STAT Working Papers

STAT Documents de travail

STAT Documentos de trabajo

No. 95 – 2CONSTRUCTING A MAP OF THE WORLD OF WORK**How to develop the structure and contents of**

a national standard classification of occupations

prepared byBrian Embury,

with contributions by

Jaswant Gulati, Adriana Mata and Eivind Hoffmann

Geneva, May 1997INTERNATIONAL LABOUR OFFICE, Bureau of Statistics

BUREAU INTERNATIONAL DU TRAVAIL, Bureau de statistique

OFICINA INTERNACIONAL DEL TRABAJO, Oficina de Estadística

Preface

This *Working Paper* presents practical guidelines for those who want to develop a *National Standard Classification of Occupations (NSCO)* with definitions and descriptions of the component groups. The principles and procedures described are based on the practical experiences of many countries, even though the examples are mainly from from Australia. The text was originally intended to be part of an ILO manual on the development and use of a national standard classification of occupations. It has, however, proved difficult to finalise the manual, and it has therefore been decided to issue parts of it in this form. A companion *Working Paper* provides practical guidelines on how to register the "occupation" as a characteristic (variable) in a statistical survey or on administrative records. The two *Working Papers* can be regarded as preliminary drafts for the manual, and the ILO Bureau of Statistics would welcome all comments on the texts and all suggestions for their improvement.

A NSCO has been compared with a system of geographic maps for a country. This comparison is also valid for the development processes: This paper tries to describe a process which is realistic in terms of resources required, given the experience that very few countries have found it possible to allocate much resources for this type of work. Nevertheless, as described the process may require more resources than can be mobilised for developing, or revising, a NSCO within a reasonable timeframe. In that case it will still be possible to use the guidelines in this paper to develop a more sketchy and less accurate "map" of the world of work than that which envisaged in the text. Precisely how and where the necessary simplifications and short-cuts should be made to arrive at a project consistent with available resources, will have to be determined on the basis of the national situation and priorities.

This *Working Paper* can be seen as a supplement to the **International Standard Classification of Occupations** (ISCO-88), which can serve as a possible model for the development of a NSCO, but does not explain **how** to develop a NSCO.

The first draft of this *Working Paper* was prepared by Mr. **Brian Embury** who over many years has shared with the ILO the results of the path-breaking methodological work of the Australian Bureau of Statistics in the development and statistical use of an occupational classification. In addition to being project manager for much of the Australian work he served as adviser to the revision or development of NSCOs in Bulgaria, Canada, Fiji and Hungary. In preparing the text he was able to draw on material prepared by Mr. **Jaswant Gulati** who worked on the *Indian National Classification of Occupations* (1958 and 1968 editions) and who has also worked as an ILO expert in Iraq, Mauritius, Trinidad & Tobago and the United Republic of Tanzania. Ms. **Adriana Mata** and Mr. **Eivind Hoffmann**, of the ILO Bureau of Statistics, have also contributed to the text. The authors are responsible for the views expressed and any errors or ommissions.

Table of contents

Page

1 Introduction

An occupational classification is a tool for presenting information about the type of work which is performed in the jobs found in an establishment, an industry or a country and for organizing this information systematically. It normally consists of two mutually supportive components:

- a descriptive component, which may be just a set of titles of occupations and occupational groups, but which often consists of descriptions of tasks and duties as well as other aspects of the jobs in each of the defined groups. In the latter case this descriptive component constitutes the *dictionary of occupations*;a *classification system*, which provides guidelines for classifying jobs into the most detailed groups of occupations and for aggregating these into broader occupational groups.

A *National Standard Classification of Occupations (NSCO)* can be compared to a system of geographic maps for a country. The top level of aggregation corresponds to a small scale map showing the main rivers, mountains, cities and roads, while the next level corresponds to a set of larger scale maps for each of the main regions, showing smaller towns and the roads between them. At the most detailed level one finds the technical maps used by municipal engineers to plan pavements, traffic lights, road extensions, etc.. These very detailed maps correspond to the detailed job descriptions which are used as management tools by enterprises to organize their activities, formulate wage and salary scales and evaluate jobs. In most countries these are outside the concern of national authorities, except in relation to the management of their own activities.

The purpose of this paper is to provide advice on the development of a NSCO to suit national requirements and conditions. After a historical overview and an introduction to the basic concepts and principles of occupational classifications in general and the *International Standard Classification of Occupations* (ISCO-88) in particular, the topics covered include: planning the project, including the assessment of users' requirements; adapting the ISCO-88 structure to suit national requirements; modifying and extending the group definitions; incorporating occupation definitions; and collecting occupational information. Organizational and practical matters of implementation are discussed in addition to methodological issues.

1.1 Users of national occupational classifications

National occupational classifications and dictionaries are usually designed to serve several operational and planning purposes. Although the detailed occupational descriptions (when they exist) and the classification structure must be seen as an integrated whole, different users have different interests in the various elements. The detailed occupational groups and descriptions are used mainly by those who need to know fairly precisely the type of tasks which are involved in different types of jobs, e.g. those evaluating hazards in the work situation, plan training activities to prepare workers for such jobs and provide vocational guidance to job seekers and those embarking on vocational training or a career; as well as for those making decisions about "clients", e.g. those responsible for job placement or granting work permits to foreigners or nationals wanting to work abroad - activities with information requirements similar to those of personnel management. Although they should be designed primarily to meet the needs of such users, descriptions of detailed occupational groups should also include elements necessary for applying relevant classification schemes.

The classification structure is used principally to sort jobs (and the persons linked to those jobs) to occupational groups in order to facilitate statistical description and analysis of the labour market and the social and economic structure of the country, as a basis for public debate and the formulation and monitoring of policies, as well as national and regional development. The breadth of potential uses of occupational statistics can be illustrated by the following examples: *Legislators and public sector administrators* may use occupational statistics when formulating government policies and in monitoring progress with respect to their application and their results, as well as in manpower planning and the planning of educational and vocational training. *Managers and workers' representatives* need occupational statistics for shaping working conditions and manpower policies, including compensation, at the establishment and industry level. *Psychologists* study the relationship between occupations and the personality and interests of workers. *Epidemiologists* use occupation in the study of work-related differences in morbidity and mortality. *Sociologists* rely on occupation as an important variable in the study of social differences in life styles, behaviour and mobility. *Economists* use occupation in the analysis of differences in the distribution of earnings and incomes over time and between groups, and in the analysis of employment and unemployment.

In a statistical study *occupation* may be the main variable or it may serve as a background or explanatory variable, depending on the purpose of the description or analysis. Used as a background variable, it may serve as a proxy for other variables more difficult or costly to observe, such as *socio-economic group* or *exposure to particular harmful substances*, or it may be used as one element in the construction of other variables, such as *social class* or *socio-economic status*.

While a comparison of the distribution of the employed population (or some other variables such as wages, hours of work, work accidents, income, consumption or reading habits) over occupational groups requires that the occupational classification should cover all jobs, the focus in other types of use, whether statistical or client-oriented, is normally on specific occupations or groups of occupations. The users interested in specific groups may between them also cover all occupations. However, in practice the coverage will be very uneven and it is likely to exclude jobs in certain areas, especially jobs outside the modern, formal sector, or for which little or no specific training has been developed.

1.2 The use of ISCO

The **International Standard Classification of Occupations** (ISCO) is designed to facilitate international communication of occupational information, narrowly or broadly defined, for both client-oriented and statistical users. It may also serve as a basis for developing or revising national occupational classifications, or act as a substitute for a national classification if none has been developed. ISCO must therefore reflect the different uses at the national level, while taking into account the special considerations which follow from its international nature.

The main client-oriented applications of an *international* standard classification of occupations relate to the international recruitment of workers and the administration of short- and long term migration of workers between countries. An internationally developed and agreed set of descriptions for detailed occupational categories which can serve as a common ? language? for the countries and parties involved in such programmes, enhances the effectiveness of communication necessary for their execution.

Internationally comparable statistics on occupational groups are used mainly to:

(a) compare the occupational distributions of jobs or persons of two or more countries; or compare the occupational distributions of variables such as wages, consumption or literacy;

(b) compare data on broadly or narrowly defined occupational groups, for example the average wages of computer programmers or the number of industrial designers;

(c) merge comparable data from different countries in order, for example, to obtain enough observations to analyze the incidence of particular work-related accidents or diseases among workers believed to have similar exposure to harmful substances, or to work under certain relevant conditions.

Experience shows that most users of international statistics use data at high levels of aggregation - usually for type (a) uses. Important exceptions are studies of earnings, work hazards and injuries and other conditions of work. They often require detailed data, sometimes cross-classified with industry and/or status in employment, but such statistics are frequently not available.

1.3 Basic concepts and principles of an occupational classification

The primary objects classified in an occupational classification are *jobs*. A *job* is defined as a set of work tasks and duties performed by one person or designed to be performed by one person (in the case of unfilled jobs). Jobs which have the same set of main tasks and duties are aggregated (grouped together) into *occupations*. *Occupations are* grouped together into narrowly or broadly defined *occupational groups* on the basis of similarity in the type of work done, i.e. similarity in the tasks and duties performed. The units described in a dictionary of occupations are occupations and occupational groups. (At the enterprise level the wage and salary scheme may describe individual jobs.)

The decisive factors for how well an occupational classification can suit the needs of any user are that the appropriate number of groups are distinguished and that appropriate criteria are used to define similarity in type of work done for those occupations which are said to belong to the same aggregate group. Unfortunately different users have different requirements with respect not only to the appropriate level of aggregation but also to the most appropriate similarity criteria. For some users (eg. insurance companies) important criteria may be whether the work is outdoors or indoors, or whether travelling is required or not. For other users, the social status of the work may be most important, or they may want to focus on the materials worked with, the goods and services produced or whether the work requires direct contact with clients and customers. By deciding on the main similarity criteria to be used in the occupational classification its developers implicitly or explicitly give priority to some users' needs over others. The implications of this for the overall use of the classification must therefore be carefully evaluated. The inconveniences for non-priority users may be significantly reduced if sufficiently detailed categories can be developed in those parts of the classification which are of importance to them.

In many of the national occupational classifications that have been revised or developed since 1985, as well as in the latest version of ISCO, ISCO-88, occupations are identified, defined and grouped mainly on the basis of the *similarity of skills* required to fulfil the jobs' tasks and duties. In ISCO-88, as well as in the NSCOs using the same similarity criteria, two dimensions of

the skill concept are used to define groups: *skill level*, which is a function of the range and complexity of the tasks involved, where the complexity of tasks has priority over the range; and *skill specialization*, which reflects the type of knowledge applied, tools and equipment used, materials worked on, or with, or the nature of the goods and services produced. With this approach the focus is on the skills required to carry out the tasks and duties of an occupation and not on whether a worker having a particular occupation is, or needs to be, more or less skilled than another worker in the same occupation.

If ? skill level? is used as the main variable for defining the broad distinctions which separate the major groups in the classification, it will by necessity run through the whole classification system. In some national classification systems the ? skill level? categories have been defined with reference to the national education and training systems, specifying the type and level of training and experience which new entrants into the occupations are typically expected to have.

In ISCO-88 skill level categories are defined by references to UNESCO's International Standard Classification of Education (ISCED); (COM/ST/ISCED; Paris 1976). This does not mean that ISCO-88 assumes that skills can be obtained only by formal education or training. Most skills may be, and often are, acquired through experience and informal training, although formal training may play a larger role in some countries than in others and will also be relatively more important at the higher skill levels. In the ISCO-88 classification system, the decisive factor for determining how an occupation should be classified is the nature of the skills required for the job - not the way in which these skills have been acquired.

'Skill specialization' is used to make both broad and fine distinctions within the major groups of the classification. Specializations are related to subject areas, production processes, equipment used, materials worked with, products and services produced, and so on; and words describing specializations are used in the titles and descriptions of the more detailed occupational groups. The same type of words are also used to describe the groups of an industrial classification of production activities. For some jobs it will therefore be possible to predict the industry in which they are located with a fairly high degree of success, knowing how they are classified by occupation. It is important to understand that in ISCO-88 and similar NSCOs this is because skills are linked to products, materials, and so on, and not because industry is used as a classification criterion.

As *job* is the primary object classified by an occupational classification, it follows that a *person* can be classified according to an occupation or occupational group only through his or her relationship with a job. This can be a job held in the past, a current job or a job he or she is looking for. In this context ? to have a job? is meant in a broad sense, so that the classification should be applicable to all employment situations: employees, the self-employed and contributing family members, i.e. everyone working for pay, profit or family gain. It follows from this that, depending on the circumstances, one person may be classified according to several different occupations if he or she has had (or is expected to have) more than one job. Users who need to work with only one occupation for each person, will have to formulate priority rules for selecting the ? most important' job. Such rules are normally formulated with reference to hours worked or income earned during the reference period.

1.4 Historical background

While distinctions between different "occupational classes" were introduced in population censuses undertaken in the early parts of the 19th century in several countries, the identification of "occupation" and "industry" as different variables, each requiring its own classification, was only made towards the end of the century, as it became increasingly clear that the division of labour between firms and organizations in an industrial society was distinct from the division of labour between different jobs within the same firm. The pioneers in this work were the statistical agencies in Australia, the United Kingdom and the United States.

The history of the development of the *International Standard Classification of Occupations (ISCO)* has always been closely connected with the work of the *International Conference of Labour Statisticians* (ICLS) which meets under the auspices of the **International Labour Organization**. The need for an international standard classification of occupations was discussed already at the first ICLS in 1921, but the first positive step towards its establishment was the adoption of a provisional classification of nine major groups by the Seventh ICLS in 1949. In 1952 the ILO published the *International Classification of Occupations for Migration and Employment Placement*, with descriptions of 1,727 occupations based on the national classifications of eight industrialized countries. The publications of the first edition of ISCO took place in 1958, and a revised edition followed in 1968. ISCO-58 consisted of a classification structure and a comprehensive set of occupation descriptions but did not include a profile of occupations in terms of formalized coding of job characteristics and worker traits. Many countries used either ISCO-58 or ISCO-68 as model for their own national classifications, e.g. Australia, Brazil, India, Pakistan, Malaysia, Indonesia, Fiji, Portugal Spain, Italy, Brazil, whereas others retained or developed their own, national structures, e.g. France, the United Kingdom, the United States, Canada, the Federal Republic of Germany and Switzerland. Some regional classifications were also developed on this basis, e.g. the Nordic countries produced the NYK as a joint standard classification and a dictionary on the basis of ISCO-58. Many countries which adopted ISCO as a model thought it sufficient to define the structure of their national classifications in terms of a set of occupational titles and alternative titles and did not develop a set of associated descriptions.

The third edition of ISCO was adopted by the 14th ICLS in 1987 and approved by the ILO Governing Body in 1988. The major changes introduced were that (i) the underlying principles and concepts were made more explicit than they were in the previous versions; (ii) *skill level* and *skill specialization* were identified as the main similarity criteria for creating aggregate groups; and

(iii) ISCO-88 does not define as many detailed categories as its predecessors, because experience had shown that it is very difficult to develop a comprehensive set of detailed descriptions that will be applicable to all countries. However, ISCO-88 does have descriptions for all of the categories that are identified at each of the four levels of the structure, and it can easily be extended by defining detailed "occupations" if and when that is needed. For the 1990 round of population censuses it has been reported that links to ISCO-88 have been established for 65 countries (for 54 there were links to ISCO-68), and for almost 40 the links were to sub-major or more detailed groups. A number of countries revising their national occupational classification or developing one for the first time have used ISCO-88 as a model, including all the transition countries in Central and Eastern Europe. A majority of the member countries in the European Union have developed national occupational classifications based on ISCO-88, and a special version, ISCO-88(COM), is being used as the reporting standard for statistics on occupations in the EU. Based on work carried out in Russia the *Commonwealth of Independent States (CIS)* is (1997) developing a corresponding classification for the CIS member states based on ISCO-88.

The first comprehensive dictionary of occupations was developed by the *Occupational Analysis Section (OAS)* of the *United States Employment Service (USES)*. It was created to meet the day-to-day needs of local office personnel in State Employment Security Agencies. These agencies needed to classify the employment experience of job seekers and the characteristics of job vacancies listed by employers, and to this end identified, described and classified occupations on the basis of what the worker has to know, to do and to be to be able to carry out the tasks of the jobs classified to an occupation. The first edition of the dictionary was published in 1939 and was entitled the *Dictionary of Occupational Titles (DOT)*. It described approximately 17,500 occupations in the US economy. A second edition was published in 1949, a third edition in 1965 and a fourth in 1977. A revised fourth edition was published in 1991 with descriptions of 12,741 occupations. In 1990-92, the *US Employment and Training Administration* of the *Department of Labor* conducted an extensive inquiry designed to determine whether a completely revised edition of the DOT should be produced and what form such a revision should take. The *Department of Labor* also addressed the issue of the relationship of the DOT to the *Standard Occupation Classification (SOC)* developed and used by the *Bureau of Labor Statistics (BLS)* and the *US Bureau of the Census*.

Since 1939, a number of countries have developed dictionaries of occupations for use in national employment services and/or classifications to be used (mainly) to produce occupational statistics. Many countries did not develop one national standard classification but used a number of different and incompatible classifications for different applications. Typically, the statistical agency developed a classification modelled on the *International Standard Classification of Occupations (ISCO)* but the labour department used a different classification, with or without a dictionary:

- **United Kingdom**'s employment services developed the *Classification of Occupations and Dictionary of Occupational Titles (CODOT)*. As in the United States, CODOT was not adopted for use in statistical applications but occupations at the most detailed level were mapped to the classifications used for statistics by the *Office of Population Censuses and Surveys* and its predecessors. In 1990 a new *Standard Occupational Classification (SOC)* was published to be used both for statistics and by the employment services. SOC was based on principles similar to those of ISCO-88, and does not have detailed descriptions of groups or occupations.

- In **Australia** the *Australian Bureau of Statistics (ABS)* produced the *Classification and Classified List of Occupations (CCLO)* in 1960 based on ISCO-58. The CCLO consisted of a classification structure and a set of occupational categories defined only in terms of a set of

alternative titles commonly used by people to describe their jobs on Australian census forms. The Australian *Department of Employment and Industrial Relations*, however, continued to use an older and quite different classification structure supplemented by nationally compiled occupational descriptions. The Australian *Department of Immigration* developed another different classification structure which was used to categorize the job skills of potential migrants. As a result, the occupational statistics produced by these government agencies were not comparable. User criticism of the structure of all of these classifications and their non-comparability eventually led to a joint project in the early 1980s to develop a national standard classification. This work resulted both in a comprehensive occupational dictionary which was published in 1983 as *Australian Standard Classification of Occupations: Working Draft* and in a completely revised structure, pioneering those of ISCO-88, in *Australian Standard Classification of Occupations (ASCO), First Edition* (1986). The former had by then already been introduced in the operations of the *Commonwealth Employment Service (CES)*, but the latter was introduced in a range of other client-oriented applications as well as for the collection of statistics. A revised version of ASCO was published in 1996. This edition has retained the main principles, and moved the resulting structure closer to ISCO-88.

- **France** has a long tradition for different services having separate classifications of occupations, each 'tailor-made' for a specific need. The *Agence nationale pour l'emploi (ANPE)* has developed a classification and dictionary (ROME) especially for the needs of job placements, paying special attention to how the experience from one occupation may be relevant for recruitment to jobs in other occupations. ROME was last revised and updated in 1994. The *Centre d'études et de recherches sur les qualifications (CEREQ)* has developed a dictionary and classification of occupations (RFE) with emphasis on their relationship to education and training. *Institut National de la Statistique et des Etudes Economiques (INSEE)* has developed a *Nomenclature des professions et catégories socioprofessionnelles (PCS)* especially designed to serve as instrument for a statistical description of the social structure of France and the behaviour of the different segments of French society.

- The former **Soviet Union** developed an *All Union Occupational Classifier (AUOC)* which defined about 5000 different occupations related either to material or to non-material production, with occupational descriptions for the former but not the latter type. The AUOC was an instrument of wage, salary, pension and personnel administration, and could not be used as an instrument for statistical description of occupational distributions. In particular its continued role in the determination of pensions in the member countries of the *Commonwealth of Independent States (CIS)* made it important to develop a CIS successor to AUOC and to ensure that it is being regularly updated in all CIS member countries. Mainly based on work carried out in **Russia** this updated AUOC is also to be given a common structure similar to hat of ISCO-88.

- In **China** the ministries responsible for the different economic sectors have developed occupational classifiers similar to the AUOC for the management of personnel and wages for the establishments under their control, with some coordination provided by the Ministry of Labour. Work is now (1997) under way to develop a common national classification which can be used for both statistics and management of staff, but there are indications that the result may not be directly compatible with ISCO-88.

- **Canada** was one of the first countries to develop a combined classification and dictionary of occupations as a national standard for use by all government agencies. The *Canadian Classification and Dictionary of Occupations (CCDO)* was developed jointly by *Statistics Canada* and *Employment and Immigration, Canada (EIC). Statistics Canada* played the

major role in the design of the classification structure and EIC played the major role in the development of the dictionary. The CCDO was produced on the basis of an extensive occupational analysis programme costing approximately 100 staff years in resources. It was published in 1970 in two volumes: the first volume presents a classification structure and contains occupational descriptions organized in terms of this structure; the second volume contains a comprehensive set of job characteristics and worker traits for each of the 6,700 occupations. A number of updates were later issued. CCDO was used by EIC for job placement and all other employment related applications, and *Statistics Canada* used a slightly modified form of the CCDO, the *Standard Occupation Classification (SOC)* for all statistical applications. A new classification to replace both CCDO and SOC, the *National Occupational Classification (NOC)* was published in 1993.

- **Indonesia** is one of the few countries in the world which has a comprehensive programme of developing and maintaining a national occupational dictionary and classification system. The first edition of the national occupational classification for Indonesia, *Klasifikasi Jabatan Indonesia (KJI)*, was first published in 1977. Later revised and expanded editions have been issued in 1980, 1982 and 1987. During this period a comprehensive programme of occupational analysis and description was also developed, using the methodology developed for and acquired from the U.S. DOT experts. This programme has made it possible to prepare about 7000 detailed occupational descriptions which cover almost all sectors of the Indonesian economy. These occupational descriptions have been issued in at least 8 volumes of *Kamus Jabatan Indonesia (KJN)*, of which seven describe the characteristic occupations of specific industry groups and the last describe general administrative occupations. In addition 7 volumes of job descriptions for public administration have been prepared, of which six cover administrative jobs and one covers functional ones.

- In **India** a *National Classification of Occupations (NCO)* was developed on the basis of ISCO-58 and then revised and expanded when ISCO-68. The later followed the ISCO model closely, with extensions and elaborations at all levels of aggregation to adapt the model to the Indian circumstances, and, with the detailed occupational descriptions, some pointed advice to placement officers on additional information which would be useful to identify appropriate vacancies for job seekers.

- Other countries and territories in **Asia and the South Pacific** which (by early 1997) had developed or revised NSCOs ISCO-88 include Pakistan, the Philippines, Macau, Hong Kong, Fiji and Papua New Guinea.[1]

- In **Africa** ISCO-88 based NSCOs had been developed in Tanzania, Namibia and Mauritius, and was under development in Kenya by 1997.

- In **Latin America** only Brazil and the Dominican Republic are known to have started work to revise their NSCOs according to ISCO-88, while in Mexico and Argentina one has chosen to use other models as basis for the new NSCOs. In the **Caribbean** Barbados and Trinidad & Tobago had ISCO-88 based NSCOs in the early '90s.

---

[1] *In fact two so called NSCOs were developed for PNG and published in 1991. One, based on ISCO-88, was prepared by the National Statistical Office and the other, based on ISCO-68, by the Ministry of Industrial Relations; thus giving another example of lack of communication within the same country.*

2 Basic principles for the development of a classification structure2.1 The purpose of a classification

The principal purpose of any classification is to provide an instrument for systematic and simplified description of the value set a particular characteristic or variable which are observed for a population of objects. The description is usually directed towards some particular purpose and this purpose would ideally guide the choice of what characteristic of the objects one chooses to focus on, as well as on how the characteristic is to be described. The complexity of the real world is reduced by describing the characteristic in terms of a limited set of classes or values that are deemed to be useful in furthering one's understanding and analysis. The set of classes or values constitutes the **classification** for that particular characteristic[2].

To develop a classification one must:

- identify the objects to be classified;
- identify the characteristic which is relevant for one's purposes;
- describe the objects precisely in terms of the characteristic;
- define a relation of similarity between the objects in terms of the characteristic;
- apply this relation to group the objects into the classes which correspond to the defined set of values, and which are exhaustive and mutually exclusive.Classifications which are to be used for statistical description and analysis must satisfy these requirements and a number of others, such as:
    - statistical feasibility;
    - statistical balance;
    - compatibility with other statistical concepts and classifications as well as comparability with older classifications and or international standards;
    - cost effectiveness in development and use.

To implement a classification in data registrations one must:

- define a methodology for the registration of the necessary information, appropriate for the situation in which registration takes place;
- formulate an appropriate set of coding and/or derivation procedures to reliably turn the registered information into the code for the correct class;
- formulate a standard set of editing specifications;
- formulate a standard set of storage and output conventions;
- formulate a set of procedures which can control that the conventions are followed.

---

2 It should be noted that the same classification may be valid for more than one characteristic or variable.

Many elements of the methodology will be independent of the situation in which the registrations take place and should be applied as consistently as possible across the range of data collections which will be using the classification. However, the procedures that are appropriate in an interviewer-conducted statistical survey may differ in certain respects from those which are appropriate when a client is interviewed at an employment office, or when (s)he is asked to fill in a registration form as part of an administrative process. One should therefore for each data collection situation develop an appropriate set of procedures and tools to ensure that the conventions are followed as far as practicable. This means that while a NSCO should

- identify and define a set of occupations covering all jobs in the economy;
- define those occupations in terms of the selected characteristics;
- group those occupations into successively broader categories on the basis of their similarity with respect to certain criteria;

it should also be accompanied by a set of tools for the collection and processing of information which will make possible the reliable registration of the occupations of jobs and persons, and those are discussed in another STAT Working Paper, cf. (Hoffmann et al. 1995).

2.2 Objects of an occupational classification

The basic object which is classified by an occupational classification is a *Job*. A *job* is a set of tasks (designed to be) performed by one individual. Many jobs will typically involve a particular individual working for an employer by undertaking a set of tasks in return for a wage or salary, but people who work for themselves are also regarded as having a "job". During a particular reference period most jobs will have an incumbent, i.e. there will be a person who will be carrying out the tasks of the job. However, we may have jobs without incumbents, i.e. in the form of vacancies shown on an organisation chart, advertised in a newspaper or listed with an employment service. During a specified reference period a job may also have more than one incumbent, e.g. if the incumbent changed during the period or if two persons share a position originally designed for one person. In the same way, one individual may have more than one job during a particular reference period, e.g. he or she may have changed jobs during the period, or be e.g. a public servant by day and a taxi driver by night or on week-ends. A job may exist now or may have existed in the past or it may exist in the future, e.g. one might identify a job held by an individual prior to retirement or dismissal, as well as a job aspired to by a school-leaver[3].

In a population census or labour force survey, as well as in the job-seeker records of an employment office, it will be *persons* that are to be classified by occupation. This they can only be if they can be linked to one or more jobs. Depending on the circumstances of the person and the objective of the registration, this job, or these jobs, can be a current one, a job previously held or a job which the person is looking for. When interviewed for a statistical survey employed persons are typically asked to describe their current job, while unemployed persons are asked about a past job. In an employment office job seekers may also be asked about the type of work they are looking for.

---

[3] It should be noted that in the literature on *job analysis* the term "job" is usually used for 'a set of "positions" which involve the same tasks', i.e. the term "position" is used in the same sense as "job" is used here.

Many jobs will have very similar if not identical sets of tasks. By grouping them together we define *occupations*, which constitute the most detailed level in the occupational classification.

An *occupation* is a set of jobs with identical sets of main (or primary) tasks. In practice every job is a little different, and one would say that an 'occupation' is a collection of jobs sufficiently similar **in their main tasks to be grouped together for classification purposes. For each occupation in the NSCO the definition should list the set of tasks which are necessary and sufficient for a job to be classified to that occupation. The occupational definitions should also list any more specific tasks which are carried out in jobs representing *specialisations* identified for that occupation.**

2.3 Choice of similarity criteria for defining groups of occupations Error! Bookmark not defined.

2.3.1 Selecting similarity criteria

The choice of *similarity criteria* for grouping occupations is the most fundamental decision to be made during the development of any classification structure. The choice will determine acceptance or rejection of the structure by users and the ultimate utility of the resulting statistics. If there are no explicitly defined classification criteria, one can only define the composition of a category only by an exhaustive enumeration of job titles which should be classified there, and there will be no clear guidance on where to classify unlisted titles or job descriptions when they are encountered. In this case the process of classification can easily become arbitrary and there will be little guidance on how to classify new occupations or occupations which were originally overlooked.

The choice of similarity criteria for an occupation classification must satisfy a number of conditions:

(1) Each criterion must relate to some known attribute of each and every occupation. In other words, it must be possible to describe each occupation in terms of all classification criteria. This is essential: if a criterion is to be used, on its own or in conjunction with others, then one must define occupations and group them into successively broader categories on the basis of their similarity with respect to that criterion.

(2) Each chosen criterion should measure a particular attribute of jobs which is germane to the purposes for which the classification is to be used. For example the criterion of *skill level* is important if the classification is to be used for purposes such as job placement, human resource budgeting, planning of vocational training, etc. Similarly, the criterion of *occupational prestige* is important if the classification is to be used for analysis of social stratification and social mobility.

(3) The concept underlying each criterion should be clearly defined and capable of being operationalized in a clear and consistent manner. For example, there is little point in saying that we will classify jobs on the basis of similarity with respect to the *type of work done* if we do not have a clear and precise definition of that concept. Further, the definition of *type of work done* must provide the basis for rating all jobs in terms of that criterion such that different classification experts can make the same classification decisions independently of one another, if they have the same information about the occupations. Similarly, it is pointless to define the *skill level of an occupation* as a measure of the range and complexity of the tasks involved if we do not have an agreed method of evaluating the range and complexity in question.

(4) Each classification criterion chosen should be distinct from the other criteria chosen. For example, suppose one chooses *skill level* as one classification criterion and operationalizes 'skill level', as in ISCO-88, with reference to the length and type of training one would usually expect of those who enter into that type of job, in order for them to be able to perform the tasks of the

occupation in a satisfactory manner. In this situation, it would be redundant to use the *length and type of training* as a criterion in addition to that of 'skill level', and to do so may create inconsistencies within the classification.

Most occupational classifications adopt *type of work done*, understood as the main tasks and duties of the job, to be the basic variable to be represented by the occupational classification. The above definitions of the terms *job* and *occupation* provide the intuitive basis for a definition of the degree of similarity in type of work between any pair of occupations.

The *degree of similarity in type of work done* between two occupations varies directly with the degree of overlap between the sets of tasks involved. Obviously, if one is comparing two occupations with almost the same sets of tasks, one can assess the degree of similarity simply by a direct comparison of the tasks involved. However, if the two occupations have few or no tasks in common, then it is necessary to develop some criteria for comparing the *similarity of sets of tasks.* If such explicit criteria are not formulated, then the construction of the occupational groups have to be based on complete listings of inclusions and exclusions from each group. With explicitly formulated criteria the listings of inclusions and exclusions can be illustrative, as the criteria will provide guidance on where to classify new occupations or occupations which originally escaped notice.

For the development of the similarity criteria, one could begin by abstracting a set of selection criteria like those which would be used to select applicants to fill jobs in the particular occupations in question. The sets of selection criteria for the relevant occupations could be compared and used as a basis for assessing the similarity of the relevant sets of tasks. For example, one might find that the selection criteria for jobs in two distinct occupations each include: significant conceptual and analytical abilities; well developed oral and written communication skills; the ability to plan and manage one's own work and that of others; well developed skills in liaison and negotiation; and detailed knowledge of a particular subject matter area. This set of selection criteria could be used as a necessary if not sufficient basis for filling a job in almost any occupation which is classified in ISCO Major *Group 2, Professionals*. However, for the purpose of comparing the similarity of all occupations found in the economy, it is necessary to refer to a set of more general criteria.

The following criteria have been adopted in ISCO-88 for assessing the similarity of different occupations in terms of the sets of tasks of the jobs of which they consist:

- their range and complexity;
- the depth and field of knowledge required to perform them;
- the tools and equipment used;
- the materials worked on or with;
- the goods and services produced.

These criteria can be generalised into the two broader concepts of skill level and skill specialisation (defined below). Hence, with this approach, the degree of similarity between two occupations is a function of the values of the skill level and skill specialisation variables associated with the sets of tasks involved in jobs which belong to the occupations.

2.3.2 The concept of skill level

The *skill level of an occupation* is a function of the range and complexity of the set of tasks involved and the depth of knowledge required. The greater the range and complexity of the set of tasks, and the deeper the required knowledge, the greater the skill level of the occupation. Hence, the more complex the tasks involved in any given occupation, the higher the skill level of the occupation. Further, an occupation which requires the performance of a wide range of tasks has a higher skill level than an occupation which requires the performance of a subset of those same tasks.

2.3.3 The concept of skill specialisation

The *skill specialisation of an occupation* is a function of the field of knowledge required, tools and equipment used, materials worked on and goods and services produced in relation to the tasks performed. The concepts corresponding to these terms can be defined as follows:

- *Field of knowledge required* indicates the subject matter about which knowledge is essential for performance of the tasks.

- *Tools or equipment used* indicates the plant, machinery or hand tools operated or used in the performance of the tasks.

- The term *plant* is used to describe mobile or stationary equipment which is large in size, performs several related functions, and which usually is controlled by an internally located operator.

- The term *machinery* is used to describe stationary equipment which is not as large as plant, performs one processing function and is usually controlled by an externally located operator.

- The term *hand tools* is used to describe equipment which is small enough to be moved and operated by one person.

- - *Materials worked on* indicates the materials which are extracted, processed, refined or fabricated as an essential part of the performance of the tasks.

- - *Goods or services produced* indicate the results of the performance of the tasks.Hence, in ISCO-88 the specific variables used to measure *skill specialisation* are similar to those traditionally used in the development of national occupational classifications, while the variables used to measure *skill level* frequently have been explicitly excluded from the definition of similarity between occupations. However, some form of *skill level* has often been reflected indirectly in the actual structure, e.g. where *professionals* has been defined as a separate group.

There are now many NSCO's which have been developed and implemented using the twin criteria of skill level and specialisation. Many of these classifications are based on ISCO-88 but others, e.g. the Canadian and the Dutch classifications, have applied these criteria differently and this has resulted in classification structures which differ from that of ISCO-88.

2.4 The operational definition of the similarity criteria

If the most important step in the development of any classification is the selection of the similarity criteria, as discussed above, then, the next step is the development of *operational definitions* of the criteria, to provide the basis for identifying a finite set of discrete values, which can

provide the basis for defining a set of mutually exclusive and jointly exhaustive categories at each level of the classification.

The selected (foreign or international) model used when developing a NSCO will probably be based on a set of classification criteria not too dissimilar from the criteria selected to be used as basis for the NSCO. However, each classification criterion must be given a nationally relevant operational definition.

We have observed that ISCO-88, for example, is based on the criteria of skill level and skill specialisation. To apply these criteria one needed an operational interpretation of the concepts. As outlined in Section 1.2 the skill level categories in ISCO-88 are defined by references to UNESCO's *International Standard Classification of Education (ISCED)*; (COM/ST/ISCED; Paris 1976), the only international instrument available. When using the skill level concept to develop the structure of a NSCO references may be made to corresponding categories in the national educational classification, to reflect the structure of the national education and training system[4].The Australians were the first to develop and implement an NSCO explicitly based on the criteria of *skill level* and *skill specialisation*. Their success turned on the recognition of the subtle difference between **(i) a classification of jobs** on the basis of the skills required to perform the tasks involved and **(ii) a classification of persons** on the basis of the skills which they had acquired by education, training and experience. This distinction reflects and underlines the fundamental importance of the point made in section 2.2: that the basic units of an occupation classification are jobs, not persons.

The Australian model, described in detail in Box A, demonstrates that, at the national level, it is possible to define *skill level* categories to reflect the institutional framework of a particular country. It also demonstrates some of the associated problems, e.g. the necessity of incorporating differences between different regions and changes in the institutional framework over time.

The Central Bureau of Statistics in the Netherlands has adopted a somewhat different approach. Their *National Standard Classification of Education* consisted of a matrix of *level of education* by *field of study*. As in ASCO and ISCO-88 the categories identified by *level of education* variable are used as basis of identifying *skill level* categories in their occupational classification. However, this classification also makes explicit use of the categories identified by their *field of knowledge* variable as the basis of identifying *skill specialisation* categories, whereas ASCO and ISCO-88 defines 'skill specializations' independently of any 'field of knowledge' categories. The Dutch approach provides the basis for an integrated set of statistics covering 'occupation' and 'education'. However, problems will arise because some fields of study can equip students for many different jobs while others do not lead to any specific type of job. The success or otherwise of the Dutch approach depends partly on the degree to which the national classification of 'education' has a vocational orientation in the identification of its 'fields of knowledge'.

2.5 How to apply the similarity criteria

Whatever set of criteria are selected as the basis of the NSCO, the next step is to consider

---

4 This does not mean that skills can be obtained only by formal education or training. Most skills may be, and often are, acquired through experience and informal training, although formal training may play a larger role in some countries than in others and may also be relatively more important at the higher skill levels. In the ISCO-88 classification system, the decisive factor for determining how an occupation should be classified is the nature of the skills required for the job - not the way in which these skills have been acquired.

the *manner* in which the criteria can be *applied* in the construction of the classification. The objective is to design a finite set of discreet categories which are as homogeneous as possible with respect to the chosen criteria and which are mutually exclusive and jointly exhaustive. The approach used in ISCO-88 is essentially to focus first on the 'skill level' for the broad distinctions to be made, i.e. between major groups, and then to identify occupation groups within the same 'skill level' on the basis of 'skill specialisation', interpreted in an appropriate manner for each particular 'skill level'.

There are other ways of using the criteria of 'skill level' and 'skill specialisation' to construct an occupational classification. For example, one could apply the 'skill specialisation' criterion to distinguish between major groups and the 'skill level' criterion to differentiate occupational groups at lower levels of the structure[5].

Whatever choice is made about the method of application of the criteria, the finite set of discreet values chosen for each of them will provide the basis for identifying and defining each of the categories at each aggregation level of the structure. The appropriate values of each of the classification criteria should be explicitly referenced in each occupation and group definition. The ISCO-88 classification structure can be readily collapsed or extended within its existing levels by increasing or decreasing the number of discreet values of each of the criteria used to define categories. The process could be likened to that of increasing or decreasing the degree of detail of a geographic map. For example, one might choose to identify eight skill levels instead of four, or one might sub-divide the skill specialisation variable into finer categories at the sub-major or unit group levels and thus create additional categories at those levels. Alternatively, one might add a fifth level to the structure by using finer, discreet values of the variables representing the 'skill specialisation' criterion. Indeed, ISCO-88 is constructed on the explicit assumption that within most of the 390 unit groups there exists a finite set of more detailed occupations which will reflect more detailedly the described skill specialisations.

The classification designer may choose not to enumerate all the possible sub-categories in any particular occupational group. Firstly, while the list of such categories will contain a number of occupations of sufficient labour market size and importance to warrant their separate identification in the classification, there will also be occupations which represent only a few jobs in the labour market and which are not of great user interest in themselves. In this situation, classification experts resort to the creation of **not elsewhere classified (nec)** groups to capture those occupations which are within the scope of an occupational group but which are not of sufficient labour market significance to warrant the creation of separate sub-categories. This solution can reduce the costs of developing and implementing the classification without any significant impact on its utility.

There is another reason why *nec* groups may be useful in a classification. At the design stage, the classification designer may not be aware of all of the occupations which should properly be classified to a particular category or new occupations belonging to a particular category might appear after the classification has been published. These problems can be resolved, in the short term, by the creation of *nec* groups which subsequently can be incorporated into the classification as separately identified categories. If certain conventions are adopted in the design of the code structure (as described below), it is possible to add *nec* groups at a later date, if practical experience indicates that they are necessary. However, such *nec* groups should only be created

---

[5] This approach was the only one considered, in the late 1970s, by a joint UNESCO/ILO group of classification experts. They rejected the validity and practicality of this approach, which has been adopted, to some degree, by the *Arab Standard Classification of Occupations*, which was issued in 1987 in Dakar by the *Arab Labour Organization*.

when absolutely necessary as their use constitute a loss of occupational information and are often abused as "dump groups" for inadequately described jobs in practical applications of the classification.

The application of the chosen similarity criteria will not usually lead to the obvious delineation of a single set of possible categories at any one level of the classification. There will always be scope for debate about the particular categories identified. In this situation, one must resolve the issues by reference to user requirements, comparability with existing classifications, statistical feasibility, statistical balance, project development costs, and the implementation costs in data collection and processing.

2.6 Single versus multiple classification structures

Some countries may decide to adopt ISCO-88 as the model for the main structure of the NSCO and decide to recognize or develop one or more additional structures (based on the same set of detailed occupations or unit groups), e.g. to meet the need for comparability with previous national statistical series because of the lack of available resources to convert all systems to the new classification simultaneously; the need for data to guide particular national policy programme; the use of occupation statistics in social as opposed to economic analysis; etc.

The decision to identify multiple structures for the NSCO may seem attractive, as it provides, at seemingly low costs, enhanced flexibility in the output of e.g. occupation statistics to meet conflicting user requirements. However, this will result in greater development costs and the inevitability of compromises in the delineation of the different the basic building blocks, so that they can satisfy the homogeneity requirements imposed by alternative classification criteria. The more alternative classification criteria that are adopted, the more difficult it is to design building blocks which will be sufficiently homogeneous with respect to all criteria.

The problems involved in developing multiple structures must be balanced against the benefits of greater flexibility in the output of statistics and in applying the classification to different uses with conflicting demands, and the decision to build multiple structures usually results from the need to accommodate alternative and sometimes incompatible classification criteria. For example, a structure based on the criterion of occupational prestige may add a significant degree of utility for some applications if used to supplement a structure based on skill level and skill specialisation. Considerations of occupational prestige may lead one to group together occupations in which the majority of incumbents are self-employed or earn very high salaries; or occupations which have high status due to traditional roles; or occupations which are dominated by women or by particular ethnic groups. However, such criteria are not always consistent with a skill level by skill specialisation grouping, and the two structures must therefore both be developed from a base where the basic units all have the same values for both the structure defining variables.

It is tempting to decide to have multiple structures as this decision avoids the difficult process of addressing the conflicting user requirements and attempting to find a single compromise structure which is capable of meeting most user requirements most of the time. The process of achieving a national standard classification with a single structure with all of its potential advantages in simplicity and comparability can present many challenges in conflict resolution. Most users in the countries which have achieved this goal, seem to consider the effort worthwhile.

2.7 The shape of the classification structure

ISCO-88 has four levels of aggregation, which consist of 10 major groups, 28 sub-major

groups, 116 minor groups and 390 unit groups. The classification has a four digit numerical code structure with each level of the classification being represented by a single column (or position) in the code. As mentioned in section 2.3 ISCO-88 is designed on the explicit assumption that there exists a set of detailed occupations which are aggregated into its unit groups. The structure therefore can be extended readily by adding a fifth level to identify a set of 'occupations' within each unit group, and some countries will no doubt have the need and the resources for this.

Most national occupational classifications typically have between 10 and 30 groups at the highest level of aggregation and between 400 and 500 units groups at the level of aggregation at which statistical coding usually is performed. However, (Hoffmann et al, 1995) recommends a more flexible approach to coding. In employment services the coding will normally be done to the most detailed level of the classification, i.e. the 'occupation'. The number of groups at this level typically varies between 1000 and 3000 categories, and some NSCOs have a significantly larger number of 'occupations'. In the 1991 Census of Population and Housing, the Australian Bureau of Statistics coded occupation data at the 'occupation' level containing approximately 1100 categories.

Some countries have adopted nominal targets for the number of categories identified at each level of the classification. For example, during the development of the *Canadian Classification and Dictionary of Occupations* in the late '60s a target of 7,000 categories at the occupational level was adopted. This was done because it was considered that the model which was used, the United States' *Dictionary of Occupational Titles* (DOT), had far too many categories for the significantly smaller and less specialised Canadian labour force. This target also provided a basis for project planning, estimates of necessary staff resources, field work scheduling and budgeting.

For similar reasons, the Australians adopted nominal targets for the minimum sizes of categories at each level of the structure of ASCO. The minimum size of a separately identified 'occupation' category was set at an estimated 300 jobs nation-wide, unit groups at 4,500 jobs, minor groups at 50,000 jobs, and major groups at 500,000 jobs. There were additional considerations as well: it was ABS policy not to publish data from sample surveys for groups where the estimated standard deviation was higher than 20 percent: given the design of the Australian Labour Force Survey, a unit group of 4,500 just came within the 20 percent standard error margin. Hence, the decision to set the estimated minimum size of unit groups at 4,500 helped to ensure that statistics from the survey could be published at the unit group level of the classification without the necessity of suppressing, i.e. merging, many categories or of abandoning publication at such a detailed level. Similar considerations were appropriate in the publication of data from the Population Census, but there the constraint was the confidentiality of data and the likelihood of persons becoming identifiable as the cell sizes in tables decreased. This was an important consideration in planning the publication of small area data.

These numerical targets obviously reflected the size of the Australian labour force (approximately 8 million) and the characteristics of statistical collections conducted by the ABS. They were not rigidly adhered to and exceptions were made for occupations with small estimated labour market sizes but of considerable labour market significance or user interest. However, the targets did help the development team retain an overall perspective on the significance of various groups. For example, fieldworkers engaged in occupational analysis may have a tendency to view their work allocations as progressively more and more important and to seek to identify ever more fine distinctions between various types of jobs. This phenomenon can lead to their identifying an excessive number of occupations and/or unit groups in a particular segment of the labour force. Numerical targets provide some overall perspective on the development of the structure and help to ensure a consistent level of disaggregation across all segments of the labour force.

2.8 Design of the code structure

The primary function of the code structure is to provide short identifiers for the groups defined in the classification. The various forms these identifiers can take will have advantages and disadvantages for the secondary functions of the code structure:

- it should provide codes with few characters to write down as this has certain advantages for manual recording in terms of speed and risk of transcription errors;

- the codes should carry some meaning in order to be easy to remember;

- it should be easy to carry out logical checks on the recorded codes;

- the coding structure should not impose limitations on the structure of the classification, e.g. by limiting the number of sub-groups one can define within any aggregate group.

For an international or regional classification an additional consideration may be that there is an advantage to have codes which can be represented by the same type of characters, even if the countries have different languages and/or alphabets.

2.8.1 Numeric versus alpha-numeric codes

The main advantages of alphanumeric codes are (i) the relative ease of memorisation of codes by potential users of the classification[6]; (ii) a greater range of possible values for each column of the code: e.g. a range of A to Z plus 0 to 9 versus a range of only 0 to 9 with numeric codes, thus making it possible to 'escape the straitjacket of the decimal system' when designing the classification structure.

The main advantages of purely numeric codes are (a) being able to communicate the structure of the classification to users who do not know the national language or alphabet; (b) the greater simplicity of numeric codes; (c) the ease of data entry; (d) the flexibility in editing and logical controls achieved by being able to specify numeric ranges as the set of valid values for variables; and (e) the possibility of using compressed codes for data storage.

The result of these considerations has been that ISCO-88 as well as most NSCOs have adopted a numeric code structure.

2.8.2 Alternative designs for code structures

Most national classifications have adopted what might be termed 'structure-based' codes. This means that each level in the structure is represented by one or more columns (or positions) in the code. For example, ISCO-88 uses the first digit to represent the major group, the second digit to represent the sub-major group, the third digit to represent the minor group, etc.

An alternative approach is to assign codes to categories so that the codes are no more than unique identifiers of the relevant categories. This approach is sometimes used when a classification

---

[6] This issue has received particular attention in employment services. Some employment services have chosen to adopt alpha-numeric code structures to assist employment placement officers to remember the codes for commonly used categories. The principle is similar to that which has been applied to telephone numbers in some countries, and which means that their phones have dials or keys with both numbers and alpha characters. For example, it is easier to remember a telephone number such as 1-800 ILO STAT than its numerical equivalent which would be 1-800 456 7828.

has multiple structures, or when the ? classification' is no more than a means of assigning unique codes to a set of question responses obtained in a statistical survey, e.g. when the categories are not necessarily mutually exclusive, and when there is no hierarchial structure implied.

Another possibility is to derive the code from the name of the category by the use of a standard algorithm. This approach is used in assigning numeric codes to countries for purposes such as trade statistics, where the code for country of origin/destination is derived from the name of the country in question.It is also possible to reserve specific digits in the code to represent various attributes common to all members of the respective categories. The most well-known example of this approach is used in the *US Dictionary of Occupational Titles* (DOT), where each occupation has a nine digit code: the first set of three digits identifies a particular occupational group (i.e. this is a structure based code with each digit representing one of three levels); the second set of three digits are used to represent *worker function ratings* of the tasks performed in the occupation; and the last three digits represent the alphabetical order of occupational titles within the code groups defined by the first six digits. However, such information-carrying coding systems become long and cumbersome and are generally considered to be very vulnerable to errors in recording and coding, and it is generally recommended to remove from the codes information not related to the structure and define separate variables to carry the additional information, i.e. to limit the DOT codes described here to 6 digits (the first and the last set of three), and to reflect the separate variables describing worker functions elsewhere.

It is recommended that the NSCO should follow ISCO-88 and adopt a numeric structure-reflecting coding system when presenting the classification.

2.8.3 Supplementary codes for general occupations

In any economy, there will be differences in the degree of specialisation of labour between large and small, old and new establishments, and between establishments in different regions of the country. Some NSCOs incorporate categories to represent jobs which are less specialised than the prevailing norm in the country, and these categories are assigned special codes which identify them as *general*.

Most NSCOs are designed so that the degree of specialisation of labour represented at the occupational level of the structure corresponds as closely as possible to the most typical degree and pattern of specialisation found in most jobs in the corresponding segment of the national economy. However, as one divides the labour force into successively finer categories, the probability increases that any one category will represent a degree of specialisation of labour that is finer, or at least different, from that found in related jobs. Differences in the degree of specialisation of labour occur in all segments of the labour force but are particularly common amongst relatively low and medium skilled occupational groups such as *clerks*, *salespersons*, *plant and machine operators*, and *elementary occupations*.

Some jobs are less specialised in their range of tasks than the task combinations which are specified even for the unit group level of the classification. In ISCO-68, the problem was addressed by creating categories referred to as *general occupations* and identified as the first occupation listed in many unit groups. A *general occupation* was defined as one which covered jobs with a wider range of tasks than those belonging to any of the other individual occupations in the same unit group. However, the existence of such categories in a NSCO is sometimes abused in practice by using them as dumping grounds for *inadequately described jobs*. Conceptually, however, the two cases are quite different: A *general occupation* is one for which we have adequate information about the tasks involved but those tasks are less specialised, i.e. cover a wider range of tasks, than those defined for other categories in the same group. An *inadequately described job* is one which

may be quite specialised in its particular combination of tasks but about which we do not have sufficient information to determine the occupation to which it should be classified. For the latter case one may sometimes need to define the *temporary nec groups* referred to in section 2.5 above.

ISCO-88 has chosen a different approach from ISCO-68 to the problem of incorporating *general occupations*. This approach specifies a set of *priority rules* which should be followed in the assignment of such jobs to categories in the ISCO-88 structure, specifying that when determining the appropriate group for a job (i) tasks which require higher skills should be given priority; and (ii) production oriented tasks should take priority over support tasks such as management, administration or sales, unless the latter are clearly dominant. (Note that here we are describing rules to be used in the construction and interpretation of the classification. Corresponding rules for use in coding operations, modified to take into account inadequate responses, are presented in the separate *Working Paper* on the use of an NSCO, cf. Hoffmann et.al. (1995).)

2.8.4 Reserved codes for special categories Error! Bookmark not defined.

Some NSCOs have adopted the practice of using reserved codes for special categories which can be found throughout the classification, such as *nec* groups, *supervisors*, *apprentices*, *trainees*, etc. The codes used for *nec* unit groups represent the only example of this in ISCO-88: all such groups are assigned the digit 9 in their code. For example, the unit group called *Personal care and related workers not elsewhere classified* has been given the code 5139 rather than 5134, which would otherwise be the first available code within minor group 513. With the aid of this convention *nec* groups are readily recognizable and additional *nec* groups can be added to the structure if practical experience suggests that this is necessary, e.g. because of the emergence of new occupations which clearly belong to a particular minor group. (It should be noted that in ISCO-88 the limitations of the decimal system have sometimes resulted in unit groups with codes ending in 9 although they are not designated as *nec* groups. Although this is presents no logical problem - occupations in this unit group are not classified anywhere else - this may be confusing.)

2.8.5 Flexibility for maintenance and further development

NSCOs usually remain in use for many years after their initial development. In this period the world of work changes and so do the requirements of the users of the classification. The longevity of a classification can be extended if its code system is designed to allow for new groups to be incorporated with a minimum disruption to existing codes. Many national classifications with structure-reflecting numeric coding systems have adopted the solution of leaving gaps in the code system at unit group and occupation level to facilitate the addition of new categories as and when required. For example, a common convention is to use only odd numbered codes at the unit group and/or occupation level, thus leaving even numbered codes available to facilitate the splitting of existing groups or the incorporation of new occupations. Flexibility can be maintained at higher levels of the classification if not all of the valid code ranges are allocated to existing groups. For example, it is not possible to add a major group to the structure of ISCO-88 without amalgamating two or more existing major groups or without modifying the code system. However, at the sub-major group and minor group levels there is much more flexibility to accommodate new groups or split existing groups if required. This can simplify any future revision of ISCO or the process of modifying the structure of ISCO-88 to meet national requirements.

3 Development of a draft structure and definitions

This chapter will deal with the review of the selected model and the changes that should be made to it, on the basis of the selected classification criteria (section 3.1); a priori knowledge about the characteristics of the national labour force (section 3.2); user consultations (section 3.3); the use of categories from the old national classification (section 3.4); the analysis of existing national occupational statistics (section 3.5); the analysis of occupation titles found in the national coding index (section 3.6); the analysis of occupation responses in existing statistical collections (3.7); and the results of occupational analysis (section 3.8).

Ideally, the classification designer should have a copy of the selected model stored in magnetic form on floppy disk so that it can be manipulated using a word processing package. This type of file will provide a very convenient starting point for the work[7].

3.1 Use of the classification criteria

The NSCO may not be based on precisely the same criteria as those of the model selected to be the starting point for its development, or those criteria may not be operationally defined in precisely the same way in the NSCO as in the model. The objective is to design a finite set of discreet categories at each level of the classification which are to be as homogeneous as possible with respect to the chosen criteria as well as mutually exclusive and jointly exhaustive. One may find, however, that quite a number of categories in the model structure do not satisfy the requirement of homogeneity with respect to the national criteria or even some of the original ones. Therefore it may be necessary to split some of the model's categories into finer divisions or to completely re-design the structure of some unit groups or minor groups. In order to do this, one should try to re-define the existing categories in terms of the national criteria. This will highlight problem areas and suggest possible solutions. Some of this work might have to be deferred until information collected nationally is available. The first step in the process of adapting the model to suit national requirements will therefore be to examine the implications of the difference in criteria for the structure of the NSCO.

If the selected model is based on criteria that are quite different from those adopted for the new NSCO, then the utility of the model will be limited to that of providing an organisational framework for the initial collection of information about the occupations appearing in the national economy, including the organisation of an occupational analysis programme; and in this case it will be necessary to adopt a zero-based approach to the design of the new structure, which will start with the collection of relevant information, and use the results to identify and define appropriate occupational categories that can be aggregated to form higher level groupings in the structure.

3.2 Use of *a priori* knowledge

Once the model structure has been modified to take account of the national criteria and specific circumstances, the next step is to incorporate any modifications suggested by a priori knowledge of the national labour force. An experienced labour statistician or occupational analyst will know a great deal about the structure of the national labour force and will be able to bring this

---

7 Copies of ISCO-88 on floppy disk are available from the ILO. The available files include the structure, group definitions, and coding indexes as published in the printed version of ISCO-88. Also available are magnetic copies of still relevant but not up-dated detailed ISCO-68 occupation descriptions.

knowledge to bear in reviewing the structure of the selected model with a view to adapting it to national circumstances. The following examples will illustrate the type of situations which may warrant modifications to the model

(a) One might know that approximately 80 percent of the labour force is employed in agricultural pursuits and that many people so engaged are working in subsistence activities. This would suggest that significant attention should be given to such occupations in developing the NSCO. If the selected model does not give appropriate emphasis to agricultural occupations, one might consider expanding this segment of the classification and perhaps refer to other models which can supplement the one selected for the rest of the NSCO.

(b) A range of occupations that are important in the national labour force may not be explicitly reflected in the selected model. For example, it may make no provision for subsistence farming occupations; or it may have a very poor coverage of occupations predominantly found in the informal sector. In this type of situation, one must identify the shortcomings in coverage and their location to ensure that appropriate modifications are made to the structure.

(c) A higher proportion of the labour force is employed in the tourist industry in the national economy than is reflected in the model, and it may therefore be appropriate to develop more detailed coverage of occupational groups in the at tourism area.

(d) The government may have planned new initiatives to establish a large garment manufacturing industry in the country although no firms are presently engaged in that industry. Hence, occupations in garment manufacturing should be included in the structure, in anticipation of future developments. Another possible development may be that recent discoveries of oil and gas might foreshadow the development of new industries and the establishment of occupations not previously found in the national labour force.

(e) The national government may be concerned with particular policy initiatives such as localisation: i.e. the training of local people to take over jobs currently performed by foreign workers. In this situation, it might be appropriate to ensure that trainee occupations are appropriately provided for in the structure so that future occupation statistics will provide information for monitoring the outcome of the programme.

(f) A high proportion of the labour force may be employed as members of the armed services, although many of them work in government departments and perform jobs that would be done by civilians in other countries. In this situation, one should consider providing a more detailed disaggregation of military occupations than is provided, for example, in ISCO-88. Alternatively, one might sub-divide occupations in the armed services into those engaged in military specialisations and those engaged in jobs with close civilian parallels. Those in the latter type could then be classified with persons performing the same occupations in the civilian labour force.

(g) One may know that the national labour force is much smaller than that envisaged by the selected model and that consequently occupations are much less specialised in some areas of the world of work. This would suggest the need to combine 'occupations' or even unit groups into broader categories to reflect the lesser degree of labour specialisation. Alternatively, the national labour force may be much more specialised in some segments than that of the model, and this would, in turn, suggest splitting some occupations or unit groups into more finely distinguished categories in the NSCO.

(h) If ISCO-88 is being used as a model, then it will be necessary to make a decision with respect to the treatment of occupations such as pre-primary and primary school teachers, nurses, midwives and social workers, as ISCO-88 has left open the possibility of classifying them to one or both of the two highest skill levels. Obviously the decision has to be made on the basis of national circumstances, i.e. on the level of formal training one would expect of those entering into these occupations, if the necessary skills were to be obtained in that way.

On the basis of knowledge of such circumstances, the classification designer can immediately proceed to make adaptations to the selected model or, at least, set procedures in motion to ensure that the issues are addressed and resolved.

3.3 Use of comments from users

Potential users of a new NSCO, most of whom will be users of the current one, if it exists, should be consulted already in the early stages of the project and have some influence on the selection of the appropriate model and the classification criteria. Ideally, they will have been invited to comment on aspects of the proposed model so that particular issues of user concern will already be known to the classification designer. The users' comments and suggestions will also supplement the classification designer's own knowledge of the national labour force and probable future developments. The designer may find it useful to review the results of the user consultation process and perhaps further analyse the data as particular issues emerge. By providing such advice the users also provide a degree of commitment to the future NSCO, even if they do not have any formal influence, and this increases the probability that they will accept and use the new classification.

Among the potential users a key source of occupational information will be the national employment service and/or private employment and recruitment agencies where these exist. Job placement officers of the employment service will have detailed knowledge of many occupations themselves or will have personal contacts to whom they can refer fieldworkers. Former job placement and other officers of the national employment service have often been recruited as occupational analysis fieldworkers.

Job vacancy listings prepared by the employment service on the basis of requests from employers are important for identifying new occupations and changes in the occupational structure of the corresponding parts of the labour force . The associated job descriptions contained in vacancy notices are an important source of occupational information. If the employment service is not computerised, consideration should be given to extracting a sample of vacancy listings and descriptions for a given period and key entering the data on to computer files for subsequent analysis.

3.4 Use of other informants

Other possible informants about desirable features of the national occupational structure and, in particular, the characteristics of individual occupations are:

- chambers of commerce or industry interest groups;
- employer organisations;
- trade unions;
- professional associations;

- researchers and other industry experts;
- vocational training institutions;
- management consultants; and
- individual enterprises or establishments.

The best method of identifying concrete sources of information will depend on how the occupations of interest have been identified. For example, if new occupation titles were extracted from existing statistical collections, the name and address of the establishments where the jobs are located may be available from the same source. It may then be possible to extract a list of establishments from the national business register. Similar use can be made of membership lists in chambers of commerce, industry interest groups and trade union federations. Privately published business directories and the *Yellow Pages* of local telephone directories will also be useful where they exist. Alternatively, fieldworkers may have their own contacts based on their previous work experience and local knowledge.

One may find that many large establishments have well-established personnel systems with comprehensive job descriptions, as well as associated information on recruitment methods and requirements, in-house training, career paths, salaries, etc. Efforts should be made to collect such information, preferably in computer readable form. At the very least, such records will be useful to check the occupational coverage of the new classification i.e. can all of the jobs listed in a particular establishment be coded to occupations already identified in the draft classification. If they cannot, this may be due to gaps in the model or draft structure, but it may also be a consequence of lack of the necessary information in the sources. One can also compare the degree of specialisation of jobs found in a particular establishment with the structure of the draft classification. Establishment records can also provide the starting point for selecting particular jobs and job incumbents for job analysis.

Where it is judged necessary or desirable to proceed with a job analysis programme, the next step is to identify a broad range of different establishments with jobs in the target categories. Care must be taken to select establishments which are different with respect to criteria such as size and age of the establishment, geographic location and the type of technology used. The establishments selected need not be representative in any statistical sense.

On-going contact should be made with key users throughout the development process and their views sought and considered as the structure evolves. When they have particular concerns or requirements for data availability, every effort should be made to accommodate them. However, it should be remembered that particular organisations may have vested interests in particular solutions, e.g. to ensure recognition and status for members, and this should be taken into account as their comments are evaluated and balanced against those of other users. A final, formal, process of user consultation should be conducted when a complete draft of the new structure is available.

Error! Bookmark not defined.3.5 Consultations with Error! Bookmark not defined. experts

One should approach the experts who have been identified as possible informants with a first draft of the new definitions and descriptions prepared on the basis of the review of already existing materials. These informants should then be asked to review the material on the basis of their own knowledge and experience. A brief questionnaire should be forwarded to the informants to highlight the issues which they should address. Particular attention should be given to the

identification of individual occupations and their delineation from each other.

The first contact with an informant should be on a face-to-face basis or by telephone to motivate the person to contribute to the project, by providing a first description of the project and its significance and stressing the importance of the expected contribution by the informant. A written request for cooperation from the appropriate government minister or permanent head of department is a useful way of enhancing the status of the project and enlisting support. In this way, their cooperation may be maintained on a voluntary basis.

Thereafter copies of the relevant material should be forwarded by mail with a structured questionnaire and a request for a reply within a set period, such as one month. It is very useful to include a brief information paper or pamphlet about the project with this material. Ideally, the draft material should be discussed during personal visits or at a combined workshop specifically convened for the purpose.

Many informants will simply write comments on the material which they have received and attach a covering letter and supplementary material. Some respondents will volunteer to contribute revised drafts covering their areas of competence, and this should be welcomed, without making a commitment to the way they will be used. The volume of material received from some informants may then be quite large. It is important to record the receipt of all replies and to file the information properly for easy retrieval when the responses are assessed.

If no reply is received within the set period, consideration should be given to further telephone contact to give the informant a friendly reminder or to conduct a telephone interview to solicit the information required. The content of such interviews should be recorded on relevant files.

After the receipt of material from all responding informants, all responses should be reviewed occupation by occupation, to determine whether sufficient material has been collected or whether it will be necessary to conduct on-site occupational analysis. Particular issues requiring further investigation should be identified and recorded. Care must be taken in interpreting the comments received as each of these sources of expertise can have a vested interest in having particular information included in the definitions and descriptions. Individual experts will tend to magnify the significance of the segments of the labour force with which they are most familiar and will press for more disaggregation than is justified in comparison with other segments. Industry experts will tend to view the world from the perspective of their own particular industry and will emphasise both the differences between jobs within their industry and their differences with jobs elsewhere. Professional associations will seek to enhance the status of the occupations of their members. Trade unions and employer organisations will seek to include material which may later prove useful for them in labour negotiations.

When all comments have been received, the drafts should be revised in the light of a carefully considered evaluation of the amount of agreement in suggestions made by the various experts, the degree of expertise of the various sources of information and the vested interests they may represent.

Error! Bookmark not defined.**3.6 Adaptation of existing materials**Error! Bookmark not defined.

Adapting existing written material which describes occupations is obviously the quickest and cheapest method of producing a set of national occupational definitions, descriptions and profiles. The effectiveness of this strategy depends on the quality, comprehensiveness and relevance of the

material available.

Possible sources of such written material include:

- a previous edition of a national classification and/or dictionary which requires updating
- working materials produced within the national employment service or vocational training and testing authority;
- descriptions of jobs and occupations produced by the education department for career advice and vocational guidance;
- descriptions of jobs and occupations produced by the public service board or commission for use within the public service;
- descriptions of jobs and occupations produced by individual enterprises;
- job advertisements in newspapers and periodicals;
- classifications and dictionaries produced by other countries with a similar labour force structure;
- descriptions included in ISCO-68 and ISCO-88.

If the selected model for the development of the new NSCO is not that of a possible old national classification it will be useful to try assigning each and every occupation in the old classification to appropriate categories in the new model. In particular if the old national occupation classification was once properly adapted to the national environment and has detailed descriptions of its occupational categories. This coding process will highlight any problems of coverage and resolution, i.e. degree of detail, that the new model structure might possess, such as:

- the existence or otherwise of occupations of particular importance in the country;
- the degree of specialisation of the national labour force;
- the various types of technology used nationally;
- differences between practices in large and small establishments;
- particular variations in occupations found nationally that are not characteristic of similar occupations in other countries; etc

At the same time this process will indicate to what extent occupational categories from the old classification can be retained. It may be possible (1) to retain many of the old categories; (2) to make marginal changes to the composition of some others; and (3) to split some old categories cleanly into two or more new categories. However, the effectiveness of this strategy will depend on the extent to which the old occupation categories are homogeneous with respect to the criteria of the model for the new NSCO, this strategy may prove ineffective.

One should also consider providing references to the national standard classification of industrial activities for those occupations which are expected to be concentrated in particular industries. This would be useful in identifying contacts for fieldwork and the information might be presented in the published classification.

If a significant number of the old occupation categories can be retained, this will reduce the

effort required in drafting new occupational definitions: it might be sufficient to update many of the existing definitions. The retention of old occupational categories will also facilitate the task of building bridges between the old and new classifications to compensate for the break in many statistical series that will occur when the new NSCO is introduced.

It might be sufficient to conduct fieldwork for *new* occupations identified through:

- recently executed statistical collections;
- knowledge about particular segments of the labour force which have undergone significant technological or other changes;
- particular segments of the economy which are known to be organised differently from corresponding segments of the countries from which material is being adapted;
- particular segments which are known to have appeared recently as a result of the establishment of new industries;
- particular segments which are important for national policy formulation and decision making.

The first step in the compilation of a new set of occupational definitions, descriptions and profiles should be to identify, collect and review all existing relevant information. It may be that much of the material is suitable for re-use after some relatively minor updating and editing to conform with the standards chosen for the new NSCO. This existing material should be carefully evaluated from the point of view of its age and currency, type of information content, purpose of original collection, collection methodology, language and national origin, as well as the consistency of the information provided by different sources.

The process of adaptation may be sufficient for producing occupational definitions for the new classification structure. It is less likely to be sufficient for producing comprehensive occupational descriptions. However, the technique of adaptation can be used to produce a draft version which can be enhanced and extended later as resources permit. In particular, they can be enhanced by the process of expert consultations described in the previous section. If one decides to rely on adaptation as the principal method for producing occupational profiles, the adapted profiles will require extensive validation because of their specificity and the range of variation likely between different countries.

Depending on the age, source, quantity and quality of the available material, it might be possible to prepare draft definitions and descriptions before proceeding further. The definitions and descriptions should be prepared in a pre-determined format as set out in section 5.2. Failure to follow a standard format from the outset will necessitate a great deal of unnecessary work at later stages of the project. Distinct types of information are best stored in separate fields for easy identification and retrieval later. Although the material may only be a first draft, appropriate standards of grammar and expression should be maintained.

The draft classification, definitions and descriptions created through the process outlined above should then be presented to relevant local experts to receive advice on the national relevance and accuracy of the existing materials or draft descriptions. Depending on the scope of the project and the resources available, this may be seen as a validation exercise, or as a preparatory step prior to undertaking a job analysis program in priority areas.

Error! Bookmark not defined.**3.7 Use of existing statistics**Error!

Bookmark not defined.

Existing statistical series can provide a wealth of information about the structure of the national labour force that is of great potential use to the classification designer. For example, the statistics which provide detailed estimates of the labour market size of a wide range of occupational categories can be very useful in addressing such issues as statistical balance in the new structure and in designing categories to meet any target sizes that may have been adopted. The statistics should also provide a picture of changes in the labour force over time so that future trends can be better anticipated when developing the structure.

If the selected model for the development of the new NSCO is the old national classification, then there should be a wealth of available statistics about the national labour force collected on the basis of that structure. If the selected model is ISCO-88, then it will be possible to extract statistics only selectively from the old national classification, i.e. for those categories which directly correspond to groups in the same structure, or which can be linked into that structure with a high degree of confidence.

An analysis of existing statistical series may also highlight many problems in the implementation of the old classification that should be addressed in the development of the new structure, and/or in the instruments for its proper use. For example, the national census may show that *managers* make up 5 percent of the national labour force and that this figure is decreasing over time; the labour force survey, on the other hand, may show that *managers* make up 10 percent of the national labour force and that this figure is increasing over time. This type of situation highlights the need to define the scope of the managerial major group very carefully and to follow through with a careful examination of the design of coding indexes and coding instructions.

Error! Bookmark not defined.3.8 Use of existing occupational coding indexesError! Bookmark not defined.

An important step in the development of the new structure is to review the scope and coverage of the classification which has been selected as the model. This is particularly the case if the model chosen is ISCO-88 rather than the old national classification. The existing national coding index used for processing censuses and surveys can provide an important input into this review process. The classification designer should try to assign to each entry in the national coding index codes corresponding to the model structure. It will then be found that some index entries can not be classified to any group in the unmodified model, while for some it may not be possible to assign the index entry to only one model category without further information. In this way the process of cross-coding will readily suggest all manner of changes that will be required in the model structure and/or the coding index. It will also suggest shortcomings in the coverage and definition of occupational categories in the old national classification which should be addressed in the development of the new NSCO.

3.9 Use of occupational responsesError! Bookmark not defined.

Coding indexes based on the old national classification will reflect the classification criteria and hence the type of distinctions between occupational categories in that classification. If the selected model for the new structure is based on significantly different criteria or if the old national coding index is not well developed and maintained, then it will be appropriate to analyse not just the existing national coding index but also a sample of the actual occupational responses captured in existing statistical collections. Such responses often contain much more detailed information than coding index entries. This procedure was pioneered by the Australians during the development of ASCO and was later followed by the Canadians in the development of their new *National Occupational Classification (NOC)*, where the procedure of drawing a sample of responses from existing collections proved to be invaluable in the development of the new NOC. Ideally, one should use a 5 percent sample of responses from the last population census; a complete sample from the labour force survey and an appropriate sample of responses from other major applications (e.g. the registration of job seekers and vacancies by the employment services). During the development of their new *Standard Occupation Classification (SOC)*, the British used a sample of job titles and descriptions obtained from the national employment service. The responses can be analysed by visual inspection, by transferring them to system cards for manual sorting, or by transferring the data onto computer files and analysing them using computer programme written in a package such as the *Statistical Analysis System (SAS)*.

The last procedure referred to above provides by far the most effective way of analysing the data. The responses can be sorted alphabetically; by classification code; they can subjected to a word frequency count; they can be manipulated to extract all mention of words or phrases such as supervisor, labourer, clerk, apprentice, trainee, process worker, machine operator, engineer, nurse, typing, farming, cooking, teaching, etc. The interrogation of the data in this way provides the basis for making estimates of the labour market size of new categories; of identifying shortcomings in the coverage of occupations; of identifying problem areas in coding to the existing national classification; of identifying likely problem areas in future coding operations; etc. The sample of responses will also provide very valuable input into the design of a coding index for the new NSCO.

Error! Bookmark not defined.3.10 Use of occupational analysis dataError! Bookmark not defined.

The results from an occupational (or job) analysis programme, whether funded by the NSCO project or undertaken for other reasons, will normally provide the best basis for identifying and defining categories at the occupational and unit group levels in the covered areas of the world of work. However, such programmes are very resource demanding and will normally not be initiated solely to serve the NSCO development project but have to be justified by considerations specific to the use of the resulting descriptions for the preparation of vocational training or skill testing and certification programmes.

The job analysis phase may be targeted at particular occupations across the labour force or at particular segments of the labour force, while for the rest, probably the majority, of occupations one will (have to) accept the descriptions found in the model with the modifications and adaptations suggested by the other types of available material as relevant for national circumstance. This will follow both from the limited resources normally available for a NSCO project, and from the high degree of similarity of tasks across countries when technology and organisational forms are similar.

Experience suggests that, for each occupation, one should undertake job analysis studies of jobs located in at least three different establishments. The selected establishments should, as emphasised earlier, provide a range of different technologies, sizes and geographic locations whenever possible and relevant.

It is possible that some jobs selected for study subsequently turn out to have tasks and duties which are rather different from what was originally expected. As a consequence there may be a need to identify and define new occupations in the unit group or even to completely revise the proposed list of occupations to be identified in the unit group. Alternatively, the fieldworker may decide that a particular job does not belong to the proposed occupation or even to the proposed unit group. In this case, a replacement job will need to be selected for study and the fieldworker should send the results of the original job analysis to his or her supervisor. The supervisor can then confirm the judgement and assign the original job to be studied in more detail by another fieldworker who has responsibility for a group which seems appropriate.

Depending on the work methods used, each completed job analysis will consist of a completed form and/or a tape recorded interview or on-site notes, photographs, organisation charts and material extracted from personnel files of the organisation, etc. This information should be summarised and combined into a **job analysis record** which should be entered into the established microcomputer data base. The information gathered can then be synthesised to prepare an occupational definition and associated description and profile.

The fieldworker should also prepare a **fieldwork report** for each occupation analysed. This report should include

- a list of all contacts by category;
- a list of all materials gathered;
- a copy of all materials gathered;
- a list of establishments visited;
- completed job analysis forms for each job analysed; and

- a draft occupational definition and description for each occupation.Fieldworkers may also be required to draft or revise the relevant unit group definitions in the light of the occupational analyses conducted.

The fieldworkers should pay particular attention to the homogeneity of the unit group structure with respect to the chosen classification criteria, i.e. 'skill level' and 'skill specialization' when ISCO-88 serves as model. As suggested above, the fieldworker may decide that additional or different occupations should be identified and defined; or that one or more occupations do not belong in the proposed unit group or even minor group. Any proposed structural changes should be documented and justified on the basis of the information collected.

4 Design constraints

In the design of a classification the selected criteria should be used to identify and define a set of mutually exclusive and jointly exhaustive categories at each level of the structure. However, the classification designer must always remember that the NSCO is being developed for specific practical applications. Although the structure should be based on a conceptual model, it may have to be constrained by practical considerations such as the framework of national economic and social institutions; the relative significance of particular occupations in the national labour force; data collection possibilities in statistical censuses and surveys; and user demand for statistics on particular categories of occupations. It should also be constrained by the need for the structure to have sufficient intuitive appeal to provide the basis for its acceptance as a national standard classification.

The application of the chosen criteria will not usually lead to the obvious delineation of a single set of possible categories at any one level of the structure. The dilemma is partly resolved by the need to consider other factors such as specific user requirements (discussed in section 4.1); the need for *nec* categories (section 2.5); feasibility limitations (section 4.2); statistical balance (section 4.3); development costs (section 4.4); as well as data collection and processing costs (section 4.5).

Error! Bookmark not defined.4.1 Specific user requirements

In the process to identify user requirements it may have been established that some of these may be too specific to be completely accommodated by the selected model and the development of a set of operational definitions of the classification criteria. It is therefore appropriate to consider whether it is possible to address those concerns during the development of the structure. For example, the national employment service may already be using a classification of e.g. *craft and related trades workers* which differs significantly from the structure of the corresponding segment in the model for the NSCO. The employment service may also be convinced of the merits of its own classification which it may have been using for a long time for job placements and surveys. It may therefore be necessary to modify the model structure to make that of the NSCO more compatible with that already being used by the employment services. Even if this may compromise some aspects of the underlying principles chosen for the design of the NSCO, one should not forget that their ultimate justification is that they help to serve significant users' needs.

Another consideration may be that there is a significant user demand for statistics on particular occupations which might not otherwise be separately identified. For example, there may be strong interest in *supervisors* in different crafts and related occupations. This may lead the classification designer to consider creating separate unit groups for these jobs when the NSCO is implemented. (Another possibility for accommodating this user demand would be to create a separate variable for "supervising functions", which can supplement the "occupation" variable when describing jobs.)

4.2 Feasibility limitations

The practical need to implement the NSCO in statistical collections suggests that serious consideration be given to collection possibilities and collection costs at the design stage of the classification. The additional need to use the NSCO in applications such as job placement, career planning, occupational rehabilitation, etc. also suggests that the practical requirements for use in these applications should also be considered at the design stage. It is therefore strongly

recommended that the draft structure should be subjected to a series of practical tests in the environments in which it will later be used. This will ensure that any aspects of the draft likely to cause problems in practice are identified and modified before the structure is finalised. For example, there is little point in creating separate unit groups for apprentices, trainees and supervisors if field tests show that it is not possible to obtain the necessary information to code jobs accurately to these groups. A useful strategy to minimise such problems is to design the structure so that information which is difficult to obtain reliably in practical situations is used as the basis for distinctions at the lower levels of the structure where its impact on coding is reduced. The process of feasibility testing the draft structure will be discussed in section 7.

Error! Bookmark not defined.**4.3 Statistical balance**Error! Bookmark not defined.

When one is designing a classification which divides the national labour force into about 10 major groups, one might reasonably expect that no single major group should contain more than e.g. 50 percent of all jobs in the economy. Indeed, one might expect that most major groups would have an estimated size of around 10 percent of the labour force. A possible exception might be a country where e.g. more than 50 percent of the labour force is engaged in occupations in the same production sector, such as agriculture. Even then, one might consider the possibility of creating separate major groups of e.g. 'crop producers', 'animal producers' and 'other agricultural occupations'. Similarly, if a major group has an estimated size of less than 1.0 percent of the labour force, one wonders on what basis it might be termed a major group. While it is the logic of similarity and not the estimated numerical size of a classification category which in principle should determine its place in the classification, the question of size cannot be completely ignored in practice, e.g. because of the way the various levels of aggregation are being used e.g. in the presentation of statistics on occupational distributions.

While considerations of statistical balance could not be important in the development of ISCO-88, the Australians paid particular attention to this issue during the development of ASCO. This was probably because their old occupational classification performed so poorly in this respect: One major group in the old classification ("Tradesmen, process workers and labourers") contained more than 35 percent of all jobs in the economy while other major groups contained less than 0.5 percent. Although this classification had 388 unit groups, research showed that 90 percent of all jobs in the Australian economy were being coded to 10 percent of those unit groups. This was partly the result of using a structure (based on ISCO-58) which had not been very well adapted to the Australian environment and partly due to shortcomings in coding operations. Many of the large unit groups were *nec* groups and their size was partly due to their use as a dumping ground for poor quality occupational responses. As ASCO has eight major groups in the structure and hence the average size of a major group is 12.5 percent of the labour force, it was argued that a group which is smaller than 5 percent of the labour force is not, by definition, a major group. In practice, the approximate size of the major groups ranges from 6.5 to 17 percent. A similar design constraint was imposed at the other levels of the classification. Hence, the occupations defined in ASCO were identified on the basis of their significance in the Australian labour force. A somewhat arbitrary limit of 300 was set as the minimum number of jobs in a group before it was given the status of a principal occupation in ASCO. Groups of jobs smaller than this were given the status of specialisations of the principal occupations.

While opinions may differ about the importance or otherwise of statistical balance in the design of a classification, the issue should be seriously considered.

Error! Bookmark not defined.4.4 Development costsError! Bookmark not defined.

The number of categories at each level of the classification has an impact on the amount of time and money required to develop the classification. This is particularly the case at the occupational level of the structure where the task of identifying and defining a large number of categories can be very costly, in particular if the development of group descriptions and distinctions is based on a comprehensive job analysis programme. Countries which undertake significant projects to develop occupational classifications therefore usually will make estimates of the number of categories they will identify at each level of the structure for planning and budgeting reasons. A maximum number of separate occupations to be identified in the classification is usually set to control total cost of development.

Error! Bookmark not defined.4.5 Data collection and processing costsError! Bookmark not defined.

It is often argued that the more categories a classification has at the level used for coding jobs, the greater will be the cost of collecting and processing the information necessary to make all the distinctions required to code data. This is a concern which often tend to carry significant weight in statistical data collections. However, experience suggests that operational coding costs depend more on the tools available to the users of the classification and the nature of the information required to draw the necessary distinctions, than on the number of such distinctions.

5 Development of group definitions, descriptions and profiles

The selected model structure should include a set of definitions for each category of the classification. If the chosen model is ISCO-88, its group definitions will provide a good basis for drafting those in the new NSCO. If another classification is selected as the model, reference should still be made to ISCO-88 as an example of the content and presentation of group definitions. The group definitions should be drafted in parallel with the development of the new structure. The task of drafting the definitions will encourage the classification designer to think carefully about the definition of the scope of each group and hence about which occupations should be identified as included or specifically excluded from the group.

When drafting group definitions the classification designer should remember that the purpose of the definitions is to define the content of the occupational category and not to provide an exhaustive description of all the tasks which might be performed in the jobs classified within the category.

The first step to be undertaken in the production of a national set of occupational definitions, descriptions and profiles should be to identify the users' needs for such information and balance them against the cost of collecting, processing and presenting the necessary information. It will then be possible to make informed decisions about what occupations to cover; what elements should be produced; when they should be produced; who should produce them; and how they should be produced. Every effort should be made to standardise the use of terms in the group definitions

Error! Bookmark not defined.5.1 Functions of an occupational classification and dictionary

It is now recognised that the dictionary component of an NSCO has fulfilled three important functions which should be clearly identified and separated. The first is the function of *identifying and defining* the basic occupations (or occupational groups); the second is the function of *describing* them; and the third is the function of *characterising* them.

Error! Bookmark not defined.5.1.1 Identifying and defining occupational categories

The most important and the least appreciated function traditionally served by an occupational dictionary is the identification and definition of the categories of the classification. Statisticians have often regarded the large quantity of detailed material as boring and of marginal use for their purposes. However, occupational (group) titles alone, even when they are supplemented by coding index entries or lists of occupations included or excluded, do not provide an adequate basis for defining the categories of an occupational classification: the categories need to be defined in terms of the set of primary tasks which provide the basis for classifying particular jobs as belonging to the particular occupational category.

The number of 'occupations' to be usefully identified separately in an economy depends on a judgment of how similar two jobs must be before they can be regarded as belonging to the same 'occupation'. Just as the number of levels in the classification structure depends on the different requirements of its various applications, the number of categories identified and defined at the most detailed level depends on the applications of that level. E.g.. the greatest demand for detailed categories comes from users engaged in job placement and human resource development and

management, including skill testing for occupational certification, but epidemiologists concerned with the effects of working conditions and exposure to harmful substances on the health of workers will also require the specification of detailed occupational groups. At the same time the greater the number of categories identified and defined, the more specific the definitions need to become, the more quickly they will need to be updated and the more frequently new 'occupations' will need to be identified and defined. The cost of preparing and maintaining a large set of definitions of categories must therefore be balanced against the benefits obtained from having the detailed information readily available.

The particular sets of jobs which we identify and group together as an 'occupation' or in an occupational group depends on our conceptual framework, the type of applications which are given priority and the resources available. From this perspective, a particular 'occupation' does not have an independent existence outside of our theoretical framework for identifying and grouping jobs into 'occupations', and 'occupations' into groups. Therefore, it is necessary to define the 'occupations' by identifying the primary tasks of jobs and the categorisation of those tasks.

The definitions used to define groups of occupations need to be precise and to focus on the information necessary to differentiate each of them from the others. The definitions should be designed for quick reference by the sophisticated user; they need not provide an exhaustive description of all aspects of the occupations involved; their relative brevity (and hence non-specificity) will reduce the need for updating and revision. The terms used in the definitions should be as standardised as possible and the language used can be aimed at a sophisticated reading level.

The number of categories identified as 'occupations' in ISCO-68 was 1506, whereas the number in existing NSCOs ranges from e.g. 1,097 in ASCO's First Edition to 6,700 in the Canadian CCDO to 12,741 in the 1991 version of DOT. Many national statistical classifications may have fewer detailed categories than ASCO, First Edition, but then these categories are usually regarded as 'groups of occupations'.

Error! Bookmark not defined.5.1.2 Comprehensive description of occupational categoriesError! Bookmark not defined.

The most readily appreciated function traditionally served by an occupational dictionary is that of providing a comprehensive *description* of the occupations identified. The descriptions in a national dictionary provide the principal source of readily available occupational information and many occupational characteristics can be derived from the content of the descriptions. A set of associated occupational descriptions has a vital role to play in many applications of the NSCO such as career education, vocational guidance, curriculum development, etc.

In particular when used as basis for vocational guidance the descriptions will be used by persons with a wide range of backgrounds. They should therefore be addressed to a lower reading age than the definitions, e.g. to persons with year 10 of general education. The emphasis should be on communication rather than on brevity and precision. Depending on the priorities of those developing the descriptions they can cover all aspects of an occupation including an exhaustive description of the tasks which may be involved, the context in which the work is done, typical characteristics of workers employed in the occupation, career possibilities, information about education and training opportunities, labour market outlook, relative levels of remuneration, etc. There are obvious advantages in identifying all of these attributes separately and thereby facilitating the incorporation of the information into a computer database for quick and efficient updating, searching and analysis. However, the usefulness of such a database is determined by the accuracy and comprehensiveness of the basic information: clever database design cannot compensate for poor data quality. The comprehensive nature of the descriptions will mean that they will tend to date

quickly and hence will need regular monitoring to determine whether or not they should be updated.

There can be provision for including information on geographical variations in the content of jobs and the context in which the work is done. All of this information can be stored in a national data base of occupational information which can, in turn, be linked to a national database of education and training courses to support the various applications of the dictionary. Appropriate extracts from this information can be published in the form of special job guides to be distributed to school leavers, people leaving military service, released prisoners, women's refuges, centres for the rehabilitation of the disabled, etc. Some countries, e.g. Australia, prepare annual updates of selected occupational descriptions for purposes such as career information and vocational guidance. The occupations identified in this material should be consistent with those in the NSCO but may be limited to a subset of greatest relevance or interest to e.g. school leavers and other job seekers.

Countries considering the development of a new NSCO should seriously consider separating the functions of identification and definition of 'occupations' on the one hand from description on the other. The definitional component is essential for the correct interpretation of the classification and should be developed and published as part of the NSCO. The descriptive component can be regarded as a closely related but separate entity from the classification; one that requires more research as well as frequent updating of certain types of information, e.g. concerning training requirements and opportunities. Updated descriptive material will obviously provide valuable input to reviews of the identification and definition of occupations in the NSCO.

Error! Bookmark not defined.5.1.3 Occupational profiles

Attempts to characterise occupations in terms of *occupational profiles* are as old as the dictionary tradition itself. *An occupational profile* aims to characterise the jobs classified to an occupation on a wide range of criteria and present the information in itemised and coded form, to be readily incorporated into computer databases for searching, matching and analysis. The data items included typically cover:

- education and training requirements for satisfactory performance of the tasks and duties characteristic of an occupation;
- characterisation of the tasks involved;
- skill typologies;
- characterisation of the context in which the work is done;
- - characterisation of the outputs of the work.Some countries have extended the framework to include information relevant for those who want to consider career possibilities, such as
- - labour market size;
- relative levels of remuneration;
- promotion prospects;
- suitability or otherwise for persons with particular handicaps or abilities,
- - exposure to harmful substances, dangers, difficult or straining postures or extreme temperatures; etc.The information contained in occupational profiles has relevance also for

e.g.

- - design of vocational training and skill testing material;
- staff recruitment;
- job placement;
- career counselling;
- job evaluation;
- the assessment of workers compensation;
- occupational rehabilitation, etc.

Occupational profiles can provide a very comprehensive picture of the characteristics of occupations for use in a wide range of important applications. It may be sufficient for many countries to focus on a set of occupation profiles which are sufficient to accurately classify each occupation in terms of the classification criteria adopted for the NSCO, e.g. skill level and specialisation. Such profiles would obviously improve the accuracy of classification decisions and simplify the process of completing the structure of the classification. They would also have important uses in many applications of the NSCO. However, many of the available methodologies for constructing the occupational profiles are difficult to validate, and they are all costly to apply reliably to a large number of occupations, or even on a strict priority basis - i.e. for 'occupations' which are particularly important e.g. from a training or skill testing perspective. One must consider whether or not the intended applications of the NSCO and/or a NDO justify the cost of producing associated occupational profiles.

Most of the development work on occupational profiles has been done in the United States and, to a lesser extent, in Canada and Australia. The first edition of the DOT contained occupational profiles on "worker characteristics requirements" and on "physical demands", dimensions included as standard components of the job analysis methodology. DOT originally attempted to classify occupations on the basis of similarity with respect to these dimensions. The strategy later changed to presenting occupational profiles as coded information, some included as part of the DOT identifying code for each occupation and the remainder as an attachment to the occupational descriptions.

There has not always been a well developed conceptual basis for the variables included in the profiles and many profiles have mixed the characteristics required by the job with attributes which are typical of people employed in those jobs without being part of the job requirements. The methodologies developed by the *US Department of Labor (DOL)* contain elaborate techniques for describing jobs and people and for matching them. Its theoretical foundations are based on the assumption that the 'fit' between a worker and his/her job will depend on how well matched the worker's capacities for working with *data*, *people* and *things* are to the corresponding job requirements. The theory assumes that all jobs require workers to relate to each of these in some way: in relation to things, workers draw on physical resources, (i.e. dexterity and strength); in relation to data, on mental resources (reasoning, knowledge); and in relation to people, on interpersonal resources (communication, empathy, authority). The functions relating the worker to each of these characteristics are assumed to be ordinal and hierarchical proceeding from the simple to the complex, and this is an assumption which has often been challenged.

Both the USA and Canada have developed manuals for the collection and coding of occupational profile data. The latest revision of the methodology used for DOT is described in US

Department of Labor (1991): *Handbook for Analysing Jobs*, US Government Printing Office, Washington, D.C. Since the US Department of Labor completed a review of all aspects of the DOT in the mid 1990s, countries considering the development of occupational profiles should study the results of that review (US Department of Labor, 1993: *A New DOT: A Database of Occupational Titles for the Twenty-First century*. Report of the Advisory Panel for the Dictionary of Occupational Titles). The reader should also refer to extensions to the DOL methodology presented in Sydney Fine: *Functional Job Analysis* (FJA); and Dale Yoder: *Job Information Matrix Systems* (JIMS). See also A.R. Miller et al (1980): *Work, Jobs and Occupations: A critical review of the Dictionary of Occupational Titles*, in particular Section 6: "Procedures used to produce the Fourth edition of the Dictionary of Occupational Titles".

As mentioned above, the Canadian CCDO included a second volume wholly devoted to the presentation of occupational profiles for each of its 6,700 occupations. However, the Canadians did not develop a new set of occupational profiles when developing the new *National Occupation Classification (NOC)* which have replaced the CCDO.

The Australians had planned a publication as part of the ASCO first edition containing what were termed *Job Content Factors (JCFs)*, The JCFs consisted of coded information characterising each occupation in the classification. The JCFs were originally developed along similar lines to that followed by the Canadians. However, the conceptual model underlying the profiles was later reformulated to focus more on job requirements rather than on the characteristics of the workers employed. A set of JCFs was published as part of the *ASCO Working Draft* (1983) but resource limitations prevented their inclusion in *ASCO First Edition* (1986). In 1992, the Australians resumed work on the refinement of the conceptual model as part of a plan to produce JCFs for the second edition of ASCO. Those interested in this work should contact the *Education and Skills Analysis Branch, Department of Employment, Education and Training (DEET)*, Canberra.

Indonesia has also developed occupational profiles for a large number of occupations on the basis of an extensive job analysis programme modelled on that of the US. Those interested in this work should contact the *Sub-Directorate for Job Analysis, Ministry of Manpower*, Jakarta.

5.2 Format and content of group definitions, descriptions and profiles

The basic purposes of occupational definitions, descriptions and profiles is to present the information in a consistent, user-friendly format which facilitates quick and easy access to the information - using standardised and precise language. The objective is not to write a novel using colourful and varied language and figures of speech combined in an entertaining literary style.

Error! Bookmark not defined.5.2.1 Format of definitions

The format and content of the definitions of the occupational categories suggested here is based on a review of the conventions adopted by existing national classifications, methods of presentation developed in conjunction with various job analysis methodologies and a logical analysis of the needs of their intended applications.

The terms used in the category definitions should be as precise and as standardised as possible. As the definitions are intended for technical reference, the use of terms can be designed to suit an advanced reading level. The definition of an occupational category should be subdivided into a number of separate elements ("fields") including *title* of category, classification *code*, *lead*

statement, *skill level category*, *skill specialisation category* and the *list of primary tasks* for the occupation. Other information may also be attached to the definition, such as a list of occupations classified to the group as well of related occupations classified elsewhere. The information presented in each field is described below:

Title

The title of the occupational category should be as short as possible consistent with the purpose of serving as an indicator of the contents of the category. The title is not intended to serve as a substitute for the definition and ideally should consist of only one or two words. This restriction on length is to facilitate the use of correct category titles in statistical tables, data dictionaries and statistical analysis systems.

The title chosen should describe the category as precisely as possible consistent with the suggested length restriction. If there exists a generally used and recognised title for the occupational category then that can be chosen, subject to it being sufficiently specific and subject to the need to differentiate the category from other categories. There is no particular advantage in choosing category titles which reflect common usage unless such usage is precise and consistent with the definition of the category in the classification. Other commonly used titles can be captured in the coding index where they can be made precise with appropriate qualifiers.

In general, it is desirable to choose category titles which identify a category in the context of other categories belonging to the same higher level occupational group and in the context of the name of the higher level group. Obviously, no two categories at any given level of the structure should have the same name. Where a particular group (e.g. in ISCO-88, Sub-Major Group *13 General Managers*) contains only a single category (Minor Group *131 General Managers*) at the next lowest level of the structure, the same name should be used at both levels of the structure.

Particular care should be taken in choosing the titles of categories which contain sub-categories. It is usually appropriate to choose the names of category titles so that they accurately refer to the contents of all sub-categories which they may contain. Where there does not exist a suitable term in the relevant language to describe the particular combination of sub-categories, the title of the category should include the titles of each sub-category linked by the conjunction: *and*.

It is common practice in occupational dictionaries to present, for the detailed occupations, and in connection with each definition and the *principal title*, examples of *alternative titles* and *specialisation titles*. *Alternative titles* are defined as titles of jobs which include exactly the same task combination as jobs described by the principal title; *specialisation titles* are defined as titles which represent jobs which require the performance of a subset of the range of tasks included in the job described by the principal title. (An exhaustive list of alternative and specialisation titles should be included in a coding index designed for the purpose of mapping everyday titles and task descriptions into the correct categories of the classification.)

Code for group or occupation

There should be one and only one code associated with each classification category. The choice of code structure is discussed in section 2.8.

Lead statement

This is a concise statement of the scope of the occupational category including the main tasks of the jobs within its scope and the products or services resulting directly from the work done in these jobs.

Skill level

This specifies the entry requirements for the jobs included in the scope of the particular category, expressed in terms of the minimum formal education, previous experience and/or on-the-job training usually considered necessary for recruitment to the jobs classified to this category in order for the person to give satisfactory performance of the tasks involved within a normal introductory period. The categories of skill level should follow those defined for the skill level classification criterion. Special requirements, such as licensing, should also be indicated under this heading.

Skill specialisation

This specifies the *field of knowledge, tools and equipment*, and *materials* required for the performance of the tasks. It is preferable to specify these three components as distinct sub-headings:*Field of knowledge*: This variable indicates the subject matter which is essential to the performance of the tasks. When relevant it may be useful to use the fields identified in the national classification of educational qualifications.*Tools and equipment*: This variable indicates the *plant*, *machinery* or *hand tools* used in the performance of the tasks.

The term *plant* is used to describe mobile or stationary equipment which is large in size, performs several related functions, and is usually controlled by more than one operator who may be inside the unit, e.g. a gas liquefaction plant, a dragline.The term *machinery* is used to describe stationary equipment which is not as large as plant, and typically performs one processing function. It is usually controlled by only one operator who may be outside the unit, e.g. a mixing machine, a bottling machine.The term *hand tools* is used to describe equipment which is small enough to be moved and operated by one person e.g. a hand saw, a motor-driven circular saw, an electric drill.*Materials*: This variable indicates the materials which are extracted, transformed, processed, refined and/or fabricated as an essential part of the performance of the tasks.

Primary tasks

This statement should list all the tasks which are common to jobs within the scope of the occupational category. An individual task can be defined as a series of work activities (elements) which are needed to produce an identifiable output that can be independently used, either by en 'end-user' or as input to a further stage of production by someone else (see Gilpatrick: 1977b: 2-1). Each task should be a separate item and the description should begin with the corresponding action verb. If there is a natural ordering of the tasks in a time sequence, this order should be used for presentation. The set of tasks is best presented as a list, e.g. in the manner used for presenting the elements of occupational descriptions.

Occupations included

This heading should list examples of detailed occupational categories included in the scope of the group being defined.

Related occupations classified elsewhere

This heading should list related occupational categories classified in other segments of the structure. One should include occupations classified elsewhere which are likely to be confused with the occupation being defined here, e.g. *nurses' aides* should be listed under this heading if classified to a group different from that of *registered nurses*.

Comments

This heading should list items of relevant information not given elsewhere, e.g. any restrictions to entry into the occupation based on the need for certain types of certificates.

5.2.2 Format of descriptions

The format of occupational descriptions should broadly follow that described for occupational definitions. However, the object of the descriptions will be to provide a comprehensive picture of many aspects of the occupations, including those already covered in the definition. The occupational description should thus be consistent with the corresponding definition, but should present a much broader range of information.

Examples of the type of additional items which should be included in occupation descriptions are:

- a description of all tasks which workers in the occupation may be required to perform, not just those which are common to all jobs in the category;
- a description of job functions, e,g, as supervisor of other workers;
- a description of typical physical and psychological working conditions;
- a description of the context in which the work is typically done, e.g. as part of a team, in large or small organisations, as self-employed;
- the identification of institutions offering vocational training for the occupation;
- relative levels of remuneration;
- information about labour market prospects;
- description of possible career paths, with information about training and experience requirements; etc.

For quick reference, attractive presentation and ease of maintenance, the information is best presented as a lists under specific headings.

Error! Bookmark not defined.5.2.3 Format of profiles

Occupational profiles have usually been presented as a set of codes. This formalised presentation is compact and makes it feasible to attach the profiles to each occupational description in a single volume dictionary. However, the complex coding systems and the small type faces typically used can act as a barrier to the use of this information. A possible alternative is to publish the profile information in a separate volume which need only be purchased by those who can make use of the information. The additional space of a dedicated volume may also make it feasible to employ a less cryptic and more user friendly presentation e.g. by the use of graphs. It may also make it easier for the profile information to be produced and updated independently of the occupational descriptions. This consideration can be important when available resources are limited and, by staggering the workloads, provides a means of maintaining a reservoir of staff with appropriate skills on a continuous basis.

5.2.4 Computer presentation

A NOCD will be designed to serve as the basic source of occupational information for a multitude of applications, and the definitions, descriptions and profiles have traditionally been presented in the form of a printed publication. The material has usually been presented on the basis of the classification structure, but examples exist where the presentation is in alphabetical order of occupational titles, by type of industry in which the occupations are most common, or by type of training which is most relevant.

The availability and ease of use of modern database software for microcomputers is challenging the traditional dominant role of the printed text as the basis for presenting and disseminating occupational descriptions and profiles. The use of database technology offers a much more flexible means of accessing, analysing, updating and matching information than is permitted by the organisation of the material by a rigid classification structure or alphabetical sequence. At the same time, the definitional role of the dictionary can be separated from the descriptive one and the presentation of the classification structure can incorporate definitions and exclude the detailed descriptions, whenever those are not needed. We can foresee the development of occupational information systems which are composed of many specialised sub-systems developed to serve the needs of different applications, but which are integrated by a standard classification structure which identifies and defines all categories and specifies their inter-relationships.

The need to have a fixed classification to facilitate the analysis of changes in occupational statistics over time is in apparent conflict with the need for frequent updating of occupational information. However, the conflict can be minimised if one separates the role of definition and aggregation from the role of description.

5.3 Preparation of draft definitions and descriptions

It may be necessary to conduct the first round of fieldwork as a pilot study to identify any remaining problems in the methodology chosen and to provide further training for fieldworkers by on-the-job experience. It may also prove necessary to repeat some of the early fieldwork at a later date when the operation is more established.

It must be remembered that reviewing existing definitions and descriptions and the preparation of new or revised material should be an ongoing task if the classification and its associated information systems are to remain current. Accordingly, the issue of how to establish ongoing communication channels with existing information sources should be addressed and strategies developed to achieve this objective, even if the work initially is carried out within the framework of a project organisation.

Ideally, the fieldworker(s) who undertook the job analyses should also prepare the draft definitions and descriptions for the appropriate occupation. Since they have conducted the fieldwork, they will have more insight into the jobs than someone who has to rely on only the recorded material. This assumes that the field staff after training have appropriate skills in written expression, editing and the use of word processing packages.

The first step in preparing a draft occupational definition and description is to ensure that all jobs analysed are correctly grouped into the relevant occupation(s) and unit groups. The results of some job analyses may result in the re-allocation of those jobs to other occupations than the ones selected originally. Particular attention must be paid to the issue of homogeneity with respect to the tasks involved and the chosen classification criteria. To group jobs into occupations, a simple comparison of the main tasks identified can be the basis of decision making: the main tasks should

be the same. By main tasks one will normally understand those tasks which are deemed most central to the successful performance of the job. These are not necessarily those performed most of the time, but those tasks which are performed frequently should also be carefully considered, even if they seem trivial.

The drafts can be prepared using a standard word processing package on a microcomputer. To avoid later difficulties, it is preferable for all drafting to be done using the same word processing package. The files can then be converted and stored in the appropriate database. The database of occupation definitions and descriptions should obviously be distinct from the database of individual job analyses. It will be an advantage if fieldworkers draft occupational definitions and descriptions in a standard form which can be represented by a key entry screen on the PC, identifying each distinct field, e.g. title, code, lead statement, skill level, skill specialisation, primary tasks, specialisations, etc. This will break the task into a number of simpler components and ensure that all the necessary information is presented. It will also serve to identify any missing information which can then be investigated further.

5.4 Coding and derivation of profile data

The coding and derivation of profile data will depend very much on the scope of the information which is being collected and the work methods used. The work should be done by a team of at least two people working together to reduce the danger of any systematic bias caused by the views of just one individual. To have a third person to serve as "referee" in case of disagreement would also be an advantage. The referee should probably be a technical supervisor. (A similar approach may also be adopted for the drafting of descriptions and definitions, at least for those which have to be developed without the support of a model.)

Error! Bookmark not defined.5.5 Circulation to contacts for comment

Once the draft material has been prepared for a particular occupation, a copy should be sent to the establishments where the fieldwork was undertaken and/or to the contacts who provided the necessary information. This both because it is a courtesy and because the information recorded may be useful to the establishments or contacts concerned. It also provides an opportunity for correction of any obvious mistakes and misinterpretations. If there are doubts about particular issues, this also provides an opportunity to resolve them. It may be necessary to remind the contacts that the objective is to produce national material and that variations in practices between different establishments cannot always be reflected.

Informants should be thanked for comments received even though it may not always be possible to incorporate those comments into the revised draft. It should be remembered that one objective of the development work for an NSCO is to establish ongoing sources of occupational information for maintenance and updating purposes.

6. Review and editing of drafts

When the draft material for a particular set of occupations has been updated to incorporate comments received from establishments and contacts, it must then be reviewed to address such questions as:

- the comparability of detail in information content across different occupations and aggregate groups;
- the standardisation of terms used in the definitional and descriptive material;
- the relative levels of aggregation across groups.The review is best done by using segments of the draft structure as the organising framework, and can be done in conjunction with the drafting of definitions for the appropriate unit and minor groups.

The work is best done by a core group of two or three staff members, as the fewer the number of people involved in this stage, the easier it will be to produce standardised and comparable material for all segments of the classification. The reviews should be done by persons who were not directly involved in the preparation of the relevant draft material; who have well above average skills in written expression and editing; and who have a broad perspective on the project as a whole.

6.1 Standardisation of terms

The appropriate style for the preparation of occupational and group definitions and descriptions is that of a technical reference manual rather than that of a novel. It is important that the language used should be concise, precise and consistent. It is very important to ensure consistency both within the classification and dictionary itself and with the terminology used by technical specialists in the respective areas, and reference should be given to synonyms and specialized terms whenever relevant. If possibel there should also be consultations with specialists in those institutions which are generally responsible for normalization of the national language(s) and the monitoring of its/their development. The construction of an occupational classification, and in particular the creation of good group titles, will often involve the coining of new terminology, and this should be done in a manner respecting national linguistic norms and standard usage as much as possible.

Standardisation of terms is particularly important if the occupational definitions and descriptions are to used in a computer database. The *text search* facilities for key words will only be effective if those words are used in a consistent manner.

The same activity should always be described by the same terms, and a particular term should not be used to describe different actions or situations. If a number of synonyms exist one of the terms should be chosen and used as the standard term. These considerations apply particularly to terms used to describe the main tasks of an occupation or the primary tasks of a unit group. For example, if a *sales manager* manages a team of *sales representatives*, then a *farm labourer* should not manage a tractor - (s)he will drive or operate it. Similarly, if a *sales manager* is said to *manage* a team of *sales representatives* then a *purchasing manager* should be described as managing rather than directing a team of *purchasing officers*. Again, a *civil engineer* may advise clients on the most appropriate methods of construction; a *community nurse* may advise clients on personal hygiene; however, a *ticket seller* does not advise customers on the price of tickets - he or she may inform customers about such matters.

An effective procedure to achieve standardisation in the use of terms is to use the indexing facility of the Word Processing software, or a specialised computer programme, to identify and index all non-trivial words used in the definitional and descriptive material. All occurrences of terms such as manage, direct, advise, inform, operate, drive, etc. can then be examined for use consistency. When necessary, the choice of terms should be changed and the analysis repeated to further refine the consistency of their use.

6.2 Review of occupations identified

A reviewer should begin by studying the drafts for the complete segment, e.g. the draft minor group or sub-major group, to get an overview of all the occupations which have preliminarily been included there. The reviewer should then study the fieldwork reports from each fieldworker involved to identify the principal problems encountered and issues raised at the different levels of the classification.

There are a number of important issues to be addressed. They are apparently simple, but the task must be done with much care and attention to detail.

The first question is: Do the occupations identified in a particular unit group or minor group represent a set of mutually exclusive categories which, taken together, jointly exhaust the intended coverage of the group? It is useful to do this in conjunction with the preparation or review of the draft unit group or minor group definition. The primary tasks identified and the entry requirements listed in the various occupation definitions should be carefully studied to ensure that the occupations are, in fact, distinct. Conversely, one should check that the proposed occupations are sufficiently homogeneous with respect to the classification criteria and do not need to be further disaggregated. This is where the work with the occupational descriptions and the work to develop the classification structure come together. One should also check that the tasks identified and entry requirements listed are such that the particular occupations are correctly classified to the proposed unit or minor group. It may be necessary to revise the definition of the scope of the unit group as well as the decision to include or exclude here particular occupations. These decisions are particularly important for the future validity of the classification, and will need to be reviewed a number of times as work progresses on other segments of the structure.

The second question is: should a proposed 'occupation' be identified as a separate occupation or should it be a specialisation of a more general occupation? For example, should 'gas fitter' be a specialisation of 'plumber' or a separate occupation in its own right? The answer will depend on: the target number of occupations projected for the classification as a whole; the number of such jobs in the national labour force; and user demands for information about particular categories. The staff member who prepared the original draft will have addressed such questions, but it is important that they are reviewed also from a broader perspective.

It is important that an independent assessment can be made of the adequacy or otherwise of the source material used to prepare the draft occupational definitions and descriptions. The reviewer should examine the range of contacts made and the number and type of establishments where the fieldwork (if any) was conducted. The necessary information should be recorded on the appropriate fieldwork record for future use.

Particular attention should be given to the titles of the individual occupations and of the group as a whole.

Error! Bookmark not defined.6.3 Consistent levels of detailError!

Bookmark not defined.

The objective here is to ensure that the amount of information included in a particular occupational definition or description is comparable to that for other occupations. It is difficult to achieve consistent levels of detail in occupational definitions and descriptions but it is desirable to make the extra effort to do so. The amount of detail given depends on whether one is considering an occupational definition or description and also on the intended use of the resulting material. It may be sufficient to describe a *bus conductor* as

- "selling bus tickets";or one may say that
- "he or she collects fares and issues tickets and appropriate change"; or one may say that
- "he or she asks the passenger for his destination, determines the appropriate fare and informs the passenger, collects money, calculates the correct change, prepares the change in one cent, two cent, five cent and twenty cent coins, issues the ticket and appropriate change to the passenger and thanks the passenger for his or her patronage".The last of these alternatives would seem appropriate in vocational guidance material, but probably to detailed for the occupational definition. However, if it is once decided to adopt that description of the tasks of a *bus conductor*, then this has obvious implications for the amount of detail required in describing the tasks of a *packaging machine operator*, a *farmer*, a *salesperson*, etc.

6.4 Review of unit group structureError! Bookmark not defined.

The first question here is: Does the type and number of occupations identified in a particular unit group represent a level of disaggregation consistent with that in other unit groups in the same minor group, the same sub-major group, the same major group and in the classification as a whole? If there is a strong user demand for information on particular occupations, it may be necessary to employ more detailed categories in some segments than in others.

The second question is: Should a *not elsewhere classified (nec)* category be included in the unit group or the minor group? Such categories should only be created if there are identifiable occupations which are within the scope of the group and not covered by the other proposed categories and which are not important enough numerically (or otherwise) to be identified separately. At the drafting stage, it may not be possible to determine the answer to such questions with sufficient certainty. If a suitable code convention has been adopted for *nec* groups, additional groups can be defined later if operational experience indicates that this is necessary.

6.5 Preparation of revised drafts

The reviewer should prepare revised draft definitions in the light of the above examination. Where necessary, (s)he may refer the drafts back to the fieldworker and request that additional information sources be provided, e.g. through consultations with the original sources. Where necessary, some additional training of fieldworkers should be provided.

7 Feasibility testing of draft structure

When a complete first draft of the structure is available, it is highly desirable to test the feasibility of using the classification in all of its principal applications. Problems identified at this stage can then be addressed in subsequent drafts of the structure. If the testing process is done on an iterative basis, there should be few unknown operational problems when the classification is officially implemented and being integrated into the relevant statistical and administrative procedures.

Statistical feasibility testing presents fewer problems than administrative testing. The former requires minimal interference with the normal operations of the statistical office because the testing can be done on samples extracted after normal operational processing of the data is completed. It can also be done on data collected during the course of other development work such as that gathered in the course of questionnaire testing. To test a draft classification in administrative applications is, however, difficult without interfering with day-to-day operations.

Error! Bookmark not defined.7.1 Statistical feasibilityError! Bookmark not defined.

Extensive operational testing on successive drafts of the classification during its development was carried out during the development of ASCO, because many users doubted the feasibility of successfully implementing a skill-based occupational classification in statistical censuses and surveys. However, it was quickly realised that the benefits of such testing apply to any development of a new classification or revision of an old one.

The ABS team worked with a 2.5 percent sample of occupational responses from the last Census of Population and Housing and several complete labour force survey samples. In addition, a question testing and evaluation programme was conducted as part of the extensive development programme for the *next* population census. This provided the opportunity to investigate the effect on data quality of all manner of variations in question wording, and it provided the opportunity to see if particular feasibility problems could be addressed by asking additional questions, by variations in the order questions were asked, by alterations in question wording, by alterations in the instructions given to respondents and by giving carefully chosen examples to illustrate the type of information required.

Since the *labour force survey* was conducted using interviewers rather than relying on respondent completion of questionnaires as in the population census, a similar question testing and statistical feasibility testing programme was conducted using complete labour force survey samples. Since the annual *employment survey* used questionnaires completed by agents of employers rather than members of households, the programme was extended to include that survey. Similarly, the programme was extended to include occupational responses obtained in *industrial accident collections*.

The data collected in this way were subsequently used in an extensive programme of operational testing to ensure that it would be possible to identify and code to the categories defined at all levels of the structure and as the basis for the development of a draft coding index for the new structure. Each new draft of the structure was tested using occupational responses from many different samples. For this purpose, a team of part-time coders were employed in the central office for a period of several years during the development of the classification. The coders formed an integral part of the development team and worked under the day-to-day supervision of staff engaged in developing the structure. This provided the development staff with direct feedback on problems

arising in the use of the classification as well as giving them experience in developing processing instructions and training other staff to use the classification.

ASCO was designed so that it would utilise as much as possible of the information usually provided by respondents in censuses and surveys i.e. the process of moving from an occupational response to an occupational code should result in the minimal loss of relevant information. The classification was also designed so as not to require information which was not available from such sources. This was achieved by the iterative process of design and testing referred to above. The feasibility testing programme required that successive drafts of the coding index be developed in parallel with successive drafts of the structure. Since there are many more occupational titles in an occupational coding index than there are occupational categories at the most detailed level of the structure, this procedure resulted in the identification of many delineation problems between categories in the draft structure. These could then be addressed and resolved. Further, the progressive development of the coding index on the basis of extensive coding tests meant that the index was well developed by the time the classification was implemented in statistical collections.

The basic methodology involved:

- the production of listings of occupational responses from the various data sets;
- the coding of these responses to the most detailed level of the proposed structure justified by the information content of the response;
- the key entry of the resulting codes and the merging of the codes with the original data set;
- the sorting of the merged data set into structure order;
- the production of listings of occupational responses and codes in structure order;
- the review of coding errors by an examination of the listings;
- the review of the results of the coding operation in terms of the percentage of responses which were coded to each level of the proposed structure on the basis of various combinations of data items.The analysis of the results was conducted on a major group by major group basis so that particular aspects of the structure which gave rise to coding problems could be identified. The consistency of the coding of each data set was assessed by producing new listings of a 10 percent sample of responses from the data set and repeating the coding operation using different coders.

The production of lists of occupational responses together with their assigned codes, sorted in structure order, made it very easy to identify problem categories. A similar list, sorted in alphabetical order of basic word in the occupational responses, made it very easy to identify problem responses. A quick visual inspection of the printed lists was sufficient to reveal incorrectly coded responses and the origins of the problems were easily traced.

Most data sets were coded as many as twelve times to evaluate:

- the utility of different combinations of data items on topics such as occupational title, tasks, materials, tools, etc.;
- the relative quality of responses obtained as a result of variations to question wording for each of these topics;

- the relative effectiveness of various coding strategies;
- the measurement of accuracy rates and inter-coder consistency rates;
- the statistical feasibility of successive versions of draft structures.

For each test, a new listing of the relevant data set was produced which contained only that subset of data items which were to be used in that test. Significant improvements in data quality were achieved in all these collections and this reduced the need to compromise the structure of the classification. When, after all possible measures had been taken to improve data quality, particular segments of the structure still posed problems in a number of different collections, there was no choice but to modify the classification. In general, distinctions between categories which proved difficult to draw on the basis of available data were relegated to the lower levels of the classification.

Two examples will illustrate the significant effect which this had on the structure of ASCO: Operational testing revealed that it in Australia was not possible to distinguish reliably between apprentices and tradespersons without asking a number of additional questions just on this issue. Similarly, it was found that it was not possible to distinguish between supervisors and the workers they supervise without asking a number of additional questions on the specific issue of supervision. However, there are limits on the number of questions which can be devoted to any one topic in most general surveys and censuses. Since ASCO was designed so that the unit group level would be the principal statistical collection level, both of these distinctions are now made only at the occupation level of the structure.

It is strongly recommended to conduct feasibility testing as an integral part of the development of any new classification, even if resources cannot permit the scale of testing carried out by the Australians.

Error! Bookmark not defined.7.2 Testing of administrative feasibilityError! Bookmark not defined.

The obvious place to testing the draft classification in administrative functions is to use it in the national employment service, which normally is the major non-statistical user. However, care must be taken to ensure that the testing can be carried out with a minimum of disruption to the day-to-day operations of the employment service. One possible strategy is to test the draft classification in one region or in a number of selected employment offices throughout the country where the staff are more capable than average and the workload is not so high as to prevent the possibility of parallel operations based on the old and new classifications. This kind of testing will also require that operational staff be trained in the use of the new classification and be interviewed subsequently about their experiences in using it, and will obviously present more organisational problems than statistical feasibility testing.

Another possible strategy is to draw as much as possible on the experience of the statistical testing and develop coding tools and procedures which are developed to be as independent as possible of the particular classification to be used by the placement officers. If this is in place, then the introduction of a new classification to be used for e.g. job placement may be seen as minor modifications to work procedures and be tested as such.

The Australians adopted the strategy of testing the *ASCO Working Draft* in their national employment service. In 1983 the *Australian Commonwealth Employment Service (CES)* introduced the draft classification as the basis of all employment operations in all employment offices throughout the country. The plan was to use the draft for several years until the *first edition* of the

classification was published. However, this strategy had as consequences that the CES continued to use the *Working Draft* for 10 years after *ASCO first edition* had been published. Hence, one of the principal objectives of the ASCO Project was therefore not achieved as the ABS and the CES continued to use quite different classifications.

Error! Bookmark not defined.8. Evaluation of draft structure and approval of final resultError! Bookmark not defined.

When a first draft of the structure and group definitions is completed, it should be distributed as a draft to important potential users for evaluation and comments. Experience suggests that the draft should be circulated in a form that looks like a draft: many users are deterred from making critical comments on what they perceive as a final product. For example, the draft text could be printed on one side of the paper and provision made on the opposite page for users to write comments, perhaps under printed headings. Alternatively, the draft could be printed in double-spaced format and perhaps be presented in a ring-binder. When distributed for comments an appropriately designed questionnaire should accompany the draft to direct users' attention to issues of specific concern.

The purpose of the validation process is to benefit from a wider range of expertise than was available when the fieldwork was undertaken. The individuals or organisations consulted should receive the full draft or material for at least a whole major group, in order to gain an overview of a significant segment of the classification and provide comments on issues such as:

- the relative levels of disaggregation;
- relative amounts of detail in definitions and descriptions;
- the draft structure of the group;as well as more detailed issues such as
- the accuracy or otherwise of occupational definitions, descriptions and profiles.

Error! Bookmark not defined.8.1 Identification of validation contactsError! Bookmark not defined.

There should be two sets of validation contacts for each segment of the classification. The members of each set should receive a copy of the draft together with a questionnaire seeking comments on particular issues. Separate questionnaires should be drafted for each set of contacts.

The first, general, set of contacts should contain all those with an interest in the classification as a whole, as well as all those who took part in the initial *User Requirements Survey* and will include:

- government departments of labour or employment;
- government departments of education and immigration;
- central public service bodies;
- local government bodies corresponding to the central government ones;
- labour market and social researchers and model builders;
- education planners;
- organisations of employers and trade unions.The members of this set will probably not have much to contribute as to the accuracy or appropriateness of particular occupational definitions, descriptions and profiles but will be mainly interested in broader issues such as

the classification structure, relative levels of disaggregation and type of information content.

The second set of validation contacts should consist of subject matter specialists, and the members of this set will obviously change from segment to segment of the classification. Few contacts will be included for more than one segment where they should have a particular interest in and/or knowledge of the included occupations. The set(s) should obviously include all those contacts already consulted by fieldworkers at an earlier stage and should be extended to include similar contacts in other geographic areas.

It may be appropriate to advertise the possibility of participating in the review process through newspapers, trade and social science newsletters and journals, as articles and/or as advertisements. If major segments or the whole classification are published as a draft document for distribution through normal distribution points for government publications it should have an attached questionnaire inviting comment from those interested. Copies of the draft could also be distributed on floppy disks or placed on public access computer bulletin boards, e.g. for access through *internet*.

The Australians published and sold copies of *ASCO Working Draft*. They stressed that the publication was only a draft for evaluation and comment. However, the old occupation classifications in use in Australia in the early 1980s (there were three of them) were so disliked that some agencies did not wait for the publication of the final classification: they introduced the *ASCO Working Draft* in their operations, thereby adding to the problems of inconsistencies and breaks in statistical series brought about by the implementation of the new classification when it had been finalized.

8.2 Design of validation request

In order to determine the composition of a segment to be circulated for validation purposes, one must consider the knowledge and interests of available contacts in order to limit the amount of pages they are asked to review. For example, the set of general contacts referred to above should receive a draft of the whole classification, but probably not the full draft descriptions. The members of the second set should, on the other hand receive only an overview of the structure to put into perspective the detailed draft definitions and descriptions concerning their specific area of expertise. Many contacts in e.g. the engineering field will be overwhelmed if they receive a large volume of material covering occupations in life science and health which they perceive as mostly irrelevant to their interests, deterring them from making any serious response, even to those areas of direct interest to them. On the other hand, contacts with only a broad interest in the overall classification are unlikely to give serious consideration to drafts of small segments. A compromise must be struck between sending a lot of material to users who have no knowledge of, or interest in, many of the occupations included and dividing the material into small segments which do not give most users a sufficient overview of the work.

Since the general contacts are mostly interested in general issues about the classification as a whole, the questionnaire for this list could remain unchanged for all segments of the classification. The questionnaire for the second set of contacts. on the other hand, should have two components: one focussing on detailed issues such as the accuracy of occupational definitions, descriptions and profiles and the second on issues which arise only in the particular segment of the classification being validated.

For validation purposes it has been found effective to print draft definition, descriptions and profiles in a single-sided format on the questionnaires, reserving the opposite page for a number of

standard questions and leaving the rest of the page blank for contacts to write in any views they might wish to express. Another possibility is to print the occupational definition in the left-hand column of the left-hand page, with each component element starting on a separate line and with a tick box against each of them making it possible for the contact to indicate whether the element should be retained, deleted or modified. Space will be available under each box for additional comments to be recorded. The right-hand page can be presented in a similar layout with respect to the occupational description or profile.

Since validation contacts are asked to comment of a significant segment of the classification, they should be given at least one month to make a considered reply. Reminder letters should be sent to all of those contacts who have not replied by the set date and telephone contact should be used to increase the response rate or clarify comments on particular issues.

8.3 Analysis of replies to validation requests Error! Bookmark not defined.

It is useful to make a loose-leaf master copy of the draft segments and to collate all comments received from all sources analysis on to this master copy. Each comment should be identified by its source. The range of opinions on each issue can then be assessed as can the relative status of the sources of the opinions. After the validation process is completed, all validation replies should be kept for future reference. After the classification is published, some users may complain about particular aspects of the classification and it is useful to be able to refer to the comments which they may or may not have made at the validation stage, as well as to conflicting opinions expressed by experts and/or users. (Non-conflicting opinions would normally have been taken on board.)

If time and resources permit, the validation process can be repeated after any necessary additional fieldwork has been undertaken and comments received in the first round have been incorporated.

8Error! Bookmark not defined..4 Preparation of validated drafts

Second drafts of the relevant segments should be produced which incorporates all those comments which are judged as reasonable, to be reviewed when a complete new draft of the whole classification is available. If time and resources permit, the second complete draft can be circulated again for further refinement. Alternatively, it can be published as a draft for use during a six-month or one-year trial period before being finalised.

8.5 Finalisation of the new classification

The final structure and descriptions should be produced by incorporating all the lessons learnt from user consultations and statistical feasibility testing. At this stage, particular attention should be paid to reviewing:

- the homogeneity of all categories at all levels of the structure with respect to the classification criteria;
- the requirements for categories to be mutually exclusive and jointly exhaustive at each level of the structure.
- the scope and coverage of the classification;

- the estimated labour market sizes of the proposed categories;
- the number and estimated sizes of nec groups;
- the desirability of statistical balance;
- the suitability of the code structure for the number of levels and the number of categories at each level;
- the selection of titles for categories which are short, accurate and descriptive;
- the precision, accuracy and utility of the group definitions and descriptions, as well as the standardisation of terms used.

The time taken to address all of these issues is often seriously underestimated. Experience suggests that at least six months should be allowed in the work programme to finalise the structure after the last user comments have been received. If a feasibility testing programme has been conducted using progressive drafts of the structure, a draft coding index should already be developed. Experience also suggests that it is highly desirable to refine the draft of the coding index for the new structure in parallel with the finalisation of the structure. This process will identify many delineation problems between categories in time for them to be addressed and resolved before the structure is finalised.

Error! Bookmark not defined.8.6 Approval of the classification

The procedure for approving the classification for publication and implementation should have been addressed at the project planning stage. The approval stage can be prolonged and the outcome is not necessarily a foregone conclusion.

The institution(s) with the responsibility respectively for producing, approving and publishing the classification varies considerably between countries. In some countries, the classification is proclaimed by government regulation or submitted to the legislature as a Bill for an Act. Serious problems have arisen in some of these countries because insufficient attention was given to addressing the implications of this at the project planning stage.

In an ideal situation, the government or legislature should only consider and approve the principle that a NSCO should be developed and maintained, and designate the responsible agency as well as the composition of an inter-agency supervisory body for the work. The advantages of this approach are (i) that the crowded parliamentary agendas need not be cluttered with each minor up-dating, modification or revision of the NSCO; (ii) that a designated agency will have both the responsibility for developing and maintaining the NSCO, and a basis for requesting the resources necessary, and (iii) interested agencies will have a mechanism for presenting their concerns and requirements. With this model the proposal for a NSCO should first be approved by the Project Steering Committee before being submitted to the supervisory body authorizing its publication.

Some countries have found it useful to seek approval in a series of stages: at the first stage, the top level of the structure is submitted for approval; at the second stage, the unit group structure is submitted; and lastly the occupational level of the structure is submitted. The complete draft of the structure down to occupational level should be submitted on each occasion so that the higher level groups are viewed in perspective but, initially, only the higher level groups should be considered for approval. While the broad levels of the structure are being considered for approval, work can continue on refining the detailed levels of the structure as these are much more time-consuming

because of the large number of categories involved. Furthermore, if the broad levels of the structure are not approved without significant changes having to be made, a great deal of time and energy can be saved by not having to restructure the detailed levels several times.

9 Provision of equipment and support services for the development project

The efficiency of the data collection and drafting operation will depend on the availability of appropriate equipment, material and support services. These include appropriate office space and equipment, field equipment and stationary, as well as support services such as transportation and secretaries.

9Error! Bookmark not defined..1 Office space and equipment

Where funds are limited, it may be possible to obtain office space and/or equipment on long-term loan from other government or private agencies which support the project. The expenses involved in renting appropriate office space and equipment can be significant, whether provided from the project's budget or absorbed by the host agency at no cost to the project. This must be determined when planning the project.

Office space

It is desirable that adequate office space be provided to accommodate the whole project team in one location, also when the team is at full strength. The nature of the project is such that close liaison and communication between all members of the team is necessary to ensure a consistent approach to the work. During the progress of the project, many conceptual and practical issues will arise and these can best be resolved by team discussion. However, in large, decentralised countries or countries with poor or costly transport links, it may be necessary to station fieldworkers in regional locations and appropriate provision must then be made for regional office facilities.

The office space provided should be suitable for installing equipment such as microcomputers, fax machines, photocopy machines etc. and hence needs to be secure and preferably air-conditioned. Ready access to quality telephone lines is important for project management and the organisation of fieldwork. The need to provide adequate, and enough, desks and chairs for team members to work at and for discussions and meetings, should not be forgotten. It is also necessary to provide enough paper, pens, files and filing cabinets, as well as (access to) relevant literature.

Microcomputers

The provision of an adequate number of microcomputers is essential for the efficient conduct of the project. They can be used to prepare project documents and data collection forms; to record and store the results of fieldwork; to draft definitions, descriptions and profiles; to prepare coding indexes; to design the classification structure; to prepare material for publication; and to facilitate project management.

If members of the project team are not very experienced in the use of microcomputers, it is recommended that a user-friendly environment such as that provided by *Microsoft Windows* should be chosen. However, this environment is fairly demanding on hardware support. An appropriate choice of microcomputer would be an IBM AT compatible computer with a 486 DX processor, at least 4 Megabyte of random access memory (RAM), 120 megabyte hard disk drive (preferably 250 megabyte), one 3.5 inch, 1.44 megabyte floppy disk drive; super VGA card and super vga non-interlaced monitor. Suitable surge protectors and/or uninterruptable power supplies should be provided if the local power supply is unreliable at times. The chosen keyboards and software

should obviously be capable of providing full support for national language(s). Ideally, every member of the project team should have ready access to such a microcomputer and this should be considered when determining the number of machines required. If more than three machines are purchased, the possibility of connecting them, and the printer they will be using, through a *Local Area Network (LAN)* should be seriously considered, so that all files can be stored and backed-up centrally.

Consideration should also be given to the purchase of a number of portable computers for use in the field. These would need to run software which is compatible with that used on the desk-top machines.

Suitable arrangements must be made for locally available hardware and software support services.

Word processing software

The most important piece of software required is a user-friendly word processing package such as *Word* or *Wordperfect* for *Windows*. All team members should be trained in the efficient use of the software. Most packages come with an interactive tutorial to assist new users.

Database software

Some countries, e.g. The Netherlands and Australia, have found that the facilities provided by database software can be very useful for storing and retrieving the large quantities of data which will be collected and edited during the project. They can be particularly useful for relating occupational definitions and descriptions from previous national classifications and those drawn from other countries or the ILO. However, it is important to have some members of staff with the necessary skills to set up and maintain the databases.

Error! Bookmark not defined.**Project management software** Error! Bookmark not defined.

If the project is large and will employ many staff members over several years, consideration should be given to the purchase of project management software to assist with planning, monitoring and controlling the project. A number of suitable packages are available.

Error! Bookmark not defined.**Laser printers** Error! Bookmark not defined.

Given the large amount of documentation which should be produced, the team should be equipped with at least one laser printer. This facility can be exploited more fully if it is connected to a LAN, as suggested above. A good quality printer is essential for the production of forms, drafts for circulation to users for validation and the preparation of camera-ready copy for publication.**Digital scanner**

The purchase of a digital scanner and appropriate *Optical Character Recognition (OCR)* software may be cost effective if it is proposed to draw upon and update existing occupational descriptions which are not available in machine-readable form. A scanner can significantly reduce the cost of key entry of existing material.

Photocopier Error! Bookmark not defined.

Ready access to good quality photocopying facilities is essential. A combination of microcomputers, word processing software, a laser printer and a photocopier can support all the

printing needs of the project in a time and cost efficient manner.

Telephones, fax and electronic mail

The project must have *a phone* reserved for its use and all members of the project team should have easy access to a telephone,. The project should have at least *one fax machine* or ready access to a fax bureau. A number of mobile telephones will greatly facilitate communication with fieldworkers. *Electronic mail* connections through internet may facilitate communication with important national and international contacts.

9.2 Field equipment

Assuming that fieldworkers will visit job locations to observe or interview job incumbents as well as their supervisors and employers, they may need the following - depending on the data collection methodology employed and national circumstances.

Transport

Fieldwork should be conducted in as many different areas of the country as possible to ensure the data obtained reflect the situations found in all parts of the country. Transport requirements and costs vary widely between countries. Appropriate provision must be made in the project budget for the cost of air, sea and land travel as appropriate, as well as for compensation to the fieldworkers for the extra cost of spending days and nights away from home.

For local transportation it may be necessary for the fieldworkers to have access to a car with driver, depending on the quality of public transportation networks and/or distances Appropriate budget allocations also need to be made for insurance etc.

Tape recorders

A micro cassette recorder should be standard equipment for all fieldworkers. The tape system used should be compatible with dictating machines available at headquarters.

Cameras

A camera can be a very effective means of recording working conditions and operations for subsequent description and possible use in publications, CD ROM presentations etc.

Error! Bookmark not defined.**Identity cards** Error! Bookmark not defined.

All fieldworkers, preferably also other project staff, should be provided with official identity cards containing their photograph and signature. This will enable them to provide proof of identity to employers, trade unions, professional associations, etc.

9.3 Support services

It will depend on the organisation running the project as to whether support services for accounting of project funds, management of contracts, organisation of travel, personnel management, maintenance of equipment, cleaning, etc are available centrally or need to be provided within the project team. They may or may not need a specific budget allocation, e.g. as an "overheads" charge to the host organization.

Computer programmers

The project team should have ready access to hardware and software support personnel and ideally one or more members of staff should be able to provide appropriate computing support to the other members of the team, to ensure that proper back-up procedures are implemented etc. and assist with data recovery in the event of mishaps. This will normally mean good understanding of the possibilities of the operating system and better understanding of the applications software packages than what is normally necessary for standard use.

Editors

Editing drafts of occupational and group definitions and descriptions will be a large task requiring significant drafting skills and experience. Persons with the necessary skills will need to be hired as employees or consultants.

Translators

Translators will be required in many countries to translate material from other languages to the national language or vice versa. One may contact the *Bureau of Statistics of the ILO* for up-to-date information on the languages, other than English, French, Russian and Spanish, in which one can get ISCO-88 or close adaptations. It may be advisable to translate draft versions of NSCO into one of the major international languages, if advice is required from international experts. Such translations should always make use of the terminology of the relevant language version of the model, e.g. ISCO-88, as much as possible. This to avoid misunderstandings based differences in terminology which have been caused solely by re-translations to that language. Translations of the final versions of the classification into other national languages than that used when preparing the original draft may be necessary, and provision for the time taken and costs incurred should be included when planning the project.

Word processing and secretarial support

In many countries, professional staff are now proficient in preparing their own documents by using a microcomputer. However, where necessary, provision should be made for the supply of word processing and secretarial services.

Printing and binding facilities

The preparation and distribution of first, second, ... and final drafts for circulation to users will require suitable printing, collation and binding facilities in-house or supplied on a contract basis

Distribution and mailing facilities Error! Bookmark not defined.

The circulation of draft documents to users for comment will place a noticeable load on distribution and mailing facilities and budgets.

Library facilities

The project team will need access to a well-equipped library or documentation service, with a comprehensive coverage of methods for job analysis, labour statistics and social surveys. The project team should develop its own library of occupational classifications, coding indexes, job descriptions, etc. from older national classifications, from other countries and from international organisations. It is also useful to collect material on classification methodology, index design and construction, job analysis and job advertisements.

Error! Bookmark not defined.**Annex Issues in Job Analysis**Error! Bookmark not defined.

Using a comprehensive job analysis programme to support the development of an NSCO, conducted with the aid of an appropriate and well tested methodology, will give the most accurate delineation of different occupations and provide comprehensive and precise information for the definitions, descriptions and profiles. Such programmes are also very time consuming and expensive, both in terms of the initial development costs and with respect to the subsequent maintenance of the resulting elements (just as it is more expensive both to purchase and to repair a luxury car than an inexpensive one).

Only a small number of countries have found the resources to undertake comprehensive job analysis programs in the public and private sectors as part of the development of an NSCO. These countries include: the United States, Canada, Australia and Indonesia. Some other countries, e.g. the Netherlands, have undertaken more limited programmes to develop occupational descriptions for use in the national employment service or for priority areas as defined by vocational training and skill testing requirements. In addition, China and many central and eastern European countries with centrally controlled economies used the results of comprehensive job analysis programmes undertaken in state enterprises as the basis for preparing official job classifications and dictionaries. The principal purpose of the latter have been personnel administration and the determination of salaries, pensions and other work related benefits. Unfortunately, only limited information is available to outsiders on the methodologies employed, and many enterprise or industry-based job analysis programmes have been discontinued with the transition to more market oriented economies.

In the United States the *Advisory Panel for the Dictionary of Occupational Titles (APDOT)* has suggested, in its *Interim Report*, that the U.S. Department of Labor's current job analysis methodology:

- was developed at a time when the nature of work in many occupations was routinized, repetitive, and organised along hierarchical lines. Concern regarding the current job analysis methodology focuses on its adequacy in capturing occupational characteristics within increasingly dynamic work settings;and:

- is inefficient where fast, comprehensive, data collection is important...The goal is to identify, if possible, more cost-effective methods that will facilitate the collection and analysis of accurate, current, valid and reliable occupational information (APDOT, 1992: 20).

1. Making use of job analysis for human resource management

Nevertheless, in the United States and elsewhere, the DOL job analysis methodology has been very influential and many former employees of the DOL have found work in the private sector organizations adopting job analysis as a fundamental tool in human resource management. In enterprises and establishments the application of job analysis has been directed towards the production of standardised job descriptions and job specifications for use in recruitment, personnel selection and job placement; the design of training systems; career guidance; performance evaluation and appraisal; labour relations and pay determination; administration of Affirmative Action Programme; assessment of compensation for industrial accidents; job re-design; organisation re-structuring; and human resource planning. Some of these applications lead to the use of job descriptions in legal proceedings. According to Primhoff & Fine, 1988: 1.22, the greater part of job

analysis activities at the enterprise level has been oriented towards evaluating the relative worth of jobs. The use of job analysis in enterprises has led to a significant extension of the functions of job analysis and to the development of new methodologies for the preparation of job descriptions.

Some of the applications of job analysis for human resource management in enterprises go beyond what is appropriate for a set of national occupational descriptions. The degree of job differentiation required for human resource management purposes in enterprises and establishments will normally be much greater than is appropriate to meet the principal applications associated with an NSCO. Nevertheless, a significant amount of potentially useful occupational information is being produced at the industry or establishment level, and does not seem to have been systematically exploited in any of the programmes to develop a national occupational dictionary or classification.

It would seem that making use of the results from job analysis for human resource management purposes in enterprises should present both challenges and opportunities to those charged with the development of an NSCO. Among the issues to be explored are: How to capture and utilise the results of such job analyses in order to improve the quality and reduce the cost of production and maintenance of national occupational descriptions. How to combine the results of the wide variation in methodologies used; the wide variations in the type of data produced; the wide variations in quality of the results produced; the variations in levels of disaggregation; the issue of commercial secrecy; etc. These issues do not seem to have been systematically explored anywhere as no organization working to develop or revise a NSCO appears to have tried to follow this type of approach. Nevertheless the possibilities for doing so would seem to be promising and the possible availability of job analysis results should be explored when contacting establishments for the purpose of collecting information for a NSCO.

2. Selection of establishments and jobs and organization of field work

The first issue when carrying out a job analysis programme as basis for a NSCO is how to decide *which jobs* in *which establishments* should be selected for study. Ideally, one should survey similar jobs in different establishments before attempting to develop a national occupational definition or description. The relevant establishments should be geographically dispersed to ensure that a national picture is obtained; cover a range of sizes to observe any consequent differences in the degree of work specialisation; and cover establishments at the forefront of technological innovation as well as those using more traditional production methods.

The concrete choice of establishments will, however, often have to depend on a number of constraints, such as: which relevant establishments one can identify and reach; the amount of cooperation which is likely to be obtained from employers; the resources available to cover the cost of the necessary fieldwork; the presence of industrial disputes involving the possible workplaces; as well as political considerations.

In addition, a number of additional issues should be addressed:

- On what criteria and on what basis will particular establishments be selected for inclusion in data collection?
    - All those willing to cooperate?
    - Those which are easiest and cheapest to visit?
    - A selection from various parts of the country?
    - A selection in particular size categories?
    - A selection in various states of technological advancement?
    - What register(s) of establishments do we have?

- Which particular occupations will be selected in each chosen establishment?
    - All occupations identified?
    - Those which are unique to the particular industry of the establishment
- Which particular jobs will be chosen to represent each occupation?
    - All jobs belonging to the same occupation as defined by the establishment?
    - A set of jobs stratified by the age and sex of the job holder?
    - Jobs with literate incumbents?
    - Jobs with incumbents with varying years of experience?

One strategy for the selection of jobs and enterprises can be to use the structure of the old classification or the draft structure of the new classification as an organising framework. The classification structure serves to ensure that the fieldwork covers all occupations in the national economy. The next step is then to identify a suitable list of establishments where jobs in particular occupations can be surveyed. This can be done by extracting records from an existing statistical collection e.g. a population survey or census which includes questions on occupation and industry:

- identify those records with appropriate occupation titles and task descriptions;

- extract the names and addresses of appropriate employers;

- select those employers in geographically convenient locations and those who might be expected to cooperate willingly with the fieldworkers.This strategy is particularly suitable for non-manual occupations which tend to geographically dispersed and where there is consequently a wide choice of establishments in which fieldwork can be undertaken.

A list of occupation titles extracted form a recent population census or survey can be used as a starting point for identifying new occupations that may have originated since the previous classification was designed. New occupations can also be identified from a list of queries arising in the course of coding operations with well organized query resolution procedures. Alternatively, a sample of all occupational responses given to a recent survey, found in vacancy advertisements and/or registered at employment offices can be extracted and analysed.

In particular for occupations which tend to be industry specific an alternative strategy may be to use the business register to select establishments by industry, geographic location and size, and then to undertake a complete survey of all jobs found there. (This strategy will not identify jobs in the informal sector or those in establishments not included in the register.)

During the processing of the responses, it will be necessary to identify similar jobs found in different establishments, to be able to define *occupations* and prepare *occupational* descriptions. This will be made difficult by the use of different terminologies in different industries and in different establishments, which will mean that similar jobs in different industries may not be recognised as belonging to the same occupation. Conversely, jobs with a very different task content may be seen as similar because they were observed in the same establishment. Similarly, geographical proximity (or distance) can be confused with similarity (or differences) in task content. There are examples that such confusion has led some to argue that brain surgeons and ward orderlies do the same kind of work because they both work in a hospital.

In countries which do not possess an existing occupational classification that is suitable for updating and/or do not have sample occupational data and statistics available from existing collections and/or do not have a well-developed and maintained business register, it might be feasible to organise the fieldwork on the basis of area sampling. The fieldwork could be conducted by using a geographic sampling frame to find and identify a range of establishments and hence a range of occupations.

3. Measurement issues

(Primoff & Fine: 1988: 1.27) gives the following list of methodological questions which are useful in comparing alternative approaches to job analysis:

- How shall the information be collected?
  - Watching the worker at work
  - Survey checklist completed by incumbents
  - Job analyst himself or herself completing a survey checklist
  - Interviewing workers singly or in groups
  - Description of incidents and happenings by workers and supervisors.
- What shall be the information collection instrument?
  - Job analysis protocols - open-ended items
  - Structured interview
  - Checklist items
  - Task inventory
  - Self reports
- What shall the observer focus on?
  - Behaviours, results, objectives
  - Psychological dimensions, aptitudes, interests
  - Physical demands
  - Working conditions
  - Qualifications: knowledge, skills, abilities (KSAs)
  - Job content, work content
- How shall linkages be established between what workers do and KSAs?
  - Correlations, insight?
  - Empirical try out, language?
- How shall the validity of data be established?
  - Sampling and statistical analysis?
  - Consensus of subject matter experts?
- What controls shall be imposed on the language of descriptions?

The answers to many of these questions will obviously be determined by the purpose for which the information is being collected, namely, the development of a national set of occupational descriptions and profiles.

In choosing an appropriate job analysis methodology for this purpose, all the following factors should be carefully considered:

- Does the methodology result in the identification of a complete set of tasks involved in the performance of individual jobs?

- Is the focus of the methodology on the production of **job** characteristics or on **worker** traits?

- Does the methodology result in the production of all the data items judged necessary for inclusion in the occupation descriptions and profiles?

- Is the methodology suitable for use in analysing jobs in all segments of the economy? If not, is it easy to modify the methodology to suit jobs in different segments?

- Must the methodology be applied by well-trained and experienced specialists?

- Will the methodology give consistent, reliable and valid descriptions when many different researchers are involved in its use?

- Is the methodology similar to those which are already widely employed within the country for human resource management in enterprises?

- Is the cost of applying the methodology within the limits budgeted for the project?

- Is it necessary to pay licence fees for the use of the particular methodology?

The cheapest methodologies to apply will be those that can be implemented in a standardised way on a large scale without the need for highly trained experts to ensure their correct use. This conclusion tends to suggest that the most cost-effective methodology is one that uses:

- structured questionnaires designed for completion by job incumbents and their supervisors;

- questionnaires which are precoded for computer analysis;

- automated or computer assisted systems which can produce occupational descriptions and profiles from the precoded questionnaires.

A number of such systems have been developed, but their cost effectiveness will need to be evaluated by reviewing the quality of the output, and making certain that all necessary licence and/or processing fees are included as part of the costs. One should also remember that the methodologies implicitly assume that most job incumbents are literate and are willing as well as capable of completing the relevant questionnaire.

It is important to remember that the purpose of job analysis in the present context is to develop occupational definitions, descriptions and profiles for the national standard classification of occupations: the purpose is not to produce job analyses of particular jobs in particular establishments. If resources permit, the results of all job analyses for each and every job studied should be entered onto computer files. However, the preparation of *occupational* definitions and descriptions, as opposed to *job* descriptions, will require abstracting and make a synthesis of what is common among all jobs deemed to belong to a particular occupation. This is the type of task which humans still do much more effectively than even the most sophisticated computer programme. To produce an occupational definition and description suitable for an NDO/NSCO by just copying the text from a single job analysis questionnaire, will usually not be possible.

A sample job analysis questionnaire is attached.

Error! Bookmark not defined.**4. Organisation of data collection**Error! Bookmark not defined.

The data collection phase will be one of the most expensive and time-consuming elements of the project. It is therefore important that it be carefully planned and well managed and the output should be subjected to ongoing quality control. The filing system(s) (both paper-based and disk-based) for storing the output of the fieldwork should be designed in advance of the commencement of work and careful attention should be paid to the progressive filing of all documentation produced. If an existing classification has been adopted as a model, the structure of that classification can be used as an organising framework. If a draft structure for the new classification has already been produced, this draft is probably the most convenient and suitable organising framework for the filing system(s). Even if a ? zero based', approach is being taken to the development of the structure, it is

still appropriate to use an existing classification as an organising framework for filing and project management, to ensure complete coverage of the sections of the world of work included in this exercise.

The work organisation of collecting of job analysis information will depend very much on the size of the project team and factors such as the size, topography and infrastructure of the country; language patterns; the geographic distribution of establishments in different industries; and the organisational structure of the participating agencies.

Error! Bookmark not defined.**4.1 Location of fieldworkers**Error! Bookmark not defined.

One of the basic organisational questions is whether to locate all fieldworkers in one central location and accept a large travel budget or to place them in regional offices close to the establishments they will survey and accept difficulties in liaison and large communication costs.

This is not a problem for which general advice can be given. The solution must be decided on the basis of local circumstance. Countries with a relatively small geographic area and/or with good road, rail, sea, air and telecommunications networks can take advantage of the fact that a central location facilitates close communication between all team members and between them and the project manager and experts.

4.2 Organisation of fieldwork

When allocating fieldwork, the project manager should consider the particular fieldworker's previous career experience so that the project may draw on his or her existing knowledge and contacts. Fieldwork should be allocated in parcels of occupations to allow the fieldworker some flexibility in making contacts and scheduling appointments and so that his or her time can be fully utilised. Ideally, closely related occupations in terms of (expected) task content should be surveyed by the same fieldworker so that the problem of delineating and defining the different occupations can be carefully addressed.

When selected occupations are known to be concentrated in particular geographic regions of the country, the fieldwork manager will need to consider the regional location of the fieldworkers before allocating particular groups of occupations to particular fieldworkers. In these situations, travel costs may make it necessary to allocate fieldwork on the basis of industrial establishments and include at the same visit occupations which are classified in different sub-major or even major groups.

4.3 Supervision of field work operations

The difficulty of supervising the fieldwork operation depends very much on whether or not fieldworkers operate from one central location or whether they are dispersed geographically, e.g. to regional offices or administrations.

The conduct of fieldwork by using staff members based in different locations over extended periods of time is a very difficult operation to supervise. In regional offices project staff may be placed under the day to day supervision of a more senior regional officer. The problem then is (i) to ensure that the supervising officer will be sufficiently conversant with the project, and (ii) that the responsibility for supervision will need to be shared with the project management at headquarters. Regional office supervisors can also be tempted to divert project team resources (staff and travel

budgets) to meet other local priorities.

Whenever possible, clear lines of supervisory responsibility should be established and maintained. Local supervision should be limited to ensuring regular attendance and effective work habits; arranging field trips; monitoring the use of vehicles and office equipment, etc. Headquarters should be responsible for monitoring progress, reviewing and controlling the quality of the work, and providing all necessary technical feedback. This process will be facilitated if fieldworkers are required to submit weekly or fortnightly reports on progress and if they receive prompt and constructive feedback on their work from the central office.

The task of supervising the fieldwork operation can be facilitated by the use of an appropriate set of work management forms and records. The design of these will be very dependent on the methodology chosen, and their number depends on the scale of the fieldwork exercise.

If the scope of the fieldwork phase is limited to new occupations and a selected set of existing occupations known to have been subject to significant change as a result of changing technology, then the fieldwork can probably be conducted by a small team based at headquarters. In this situation, only the results of the job analysis will need to be registered. If, however, the scope of the fieldwork includes conducting occupational analyses for all occupations in the national economy, then a large range of records and corresponding registration forms will be required to manage the conduct and record the results of the work.

In the following we will assume that it is planned to conduct job analyses by visiting and interviewing job incumbents on-site in a range of establishments. The registrations required to manage the conduct and record the results of such a project will include the following:

- **Allocation of field work** will record the allocation of fieldwork segments to particular fieldworkers and, if relevant, to validation officers, and will record the commencement and completion of all stages of the fieldwork.

- **Field work reports** will record all sources of information and all contacts made by the fieldworker(s) for each occupation; all contacts who made contributions; the addresses of establishments where occupational analyses were conducted; and details of supplementary contacts after draft occupation definitions, descriptions and profiles have been prepared. It should also list details of all problems encountered and significant issues discussed.

- **Job analysis results** will be used to report the results of job analysis for each job studied.

- **Job profiles** will be used to record the results of the collection, derivation and coding of occupational profile data, if this type of activity is included in the project. Reference should also be given to documents defining the variables to be measured, the categories to be used, and the coding or derivation rules for each variable.

- **Fieldwork reviews** will provide a record of the fieldwork review phase which should be conducted by headquarters. The procedure for reviewing and assembling draft occupational definitions and descriptions into integrated drafts covering major segments of the classification.

- **Validations** will provide a record of the validation process for each major segment of the classification. It will record all contacts consulted; all replies received; and all comments which were actioned.

Filed together with the above registrations should be documents which define the activity to be undertaken; list all major steps to be followed and identify any equipment required.

Error! Bookmark not defined.4.4 Communication and liaison

The conduct of fieldwork by many staff in different locations over extended periods of time creates major communication and liaison difficulties. It is important that regular telephone contact be maintained between fieldworkers and staff at headquarters if possible, as well as between fieldworkers and their counterparts in other locations. Only in this way can fieldworkers benefit from the experience of their counterparts and problems which arise in the field be resolved in a consistent manner. Good and frequent communication also helps to maintain the morale of fieldworkers who may come to feel rather isolated and discouraged in remote locations. Other forms of communication, such as a weekly or monthly project newsletter, should also be considered.

4.5 Workshops

The conduct of periodic workshops for on-the-job training and the presentation of work-in-progress is a very effective means of improving communication between all members of the project team. Such workshops can build morale and serve to ensure that all members of the team share common understandings of concepts, definitions, methodologies etc. Their importance is greater if fieldworkers are based in regional offices rather than in one central location.

In Australia, during the development of descriptions for ASCO, the project's fieldworkers were based in five regional locations for several years. Every six months, workshops of one week duration were held in the central office and attended by all members of the project team. Central office personnel presented papers discussing conceptual and methodological issues as well as alternative proposals for the classification structure; fieldworkers presented papers describing their work in progress on particular segments of the classification. The forward work programme was reviewed, and revised when necessary. The workshops proved very effective in refining methodology, standardising procedures, maintaining morale, and coordinating geographically dispersed activities.

References

Fine, S. A. & Wiley, W. W. (1971): *An Introduction to Functional Job Analysis*.Kalamazoo, Michigan, W. E. Upjohn Institute for Employment Research.

Fine, S. A. (1988) "Functional Job Analysis", in Gael, S., ed. (1988).Gael, S. (1988): "Job Descriptions", in Gael, S. ed.(1988)

Gael, S. ed, (1988): *The Job Analysis Handbook for Business, Industry andGovernment*, John Wiley & Sons, New York. ISBN 0-471-63173-6 and 0-471-63172-8.

Ghorpade, J. (1987): *Job Analysis: A Handbook for the Human Resource Director*. Prentice Hall, Englewood Cliffs, New Jersey 07632. ISBN 0-13-510256-1 01.

Miller, A.R. et al (1980): *Work, Jobs and Occupations A critical review of the Dictionary of Occupational Titles*, National Academy Press, Washington, D.C.

Primoff, E. S. & Fine, S. A. (1988): "A History of Job Analysis", in Gael, S. ed. (1988).

Stone, C. H. & Yoder, D. (1970) *Job Analysis*, Long Beach: Bureau of BusinessServices and Research, California State University.

US Department of Labor (1991) *Handbook for Analysing Jobs*, US Government PrintingOffice, Washington, D.C.

US Department of Labor (1992) *Interim Report of the Advisory Panel for the Dictionaryof Occupational Titles*, Washington, D.C.

US Department of Labor (1993): *A New DOT: A Database of Occupational Titles for theTwenty-First century*: Report of the Advisory Panel for the Dictionary of Occupational Titles, Washington, D.C.