

Measuring Intangible Investment

Treatment of the Components of Intangible Investment in the 1993 System of National Accounts

by

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ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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CHAPTER 1. GENERAL TREATMENT

1.1 The distinction between consumption and capital formation

"The issue is not simply whether to classify certain *flows* as consumption or capital formation but how to achieve an economically meaningful and feasible set of accounting procedures for the *assets* acquired through gross fixed capital formation within an integrated coherent set of accounts encompassing past and future periods as well as the present." (CEC *et al.*, 1993, para. 1.55).

These must be *economic assets*. "These are defined as entities:

- over which ownership rights are enforced by institutional units, individually and collectively;
- and from which economic benefits may be derived by their owners by holding them and using them over a period of time." (*op. cit.*, para. 10.2).

1.2 Treatment of the components of intangible investment

As can be seen from Table 1, three of the core components of intangible investments are deemed to be such an economic asset. Of the "other components", patenting, goodwill and subscription to databases (included with software) also pass the asset test. Further details of the treatment of these categories are given in Chapter 2 of this paper.

R&D training, marketing and the rest of the other proposed components are not treated as capital expenditures.

Table 1. **Treatment of the components of intangible investment in the 1993 System of National Accounts**

Capital items (SNA)	Non-capital items (SNA)
<i>Core components</i>	
Software	R&D
Mineral exploration	Training
Rights	Marketing
<i>Other components</i>	
Subscriptions to databases	Engineering and design
Patenting	Development of the organisation
Goodwill	Remuneration for innovative ideas
	Other human resource development

The argument is as follows:

"Expenditures by enterprises on activities such as staff training or research and development are not the type of intermediate inputs whose consumption is determined by the level at which production is carried out in the current period but are designed to raise productivity or increase the range of production possibilities in the future, in much the same way as expenditures on machinery, equipment, buildings and other structures. However, expenditures on training and research or development do not lead to the creation of assets that can be easily identified, quantified and valued for balance sheet purposes. Such expenditures continue to be classified as intermediate consumption therefore even though it is recognised that they are undertaken for the purpose of trying to secure future benefits. In fact, many other expenditures undertaken by enterprises may also have impacts in future periods as well as the current period: for example, market research, advertising and expenditures on health and safety that affect the well being and attitudes of the work force". (*op. cit.*, para. 51).

Nevertheless proposals are made to make certain of them separately available in the SNA as follows:

Functional Classification	Satellite accounts
R&D	R&D
Engineering and related technological work	Database work (data processing)
Sales promotion	(All education)
(Employee training, welfare and morale)	

Specific instructions for the treatment of training, R&D, etc., in the revised SNA are outlined in Chapter 3 of this paper.

1.3 Changes from the 1968 SNA

"The 1993 SNA treats expenditures on mineral exploration as gross capital formation resulting in the creation of an intangible fixed asset (AN.1121) under produced assets. All expenditures are included, no matter whether the exploration is successful or not. The average service lives similar to those used by mining or oil corporations in their own assets are suggested as the appropriate guide for the amortisation period. The 1968 SNA treated expenditures on mineral exploration as intermediate consumption.

The 1993 SNA treats systems and standard applications computer software that a producer expects to use in production for more than one year as an intangible fixed asset (AN.1122), no matter whether the computer software is purchased in the market -- separately or together with the hardware -- or developed in-house. It also includes data bases which the enterprise expects to use for more than one year. The 1968 SNA was interpreted as treating expenditures on software which is bought as an integral part of a major hardware purchase as capital formation, but software purchased or developed independently was treated as intermediate consumption.

The 1993 SNA includes in output literary or artistic works (i.e. the writing of books, composing music, etc.) which are produced for sale whether they are produced by employees or by self-employed workers. Furthermore, it recognises that these outputs can contribute to production in subsequent periods and therefore treats expenditures on these outputs as gross capital formation resulting in the creation of an intangible fixed asset (AN.1123). Consequently, fees, commissions, royalties, etc., stemming from licensing others to make use of the works are treated as payments for services rendered. Accordingly, copyrights no longer appear as non-financial non-produced intangible assets giving rise to property income, as they did in the 1968 SNA.

Like the 1968 SNA, the 1993 SNA continues to treat expenditures on research and development as intermediate consumption, not capital formation. However, it recommends that these expenditures be identified within intermediate consumption to facilitate the development of satellite accounts for research and development. Consequently, there are no fixed produced assets in the accounts to which the legal title of a patent can be linked. Thus, purchase/sale of patents continue to be treated, as in the 1968 SNA, as net purchases of intangible non-produced assets, where the assets to be recorded under 'patented entities' (AN.221) are the patented inventions, discoveries or processes that are the result of research and development activity and not the legal titles themselves. It should be noted, however, that the 1993 SNA, by convention, does include licensing related services in output and, therefore, royalty and similar payments in respect of patent licenses are considered payment for services and not property income as in the 1968 SNA. The same treatment is applied to payments for services of trademarks and franchising in respect of other non-produced intangible assets." (*op. cit.*, Annex 1, paras. 66-69).

CHAPTER 2. TREATMENT OF COMPONENTS OF INTANGIBLE INVESTMENT WHICH ARE CONSIDERED AS CAPITAL FORMATION IN THE REVISED SNA

2.1 Definitions and coverage

Two kinds of assets are involved:

- intangible produced fixed assets
- intangible non-produced assets.

2.1.1 *Intangible fixed assets (AN.112)*

"Fixed assets that consist of mineral exploration, computer software, entertainment, literary or artistic originals and other intangible fixed assets, as defined below, intended to be used for more than one year.

2.1.1.1 *Mineral exploration (AN.1121)*

The value of expenditures on exploration for petroleum and natural gas and for non-petroleum deposits. These expenditures include pre-license costs, license and acquisition costs, appraisal costs and the costs of actual test drilling and boring, as well as the costs of aerial and other surveys, transportation costs, etc., incurred to make it possible to carry out the tests.

2.1.1.2 *Computer software (AN.1122)*

Computer programs, program descriptions and supporting materials for both systems and applications software. Included are purchased software and software developed on own account, if the expenditure is large. Large expenditures on the purchase, development or extension of computer databases that are expected to be used for more than one year, whether marketed or not, are also included.

2.1.1.3 *Entertainment, literary or artistic originals (AN.1123)*

Original films, sound recordings, manuscripts, renderings, models, etc. on which drama performances, radio and television programming, musical performances, sporting events, literary and artistic output, etc., are recorded or embodied. Included are works produced on own account. In some cases, such as films, there may be multiple originals.

2.1.1.4 *Other intangible fixed assets (AN.1129)*

New information, specialised knowledge, etc. not elsewhere classified, whose use in production is restricted to the units that have established ownership rights over them or to other units licensed by the latter". (*op. cit.*, Chapter 13, Annex "Definition of Assets", pp. 307-308).

2.1.2 *Intangible non-produced assets (AN.22)*

"Non-produced assets that are constructs of society. They are evidenced by legal or accounting actions, such as the granting of a patent or the conveyance of some economic benefit to a third party. Some entitle their owners to engage in certain specific activities and to exclude other institutional units from doing so except with the permission of the owner. Intangible non-produced assets consist of patented entities, leases and other transferable contracts purchased goodwill and other intangible non-produced assets.

2.1.2.1 *Patented entities (AN.221)*

Inventions in categories of technical novelty that, by law or by judicial decision, can be afforded patent protection. Examples include constitutions of matter, processes, mechanisms, electrical and electronic circuits and devices, pharmaceutical formulations and new varieties of living things produced by artifice.

2.1.2.2 *Leases and other transferable contracts (AN.222)*

Leases or contracts where the lessee has the right to convey the lease to a third party independently of the lessor. Examples include leases of land and buildings and other structures, concessions or exclusive rights to exploit mineral deposits or fishing grounds, transferable contracts with athletes and authors and options to buy tangible assets not yet produced. Leases on the rental of machinery are excluded from non-financial intangible assets.

2.1.2.3 *Purchased goodwill (AN.223)*

The difference between the value paid for an enterprise as a going concern and the sum of its assets less the sum of its liabilities, each item of which has been separately identified and valued. The value of goodwill, therefore, includes anything of long-term benefit to the business that has not been separately identified as an asset, as well as the value of the act that the group of assets is used jointly and is not simply a collection of separable assets.

2.1.2.4 *Other intangible non-produced assets(AN.229)*

Intangible non-produced assets not elsewhere classified." (*op. cit.*, Chapter 13, Annex "Definition of Assets", p. 310).

2.2 Measurement

2.2.1 *General recording of gross fixed capital formation and transfers of ownership*

"Gross fixed capital formation is measured by the value of its acquisitions less disposals of new or existing assets. The time at which gross fixed capital formation is recorded is when the ownership of the fixed assets is transferred to the units that intend to use them in production. This time is generally later than the time when they are produced, and not necessarily the time at which they are actually put to use.

An existing fixed asset can be sold and its ownership passes from its original owner to another. The value of an existing fixed asset has already been included in gross fixed capital formation -- or in final consumption expenditure in some instances -- of at least one user at some earlier point of time. When ownership of an existing fixed asset is transferred, it is recorded as a positive acquisition for the new owner and as a negative (a disposal) for the previous owner."

2.2.2 *Intangible fixed assets*

"Acquisitions less disposals of intangible fixed assets constitute the remaining component of gross fixed capital formation to be discussed. They share with tangible fixed assets the characteristics that they are both produced as outputs from processes of production and are themselves used repeatedly or continuously in other processes of production. Intangible fixed assets (*op. cit.*, paras. 15.86, 15.87, 15.89), for example, computer software or artistic originals whose use in production is restricted to the units that have established ownership rights over them or to other units licensed by the latter. Major improvements to these assets count as acquisitions; for example the enhancement and extension of software systems" (*op. cit.*, para. 10.89).

2.2.2.1 *The production of originals and copies*

"The production of books, recordings, films, software, tapes, disks, etc. is a two-stage process of which the first stage is the production of the original and the second stage the production and use of copies of the original. The output of the first stage is the original itself over which legal or *de facto* ownership can be established by copyright, patent or secrecy. The value of the original depends on the actual or expected receipts from the sale or use of copies at the second stage, which have to cover the costs of the original as well as costs incurred at the second stage.

The output of the first stage is an intangible fixed set that belongs to the originator (author, film company, program writer, etc.). It may be produced for sale or for own-account gross fixed capital formation by the original producer. The asset may be sold at any time to another institutional unit so that it is convenient to refer to the owner of the asset rather than the originator, although they are often one and the same unit. If the original is sold when it has been produced, the value of the output of the original is given by the price paid. If it is not sold, its value could be estimated on the basis of its production costs with a mark-up. However, the size of any mark-up must depend on the discounted value of the future receipts expected from using it in production, so that it is effectively this discounted value, however uncertain, that determines its value.

The owner of the asset may use it directly or to produce copies in subsequent periods. Consumption of fixed capital is recorded in respect of the asset in the same way as for any other capital asset used in production.

The owner may also license other producers to make use of the original in production. The latter may produce and sell copies, or use copies in other ways: for example, for film or music performances. In these cases, the owner is treated as providing services to the licensees that are recorded as part of their intermediate consumption. The payments made by the licenses may be described in various ways, such as fees, commissions or royalties, but however they are described they are treated as payments for services rendered by the owner. The use of the asset is then recorded as consumption of fixed capital in the production account of the owner. The services produced by the owner are valued by the fees, commissions or royalties, etc. received from the licensees." (*op. cit.*, paras. 6.143 - 6.146).

2.2.2.2 *Mineral exploration*

"Mineral exploration is undertaken in order to discover new deposits of minerals or fuels that may be exploited commercially. Such exploration may be undertaken on own account by enterprises engaged on mining or the extraction of fuels. Alternatively, specialised enterprises may carry out exploration either for their purposes or for fees. The information obtained from exploration influences the production activities of those who obtain it over a number of years. The expenditures incurred on exploration within a given accounting period, whether undertaken on own account or not, are therefore treated as expenditures on the acquisition of an intangible fixed asset and included in the enterprise's gross fixed capital formation.

The expenditures included in gross fixed capital formation include not only the costs of actual test drillings and borings, but also the costs incurred to make it possible to carry out tests, for example, the costs of aerial or other surveys, transportation costs, etc. The value of the resulting asset is not measured by the value of new deposits discovered by the exploration but by the value of the resources allocated to exploration during the accounting period. Consumption of fixed capital may be calculated for such assets by using average services lives similar to those used by mining or oil corporations in their own accounts." (*op. cit.*, paras. 10.90-10.91).

"Mineral exploration should be valued either on the basis of the amounts paid under contracts awarded to other institutional units for the purpose or on the basis of the costs incurred for exploration undertaken on own account. That part of exploration undertaken in the past that has not yet been fully written off should be revalued at the prices and costs of the current period." (*op. cit.*, para. 13.43).

2.2.2.3 *Computer software*

"Computer software that an enterprise expects to use in production for more than one year is treated as an intangible fixed asset. Such software may be purchased on the market or produced for own use. Acquisitions of such software are therefore treated as gross fixed capital formation. Software purchased on the market is valued at its purchaser's prices while software developed in-house is valued at its estimated basic price, or at its costs of production if it is not possible to estimate the basic price." (*op. cit.*, para. 10.92).

"Computer software should be valued on the basis of the purchasers' price paid for the software or, in the absence of estimated market prices, on the basis of costs of production when produced in house.

Software acquired in previous years and not yet fully written down should be revalued at current prices or costs (which may be less than the original price or cost)." (*op. cit.*, para. 13.44).

"Gross fixed capital formation in software also includes the purchase or development of large data bases that the enterprise expects to use in production over a period of time of more than one year. These data bases are valued in the same way as software, described above." (*op. cit.*, para. 10.93).

2.2.2.4 *Entertainment, literary or artistic originals*

"Originals consist of the firms, sound recordings, manuscripts, renderings, models, etc. on which drama performances, radio and television programming, musical performances, sporting events, literary and artistic output, etc. are recorded or embodied.

The acquisition of an original constitutes gross fixed capital formation. The original is often retained by its producer, but it may also be sold after it has been produced in order to be exploited by another unit. When it is sold the gross fixed capital formation is measured by the price paid by the purchaser to acquire the asset. If it is not sold, its valuation may be difficult because it depends on the future benefits that the owner expects to derive. These benefits may be very difficult to estimate in advance. In the absence of other information, it may be necessary to value the original by its costs of production, as in the case of many other kinds of output produced for own gross fixed capital formation." (*op. cit.*, paras. 10.94 - 10.95).

"Entertainment, literary or artistic originals and other intangible fixed assets should be valued at the purchasers' price when the intangible assets are actually traded on markets. In the case of intangible assets that have been produced on own account, it may be necessary to value them on the basis of their costs of production, appropriately revalued at prices of the current period and written down. Otherwise, it may be necessary to use estimates of the present value of the expected future receipts to be received by the owners of such assets." (*op. cit.*, para. 13.45).

2.2.3 *Intangible non-produced assets*

2.2.3.1 *Economic appearance of non-produced assets (K.3)*

"By definition, non-financial non-produced assets are not created by processes of production. Thus, they are not among the assets that result from gross capital formation, as recorded in the Capital Account. Some of these assets occur in nature, and others come into existence in ways other than through processes of production as what may be referred to as constructs devised by society. The cases below represent the additions to the volume of these kinds of assets. The term 'appearance' is used to contrast with additions that are the result of processes of production as defined in the System." (*op. cit.*, para. 12.14).

"Non-financial intangible non-produced assets are constructs devised by society evidenced by legal or accounting actions. They make their appearance in the System when entities are patented, transferable contracts are written, or enterprises are sold at prices that exceed the net worth of the enterprise in question, etc. The patenting consists of the entity being granted legal protection by law or judicial decision. The writing of transferable contracts consists of the coming into force of a binding

agreement that provides some economic benefit that can be passed on to a third party independently of the provider of that benefit."

When an enterprise is sold at a price which exceeds its net worth, this excess of purchase price over net worth is the asset 'purchased goodwill'. Goodwill that is not evidenced by a sale/purchase is not considered an economic asset: the only way that goodwill enters the System is for such a purchase to occur. Two cases must be distinguished. For the sale/purchase of an unincorporated enterprise not treated as a quasi-corporation, the purchased goodwill represents the excess of the purchase price of this enterprise over its net worth (derived from its separately identified and valued assets and liabilities). Conceptually, the entries are as follows. Prior to the sale, the excess of the purchase price of an enterprise over its net worth enters the balance sheet of the seller, via the other changes in the volume of assets account, as an economic appearance of a non-produced asset so that the enterprise can be sold at its purchase price; this excess is then disposed of by the seller as 'disposals of intangible non-produced assets' in the capital account and acquired by the purchaser as 'acquisitions of intangible non-produced assets' in the capital account. The purchased goodwill is then recorded in the closing balance sheet of the purchaser. For the sale/purchase of a corporations or quasi-corporation, the purchased goodwill represents the excess of the purchase price of its shares and other equity over their value just prior to the sale/purchase. This excess enters the balance sheet of the seller of shares and other equity prior to the sale as a revaluation of a financial asset so that the shares and other equity can be sold at their purchase price. At the same time, the purchased goodwill enters the other changes in the volume of assets account as an economic appearance of an intangible non-produced asset and is recorded as such in the closing balance sheet of this corporation or quasi-corporation. The sales and purchases of the shares and other equity are recorded in the financial accounts of the seller and the purchaser. (*op. cit.*, paras. 12.21-12.22).

2.2.3.2 *Write-off and cancellation of purchased goodwill, transferable contracts, etc., and exhaustion of patent protection*

"Just as the appearance of intangible non-produced assets is recorded in the other change in the volume of assets account, so is their write-off, termination, or exhaustion. For purchased goodwill, amortisation should be recorded over a period of time after the purchase of an enterprise, following country accounting standards; the exhaustion of patent protection should be recorded over the duration of the patent." (*op. cit.*, para. 12-34).

2.2.3.3 *Acquisitions less disposals of intangible non-produced assets*

The value of the acquisitions or disposals of leases or other transferable contract recorded in the capital account consists of payments made to the original or subsequent tenants or lessees when the leases or concessions are sold or transferred to other institutional units. The value of acquisitions of intangible non-produced assets include the associated costs of ownership transfer incurred by the purchaser while disposals are valued after deducting the costs of ownership transfer incurred by the seller. The costs of ownership transfer are a component of gross fixed capital formation." (*op. cit.*, para. 10.130).

2.2.3.4 *Valuation of intangible non-produced assets*

"Intangible non-produced assets entitle their owners to engage in certain specific activities or to produce certain specific goods or services and to exclude other institutional units from doing so except with the permission of the owner. The owners of the assets may be able to earn monopoly profits by

restricting the use of the assets to themselves. Included are patented entities, leases and other transferable contracts, and purchased goodwill.

Whenever possible, intangible assets should be valued at current market prices when they are actually traded on markets. Otherwise, it may be necessary to use estimates of the present value of the expected future returns to be received by the owners of such assets. For purchased goodwill, a valuation should be at acquisition cost less accumulated amortisation." (*op. cit.*, paras. 13.62-13.63)

2.2.4 Capital stock and consumption of fixed capital

2.2.4.1 General recording of capital stock and consumption of fixed capital

The *capital stock* is the value, at a given point in time, of the fixed capital assets in producers' establishments that are available to participate in the productive process. 'Capital assets' consist of all the items that are included in Gross Fixed Capital Formation as defined in the System; 'producers' include non-market as well as market producers.

The capital stock is an essential component of the balance sheets of the System and capital stock statistics are also needed to estimate consumption of fixed capital, which is an entry in both the production and accumulation accounts of the System and which also appears in the distribution of income accounts in moving from gross to net concepts of income and saving.

"The categories of fixed assets to be included are the following:

- a) Tangible fixed assets: dwellings, other buildings and structures, machinery and equipment, and cultivated fixed assets (livestock for breeding, dairy, draught, etc., and vineyards, orchards and other plantations of trees yielding repeat products);
- b) Intangible fixed assets: mineral exploration, computer software, entertainment, literary or artistic originals, and other intangible fixed assets.

The so-called 'perpetual inventory method' is usually employed to obtain estimates of the current values of the gross and net stocks needed for the analysis of production and productivity growth and for balance sheet purposes. In the central framework of national accounts, the stock data should be valued by writing down the current market prices of these assets by the cumulative consumption of fixed capital valued at current replacement costs which has occurred since the time they were acquired for purposes of production. The net basis (i.e. stocks of fixed assets, net) would be consistent with the concepts used in the balance sheet of the institutional sectors. However, in order to obtain productivity measures -- to match similar data on labour inputs -- data on gross stocks of fixed assets by industries are useful as well." (*op. cit.*, paras. 15.100-15.101).

"*Consumption of fixed capital* constitutes a negative change in the value of the fixed assets used for production. It covers both tangible fixed assets and intangible fixed assets, such as mineral exploration costs and software. Consumption of fixed capital must be measured with reference to a given set of prices, i.e. the average prices of the period. It may then be defined as the decline, between the beginning and the end of the accounting period, in the value of the fixed assets owned by an enterprise, as a result of their physical deterioration and normal rates of obsolescence and accidental damage. The value of a fixed asset depends upon the benefits that can be expected from using it in production over the remainder of its

service life. This value is given by the present discounted value, calculated at the average prices of the period, of the stream of rentals that the owner of a fixed asset could expect if it were rented out to producers over the remainder of its service life. Consumption of fixed capital is then measured by the proportionate decline in this value between the beginning and end of the accounting period.

Consumption of fixed capital thus measures the decline in the usefulness of a fixed asset for purposes of production. It is a measure that depends on the productive potential of an asset over its normal service life. The value of a fixed asset at any point in time inevitably involves expectations about the future, but this is true of virtually all assets including financial assets and valuables. It is possible to derive reasonable estimates of the consumption of fixed capital on the basis of the average service lives of assets and simple assumptions about the rates of decline of their efficiency in production over time. Despite elements of uncertainty, producers and users of fixed assets have to take views about their values in practice, and markets in which new and existing fixed assets are actively traded provide information that should be taken into account in calculating consumption of fixed capital. Consumption of fixed capital has also to be calculated in respect of major improvements to non-produced assets and costs of ownership transfer associated with non-produced assets as these add to the value of such assets and are a component of gross fixed capital formation." (*op. cit.*, paras. 10.118-10.119).

2.2.4.2 *Consumption of intangible assets*

Methods of measuring consumption of fixed capital are discussed at length in Chapter 6 of the 1993 SNA and the associated annex. However no special guidance is given on how to apply the recommended methods to intangible assets other than in the passages already cited above. Similarly intangible assets are not treated specifically in Chapter 16 on price and volume measures.

CHAPTER 3. TREATMENT OF COMPONENTS OF INTANGIBLE INVESTMENT WHICH ARE NOT CONSIDERED AS CAPITAL FORMATION IN THE REVISED SNA

3.1 Treatment of other core intangibles in the Production Account

"Research and development are undertaken with the objective of improving efficiency or productivity or deriving other future benefits so that they are inherently investment -- rather than consumption -- type activities. However, other activities, such as staff training, market research or environmental protection, may have similar characteristics. In order to classify such activities as investment type it would be necessary to have clear criteria for delineating them from other activities, to be able to identify and classify the assets produced, to be able to value such assets in an economically meaningful way and to know the rate at which they depreciate over time. In practice, it is difficult to meet all these requirements. By convention, therefore, all the outputs produced by research and development, staff training, market research and similar activities are treated as being consumed as intermediate inputs even though some of them may bring future benefits." (*op. cit.*, para. 6.163).

"Research and development by a market producer is an activity undertaken for the purpose of discovering or developing new products, including improved versions or qualities of existing products, or discovering or developing new or more efficient processes of production." (*op. cit.*, para. 6.142).

Research and development is not an ancillary activity like purchasing, bookkeeping, storage and maintenance which tend to be found to some extent or other in all establishments. When research and development is carried out on a significant scale with an enterprise, it would be desirable to identify a separate establishment for it so that the relevant inputs and outputs could be distinguished for analytical purposes. (Similarly, when an enterprise engages in activities such as staff training or market research on a significant scale, it would be desirable for separate establishments to be identified so that information about those activities becomes more accessible for analytical or policy purposes.) The research and development undertaken by market producers enterprises on their own behalf should, in principle, be valued on the basis of the estimated basic prices that would be paid if the research were subcontracted commercially, but is likely to have to be valued on the basis of the total production costs, in practice.

"The output produced has then to be treated as being delivered to the establishment, or establishments, which make up the rest of the enterprise and included in their intermediate consumption. When there are several other establishments, the amounts of research and development delivered can be distributed in proportion to their value added, or total costs, in much the same way that the output of head offices or other central facilities has to be allocated." (*op. cit.*, paras. 6.142 and 6.164 combined).

"When an enterprise contracts an outside agency to undertake research and development, staff training, market research or similar activities on its behalf, the expenditures incurred by the enterprise are treated as purchases of services used for purposes of intermediate consumption." (*op. cit.*, para. 6.165).

"Research and development undertaken by specialised commercial research laboratories or institutes is valued by receipts from sales, contracts, commissions, fees, etc. in the usual way.

Research and development undertaken by government units, universities, non-profit research institutes, etc. is non-market production and is valued on the basis of the total costs incurred including the imputed rentals on own buildings. The activity of research and development is different from teaching and is classified separately in ISIC. In principle, the two activities ought to be distinguished from each other when undertaken within a university or other institute of higher education, although there may be considerable practical difficulties when the same staff divide their time between both activities. There may also be interaction between teaching and research which makes it difficult to separate them, even conceptually, in some cases." (*op. cit.*, para. 6.142).

3.2 Identification of other intangibles in functional classifications

3.2.1 Functional classifications

"Functional" classifications are proposed in the System for classifying certain transactions of producers and of three institutional sectors -- namely households, general government and non-profit institutions serving households. They are described as "functional" classifications because they identify the "functions" -- in the sense of "purposes" or "objectives" -- for which these groups of transactors engage in certain transactions. The classifications concerned are:

- Classification of individual consumption by purpose
- Classification of the functions of government
- Classification of the purposes of non-profit institutions serving households
- Classification of outlays of producers by purpose." (*op. cit.*, para. 18.1).

They are intended to serve several purposes of which one is "to provide users with the means to recast key aggregates of the system for particular kinds of analyses, some of which are described in Chapter 21. For example:

- a) It can be argued that for several analytic purposes, the SNA definition of gross capital formation is too narrow. In studies of labour productivity, researchers often need a measure of "human capital" which is normally derived from information on past expenditures on education. The four functional classifications therefore identify expenditures on education incurred by households, government, non-profit institutions and producers.
- b) In studying the process of economic growth, researchers sometimes prefer to treat some or all research and development (R&D) expenditures as capital formation rather than as consumption expenditure. Both classification of outlays of producers by purpose and classification of the purposes of PNP institutions and report R&D separately; classification of the functions of government does not presently identify all R&D undertaken by government but it may be possible to do so in a revised version of this classification." (*op. cit.*, para. 18.4).

"In principle, the unit of classification for these four classifications is a transaction or group of transactions; what are being classified are actual or imputed expenditures made in connection with particular functions or to achieve particular purposes. In practice, it will not always be possible to work at such a detailed level." (*op. cit.*, para. 18.6).

3.2.2 *The classification of selected outlays of producers by purpose (COPP)*

"The classification of outlays of producers by purpose is used to classify certain expenditures by producers -- namely intermediate consumption, compensation of employees, other taxes less subsidies on production, consumption of fixed capital and gross fixed capital formation.

In principal, COPP applies to all producers, whether market or non-market, although not all the classifications are of equal interest for both kinds of producers; for example "Outlays on sales promotion" will not usually apply to non-market producers. It is probable that, in practice COPP will mainly be of interest for classifying transactions of market-producers. There is currently very little experience with classifications of this kind. Although the classifications units should be transactions, it seems likely that in practice they will often have to be 'cost-centres' or other units mainly serving a particular purpose, such as sales promotion, book-keeping, employee training, etc." (*op. cit.*, paras. 18.3-18.4).

The classification is given in Table 2. "It is provisional and may be substantially revised before it can be published." (*op. cit.*, para. 18.5).

3.2.3 *Treatment of other intangibles in COPP*

It is the COPP which is most relevant to the intangibles exercise. As can be seen from Table 2, it will identify outlays on R&D, on one element of marketing (sales promotion) and on engineering and related technological work. However, it merges training with other outlays on employee welfare and morale.

Table 2. **Classification of selected Outlays of Producers by Purpose (COPP)**

Categories of COPP	P.2	D.1	D.29-D.39	K.1	P.51
1. Outlays on current production programmes					
2. Outlays on repair and maintenance					
3. Outlays on engineering and related technological work					
4. Outlay on research and development					
5. Outlays on pollution abatement and control					
6. Outlays on sales promotion					
7. Outlays on external transportation					
8. Outlays on employee training, welfare and morale					
9. Outlays on general administration					

P.2 Intermediate consumption.
D.1 Compensation of employees.
D.29-D.39 Other taxes less subsidies on production.
K.1 Consumption of Fixed Capital.
P.51 Gross Fixed Capital Formation.

Source: *op. cit.*, Table 18.4.

3.3 Proposals for satellite accounts

3.3.1 General approach

"The central framework of the SNA presents a number of characteristics which give it the advantages of an integrated accounting structure. It is exhaustive and consistent within the boundary of the economic activities it covers; that is to say, each unit, transaction, product and purpose is given a place, and only one, in the classifications and accounts of the System. Moreover, the set of concepts adopted by the System is fully coherent.

The counterpart of these benefits is that there are certain limitations as to what may be accommodated directly in the central framework ..."

As already indicated in several earlier chapters, the SNA does not claim that its categories and concepts are in all cases the only right ones. Additional or different requirements necessitate the development of complementary or alternative categories and concepts.

Satellite accounts or systems generally stress the need to expand the analytical capacity of national accounting for selected areas of social concern in a flexible manner, without overburdening or disrupting the central system. (*op. cit.*, from paras. 21.1-21.4).

"Broadly speaking, two types of satellite analysis may be distinguished in their relation with the central framework of the SNA. One type involves some rearrangement of central classifications and the introduction of complementary elements that differ from the conceptual central framework (like the

identification of the output of ancillary activities) without drastically diverging from the concepts on which the central framework is built. These constructs are not based on nor emphasise alternative concepts, even when they use some on a complementary basis. This first type of analysis mostly covers accounts specific to given fields like education, tourism and environmental protection expenditures. Introducing their content into the central framework would overburden it and would not be totally possible; doing it in a specific, satellite, accounting framework allows additional margins of flexibility.

The second type of satellite analysis is mainly based on concepts that are alternatives to the ones of the SNA. A different production boundary or enlarged concepts of consumption and capital formation may be introduced, or the scope of assets may be extended, the borderline between economic phenomena as covered by the central framework and natural phenomena may be displaced, the links between income and wealth may be put in the context of a broader concept of wealth, including national assets etc. Often a number of alternative concepts are generally used at the same time. This second type of analysis may involve, as does the first one, changes in definitions or classifications, but in the second type the main emphasis is on alternative concepts. Using those alternative concepts may give rise to partial complementary aggregates the purpose of which is to supplement the central system. Various efforts are also made to include some or all of them in an alternative system of national accounts." (*op. cit.*, paras. 21.45-21.46)

3.3.2 Functionally oriented satellite accounts

"Satellite analysis may apply to various aspects of national accounts and pursue different objectives. One approach is to concentrate on one field to give a full picture of it, in a systematic way, by establishing a specific accounting framework, articulated with the central framework", (*op. cit.*, para 21.49)

"In short, satellite account in a given field covers the analysis of uses or benefits out of the national expenditure, production and its factors, transfers and other ways of financing the uses, both in value terms and, when relevant, in physical quantities." (*op. cit.*, para. 258).

"As regards its relations with the central framework, such a specific, satellite framework does not aim at covering all economic life; it is a self-consistent framework in a partial domain. Escaping from some constraints of the central framework, which is mainly institutional in nature, a satellite framework of account is by hypothesis more functional.

To put more emphasis on the functional point of view, such satellite accounts combine an extension of the kind of activity and product analysis and a generalisation of the purpose approach. It is possible to try to design an accounting framework to cover a wide variety of them, all of them belonging to a family of functionally oriented satellite accounts. Such accounts are relevant for many fields, like culture, education, health, social protection, tourism, environmental protection, research and development (R&D) development and transportation, data processing, housing and communications. (*op. cit.*, para. 21.51).

"Many elements shown in a satellite account are invisible in the central accounts. Either they are explicitly estimated in the making of the central accounts, but they are merged for presentation in more aggregated figures, or they are only implicit components of transactions which are estimated globally. For each of the fields mentioned in paragraph 21.51 above, only a small number of figures appear in the central accounts, even when the latter are very detailed. Consequently the first role of a functionally

oriented satellite account is to make explicit the implicit figures of the central framework". (*op. cit.*, para 21.115).

"Most of the fields just mentioned refer to services, they generally spread over a number of activities and they correspond in many cases to subjects that very often are of social concern. It should be noted at the outset that because the fields of functionally oriented satellite accounts sometimes overlap, the shares of national expenditure in those fields in relation with gross domestic product (GDP), for example, may not be strictly additive. Some activities/products/purposes may be classified in several places. Thus, if shares of overlapping fields have to be calculated, the denominator will normally have to be modified.

To analyse a specific field in depth and at the same time have the possibility of calculating some significant aggregates such as national expenditure, the starting point is an analysis of the uses. This corresponds to the question 'how many resources are devoted to (education, transportation, tourism, environmental protection, data processing, etc.)?' Or, identically, 'how much is spent on (education, transportation, etc.)?' In order to answer this question, we have to decide upon:

- a) the goods and services that we will consider specific to this field, where national expenditure includes the uses (current or capital) of these specific products;
- b) the activities for which we will record capital formation;
- c) the transfers that we will consider specific to this field, recognising that they will be a separate component of national expenditure only to the extent that they are not already included in the value of the uses of the specific products (otherwise, they will be analysed only in relation to financing).

Depending on the field, the design of a given satellite account will emphasise:

- a) the detailed analysis of the production and uses of the specific goods and services (e.g. R&D or transportation);
- b) the detailed analysis of transfers (e.g. social protection);
- c) both production/uses and transfers equally (e.g. education and health); or
- d) uses as such (e.g. tourism, environmental protection).

When units which are the users, as actual consumers or investors, and units which ultimately bear the expenses coincide, figures for users tell us who finally bears the expenditure. This is the normal case for data processing and to a large extent transportation or tourism. On the other hand, ultimate users and ultimate bearers of the expenses may often differ, as is the case for education and health. In these cases, analysing the way the uses are financed is very important. When transfers represent all, or the main part of, national expenditure, this analysis is even more crucial.

Analysing in detail who are the users, consumers, investors, or transfer recipients is thus an important part of what can be done in a satellite account. Even if the aggregate under study is called national expenditure, the users in this context are the units which actually acquire the goods or services

(for actual final consumption, intermediate consumption or capital formation) or receive specific transfers which are not intended to finance these acquisitions of goods and services." (*op. cit.*, paras. 21.52-21.56).

"A satellite account may use elements which have no equivalent in the central framework. Such elements have not been shown when presenting the satellite accounting framework, because they vary according to specific requirements of the fields. Examples of such elements are classifications of diseases (for consumption of health services and connected products) and of scientific disciplines (for R&D expenditures)." (*op. cit.*, para. 21.119).

"Finally, as we focus attention on one field, it is useful to associate non-monetary figures to the monetary ones. Non-monetary figures relate to producing units and factors of production (labour, various kinds of assets) and users/beneficiaries." (*op. cit.*, para. 21.57).

The field of a given satellite account is essentially delimited by defining the content of the various types of uses to be included in the specific aggregates relevant to this field." (*op. cit.*, para. 21.59).

"The first step is to define the goods and services that are considered specific to this field. It is convenient to distinguish two types of specific *goods and services* in this context: *characteristic goods and services* and *connected goods and services*. The first category covers the products which are typical for the field under study. We are interested in studying the way these goods and services are produced, what kinds of producers are involved, what kinds of labour and fixed capital they use and the efficiency of the production process and, hence, of the allocation of resources. For example, for health, characteristic products are health services, public administration services, education and R&D services in health.

The second category, *connected goods and services*, includes products in whose uses we are interested because they are clearly covered by the concept of expenditure in a given field, without being typical, either by nature or because they are classified in broader categories of products. In health, for example, transportation of patients may be considered connected services; also pharmaceutical products and other medical goods, like glasses, are very often treated as connected goods and services. For these connected goods and services, we are not primarily interested, when studying a given field, in their conditions of production.

The economic activities providing the two types of specific products are given a different treatment in a satellite account.

Specific goods and services generally appear at various levels and/or in various headings of the product classification used in the central framework. The headings in question are regrouped and additional details are introduced in order to build up the classification specific to a given satellite account. However, in order not to conflict with the requirements of statistical co-ordination, this specific classification remains strictly linked to the central classification of reference.

Some services may appear in the specific classifications of two or more satellite accounts. For instance, research in health services in higher education institutions is at the same time a specific product of both R&D and of education and health. (Of course, if aggregation of national expenditure in different fields has to be considered, double counting would have to be avoided.) (*op. cit.*, paras. 21.61-21.65).

From this point onward in the detailed description of the account there are no references to intangibles other than the observation that R&D expenditure may have elements of both consumption and capital expenditure.

3.3.3 *Satellite accounts based on alternative concepts*

"The second type of research work is evidently more controversial than the first one, but it is important. It allows national accounts work to be extended beyond what is, or perhaps might be, included in the central system of the SNA. It provides useful results for economic analysis. Its experiments with new concepts and methodologies, with of course a much wider margin of freedom than in current national accounts work. This research work may influence the development of central national accounts. The system does not make standardised recommendations as to this type of work, which, by definition, must remain open.

The borderline between intermediate and final consumption and capital formation may also be modified in various ways. Two typical cases refer to human capital and to consumer durables. When final consumption in education and health is, at least in part, treated as fixed capital formation, the corresponding central framework transactions pass from consumption (mainly final, partly intermediate) to fixed capital formation which results in human capital assets. A less radical treatment is to capitalise only actual expenditures on education (possibly part of expenditures on health) as intangible assets, so extending the scope of the latter. As an immediate consequence, the concept of consumption of fixed capital would be extended." (*op. cit.*, paras. 21.29-21.30).

"The kind of satellite accounts studied in the preceding section may also have recourse to alternative concepts as was touched upon ... ". All or part of R&D expenditures may be treated as gross fixed capital formation instead of current outlays. The satellite accounting framework presented in the above section as a general orientation does not prevent the extension of some satellite accounts in the directions mentioned in this paragraph. On the contrary, these additional dimensions represent valuable enrichments of the analytical power of the national accounting approach." (*op. cit.*, para. 21.120).

Table 3. Coverage of national expenditure in various fields

Components of uses/national expenditure	Culture	Education	Health	Social protection	Tourism	Environmental protection	Research and development	Aid for development	Transportation	Data processing	Housing
1. Consumption of specific goods and services											
1.1 Actual final consumption											
1.1.1. Market products	X	X	X		X				X	X	X
1.1.2. Non-market products											
1.1.2.1. Individual	X	X	X						X		X
1.1.2.2. Collective	X	X	X	X	X	X	X	X	X	X	
1.2 Intermediate consumption					X	X	X		X	X	
1.2.1. Actual intermediate consumption						X					
1.2.2. Internal intermediate consumption	X	X	X				X		X	X	
		X	X			X					
2. Capital formation in specific goods and services						X	X			X	X
3. Fixed capital formation of characteristic activities in non-specific products ¹	X	X	X	X	X	X	X		X	X	X
4. Specific current transfers (not counterpart of item 1)	X	X	X	X	X	X	X	X	X		X
5. Specific capital transfers (not counterpart of items 2 or 3)				X				X	X		
<i>Total uses of resident units</i>											
6. Current uses of resident units financed by the rest of the world (less)											
7. Capital uses of resident units financed by the rest of the world (less)											
<i>National expenditure</i>											

1. And their acquisition less disposals of non-produced, non-financial assets.

Source: *Op. cit.*, Table 21.2.