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PROPOSAL FOR A CLASSIFICATION OF THE PRIMARY  
PRODUCTS OF ISIC 892 - TECHNICAL ACTIVITIES

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## INTRODUCTORY NOTES

The classification described below is for the products of ISIC 892 - Technical Activities. We would suggest that the industry be titled Architectural, engineering and other technical activities.

A proposed commodity/product classification of the primary or principal products of ISIC 8921, Architectural and engineering activities and other technical consultancy, is attached. In defining primary products for ISIC 8921, the content and boundaries of the industry as presently defined, have been respected, with minor modifications to the categorisation of the content.

A proposed classification of the primary or principal products of ISIC 8922, Technical testing and analysis is also attached. In this case the content and boundaries, as well as the categorisation of the content of the industry, as presently defined, remain unchanged.

### 1. Conceptual principles

The conceptual principles that were respected in creating the classification of products are listed below. Many of them derive from Peter Hill's paper "On Goods & Services".

- (i) The product or commodity is distinguished from the process or activity of which it is an output.
- (ii) The product or commodity is transactable in isolation of other products. Where a service is normally provided together with another good or service, they are together delineated as a product.
- (iii) It is assumed that the classification is designed to measure the output of establishments, hence the classification has been developed with respect to transactions that take place between establishments belonging to the same company or enterprise, between establishments belonging to different companies or enterprises and between establishments belonging to the business sector and units belonging to other sectors such as the personal sector, the government sector or external sector.
- (iv) The products are ones for which market transactions occur but they could also be "in-house" transactions taking place between establishments of an enterprise, which may be valued by internal accounting procedures and for which accounting transfers may or may not be made.

The criteria that classes should be ones for which price information can be assembled so that it is possible to make quantity estimates by deflating revenues by prices, has been kept in mind. In creating the classification no particular assumption has been made with respect to how "in-house" transactions will be valued. This issue will have to be resolved at the time of compiling data.

## 2. The classification

The proposed product breakdown which is attached with definitions is for CPC 893. We propose that the title of CPC 893 should read Architectural, engineering and other technical services.

The current CPC has one product CPC 8931 'Services related to architectural and engineering work' at the four digit level which is disaggregated into five products at the five digit level. Had we stayed within this structure we would have been restricted to articulating nine products at the five digit level. We have therefore reorganized this structure, and created more detail at the four digit level which permits greater elaboration of the product classification at the five digit level. It also allows for a two tiered structure.

Six products are delineated at the four digit level.

- 8931 - Architectural services
- 8932 - Engineering services
- 8933 - Integrated engineering services
- 8934 - Urban planning and landscape architectural services
- 8935 - Related scientific and technical consulting services
- 8936 - Technical testing and analysis services

The first five are primary products of ISIC 8921 and the sixth is the primary product of ISIC 8922.

The five digit detail for each of the six products is attached.

The relationship between the current CPC 893 and the proposal is described below.

This reorganization has two main consequences. First the realignment of some services (compared to the current CPC/ICGS correspondence) and secondly a change to the numbering system.

The most important realignments are:

- (i) Urban planning services are separated from architectural services since, in Canada, these services are provided by consulting engineers and specialized establishments as well as by architects.
- (ii) Mapmaking services is a separate product under the "Related scientific and technical consulting services" aggregation, instead of being part of Engineering Services.
- (iii) Geological surveying services in connection with the siting and foundation of dams, tunnels, bridges and other construction projects, including tall buildings is now in 'other engineering services (geotechnical)' rather than in, what was formerly, 'geological and prospecting services'.

### 3. The background

In the case of "architectural services", it was found that the most useful distinction derived from the fact that different services are provided at various stages of a project. Some of these services take an advisory form, some precede the design phase, others are concerned with the design of a building or structure but precede actual construction and yet others involve contract administration and are provided during the construction phase of a building. Since Architects may be called upon to provide services at any or all of these different stages, we have delineated three products to correspond to these different services and a fourth one to cover the case when the same firm provides two of them, namely design services and contract administration services and prices them together as a percentage of construction cost.

In Canada the services provided by Architects are priced differently, depending upon the type of service provided. When the scope of the service(s) provided is narrow, such as the provision of a pre-design study or schematic design services only, fees are usually related to direct personnel expenses. In the case when design services and contract administration services are provided together, by the same firm, fees are calculated as a percentage of the construction cost. This difference in pricing method according to the service(s) offered, was one of factors which was kept in mind in delineating and defining products either as separate products, or as a joint product.

Our associated countries have suggested that architectural services could be broken down by type of building. We suggest that individual countries might carry types of building at a six digit level of detail, in their own classifications.

In the case of "engineering services" delineation is more complex. There are three dimensions. First there is the kind of service provided for example advisory services, design services or services during construction. Second there is the project for which the service is provided and third there is the engineering specialisation for example civil, mechanical, electrical, chemical, accoustical, etc. We considered the possibility of using engineering specialisation as the main criterion to delineate products. However, we found that design services are not the only service provided by engineers. Secondly though there are some specialised firms, most of the time engineering firms are contracted to offer services which require a multi-disciplinary team of professionals which include engineers and technicians of different specialisations. Accounts are kept by contract. We would find it difficult to identify specialised establishments or to classify non-specialised establishments to one specialisation. We concluded that this criterion is therefore more appropriate for an occupational rather than a product classification. In the classification of "engineering services" we have attempted to bring the three dimensions of service, project and specialisation together and to make some broad distinctions.

We have found it useful to distinguish, Advisory and Consultative engineering services, Engineering design services and Services provided during the construction or installation phase. We also found it useful to distinguish engineering design services provided for buildings and civil works and those provided for industrial process and production. Under buildings, we found it useful to distinguish structural engineering design services from mechanical and electrical engineering design services. The distinction between structural engineering design services for buildings and other civil works is an attempt at distinguishing different kinds of engineering design work but we realise that there may be more similarity between engineering design services for a high rise building requiring a structural steel frame and a reinforced concrete and steel bridge than between the engineering design services for a reinforced concrete and steel bridge and a road or railway. The calculation of fees for engineering services is very similar to the method used for architectural services however because engineering fees are related to the complexity of design, individual countries could distinguish levels of complexity at a six digit level for those five digit products that need further differentiation.

By delineating a separate product called Integrated engineering services, we have made provision for the total package of services that is sometimes provided, for complete turnkey projects. The provision of engineering services for overseas projects often take this integrated form. At the five digit level, we have differentiated the product in terms of the type of project. As this is primarily a form of engineering service it could also be left as an undifferentiated product under engineering services with the number CPC 89328.

We have introduced a separate product called Urban Planning because in Canada, town and city planning services are offered by consulting engineers and specialised establishments as well as by architects.

Under 'related scientific and technical consulting services' we are aware that scientific prospecting services, and subsurface surveying services as we have defined them, may be provided together and that surface surveying and map making services may also be provided together. However, we have not created additional joint-product categories because our field work suggests that establishments are able to provide separate information for each of the products presently defined.

For "technical testing and analysis services" we have distinguished five products which follow, quite closely, the definition of the industry. Any of the first three classes of services could result in the certification of products.

## THE CLASSIFICATION

CPC

893 - Architectural, engineering and other technical services.

**8931 - Architectural services**

89311 - Advisory and pre-design architectural services

89312 - Architectural design services

89313 - Contract administration services

89314 - Combined architectural design and contract  
administration services

89319 - Other architectural services

**8932 - Engineering services**

89321 - Advisory and consultative engineering services

89322 - Engineering design services for the construction of  
foundations and building structures

89323 - Engineering design services for mechanical  
and electrical installations for buildings

89324 - Engineering design services for the construction  
of civil works

89325 - Engineering design services for industrial process  
and production

89326 - Engineering design services n.e.c.

- 89327 - Engineering services during the construction and installation phase
- 89329 - Other engineering services
- 8933 - Integrated engineering services**
  - 89331 - Integrated engineering services for transportation infrastructure turnkey projects
  - 89332 - Integrated engineering services for water supply and sanitation turnkey projects
  - 89333 - Integrated engineering services for manufacturing turnkey projects
  - 89339 - Integrated engineering services for other turnkey projects
- 8934 - Urban planning and landscape architectural services**
  - 89341 - Urban planning
  - 89342 - Landscape architectural services
- 8935 - Related scientific and technical consulting services**
  - 89351 - Geological, geophysical and other scientific prospecting services
  - 89352 - Subsurface surveying services
  - 89353 - Surface surveying services
  - 89354 - Map making services



- 8936        - Technical testing and analysis services
- 89361      - Composition and purity testing and analysis
- 89362      - Testing and analysis of physical properties
- 89363      - Testing and analysis of integrated mechanical  
            and electrical systems
- 89364      - Technical inspection services
- 89369      - Other technical testing and analysis

## EXPLANATORY NOTES

893 - Architectural, engineering and other technical services.

8931 - Architectural services

89311 - Advisory and pre-design architectural services - Assistance, advice and recommendations concerning architectural and related matters. Included here is the service of undertaking preliminary studies addressing issues such as site philosophy, intent of development, climatic and environmental concerns, occupancy requirements, cost constraints, site selection analysis, design and construction scheduling and any other issues affecting the nature of the design and construction of a project. The provision of this service is not necessarily related to a new construction project. For example, it may consist of advice concerning the means of carrying out maintenance, renovation, restoration or recycling of buildings, of an appraisal of the value and quality of buildings or of advice on any other architectural matter.

89312 - Architectural design services - Architectural design services for buildings, building complexes etc. Design services may consist of one or a combination of the following: schematic design services which consist of the determination of the essential character of the project with the client in defining intent, space requirements, budget limitations and time scheduling and of the preparation of sketches including floor plans, site plans and exterior views; design development services which consist of a more precise illustration of the design concept in terms of siting, plan, form, material to be used, structural, mechanical and electrical systems and probable construction costs; final design services which consist of drawings and written specifications sufficiently

detailed for tender submission and construction and of expert advice to the client at the time of calling for and accepting tenders.

- 89313 - Contract administration services - Advice and technical assistance to the client during the construction phase to ensure that the building is being erected in conformity with the final drawings and specifications. This service involves both office and field activities such as construction inspection, preparation of progress reports, issuance of certificates for payments to the contractor, guiding the client and the contractor in the interpretation of contract documents and any other advice on technical questions that may develop during construction.
- 89314 - Combined architectural design and contract administration services - Provision of a combination of architectural services utilized on most projects including schematic design, design development, final design and contract administration services. This service excludes advisory and pre-design architectural services but may include post construction services which consist of the assessment of deficiencies in construction and instructions regarding corrective measures to be taken during the twelve month period following the completion of the construction.
- 89319 - Other architectural services - All other services provided by architects establishments and which require the expertise of architects such as the preparation of promotional material and presentations, preparation of as-built drawings, constant site representation during the construction phase, provision of operating manuals etc. Excluded are services offered by architects establishments but which are the primary products of other industries such as interior decorating, real estate and land assembly, construction and/or project management etc.

**8932 - Engineering services**

89321 - Advisory and consultative engineering services - Assistance, advice and recommendations concerning engineering matters. Included here is the service of undertaking preparatory technical feasibility studies and project impact studies. Examples are; study of the impact of topography and geology on the design, construction and cost of a road, pipeline or other transportation infrastructure; study of the quality or suitability of materials intended for use in a construction project and the impact on design, construction and cost of using different materials; study of the environmental impact of a project; study of the efficiency gains in production as a result of alternate process, technology or plant layout. The provision of this service is not necessarily related to a construction project. It may consist, for example, of the appraisal of the structural, mechanical and electrical installations of buildings, of expert testimony in litigation cases, of assistance to government bodies in drafting laws etc.

89322 - Engineering design services for the construction<sup>1</sup> of foundations and building structures - Structural engineering design services for the load bearing framework of residential and commercial, industrial and institutional buildings. Design services consist of one or a combination of the following: preliminary plans, specifications and cost estimates to define the engineering design concept; final plans, specifications and cost estimates including

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1) Construction includes major improvements and repairs, renovation, restoration.

working drawings, specifications regarding materials to be used, method of installation, time limitations and other specifications necessary for tender submission and construction and expert advice to the client at the time of calling for and accepting tenders; services during the construction phase. [Excluded are engineering services for buildings if they are an integral part of the engineering design service for a civil work or production plant or facility.

89323 - Engineering design services for mechanical and electrical installations for buildings - Mechanical and Electrical engineering design services for the power system, lighting system, fire alarm system, communication system and other electrical installations for all types of buildings and/or the heating, ventillating, air conditioning, refrigeration and other mechanical installations for all types of buildings. Design services consist of one or a combination of the following: preliminary plans, specifications and cost estimate to define the engineering design concept; final plans, specifications and cost estimates including working drawings, specifications regarding materials to be used, method of installation, time limitations and other specifications necessary for tender submission and construction and expert advice to the client at the time of calling for and accepting tenders; services during the construction phase.

89324 - Engineering design services for the construction of civil works - Engineering design services for the construction of civil works such as bridges and viaducts, dams, catchment basins, retaining walls, irrigation systems, flood control works, tunnels, highways and streets including interchanges and related work, locks, canals, wharves and harbours works, water supply and sanitation works such as water

distribution systems, water, sewage, industrial and solid waste treatment plants and other civil engineering projects. Design services consist of one or a combination of the following: preliminary plans, specifications and cost estimates to define the engineering design concept; final plans, specifications and cost estimates including working drawings, specifications regarding materials to be used, method of installation, time limitations and other specifications necessary for tender submission and construction and expert advice to the client at the time of calling for and accepting tenders; services during the construction phase. (Included are engineering design services for buildings if they are an integral part of the engineering design for a civil work.)

89325 - Engineering design services for industrial process and production - Engineering design services for production process, procedures and facilities. Included here are design services as they relate to methods of cutting, handling and transporting logs and logging site layout; mine development layout and underground construction, the complete civil, mechanical and electrical mine surface plant installations including hoists, compressors, pumping stations, crushers, conveyors and ore and waste handling systems; oil and gas recovery procedures, the construction, installation and/or maintenance of drilling equipment, pumping stations, treating and storage facilities and other oil field facilities; materials flows, equipment layout, material handling systems, processes and process control (which may integrate computer technology) for manufacturing plants; special machinery, equipment and instrumentation systems; any other design services for production procedures and facilities. Design services consist of one or a combination of the following; preliminary plans, specification and cost estimate to define the engineering design concept; final plans, specifications and cost

estimate including working drawings, specifications regarding equipment and materials to be used, method of construction and/or installation, time limitations and other specifications necessary for tender submission and construction and expert advice to the client at the time of calling for and accepting tenders; services during the installation phase. [Included are engineering design services for buildings if they are an integral part of the engineering design service for a production plant or facility.]

89326 - Engineering design services n.e.c. - Other specialty engineering design services. Included here are accoustical and vibration engineering design, traffic control systems engineering design, prototype development and detailed design for new products and any other specialty design services.

89327 - Engineering services during the construction and installation phase - Advice and technical assistance to the client during construction to ensure that construction work is in conformity with the final design. This service involves both office and field activities such as the review of shop drawings, periodic visits to the site to assess progress and quality of the work, guiding the client and the contractor in the interpretation of contract documents and any other advice on technical questions that may develop during construction.

89329 - Other engineering services - Engineering services not elsewhere classified. Included here are geotechnical engineering services providing engineers and architects with necessary subsurface information to design various projects; groundwater engineering services including groundwater resources assessment, contamination studies and

quality management; corrosion engineering services including inspection, detection and corrosion control programs; failure investigations and other services provided by consulting engineer establishments which require the expertise of engineers. [Excluded are services which are the primary products of other industries such as real estate and land assembly, construction management etc., even if they are provided by consulting engineering firms.]

**8933 - Integrated engineering services**

89331 - Integrated engineering services for transportation infrastructure turnkey projects <sup>2</sup> - Fully integrated engineering services for the construction of transportation infrastructure turnkey projects. This service includes planning and pre-investment studies, preliminary and final design, cost estimate, construction scheduling, inspection and acceptance of contract work and can include technical services such as the selection and training of personnel and the provision of operation and maintenance manuals and any other services provided to the client by the engineering establishment which form part of an integrated bundle of services for a turnkey project.

89332 - Integrated engineering and project management services for water supply and sanitation works turnkey projects <sup>2</sup> - Fully integrated engineering services for the construction of water supply and sanitation works turnkey projects. This service includes planning and pre-investment studies, preliminary and final design, cost estimates, construction scheduling, inspection and acceptance of contract and can include technical services such as the selection and training of personnel and the provision of operation and maintenance manuals and any other services provided to the client by the engineering establishment which forms part of an integrated bundle of services for a turnkey project.



89333 - Integrated engineering services for the construction of manufacturing turnkey projects <sup>2</sup> - Fully integrated engineering services for the construction of manufacturing facilities turnkey project. This service includes planning and pre-investment studies to address issues such as the integration of operations, site selection, pollution and effluent control and capital requirements; all necessary structural, mechanical and electrical design services; production process engineering design services including detailed process flow diagram, general site and plant arrangement drawings, plant and equipment specifications; tender specifications; construction scheduling inspection and acceptance of work and can include technical services such as the selection and training of personnel, the provision of operations and maintenance manuals, start-up assistance and any other services provided by the engineering establishment which form part of an integrated bundle of services for a turnkey project.

89339 - Integrated engineering services for other turnkey projects <sup>2</sup> Fully integrated engineering services for other construction works. This service includes planning and pre-investment studies, preliminary and final design, cost estimates, construction scheduling, inspection and acceptance of contract and can include technical services such as the selection and training of personnel and the provision of operation and maintenance manuals and any other services provided to the client by the engineering establishment which form part of an integrated bundle of services for a turnkey project.

2) - Project management services such as cost control and accounting, procurement, coordination of the contractor's and consultant's work etc. may be provided by engineering establishment but are charged for seperately.

**8934 - Urban planning and landscape architectural services**

**89341 - Urban planing** - Development of programs regarding land use, site selection, control and utilization, road systems and servicing of land with a view to create and maintain systematic, coordinated urban development.

**89342 - Landscape architectural services** - Plan and design services for the aesthetic landscaping of parks, commercial and residential land, etc. This service consist of preparing site plans, working drawings, spcecifications and cost estimates for land development, showing ground contours, vegetation to be planted, and facilities such as walks, fences and parking areas. Also included is the inspection of the work during construction.

**8935 - Related scientific and technical consulting services**

**89351 - Geological, geophysical and other scientific prospecting services** - Geological, geophysical, geochemical and other scientific consulting services as they relate to the location of mineral deposits, oil & gas and ground water by studying the properties of the earth and rock formations and structures. Included here are the services of analysing the results of subsurface surveys, the study of earth sample and core, and assistance and advice in developing and extracting mineral resources.

**89352 - Subsurface surveying services** - The gathering of information on subsurface earth formations by different methods including seismographic, gravimetric, magnetometric and other subsurface surveying methods.

**89353 - Surface surveying services** - The gathering of information on the shape, position and/or boundaries of a portion of

the earth's surface by different methods including transit, photogrammetric and hydrographic surveying, for the purpose of preparing maps.

89354 - Map making services - This service consist of the preparation and revision of maps of all kinds (e.g. road, cadastral, topographic, planimetric, hydrographic) using results of survey activities, other maps, and other information sources.

8936 - Technical testing and analysis services

89361 - Composition and purity testing and analysis - This service consists of the testing and analysis of the chemical and biological properties of materials such as air, water, waste (municipal and industrial), fuels, metal, soil, minerals, food, chemicals, chemical products, etc. Included is the testing and analysis in related scientific fields such as microbiology, biochemistry, bacteriology, etc. Excluded are medical and dental testing activities.

89362 - Testing and analysis of physical properties - This service consists of the testing and analysis of physical properties such as strength, ductility, electrical conductivity and radio activity of materials such as metal, plastics, textiles, wood, glass, concrete and other materials. Included are tests for tension, hardness, impact resistance, fatigue resistance, and high-temperature effects.

89363 - Testing and analysis of integrated mechanical and electrical systems - This service consists of the testing and analysis of the mechanical and electrical

characteristics of complete machinery, motors, automobiles, tools, appliances, communication equipment and other equipment incorporating mechanical and electrical components. The results of the testing and analysis generally take the form of an assessment of the performance and behavioral characteristics of the object tested. Tests may be performed using models or work-ups of ships, aircraft, dams, etc.

89364 - Technical inspection services - This service groups a variety of tests and analyses of a technical or scientific nature which do not alter or affect the object being tested. Included are radiographic, magnetic, and ultrasonic testing of machine parts and structures conducted in order to identify defects. These tests are often conducted on site. Excluded are inspections of a non technical or scientific nature such as visual inspection of building, machine, etc. Also excluded are governmental inspection services.

89369 - Other technical testing and analysis - This service regroups all other technical testing and analysis not elsewhere classified. Excluded is seed testing.