differing applications; guidelines are established by this level through the precedents in the system designed and implemented.

V. Supervisory controls

Technical supervision is available - work (e.g., specifications) is reviewed after completion for soundness of overall approach; work in progress is reviewed only on request.

IV. WORK RELATIONSHIPS

Internal

H. Skill

Contacts are for the purpose of providing expert advice on design and implementation of informatics systems; determining user requirements and advises users and developing plans for informatics support to users. The user processes are not well-defined and must be adapted to permit informatics. The support of other specialists must be obtained and the use of equipment must be coordinated. The acceptance of modification to specifications and work processes is accomplished through negotiations.

V. Importance

With users within the Organization and with other specialists (systems analysts, operations supervisors, etc.).

External

H. Skill

To compare experience with similar hardware, software, or applications, (information about projects of this scope is often sensitive) and to obtain cooperation (e.g., sharing documentation); to explore new developments in hardware or software.

V. Importance

To facilitate understanding and to remain up-to-date on technological changes and innovations.

V. SUPERVISORY RESPONSIBILITY[1]

H. Responsibility for support staff

May oversee the work of support staff in the course of assignments.

V. Responsibility for Professional staff

May lead work groups or instruct lower level specialists on a temporary, project basis.

VI. IMPACT OF WORK

H. Effect on work

Decisions are taken on the feasibility of informatics proposals and specifications to automate individual system/applications (element 32). Proposes the design and integration of major systems important to the success of the Organization's objective, and proposes innovations to the design and delivery of the Organization's informatics services/programmes.

V. Consequences of errors

Organization's operations rely significantly on computer performance so that errors (in development or processing) would delay or prevent programme implementation; errors require re-writing of the applications, and result in misinformation for users, missed deadlines, and inadequate service.

[1] Some posts may supervise subordinate Professional and support staff. Such posts are measured by application of Factor V of the Master Standard.

P-5 GRADE LEVEL

A. Description of typical duties

Work at this level involves responsibility for the strategy, design, and structure of major components of the Organization's informatics and telematic resources, and the direction of senior specialists in the management of the resultant systems and applications, either in directing the total programme for the Organization, or a major unit of the function. This level works closely with user management to ensure that the Organization's requirements are effectively met. It is expected that this level will apply techniques to solve intricate problems of organization-wide importance and will manage multiple, concurrent and often disparate work tasks of several projects. The responsibilities of the job require that its incumbent:

- Define informatics and telematics policies and procedures; identify and plan for the Organization's future needs in the major unit; represent the Organization in internal and external forums; advise senior management on computer systems development and on the implications of various informatics and technological alternatives.

- Plan and oversee the design and the implementation of computer systems to integrate office, information and data systems of the Organization; develop and monitor performance standards; ensure that projects meet established time and cost parameters and standards of technical quality.

- Supervise subordinate specialists, including the development and implementation of training programmes for subordinates and users.

- Develop and monitor the work programme budget, managing the hardware/software for the Organization and advising on acquisitions.

- Provide advice and guidance on managing change in the work environment resulting from office automation; advise on the organization of work and equipment to facilitate automation.

- Ensure the development of standards, procedures and practices that will result in a stable and effective systems software and database environment.

- Determine application and system integration and linkages within the Organization, resolving operating, technical, and coordination problems.

B. Factor rating rationales

I. PROFESSIONAL KNOWLEDGE

H. Theoretical knowledge

Knowledge at the advanced university degree level is required to coordinate the informatics and telematics services with the operations of the Organization.

V. Practical experience required

A minimum of 13 years of experience including six years' international experience and supervisory and administrative experience.

D. Language knowledge

Two languages are required to communicate extensively throughout the Organization.

II. DIFFICULTY OF WORK

V. Individual contributions

Work at this level involves developing new solutions and/or plans, integrating and directing concurrently several projects led by computer information systems specialists.

H. Complexity of assigned work

The individual projects involve difficulties, such as innovative applications, dissimilar systems and databases, and require the integration of various systems; project deadlines and the accuracy of processing are important to the operations of the Organization.

III. INDEPENDENCE OF WORK

H. Guidelines

Work at this level must adapt established technical standards and practices to frequent technical changes in the field; integrate highly technical functions into the administration processes of the Organization.

V. Supervisory controls

Guidance regarding the overall approach and priorities is given; work is reviewed for attainment of objectives.

IV. WORK RELATIONSHIPS

Internal

H. Skill

To represent the service within the Organization and to provide authoritative advice.

V. Importance

Users (clients) throughout the Organization including field offices.

External

H. Skill

To negotiate with counterparts and vendors to improve effectiveness of the operation (e.g., in formats of statistical reports submitted by many different organizations); to justify budget requests and programme performance to governing body.

V. Importance

To represent the interests of the Organization to its governing body, other United Nations organizations or national governments and contractors.

V. SUPERVISORY RESPONSIBILITY

H. Responsibility for support staff

Normally supervises two to ten support staff members.

V. Responsibility for Professional staff

Normally supervises four to eight Professional staff (in addition to temporary staff associated with particular projects).

VI. IMPACT OF WORK

H. Effect on work

Decisions are taken on the structure and integration of a variety of systems used for computerizing applications that are important in the accomplishment of the Organization's objectives; proposals are made on priorities of projects and on designs for systems critical to the success of the Organization's objectives.

V. Consequence of errors

Projects are of considerable scope and are important and critical to the Organization's operation. Projects are completed without technical supervision; errors that go undetected would adversely effect the normal operation of the Organization's programmes and are costly (e.g., missed deadlines for conversion of processes interrupt programme operations).

D-1 GRADE LEVEL

A. Description of typical duties

Work at this level involves responsibility for planning, directing and evaluating all informatic and telematic resources of an organization which uses a large-scale computer network and in which the computer information system services are critical to meet the substantive organizational objectives and functions, while user requirements are complex and diverse. This level requires managerial ability and awareness of technological development and the needs of the Organization. The work has extensive impact and is critical to the achievement of the objectives of the Organization.

The responsibilities of the job require that its incumbent:

- Advise executive management of short- and long-range informatics systems implications on the programmes and on the budget of the Organization, explaining and accounting for the informatics programme to management and the legislative body.

- Organize resources and establish priorities in the informatics programme to facilitate the achievement of the Organization's objectives.

- Determine the acquisition of hardware and software for the Organization, negotiate facilities and services with vendors and monitor the delivery and compliance.

- Be responsible for the informatics architecture of the Organization, identify organizational issues that need decision or clarification to implement the informatics architecture and obtain executive clearance/decision on these.

- Manage and direct subordinate supervisors who are responsible for project design, implementation and maintenance.

- Determine standards for the Organization related to acquisition, processing, storage and dissemination of information.

B. Factor rating rationales

I. PROFESSIONAL KNOWLEDGE

H. Theoretical knowledge

Knowledge at the advanced university degree level is required to coordinate the informatics and telematics services with the operations of the Organization.

V. Practical experience

A minimum of 13 years of experience, including six years' international experience and supervisory and administrative experience.

D. Language knowledge

Two languages are required to communicate extensively throughout the Organization.

II. DIFFICULTY OF WORK

H. Individual contribution

Planning, integrating and coordinating the total informatics support of the Organization, including directing several projects led by subordinate supervisors.

V. Complexity of assigned work

Projects are critical to the operation and achievement of the Organization's objectives and most substantive areas of the Organization's work and require coordination of different on-going projects involving the most complex types of equipment, software, and user requirements, using large-scale machines or networks; priorities for service often conflict.

III. INDEPENDENCE OF WORK

H. Guidelines

Work at this level requires adaptation of established standards and practices to frequent changes in the field; integration of highly technical functions into the administrative processes of the Organization and establishment of guidelines important to the operation of the Organization.

V. Supervisory controls

General objectives and priorities for the informatics use of the Organization are set at higher levels; supervisor is consulted in establishing the overall approach; work is judged on basis of attainment of objectives and not reviewed in progress.

IV. WORK RELATIONSHIPS

Internal

H. Skill

Contacts are for the purpose of representing the Organization's telematics and informatics function; providing authoritative advice during Organization's programme planning and budgeting process.

V. Importance

Users (clients) within the Organization, other specialists, locally and in other duty stations, Organization's managers (budget directors, planners).

External

H. Skill

Contacts are for the purpose of representing the Organization, negotiating establishment of appropriate policies and contracts governing such matters as hardware purchase, software development and/or purchase, time sharing services, telecommunication services, and standardization of methods, hardware, and practices.

V. Importance

The computerized systems are critical to the accomplishment of the Organization's purpose, and incumbent represents the Organization's interests in important matters, such as testifying to the legislative body about Organization's performance and budget requests and defining long-term contracts with vendors.

V. SUPERVISORY RESPONSIBILITY

H. Responsibility for support staff

Normally supervises 11 to 25 support staff members.

V. Responsibility for Professional staff

Normally supervises 9 to 20 Professional staff (as well as project staff temporarily assigned).

VI. IMPACT OF WORK

H. Effect on work

Decisions determine the priority and schedule of completion of projects critical to the Organization's functions or objectives; also determines level of quality of projects; proposals affect a wide range of the Organization's activities.

V. Consequence of errors

Errors could cause loss of credibility of the informatics processes and detract from the Organization's mission. Delivery of services is critical to the success of the mission of the Organization.

Annex I

DETAILED RATIONALE FOR FACTOR-POINT RATING OF TYPICAL DUTIES

Factor I - Professional knowledge required

(a) Theoretical knowledge

Level 1. (Applies to typical duties at levels P-2 and P-3.) The basic university degree (or its equivalent) is required in a discipline such as computer sciences, engineering, business administration, mathematics, physical sciences, etc., to cultivate the analytical skills relevant to the performance of the work which deals almost entirely with symbolic, abstract representations and relationships (e.g., use of programming languages and software packages). Knowledge of standard high-level programming languages.

Level 2. (Applies to typical duties at levels P-4, P-5 and D-1.) At this level, a thorough knowledge of technical principles and concepts of informatics must be combined with knowledge of the administrative and management policies and practices of the Organization., knowledge of the broader political, economic and social climate which shapes demands for user services, and familiarity with the computer environment of the Organization. Together, these knowledge requirements are the equivalent of theoretical knowledge at the advanced university degree level.

(b) Practical experience

All levels. Requirements for all Professional positions in the job family include experience which develops proficiency in those automated systems appropriate to the work of the position and "hands on" experience in the speciality area of the position, such as database management, office automation, computer equipment and packages, teleprocessing, on-line systems, etc. A degree of technical proficiency is required at all levels to perform, technically review, and provide expert advice about automated systems.

Level B. (Applies to typical duties at level P-2.) A minimum of two years (up to five years) of "hands on" professional experience at the national level in applications and with equipment similar to those of the assignment is a prerequisite to the performance of the work. This experience would develop skills in database programming languages, in designing on-line and off-line applications; and would develop knowledge of the restrictions, limitations and possibilities of various hardware and software packages; and of various storage and access methodologies used by third-generation computers.

Level C. (Applies to typical duties at level P-3.) A minimum of six years (up to ten years) relevant and progressive experience at the national level is prerequisite to the independent

performance of the work. Performance of these assignments requires a broad knowledge of methods, equipment and softwares capabilities, and of data-management principles, and an ability to conceptualize applications and/or their feasibility from descriptions of work processes. This experience would develop the skills necessary for analysis, design and programming work, for developing databases, for the creation of generalized computer software in an environment using large on-line, interactive systems, etc.

Level D. (Applies to typical duties at level P-4.) A minimum of eight to ten years of national experience is required, as well as two to five years of professional experience with international applications. The work requires experience in the management of projects or operations. Such experience is the necessary preparation for leading major and complex projects, such as conducting feasibility studies and applying technical methods to solving data processing problems of complex material; designing on-line and off-line data-processing applications for users at locations remote from the main processing site; managing large and organization-wide databases, etc.

Level E. (Applies to typical duties at levels P-5 and D-1.) The work requires a minimum of 13 years of professional experience, including experience in designing systems. This experience must include at least three years of designing complex systems for international applications and at least three years of international experience in managing the information systems work of an organization (e.g., developing its budget, recommending its work programme). These experiences are requisite preparation for administering a significant programme within the common system and representing its interests in internal and external forums - i.e., computer information systems and the information provided therein are critical to the raison d'être of the Organization.

(c) Language knowledge

Level 1. (Applies to typical duties at level P-2.) Required proficiency in the working language of the Organization. Positions require only one language, as contacts are usually within the functional area, with counterparts, vendors, or user units.

Level 2. (Applies to typical duties at levels P-3 to D-1.) Required proficiency in two languages to communicate with users, vendors and other specialists and to prepare technical documentation and reports.

Factor II - Difficulty of work

(a) Individual contribution

Level 5. (Applies to typical duties at level P-2.) A critical feature of the work is the analysis of user or organizational requirements, relationship of various components of the automation environment, and of subject area and subject matter to determine the approach and technology. The

undertaking of individual portions (rather than complete applications or complex systems) requires interpretation and manipulation of existing approaches and applications.

Level 6. (Applies to typical duties at levels P-3 and P-4.) The work requires typically to review and correct work of other professionals, either as project leader or as the technical authority on specific applications and systems. The projects involve overseeing the work of other specialists or the use of staff members assigned as resource persons. Such work requires intensive utilization of a variety of tools, and extensive adaptation of existing applications, such as changes to specifications or software packages. It must be assured that intent/needs/specifications are met, and that there is optimum utilization of the tools available. In the course of this work, it is expected that users would be advised of changes to their work operations that would facilitate or be necessary for automation.

Level 7. (Applies to typical duties at levels P-5 and D-1.) Work is that of an expert adviser to an organization - one who typically leads or directs simultaneously several complex projects which have leaders who report to this level on a continuing, permanent basis. The projects require original technical solutions in order to meet the needs of the users and the Organization. This level requires coordination of these projects, resolution of competing client demands for service, and integration of the informatics systems into the operations of the Organization.

(b) Complexity of assigned work

Level I. (Applies to typical duties at levels P-2 and P-3.) Assignments are usually restricted to specific portions of the systems requiring analyses of various factors and conditions, consideration of the existing hardware and software, and adaptation of existing approaches and applications. The work may be part of a project done by a team or a specific assignment performed independently.

Level J. (Applies to typical duties at levels P-4 and P-5.) The projects are of substantial intricacy, i.e., technical, operational, and administrative concerns with problems difficult to solve, e.g., difficulty in describing the operations, user resistance, etc. These assignments relate to projects involving difficult and/or sensitive subject matter, the complete project cycle, and systems which typically encompass a distinct facet of an organization's raison d'être. In conducting the feasibility studies and designing the automation processes, it is necessary to analyse relationships between various existing systems. The supervisory level typically coordinates several projects led by other specialists, many of which are at the "J" level of intricacy requiring considerable depth of treatment.

Level K. (Applies to typical duties at level D-1.) Typically, several different types of informatics projects, most of which are of substantial intricacy, are simultaneously ongoing. User requirements are diverse. The function is broad in scope and requires application of extensive expertise. Work requires the coordination of the work of subordinate supervisors in respect of ongoing projects and current priorities, as well as long-term objectives for the development and maintenance of systems for the most substantive aspects of the Organization's raison d'être. Resolution of competing user priorities and the allocation of costs and resources among users are

major responsibilities at this level. Resolution of these problems requires a deep understanding of the operation, history and potential for informatics use in the Organization.

Factor III - Independence of work

(a) Guidelines

Level 11. (Applies to typical duties at level P-2.) Guidelines consist of the Organization's and the common system's automation standards and policies, equipment and technical references, and precedent system design documentation. Work characteristically requires applying existing guidelines to new applications as each new assignment presents a different set of problems, considerations and possible solutions.

Level 12. (Applies to typical duties at level P-3.) Assignments at this level go beyond applying combining existing guidelines to developing new applications. Adaptation and interpretation is required to make data available in forms other than currently possible. Solutions to each contingency do not exist as the range of permutations is too wide and each requires individual solutions. Project plans, time-frames and standards for the work are developed by the project leader.

Level 13. (Applies to typical duties at levels P-4 and P-5.) Assignments require that clients and other specialists be apprised of guidelines that are applicable and be given authoritative interpretations of guidelines coverage, flexibilities and constraints. At this level, significant client operations that are proposed for computerization are subject to review and possible reinterpretation to accommodate informatics. Frequently it is not possible to draw on approaches and methods used elsewhere. Resolving problems and rationalizing systems require creativity for which no absolute precedents may exist. This level establishes guidelines in that the work becomes precedent-setting for future applications and the technology which is chosen by this level predetermines the structure for future applications. This level applies administrative guidelines as well.

Level 14. (Applies to typical duties at level D-1.) This is the level of a head of a major department involving many elements of systems design, equipment and staff capability, and competing priorities converge so that precedents and guidelines are seldom directly applicable to current circumstances. All guidelines characteristic of lower levels apply, variously and simultaneously, to projects in progress. In addition, a significant number and variety of guidelines pertinent to the administration of the Organization must be interpreted and negotiated in the course of application. Guidelines are established, (e.g., priorities, budget allocations) for operation of the programme which are significant to the efficiency of the whole Organization.

(b) Supervisory controls

Level N. (Applies to typical duties at level P-2.) A senior specialist assigns work, indicates purpose and desired results, and anticipated problems beforehand, identifies useful precedents and appropriate approaches. Work in process is reviewed periodically, e.g., program is checked and tested at various stages.

Level O. (Applies to typical duties at levels P-3 and P-4.) Purpose and desired results of the applications are discussed with the supervisor beforehand. At this level, specialists initiate assignments and propose an overall approach, which are discussed with the supervisor. The supervisor may identify certain points during the course of the assignment for reviews or checks. The work is completed independently within the boundaries of the approach developed with the supervisor.

Level P. (Applies to typical duties at levels P-5 and D-1.) Assignments at this level involve coordinating several projects. The supervisor is generally consulted in advance about approaches to providing services and is available for consultation during the progress of projects. The supervisor is generally briefed on the extent to which projects have met schedules and fulfilled clients requests. Supervision of work in progress at this level typically takes the form of consultations about important matters, such as responding to competing client priorities for services, equipment and resources.

Factor IV - Work relationships

(a) Contacts INSIDE the Organization - skills

Level 6. (Applies to typical duties at level P-2.) Typically to exchange information with colleagues in the Organization (e.g., with peers about equipment and techniques) or to request advice of senior specialists regarding difficult problems. This level of contact involves collecting and exchanging information with users on needs and the most appropriate approach to computerizing operations, and providing general training or orientation concerning automation when the primary purpose is to inform.

Level 17. (Applies to typical duties at level P-3.) Assignments generally require that non-routine matters be resolved by working with other Professionals or users, for example:

- Negotiating major changes in systems specifications, in order to make more efficient use of available hardware or software.

- Persuading clients to adopt changes in work operations which will facilitate or are necessary prerequisites to automation, or persuading clients to accept systems output which is more limited than originally requested, in order to save costs.

- Resolving conflicting requirements of users and integrating/harmonizing databases and automation approaches.

Level 18. (Applies to typical duties at level P-4.) To provide authoritative advice to the Organization in negotiating schedules and types of services to be provided to clients, extensive changes in work operations, and automation of new areas of activity. To provide liaison between officials in different areas that will be effected by informatics.

Level 19. (Applies to typical duties at levels P-5 and D-1.) This level represents the interests of the informatics programme within the Organization and negotiates the establishment of appropriate policies governing such matters as time sharing, telecommunications, standardization of practices, etc.

(b) Contacts INSIDE the Organization - importance

Level 2. (Applies to typical duties at levels P-2, P-3 and P-4.) Contacts are with clients throughout the Organization served and are inherent in the nature of the work, i.e., to provide and exchange technical information.

Level 3. (Applies to typical duties at levels P-5 and D-1.) Contacts are typically with clients throughout the Organization as well as specialists and users of services in the Organization's field duty stations, to provide authoritative advice on informatics policies, practices, and standards.

(c) Contracts OUTSIDE the Organization - skills

Level 16. (Applies to typical duties at levels P-2 and P-3.) Contacts are for the purpose of exchanging information about applications and techniques, such as use of computer languages and software, and are required to maintain an awareness of state of-the-art technology.

Level 17. (Applies to typical duties at level P-4). Contacts are with specialist staff in other organizations to solve problems and share experiences with similar hardware, software and applications. Counterparts must be persuaded to share information about projects of this scope, which is typically sensitive, and to release pertinent documentation. Contacts are with vendors to resolve equipment and software problems, and to identify technologies for purchase.

Level 18. (Applies to typical duties at level P-5.) Contacts with counterparts in other organizations and vendors are to negotiate adjustments to improve the effectiveness of the operation by developing standardized and compatible approaches in such matters as report format, definition of common data elements and potential database access.

Level 19. (Applies to typical duties at level D-1.) Contacts at this level are with heads of organizations in which informatics is widely used and is considered as diverse and critical to their raison d'être. These contacts are made to represent the Organization and to commit the Organization to policy positions in such matters as time sharing, telecommunications, and standardization of practices.

(d) Contacts OUTSIDE the Organization - importance

Level 2. (Applies to typical duties at levels P-2, P-3 and P-4.) Contacts to share information about experiences with current or proposed computer equipment, software, language applications, techniques, etc., through normal participation in the professional community to facilitate the comprehension and application of techniques.

Level 3. (Applies to typical duties at level P-5.) Contacts are for the purpose of negotiating adjustments to install and improve operations.

Level 4. (Applies to typical duties at level D-1.) Contacts are to represent the Organization, and with the legislative body in organizations in which automation is critical to their raison d'être.

Factor V - Supervisory responsibility

Level 22-U. (Applies to typical duties at levels P-2 and P-3.) These ratings indicate that supervision is not a regular continuing responsibility, although posts at this level may oversee or lead the work of other staff (both Professional and support staff) on a temporary, project basis, and determine the work methods and standards to be followed.

Level 23-V. (Applies to typical duties at level P-4.) Positions at this level are typically project-oriented and require leadership of the work of staff assigned on a temporary, project basis, as well as staff assigned on a continuing basis. Credit for this focus of leadership is reflected in other factors (II and VI). Points attributed to individual positions will be those applicable under factor V

of Tier I to the normal number of staff supervised on a continuing basis in such a case. Normally, the number of Professional staff supervised on a continuing basis by a supervisor at the P-4 level will not be less than three, and the number of support staff will be between two and ten.

Level 23-W. (Applies to typical duties-at level P-5.) Positions at this level have significant management responsibilities; the number of staff supervised will vary from organization to organization. Points attributed to individual positions will be those applicable under factor V of Tier I to the actual number of staff supervised in each case. Normally, the number of Professional staff supervised at the P.5 level will not be less than five, and the number of support staff will be between two and ten.

Level 24-X. (Applies to typical duties at level D-1.) Positions at this level have major management responsibilities; the number of staff supervised will vary from organization to organization. Points attributed to individual positions will be those applicable under Tier I to the actual number of staff supervised in each case. Normally, the number of Professional staff supervised will not be less than 12, and the number of support staff will be between 11 and 25.

Factor VI - Impact

(a) Effect on work

Level 31. (Applies to typical duties at level P-2.) Decisions are taken on the structures of individual applications and the determination of the methods by which specific processes will be accomplished. The components of work exist within larger systems which accomplish further work processes; products become ingredients for further processes and, consequently, affect their accuracy.

Level 32. (Applies to typical duties at level P-3.) Decisions taken at this level determine the structure of inter-related applications which directly affect the efficiency and accuracy of work accomplished by automated systems and comprise a distinguishable facet of an organization's purpose. Decisions are made on the system components, such as data-elements definition and structure supporting computer program, equipment configuration and cost forecasts. Proposals (e.g., estimated resources needed to accomplish project) affect the design of applications. Proposals are made on the general approach to development, such as the feasibility of adapting existing available hardware and software for new applications or the enhancement of existing systems through conversion to more efficient hardware and software.

Level 32/33. (Applies to typical duties at level P-4.) Decisions taken at this level are as described in "32". Proposals made are related to projects of such scope that a wide range of the Organization's activities are effected; e.g., through integration of related major systems or major equipment acquisition.

Level 33. (Applies to typical duties at level P-5.) Decisions at this level are related to projects of such scope that a wide range of the Organization's activities are effected. Proposals, if accepted, directly affect the purchase and efficient and effective integration and utilization of hardware and software through the systematic and rational development of applications and the assessment of their related resource requirements.

Level 4. (Applies to typical duties at level D-1.) Decisions at this level directly affect the purchase and, efficient and effective integration and utilization of hardware and software through the systematic and rational development of applications and assessment of their related requirements. This level proposes long-term major systems changes, as needed, to keep the Organization current in respect of user needs and potentially useful developments in automation. The work requires the assessment of opportunities, benefits and problems related to the introduction of automated systems to support the Organization's diverse programmes and the encouragement of the efficient integration of systems and information both within the Organization(s) and in relation to information developed by other organizations.

(b) Consequences of error

Level d. (Applies to typical duties at level P-2.) Completed work at this level is generally reviewed for soundness of approach, thus errors discovered at this stage are generally costly to the immediate project group in terms of time and expense required to redo work.

Level e. (Applies to typical duties at levels P-3 and P-4.) Since work is not normally reviewed in progress, errors could go undetected until the projects were so advanced that even expenditure of resources on an emergency basis would not be sufficient to fulfill commitments to clients and would have an impact on client's programmes.

Level f. (Applies to typical duties at level D-1.) Errors at this level consist of incorrectly forecasting performance of the Organization and equipment. In such instances, the delivery of services is critical to the success of various client programmes and important to the delivery of services to constituents.

Annex II - GLOSSARY

The primary objective of the glossary is to assist job classification specialists in their understanding of the terminology used in these standards. Thus, it is a collection of the terms used in the standards as well as others commonly encountered in job descriptions for this field of work. It is not meant to provide complete and technical definitions but to help the reader understand their basic sense and everyday usage.

There are many terms that reflect the automation environment, but few of them are subject to precise, unerring definition. Many are terms of art and semantics, coloured by circumstance and application in different situations. Thus, although the following explanations and characterizations are sound, the reader is cautioned to remember that this is a glossary, not a dictionary.

Many of the terms are composite or compound terms. In this glossary, the listing is purely alphabetical: the key word is the first word where it is a noun, a modifier or a phrase.

Application: The use of an information system or software package for a particular purpose or in a special way.

Architecture: The selection, design and interconnection of the physical components of a large-scale computer system.

Batch processing: The processing of data or the accomplishment of jobs, accumulated in advance, in such a manner that the user cannot further influence its processing while it is in progress.

Central processing unit (CPU): A unit of a computer that includes circuits controlling the interpretation and execution of instructions.

Compatibility: The ability to transfer computer programs and computer readable data from one hardware system to another without losses, changes or extra programming.

Computer: A data processor that can perform substantial computation, including numerous arithmetic operations or logic operations, without intervention by a human operator during a run.

Computer-readable information: Information available in digitized form which may be transferred and read as such by another computer device.

Configuration: The particular choice of hardware and its connections making up a computer system.

CPU: See *central processing unit.*

Data: A representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by humans or by automatic means.

Database: A collection of structured data. The structure of the data is independent of any particular application.

Database administration: The day-today management and control of the databases used for the operation of an organization.

Data processing: The systematic execution of operations upon data.

Feasibility study: The stage in the implementation of a computer system when estimates of the cost and effort involved in implementing a full system are made.

File: A set of related records treated as a unit. For example, in stock control, a file could consist of a set of invoices.

Hardware: Physical equipment used in data processing, as opposed to computer programs, procedures, rules and associated documentation.

High-level language: A programming language that does not reflect the structure of any one given computer or that of any one given class of computers.

Informatics: A comprehensive term to describe all aspects of the development and operation of information systems and the supporting computer methodology and technology.

Information: The meaning that a human assigns to data by means of the conventions used in their representation.

Information system: A system for the collection, storage, processing and dissemination of information to the users, which may or may not be computerized.

Input: Data being received or the process of receiving data into a data processing system or part thereof.

Installation: The process of introducing a hardware/software system into a new location and bringing it to operational status.

Interactive: A mode of operation of a computer system in which a sequence of alternating entries and responses between a user and the system takes place in a manner similar to a dialogue between two persons.

Interface: The boundary between two hardware or software systems across which data is transferred. An overall term to refer to the physical linages and procedures, codes and protocols that enable meaningful exchange of programmes, commands or data between two computerized systems or devices.

Keyboard: A set of keys in a typewriter-like arrangement used to enter data or commands into the computer.

Language: A set of characters, conventions, and rules that is used for conveying information.

Mainframe: A computer with a variety of peripheral devices, a large amount of storage and a fast central processing unit, generally used in comparison with a smaller or subordinate computer.

Microcomputer: A complete small computer system built around a microprocessor CPU.

Minicomputer: A computer whose size, speed and capability lie between a mainframe and a microcomputer.

Module: A cohesive set of small programs which perform specific functions and can be compiled separately and viewed as a unit of an application computerized system.

Network: A set of computers and peripherals connected by communications links.

Office automation: The use of computer-based technology to increase the productivity of office workers.

Operating system: Software for controlling the execution of computer programs that may provide scheduling, debugging, input/output control, accounting, compilation, storage allocation, data management, and related services.

Output (noun): The process that consists of the delivery of data from a data processing system or from any part of it.

Package: A set of commercial available programs designed for a specific use.

Peripheral equipment: In a data processing system, any equipment, distinct from the central processing unit, which may provide the system with outside communication or additional facilities.

Protocol: The formal rules governing the exchange of information in a communication link including format, timing, sequencing and error control.

Security. The establishment and application of safeguards to protect data, software and computer hardware from accidental or malicious modification, destruction or disclosure.

Software: Computer programs, procedures, rules, and any associated documentation concerned with the operation of a data processing system.

Strategy: A set of activities chosen in order to achieve long-term goals.

Systems analysis: The process of defining and determining the behaviour of a system for purposes of problem identification, problem selection and systems design.

Telecommunications: The transmission and reception of messages over a distance, e.g., using radio, telephone lines.

Telematics: The use of computer-based information processing in telecommunications.

Terminal: An input-output unit by which a user communicates with a data processing system.

Transaction: A short interaction between a computer and an operator for a specific purpose, such as recording a payment or entering a name.

Work station: A term for "terminal" with its own processing capability, for example, powerful microcomputers which can perform many tasks and be integrated into the office environment.

Annex III - CCOG FOR GENERAL SERVICE CATEGORY

2.A.05. Computer Information Systems related

Provide technical, procedural and record-keeping support in the compilation, maintenance and extraction of information through the use of computer equipment by applying established procedures to such tasks as updating and running programs; reviewing outputs for desired results; documenting equipment and software usage; coding and entering input data; maintaining computer records; answering users' questions; identifying and resolving errors caused by human or equipment failures; operating and supporting particular multi-user applications and software services; and training users.

2.A.05.b. Software user support

Provide support to users of generic software packages; analyse requirements of primary users of single purpose, small-scale, stand alone systems; design applications using commercial software packages to meet the requirements of the particular applications; program or customize prototype software; test and install commercial software packages; orientate and train users in use of software features.

2.A.05.d. Application user support

Adapt, program, operate and support multi-user application automated features including file management, data verification and reporting; monitor application capabilities in relation to evolution of user requirements; initiate control and document adjustments to application; maintain user documentation; edit checks and error messages; conduct individual user orientation and group training for applications; coordinate implementation of upgrades and enhancements to application; and design and extract customized user reports.

2.A.05.f. Programming assistance

Write and test simple, well-defined programs using high-level and fourth-generation languages; maintain and modify existing programs and procedures; prepare and generate screen maps; prepare and submit jobs for computer processing; prepare test data and test runs; prepare and up-date documentation.

2.A.05.g. Computer operations

Directly operate or control the operation of computer equipment by means of a console, master terminal or peripheral equipment.

2.A.05.h. Data entry operation

Convert data for computer processing through the operation of alphabetical or numeric keyboard, remote terminals or other machines, including entry through a computer into storage devices.

3.B.13. Computer equipment installation

Install, adjust and conduct minor repairs of computer workstations and automated office equipment; orient users on capabilities and operation of relevant equipment; test equipment performance; schedule maintenance and replacement; and monitor equipment acquisition, delivery and service contracts with outside suppliers.

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