



MAPPING THE WORLD OF WORK:

An International Review of the Work with Occupational Classifications and Dictionaries¹

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INTRODUCTION

1. This paper will present an overview of the work undertaken to develop, use and maintain national occupational classifications and dictionaries and the role of and corresponding work with the *International Standard Classification of Occupations (ISCO-88)* and its regional variants. As used in this paper the term 'Occupational Classification and Dictionary' (OCD) can be taken to mean a classification system for jobs, and the persons who hold those jobs, with associated group definitions and descriptions. The term 'National Occupational Classification and Dictionary' (NOCD) means an OCD which has been developed and is being used by a national (state) organisation, normally the National Statistical Office or the National Employment Service, and which is seen as the responsibility of this organisation and carries its authority. (This does not necessarily mean that it is the only national standard classification of occupations and that it is used by every user of such classifications.) The 'classification' element of an OCD consists of the specified groups, the definitions of the groups and their differences, as well as the rules and the coding index used to assign jobs and persons to the groups. The 'dictionary' element of an OCD consists of the group titles, the descriptive definitions and the non-defining parts of the group descriptions. These different elements may be more or less developed, and more or less coordinated between themselves, e.g. descriptions may be formulated to be valid for sets of groups which do not coincide completely with those defined by the classification structure.

2. NOCDs have many similarities to geographic maps of a country: As with geographic maps, different users of the maps of the world of work (the OCDs) will ask for very different types of information (*content*) scaled to very different degrees of detail (*resolution*). Geographic maps range from small-scale outlines printed in a newspaper to indicate the location of the latest natural disaster, indicating only coasts and borders and a few major cities, to large-scale location maps for a city's water and electricity supply systems. Maps of the world of work also range from consisting of a few broad occupational categories, used to organise information on the number of persons in a country who are doing different types of jobs, to detailed descriptions of tasks and duties of all the jobs in an enterprise, serving as basis for the fixing of remuneration and the organisation of work. The scope (*coverage*) of both types of maps will also vary according to usage: Some basic topographical maps will be developed to cover the whole territory of the country and are intended to serve a wide variety of users, both as a source

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of information and as instruments for organising in space other types of information. In the same way some OCDs will, as maps of the world of work, aim to cover all jobs in the economy and for many users provide a background variable, an instrument, for locating information - about e.g. income, working conditions, reading habits, divorce rates, training - in the world of work. Other maps, topographic or of the world of work, will be prepared only for those areas where the type of information they carry is relevant, and at a time when there is a specific need important enough for the user to be willing to cover the costs of data collection and map construction. Just as the common denominator of geographic maps is the spatial referencing of information, the common denominator of OCDs is that they are focussed on the type of tasks and duties that persons do in their jobs. However, given this common denominator, the degree of resolution, the type and depth of thematic information, and the coverage will vary between different maps of the world of work, hopefully corresponding to the needs of the different main users.

3. In this paper reference will be made to two different, although partly overlapping, distinctions. Both are relevant to any discussion of the development, use and maintenance of OCDs: One concerns the distinction between (a) statistical and (b) client-oriented usage of an OCD. The other refers to the distinction between (i) a sorting function and (ii) a database function for occupation related information. The latter distinction corresponds closely to the difference between the classification and the dictionary functions of an OCD. All statistical applications make use of the sorting function of the OCD, and they may also make use of the database function to determine where to sort particular jobs. Client-oriented users, concerned with making decisions affecting individuals and/or giving them advice, will be the primary users of the database function, but will also make use of the sorting function, e.g. to match job-seekers and vacancies, to decide 'yes' or 'no' if this depends on whether the client has (had) a job which belongs to a particular group of occupations, and to provide basis for statistics on the operations of employment services.

4. To structure the presentation and discussion, this paper will use the following 'model' for the work to develop, use and maintain/update an OCD: (This does not imply that this is the way the work should or could be organised in practice.)

- (a) First analyse how the OCDs are (to be) used and the users' requirements, to arrive at conclusions concerning (i) who will benefit/suffer from the existence or not of an (up-to-date) OCD, and in what way and to what degree; (ii) the amount of resources which can be devoted to work on the OCD, both for the initial development and for follow-up work; (iii) the division of labour between the interested and competent parties; (iv) the content of the information to be collected for the OCD; and (v) the structure of the OCD;
- (b) Collect the relevant information, using appropriate methods to ensure the wanted coverage, resolution and type and depth of information;
- (c) Organise the collected information in ways which will facilitate the development of the OCD as a tool for sorting and as a database for information on occupations, as well as making possible easy maintenance and updating;
- (d) Develop the tools needed for using the OCD effectively, such as rules, guidelines and coding indexes;
- (e) Develop and put in place procedures to ensure maintenance and updating of the OCD;
- (f) Specify procedures for evaluation of the contents and structure of the OCD with a view to initiate revision if that is deemed necessary.

NATIONAL OCCUPATIONAL CLASSIFICATIONS AND DICTIONARIES: AN OVERVIEW

5. Most countries have carried out some form of occupational mapping of their workforce, even if only at a very aggregate level and only with instruments neither designed for nor adapted to their specific circumstances. All the 115 countries, areas and territories for which information was available at the ILO did use some type of occupational classification in the population census undertaken in the 1989-94 period, see *ILO (1996)*. Thus one can estimate that around 130 countries, areas and territories have an NOCD, in this sense. In the majority of censuses the classification scheme used was that of the *International Standard Classification of Occupations (ISCO)* or a minor national adaptation of ISCO. Most of these countries used ISCO-68 or ISCO-88 as the basis for their coding of occupations, but some did use an adaptation of the first ISCO (ISCO-58) or of an independently developed national occupational classification (NOC). Some countries in Latin America used COTA, a regional adaptation of ISCO prepared by the *Inter-American Statistical Institute* for the 1960 and 1970 rounds of population censuses. For a significant number of countries the use of ISCO for coding was based on the recommendation by the *United Nations* that occupation shall be coded to the groups defined by the latest edition of ISCO, or which are consistent with these groups, see *United Nations (1980) and (1998)*. The wide-spread use of ISCO cannot in all cases be said to have been based on careful evaluation of whether this classification would be the most appropriate. However, the choice may very well have been cost effective, given the limited resources available at the national level for the task of developing a NOCD.

6. The one common feature of the census classifications is that they cover the total, employed population of the respective countries, and in this sense can be said to provide a base-map for their world of work. The degree of resolution ranged from 7 groups to 1,700. In most countries with a NOCD the resolution used in census coding is to a smaller number of, i.e. to broader, groups than those which exist at the most detailed level. However, the total number of different occupations separately defined at the most detailed level is below 2,500 in most NOCDs. Typically the maximum number of groups in a NOCD is between 800 and 1,200, and, judged by the number of jobs going into the different groups, the degree of resolution is very uneven between the different parts of the NOCD, partly reflecting very different degrees of specialisation between the jobs found in different parts of the economy.

7. Many of the census classifications have no further information about the type of work performed by the jobs classified to the different groups than what is summarised in the titles of the groups, i.e. there is hardly any dictionary element present. In a number of NOCDs which have group definitions, these contain only the basic information needed to distinguish groups from each other, i.e. short references to what is needed to carry out the tasks and duties of the jobs, such as subject matter knowledge required, materials worked with, products or services produced, or machines or equipment operated, as the case might be.

8. Based on the material available in the ILO we can estimate that in around 50 countries NOCDs have been developed to serve client-oriented users of NOCDs, both for 'sorting' and for 'information about occupations'. In many of the countries these NOCDs are the same as, or close variants of, those used by the statistical authorities. However, reflecting the diversity of users' interests in some countries, NOCDs which are quite different from those used for labour force statistics have also been developed and are being used in client-oriented applications. They may differ from the statistics classifications in terms of the principles used for delineating groups, the degree of coverage and resolution, as well as in the type and depth of the information included in the descriptions. Many of these 'alternative' NOCDs have some claim to be seen as a NOCD, at least for their area of concern. In some countries the decisions to develop separate NOCDs for different applications have been based on a deliberate choice, e.g. in France, while in others the development and use of different NOCDs by different organisations seems to be mostly due to lack of communication or as a consequence of historical circumstances. With the limited resources available for this type of work in most authorities, it has often been seen as less costly, and certainly quicker, for them to develop something adequate for their own use without having the trouble of co-ordinating with others. Classifications developed for the coding in statistical surveys have typically given higher priority to coverage and perceived data collection feasibility than those developed by e.g.

vocational training authorities, and have been much less concerned with the resolution in certain areas or the type and depth of descriptions.

METHODS FOR AND RESULTS FROM CONSULTATION WITH USERS OF NOCDs

Methods for communicating with users

9. In all countries where an effort has been made to develop OCDs which should serve several and different user requirements, the responsibility for this work has been given to (or taken by) an organisation with a specific, strong user interest, e.g. the National Statistical Office or the Employment Services. However, a tool-maker cannot know equally well all the applications which are to be made of the tools, and most users will not know how to obtain the improvements they would like to see. Therefore formally organised bodies (steering groups, users' workshops, consultative committees), users' surveys and informal contacts have often been used to explore the requirements of other users. These channels of communication are useful and necessary also to mobilise resources and support from other organisations for the work to be done, to create necessary external pressure to honour commitments made to achieve progress, and to get guidance on proposals for both broad strategies and detailed solutions. The experience of different countries and of the ILO's own work strongly indicates that:

- (a) most users will express more useful and reflected opinions on the OCDs as reactions to a proposal or examples, rather than spontaneously;
- (b) concrete examples of the implications of alternative proposals will result in more clear advice from the different users than general requests for advice on the current situation or on general principles - cf. the Australian survey of users' preference for three alternative classification structures when developing the *Australian Standard Classification of Occupations (ASCO), First Edition*;
- (c) while it may be fairly easy to identify both general and specific deficiencies in existing tools, it is in practice impossible to quantify the damage or loss to users, or their clients, of such deficiencies and therefore also impossible on this basis to specify the 'correct' amount of resources to invest in the development or improvement of the OCDs.

Main user requirements

10. In one or more of the countries surveyed for this paper the following areas have been identified as finding OCDs to be important tools:

- statistics
- job placements
- vocational guidance
- planning and design of vocational training and skill certification programmes
- immigration control
- monitoring occupational safety and health
- pay and human resource management systems

The user requirements of these areas are reviewed briefly in the following sections.

Statistics

11. The statistical use of OCDs is to sort and present information according to the groups specified by the classification. The degree of resolution and the specific distinctions to be made will depend on the source and quality of the primary data, the needs of the main users of the particular set of statistics and the perceived costs to the statistical agency in terms of work-hours and errors. Information about the type of work (tasks, working conditions, etc.) of the jobs to be classified to the different occupational groups is needed only to help the coding where the coding index is not adequate, for the updating and maintenance of this index and the classification and/or to satisfy requests for regrouping of the basic categories according to criteria which are not used in the standard aggregation structure. As a consequence the definitions in statistical classifications tend to be short and to focus on group differences.

12. The required coverage of the classification depends on the population to which the relevant statistics apply. The general statistical classifications are designed to cover all jobs in the economy, i.e. the whole employed population, but the classifications used for special statistical areas, e.g. various wage statistics in Sweden, will only cover those groups which are relevant for e.g. the manufacturing sector.

13. It is a common perception that statistics need mainly the aggregate parts of an OCD classification structure. However, a number of statistics-users want answers to questions like "What is the number of dental assistants, plumbers, turners, farm labourers, secondary school science teachers or bus drivers in area A, and what are their average salaries?" In addition to statistics about specific occupational groups, other users want to know the distribution of income, consumption, reading habits etc. over a limited number of broad groups defined with the help of the statistical variable 'occupation'. In the latter case 'occupation' serves as a background variable in the description or analysis. The logical and practical consequence of the need for statistics on detailed groups as well as for (shifting) aggregate groups is that coding should be carried out to the greatest detail supported by the information used as the basis for coding, i.e. in the statistical survey or the administrative records.

Job placements

14. The job placement agencies' use of the OCD is mainly for the sorting of job-seekers and vacancies, to (i) facilitate the matching process (which normally will involve also other characteristics of both the job and the job-seeker); (ii) produce relevant statistics on job-seekers, registered unemployment, vacancies and placements; and (iii) organise the work in the employment office. The sorting and matching process try to reduce as much as possible the number of unsuitable jobs and candidates that the job-seeker and employer respectively will have to consider, while at the same time try not to eliminate possible opportunities or candidates. The first of these considerations would lead to very fine resolution in the sorting, while the other would indicate that sorting to broader and more general groups may be more appropriate, in particular for job-seekers who are looking for 'any job possible'. These considerations should lead to initial sorting (i.e. coding) to detailed groups combined with algorithms for matching which can take into account clusters of 'similar' occupational groups, where 'similar' is defined in terms of ease of transfer of skills between occupations. (The German system for vocational guidance as well as the French 'ROME' system and the Swedish 'WAP 2000' system have developed a conceptual and visual basis for this.)

15. A matching process which as far as type of work is concerned relies heavily upon the use of correct occupational codes, will in principle not need further information about the occupations than what is needed for correct coding, i.e. it will need to use the same information as is needed for statistical coding (sorting). For this reason the employment officers often have as their main tool a summary version of the OCD used by their services, even though the communication process with both employers and job-seekers can be improved if the employment officers have easy access to information about the type of work (tasks and duties), skill requirements and typical working conditions of occupations, both to establish the particulars of the job/experience in question and to perform the vocational guidance function where this is combined with that of placement. Present practices do reflect, however, the need to use both job- and person-specific information in the matching process and that many of the OCDs used are inadequately updated and maintained. The last point will be discussed further below.

16. It is worth noting in this context that the Dutch Central Bureau for Labour Exchange (CBA) has developed a system (FIT) for matching vacant jobs and job seekers which focus on the contents (tasks and duties) of the jobs, rather than on occupations. A hierarchy of 120 clusters of around 2000 tasks are specified in FIT, to be related to both the vacant jobs in question and the experience and training of the job-seeking individuals. In principle this should provide for greater flexibility in the matching process than the use occupational categories as the basis for sorting.

17. The coverage of the OCDs used for placement is very often 'truncated' because the employment services normally serve mostly the lower and medium skill level jobs in the labour market. Thus the French 'ROME' has a rudimentary coverage of occupations which require technical and higher education, and in the Swedish employment services these job categories are handled by special officers and routines.

Vocational guidance

18. The term 'vocational guidance' is used here to cover all systematic efforts to inform and advise persons about job and career prospects, given their current situation, skills, interests, knowledge and mental and physical capacities. Included is also guidance with respect to choice of secondary and further education in the light of career opportunities, as well as choice of short vocational training courses, apprenticeships, rehabilitation training opportunities (if needed), and current job opportunities. More types and depth of information is required from the OCDs for such use than for statistics or job placement. Important is information about tasks and duties, materials and machinery worked with, products and services produced, typical working conditions, mental and physical skill requirements, career opportunities and job prospects in the short and medium term, income range and 'typical personality profiles' suited for the jobs, in addition to information about training opportunities and ways to gain relevant experience.

19. In principle no particular sorting of the descriptions contained in the 'dictionary' part of the OCD or in separate guidance material would be better than others, if good indexes reflect the different types of information provided in the descriptions and there is a good system of cross-references between descriptions. Printed descriptions could well be sorted alphabetically by group title, and examples of alphabetically organised occupational dictionaries or guidance material can be found. However, in practice descriptions in general OCDs are almost invariably presented according to the classification structure, while printed guidance material is frequently sorted into broad 'activity areas' reflecting types of products or services produced. The number of different 'articles' in such guidance material will tend to be much smaller than the number of occupational groups in the OCDs, especially as its coverage frequently is limited to those occupational groups which are deemed to require a non-trivial amount of formal training beyond compulsory schooling, or to cover only those occupations for which training is well organised. Sometimes the clusters of occupations described in the guidance publications are formed on the basis of the type of training needed or typically followed to enter the occupations, or whether the occupations are commonly seen as steps in one or more career paths. This means that the degree of resolution, judged by the number of different occupations identified in a cluster or by the number of persons working in the type of jobs covered by the group, will vary by several orders of magnitude. Numerically small occupations with well developed training schemes or career paths will tend to be much better described than numerically larger and more "open" occupations. This also reflects differences in the ease of collecting the relevant information.

Planning and design of vocational training programmes

20. Analysis of statistical information about the number of employed and unemployed persons in relevant occupational categories and of whether there is an increase or decrease in these groups, is used as background to decisions about the capacity of training programmes which are linked to the specific occupational categories (e.g. Australia). The occupation descriptions which can be found in certain of the OCDs are also consulted in the design of some training courses, but such courses are mostly developed through direct contacts between the respective training institutions and representative, sometimes tripartite, local, regional or national bodies. In the Netherlands this type of use seem to have influenced an OCD directly or to have led to the development of a special OCD, i.e. the OBIS system. In Germany there is a

close relationship between many of the occupational descriptions, and the process for developing them, and the design and implementation of vocational training programmes. This is particularly so for those occupations ("Ausbildungsberufe") for which there exists a legally based vocational training programme involving both employers and the schooling system. Another example may be the work on 'units of competence' of the 'National Vocational Qualification' system in the United Kingdom by the 'National Council for Vocational Qualifications'. This system is intended to influence both the extent and content of vocational training in that country.

Migration control

21. For the production of relevant statistics, Australia has introduced relatively detailed occupational coding of all visa applications, as well as for the coding of passenger cards collected for overseas arrivals and departures. A NOCD code (i.e. an ASCO code) is also given to all immigration applications and will provide part of the basis for assessing the skill level, an element in the points system used to determine whether permission to immigrate will be granted. Previously the Australian immigration authorities used its own OCD which gave special emphasis to 'priority' occupations and lumped the rest into one or a few groups. Systems similar to this are used also by immigration authorities in other countries, or by authorities charged with the administration or monitoring of citizens working abroad.

Monitoring occupational safety and health

22. The registration of occupation on death certificates and of type of work on reports of occupational accidents, injuries and illnesses have long represented important examples of 'sorting' to provide a basis for epidemiological studies on work-related elevated incidence of specific causes of deaths, accidents or illnesses, e.g. specific types of cancers (e.g. Sweden, Australia and the United Kingdom), or for general studies of social differences in mortality and morbidity. (For the former studies the cross-classification with 'industry' of certain very detailed occupational groups will sometimes be needed to be able to isolate high-risk groups.) For these types of studies there are also significant advantages to common international classifications, as they will represent a possibility to pool data from several countries for small, possibly high-risk, groups of the population. In cases where it has been possible to observe significant occupational patterns of mortality or morbidity, warranting further investigations about possible causes, the occupational descriptions found in the OCDs will normally not give information which is detailed enough to identify possible risk factors. 'Better' descriptions from this perspective, as well as possibilities for re-grouping detailed occupations according to known risks factors, are considered to be important ways to improve the OCDs presently used.

Pay and human resource management systems

23. Enterprise- and organisation-specific systems for job classification and evaluation (JCE systems) are related to the OCDs reviewed in this paper, but outside the scope of the review. However, there are some examples of overlapping between JCEs and OCDs. For example, in some countries one can find systems of collective pay determination which have resulted in the use of industry- and country-wide wage and salary systems. These collective agreement systems seem characterised by tailor-made distinctions between relevant groups. These groups are typically "described" mainly by their titles, which are well understood by the social partners who have negotiated the agreements and who together monitor their implementation at the workplace, where they are supplemented by agreed ranking-systems used for determination of the actual pay. These collective agreement systems are normally not linked to the NOCDs. (A Swedish project in the 1970s to develop a NOCD which also could be used in the collective agreements had to be abandoned as the social partners could not reach agreement on its structure and degree of detail.)

24. Another example of overlap between JCEs and the NOCD has been reported from Australia, where large corporations have used ASCO to analyse the staffing structures of enterprises with different JCE systems. Private management consultants have also used ASCO as a tool in their work. From Australia it has also been reported that as strong patterns of

occupational segregation has been identified as one of the major structural impediments to equal pay and opportunity for women and men in the labour market, the Australian Affirmative Action Agency has recommended the use of ASCO in the compulsory reporting of progress in the implementation of affirmative action programmes. So far, consideration of the private sector's use of ASCO does not seem to have had any independent influence on its structure and content.

Summary statement about what users want to know

25. Any review of users' demand concerning NOCDs will specify that information about 'occupations' is needed on a range of topics, the most important of which are:

- tasks and duties of the jobs;
- materials and machinery worked with;
- products and services produced;
- typical, as well as extreme, working conditions and work situations;
- mental and physical skill requirements;
- career opportunities and job prospects;
- range of income gained;
- 'typical personality profiles' suited for the jobs;
- training opportunities and ways to gain relevant experience.

This information is both of interest in itself, in particular for vocational guidance and choice, and because it provides the basis for constructing relevant sorting tools (i.e. classifications) to be used to search for information of interest; to match job qualifications, experience and desires of persons to job openings, training and immigration opportunities; and to describe and analyse the situation and condition of occupationally defined groups of persons in terms of their present or past work experience.

26. Not many users seem concerned about the conceptual basis for the OCDs they use, and OCD-publications are generally rather vague in their presentation of this basis. However, the following description seems to cover the main practice and most users' requirements:

The primary units described and sorted by an OCD are the 'occupations'. An 'occupation' is defined as a set of 'jobs' with the same main tasks and duties, where a 'job' is a set of tasks and duties (designed to be) performed by one person. Persons are classified through their link with a job - past, present or future.

Different users tend to have different and sometimes conflicting views both about how finely the distinctions between different 'occupations' should be drawn, and about what should constitute 'similar occupations', i.e. what the main sorting tools should be. This issue is discussed further in the section below on the classification systems of the NOCDs. Most users do not have very precise ideas about the form which they would like for the occupational descriptions.

27. In some countries researchers have developed interesting examples of formal typologies (coding schemes) used to describe various aspects of the occupational groups. Examples can be found in Australia, Canada, Germany, the Netherlands and the United States. These typologies have been developed mainly to satisfy needs of vocational guidance and rehabilitation, but they have been used also for empirical studies of the functioning of the labour market and its impact on e.g. income distribution, as well for studies of occupational differences in mortality and morbidity.

WORKING WITH THE NOCD

Dividing the NOCD work between different organisations

28. Some conclusions have emerged concerning the organisation of NOCD work and the division of labour between the interested organisations, taking into account that it is difficult to find a country where there is one organisation which sees this work as its core task (in contrast to geographic mapping which in most countries is the responsibility of a national mapping agency). Most countries seem to have a more or less formalised split of responsibilities for the NOCD between institutions or departments. The responsibility for the development of the main classification structure(s) has typically been 'given' (often by default) to the national statistical organisation for which the sorting function is a major interest, while the responsibility for the informational content of the dictionary (i.e. the data-base function) rests with organisations with both a direct interest in the information as such and a network of collaborators and contacts through which the information can be collected. The main 'dictionary organisation' will often be (associated with) the national employment service, in particular if vocational guidance is seen as an important part of its duties. Problems of co-ordination do result from this split in responsibilities, in particular related to agreements on co-ordination of budgets and initiatives and on a reasonable overlap of tasks, but one advantage is that each organisation has an operational interest in the results of its own work. Another advantage is that the split in responsibilities may serve to ensure that some work will continue even if one of the partners fails to follow up its part of the job for a period. The split may also provide some pressure for neglected work to start again.

29. It is also important to recognise that success in the work with the OCDs requires both top management support for the work and that the managerial and operational responsibility is given to strongly committed and competent persons who are willing and able to overcome institutional indifference as well as the technical challenges involved.

Collecting occupational information

30. A large number of different methods have been developed for collecting information for job descriptions and performing job analysis for individual organisations and enterprises, see e.g. *Gael (1988)*. However, there is very little documentation (outside the U.S. and Germany) about how information has actually been collected for NOCDs. The methods and results from enterprise-level job analysis work seem to have had only indirect influence, at best. To a large extent this must be a consequence of the differences in the scale of the task of developing descriptions valid for up to a few thousand jobs in one organisation on the one side and for several million jobs in a country on the other. The lack of documentation about methods used to develop NOCDs is probably also related to the costs of performing 'satisfactory' job analysis. These costs may be acceptable when performed on a relatively small scale and with quite tangible benefits in terms of improved personnel management and improved control with wage and salary costs, but they are quite unacceptable on a national scale with much more diffuse benefits, even if satisfactory sampling and generalisation procedures existed. French experts had planned to carry out 30,000 interviews over a four year period for their major occupational dictionary the *Répertoire française des emplois (RFE)*, but they only managed to execute 10,000 over six years, using something like 90 work-years. The Australians used about 40 work-years of staff resources over a three-year period for their *ASCO Working Draft* which was published 1983 and which has provided, with some updating, the basic information for the subsequent Australian work with ASCO. No resource estimates have been reported from other countries, but in particular the work in Germany does clearly involve a large network of persons both in the public and the private sector, mostly consulted as specialists in a more or less systematic manner.

31. The most common approach to the development of occupational descriptions is exemplified by the Australian one. The Australians started from the descriptions found in the Canadian *Classification and Dictionary of Occupations (CCDO)*, and carried out interviews with sector experts, management and

work organisation consultants, managers, supervisors and workers themselves to establish (a) whether the described occupations existed in Australia; (b) whether other occupations existed which were not described by the CCDO; (c) whether some of the 'specialisations' in the CCDO would be important enough in Australia to warrant their own descriptions; and (d) what modifications should be made to the CCDO descriptions to reflect Australian circumstances and practices. On-site inspection of work operations were also used to some extent. As much as possible, the state and local employment offices were allocated descriptions for verification and updating, for those occupations which were thought to be particularly relevant in their geographic area. Standard formats and guidelines were used, but the range of work situations considered, the way informational inconsistencies were resolved or reflected and other aspects influencing the quality of the resulting descriptions depended inevitably upon the particular officers and their contacts. This process resulted in 2,208 individually described 'occupations' instead of the 6,700 described in the CCDO model.

32. The French data collection operation, on the other hand, did not start from an existing model or already existing descriptions. It was mainly based directly on studies of individual jobs, planned to span all different work situations. After initial studies to select firms, the activity to be studied within the firm, and the particular job and worker, data were collected at the level of the firm, the activity and the worker to obtain both the context and the specifics of the work done. The worker interview was largely open, and was carried out by well-educated persons who had been trained for the task. The resulting 10,000 job descriptions were consolidated into 810 'types of employment' (the term 'occupation' was deliberately avoided) or typical work situations, each covering a group of tasks offering common characteristics so that they can be performed by the same individual. In this consolidation process the following criteria were used:

- the position of the worker in the organisation, his/her function and place in the technical process;
- the way the worker operated in relation to people, to machines and to documents, using some reference to the typology used by the US' *Dictionary of Occupational Titles (DOT)*;
- the degree of autonomy of the worker relative to the instructions received.

In the 23 volumes of 'type of employment' descriptions published as result of this exercise mining occupations and jobs directly related to the production and distribution of energy are not covered. Neither are some of the professions, such as lawyers, medical doctors and some others.

Updating the occupational information

33. In reviewing the work on different NOCDs one can easily get the impression that most of the organisations which have been able to develop a (reasonably) finished product, tend to collapse from the effort after crossing the finishing line, at least as far the NOCD is concerned. The general picture is that no systematic effort and hardly any resources are spent on the updating and maintenance of the NOCDs for a good many years after they have been published. One reason for this seems to be that little care has been made to distinguish between updating and maintenance on the one side, and revision on the other. ('Maintenance' does of course mean the correction of mistakes and inaccuracies as they are discovered. 'Up-dating' means the renewal of descriptions as tasks and duties change, for example because of new types of machinery and work organisation, and the addition of new occupations into the existing structure.) In principle maintenance and updates should be undertaken continuously, while the 'revision' of the NOCD, meaning a complete re-evaluation of its principles and structure, should only be considered once every 15 to 20 years. One consequence of the lack of maintenance and update is that the quality of the OCD is slowly undermined, as it is getting out-of-date, with frustration and loss of confidence among users as one of the consequences.

34. The most notable exception to the lack of updating concerns the main instruments used for vocational guidance. These instruments are typically re-issued every two to three years with at least some updated information, in particular about training opportunities, but also with some new material about

(groups of) occupations and about trends in employment opportunities. One reason why information about training opportunities may be easier to update than other types of occupational information is that the training courses are organised and revised by formal, permanent institutions, which are relatively stable (at least when run by the public sector) and with an interest in making their courses known to potential clients. The vocational guidance material distributed to school-leavers and job-seekers is one possible channel of free publicity for the training institutions.

35. The sources of occupational information used to update the vocational guidance material are typically the same type of industry specialists as those mentioned above when describing the Australian development work. In addition the training institutions themselves may also give information about what they see as trends in tasks and duties in relevant areas of work. One consequence of this is that the material may emphasise new technologies and methods rather than the typical ones. The new information on trends in tasks and skill requirements of occupations found in vocational guidance material will normally not, however, be used to update relevant parts of the NOCD. The main reason for this is probably that responsibility for the vocational guidance material normally is not located together with the responsibility for the NOCD.

36. Statistical organisations normally make an effort to update the occupation coding indexes, but often only in connection with the preparations for the population censuses, which are carried out every 5 to 10 years.

Organisation of the information concerning each occupational group

37. Although some NOCDs will not give any other information about the jobs than what can be understood from the group titles, most of them will have at least definitional statements which are mainly designed to make clear the dividing lines between different groups. They frequently consist of a short opening statement describing the general functions of the jobs classified to them. This may be followed by a more or less structured text enumerating main tasks and duties as well as tasks which may be of importance in certain jobs classified to the group but which are not necessarily considered as inherent for such jobs. Tasks which excludes jobs from a particular group may also be mentioned. Some OCDs will have lists of titles of occupations which are included in the respective groups and, in some cases, lists of related occupations which are classified to other groups. Supplementary occupational descriptions can in many countries be found 'outside' the OCDs. The German classification *Klassifizierung der Berufe (KdB)* has no occupational descriptions, but descriptions found elsewhere have frequently been coded to KdB. The Swedish classification NYK used until 1997 had only brief definitional statements, but there used to be a dictionary which described in depth broader groups than those specified in the NYK. The French statistical classification PCS has established links to RFE mentioned above, with its information about the type of firm and unit in which the jobs may be found; the limits to the type of employment and the occupation's relationship with others; tasks performed; level of responsibility and instructions received, implications of mistakes and relationship with other people; work environment; ways of access to the jobs and training required; further career opportunities. The graphic depiction of the last two types of information is one of the strong features of the French job-placement tool 'ROME'.

38. Not many OCDs have followed the U.S. *Dictionary of Occupational Titles'* example of using formal typologies (coding systems) for the description of aspects such as training and experience required, 'typical personality profiles' suited for the jobs, mental and physical skill requirements, working conditions, income range. Outside Canada and the U.S. the most interesting examples can be found in Australia, Germany and the Netherlands. The Australian 1983 *ASCO Working Draft* developed formalised occupational profiles expressed in coded form. The 'Job content factors' (JFCs) covered a wide range of dimensions: Formal preparation, including General education and Post-school preparation; Informal preparation, including On-the-job training and Experience; Holland categories; Special requirements; Subject matter; Equipment used; involvement in various Mental activities, Physical activities and Social activities; Environmental location and conditions; Time constraints; Rewards (pay); Labour market size; and Industry code. Unfortunately, resources were not available to carry on this aspect of the Australian work after the *ASCO Working Draft* had been completed. In Germany and the Netherlands formalised

typologies describing various aspects of occupations have been developed for vocational rehabilitation, for vocational guidance and for curriculum development. The typologies used seem to have been tailor-made for each system with little or no standardisation, except where the same organisation is responsible for several systems.

The classification systems of the NOCDs

39. Although in principle the entries in an OCD can be organised alphabetically by the titles of the described groups, most, but not all, have organised the material by a more or less hierarchical classification structure based on 'type of work performed' as described by the main tasks and duties. This structure is normally intended to be the main system for sorting (i.e. coding) jobs, persons holding those jobs and for searching for information about the jobs.

40. In most of the NOCDs developed before 1985, 'type of work performed' was seen as referring to some clearly and some more diffusely defined 'activity areas' such as 'health and social security', 'farming', 'transport' etc. which were considered to be related to the outcomes of the jobs' activities rather than those of the firms in which the jobs were performed. Thus these 'activity areas' were seen as clearly distinct from 'industry', the variable used to classify firms on the basis of their most important products. That many users, of occupational statistics in particular, found it difficult to understand the difference between 'activity area' and 'industry' was partly due to use of the same, or very similar, words to label the two types of groups, but also partly due to the strong correlation found in practice between the two variables. It was more serious, however, that although this way of organising the information about different occupations was convenient for some users of that information, in particular for communication with employers and for organising the work of collecting information about tasks and duties, it was virtually useless as basis for description and analysis of labour markets and social structures and behaviour.

41. Giving priority to the description and analysis of social structures and behaviour, the French national statistical office (INSEE) developed in the early 1980s the socio-professional classification PCS, which give priority to social positions and perceptions for defining 'similar' occupations. The revisions of the Australian NOCD and of the ILO's ISCO gave priority to the needs of labour market description and analysis, resulting in a classification structure where broad distinctions are made on the basis the skill level required to carry out the tasks and duties of the jobs and the finer distinctions are based on skill specialisations within the broad skill-level groups.

42. The conceptual basis for the new classification structure for ISCO was developed using the results of work carried out in Australia. Benefiting from these results the ILO was able to develop a structure suited for a classification which serves both as a model for development and revision work in many countries and as a common denominator for the presentation of occupational statistics and other information from different countries. It also serves as an instrument for communicating occupational information between countries, e.g. in the international exchange of workers. In addition to having strong similarities to the Australian ASCO, the revised ISCO (ISCO-88) structure provides the basis for the work to develop a common occupational structure for the presentation of occupational statistics in the European community (ISCO-88(COM)), as well as for work to develop new or revised NOCDs in a large number of countries (see below).

43. It is quite clear that classification structures based on either 'activity areas' or on 'skill level and skill specialisation' have no better claim to be the 'best' or 'better' than any of the other possible ones, even if many of the users who are monitoring labour market trends or who are analysing its structure and development, have welcomed the use of a skill based classification structure. The 'best' classification system can only be determined by the type of questions one wants to find answers to or the type of work one is trying to do. It is also clear that with modern computer technology, different classification schemes can be applied easily to the same basic (i.e. detailed) occupational groups, provided the right codes and keywords have been attached to or been integrated into the group descriptions. Strong differences between different users of a NOCD about the best classification structure for their respective work and clients, for example between the national statistical and employment services, should therefore not prevent

them from co-operating on revising, updating and maintaining the basic descriptions of the NOCD and the development of tools for the effective use of the NOCD.

Tools, rules and guidelines for effective use of OCDs as sorting tools

44. Many of the complaints voiced about statistics based on ISCO-68 and ISCO-based NOCDs were misguided in the sense that they were formulated as complaints about the structure and principles of ISCO when the problems which provoked them really were caused by inadequate updating and maintenance and/or improper use of the classifications, in particular when they were used for the coding of jobs and persons. Based on the experience of the ILO and the countries surveyed, and in particular the methodological work carried out in Australia, it is possible to formulate some 'golden rules' about occupation coding for statistics and for client-oriented applications:

- (1) The key to correct coding of jobs into occupations is the existence of a carefully constructed coding index reflecting the classification structure, both of which have been kept up to date;
- (2) Coding should be based on relevant information about the job, normally this will be the occupational title and the job's main tasks and duties;
- (3) Coding should be based on clear instructions about how and when the various elements in the occupational response should be used, and the coding index should be constructed to reflect these rules;
- (4) Coding should always be to the most detailed level in the classification supported by the information available;
- (5) 'Not elsewhere classified' categories are to be used only for the jobs specified as belonging to these groups. Inadequately described jobs, jobs which cut across defined groups, and jobs which for other reasons cannot be coded should be given special codes and referred as queries to supervisors and those responsible for the NOCD for resolution;
- (6) Institute a coding quality control programme and give coders feedback on queries and performance;
- (7) Use systematically queries generated during the coding process to update the coding index and the classification.

45. Computer-assisted coding (CAC) systems have been developed in several countries, mostly for statistical use. They make it easier for the coder to follow the rules and guidelines necessary for high quality, low-error coding than to use the short cuts which under traditional procedures have led to occupational coding having error rates of up to 20 per cent. There is good reason to expect that such error rates are as common among employment officers as among statistical coders, even though the former may be expected to know the NOCD better (depending on their training and experience) and also to be able to get more information from job-seekers and employers. However, these officials also need tools such as those specified by the above 'golden rules'. Without tools such as (1) and (5) we must expect that an increasing number of vacancies and job-seekers will be coded to the 'not elsewhere classified' groups, with the result that 'occupation' increasingly becomes useless as a basis for matching or for statistical description. (This development has been described e.g. by experienced job placement officers in Sweden who developed informal strategies to cope with the problem.) It should be noted that CAC systems make the coding process more effective, but that proper coding procedures can be followed also without such systems. Some statistical organisations have also been using (partly) automated coding (AC) systems, which typically will code about 60-70 percent of the responses in a census or survey. The remaining responses must be coded manually or interactively. The overall error rates seems to be about the same as for manual coding. Current developments seem to be leading to "expert systems" which have features common to both CAC and AC systems.

Procedures for thorough evaluation of existing NOCDs

46. Little information has been made available to the ILO on how such evaluations are initiated, decided upon or executed. The report on the work in Australia makes it clear that strong signals had been received from various user communities, as well as from government-initiated inquiries, before the work to develop ASCO was started, and that consultations with users took place during the development process. The most interesting of these consultations is a users' requirement survey which asked the respondents to rank three different alternative models for classification structure, each presented in some detail. The work to develop a new 'Standard Occupational Classification' (SOC) in the United Kingdom also started with a survey of the user community's perception of the existing instruments, but in a much less formalised way than that used by Australia. The extensive network in Germany used to update the occupational information relevant for vocational guidance and planning, does not seem to have been much used to evaluate the classification structure. It seems clear that in many countries there is no formal evaluation of the existing NOCD before the responsible agency(ies) decide(s) that it needs to be revised. Such decisions seem to be based, in many cases, on a combination of pressure from dissatisfaction with the (slowly) deteriorating quality of a poorly updated and maintained NOCD, and of the related statistics, and an inspiration-effect from developments in other countries and international organisations. Few persons take an active interest in the NOCDs, at least in most countries outside North America, and the persons who do therefore depend on inspiration and impulses from the international community. As the developer and guardian of ISCO, the ILO feels some responsibility both for communicating such inspirations and impulses and for emphasising that the work at the national level should be based on national needs and priorities.

THE ROLE THE INTERNATIONAL STANDARD CLASSIFICATION OF OCCUPATIONS (ISCO-88) AND THE ILO:

47. ISCO-88 is one of the main international statistical standards and classifications for which ILO is responsible. The current version, ISCO-88, was approved by the *14th International Conference of Labour Statisticians (ICLS)* in 1987 and by the *ILO Governing Body* in 1988. It was immediately made available to users in English, French and Spanish, and has, since 1990-91, been available as printed volumes as well as on diskette², see *ILO (1990)*. Also available on diskette is a set of descriptions of more detailed occupational groups than those included in ISCO-88. They have been taken from the previous version, ISCO-68, with minor adaptations and only limited updating. Useful ILO material on work with occupational classifications can be found in the two *STAT Working Papers* in the list of references at the end this paper, as well as in chapter 10 in *Husmanns et al (1992)* and in chapters 22, 23 and 24 of *Chernyshev (1994)*. Information about the classifications used in the *ILO Yearbook of Labour Statistics* can be found on STAT's web pages where hyper-links are provided to the corresponding web-sites of the *Institute of Employment Research* at the *University of Warwick* and *United Nations Statistical Division*. In the future we also hope to establish such links to the corresponding national sites, as part of the plan to establish the ILO site as the main door of entry into the world of occupational classifications, as well as to the occupational classifications of the world.

48. ISCO-88 was developed to serve three main objectives: (i) to facilitate international communication about occupations by supplying national authorities with a tool to make national occupational information available internationally; (ii) to make it possible for occupational information to be produced in a form which can be useful for international research as well as decision making and action oriented activities, such as those connected with international migration of workers or job placements;

²A Catalan version was published in 1996, and a Russian version in early 1998. We suspect that there may exist more or less complete, informal and unauthorized translations into other languages, e.g. Chinese and Turkish, made as basis for the development of a NOCD.

and (iii) to serve as a model for the development or revision of national and regional occupational classifications.

49. As custodian of ISCO-88 ILO has provided advice for three efforts to develop common regional classifications based on ISCO-88: (i) ISCO-88(COM) developed for Eurostat by the *Institute of Employment Research (IER)* at the University of Warwick, United Kingdom; (ii) ISCO-88(CIS) developed by CIS STAT for CIS member countries; and (iii) ISCO-88(OCWM) developed for the *ILO/UNDP Asian Regional Programme on International Labour Migration*. Up to end March 1998 there had been direct contacts with 53 countries and territories which have developed, or are in the process of developing, national occupational classifications based on ISCO-88 as a model or on the same principles. (There had also been contacts with nine countries that had decided to use another model when revising their national classification. This would usually be the previous version, in which case the ?revision? may be seen more as an update.) Advisory visits had been made to 17 countries and officials from two countries had visited the ILO. National training seminars have been organized for officials from China, Kyrgyzstan and Thailand, and regional seminars for officials from the Commonwealth of Independent States (CIS), South East Asian Countries and South Pacific countries. Countries where a national classification based on ISCO-88 has been developed with the assistance of an ILO sponsored or back-stopped resident expert include Trinidad & Tobago, Tanzania, Namibia, Mauritius and Fiji. We know that 65 countries with a population census in the 1989-94 period established links, at an aggregate level, to ISCO-88 for their latest census results while 33 countries linked the results to ISCO-68. In the statistics submitted for the 1998 edition of the *ILO Yearbook of Labour Statistics* 41 countries and territories are represented with employment and/or unemployment statistics according to ISCO-88 major groups, while 38 countries were still reporting according to ISCO-68.

50. ISCO-88(COM) was developed by IER on behalf of the *Statistical Office of the European Communities (Eurostat)*, to be used for statistics reported to Eurostat from all member countries of the *European Economic Area (EEA)*. As part of and in direct continuation of this work IER has provided advisory services to the statistical authorities in both EEA member countries and countries in central and eastern Europe receiving support from the PHARE programme. IER has also organized regional seminars for officials from the statistical offices in the two groups of countries, two and five respectively. Thus IER represents a second international centre of competence for work on occupational classifications, and the five seminars organized for PHARE countries in recent years represents the only sustained activity of cooperation and exchange of information between officials in a group of countries on methodological problems and results in this subject matter area.

51. As pointed out above the work with NOCDs is often split or carried out as a cooperative effort between the National Statistical Office and the National Employment Service, with one or the other as the leading agency. At the international level the work has been dominated by the work carried out by the ILO Bureau of Statistics as the custodian of ISCO-88, and although there has been awareness of the needs of client-oriented applications in this work, national as well as international, ISCO-88 is primarily tailored to be used by those who produce or analyse occupational statistics. Only in two regional efforts has the work been undertaken mainly from the perspectives of client-oriented use of the international classifications: (i) The work on an occupational classification, ISCO-88(OCWM), to be used in the management and monitoring of migrant workers in South-East Asia, see *ILO/UNDP (1992)*; and (ii) the work undertaken within the EURES programme to extend ISCO-88(COM) in certain areas to provide more detailed distinctions between different types of job opportunities advertised through EURES. Information received by ILO in November 1998 suggested that preliminary proposals for about 45 extensions have been formulated, mainly among the higher skill level categories of ISCO-88(COM). The intended status of the results of this work within the EU is not known, but the results will be carefully considered when examining the need for up-dating and extensions to ISCO-88.

52. Other systematic work to up-date and extend ISCO-88 has been modest, but the *World Health Organization* has provided new descriptions for the following groups defined for *nursing* occupations: 223, 2230, 323, 3231, 3232 and 5133. These updated descriptions will be placed on the ILO/STAT web-site before the end of 1998, together with other updated descriptions as they are being developed.

53. Proposals for up-dating and extending the ISCO-88 classification structure may take several forms: (a) A number of more detailed occupational classes may be presented as subdivisions of appropriate ISCO-88 unit groups, with a two digit extension to the unit group code: "-xy". Such extensions will be proposed where it has been made clear that international exchange of occupational information, including statistics, on these groups will warrant their separate identification within the ISCO-88 structure. This may happen e.g. (i) at the initiative of e.g. international federations of organizations of people working in particular professions who can make a case for the separate identification of these professions in ISCO-88 as important for the international recognition of such occupations (e.g. the suggestion to create a group *2111-11 Medical Physicist*); (ii) because new occupations have emerged as a consequence of technological or other developments common to a number of countries (e.g. the need in too many countries to create a separate group for those engaged in the clearing of land-mines); or (iii) exchange of information between several countries for e.g. recruitment, job placements and the international migration of workers will be facilitated by references to detailed standard occupational classes, e.g. as is now happening with ISCO-88(COM) within the framework of the EURES programme of the European Union. (b) Regional adaptations of ISCO-88 may introduce new unit and/or minor groups to the ISCO-88 structure, to bring together and highlight some important occupations which in ISCO-88 are "hidden" in one or more unit groups, or which it is difficult to place within the ISCO-88 structure. (One example is the ISCO-88(COM) minor group *247 Public service administrative professionals*.)

CONCLUDING REMARKS

54. It should be clear from what has been said that the main problems and shortcomings related to the development, use and maintenance of the NOCDs are related to the first and last of these activities. Concerning the use of the NOCDs it seems fair to say that well developed and understood tools now exist, and the resources needed to bring them into use are not prohibitive, even considering the limited resources which normally are allocated to this area by the respective agencies. However, methods for proper development and updating of much of the occupational information which should form the basis and core content of the NOCDs seem to be much too expensive to be used in practice by most countries, with the exception of those countries, e.g. Germany and the Netherlands, which give much importance to vocational education and related guidance. The work for vocational guidance and planning does not, however, extend to or feed into work on the classification in a systematic and continuous manner. As a result most countries have some good, detailed 'street maps' for individual enterprises and/or occupational areas, and some general 'small-scale maps' with limited information for the whole world of work. The latter are of variable and often doubtful quality. Given the limited resources normally made available for work with OCDs the best prospect to improve on this situation is to learn how to exploit better the information contained in enterprise-level job descriptions and to generalise from them, as well as how to make more effective use of all the other unstructured information about jobs which already exist. Unfortunately we cannot expect a technological breakthrough in the mapping of the world of work which will be similar to what remote sensing from satellites has represented for geographic mapping. The work to up-date and extend ISCO-88 and the regional adaptations must depend on the work which goes on in the countries, but it is not easy to organise the necessary flow of information, in particular as the international and regional organisations which are the custodians of these classifications are as disinclined to allocate resources to such work as are the national authorities for the NOCDs.

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