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The conceptual development of a classification of services

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THE CONCEPTUAL DEVELOPMENT OF A CLASSIFICATION OF SERVICES

Summary: As the standard product classifications are subject to criticism of their conceptual unclearness, we have developed a conceptual model for the classification of services based on how they are used in a statistical system which relates the supply and demand of services. The concept is demand oriented: the purpose of the services is the theoretical criterion. We operationalise this with the intended effect and the target group of the services.

Keywords: product classification, supply, demand.

1.   Introduction

The steady growth of services is characteristic of most Western economies and the economic importance of the services sector has increased immensely. Yet the measurement of price and volume changes for most services remains a problem. In an early study Hill (1977) argued that there is little understanding of the nature of the physical units in which most services should be quantified, and consequently their prices are also vague and ill defined. The standard classifications available for services (the Central Product Classification (CPC) and the Classification of Products by Activity (CPA)) can be criticised for the same reasons. Among other things, the available standard classifications contain too many categories which are heterogeneous according to the unit for measuring the volume of the services, and the categories are too aggregated to measure the volume in household and production unit surveys. But above all the classifications lack a clear conceptual foundation.

Classification systems, including a classification of services, need to be based on clear concepts and therefore need a strong conceptual foundation. This foundation has to be derived from the use of the statistical outcomes in which the classification is applied. In this paper we develop a conceptual framework for a classification of services which is used in a statistical system in which the supply and demand of services are related. Before we present our concept for a classification of services, we shall evaluate a discussion on the concepts of the classifications of economic activities of enterprises. Although the classification unit is different, the conceptual frameworks of classifications of economic activities and products (including goods and services) may be quite similar. In Section 3 we shall discuss the characteristics of the statistical system and the associated user needs. Section 4 will present the concept for a classification of services.

2.   The concepts in classifications of economic activities

Triplett (1993) distinguishes two alternative economic concepts for classifications of economic activities of enterprises. For use that implies a production-oriented concept, groupings by similarity of production processes will provide the appropriate statistics. This concept has been designated as *supply* based. Examples of such data use include the measurement and analysis of productivity, and comparisons of capital intensity of production across different economies. For consumption oriented use, groupings according to characteristics of the demand for commodities will provide the appropriate statistics. This concept is designated as *demand* based. Examples of such data use include calculating market share, marketing analyses concerned with competitive shares, and demand for consumption of goods or services.

The use of different concepts will certainly lead to different classifications. The production processes of advising on tax and advising on pedagogical issues are quite similar and according to the supply-based concept one would classify them in the same category. However, according to the demand-based concept, one would classify them in different categories.

The *Nomenclature des Activités de la Communauté Europeènne* (NACE) has been developed to classify the main economic activity of enterprises. It is based on the *International Standard Industrial Classification* (ISIC). The main criteria used in this classification are the characteristics of the activities of production units that are strategic in determining the degree of similarity in the structure of the units and certain relationships in an economy. The major aspects of these activities are (a) the character of the goods and services produced, (b) the uses to which the goods and services are put, and (c) the inputs, the process and the technology of production. Its concept tends to be a combination of the supply-based and the demand-based one. However, the main problem is that the criteria are not explicitly operationalised. This leads to a situation in which in some parts of the classification the supply side is more emphasised, and in other parts the demand side.

Similar problems appear in product classifications. The *Central Product Classification* (CPC, Version 1.0) covers goods and services, i.e. anything that can be the object of a transaction between economic actors. The criteria in the CPC are the physical properties and the intrinsic nature of the products, e.g. the raw materials from which they are made, the way in which they are produced, the purpose or user category for which they are intended, the prices at which they are sold, whether or not they can be stored. If we review the criteria used in the CPC, we come to the same conclusion as we did for the NACE. The criteria are both supply and demand-based, they are not explicitly operationalised, and the result is an unclear mix of concepts.

The way products are produced is not necessarily the same as the industrial origin, although they often coincide. The *Classification of Products by Activity* (CPA) is

based on the CPC. This is an example of a classification where the mix of concepts is even more complex, because it is aggregated into broader categories according to the NACE. Not only the characteristics of the production and consumption of goods and services are taken into account, but also the industrial origin.

Our conclusion is that the existing product classifications use a diffuse combination of classification criteria, resulting in a classification lacking conceptual foundation. This will lead to a problem for the users of statistics based on these classifications, because they are mainly interested in one concept or in the relations between different concepts (Triplett, 1993). We have developed a conceptual model based on the demand side concept which can be applied to services, but at the same time relates the demand of services to characteristics of the production units that produce these services.

3.   An integrated system for supply and demand of services

3.1   The lack of an integrated system of social statistics

While for economic statistics a general integrating framework is available in the *System of National Accounts* (SNA), social statistics lack such an integrating system. Notwithstanding the fact that much effort has been put into developing a coherent set of social indicators, the proposed lists of such indicators cannot be considered as an integrated system in statistical terms. In essence they consist of isolated indicators while the relationships between these indicators remain unquantified and do not have the character of definitional equations (Van Tuinen, 1995).

As the SNA produces authoritative statistical information, it could be promising to develop links between SNA and social statistics, thus facilitating the integration of social statistics by providing anchor-buoys. In practice, economic and social statisticians rarely work together to integrate the two fields of statistics. This does not mean that in theory there are no relevant links between the economic system and social statistics. In particular economic and social statistics meet each other in the common field of supply and demand of services.

Take health, for instance. The social statistics on health describe the actual state of health of the population. This state of health is not only influenced by demographic and socio-economic factors, but also by the consumption of health services. The production of health services is described by the economic statistics in volumes and values. In order to give a complete picture of health in society, the economic information on the production of health services has to be linked to the state of health, the related demand for health services and medical consumption.

Information on the volume of the production of services (be they health services or others) can be obtained from production units or from persons and households. The

realised supply of services measured through a business survey should be similar to the realised demand of services as measured by a household survey. The differences between the business and household surveys can be quantified and possibly explained. If we are able to explain the difference and quantify each explanation, this will lead to an integrated figure. This in turn might result in one figure for one characteristic, and the result should be of higher quality. We shall elaborate on the used method of integration in subsection 3.4.

After integration of the results obtained from business and household surveys on the realised volumes of supply and demand of services, we have the opportunity to make use of the already available and commonly accepted integrated data of the SNA to verify the data of business and household surveys. As such, we have two related integration processes. The first is the integration of the results on the volumes of the production of services from business and household surveys, and the second is the verification of the volume of services by comparing it with the volumes counted in the SNA. This is not a one-way process; in co-operation with National Accounts, we shall develop the estimation of these characteristics further.

3.2   The supply and demand model

Statistics Netherlands is working on a supply and demand model of the government and non-profit sector. We are concentrating mainly on NACE sections K, L, M, N and O (Legal activities, Investigation and security activities, Public administration and defence, Education, Health and social work, Other community, social and personal service activities, including recreational, cultural and sporting activities).

Let us take a closer look at the field under study. Firstly, you can characterise the production units mainly as non-market producers. Their activities are mainly financed through subsidies from the government, contributions by households directly or indirectly via insurance companies, and are strongly steered by government regulations. The statistical units are the local Kind of Activity Units (local KAU), which we shall call institutions. The transactions should be measured in volumes and values (in Dutch guilders, or Euros in the near future).
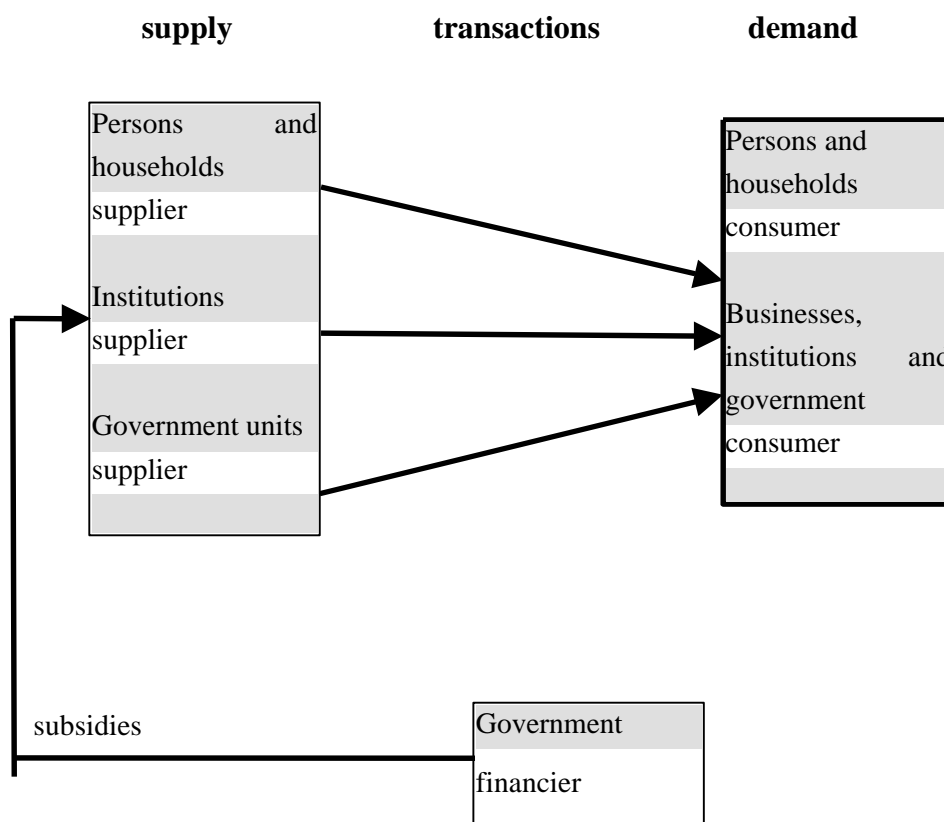
A second characteristic is the dominant role of the government as an active producer of services. We are aware of a cyclical process, in which the government tends to exchange its role as an active producer of services for a role of financier and vice versa. This leads to so-called substitution processes in the corresponding activity classes. The statistical units are the government units; together with the local KAU's we shall call them production units. The transactions should be measured in volumes and values.

The third characteristic is the relative importance of voluntary work. Persons and households produce services in three ways: as own-account workers, as voluntary workers and as producers for own consumption. The transactions of own account

workers should be measured similar to production units or government units. The production of the services of voluntary workers and the production for own consumption should be measured in volumes and time, as these are below the production boundary of SNA.

Besides the consumption by persons and households, the services are also consumed by businesses, institutions and government units. This so-called intermediate consumption should be estimated in the integration process to reduce the differences between business and household survey outcomes. The government also plays a role in subsidising persons and households to advance the consumption of services; we leave this out of the model for the present.

Figure 1. Actors, roles and transactions in the supply-demand model for the government and non-profit sector.

supply	transactions	demand

Persons and households supplier

Institutions supplier

Government units supplier

Persons and households consumer

Businesses, institutions and government consumer

subsidies

Government financier

Which are the most important variables to be measured for the suppliers and consumers of the services?

For the legal persons (institutions and government units) that supply services the following variables are relevant: NACE, SNA-sector, institutional sector (non-financial corporations, financial corporation, general government, households, non-profit institutions serving households), type of producer (market producer, producer for own final use, other non-market producer), number and hours of work by professionals, number and hours of work of voluntary workers, region, financial information according to the standards of the *European System of Accounts* 1995 (ESA; Eurostat, 1996) including subsidies and taxes of general or local government, some indication of the production capacity and the volume and prices of provided services.

For the natural persons (who are engaged in an economic activity in their own right) some information on the volume of the provided services will be sufficient. A basic classification by age, sex, and income is recommendable.

For the final consumers (persons and households) the following variables are relevant: the volume of consumed services, a basic classification by age, sex and income, a more precise classification based on the different target groups of the services provided, the satisfaction with the provided services.

For the intermediate consumers (businesses, institutions and government units) the following variables are relevant: the volume of the consumed services, NACE, SNA-sector, region, financial information according to ESA-standards including subsidies and taxes of general or local government.

3.3   The value of the supply-demand model for the users of statistics

What will the value be for the users of integrated data on the economic process of the production of services and characteristics of the consumers? In government policy it might support decisions about which regulations and subsidies are needed to achieve policy goals. For instance, decisions on which producers of services should be subsidised for what amount of money. Another example is the decision whether to produce the services by the government itself, by institutions that are subsidised by the government, or by market producers. These choices made by the government have little support from data on the production and consumption of the relevant services. To improve this foundation, the *purposes*, the *production costs* and the *quality* of services and characteristics of the suppliers and consumers will be particularly relevant.

The *purposes* of the services should be measured by the classification of services; services should be classified according to their intended effects service and their target groups. This is the main reason that we prefer the demand-based concept: we classify services according to the fulfilment of certain needs in society. The only

possible reason to look beyond the demand is that differences in the production processes of similar services have different side effects. We will not elaborate on these here.

The *production* costs of the services can be estimated using the financial information on the production units. In this respect we are interested in the production costs of the services and the amount of subsidy from the government. Of course, it will be necessary to be consistent with the results of the National Accounts. In practice this will lead to a situation in which the results of National Accounts are detailed by supplementary information.

One of the recurring problems in the integration process of production unit and household survey outcomes becomes apparent here: production unit surveys are institution based and the sample is from a business register which only contains information on the primary economic activity of the production unit. Persons and households consume services from production units that produce these services as primary or secondary economic activity; we shall elaborate on this in subsection 3.4.

The *quality* of the produced services is perhaps the most difficult aspect to measure. To measure the quality of services we have to measure to what extent they fulfil their purpose. Several aspects are distinguished in this respect. The first is the need to discover whether the services are consumed by the intended target group. If the majority of the consumers do not belong to the target group, it will not be effective. The other side of the coin is whether the majority of the target group consumes the service. To achieve this, we have to classify the consumers according to characteristics that identify target groups in society. The second aspect is whether the service has the desired effects for those who consumed it. This can only be measured indirectly, by asking about satisfaction with the provided service.

Having developed the supply and demand model for the government and non-profit sector, as described above, we are able to answer policy relevant questions. It is for instance possible to study whether the services are consumed by the groups in society targeted by the producers of the services. A closely related question that can be answered is whether the government subsidy for producers of services are effective, i.e. whether the services are consumed by the intended target groups and have the right effects. To prepare policy decisions, it would be helpful to use the relations between the characteristics of supply and demand of services to simulate some of the consequences of these policy decisions. For example, what consequences will cutting subsidies on social welfare institutions have for the consumption of health services?

3.4 Conflicting results from production unit and household surveys

As mentioned above, the realised supply of services measured through a production unit survey should correspond to some degree with the realised demand of services measured by means of a household survey. The following stages of the integration process will be relevant:

- *Harmonisation* which includes the adaptation of definitions, classifications and measure of detail of the information from production unit and household surveys.
- *Completion*, which includes corrections for differences in population of both production units and households covered by the sources.
- *Minimisation of measurement error*, including sampling and non-sampling errors like errors in the sampling framework, observation errors, classification errors, effects of selectivity of response, etc.
- *Balancing*, i.e. the elimination of remaining (unexplained) discrepancies between the data from the production unit and household surveys.

All these steps will give insight into the quality of the available survey information and are as such relevant and effective in themselves.

One of the recurring explanations of the differences between production unit and household surveys is that the (operational) definitions of services are not identical. It is quite usual for the production unit surveys to measure the produced services in a highly aggregated way, while in household surveys this aggregated concept has no meaning at all, and they therefore measure only a small part of services.

A second explanation is that production unit surveys are institution based and the sample is taken from a business register which only contains information on the units' main economic activities. Persons and households consume services from units that produce these services as primary or secondary economic activity. The resulting estimation of the volume of delivered services will be unequal. To solve this problem production units which produce services as a secondary activity are asked to supply volume and price information on these services in addition to the relevant information on their main economic activity. In such a way, we combine the relevant information of the supply side and the demand side. The method we have developed for the classification of services indicates which services are produced as a secondary activity in a NACE-class, as we make an inventory of each NACE-class in which services are produced based on various sources (see sub-section 4.2).

A third recurring explanation has to do with the national and domestic measurement of the concept. The production unit survey estimates the volume of the production of services by domestic production units. This means that services consumed by the domestic population of people outside their homeland is not taken into account, while it is included in household surveys. The household survey only estimates the volume of services of the domestic population of people, and no estimation of the services consumed by others (e.g. tourists) is taken into account. In short: in the

integration process the volume of the international trade in services should be estimated.

A fourth explanation is that the institutionalised population is omitted from the sample frame of household surveys in the Netherlands, because it is difficult to interview them. This category has a large consumption of medical and social work services in particular, and results in large differences between production unit and household surveys.

A fifth recurring explanation is that people who have died or emigrated during the year under review, have consumed services, but can no longer be interviewed in a household survey. Medical consumption in the event of death and consumption of legal services in the event of emigration will be underestimated in household surveys.

A sixth explanation is the selectivity of non-response in household surveys. Non-response is only a problem when it is selective; the magnitude of the non-response is not necessarily a good indicator of selectivity. This becomes a severe problem if the theme of the household survey causes the selectivity: for example, if relatively more people with a high medical consumption refuse to respond in a health survey. Selective non-response can be identified and corrected for by using information of administrative registers. If registers contain variables with a high correlation to variables in the survey and the response is selective on the register variables, these can be used to weight the survey. Exact matching of the administrative registers with the survey records produces the best results.

These differences between production unit and household surveys are estimated during the integration process. The results of both surveys are corrected for these differences. This leads to one figure for the measured phenomenon. After this integration process, we are able to relate the information on the production of services by production units and the information on the consumption of services by persons and households.

4.   The concept of the classification of services

4.1   The requirements of the classification of services

A classification differs from other ways of grouping in the sense that the criteria are explicitly formulated, operationalised and consistently applied. In other words, after an inventory of user needs, a clear conceptual point of view is formulated. This point of view is translated into theoretical criteria. The theoretical criteria are operationalised and consistently applied to each classification unit. In this case, the unit of classification is a package of similar services.

One of the requirements of the classification is that it can be aggregated into the categories of the CPA and to classifications that are used for international purposes.

We chose the CPC, because the CPA can be derived from this classification. In practice this means that the categories of the classification of services are particularisations of the CPC.

Another important requirement is that the classification of services can be applied in production unit and household surveys, in particular for the measurement of volumes and prices. For production unit surveys this means that the volumes and prices of the services must be able to be found in the administrations of the production units. To estimate the volume of services, it is relevant that it can be measured in particular units. When a package of similar services is the smallest unit of the classification, all the separate services should be measured with the same measurement unit. This might also be a problem when the most detailed categories are aggregated: this is only possible when the more detailed categories are measured in the same measurement unit.

4.2 The concept, classification criteria and development of the classification

The classification process consists of the following steps:

1. The theoretical criterion is derived from the use in the supply and demand model: the purpose of the service.

2. The criteria are chosen and operationalised: the intended effects and the target group of the service.

3. For each NACE class of the relevant NACE sections descriptions of services are collected from various sources.

4. The relevant criteria are confronted with these descriptions of services. For each service description the criteria values are determined.

5. Service descriptions are added for those services not covered by existing service descriptions.

6. The overall result is judged and revised in co-operation with representatives of the branch organisations.

We tried this method out in a pilot study in the Social work sector and it worked out reasonably well.

The demand side concept. The conceptual point of view is derived from the use of the classification in the supply and demand model for the government and non-profit sector: the purposes of the services should be the central point of view for the classification of services. This means that we prefer the demand side concept: groupings according to characteristics of the demand for services. For the consumers of the services, it is not relevant how these services are produced but what their intended effects are for the consumer.

The purposes. The purposes must be operationalised according to two dimensions: the intended effects and the target groups.

The intended effects are operationalised as follows. Firstly, the categories of the CPC are reformulated as intended effects. The CPC has mostly titles of services such as: hospital services or services furnished by trade unions. Secondly, for each service we decide what the occupation is of the most adequate worker to provide the service. In most cases, services in the NACE sections under study are produced mainly by labour. The most adequate worker is the worker who is best suited for the job. To decide on which occupation is best suitable for providing the service, we use information from collective labour agreements and from the Labour Force Survey. To classify the occupation of the most adequate worker, we apply the Netherlands Standard Classification of Occupations 1992 (Bakker, 1993). Thirdly, we derive the main tasks of the occupation; these are measured according to a list of 128 task clusters (see Table 1), and each of the 1,211 occupations is characterised by a maximum of three tasks. In cases where the services are not provided by a single worker, but by a team, we combine the information on the main tasks of the whole team. In most cases the main tasks are described as a process and not as an intended effect. In the near future, we shall reformulate the titles of the main tasks tot take intended effects into account. Lastly, we combine information from the CPC on services with the tasks of the most adequate worker providing the service.

The target groups. The list of target groups is developed by analysing descriptions of services. These descriptions are from various up-to-date and already existing sources (see below). In most cases the target groups form a significant part of the service descriptions. After the inventory of target groups, we shall try to harmonise the list of target groups in order to reduce the number of categories.

The descriptions of services. With the formulation and operationalisation of the criteria, we have described the potential categories of the new classification. But we do not know whether all of the categories are filled with services that actually occur and which services are in these potential categories. Each service in the CPC is specified with the combination of main tasks of the most adequate workers who provide the service. Of course, there is a strong link between the categories in the CPC and the main tasks of the workers who provide the services. This means that there is a limited number of combinations.

As there is no list of services at a detailed level is available in the Netherlands, descriptions of services from various sources are collected and analysed. The choice of these sources is inspired by the idea that the volumes and production costs of the services are available in the administrations of the production units providing the services. For instance, we analyse collective labour agreements in the non-profit sector, and directives from trade organisations and local government on how to administrate the output and economics of the production unit, etc.

The analyses of service descriptions On the one hand the service descriptions are classified according to the classification criteria (CPC, main tasks of the most

adequate worker who provides the service, the target group). On the other hand they are classified according to additional information, such as the NACE class and the unit used to measure the volume of the service. The NACE is necessary for the decisions on which production units will receive questions on these services. If many services are produced in a certain NACE class a secondary activity, this will be identified. The unit to measure the volume of the service is necessary if we want to apply the service classification to production units or household surveys. The measurement units are chosen as closely as possible to the administrative concepts used in the various sectors, thus ensuring the possibility of measuring the volume of the supply of services by production units.

We tried out some of the coding procedures in a pilot study for the Social work sector. When we started this work, it became clear that this was not an easy task. To guarantee the coding quality it was decided to code the criteria by two people independently, and confront the two values. In the case of dissenting opinions between the coders, a decision was taken jointly. After a while, it became possible to code the service descriptions in one session with two coders jointly.

Black spots. Using the CPC, we examined which areas had not yet been covered. In the pilot study for the Social work sector we ascertained that approximately 80% of the services had been covered by service descriptions from one or more sources. Using the knowledge and experience from the coding of the service descriptions in an earlier stage and on the NACE-section under hand, we added the missing service descriptions and classified them according to the classification criteria. One of the additional sources for this was the table of industry by occupation. For each class of the NACE, we made an inventory of the regular occupations (classified according to the Netherlands Standard Classification of Occupations 1992) with the use of several Labour Force Surveys. These occupations have an indicating function to decide on which services are provided in that industrial branch.

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Table 1. The 128 task clusters

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code	task cluster	code	task cluster
001	managing supervisors and decision-making general policy	049	guard, safeguard, patrol
002	supervising workers and decision-making general policy	050	domestic cleaning (office cleaning included)
		051	industrial cleaning
003	supervising workers without decision-making general policy	052	melt, mould, cast
		053	metal-fitting (one specific tool)
004	decision-making general policy without supervising	054	metal-fitting (more than one specific tool)
		055	making (machine) tools, precision metal-fitting
005	preparing concepts for general policy	056	plastic modelling
006	planning/ co-ordination work	057	sheet metal work
007	preparing estimates of costs	058	welding, flame cutting, soldering
008	overseeing implementation of legislation	059	insulate
009	advising on legal, taxation subjects	060	install pipes (installation technique)
010	advising on organisational subjects	061	erect constructions
011	advising on marketing, economic subjects	062	fit, erect, install machinery
012	advising on technical, technological subjects	063	fit, erect, install, repair mechanical equipment
013	advising on social, societal subjects	064	maintain, repair (motor-)vehicles
014	informing	065	fit, maintain strong current
015	conduct research without strong numerical aspects	066	fit, maintain weak current
		067	fit, maintain electronics
016	conduct research with strong numerical aspects (technician work excluded)	068	lay bricks, pointing walls, set tiles
		069	plaster
017	conduct chemical and physical tests and analyses (technician work)	070	concrete, reinforce concrete work
		071	carpentry
018	check, inspect, examine, verify, test, sort	072	operate woodworking machine
019	write, edit, translate	073	cover floors, upholster
020	design, advising on information technology	074	paint, spray paint
021	maintain, process computer software and operating systems	075	fix glass, cut glass
		076	roofing
022	design	077	maintain work: carpentry, lay bricks, fix glass
023	prepare technical drawings, calculate, take measurements	078	maintain work: electric installations
		079	maintain work: gas, water, heating installations
024	personnel work	080	make roads, digging work
025	secretarial work	081	preparation of printing material: text
026	clerical work with numerical aspects	082	preparation of printing material: images
027	clerical work: overseeing rules, regulations	083	print
028	clerical work with linguistic aspects	084	binding books
029	typing/word processing	085	manufacturing of ready-to-wear clothing, tailoring
030	archive, library work	086	preparing fur, manufacturing leather products
031	auxiliary clerical duties	087	clean, cut, dress, slaughter meat and fish
032	receive clients (reception work)	088	prepare food (no fast food)
033	trade (retail excluded)	089	prepare food (fast food)
034	buy	090	serve food and beverage
035	sell: agent work	091	operate production machines
036	sell: shop work	092	setting up production machines
037	receive payments in shops and similar establishments	093	monitor production processes
		094	assemble
038	store, issue	095	pack by hand
039	load, unload goods	096	demolish
040	deliver	097	disassemble
041	transport, carry	098	manufacture, repair (craft)
042	operate mobile machinery, cranes	099	teach
043	fly an aeroplane	100	instruct (physical)
044	navigate a ship	101	heal humans
045	drive a train, tram, subway	102	give technical medical assistance
046	drive a heavy-truck, lorry	103	give medical assistance (technical excluded)
047	drive a bus, coach	104	sterilise
048	drive a passenger car, delivery van	105	physiotherapy

Table 1. The 128 task clusters

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code	task cluster	code	task cluster
106	guide humans with personal and social problems	118	forestry work
107	providing nursing care	119	fishery work
108	provide personal and housekeeping services	120	operate equipment for images and sound, transmitting broadcasts, lighting
109	take care of personal appearance		
110	heal animals	121	act, direct
111	give veterinary assistance	122	announce, present (broadcasting) programmes
112	care of, train animals	123	present personal appearance
113	hunt, fight against vermin	124	dance
114	horticultural work	125	sing
115	gardening work	126	play musical instrument, conduct, compose
116	arable farming work	127	make visual arts
117	cattle-breeding work	128	do competitive sport