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National Accounting of Information

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Reference Manual of SNIA Version 1.1

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I. INTRODUCTION

A. The SNIA as a System

1. Development

a. The Past

1) Information industries are mostly regulated by special (telecommunications, education, cable TV, etc.) laws and surveyed by special "industrial" (cultural, telecommunications, etc.) statistics.

2) A wide variety of analysts, observers, scholars and politicians agree that

- Rapid ***integration, homogenization and restructuring of the traditional information activities, occupations, professions and industries*** are the prevailing general processes in the developed and developing world.

- ***Knowledge stocks and information flows*** are expected to be the politically most important fundamental elements of information societies, that -- regulated in laws -- define their character and development. Thus knowledge stocks and information flows are the subject of direct political interest.

- Various kinds and media of information are increasingly ***substitutable*** for users due to the impact of digital information technology and networking.

- Even though commoditization is going on, the bulk of information flows are ***not accounted as economic flows***.

- ***Information related non-economic factors,*** such as the deeply rooted desire of people for personal freedom, including freedom of speech, privacy, democracy, national identity, and freedom of the nation and freedom of country; sovereignty, autonomy ***seem to have an increasing role*** in national and world affairs.

- In central government, information is viewed in a number of ways: as power, as a resource, as a commodity, as cultural and moral value and as an object of

protection. These aspects should be assessed and harmonised in the frames of a ***comprehensive information policy*** which extends to the public and private sectors.

- The ***power aspect*** of information -- concerning power of the state -- requires that the information transactions and processes may not ***endanger*** the nation and country, its national security, constitutional stability and governability and state should maintain its subsistence and react accordingly to the internal and external changes .

The isues related are maintaining key telecommunication equipment, secrecy and also maintaining information sources, and institutions which provide timely, relevant, unbiased and complete information to governments. This latter aspect is closely related to the "resource" aspect.

- The power aspect -- concerning power of the state forming elements -- also requires the maintenance or improvement of the definition and balance of state-forming elements and that the government should provide information on its activity to the state-forming elements and define and maintain human rights including privacy.

- The ***resource aspect*** of the own information activity of central government requires that it has to possess over satisfactory information resources for its activity. In the frames of its obligation and commitment to promote economic activity in order to grow national income and national wealth, it should promote the accumulation of information assets and the information activities that contribute to the growth of national income and wealth.

- The ***commodity aspect*** of the information activities of government requires that it should output such information goods and services for whose output it is obliged by law and provide optimal conditions for dissemination and traffic of such information. In the frames of its general obligation to promote economic activity in order to growth national income and national wealth and income it should provide a big homogenous marketspace for information production and distribution without unnecessary bars, synergy of government and market information suppliers. To different extents in various countries, it requires the protection or promotion of domestic information producers, the "bit industries".

- The ***cultural value*** aspect requires that production, accumulation, use, export, import of those information goods and services that can be called "products of high culture", or "products of national culture" should be protected or supported.

- The ***moral value*** aspect of information requires that production, use, export, import of those information goods and services that have or represent moral value, will be supported or protected while "immoral" goods and services are banned or handicapped, at least for a certain set of consumers, particularly children.

- The ***social aspect*** of information requires that information produced should be redistributed; a minimum amount of free public information should be provided by governments to the information-poor and outstanding and socially dangerous inequalitites in the ownership of knowledge should be decreased.

3) A comprehensive information policy is a policy whose object are ***non--industry-specific information transactions*** or a policy that effects in all or most industries or for all or most individuals. Formulating and conducting a comprehensive information policy need an intellectual framework including general notions and concepts.

4) A comprehensive information policy assesses the real-world (material) and financial implications of information transactions. Such a comprehensive policy -- because of the vast, growing, interwoven and ever-changing subject-area -- must be partly based upon comprehensive measurement in both value and physical units. A harmonized and consistent comprehensive macro-level system should be available to model and explain information processes and phenomena. The statistics should be expressed mostly in ***common units of measurement***. The scope of such a system should cover all transactions when or where information goods, services or human knowledge are involved.

5) In ***value (financial) terms, the System of National Accounts*** (SNA) as a comprehensive value-based system -- with a number of modifications, of which a few will be discussed later -- may provide a suitable ***frame for policy making and*** some ***science issues***. SNA is known in the U.S. as NIPA and is published by BEA. The current version of SNA is Revised System of National Accounts, 1992 (ST/ESA/STAT/SER.F/2, Rev.4) which has been referred to as [SNA92]

6) UNESCO, UPU, ITU, WHO, ILO and other international organizations present such natural-unit-statistics which obviously focus at their problem area and serve for their particular purposes. New media are less covered in these surveys than they deserve. These systems don't even aim at providing a comprehensive framework. The experiments in Japan and the cooperative study by de Sola Pool and coworkers were the pioneering in the comprehensive approach based upon common natural-units of measurement. The compilation of World Communications Reports represent the first significant, world-scale, international efforts to describe information phenomena altogether in a complex,

comprehensive and standardized -- but not yet commensurable -- way, within the frames of official statistics. However, ***there is still no comprehensive, common-natural-unit-based system available***.

7) The recognition of the lack of a comprehensive, common-unit system and the attractive opportunity of measuring and modeling knowledge stocks and information flows lead to suggestions to modify SNA and the invention and implementation of the ***System of National Information Accounts***, ***(SNIA), a comprehensive, bit- and value based satellite system***.

SNIA may help to understand society -- old and new phenomena -- from ***a new aspect***.

8) SNIA ***emerged*** from the efforts made since 1982 in Hungarian Central Statistical Office. These efforts aimed at the foundation of a comprehensive conceptual and statistical frame which - together with SNA and a number of auxiliary indicators - would be suitable for measuring the main processes and phenomena in the world of information and communications at a macro level.

The ***fundamental concepts and classifications*** were described in a number of ***working materials*** and some of them in the ***official documents*** of HCSO. A ***Methodological guide for SNIA'92 Hungary*** has also been prepared. This describes the data sources and algorithms that have been applied when compiling SNIA'92 Hungary. The ***database of SNIA'92 Hungary*** covers the period between 1945 and 1990. Raw statistical data were gathered and accumulated for transactions with 24 kinds of nformation goods (as books, newspapers, journals, audio records, recorded audio tapes, videotapes, magnetic diskettes, magnetic computer tapes, paper-based government and business documentation) together with 19 information services (as radio-and television broadcasting, cable television, education, phone-calls, telegrams, theater and movie performances), and for human knowledge. The data were mostly taken from official statistics. Altogether, over 500 time-series of "raw" variables and several constants were included. These data then were transformed to common natural units: bits. Then aggregates of the "Information Production Account", "Information Capital Account", "Information income accounts" and "Rest of the World" accounts were estimated or computed for each good and service, for all goods, all services, main sectors of the society (households, "socialist state", corporations etc.), "human consumable" goods and services and for all goods and services altogether. Three ***versions*** -- 1990, 1991 and 1992 -- were matched against the known historical events and known or assumed processes in the country. No twin tables were compiled; economic flows accompanying information flows are not reflected in these pilot studies.

b. A short characterization of the available system

9) SNIA has been based upon the same fundamental general concepts as [SNA92]. These include ***actor, institutional unit, sector, good, service, commodity, transaction***., ***stock, flow, account, balance.*** The very same concepts, however, have sometimes been interpreted in a wider environment due to the needs of reflection information phenomena to include events and objects that are beyond the scope of SNA, but seem to be important.

10) The revisiting and review of concepts and classifications of [SNA92] have produced the impression that a ***feedback from SNIA to SNA*** also would be desirable and important.

11) ***New integrated sectors***; the main groups of social actors of information affairs, who are relevant to policy making, should also be added to those of SNA to reflect the real situation, phenomena and processes.

12) The fundamental question of SNA is "Who does What by What means for What purpose with Whom in exchange for What with What changes in Stocks?" Acccordingly in SNIA, a general transaction assumes at least two actors, at least one of which outputs a good or service to the other.

13) ***Information*** is understood here as something which ***forms*** or is ***formed*** with***in*** (the brain of) either human or machine actors, or is represented in/on the goods/services outputted. Volume/amount of information carried by physically existing goods and services - in a ***standardized communication situation*** as defined here - is an attribute of goods and services which is similar to some physical parameters. This interpretation seems to be in harmony with exact theories of information, such as Shannon's.

14) In accordance with this, a transaction can be called an ***information transaction***, if it implies the flow of information, a change in the state of informedness, or ownership of knowledge of the sides. There is a set of goods and services whose main function is just to convey/carry information, these are called ***information goods and services***. Information goods do not include machines like computers, office and telecommunications devices; rather they include books, diskettes, records and a number of other durable media.

15) A non-exhaustive list of the main categories -- in terms of which SNIA describes information phenomena -- includes ***information-input, -output, -production (gross and information added), -consumption, -use, -asset, -accumulation, -capital, -stock, productive -consumption, -capital consumption, -export, -import and externalities***. Unlike SNA, SNIA makes difference between use and consumption: while consumption assumes annihilation of the good or service,

use does not. Almost the whole arsenal of macroeconomics is expected to be transformable to SNIA.

16) The most outstanding difference between SNA and natural-unit-tables of SNIA is in the way they value flows and stocks. While the valuation of transactions in SNA has practically been based upon ***general substitutability for money***, i.e. on opportunity of exchange, in SNIA it is based upon ***general substitutability for a digital record***, an opportunity of recording. Accordingly, it is not information in SNIA which is considered as resource or product, but goods and services (including non-durable signals) which carry/convey information. This is in agreement with SNA where it is not "value" which is considered as a resource or product, but goods which have or convey value. Information interpreted in such manner can be treated similarly to heat.

17) There is a broad agreement in psychology and cognitive sciences that human information processing is a massively parallel process, in which several ***faculties of the mind*** are involved. SNIA should consider an advanced model of human information processing. Accordingly, various versions of SNIA account the information that goods and services convey at ***"sensory"*** or at ***"perception"*** level.

18) The "natural-unit" SNIA tables are compiled in bit units. Most tables that concern all information goods and services altogether, may be compiled in value units either. These tables show "information economy" in a commodity approach. These tables do not belong to the standard set of tables of SNA, for they contain figures for such a group of goods and services whose elements are scattered in a number of industries, group of kinds and group of services of standard SNA. This set of economic-value-based twin-tables, however, creates a bridge, a ***direct linkage to SNA***.

19) SNA emphasizes that when focus attention on one field, it is useful to associate non-monetary figures to the monetary ones. In SNA non-monetary figures mostly relate to producing units and factors of production and users/beneficaires.

20) While SNIA has been designed for macro level analyses, its concepts and structure make it usable for treating other communication issues and situations, as ***regional communication*** or communications ***among various communities and groups***. These accounts do not organically belong to the SNIA as proposed here.

21) As for now, when implementing SNIA in pilot studies experimentally, its requirements can not be met completely. At present, SNIA can be implemented as a macro-statistical ***satellite system*** to SNA. Having standard information-

accounting introduced at institutional units -- actors of the economy and society -- SNIA could be implemented as a ***real national accounting system***.

c. The Future

22) SNIA should be ***standardized at the international level***, so that it can be used in the same way in various countries. Without standardization and official introduction, SNIA cannot reach its objectives. For those details that cannot be standardized, imputation procedures remain open for all countries so that they can find the best estimates. SNA should adopt a number of classifications reflecting the character of information transactions.

23) SNIA should reflect the opinion of standardizing international community on the role of information and knowledge, particularly human knowledge in society. It should provide ***guidelines and principles for international organizations and national official statistical organizations*** for the contents and ways of surveying information industries: telecommunications, education, printing and publishing, R&D, information services, financial institutions, governments.

24) The figures of a standardized SNIA should mainly be based upon the regular annual, biannual and quinqueannual ***surveys of UNESCO, ITU, UNSO,*** and other international organizations. Objectives and principles of SNIA should govern the structure of these surveys.

25) ***Private information industry*** may outpace official statistical administrations in introducing SNIA.

2. The objectives of the future system

26) The objective of the system is to provide a ***comprehensive, multipurpose intellectual framework***. At the macro level, the framework should allow the governments, business groups and citizens to analyze and display the important and ***relevant individual features of the countries*** and to provide information for the government to formulate the objectives, and legal norms, to conduct and monitor the effects of a ***comprehensive -- non-industry and non-department level -- national and international information policy*** . In addition, it should be useful for conducting ***scientific research***.

27) At micro level, the system should provide sound basis to analyze information transactions and understand their social and economic consequences.

3. Significance of SNIA

28) After its implementation and introduction to official statistics and government activities, SNIA actually ***should declare the view of the society on fundamental issues;*** the relationship between society and knowledge, society and human knowledge, knowledge and information, value and volume of knowledge and information, human and machine knowledge and information. It implicitely defines the purposes of the society with information and knowledge, their production, consumption and use. All this determines the practical significance of SNIA.

29) The scientific, methodical, statistical and economical significance of SNIA as an intellectual framework or vehicle comes from the fact that in accordance with the ***increasing substitutability*** of

-- different media (information goods and services with other information goods and services),
-- human information activities with machine information activites,
-- information goods and services with human knowledge and vice versa,

it allows for their uniform common treatment. This will be explained in the foregoing paragraphs.

30) Traditional statistics do not determine the amount of information that different media convey ***altogether*** while they are used, produced, exported, consumed, imported or accumulated. With a ***common treatment of various, commensurable media*** gross information production, use, consumption, etc. may play the role of indicator "steel production" played in statistics in the first half of the century.

31) The interrelation between computers and other information machinery and humans frequently is reduced to the issues of ***creating or losing jobs***, and of contribution of information technology to ***productivity***. ***Common treatment of certain commensurable human and machine transactions*** may contribute to this issues and also come up with new aspects.

32) These ***new aspects may make questionable some of the fundamental categories and classifications applied in economics.*** In traditional economics humans are represented by "labor", "final consumption" and machines are represented by "production", "productive consumption", "accumulation". Humans have played an outstanding role, when factors of production (labor) and consumption (households) of society are considered in macroeconomic theory that has been invented by humans and for making decisions in their interests.

33) In a society where machines play decisive role in production, assets and consumption particularly in information assets, production and consumption, a ***new alternative economics and economy*** may be advantageous. Though this development may seem to be premature, one can assume that such economics probably will provide a ***more equal treatment for machines***.

> Human-centered societies have created special rules for human individuals, such as owning rights, protection these rights, ban on homicide, and a lot of others. These rules might have come out of the natural solidarity of humans, reflexivity of perception, the incomparable value of humans and a number of other factors. In a society where these aspects are less important than in the Past, people view themselves more and more as machines, and some aspects make it even advantageous, it may be reasonable to accept or to attribute some kind of legal personality to certain machines.

34) The reproduction process of information goods and services is only partly covered by SNA in economic value terms. Huge masses of information -- such as home education or foreign broadcasting which make the bulk of externalities and consumption -- currently remain outside the frames of SNA or their signficance remains hidden because the value terms of SNA are not even near proportional with political significance bound to their volumes. SNIA with common treatment ***of the whole consumption - production - consumption - use - production process*** may provide a tool to understand the whole ***social reproduction cycle of information***.

35) It is known that the output of marketed and non-marketed goods and services have been valuated in different ways in SNA. The role of state and government in financial terms cannot completely be assessed. A large or major part of the lattter kind of activities should be considered as information activity. SNIA, in principle, with ***common and equal treatment of various sectors***, provides an opportunity to measure the productivity of market and non-market information activities. For this purpose a ***strict definition of output services*** is needed.

> The effectiveness of a local government cannot be assessed while its output is described in overgeneralized and/or fuzzy terms like "General government" or "Safety". It will be commensurable, however, when the ***activity will be redefined in details in physical, office-automation-process-terms*** and becomes activities as "building licensing", "elevator licensing", "supervision of shops", "providing passport", "providing social security number", etc. The difficulties and traps on this area are visible, but the opportunities information technology offers in this area shouldn't be underestimated.

36) SNIA is ***object, subject and tool of policy making***.

37) ***As a tool, SNIA*** with SNA should serve as a permanent background for assessing the political significance and various possible real consequences of various measures to be taken. Such a system offers a lot of plausible comprehensive categories, statistical indicators, figures and models for nation-level political thinking and for formulation of nation-level political objectives and barren zones. As such, it has to reflect subjects and objects of information law and influence information law.

38) As soon, as the idea of a SNIA has been presented it has become the center of debates. It concerns various interests goups, institutions, traditional surveys, reorganizes a number of traditional fields of official statistics as "cultural statistics", "telecomm statistics", "computer statistics" and redefines a number of traditional statistical concepts. As such it is ***object of policy making.*** Among the issues SNIA has involved there are: definition of general government sector and their units, definition of information capital, definition of final and intermediate information consumption, treatment of information contribution and compensation of employees, recording intellectual property, survey of information flow from households to governments, households' self-services, privacy, freedom of information and a number of other hot policy issues.

39) SNIA is a ***subject of policy making***. Once approved, SNIA with its concepts and statistical background will be able to influence political arena.

4. Fundamental Elements of SNIA

40) ***On theoretical plain***, SNIA consists of

- definitions,
- explanations,
- indices,
- accounts,
- standard tables for publications.

41) SNIA should cover those subjects, objects, relations, acts, actions and activities which are connected with information phenomena, are subject to legal definition, require comprehensive treatment ***and*** can be subject to operationalization.

42) The system should be based upon a set of internationally agreed concepts, definitions, conventions, classifications. It is desirable that these concepts should

be embedded in comprehensive national information law to replace industry-level laws. Accounting and revaluating rules should comply with a revised SNA.

43) Whenever it is possible, ***SNIA should rest upon micro-level information accounting*** with network management and monitoring software. Central government should define the guidelines to design and audit these systems.

44) ***SNIA accounts***, in principle, could be elaborated for an arbitrary period of time. In accordance with SNA's mainly annual approach, SNIA will usually be compiled ***yearly***. A number of data may not be available for each year. In such cases a ***time-series of SNIA-s*** may be of help where raw data may be interpolated or extrapolated. Raw data tables and accounts for the yearly and the time-series approach are different. The yearly approach will be described here. The accounts relate to different types of information activities ***within the year*** while the balance sheets record the values "***as of*** " ***a certain date, namely the beginning and end of the calendar year***.

5. The present manual

45) This is the ***first draft*** of the Manual of a standardized SNIA which should be issued later by authoritative international bodies to direct national official statistical institutions to plan their domestic statistical surveys and international data supply. The objective of this Manual is primarily ***to provide material for further discussion and development***. The Manual is based largely upon SNIA '92, Hungary, a study of the relevant recent surveys of the U.S. and international organizations, and consultations.

46) The manual contains ***definitions*** and ***descriptions***. The definitions are assumed to be refined and then released as definitions to be used as such in various national statistical systems. Definitions, whenever it is possible, should be introduced into local regulations. The relation of international statistics to local law, however, is fuzzy, and complete match cannot even expected. International and national statistical schedules or prescriptions have generally no obligatory power. Development of common solutions may still lead to the adoptation of concepts in local national law. A part of the descriptions and explanations may be transformed into definitions during the later discussion of this draft.

47) A number of definitions, though seem to be operationalizable have not yet been operationalized. Their ***operationalization*** will be the task of special task forces within the standardization activities as it will be described in the following chapters.

48) The ***accounts*** are implemented as printed tables or a system of cross-referencing computer spreadsheets or databases in EXCEL. Indices make the documentation more easily comprehensible.

49) The Manual has been ***written mainly for*** statisticians, economists and information scientists. For those who are not familiar with SNA, an orientating consultation with expert official statisticians is desirable before reading. A ***linear reading*** is advised.

50) The Manual should have been prepared so that the reader would be able to read it without continually looking up the source [SNA92]. Thus it ***follows the structure of SNA.*** The opportunity of comparison with SNA is still extended with ***verbatim application of definitions and explanations*** when it is feasible and desirable. As far as these texts have been used for the definition and introduction of a completely new satellite system, quotation marks have been several times omitted.

B. Accounts and Activities

1. The sequence of accounts

51) The national bit-accounts of SNIA should be based upon statistical surveys. The surveys collect data from regular obligatory business records of institutional units (as education statistics) or are representative. The twin tables should be elaborated from standard SNA accounts, and data of representative statistical surveys.

a. Raw data tables

52) ***Raw data tables*** contain the external data -- variables and constants -- used in the accounts in a transformed form.

The tables are mostly compiled by goods and services or surveys. These tables must not be viewed as questionnaires. In a number of cases ***auxiliary "intermediate" indicators*** are used to compute bit-level data. The computation of these auxiliary indicators is made in ***auxiliary tables***. A key-importance table is the ***table of per unit equivalents***.

b. Transformation tables

53) ***Transformation tables*** of the system contain the derivations of the figures of accounts. Transformation tables contain ***items of raw data tables***, ***derivatives of auxiliary data tables*** and ***transformation variables and constants***.

54) The reproduction cycle of the economy and of information is endless. There is still a ***logical system of accounts,*** as certain items of the accounts ***actually are*** derived from those of others which is not true in the reverse direction, the order of these derivations cannot be changed. The activities they describe, however, as in SNA, should not be interpreted as taking place sequentially in time.

c. The Information Production Account

55) The ***Information Production Account*** of SNIA relates to the activity of producing such goods and services that carry or convey information, as these concepts defined within the system. Its ***balancing item*** is mostly ***information added***, but for a number of goods and services it is ***gross information output***. Information added is the difference between ***gross information output*** and ***intermediate information consumption***. Information added is the source from which primary information incomes are generated, therefore -- as in SNA -- it is carried foreward into the Primary Distribution of Information Income Account.

d. The income accounts

56) While the concepts of the Production Accounts or Accumulation Accounts of SNA can clearly be reinterpeted for information flows, the concepts of articulated ***income accounts may be the subject of various interpretations*** when "transferred" into SNIA. The considerations applied here should be determined by the principles how society distributes and redistributes information. Generation and allocation of primary information incomes is influenced by information contribution and compensation of employees, obligatory and free information flowing in non-information economic transactions and property information income. Redistribution of information may serve economic and social, e.g. welfare or ethnic purposes.

e. The accumulation accounts

57) Similarly to SNA, these accounts ***record the acquisition and disposal*** of information assets and liabilities by institutional units through transactions or as a result of other events. They show formation of fixed information assets and information capital consumtpion.

58) The Accumulation Accounts of SNIA ***do not record*** information accumulation on or in most non-information goods. It also ***does not combine*** information accumulation represented by information-goods with non-produced human knowledge.

59) SNIA does not have a ***Financial Account***.

60) As in SNA, the link between the accumulation accounts and the income accounts is provided by the fact that ***saving*** must be ***consumed*** (in SNA used) to acquire assets.

f. The balance sheets

61) As in SNA, the Balance Sheets show the ***information assets*** and ***liabilities*** of institutional units at the beginning and the end of the accounting periods. The consequences of various transactions all appear in this table; however, the data for subtle analysis of assets and liabilities are mostly absent. The ***role*** of information liabilities is probably much less significant, than that of financial liabilities, even the need for introduction of the concept may be questioned.

2. Activities and transactions

62) The accounts of the SNIA are designed to provide analytically useful information about state of affairs and processes of information activities taking place in ***society***, such as production, consumption and accumulation of information assets. They should do this usually by recording transactions between institutional units. As far as the transition from raw data to the accounts of SNIA is not feasible without a subtle analysis and distinction of the ***physical processes*** occuring during transactions, these physical processes are studied, whereever it can be done. A great number of information transactions is ***recorded*** once at ***one of transactors*** only in ***raw natural units of measurement*** rather than twice at both transactors. In such cases various imputations are applied.

C. The Sectors of Society

63) As in [SNA92], two main kinds of institutional units, or transactors are distinguished by the SNIA. In SNIA, these are ***individuals*** and ***legal entities***. Institutional units are essentially units that are capable of owning goods and assets, of incurring liabilities and of engaging in information activites and transactions in their own right with other units.

64) For purposes of the system, institutional units are grouped together into mutually exclusive ***sectors*** composed of the following types of units:

- corporations;
- government units;
- non-profit institutions (NPI-s) serving households;
- households.

The households sector comprises individuals and ***households s.s.***. ***One-person households*** are classified as individuals. These sectors together cover the total economy without overlapping. For a number of purposes and reasons, the system also suggests a ***supersector*** called ***"ethnic community".***

65) The ***complete set of descriptions of accounts*** at the level of supersectors and sectors is given in Section II., "Overview" and subsequent sections and the accounts are appended at the end of the book as Appendix A.

66) Institutional units that are ***resident abroad*** are classified as the ***"rest of the world"***. Information transactions between resident and non-resident units should be recorded in order to obtain a complete accounting for resident units and units of an "ethnic community". There are serious deficiencies in this respect, particularly on the mass media area.

D. Concepts and Classifications

67) SNIA deals with production, consumption, use and assets of those entities that carry or convey information. This implies, that transactions (even as simple and important as producing steel, or corn) that do not concern such entities are necessarily beyond the boundaries of SNIA, though these non-information transactions will be included in twin tables in value terms. SNIA in this respect has a ***narrower scope*** than SNA. This follows from the objectives of SNIA and will not be mentioned or discussed later.

68) The contents of SNIA and all conclusions emanating from it depend heavily on the ways the items included in the accounts are defined. The issues here involve ***fundamental questions*** of ***economic theory*** and as well as principles of ***information theory***. A common understanding of these issues and a ***consensus or majority opinion*** are prerequisites of the introduction and successful use of SNIA at each level.

1. The production boundary

69) National accounts assume that most benefits to be distributed and consumed have been created in the production process, so the activity of production -- as defined in SNA -- is fundamental for society.

70) In SNIA -- as in [SNA92] -- information production is understood to be a ***physical process***, carried out under the responsibility and management of an institutional unit during a given time span and at one (or more) definite location(s). ***Information production sensu lato*** is the production of those goods and

services that convey or carry information. Instead of information production s.l. the ***production of information goods and services*** is accounted.

71) One of the problems which one meets when defining the production boundary in SNA and SNIA is to get to decision concerning ***activities of individuals , that could have been supplied to others but are actually supplied for consumption in their household or for themselves***. A reasonable compromise is needed here.

> This can be examplified with "bringing up children", "supplying TV programs with own TV sets for family members or friends", known as "the production of services for own final consumption in households" in SNA. These activities obviously result in outputting information. SNA does not account these services as outputs for fearing of generating incomes whose significance is quite different from those that are accompanied with monetary flows. "The inclusion of large non-monetary flows of this kind in the accounts together with monetary flows can obscure what is happening on markets and reduce the analytic usefulness of the data." ([SNA92], Ch.I, p.6). Similarly in SNIA, precision and accuracy of the time-use survey data that are available for describing the flow of these services is not comparable with that of those information goods and services that are produced and offered by market and government producers. There is a real danger indeed of dilution of the hard data core. On the contrary, the volume of these activities is significant, less, but its magnitude is commensurable with that of education in schools.

72) SNA is ***market oriented*** and intended to provide higher quality data for the market sector. It is not yet clear, whether this is to be followed or not, beacuse information transactions are mostly non-market transactions.

73) Having the general, conceptual definition of information production, the production boundary is contoured with an explicit enumeration of those goods and services that are thought to satisfy the general concept of goods and services carrying information. By this, a ***classification*** -- an extended CPC -- should be applied. CPC should be extended to cover the services which provide the bulk of information output.

74) While the appearance of the physical production process of a certain good or service as "production of a given kind of goods and services" in SNA is dependent of its classification into that given class of goods and services, volume of production of all information goods and services should not depend on classifications of goods and services. However, as a result of the narrow scope of

the available classification schedule as a whole, or presence of too broad classes, ***some goods and services may disappear from the system***.

2. Other boundary problems

75) ***SNA*** emphasizes that ***natural processes may or may not be accounted as production*** depending upon the circumstances in which they occur. For instance, natural growth of stocks of fish in the ocean is not and that in fish farms is counted as production. A necessary condition of production that "it must be carried out under the instigation, ***control*** and responsibility of some institutional unit that exercises ***ownership right*** over whatever is produced." According to [SNA92] that which is not influencible or not influenced indeed should remain out of the frames of the system.

76) The ***interpretation of the concept of "natural processes" in SNIA*** meets difficulties. Both "control" and "ownership right" need further clarification and interpretation, particularly when these terms are applied to human knowledge. [SNA92] calls knowledge, skills and qualification "education assets" and regards them as assets belonging to the individuals possessing them. [SNA92] also declares them to be beyond the accounted asset boundary of the system.

77) If acquisition of ***human knowledge*** as a whole were put aside, this would create a strange situation: human information consumption, as that of education -- accounted both in SNA and SNIA -- should essentially be considered as ***waste***. Consistency requires that at least those cases of human information acquisition when (produced) information goods and services are consumed during intensional acquisition should be treated as production.

78) Our present understanding of human mind, its operation as an information processing unit and its faculties should be reflected in its treatment in SNIA. SNIA intends to make a distinction between ***produced and non-produced human knowledge***.

79) At the ***sensory level***, human information acquisition -- ***creation of human knowledge*** -- is almost automatic, and it might be classified as a "natural process": spontaneous, and independent of the control of the individual. While ***percept*** is mostly conscious, ***perception***, as a process, is not. In this way, human information acquisition also might be out of the production boundary of SNIA. The ***whole process of information acquisition of an individual,*** treated as an ***activity of his own entirety,*** however, and the product; knowledge, may be under the control of individuals and even subject of legislation. Law does not know "ownership rights" over an individual, but the rights an individual has over himself or over his knowledge are more extended than ownership.

80) ***Using media***, as listening to radio, watching TV or cinema-films as well as speech and music are always considered ***conventionally*** as a non-natural process.

81) Human information acquisition without conscious control (non-controlled, spontaneous sensing as just gazing, looking, hearing or perception as a self-contained activity of an individual) may be classified as a ***natural process***. Direct unconscious experiencing of the environment -- when there are no signals that have been created intentionally by an actor of the system available -- will also remain beyond the production boundary. These aspects yet need and will get some more clarification particularly with respect to opportunities of measurement.

3. The consumption boundary

82) The proper treatment of information phenomena requires a distinction between information consumption and ***information use***.

83) In SNIA, ***information consumption*** will be understood as physical annihilation of those goods and services that convey or carry information. Information consumption is generally measured as ***physical consumption of information goods and services***. This provides a lower estimate for information consumption sensu lato, which contains systematic error, because information consumption tied to non-information goods will not be measured. It is the concept of information use that will be introduced to denote the transactions that are not related to physical annihilation of information commodities.

84) In SNIA as well as in SNA, the ***production boundary determines*** the total information-added produced and when doing so, puts limits on incomes generated by production. The goods and services left out of consideration when defining production, should remain beyond the ***consumption boundary*** of the system, too.

85) In SNIA, the concept of ***final information consumption*** has no positive social meaning.

4. The asset boundary

86) [SNA92] defines ***assets*** as entities over which ownership rights are enforced by institutional units and from which economic benefits may be derived over a period of time. In SNIA, ***information assets s.s.*** consist of those information goods that have been used for a longer period, repeatedly, for producing information.

Information assets s.l. comprise the assets of information goods and of human knowledge. ***A part of financial assets*** is a discernible part of assets of goods.

87) In accordance with the extended production boundary, the ***asset boundary of SNIA also extends over that of SNA:*** a number of goods held by households, corporations and governments has not been included in assets of SNA. Imputation is unavoidable here in each sector .

88) In sectoral classification of fixed information assets the ***physical proprietorship*** over the good is decisive. Intellectual property rights to the good given will not be considered in classification of assets by their ownership.

89) In most countries, no ***government databases*** are counted as assets. This is in contradiction with the fact that they are information assets: increasingly suitable and actually have been used for supplying external information services to individuals and corporations. This leads to a significant ***transfer of income*** from the government sector to the corporations or households sector. This transfer is not ***recorded*** in bookkeeping and SNA. At the same time, governments are not prepared to and not efficient at exploiting capital. The proliferation of databases and the impact of information technology make necessary new approaches to the economic treatment and regulation of government information assets and information production. With exploiting information capital, enterpreneuring government units play a new role in the society. Agencies of the central government may even be financially interested in exploiting their information assets and may be powerful enough to overcome the efforts to keep their enterpreneurship between limits.

90) Ownership and proprietorship of databases are crucial issues ***in the government sector***. The proprietor, whosoever it is - either the agency holding the database, or central government as a whole, or the nation - is entitled to enjoy the benefits coming from having the asset.

91) ***Human knowledge of individuals*** is at least partly within the asset boundary, but, as yet, cannot be measured in its entirety. This situation will be resolved with leaving produced human information acquisition within the production boundary but open-ended. Changes in the assets of non-produced human knowledge will be conditionally estimated in conditional units and treated separately from measurable information assets.

92) [SNA92] counts ***consumption of educational services*** as final consumption and not as expenditures on fixed assets. In SNIA, in accordance with the foregoing paragraph, consumption of education should be treated as leading to human information capital formation.

93) The issue of ***naturally occurring assets*** and their valuation needs still further clarification in relationship with such areas as gene-banks, just to mention one. SNA envisages that naturally occurring assets and their changes should be represented in the system. A completely analog treatment may not be feasible in SNIA.

5. National boundaries

94) Most accounts of the system are compiled for ***resident institutional units*** grouped into sectors and subsectors. The concept of residence is the same as that used in the balance of Payments Manual of IMF and [SNA92] for those units and activities of SNIA that are represented there. Similarly to [SNA92], an institutional unit is said to be resident within a given ***country*** (in SNA "economy"), when it maintains a ***centre of economic interest*** in the ***space*** within the sovereignty of that country.

95) Similarly to GDP, the ***gross domestic information production*** (GDIP) of a country is equal to the sum of the information added by all resident institutional units engaged in production as defined in the system. This is not necessarily the same as the sum of information added by all productive activities within the geographical boundaries of the country. Resident units may ***produce information abroad*** and ***alien units*** may produce information within the country. This distinction is similar to that between GDP and GNP.

96) The SNIA ***supersector "ethnic community"*** needs clarification. Population in several countries, particularly large countries is divided. There are groups formed by using a common language, being of common geographic region of origin, common kinship or tribal origin, common state of origin, common race or color or sharing common culture or more of these criteria.

97) In Europe, these groups are mostly "language" or "geographic region" communities and they call themselves as "nations". Various minority groups living remote from motherland, or groups never allowed to create their state -- as Kurds -- are referred as to ***"nationalities"***. In the U.S., these groups are called "ethnic groups".

98) In the U.S., racial groups has been most important, but significance of language and origin groups are increasing.

99) SNIA seems to be suitable for the treatment of communication ***between and within ethnic groups***, and ***between ethnic groups and countries***. This principial suitability of SNIA, however, is influenced by the willingness of official statistics

to reflect the real situation. While the U.S. statistics applies several racial categories, groups surveyed in Central Europe are mostly language communities and racial issues since the World War II have not been concerned.

100) ***Ethnic community*** will be defined as a class of all units that declare themselves as members of that "ethnic community". The underlying reasons and ways for the members of an ethnic community; why and how they recognize and distinguish each other may be more or less diffuse.

101) Individuals of the same "ethnicum" may live in several countries. Hence the supersector "ethnic community" ***transcends boundaries of countries*** or states.

102) Clear distinction, seggregation and a formal system of representation of interests has contributed to maintenance of peaceful coexistence of different ethnic communities in traditional societies. Mixing, lack of clear distinction and appearance of a new ethnic community; the "international" and its dominance in mass communication, have raised uncertainty and unawareness of the just representation and makes the traditional balance of power questionable and more fragile in several countries.

103) In a multicultural society, the institutionalization of information flows, awareness of institutionalized forms, representation and balance among several origin and language groups instead of a single racial opposition may be stabilizing factors.

E. The Implementation of Concepts and Classifications

104) The level of ***tolerance and compromises*** necessary in compiling SNIA will probably be greater than that for SNA. This is to avoid imposing ***unrealistic demands*** on the to-be compilers of to-be national information accounts and to avoid too subtle distinctions or too specific problem setting.

105) ***In a real "information age"*** when digital telecommunications become more common and infiltrate society, a great number of information transactions will assumably be measured even for the purposes of transactors and operators. Under such circumstances a significant improvement in the conditions of the national level accounting and progress is expected.

106) [SNA92] highlights a number of ***questionable rules in the system***. The examples given are the "distinction between final consumption and intermediate consumption" and "distinction between consumption and gross capital formation" allowing that "The gross capital formation used in the System needs to be much more precise." These issues will be revisited and SNIA rules will be

introduced in the next chapters. The next two paragraphs are going just to outline few of several problem areas.

1. The treatment of human knowledge

107) The treatment of human knowledge is a cardinal question in societies and SNIA. Human knowledge is a product and an asset.

108) Human knowledge as a product may be a result of a conscious cooperative effort of an individual and other institutional units supplying education or training services, or of a self-service; learning. Unintentionally gathered experience also leads to knowledge.

109) Services consumed in the process of intentional knowledge acquisition can be education and training or "learning with children" in households.

In accordance with the general definition of assets and information assets education, should be mostly classified as ***human information capital formation***.

In SNA, consumption of ***training*** is treated as intermediate consumption. This approach is debatable: certain kinds of training should obviously be classified as increasing the range of "production possibilities" in the future and leads to "lasting knowledge", formation of "human information capital".

110) In [SNA92] learning is not considered as a flow, beacuse it involves only one unit and human knowledge es embodied by individual is not subject to exchange. Philosophy of SNA, however, allows the introduction of intraunit operations as flows for technical reasons. In the age of lifelong training and flexible production systems, not only institutionalized training but also worktime learning through experience are important activities. These may suggest understanding learning as a kind of production of lasting human knowledge and human information capital formation.

These issues will be discussed in details in the next chapters.

2. Production, consumption and use of information by employees

111) Information flows between employees and employers have always been an area of conflicting interests and subject of debates. Rights of employees to use employer's information (trade secret) and rights of employer to use emplee's information (patents, copyright, privacy) are subject to regulation. The treatment of interemployee and employee--client flows will be described in the later chapters.

F. Links with Economic Theory and Information Theory

112) ***Economic theory*** should be intensively used to explain the changes of knowledge stocks and information flows. To a certain extent, SNIA may even be viewed itself as an economic system.

113) Standard SNIA should be ***used for economic purposes*** with a good command of both systems and with a permanent attention to the definitions of concepts. The ***common treatment of value and volume quantities*** will be guided by the purpose of the study.

114) ***The accounting rules and procedures of SNA*** should be applied in SNIA whereever those are applicable.

As for now, institutional units generally do not maintain natural-unit bookkeeping for several kinds of their information goods and services. Where such exists, it scarcely corresponds to traditional quadruple entry bookkeeping principle which after all is just a technique to follow transport processes numerically. Recording the most important information flows at institutional units is a prerequisite of the implementation of SNIA at national level.

115) ***Micro-macro links*** are hence now looser in SNIA than in SNA. This has certain implications for the techniques implemented in SNIA and the quantity and quality of data. In practice, it is not realistic in [SNA92] to envisage macro-economic accounts being built up by simple aggregations of the relevant microeconomic data. This is because individual units may be obliged to use concepts designed for other purposes like registration, authorization or taxation. The situation is the same for SNIA. In such cases [SNA92] holds it easier to make global adjustments to the data after they have already been aggregated. This can also be done in SNIA or one may use global estimates from independent sources. In the latter case the aggregates of micro data are used as check points.

116) As in SNA, ***household surveys*** provide important data, as time-balances, or surveys for proprietorship of information assets. These representative small-sample surveys, however, are scarce, their accuracy is limited and the questions change frequently. The application of such surveys is difficult and needs precaution and interpretation. A number of them should be standardized.

117) SNIA accounts still constitute a ***consequent system, transactions are transduced through the system*** so that the ***law of conservation*** is valid: information produced will be consumed, exported or accumulated, and it is only produced, accumulated or imported information which can be consumed.

118) SNIA will be equipped with a number of ***twin-tables***. A twin-table of a SNIA table reflects the economic flows accompanied to the information flows described in the appropriate SNIA table. Twin-tables provide the opportunity of a synoptic analysis extending to the economic value and volume of information areas and create a direct bridge between SNA and SNIA.

119) There is a great number of papers devoted to ***information theory***, particularly to definition of "communication", "information" and "quantities of information carried". The exact, abstract ***mathematical theories*** are apt for specification, instantiation, operationalization and computations.

120) SNIA defines operational procedures to measure "volume of information conveyed by goods and services" instead of defining "information" as such ("an sich"). The procedures SNIA offer are in accordance with a number of exact theories. SNIA definition standardizes the underlying communications situation and so removes ambiguity coming from the inherent ***situation-dependence*** of general definition of quantities of information carried.

G. The Aggregates of the System as Indicators of "Information Household"

1. Introduction

121) SNIA contains a "whole arsenal" of consistent, coherent accounts, balance sheets and tables. It is a complete account of knowledge stocks and information flows in a meaning as these have been defined in the system. Some indicators, as gross information production, information added, information export, import, information assets, externalities of foreign information production and a lot of others ***may be used independently from the system as a whole***, by analysts, politicians, the press, professional and business communities and the public as summary, global indicators of information activity within society or within its main sectors, corporations, government and households. Movement of such indicators and related economic values may be used to formulate political programmes or evaluate the overall performance of the society or relative success or failure of policies of government or pressure groups.

122) A number of SNIA indicators may be subject to direct influence by various government provisions and policies. The changes evoked in this way, may imply desired consequences. These indicators can be called ***controlling parameters***. Another group of indicators may be practically not influencible; the measures government may take have no calculable impact on them. A number of indicators may express certain ***values***, their increase or decrease may be posed as an ***objective***.

123) As with each statistical indicator, there is the danger with SNIA that its indicators will be ***misunderstood or misinterpreted*** and that false conclusions will be drawn from them.

124) The information flows and knowledge stocks of a society, described and not-described by SNIA accounts, may be referred as ***"information household"*** In this context the word "household" is used to cover all information activities, flows and transactions occurring in a society during a time span. Societies are assumed to be largely determined by their "information household". SNIA is designed to reflect those stocks and flows that are important at macro level policy making and measurable.

125) SNIA reflects the processes of ***accumulation, use and consumption of information capital***.

126) The main aggregate indicators of SNA are extensively used as summary indicators of economic activities and ***welfare***. Obviously there are several information transactions that may be considered as components of welfare. On the area of free speech, free communication and press, the right to information, free access to government information usually individual cases of violation are reported and used as indicators of the situation. Freedom of speech cannot even be characterized by volume of information flows. The magnitude of flows of social redistribution of information (education, "public" information goods, etc.) still characterize the efforts of governments to put restraints on internal social or ethnic inequalities.

127) Such indicators as "per capita net information flow from government to households and vice versa" and "share of the government sector in information production", characterize the relationship between households, individuals, corporations and government in the society. A number of similar figures reflect such processes as ***centralization*** or ***decentralization***, ***democracy or autocracy in operation.*** The ***per capita figures of import*** and ***use of import*** reflect informational ***openness*** of the country, the ***per capita figures of export*** may reflect its ***vitality***. Per capita volumes of "import plus externalities of foreign information production" as related to "domestic production" and "use" determine external***dependencies***. Volume of "information assets" and its distribution qualify the country for being ***information-poor*** or ***-rich.***

128) ***SNIA indicators can be used in an industrial environment***. For a number of years, FCC of the US has been publishing data for the distribution of switched access lines (of reporting local exchange companies) and different channel capacity of international private line services by bit-based channel-capacity-

classes. When telecomm lines will be used more and more for various purposes and different amounts of information will be communicated on these lines, the application of bit based performance indicators in telecomm industry may be beneficent.

2. The coverage of GDIP and the role of imputations

129) ***Imputations*** are applied in the system to fill up the vacancies in the raw data tables. As in SNA, imputations should not be interpreted as introducing hypothetical activities or transactions or flows into the system. The purpose of imputation is just to complement the tables, making these items available for aggregating and operations in the accounts. There should always be actual activities and transactions underlying the estimates. Having this in mind, imputations should not influence significantly the level of gross domestic information production.

130) Within the limits of the system, its indicators reflect ***growth*** of information production and ***productivity***.

II. OVERVIEW

A. Introduction

1) The central framework of SNA describes the ***essential phenomena of economic life:*** production, generation, distribution and use of income, consumption, accumulation and wealth. It provides a simplified but complete representation of these phenomena and their interrelations. The same concepts, defintions and classifications are applied to all accounts, and the consequences of economic transactions are consequently lead through all accounts. Integration and consistency are basic requirements for any national statistical system that is going to mirror real world processes and phenomena.

2) SNIA describes ***essential information phenomena*** both economic and non-economic in accordance with SNA in an integrated and consistent system.

3) The purpose of this chapter is to give an overall picture of the backbone of SNIA in a comparison with the central framework of SNA.

1. Analyzing information flows and stocks

4) SNA does not specify exactly the economic flows and stocks it describes. These objects can be formulated in a more formal way as it follows.

5) ***An economic flow*** is the multi-tuple of
- an ***actor***, an economic agent engaged in doing something
- a ***kind of action*** doing of what the operator during a time intervall is engaged in, and which action is
  characterized by the***activity*** itself or
  the ***result*** of activity,
- ***stocks*** of the first actor at the beginning and the end of its activity
- a number of other ***economic agents,*** who
  receive the thing the first agent completed
  provide ***something in exchange***
- ***stocks*** of the second and more operators before and after the exchange.

6) The set of ***"in SNA accounted economic flows"*** is more limited than those that are defined by the general definition given for "economic flows" in SNA.

7) Basically the function of SNIA is to create an opportunity to and to implement the consequent and coherent ***recording of statements*** referring to certain facts, or beliefs for events, states (of-affairs), phenomena and processes concerning acts, actions, activities concerning information. For saving space and time, the statements are recorded as items in data tables.

8) Statements can be made with ***instantiation of assertative natural language sentences.***

9) The sentences may have the following general ***structure***.

<Sentence>:=<Noun group>&<Verb group>
<Verb group>:=<Object>&<Illative>&<Dative>&<Elative>&<Resultative>

10) A noun group consists of a noun and ***adjective***s. Adjective can be a structure with ***instrumentalis,*** that describes the ***instruments*** of the subject.

11) Subject describe or denote the ***actors***, ***actants*** of the act. Subjects of the SNIA are called institutional units.

12) Verbal groups describe or denote an action or acitivity. Verbs describe or denote an ***act***.

More than 10000 acts, as "speak", "write", "argue", "deny", "handle", "treat", "process", "transfer", "broadcast", "copy", "analyze", etc. can be enumerated as such that may influence the knowledge state of subjects that is to be covered in some way by SNIA.

13) A considerable number of these ***acts and actions are involved in laws*** or other kinds of legislation. Examples are "know", "speak", "disseminate", "copy", actions as "disclosure of records", "maintain a system of records", "access to records", "foreign communication by radio", "move data", "collect data", "keep data", "use data":

Another group of acts is characteristic for individuals and is not subject to legislation, like thinking at, dreaming, hesitating, being angry, enjoying something.

The link between those acts that are regulated by law and can be represented in SNIA determines usefulness of SNIA in legislation. Two types of act and actions can be defined: the acts and actions regulated now, and those that are supposed to be regulated later.

14) The most important ***international,*** world-level maxims defining subjects, objects, relationships, acts and actions concerning information are those of UN General Assembly as Declaration of Human Rights. A number of other international organizations, like UNESCO, Council of European Communities, Europe Parliament issued definitive texts like "green books" of European Community.

15) The important national subjects, objects, social relations, acts, actions and activities connected with concept of information, are subject to ***legal definition and regulation actually valid*** in each country. An analysis of the regulation areas and activities show that the codified and operationalizable categories of subjects, objects, relations, acts, actions and activities can be classified into three groups. Those that

- are not subject to comprehensive treatment,
- are subject to comprehensive treatment in themselves,
- are subject to comprehensive treatment, including them as elements or parts of generalized categories.

16) ***Dative*** describes or denotes
- the recipient of the object or
- sufferer or beneficiary of action. Recipients, and beneficaries may be subjects, sufferers may be objects or subjects.

17) ***Activity*** of a subject is a net of actions made by him. The net is defined by actions and ***temporal relations*** over them.

18) ***Objects*** describe or denote ***direction*** or result of the act. ***Results*** can be physical objects, particularly information goods. The maintenance or change of the state or status of something in the dative's possession can also be the result of an action.

19) ***Finalis*** denotes ***objective*** of the actor.

20) ***Illatives*** denotes
- the ***source*** of object
- the state of object or subject before the action.

Any actor participating in an information acitivity or transaction has a certain stock of information assets before and after the transaction has been completed.

21) ***Information flow*** is defined here as an action, whose object, instrument or source is an information good or a signal.

22) The ***accounted information flows*** applied in SNIA along the course of practical computations can be defined as follows:

#a) those actions that represent an economic flow in SNA and also represent a measurable information transaction,
#b) those actions that represent a sequence of information flows and also represent an economic flow,
#c) those actions that represent an information flow and also a sequence of economic flows,
#d) those actions that represent a distinguishable part of an economic flow and represent an information flow,
#e) those actions that represent an information flow but are not considered as an economic flow.

23) As it can be seen from the previous paragraph, most ***accounted information flows can eventually be related to economic flows*** . This assures that a good correspondence can be maintained between SNA and SNIA and twin-tables can be built up.

24) The ***principle of correspondence of flows*** is the following

- There is a one-to-one correspondence between recorded SNA and SNIA flows during type #a) actions,
- A sequence of SNIA flows can be corresponded to a recorded SNA flow during type #b) actions,
- A sequence of SNA flows can be corresponded to a SNIA flow during type #c) actions,
- A distinguishable component to an SNA transaction can be corresponded to an SNIA flow in type #d) actions.

2. Recording flows and stocks in SNIA

25) The system should be intelligible and manageable, and various aspects and processes be balanced. These are contradictory requirements, which are met with a limited number of ***main categories***.

26) While governments in many times are interested in knowing the information flows between given pairs of actors, it is not generally needed, and for general purposes it is sufficient to record each type of transaction between a given actor of a given group and all the other actors indiscriminately. Pairwise study of ***transactions of a given actor*** with another given actor or a given group of actors is beyond the scopes of the system.

27) Similarly to SNA, "the purpose of the system is to get national accounts that are as consistent as they would be if the accounts were fully articulated."

28) ***In SNA each account*** refers to a certain aspect of economic life. The ***accounts of SNIA*** are to follow this classical presentation but the correspondence will not be perfect. SNIA accounts are described in later sections with more detail in further relevant chapters.

B. Main Categories

29) ***Main categories of the system*** are those described in the previous chapter as defining information flows and stocks and reflected by the statements defined over:

1. Institutional units and sectors

30) At physical level, in physical information flows, those are ***human*** individuals and ***machines*** who can directly communicate something with each other through a physically existing interface between them. They are ***transactors of the physical information flows***.

31) Subjects of recorded SNIA transactions will be called ***institutional units.*** The institutional units defined in [SNA92] will be applied in SNIA with slight extension and modification. Henceforth that definition will be recapitulated here.

32) As far as many economic transactions involve the exchange of ownership of a good or asset, the institutional unit in SNA must be an entity which is capable of owning assets in its own right and of incurring liabilities, engaging in economic activities and in transactions with other entities on their own account. Their ***characteristics*** comprise:

- Be entitled ***to own*** goods or assets on its own right,
- able ***to exchange the ownership,***
- able ***to incur liabilities*** on its own behalf,
- able ***to enter into contracts,***
- may be ***involved in litigation*** on its own account,
- able to ***take decisions and actions*** for which is held to be directly reponsible at law,
- either a complete ***set of economic accounts*** exists or it would be feasible if they were required.

33) The ***recorded elementary transactors of physical information flows*** in SNIA are individuals and machines. While individuals will be aggregated into the main sectors of the system, machines will be used only for the identification of interfaces of flows between individuals and complex units, the normal transactors of the system.

34) The SNIA transactors besides human individuals -- legal units, households -- are called ***complex transactors.***

35) ***Flows between complex transactors,*** like enterprises, government agencies, non-profit institutions owning, renting or possessing these machines, and employing or hiring individuals partly can be deduced from physical flows. Physical flows transactors are accounted only at the interface of institutional units and the flow will be classified as machine / human output and machine / human input.

36) In a society with a population given, ***human information production and consumption abilities are always limited, while machine production and use of information can grow without limitations,*** because both information productivity / consuming capacity and population of machines may grow. Introduction of machines into production and use of information is the main source of physical level information productivity of the society. However, these individuals are affiliated and machines are owned to institutional units, which determine their behavior.

37) Also those are institutional units which are responsible to provide data for surveys.

a. Institutional sectors

38) There are three clearly ***discernible groups of institutional units*** of [SNA92] whose elements constitute the class of institutional units:

- Legal or social entities in the form of ***corporations*** or ***non-profit institutions***, whose existence is recognized by law or custom in the society.
- Units of central, state or local ***governments.***
- ***Households.***

39) Corporations, non-profit and government institutions sometimes must be divided into narrower, more homogeneous establishment type units. An ***establishment*** is a unit which is in principle engaged in one economic activity and observable but which may also cover secondary activities.

40) ***Corporation*** is a legal entity created for purpose of producing goods or services for profit which is collectively owned by shareholders who have the authority to appoint directors responsible for its management. Subsidiaries (incl. ancillary corporations) and associate corporations also belong to this group.

41) ***Non-profit organisations*** (NPI-s) are legal or social entities created for the purpose of producing goods and services but not for the purpose of generating an income or providing a financial return. NPI-s are not necessarily engaged in non-market production and may charge fees which are geared to their average production costs. NPI-s like professional chambers and trade associations provide a considerable amount of information to their members. Churches, trade unions, political parties with membership's registers, experts' staff, press contacts etc. are large information producers, although their information activities are hardly accountable separately.

42) ***Government units*** are legal entities which have legislative, judicial or executive authority over the institutional units within a given territory. Governments provide collective services and free or greatly reduced priced services to individual institutional units and redistribute income.

43) The ***definition of units within central government*** may impose difficulties and has significant consequences for the perceived dimensions of information flows.

44) Among the ***consequences*** one can mention that if central government is accepted as a single unit, all interdepartmental transactions should be classified as intra-unit transactions, and volume of output and input may be radically less than if informationally or economically independent units are considered. However, this issue isn't just a technical one, it ***concerns the foundations of the government and state***.

45) ***[SNA92]*** holds the opinion that "Central government is an exceptionally large and complex institutional unit. From an economical point of view it is not feasible and desirable to try to break it down into smaller institutional units. Central government may be composed of many large departments, each of which may be repsonsible for considerable amounts of expenditure, but they are nevertheless not separate institutional units. Each department is not capable of owning goods and assets, engaging in transactions, incurring liabilities in its own right, that is independently of central government as a whole." ***SNA declares central governments to be one unit*** in each country.

46) This approach has been based upon the facts that

- central administration is headed by a single responsible person (prime

minister, chancellor, governor, president),
- economic flows of the central government are defined and determined altogether by legislation.

47) Others may hold the opinion that once a general definition for the concept of institutional units had been accepted, ***independence or dependence of government agencies of a country is a matter of fact*** indeed and is not a definitional issue. What is more, the extent of independence or dependence can be made visible after having and applying the general definition. A good account (both SNA and SNIA) should reflect the character of the government (and state). Such an approach wouldn't ab ovo declare the government as one entity in every country and wouldn't ab ovo define the position of government units in the system.

48) If the ***classificatory system of SNIA*** did not reflect the units really exist inside central government, the figures obtained might be useless for preparing and making decisions concerning these units.

49) The extension of the notion of "control" as defined in [SNA92] for corporations in a modified version seems suitable for defining

- independent and
- subordinated governmental units.

> In Hungary, at least the one-chamber Parliament, the President, the Prime Minister, President of Court of Constitution, President of Supreme Court and Supreme Prosecutor can be considered to be independent. Independency of the Parliament is doubtless. The rest of the organs are chaired by heads elected by the parliament. Independence has been provided by the provision of law that they cannot be summoned unless they commit crime.

50) Just such an approach could make SNA (and SNIA) suitable for drawing not only economical but - what is inseparable - social conclusions. Volume of information flow between agencies would illustrate factual activities of the government.

> Departments in a "totalistic" state are totally subordinate to the head of the governme democratic and constitutional state, departments can freely undertake contractual contacts with private and non-private units, and the (federal) state budget contains several separate items for many of them, which items are not redistributable. They also have the right and obligation to manage the assets assigned to them and are ***economically independent*** to a significant extent.

51) Information does not flow freely within government, not even in total states. In a democratic constitutional state which respects privacy, free flow of information is not only impossible, but forbidden by law which defines the scope of various authorities and measures in order to protect privacy.

> For instance, ***informational independence*** of Hungarian Inland Revenue Office is guaranteed by law so that any transfer of data from the Office is prohibited except the case of required notification.

52) In several countries, the relation between the departments and body of government looks like that between a holding company and its subsidies rather than that between the intra-unit departments.

53) Government agencies accomplish mostly information activities. In their traditional shape, these agencies had no goods that could have been exploited as capital goods. A new situation emerges with impact of government data banks. With tying up some plus efforts to organise the data into a database under an on-line dabase management system, the whole system automatically turns to a capital good. A database can be exploited so that it is able to provide on-line services. Many of them functionates as working capital indeed, which is not characteristic for a non-profit organisation. At this point, regulation of independence and interfaces of government agencies has got more significance.

> Since telematics had entered the scene, interagency information transfer has become a particularly important subject to legal regulation in the ***U.S.***. Mutual account of services provided by government units to other government units is held to be a good measure to reduce double effort and paperwork burden and is held desirable.
>
> The ***Federal Paperwork Reduction Act*** acknowledges that information is a valuable resource and it should be managed in the administration as such. U.S. regulation OMB Circular No A-130 declares that agencies shall share their information technology facilities with users from other agencies to the maximum extent feasible, but will recover full costs from Federal users of facility. The agencies enjoy a partial independence in managing their "information resources".

54) A ***household*** is a small group of persons who share the same living accommodation, who pool some, or all, of their income and wealth and who consume certain types of goods and services collectively, mainly housing and food. Families constitute ***private households***. Members of religious orders living in monasteries, prisoners, long-term patients in hospitals, officials of armed forces

belong to ***institutional households.*** This definition in [SNA92] and its interpretation are accepted, though the concept of "household" could have been bound to common information production and consumption either.

55) It may be questionable that households alone, or households ***and*** their members will be considered as units in the system.

> Such household information stocks - as family libraries, family photo- albums, archi ***common property*** and use of the household members. Also some information services - like TV broadcasting - and the TV set are ***used and consumed commonly***. However, some transactions within households are made individually - as teaching children, watching TV (using visual
>
> Relation of ***non-formal communities*** to their members is an important and quantitatively less studied issue of society. Therefore, a distinction would be desirable in households between collectively and individually produced or consumed information. Statistics fail to provide useful regular information on this subject due to apparent difficulties of operationalization.

56) ***International organisations*** like UNESCO, UNO, IAEA etc. produce and consume vast amounts of information and so play an important role in the "information household" of the countries concerned.

b. Delimitation of "society", "the rest of the world", and "ethnic community"

57) The ***society*** is defined in SNIA as entirety of all institutional units. It consists of all institutional units which are resident in the economic space of the country. The economic space of a country, although including essentially the space of sovereignty, doesn't coincide exactly, some additions and subtractions are made in accordance with SNA.

58) Resident units engage in transactions with non-resident units (that is units which are residents of other countries). These transactions are ***external transactions*** for the given countries and are shown in the accounts of the rest of the world. Formally the rest of the world can be treated as a sector of the country.

59) Individuals can be and usually are grouped into groups of ***ethnic groups*** according to their declaration. Individuals belonging to the same ethnic group in various countries constitute individuals of that ***ethnic community.*** Some states may represent countries ***and*** ethnic communities. The non-individual

institutional units of such a country belong to the ***non-individual institutional units of the ethnic group and community.***

60) Native speaker individuals of a given language constitute the ***language group*** of that language. Information goods and services on that language will be considered as ***outputs of the language group***.

2. Transactions and other flows

61) Institutional units undertake a great number of ***economic and non-economic actions***. These actions result in economic flows and information flows. ***Economic flows*** create, transform, exchange, transfer or extinguish economic value. ***Information flows*** create, transform, exchange, transfer or extinguish volumes of information. An action may represent an information ***and*** an economic flow or only one of them or neither of them.

62) In order ot provide harmony with SNA, ***set of accounted SNIA flows*** will contain

- all accounted economic information flows in SNA,
- a number of non-accounted economic information flows,
- a number of non-economic information flows.

63) Most economic actions between institutional units are undertaken by ***mutual agreement*** . They are either an exchange of economic value or a voluntary transfer by one unit to another of a certain amount of economic value without a counterpart. The economic actions undertaken by mutual agreement are called ***economic transactions.*** Some actions involving only one institutional unit are also treated as an economic transaction.

64) The ***economic actions taken unilaterally by one institutional unit*** so that it has consequences on other institutional units without the latters' consent, are called "other economic flows". SNA records these actions only to limited extent. even though these phenomena are generating economic flows. The consequences of wars are not treated as transactions but as other economic flows.

65) The vary same terminology will be applied for information transactions in SNIA, ***discerning information transactions and other information flows***, based upon the intentions of the sides as described in the previous paragraphs.

66) The information flows can be ***actual, observable*** and ***measurable*** or they can be built up or estimated as described in the paragraph on information flows. A number of flows is ***observable but cannot be valued immediately or later.*** This can be

examplified with the flows between various parts of human brain. At the same times many observable and in-principle measurable transactions will not be recorded. Examples are electromagnetic signals in various transport systems as those of railways and air traffic control.

a. Main types of information transactions and other information flows

67) ***Elementary information transactions are numerous. They can still be grouped*** into a relatively small number of types according to their nature as defined here. The main classification of transactions and other flows includes three first level classes each of which can be subdivided hiearchically.

68) ***Information transactions in goods and services*** describe the origin and use of information goods and services. The term ***"information products"*** refers to goods and services.

69) ***Distributive transactions*** are those by which the information added is distributed to individuals, objects and transactions involving the redistribution of information income and existing information wealth among subjects.

70) Other ***information accumulation entries*** cover information transactions and other information flows not taken into account before and which change the quantity of information assets and liabilities, as changes in non-produced information assets. These should also cover the effects of such phenomena as natural catastrophes and political events. They also include holding information gains and losses, too.

71) ***Financial information transactions*** do not constitute a separate class of information transactions. Paying, however is subject to a special treatment to be described elsewhere.

72) ***Accumulation entries*** cover such information flows that change the volume of information assets both as a consequence of economic and non-economic phenomena.

b. Characteristics of transactions in the SNIA

73) An accounted economic information transaction may be treated as

- a self-contained "recording unit" in SNIA,
- partitioned into more "recording units" in SNIA.

Non-accounted economic information transactions and non-economic information transactions are self contained units of the system.

74) ***Self contained recording units of the system may be classified independently of the actual type of underlying economic transactions*** escorting them.

> For instance, the broad category "gross fixed information capital formation" may concern "final consumption" or "fixed capital formation" according to the present rules of SNA. A transaction as "Purchase of a "software product"" may qualify as "intermediate consumption" as an economic transaction and as "gross fixed information capital formation" as an information transaction.

76) In the value-assessed ***twin-tables*** to the SNIA accounts, economic flows should be reclassified according to the character of the underlying information flow. The "Purchase of a "software product"" will be classified as "gross fixed information capital formation" and will be shown in value units.

77) In long run, a ***concordance between treatment of information transactions*** in SNA and SNIA is desirable. Underlying technical characteristics of information transactions defines their economic character and should determine economic treatment in SNA.

c. The complementary classification of transactions and other flows

78) SNA offers a ***complimentary classification of transactions*** that shows the various kinds of transactions in kind explicitely, the components of compacted flows. This classification will not be applied in the SNIA.

3. Assets and liabilities

79) ***Information assets*** will be defined as really or "to-be" existing information goods or human knowledge that are subject to claims of the institutional unit. Information liabilities are really or "to be" existing information goods and human knowledge that are claimed by other institutional units. The balance sheet of SNIA shows the stocks of assets and liabilities held at a point of time by each unit or sector. Stocks are connected with flows: any change in stocks should be induced by flows.

80) The ***coverage of economic assets*** is limited to those assets which are subject to ownership rights and from which economic benefits may be derived by their holding them or using them in economic activities. The coverage of ***accounted in SNA economic assets*** is stil narrower.

81) The ***coverage of information assets*** may extend beyond economic assets, since the class of information goods itself is broader in some aspects. The class of ***accounted information assets*** is a less broad class than that of all information assets. Produced information assets are mostly economic assets or have the potential to become economic assets.

82) The ***classification of information assets*** into financial and non-financial assets has not been used in SNIA. SNA also distinguishes assets that serve as "store of value" and those that "usable in economic activity". SNIA should apply the classification into "information capital", "inventories" and "valuables".

4. Producing units and products

a. Information producing units

83) An action that results in outputting a new object, something, earlier not existed and which functionally carries information: that is rendering an information service or creating an information good, while consuming resources, is called ***information production***.

84) Institutional units may produce various economic goods that are considered as information goods and also such objects that are accounted as information goods, but not yet as accounted economic goods. Units of both types are called ***information producing units***. Information producing units include individuals.

85) To study information production in detail or obtain better estimates, it would be sometimes useful to refer to more homogeneous units, ***establishments***.

86) Establishments should be defined in the same way as it has been done in SNA and can be classified to ***market and non-market establishments***. Market establishments are grouped to constitute a ***market industry*** .

b. Products

87) Goods and services together, are called ***products.*** They take part in physical processes and valuated by their economic value and volume of information, if such exist. Similarly, information goods and services are called together ***information products***.

88) SNA applies ***Central Product Classification***. This classification scheme -- in an aggregated and extended form -- will be used in the SNIA, wherever it is possible.

89) The products that cannot be valuated regarding their volume of information they carry, will be classified into more products, so that the valuation can be done. This will be called ***partitioning*** in a complete accordance with the SNA. Also some products not considered in SNA will be added.

5. Purposes

90) The ***concept of purpose*** is related to a transaction or a product.

C. Rules of accounting

1. Introduction

a. The terminology for the two sides of the accounts

91) The SNIA utilizes the term ***"resources"*** for the side of the current accounts where transactions appear that add to the volume of information of a unit or a sector. Resources are -- similarly to SNA -- put on the right side. The left side of the accounts, which relates to transactions that reduce the volume of information of a unit or sector is called ***"uses".***

92) The balance sheets apply the term ***"changes in liabilities"*** on the right side and their left side is called ***"changes in assets",*** accordingly.

b. Double entry/quadruple entry

93) For a ***unit or sector***, national economic accounting is based upon the principle of double entry, as in business accounting. ***National accounts*** are based on the principle of quadruple entry because each flow should be recorded twice by the two transactors involved.The accounting principles of SNA should be maintained in the course of compilation of the ***twin tables of SNIA.***

94) ***Information accounting*** at present is much less developed, and information transactions and flows -- that is transactions and flows with information goods and services or human knowledge -- are only rarely recorded in this form at institutional units. The improvement of the unit-level accounting of information flows is a prerequisite of information accounting at the level of nation. Information accounting should first be implemented for the external information transactions of the units accomplished by telecommunication networks.

Information accounting in bit units***is conducted*** on a regular basis in local, regional and wide area computer networks and

telecommunication networks. Standard software is available for recording transcactions of the users for ***resource management*** and ***risk management*** (security). There is no standardized relationship, however, between transactions, monitored by operating and network management systems, economic bookkeeping and national accounting. Concepts of these systems -- as "superuser", "owner of a file", "owner of a process" should be***harmonized*** with the concepts of ownership in copyright regulations, economic accounts and privacy regulations.

95) In principle, national information accounts ***for the whole economy or society*** should also be based on the principle of quadruple entry.

96) Although the accounting principles are the conceptual basis for the consistency of national accounts, the national economic and information accounts cannot be treated in the same way as the economic accounts of an institutional unit.

2. Time of recording

97) Transactions and other flows ought ***to be recorded for the same time in the various accounts*** in question for all the units involved. This principle has been many times violated at the institution level recording. While data for information production processes are frequently up-to-date, it is not uncommon that raw figures for information consumption are being estimated retrospectively, when some time is elapsed.

98) The general principle in SNA that transactions between institutional units are to recorded on an ***accrual basis,*** that is, when claims and obligations arise. Cash flows and physical flows of goods and services may take place in other points of time. ***SNIA*** should comply with SNA -- concerning time of reecording -- whenever it is possible. ***Physical information flows*** should be recorded when they take place.

3. Valuation in volume terms

a. General principles

99) A transaction should be valued at the very ***same volume of the same (mostly non-bit) natural unit of measurement*** through all accounts of all institutional partners. This may present numerous problems. For example, telecommunicated messages - in package switching networks - may change their shape and volume during

transfer. Information can be added or lost during the transportation of information goods.

100) Transactions and other flows of various industries should then be revaluated centrally in national information accounting in common natural units ***according to the date of revaluation.*** Assets and liabilities should also be valued according to the time the balance sheet relates.

b. Methods of valuation

101) Economic valuation in SNA and SNIA should face the problem of treating taxes on products, subsidies, customs duties and other incomes. ***Information valuation*** faces similar but less problems. Some examples will be mentioned in the following paragraphs.

102) Software products, audio records and other products are many times supplied with accompanying paper-based documentation of significant volume. Such ***accessories*** may be treated separately or together with the information good or service in dependence of easiness of surveying.

103) Payment and other economic processes accompanying to "primary" information flows also represent a significant volume of information. These ***"secondary" information flows,*** however, mostly assume different media and could sometimes be treated better as separate information flows.

104) ***The method of economic valuation*** used in twin-tables should be consistent with that applied in official national accounts.

105) ***Economic valuation of transactions in the twin-tables*** that are

- both accounted economic and accounted information transactions, or
- accounted economic transactions that are not information transactions, or
- accounted information transactions that are not economic transactions

do not present difficulties.

106) Economic valuation of information transactions that are

- economic transactions but not accounted in SNA, or
- accounted as part of an including "booth" activity

presents methodological problems which should be resolved with various estimations adapted to the situation.

c. Volume measures and real measures

107) SNA valuates economic flows at constant prices and current prices. Flows at constant prices are said to be in volume terms. In twin-tables those are ***economic flows in volume terms*** that should be shown together with information flows. These should not be missed for "volumes of information" treated in SNIA in bit units.

108) Information flows of a longer than one year period of time should be studied considering the same transition formulae that are valid at the time of valuation, that is ***"information flows in volume terms"*** should be applied.

109) ***Inter-country or inter-regional comparisons*** may asssume the same level of technology in the various territorial units that are to be compared.

4. Consolidation and netting

110) The term ***consolidation*** covers the accounting procedures that are followed when different units are grouped into a sector or supersector. Consolidation is an important element of accounting which determines the results to a great extent. It reflects our ideas concerning the nature of flows to be studied.

111) To provide compatibility with SNA, ***for sub-sectors and sectors, flows between constituent units*** are not consolidated as a matter of principle. That means ***interunit, intrasectoral flows*** are not neglected.

D. The Accounts

1. Introduction

a. SNA accounts

112) With the tools introduced ***various flows and stocks can be recorded*** in a number of accounts.

113) Accounts ***can be built for*** the

- subjects: institutional units, sectors, supersectors, including the rest of the world,
- subjects: capacities of institutional units, establishments and industries,
- objects: assets and liabilities,
- objects: products, and their groups

- actions: transactions, and their groups
- purposes and their groups

of the system.

b. Guiding principles at foundations of the architecture of SNIA accounts

114) SNA has been ***designed for describing the generation, distribution and accumulation of income***. Most economic units and the countries are tied to these processes. SNA describes how these legitime objectives are achieved. A number of categories of SNA -- in some form -- had already been extensively used at micro level for a long ago before those were introduced to SNA.

115) If information stocks and flows become the foundation of society then ***SNIA should reflect*** how ***information flows and knowledge stocks*** become and are indeed the foundation of society, that is, accounts, classes and indicators of SNIA should be open for modelling and simulation of the behavior of the groups of main actors.

116) If it would happen just merely ***because growing information flows and knowledge stocks represent growing and dominant economic flows,*** then the direct application of SNA -- with perhaps a new sectoral grouping -- would be a suitable tool for policy making. The fact that information flows of significant volume and political importance do not represent economic flows, economic and information flows are not proportional to each other and the bulk of information is generated, distributed and consumed under non-market conditions indicate that account of information flows cannot be substituted by the account of economic flows and vice versa.

117) While several information flows also represent economic flow, it is not sure that the share of volumes of information produced under market conditions has been growing in the past decades.

118) SNIA ***should possibly reflect those information-related but non-economic states and processes of subjects, that are open for operationalization***. The system of SNIA is not just an accounting system. It should mirror the common view how information activities are or should be treated in the society, the relation of information activities to economic activities, the whole reproduction process of information acitivities with its legitimate objectives and means.

119) ***Three philosophies*** will be mentioned here for defining SNIA: building a "true satellite", an "analog-with-SNA" and an "pragmatical" system.

120) A ***"true-satellite-to-SNA" SNIA*** conceptualize processes of "social reproduction of information" completely within economy as SNA conceptualizes it. It would define and determine the quantitites of information that accompany to generation, distribution and accumulation of economic income as these processes have been defined in SNA. In such a system, the quantities of information are assigned to economic stocks and flows, and each economic stock or flow would be measured in value terms while a number of them -- those concerning information product and human knowledge -- also additionally in natural units. In such a system ***each account of SNA would have an "SNIA pair"***.

121) An ***"analog-with-SNA"*** SNIA would conceptualize social reproduction of information as an independent and self contained process. Such a system would define accounted information transactions and information flows independently of the definition of accounted economic transactions and flows, etc. available in SNA. These were analog, but completely independent from the SNA concepts. Furthermore, this system should contain a ***complete set of analogous (with SNA) SNIA accounts.*** reflecting "information reproduction". No direct connection with SNA would be available.

122) This system would be justified by the assumption that process of "information reproduction" should be viwed as an analog process with economic reproduction, individuals and other units accomplish information transactions and that their objective is generation, distribution and accumulation of "information income". Although there are indications that this assumption is not completely false, one cannot claim that there would be such a widely accepted conscious process, codified like "production, distribution and accumulation of information income". The information societies to come, may size up the situation, and may declare a system that not only intentionally distributes and redistributes information income, but even whose main objective is the production, distribution and redistribution of information income.

123) A ***pragmatic accounting system*** should be based upon the requirement that both SNA and SNIA reflect different overlapping parts of the very same physical world. It should comply with the fact that information reproduction takes place in and outside economy as it has been conceptualized by SNA. This pragmatic system operates with partitioned or non-partitioned accounted economic transactions as recording-units -- whenever it is possible -- but adds non-accounted economic information transactions and non-economic information transactions, introducing appropriate corrections to SNA-aggregates.

124) While economy has not assimilated the complete system of information reproduction, the view of information flows and stocks in frameworks of several kinds of analog to SNA categories of transactions and flows still seems to be

reasonable for non-economic information transactions either. Henceforth, ***kinds of information flows and stocks*** will mostly be defined as the extensions of those in SNA. Not all kinds, however, will be adopted.

125) There is a ***number of general categories*** , beyond the industry-specific terms, that are used or understood in more or less defined or consolidated contexts by the professionals, management and policy-makers in the information industries when they describe or documentate information activities. These categories -- as "information production", "information use", "distribution of information", etc. -- should then be used and matched with those of SNA. Other kinds defined as "information income", have not yet been used on the micro level but were considered reasonable and useful.

126) ***Rules of classification of accounted information flows and stocks*** into these classes should follow the nature of actual processes happening in society. Consequences of reclassification should be taken into correction in twin tables. With its proper classification of economic information transactions, SNIA should reflect our information age, offering new classifications to SNA.

127) Also in its ***sequence of accounts,*** SNIA should adopt a pragmatic approach

The structure of accounts of such an SNIA follows SNA wherever this is validated by the word usage and the transactions actually made at micro levels. This provides a ***non-complete set of SNIA accounts*** that are more or less analogs of SNA accounts. By this coherence should be maintained with "twin-tables".

128) The conventional view on the sequence of reproduction consisting production, distribution and use processes seems reasonable for reproduction of information in economy as well as beyond it. That means analogs with (SNA) Production Account, Capital Account, Other Changes in Assets, balance sheets and Rest of the World Accounts with analog kinds of information flows and stocks may be accepted as familiar for professionals of the information industries. It may be questionable that the kinds of flows described in Primary Distribution of Income Account and Secondary Distribution of Income Account should be described here or not.

129) Information income, distribution of information income are ***not yet accepted concepts*** in laws and not yet used by professionals, but the systems of public education, public broadcasting and national cultural institutions can still be treated -- in accordance with SNA -- as ***systems of distribution and redistribution of national information income***.

130) Sometimes it may be desirable to decrase inequalities in economic income and wealth in society. It is still obvious, that ***primary purpose of the society is mostly not a redistribution of incomes***. Redistribution of incomes is rather a means than an objective of most societies.

131) ***The primary interest of society*** is in accumulating knowledge and assets of information which can be assumed to contribute to success and prosperity. This is traditionally implemented by public schooling, supporting R&D -- and for this -- by redistribution of incomes. The impact of information technology makes necessary that the objectives and the relationships between objectives and means of society should be revised. SNIA should provide an intellectual framework for this.

132) Altogether that means that a pragmatic ***SNIA should apply "distribution of information income accounts"*** that reflect "distributive" information flows. These flows can be related to accounted in SNA distributive economic flows or parts of them. These flows should be reflected in twin tables to SNIA.

133) Information income accounts do not deal with taxes and subsidiaries, because these do not constitute information flows, except payment and taxation documentation to be treated in a special way. ***Information income accounts should deal*** with obligatory and free information that is component to economic transactions. This should be considered as primary distribution of information. Value of obligatory and free information components should be treated as primary economic incomes, analog with taxes and subsidiaries (after products, export and import), in twin tables and in a separate line when making a correction to SNA figures.

134) Information income accounts also should deal with ***compensation of employees with information products.*** This surprisingly significant item decreases information income of employees. ***Payment*** may be treated as an information component to a large group of economic transactions.

2. The Integrated Information and Economic Accounts and their components

135) The main types of accunts of SNA are:

- accounts for institutional units and sectors
  (current accounts, accumulation accounts, balance sheets),
- integrated economic accounts
- input/output tables.

a. A first glance to Integrated Information and Economic Accounts

136) The Integrated Information and Economic Accounts consists of SNIA tables expressed in natural units and twin tables expressed in economic value units. The accounts will first be prepared by broad carrier / media categories, broad classes of information goods and services then aggregated through these classes.

b. Matching elements of SNIA and SNA

137) ***Each account in SNA*** -- except Secondary Distribution of Income Account and Financial Account -- ***has an analogon in SNIA***. The analog-accounts (tables) of SNIA do not completely agree with the corresponding SNA table;

- some rows were renamed and redefined, and
- some rows were deleted,
- new rows were added.

138) As it will be explained later, ***twin-tables*** will be assigned to a number of SNIA tables. The figures in the corresponding items will reflect information flows and related economic flows. The problems with and the limitations to such a correspondence will be described in the foregoing chapters.

c. The full sequence of information accounts for institutional units and sectors and their balancing items

(i) Current Accounts

139) "Current accounts in SNA***deal with*** production, distribution, redistribution of income and use of income. Each account starts with recording, as resources of the balancing item of the previous one."

140) The ***Information Production Account*** records information use, information output, intermediate and capital information consumption with balancing items of information added, gross and net. Since information goods and services consumed as intermediate and capital consumption can not be recorded for each broad carrier class, information added will be determined at the national aggregate level of gross domestic information production of all information products and human knowledge.

141) The ***primary distribution of information income accounts*** show how information output (for most information products) or gross information added (for GDIP) is distributed to factors of production allocated in the main sectors. It should reflect the view of society at the issue which these factors are and how to define them. The ***Generation of Information Income Account*** records the

information incomes of producers and distributive transactions that are directly linked to production.

> It is a fundamental issue whether various kinds of information supply by employees during their worktime is considered as a service and included as production by the individual or employer's sector or it is considered in some other way. The way of interpretation of concept of labor determines the items of this account. The concept of labor is to appear in codified form in public law and corporation rules governing the rights and obligations of employees in electronic networks. Right now, rights and obligations of employees and employers working on private and public computer networks, particularly in an academic environment, are under discussion.

142) In information redistribution, those are not only households and governments that may participate from primary information added, but so do corporations either.

143) The ***Allocation of Information Income Account*** shows the distribution of information income according to recipients of primary information income. It should show ***information capital income, enterpreneurial information income,*** and ***disposable information income***.

144) The ***Redistribution of Information Income Account*** would show how the balances of primary information incomes are transformed into (adjusted) disposable income. This account will not be introduced to SNIA.

145) The ***Use of Information Income Account*** shows how disposable information income is allocated between saving or consumption.

(ii) Accumulation accounts

146) ***Accumulation accounts*** show all changes in information assets, liabilities and net volume of information goods and produced human knowledge and separately, in arbitrary units, those of non-produced human information capital.

147) Information saving is the ***starting element*** of accumulation accounts.

148) The ***Capital Account*** records the transactions linked to acquisitions of information assets and capital transfers involving the redistribution of information assets. The latter will be sometimes referred as to "information wealth" or "knowledge".

149) The ***Revaluation Account*** records holding information gains or losses due to revaluation of assets.

(iii) Balance sheets

150) Balance sheets show the ***net volume of information*** (net worth) and changes in balance sheets.

d. The transactions accounts

151) ***A transaction account in SNIA shows*** the "resources" and "uses", for a given information transaction or group of such transactions, for each sector and/or product engaged in this type of transaction, but it does not record direct relations between transacting sectors. The relations of type "what from whom to whom" are recorded in the input/output tables of the System.

152) The ***Goods and Services Account*** that can be elaborated for most information goods and services, their groups and society as a whole is a most important and useful table. It shows the total resources (output and imports) and uses of goods and services (intermediate consumption, non-productive consumption, changes in inventories, fixed capital formation, and exports) of a society.

153) Following the tradition in the SNA, "uses" will be placed on the right side and "resources" on the left side.

154) In the appropriate twin-tables, the same transactions will be recorded in value terms.

e. The assets and liabilities accounts

155) In the assets and liabilities accounts, information transactions and other changes in information assets together with stocks of information assets and liabilities are to be recorded.

156) In the appropriate ***twin-tables***, the same transactions should be recorded in value terms.

f. The Rest of the World Account

157) As in SNA, the Rest of the World Accounts covers ***information transactions between resident and non-resident institutional units*** and the related stocks of information assets and liabilities when relevant. It is established from the point of view of the rest of the world. A "resource" for the rest of the world is a "use"

for the country and vice versa. A positive balance means a surplus of the rest of the world.

158) In appropriate ***twin-tables***, the same transactions are recorded in value terms.

g. The aggregates of the system

159) Similarly to SNA, SNIA offers a number of composite values which characterize the information activities of a society, or nation considered from a particular point of view. These are summary indicators and key magnitudes for purposes of economic and social analysis and comparisons over space and time between countries, nations and regions. The following indicators will be sugggested to accept as ***"main aggregates"*** of the system. Main aggregates do not substitute the system as a whole.

160) ***Gross domestic information product*** represents the final result of production of information goods and services of resident producer units. It is the sum of gross information added of all resident producer units. It is a measure of production that filters out the effects of multiple accounting being the difference between output and intermediate consumption. It reflects the amount of "newly created" information. This is not to be missed for "new -- for someone -- information" or "new ideas" which are not measured in SNIA.

161) ***Net domestic information product*** reflects the amount of newly created information less fixed information assets consumed at its production.

162) ***Balancing items*** of exports and imports plus domestic externalities of foreign information production and foreign externalities of domestic information production reflect the activity of the unit -- a region, a country, an ethnic community -- on the international scene.

163) ***Balancing items*** of domestic information consumption and domestic consumption of foreign information products reflect the dependence of the unit.

164) ***Sectoral distribution*** of sources of information consumed, and ***intersectoral information*** flows show the character of society and allows to make forecasts for its behavior.

165) Volume of ***adjusted disposable information income*** does determine the maximum "informedness" the society achieved.

166) Volume of ***information assets*** and its constituents determine maximal extent of information capital use and of information property income.

167) Indicators of ***productivity***, ***efficiency of use and consumption*** characterize other important sides of operation of society.

168) The value of these indicators depend on the definition of production included in definition of boundaries and classifications of the system. Definition itself reflects the ***social values and the views*** of the standardizing body***concerning the way society should operate*** .

169) The relationships between information added, consumed and information assets express***"intellectual inertia"*** of the country.

3. The other parts of the accounting structure

170) The detailed analysis of flows of goods and services is an integral part of the central framework. The system provides ***tables of type "What from whom to whom"*** as regards information added, its components and supply and acquisition. Accordingly, the system has more central input-output tables.

171) ***Per capita figures*** are useful when international comparisons are made. Coherent data on population and labor should be added to the system.

a. The central supply and disposition table and other input/output tables

172) These tables show the flows of information output and information added between various products and various sectors.

E. The Central Framework of SNA and SNIA

173) Those are twin tables of SNIA that are directly comparable to SNA accounts. Items in twin tables of SNIA are those of included in those of SNA accounts plus some new items due to new lines in SNIA accounts.

174) The whole system of SNIA, including its raw data tables, can functionate as a satellite system to SNA. In SNIA the attention is focused to those phenomena and processes that concern information. Various aspects of information are treated so, that -- whenever necessary -- information transactions are taken out of economic transactions, reclassified and taken together with non-economic information transactions and flows.

175) The production boundary is changed accordingly, as usually in satellite studies, enlargened, the concept of fixed assets and the related fixed capital

formation was broadened in SNIA in comparison with SNA. At the same time the consumption boundary has also been extended.

III. FLOWS, STOCKS AND ACCOUNTING RULES

A. Introduction

1) As with SNA, SNIA is interested in making statements on the ***state*** of some objects at a fixed point of time and ***processes*** that take place with one or more objects within a period of time with a finite duration. These states and processes are defined in the later chapters and referred as to information (knowledge) stocks and information flows.

2) The fundamental issue to be decided when designing SNIA is whether quantitites of information that are accompanied to ***economic stocks and flows*** will be accounted as defined in SNA, or ***information stocks and flows*** defined in another way and linked to economic stocks and flows .

B. Information Stocks and Flows

3) SNIA should be defined to measure information stocks and flows in natural units and economic value terms.

4) In general, ***information flows and stocks should be entered*** in the records of institutional units that own or owned those information goods and assets, in the records of units that deliver or take delivery of services (particularly information services), or in the records of units that provide labor and capital, or use of them in production similarly to their economic records.

5) As it has been noticed recorded flows and stocks in SNIA are

- all accounted in SNA economic information flows and stocks in SNA (partitioned or not),
- non-accounted in SNA economic information flows and stocks,
- a number of non-economic information flows an stocks.

C. Flows

6) ***Economic flows*** are processes that reflect the creation, transformation, exchange, transfer or extinction of economic value; they involve changes in the

volume, composition or value of an institutional unit's economic assets and liabilities.

7) In ***monetary transactions*** , there are ***two flows of economic values,*** that is, the flow of goods and services and the balancing flow of monetary values. In the case of external output, goods and services are flowing out making the institutional unit less rich and monetary values are flowing in making it richer. SNA considers the latter. Direction of physical flows of information in a transaction is frequently oppositional to the flows of monetary values.

8) ***Information flows*** are processes that reflect the creation, transformation, exchange, transfer or extinction of volumes of information.

9) The information flows that are proper for changes of knowledge of individuals as a consequence of ***spontaneous internal mental processes*** should be treated as a natural process.

10) Examples of ***information flow without accompanying recorded economic flows*** are free-time conversation or certain kinds of religious activity. Road transportation of books from the printer to the bookshop of the same owner is ***physical flow of information goods*** that do not represent an economic or recorded information flow. Broadcasting, distribution of speech are examples for ***physical flow of non-durable signals,*** and supplying electromagnetic broadcasting signals for the input of a receiver's set is an example for ***physical flow of an information service***.

11) ***Economic flows probably mostly are accompanied by information flows.*** Engagement in economic activities presumes that information conditions of the parties concerned will change, even if this cannot be measured.

12) Contrasting to economic flows, the ***physical information flows*** that include the movement of every kind of goods and services, either own-produced or non-own-produced, less road, air, waterway or railway transportation, are also meaningful. For example, ***government information dissemination*** is frequently contracted out and dissemination activity as a whole is assessed for the aggregated figures of own produced and contracted out products.

13) The information goods and services supplied altogether by a ***supplier*** i to an acquirer ***(recipient)*** j and the supplier j to the recipient i during a period dt will be called the ***information turnover*** between them.

14) ***Gross information flow*** is an indicator whose value will be defined as the sum of volumes of information carried by all information goods and services in

physical information flows in the reporting period less flows of transportation and trade. Gross information flow is studied on the level of main sectors.

15) ***Net information flow*** -- an indicator -- is the sum of volumes of information added carried by all own-produced information goods and services in physical information flows in the year. Net information flow is studied on the level of main sectors.

16) In SNIA, the "flow of information" is assumed to be realized in information transactions and other information flows.

1. Transactions

17) The SNA term "transaction" will be referred here as "economic transaction" or "recorded economic transaction" to distinguish it from information transactions to be defined here and used together with economic transactions.

a. Economic transactions

18) Economic transactions should be discerned from other types of economic flows. An ***economic transaction*** is an economic flow realized by an interaction between institutional units by mutual agreement or an action within an institutional unit that is analytically useful to treat like a transaction, often beacuse the unit is operating in two different capacities. The parties may enter the transaction so that the agreement is forced by law.

19) In SNA, ***a monetary transaction*** is an economic transaction whose one component consists of the payment of money by one party to the other or of the establishment of a new financial claim by one party over the other or the extinction of a financial liability owed by one party to the other. A financial claim is essentially an asset which entitles its holder to receive a payment. Monetary transactions will not be treated as a target group. Payment itself is an information component to economic transactions, that will be discussed later.

20) While in value terms most of the economic transactions are recorded, it is not the case with volumes of information.

> This situation presumably will be changed in a network oriented society, when economic transactions will be initiated, accomplished, controlled and reported by electronic and photoelectronic networks. SNIA is a tool for policy making for a future information society and it can be completed only in the electronized environment of a matured information society.

21) Economic transactions need to be clearly distinguished from the activities, such as physical processes of production or consumption of which they may be composed. The same situation is valid in SNIA: ***physical information flows should be distinguished from the institutional unit-level, accounted information flows and transactions***.

> For instance, telephone calls are not taken into account at every physically existing switching centre the call is running through, though at every such centre new signals are produced and the input signals are consumed. Just the signals at the interface between the user and the service supplier (i.e. at both's receiver) are considered and the rest of an arbitrary number of signals of switches, computers etc. are left out of the account.

In information transactions it is not uncommon that more than two transactors take part.

22) Economic transactions are interactions between pairs of institutional units which ***may have one or two components***. A component to an economic transaction is an action in which:

- the ownership of a good or an asset is transferred from one unit to other; or
- a new financial claim is created or existing claim extinguished; or
- one unit provides a service to other; or
- one unit works for the other.

23) Accounted economic transactions of SNA sometimes will be partitioned into measurable information transactions or constituents in SNIA and a number of non-accounted of economic information transactions will be added.

b. Information transactions

24) Information flows ***could be defined*** as those actions that result in changing the volumes of information assets of institutional units.

25) ***Information transactions are*** the intentional actions of institutional units by mutual agreement, either economic or non-economic, on whose effect information goods, non-durable signals and non-information goods flow, carrying information, or actions within an institutional unit that are analytically useful to treat like transactions, often beacuse the unit is operating in two different capacities. The parties may enter the transaction so that the agreement between them is forced by law.

26) The wide-sense interpretation of the notion of information goods, services, activities and transactions goes well beyond the traditional interpretation of the concept of economy.

> "A chat between two friends in a pub", a "family or schoolmates' dis course", "conversation of cab-drivers on CB radio" are something which SNA do not concern and which aren't usually interpreted as economic transactions. These transactions, however, sometimes can also be interpreted as ***economic transactions with zero amount economic consequences***. Such an interpretation of economic transactions would make easier the formal treatment of SNIA, but may endanger the fundaments of SNA.

27) Monetary transactions may have the form of cash, check, magnetic card, electronic transfer, bond, or other forms. Later in the following text we shall focus the attention to the issue: "***Which kind of monetary transactions evokes which kind of information transactions?"***

(i) Transactions with and without counterparts

28) Information capital formation from own-produced information goods, information capital consumption and waste production are the examples of ***transactions without another partner***.

29) Distribution of advertisement materials is an example of a transaction in which one party provides a good to another and ***does not receive an economic or information counterpart*** in return. Counterparts may be distinguished as having volumes of information or economic values.

30) SNA considers social insurance contribution and the taxes payed for contingent benefits or collective services as transfers of economic values rather than exchanges.

(ii) Rearrangement of transactions

31) The concept of ***collective services*** has been used in SNA. Most collective services cannot be qualified collective when the underlying physical information flows are considered.

(a) Rerouting

32) A ***rerouting*** occurs when a flow is recorded in channels that differ from the actual ones. This can be illustrated by a direct transaction between unit A and C

is recorded as taking place indirectly through a third unit B acting as intermediary.

33) SNA's recording of economic transactions for wholesalers and retailers does not mirror the way those involved view them. For the sake of simplicity, the purchases of goods for resale are not recorded explicitely and are viewed as selling the services of storing and displaying them in convenient locations. The very similar approach may be applied in SNIA.

34) While the stocks of ***retailers and wholesalers*** are taken into account, the information flows resulting the changes in these stocks will be treated as balancing items. Storing and displaying information goods are not considered as information activities. Bookstores are left out of consideration, when net information flow is recorded.

35) The route of a mail can be described as Sender-->Post-->Receiver, but a route of Sender-->Receiver will be recorded instead.

(b) Partitioning information transactions

36) Some economic transactions are recorded as two economic transactions in SNA, as with a ***rental*** is partitioned into a repayment of principal and a payment of interest.

37) Several accounted in SNA economic transactions may be partitioned into self contained information transactions and self-contained non-information transactions. For example, "output of services of central government" may be partitioned into several information and non-information outputs.

38) Several accounted in SNA economic transactions should technically be partitioned into information and non-information constituents. The separation of "information constituents" serves the purposes of determination of volume of information flowing in the transaction. For instance, payment and information carried by banknotes and various actions of payment cannot be reasonably separated as a self-contained transaction, it is a component to the transaction. Similarly, the supply of employment, property and credit information by a consumer to a bank in the course of requesting loans should not be treated as a self contained transaction. The supplying of obligatory nutrition information handed over together with commodities, when purchasing food or beverages, must not be treated as a self contained information transaction. The volume of information flowing in similar transactions altogether is significant. These flows will be classified as "Obligatory and free information bound to economic transactions" among flows of primary distribution of information.

39) Employees' output -- labor -- will also be partitioned into worktime personal communication production and consumption, and the rest of their worktime activities.

(c) Recognizing the principal party to a transaction

40) In recognizing ***the principal party***, an information transaction is recorded as taking place directly between the ultimate or principal owner, or recipient or beneficient and the other party. The recognition of these sides is not always easy.

41) ***Commercial radio- and television broadcasting corporations*** may hire broadcasting capacity from other companies, while they maintain themselves by reselling broadcast time for advertisment purposes. The principal parties of transactions to occur here are as follows. In hiring a broacasting station (machinery) -- an economic transaction -- those are broadcasting company and station owner. In broadcast time-reselling -- an economic transaction -- the principal parties are the broadcasting company and the advertisement agency. The first and second economic transactions are not escorted by the flow of a significant volume of information. The principal parties in broadcasting are the broadcasting company and households. This transaction, non-pay commercial broadcasting itself, is an information transaction indeed, which, however, is not an economic transaction and might but will not be treated as an economic externality.

42) ***Government financed education, training and other information services*** impose a similar problem. The payee, beneficiary and the service-supplier are different units.

43) ***Telephone services*** also represent a major problem. The caller may or may not be the payer. The payer pays for the information received, but not only for the information the service company renders him but also for the information the service company produces for his partner. The service company does not pay for the information it consumes (for the conversation itself, intermediate consumption) while producing the outgoing voice signals. It is not known whether the caller or the payer supplies in average more information.

44) In ***barter transactions*** the sides exchange goods and services directly. Barter transactions are non-monetary transactions. While economic value is to be estimated in these transactions, volumes of information may be subject to exact measurement.

(iii) Remuneration in kind

45) ***Economic remuneration in kind*** is a payment ***to employees*** in the form of goods and services -- economic values -- instead of money. Information goods and services may be amongst such economic values but the information goods or services may have less direct economic value either. Such remuneration should be covered -- if feasible -- by SNIA. The concept of remuneration in kind is bound to "employees" as receivers.

46) It is not only payments (wages, salaries) that flow to the employee but so does information, either. The ***information acquirable and acquired by the employee*** is valuable, it can be used and misused and it may determine the employee's further carrier. That's why regulations exist which define the rights and obligations of the employee with the information he/she in this quality accessed. But it is not only the information of restricted use or business secret which is valuable, but so are contacts, personal knowledgeability, etc..

> Surveys indicate that an average clerical worker in the US in the seventies spent 106 minutes a day for acquiring information, 73 minutes for meeting and phoning and an additional 33 minutes for reading.

47) The concept may be applied in an extended meaning for those related information flows from employer to employee that do not represent economic flow and so neither are considered as remuneration in kind in SNA.

48) A detailed accounting of ***information flow to and from the employee*** in an ***uncomputerized office*** is practically infeasible so far.

(iv) Information transfer in kind

49) ***Economic transfers in kind*** are two party transactions, one of which provides a good, a service or asset other than cash to the other without receiving an economic counterpart in return.

50) ***Information transfer in kind*** will be defined as providing an information good or service without receiving an economic counterpart in exchange. Data supply by neighborhoods for police authorities in the frame of partnership agreements, many private conversations and phone conversations between corporations, direct mailing, advertisment actions, presents and gifts can be mentioned as examples.

51) Information transfer in kind should be many times classified as economic transfer in kind, either. Gifts, charitable contributions of books are examples. Free information is distributed among users of government information, unemployed or handicapped individuals, to-be investors of a country and so on.

52) Necessity, fairness and financial account of information transfer between government agencies (sometimes ***transfers in kind between government agencies)*** is a vital issue in debates on government data systems, privacy, freedom of information and production in government.

(v) Intra-unit information transactions

53) An economic transaction should also be assumed to take place when a unit decides to retain a good for purposes of its own final consumption or capital formation i.e. certain intraunit actions are treated as transactions. This is a frequent phenomenon for economic information transactions.

> At Hungarian Telecommunication Company, almost 10% of phone calls is service call (telegrams, repair and maintainig calls etc.). These are ***intraunit economic and information transactions*** (providing non-durable signals) within the corporations sector. These calls should be considered as final or intermediate consumption.

54) ***SNIA*** should recognize and sometimes account intra-unit transactions. If central government was treated as a single unit, then the transactions between various agencies should be considered as internal transactions. Non-collective intra-household services -- like "learning with children" -- could also be considered as intraunit transactions.

55) Physical information flows -- signals along neural axons wires and other channels --

- among parts of the brain (recognized by individual as faculties of his mind) or
- parts of brain and communicating (e.g., speech and sensory) organs of the same individual
- among parts of the same machine and
- between communicating organs of different (capacities of) people and machines, such that have external interface-- in form of visual, audial and other signals.

should be classified as

- being in the system or beyond its borders and
- being intraunit or interunit flows.

56) The intra-institutional-unit flows should be surveyed in time units first.***Time-use statistics*** are good for estimating volume of output, consumption and use of personal communications independently from the number of participants.

57) ***Volume of flows*** should be proportional with number of units within institutional unit, average channel capacity and average time spent with consuming information.

58) Industrial studies of interemployee communication in ***computerized offices*** (electronic mailing, computerized phone calls) has provided hints to understand intraunit communications between employees. These data should be applied for estimations.

59) For the purposes of the system, ***regular surveys*** would be needed, but the whole area is well beyond the ambitions and opportunities of the present-day official statistics. At the same time the area is subject to legislation and policy making. New representative surveys may also help to fill the gaps in our knowledge about information flows between employer and employee. The surveys should not violate privacy.

(vi) Obligatory information transactions

60) There are several examples of obligatory economic transactions that are ***obligatory information transactions*** as well. These transactions altogether carry a significant volume of information and their amount and contribution to the flows among various sectors is an important feature of the society.

> It is not uncommon that government agencies force individuals or corporations to supply information as examplified by population censuses, statistics, tax returns, customs declaration, testimony at law enforcement authorities, etc. Also government agencies should report certain events to other agencies, and interested parties make testimony before court. Vendors of durable consumers' goods are obliged to enclose warranty declaration and instructions to the handling of good.

61) Obligatory information transactions will be grouped into ***two main groups,*** obligatory information constituents bound to economic transactions and the rest of obligatory information transactions. Obligatory information constituents bound to economic transactions are parts of economic transactions, obligatory information transactions constitute a special kind of information transfer.

c. Externalities and illegal actions

(i) Information externalities

62) Although ***economic externalities*** have been defined, they are not recorded in [SNA92], because local law in many countries permits not to consider them, and

imputation of meaningful values for intrinsically non-market phenomena like externalities are would be cumbersome. Economic externalities never dominate economic transactions.

63) Certain information activities carried out by institutional units cause changes in the condition or circumstances of other units without their consent: They may be forced unwittingly and unintentionally consume or use information. These are ***information externalities.***

> A local transducer station or foreign and not-interested radio stations can "waste" the air-space over other countries. These can be viewed as unsolicited information services delivered without the agreement of the units affected or even against them.This "unintentional import" influences the opportunities of the domestic production, it can be viewed as "Polluting with impunity".

64) It is necessary to have this phenomenon accounted, because of its volume and political significance. In small countries domestic externalities of foreign broadcasting may even dominate domestic information consumption. The elaboration of and argumentation for international agreements on allocation of frequency bands need a careful analysis of SNIA-s of various countries.

65) Contrary to economic externalities, ***domestic information externalities of foreign spill-over broadcasting can be well estimated*** with survey data. Foreign information externalities of domestic broadcasting are also subject to surveying, but the survey data are mostly not available for the producer country.

66) Information flow from employer to employee could have been treated as an ***economic externality***.

(ii) Illegal information transactions and crimes

67) This is an important factor both in the SNA and SNIA accounts. The well-known examples are illegal copying of video- and audiocassettes and software-pirating. ***Illegal economic transactions*** should be treated in [SNA92] as legal transactions, provided they are genuine transactions into which both parties enter voluntarily. This approach is reasonable, appropriate data should be imputed for the "natural unit" tables of SNIA.

68) ***Theft or violence*** is an extreme form of economic ***and*** information externality in which damage is conflicted on another institutional unit deliberately and not not merely accidentally or casually. These are not treated as information transactions and imputed values are not recorded for them.

69) ***Illegal receiving of telecommunications satellite or pay TV broadcasting*** is not theft but a crime against intellectual property which -- according to [SNA] -- in no sense ought to be construed as transactions. Statistics, however, should measure the phenomena that exist without respect of their legality or illegality. SNA itself at another paragraph classifies as "concealed production" the production which was concealed to avoid payment of copyright fees. These factors doubtlessly influence the figures of factual information consumption and use and so should be measured in some ways in SNIA, but no data are available. The negligence of illegal consumption and use of telecommunications satellites or pay TV services does not influence the rest of the system, because these services are not considered either in the the Production Account. Illegal receivers while consume broadcasters' signals are also producers of "TV show" services but this is probably included in viewing statistics, thus will not introduce bias into the system.

70) *"**Imputation*** of figures in natural units of measurement" refers to attributing an estimated information volume to an actual flow or introducing purely accounting entries.

d. Non-information transactions

71) ***Non-information transactions*** are not treated in SNIA except aggregates of twin-tables. Margins of the twin tables show the main aggregates of the economic flows of the country including those that are information flows. Some margins should be corrected according to the rerouting and reclassifying of transactions in SNIA.

2. Other flows

72) The changes in values of information stocks that are not consequences of transactions are called ***other information flows***.

a. Other changes in the volume of information assets

73) These changes are connected with actions that do not meet one or more characteristics of transactions.

74) The first category is a result of an ***interaction between institutional units and nature***.

75) The second category relates to exceptional, unanticipated ***destruction, loss or other damage of assets,*** intentional or unintentional.

76) The third category relates to ***reclassification of institutional units*** due to profile- or owner-changes or of ***products*** due to the changes of classificatory system or classification.

b. Holding gains and losses

77) [SNA91] supposes that all ***economic stocks*** shall be ***revaluated*** as prices are changing. A similar problem is available with information.

78) ***Information stocks*** should also be ***revaluated***. According to the general definition, the conversion to bits should be done so that it will reflect the actual average technical conditions.

> In the early eighties texts were keypunched by eight bit characters. Scanning became dominant in massive digital input in the nineties. Information density of primary scanning (used at pictures and figures) is also growing. At the same time various compressing algorithms decrease the average storage capacity needed to digitize and / or store documents.

79) Information goods gradually lose information due to their ***aging and deterioration***.

80) Due to these factors, volume of accumulated and produced information goods may grow or decrease by a 5-10 percent factor yearly.

81) ***A balancing item*** in the flow accounts of SNA and SNIA is an accounting construct obtained by substracting the total value of the entries on one side of an account from the total value for the other side. It cannot be measured independently of the other entries and does not relate to any specific set of transactions. Balancing items in SNA are value added, operating surplus, disposable income, saving, net lending, current external balance.

82) The ***balancing items*** in the accounts of the SNIA may be different for various goods and services.

D. Stocks

1. Stocks

83) The term "stocks" has been used ***in two senses*** in the SNA and SNIA. The first and more general meaning of the term refers to the set of all information goods specified by some way. The second meaning, however, refers to a part of these

goods only, those that are at their producers as own production for output, work-in-progress, materials and parts or commodities pruchased to be sold.

84) Accounted stocks in SNIA are

- stocks of accounted economic information goods in SNA
- constituents of accounted economic non-information stocks in SNA
- stocks of non-accounted in SNA information goods and of human knowledge.

85) Stocks are to be recorded at the ***beginning and the end of accounting periods***.

86) ***Intellectual property*** is an important issue in national accounts and twin tables of national information accounts. Telecommunications networks may take the functions of automatic reproducing and distributing of existing knowledge. Such development of electronic networks may make obsolete present copyright law. Intellectual property will mostly be not recorded as stocks.

2. Balancing items in the Balance Sheets

87) Net worth is the balancing item in the Balance Sheets of SNA. Its counterpart in SNIA is ***net volume of information.*** Balance sheets of various goods may have ***different balancing items*** due to measurability issues.

E. Accounting Rules of SNIA

88) ***SNIA's rules of accounting*** for the time and place of recording of raw natural data for information flows and corrresponding economic flows at institutional units should comply with those of SNA. That means:
- quadruple recording should be used wherever it is allowed by cost and technical limitations,
- information and economic data as far as possible should cover the same action,
- the recording should be made for the physical time of action or on accrual base.

89) SNIA's rules for the national level compilation and accounting are:
- ***quadruple recording*** should be used wherever it is possible,
- the transformation to bit units should be made regarding a ***single point of time.***
- ***corrections should be made*** in economic flows due to their reclassifications according to the character of appropriate information flows,
- ***consolidation*** should be made according to the rules of SNA.

90) These principles should be applied at ***planning new surveys when implementing SNIA***.

91) In the pilot studies in a country where standardized ***SNIA has not been introduced***, one should strive for applying these principles as far as possible.

F. Valuation and revaluation

92) The power of SNIA and SNA is their ability to measure the numerous information processes and phenomena in various information industries and altogether all of them in a comparable way. Like SNA, SNIA does not attempt to measure the ***utility of information flows, their moral value,*** just their ***digitally recordable volumes***.

1. General rules

a. Two-phase valuation of volumes of information

93) ***Valuation in the SNA*** is mostly done by the actors themselves in the course of transactions they take part. The valuations are recorded, aggregated and used directly with or without corrections made for various reasons. The economic valuation in twin tables of SNIA should apply SNA valuation.

94) ***In SNIA***, valuation of non-digital information goods and services in natural units is a ***two-phase process***. Quantitites of information goods produced, sold, used, and so on should be recorded by the actors of transaction in traditional natural units of measurement. These quantitites should then be aggregated and revaluated in a standard way when SNIA is compiled.

95) There are several ***problems with valuation*** in traditional natural units of measure.

96) The ***multiple (quadruple) entry principle*** would prescribe a transaction be recorded on-site at the same value all through the accounts of both or more parties involved in the transaction.

97) In many cases, natural characteristics of production, sales, use, etc. transactions of information services and goods are at present ***not recorded*** at all.

When a record is made on a transaction, ***recording is frequently one-sided, only one party records it***. Bits are recorded in exceptional cases only. In case of double recording, they sometimes may be made in different units of measure. For instance, sales of newspapers and magazines are recorded in copies at

distributors. Libraries - when receiving newspapers and magazines - consider each copy is a "library unit" and this is done so untill the copies will somewhen be bound into a volume. Before binding, the copies are added to volumes. After binding, several "library units" will turn to one library unit, particularly a bound volume.

98) In the best case, the data for various information goods and services are available in various natural units of measure. Then these data should be converted to bits. In practical computations, several ***equivalents*** (constants or functions of time) are used. These equivalents express the average number of bits per an "n", a character, a minute of broadcasting with a given bandwidth and noise, videocassette, etc... Multiplying values of production, use, consumption, exports, imports of information expressed in traditional natural units of measure by equivalents, the respective indicators will be obtained in bits.

b. Concepts of information

99) For the past fifteen years a number of ***mathematical objects*** were defined as "information".

100) ***Communication theory*** has dealt with the quantity of information trasmitted by broadcasting and other telecommunications systems . The simplest way to modulate signals is to use use telegraph signals to insure that the channel has one of two states: with current or without current. The fastest ***signalling rate*** of such a communication channel is called the ***"baud rate".*** When only two level signalling is used, the baud is also equal to the ***rate of information transfer***. Electromagnetic signals sent or detected on a communication channel can be decomposed into a number of component sinusoid wave of a given amplitude and frequency. Each single channel has a certain bandwidth. The frequency domain outside which the transmitted attenuation rises rapidly is called ***bandwidth.*** For instance the amplitude response of a standard telephone channel has a bandwidth of about 3 kHz from 300 Hz to 3.3 kHz. It has been shown by Nyquist that for all methods of modulation, the maximum signalling rate is about twice the frequency bandwidth. The maximum information transfer rate is related to both the baud rate and the number of levels of coding used. Shannon has shown that the ***maximum information transfer rate or channel capacity*** in a Gaussian noisy channel is "bandwidth * $\frac{2}{}$log (1 + S / N)" whereover S / N is the ratio of signal strength to that of random noise level.

101) Using more and more complicated ***coding algorithms in new telecommunications standards*** has allowed to grow the volume of transmitted bits through the same channels.

102) The statements made by various authors as factual statements or assumptions on the nature of "information" sometimes were assessed as definition. These authors were ***mismatching the concept of "definition" and various kinds of "factual statements"***. This is a frequent phenomenon in a number of social sciences.

103) The ***general concept of information*** as it is shown in the everyday word usage is not apt for a simple definition, that is, giving a short definitive text with a hyperonim and restrictions. Thus general concept of information will not be defined here.

c. Substitutability of information and of media

104) The case of energy-policy and energy statistics can be viewed as an analogy to comprehensive information policy and information statistics.

> Technical development made ***energy-carrier materials substitutable to a great extent.*** Particularly the impact of electric energy, its ***ability to substitute almost all other kinds*** of energy-carriers and the easiness to transport energy in this form opened up avenues in front of a comprehensive thinking in energy -related matters and a comprehensive energy policy. It's only heat capacity of the materials which is regarded here.

105) Information goods and services are assumed to be ***less substitutable*** with each other than carriers of energy and the extent of substitutability depends on their contents and language.

> A lexicon on theoretical physics cannot be substituted with a volume of "Playboy" even if the latter conveys as much (or more) information as the former.

106) Thanks to standardization and various new input and converter units, various (information-bearer) ***mediums (with the same contents) became practically convertible and substitutable*** without any technical limitations.

107) Various kinds of ***amusement and entertainment*** information services and goods are also substitutable to a great extent.

108) ***Pictures, written texts and voice*** communication seem to be substitutable by each other within limitations.

109) A number of ***communications in legal procedures*** is bound to formal restrictions.

> In Hungary, a written declaration of will is needed at marrying. According to more technology-friendly regulation, courts may maintain tape recording instead of shorthands and typed records of hearings. At the same time any piece of information may serve as a proof in the court irrespectively of media and contents.

110) Information goods and services are almost without limitations can be substituted with ***digital information goods and services***, carrying the same information in digital form. With their general ability to substitute other forms of media, digital information goods and services can be viewed as the analogs of electric energy.

111) ***Revaluation in SNIA, that is transition to bit units***, is based upon the fact that signals on / in each object can be substituted by digital signals, any information good or service can be substituted by its digital correspondent so that it is equivalent for the user.

d. Definition of the valuation principles

112) The goods and services that are so as to carry / convey information are called ***information goods and information services***.

113) ***Volume of information*** carried / conveyed by signals on / in information- and non-information goods and services is equal to volume of binary storage capacity

- needed to record (input) these signals
- at the average level of technology available at the moment of the accounting
- in a digital form so that
- the record will be sufficient
- to reproduce the signal so that
- the reproduction would allow its equivalent use
- with the original
- by usual users.

114) The definition makes it obvious that ***experts' estimates*** should be used extensively to define "average level of technology", "sufficiency for equivalent usage" and "usual users" and the transition constants corresponding to these conditions. If once these "per" equivalents have been determined at an international level, their usage must not cause systematic errors in international comparisons, even if their actual accurate value may be subject to discussions.

115) For the media on which information has already been recorded in digital form, volume of information they carry is per definitionem the volume of bits recorded altogether on the carrier during and connected with recordings and still available to access.

116) Special procedures will be applied to ***define volume of human information***. These procedures will be discussed later.

117) Let's plunge into some details of the definition and cast a glance at ***paper-based documents*** like printed matter; dailies, books, stamps, forms and handwritten or typed scripts and records.

118) Paper-based documents display texts, pictures or line-drawings. Digital recording has been made with various technologies. A technology is a process within which humans and machines cooperate.

119) Though high-technology OCR devices were available as soon as in the late sixties, the typical technology for ***text reproduction*** was repeated ***keypunching***. ***Keypunching of texts*** is an intelligent reproduction, in the course of which a human scans the document, recognizes its intellectual elements like columns, pictures etc. and finally recognizes, arranges and reproduces characters in the proper way with a keyboard. Machine scanning implements a regular grid perception, human visual perception is smarter; eyeballs seem to find and follow the sequence of key points, but the details are not yet known. As a consequence of the human picture processing and compacting intelligence and printers, a surprisingly small quantity of information is needed to the apparent reproduction of the very same A/4 sheet, particularly a round 2 Kbyte, one thousandth of the scanner's. In the course of processing, smart human digitizer disregards everything which is though perceivable still he believes irrelevant to the communication which leads to a dense compaction. Intelligent software products like RecognitaPlus^{TM} are capable to imitate intelligent human reproduction of information to some extent.

> Routine keypunching may fail when individualities of the scripts or the document are important like for historians, investigators and graphologists with handwritten texts. A bloody stain on a book will be disregarded by a keypuncher but never by a policeman.

120) ***Line drawings*** were digitized with a digitizing pen or tablet since the early eighties. Follow-up digitizers provide pairs of vector coordinates for succeeding points of the curve. Digitizing head is to be moved by a human. Tablets provided a raster map of the tablet. Thanks to human intelligence, graphs can be recorded in a much more compact form with follow-up digitizers.

121) ***Pictures*** could have been digitized by drum and flatbed scanners since the sixties, however these devices were exploited only in some scientific institutes for technical purposes.

122) In the late eighties this was replaced by ***scanners***. The complete view of a document can be reproduced from a file obtained by regular scanning called "document imaging". Digitization of an A/4 sheet with a monocolor scanner yields about 2 Mbyte typically on magnetic discs. Actual file dimensions depend on file structure, compression, storage device or media plus random momentary factors. ***Compacting*** and ***compressing*** technologies offer significant savings at digitizing pictures, or speech. These are to be considered according to the level of their application. Compacting and compressing leads to a more than ten-times reduction of volume of raw scanning information.

123) In sum, either human or machine digitization technology needs scanning, which is the first step. Technologies yield more or less compacted information as their output. Due to the definition, ***the storage capacity needed at this primary "sensory level" recording was in the accounts considered rather than the capacity for the storage of a more compacted output.***

In accordance with this, the knowledge of scanning parameters is a cardinal issue.

124) Human brain consists of massively parallel organs and organella, a number of which are responsible for perception, i.e. voice/letter, word and conceptual level representation of knowledge. Another way of accounting aims to estimate how much information will be addressed to these levels. The character-level account will be referred as to ***"perception level"*** , though perception would assume grammatical, semantic and practical levels either.

125) Perception-level account ***cannot be realized*** for all information transactions, beacuse several information transactions -- as receiving radio broadcasting signals by a receiver -- do not concern perception. Pictures will always be treated at the sensory level.

126) ***The way of accounting affects the magnitudes of figures*** and the conclusions. If pictures and texts are considered separately in the "perception level" account, volume of information of a product depends on the quantity and quality of pictures. In the "sensory level" accounts, however, volumen depends on the surface of paper bound in the product and neglects the fact that pictures represent more information. ***Sensory level account*** provides more significance for paper-based media.

127) In man, there is a powerful ***continuous flow of information at sensory levels*** which is much less intensive at character/letter or conceptual levels. Thus the phenomena when reflected at sensory levels as bare pictures or noise are accompanied with more information than their high level representation.

128) SNIA measures transactions in services and goods. Producing broadcasting signals for each new receiver is rendering a new service for a new consumer. If new sets are installed, then along with this, the volume of broadcasting services -- produced and consumed -- will grow. It is another corollary of the definition that each copy of the newspapers, books etc. do convey the same amount of information, henceforth each will be taken into account with the same volume of information, despite the fact a given reader at the second reading of a book will not be twice as much informed as he was after the first reading. Therefore ***volume of information will be additive over copies*** of information goods and services.

129) Due to the distinction made in SNIA the concepts of ***"depreciation", "discounted present volume",*** or ***"writing down"*** of volumes of information will not be applied. Volume of information capital remains the same during its lifetime -- except revaluation due to changes in technology -- it ***does not change in the process of usage***, only with consumption. Additional extensions to information capital, as with databases, should be recorded and valuated.

e. Special cases

130) In the previous paragraphs the issues of the interpretation of "reproduction" of paper-based information-goods were discussed. Most problematic situations occur with other kinds of products.

131) There is a wide class of objects like medals, decoration, heralds, stamps and playing cards whose destination is to carry some information but not just the information written or printed on them. Of those, the problem of ***coins and banknotes*** was addressed in a former chapter. A number of other problems will be addressed here.

132) SNIA definition for volume of information suggests applying ***channel capacity*** to estimate the rate of information transfer, i.e. "information density" of information services like broadcasting, phoning, data transmission, speech and others.

133) A great number of devices applies ***lamps for supplying information*** about something. Traffic lamps on roads, and railway semafors can be mentioned as

examples. These devices haven't been subject to statistical surveys, they remain beyond the practical production border of the system.

> It is still worth mentioning that a single lamp could provide at least some terabits per year for a single watcher when accounted at visual sensory level of a man. The amount of information needed to reproduce what a three-color ***traffic lamp*** with four states (go, stop, wait, out of correct regime) provides is no more than two bits when considered at logical/conceptual level of the human user. This is repeated about four times a minute, which makes 540 bit/hour, almost 5 million bit per year. That is, if the ***vision of a working lamp*** is to be reproduced for a human user, it requires much more information than just reproduce the work of an existing traffic lamp in an automatic ***traffic control system***, or the information eventually used at ***conceptual level*** by a driver.

134) ***Pictograms*** constitute a not completely standardized class of signals. Their class is open, their number is not limited, number of bits to encode them is not computable. A limited set of pictograms also have a clear verbatim meaning as "No parking", "No smoking".

135) Bit-accounts of SNIA are free of problems with various ***foreign currencies***. Twin-tables should apply the techniques used in SNA.

2. Partitioned transactions

136) Economic transactions sometimes should be separated into two or more information (or perhaps non-information) transactions or constituents to provide their accountability and/or transformability. These transactions are called ***partitioned transactions***. For instance, the transactions that are associated with creating paper-based documents are partitioned into two parts; the "transaction without taking the creating of the documents into consideration" and "creating and outputting the accompanying paper-based documents". Sometimes, institutional units may be interested in hiding the real character of their transactions.

137) SNA should deal with basic prices, purchaser's prices, f.o.b. and c.i.f. prices when valuates products. While volume of information of some information goods and services may ***change during a transaction***, present development of SNIA does not allow to consider all these changes.

G. Time of Recording

1. Introduction

138) To illustrate the various opportunities that are open for the definition of time of recording of a transaction, SNA mentions the ***example of public procurement***. Here one can distinguish the day that budegt is voted upon by legislature, the day on which the ministry authorizes a department to pay out specified funds, the day a particular commitment is entered into by depertmnets, the day deliveries take place and the days payment orders are issued and checks are paid.

139) An action which represent an information transaction and an economic transaction ***may begin and end in different points of time as an economic transaction and as an information transaction***. An economic transaction starts when a claim is recorded. The information transaction, however, may start with the physical delivery of the product.

2. The choice for recording on actual basis

140) IMF government finance statistics recommend recording on an actual cash basis, at least in respect of aggregate data. SNA recommends recording on an ***accrual basis***: "Accrual accounting records flows at the time economic value is created, transformed, exchanged, transferred, extinguished. This means that flows which imply a change of ownership are entered when ownership passes, services are recorded when delivered, output at the time products are created and intermediate consumption when materials and supplies are being used."

141) SNIA is interested mostly in factual information flows. These take place when the physical flow actually occurs and not when accompanying economic flows are eventually realized. That's why ***actual recording*** was recommended. This may perturbate the twin-tables. Accrual basis recording -- recording when claims and liabilities emanate -- also will be applied whenever recording is bound to recorded economic flows rather than physical information flows.

3. The timing of exchanges and transfers

142) Regarding exchanges and transfers of ***non-financial assets,*** SNA envisages actual recording, that, what SNIA generally envisages: entering the books of the partner or when physical possession and control is acquired. In SNIA, recording of transfer of human knowledge at entering and leaving employment can be done on an actual or accrual basis and the resulting figures will differ significantly.

143) ***Services*** are recorded in SNA and should be recorded in SNIA when delivered.

144) ***Distributive transactions*** are recorded in SNA when the related claims arise. "So compensation of employees, interest, rent on land, social contributions and benefits are all registered on the period during which the amounts payable built up. Taxes on products nad imports are recorded at the times the products in question are produced, imported or sold, depending on the basis for taxation." Transactions on financial assets are recorded on a change-of-ownership basis.

145) The issues mentioned above -- except compensation of employees -- are not crucial for SNIA.

4. The timing of output and intermediate consumption

146) In SNIA ***intermediate information consumption*** should be recorded, when the goods and services are consumed. Additions to ***work-in-progress*** should be recorded continuously.

5. The timing of changes in inventories and consumption of fixed capital

147) ***Inventories*** held as inputs by producers, output as yet unsold, or products held by wholesale or retails traders should be recorded, when products are purchased, produced or otherwise acquired. Removals are recorded when this physically takes place.

148) The ***consumption of fixed information capital*** should be recorded, when this takes place, fixed capital will be annoyed. In SNIA valuation of fixed capital is not bound to the timing issue.

6. The timing of composite transactions and balancing items

149) ***Timing of composite transactions*** should happen according to the timing of constituent flows.

150) Interpretetation of ***timing of balancing items*** needs extra attention and should be discussed separately.

7. The timing of other flows

151) ***Holding gains and losses*** are computed for an accounting period and imputed in the second phase of valuation.

8. Balance sheet items

152) The ***closing balance sheet*** for one period is the ***opening balance sheet*** for the next period.

9. The accounting period

153) The annual changes in the overall parameters are already significant and measurable. The source statistics and most SNA tables are yearly. Thus the ***accounting period*** should be a year.

H. Aggregation, Netting, Consolidation

154) ***Aggregation*** of flows into major groups according to actors, capacities, objects, purposes, sources creates the data of institutional unit- or nation-level. Aggregation is not a simple addition operation: The figures may be netted or consolidated.

155) ***Consolidation*** is a special kind of accounting procedure which involves the transactions which occur between two transactors belonging to the same institutional sector or subsector. Consolidated accounts do not show intrasector (intraunit) flows.

156) Institutional units and sectors may have the same kind of transaction both as "uses" and "resources". In "gross recordings", uses and resources of a transaction are recorded separately, in ***net recording*** only one of them and their difference. For instance the "information asset of books" can be recorded annually. Also the balance of changes (+ or -) can be recorded and then the asset of a basis year can be continued. Finally the increments and decreases of the asset can also be recorded. The latter recording is "gross recording".

IV. INSTITUTIONAL UNITS AND SECTORS

A. Introduction

1. Institutional units

1) SNA and SNIA records and aggregates flows between and stocks of institutional units.

a. Institutional units of SNA

2) The main attributes of an ***institutional unit in SNA*** are as follows:

- "An institutional unit is entitled to own goods or assets in its own right; it is therefore able to exchange the ownership of goods or assets in transactions with other units;

- It is able to take economic decisions and engage in economic activities for which it is itself held to be directly responsible and accountable at law;

- It is able to incur liabilities on its own behalf to take on other obligations or future commitments and to enter into contracts.

- Either a complete set of accounts, including a balance sheet of assets or laibilities, exists for the unit, otr it would be possible and meaningful, from both am economic and legal viewpoint, to compile a complete set of accounts if they were to be required."

b. Institutional units of SNIA

2) To provide a useful background for policy making and science, SNIA should be capable to cover and treat ***the units involved in information transactions that are kept frequent and important*** by the given society. These transactions are usually codified in legal rules.

3) The ***number of various sets of subjects*** taking part in information transactions and ***referred in and concerned by legal rules*** is enormous.

> For example, Privacy Act of 1974 of the U.S. mentions among others "agency", "identifiable individual", "citizen", "alien", "alien, lawfully

> admitted", "person", "officers and employees of the agency", "com plainant", "court", "United States", "legal guardian", "parent of mi nor", "consumer reporting agency" and "subject individual".

4) The concept of ***institutional unit in SNIA*** should cover those subjects whose actions should be surveyed and accounted in the comprehensive sytem in a comprehensive way.

5) ***Individuals*** are the most important actors in information transactions. They should be treated in SNIA as self-contained units, separately from their affiliation to other institutions or belonging to households.

6) In principle, there were ***several ways open to define institutional units*** for SNIA. One of the ways to accept the institutional units of SNA. Reformulation of SNA definition in terms of information flows to get to a "mutatis mutandi" definition is straightforward, but may imply long-ranging consequences. The concept of "informational independence" can also be introduced.

7) To transform the SNA definition is straightforward. According to such a ***"mutatis mutandi" definition*** an institutional unit is capable in its own right

#1 owning information assets
#2 incurring liabilities
#3 engaging in information activities
#4 engaging in information transactions with other institutional units.

8) By #1 various interpretations crop up. "Information assets" have already been defined in SNIA. "Owning", however, may be equal with physical owning or having the "intellectual property" rights in SNA.

9) The exclusive use of the concept of "having intellectual property rights" as a substitute for "owning" in SNIA would lead to complications.

> The law in a number of countries as in Hungary, exludes from the owning of intellectual property the units unless they are individuals, though the exclusive right of the author to use the works can be transferred to non-individual units either. This would exclude corporations etc. from among the class of institutional units of the system.

10) Interpreted anyhow,***criterion #1 does not add*** units to***or takes away*** units from those defined as institutional units in SNA: Those are individuals, corporations, government units and NPI-s and only these units that may be able to own works.

11) The criterion #2 coincides with that of SNA.

12) At #3 that "an institutional unit is able to engage in (at least some kinds of: I.D.) information activities" adds no further resctrictive condition, such that institutional units of SNA couldn't fullfil. It may add, nevertheless, new kinds of units to those in SNA. That is so, because information activities have been defined here in a wide sense. Examples of these units can be school classes, various ad hoc bodies of professional organizations, departments and sections of institutional units, non-registered voluntary civil organizations, user groups on computer networks and so on.

13) However, criterion #3 is just one of the four, and the criteria #1--#2 and #4 exclude such units.

14) The criterion #4 necessitates that the unit should be able to engage in (at least some kinds of) information transaction with other units. This again does not impose restrictions to the set of units defined in SNA and the additional units introduced by this criterion are excluded by the rest of the criteria.

15) This means that the class of subjects defined by the "mutatis mutandi" definition can be more or less approached by the class "institutional units as defined by [SNA92]" .

16) ***"Informational independence"*** of a unit from another can be defined in a number of ways, for instance, by

- the right of the unit to request, use, consume, output information
in its own name, which right is not influenced directly by other units,

- the flows of private data. A unit can be defined as class of those smaller component units (individuals, sections, etc.) among which the flow of private data is not forbidden by law.

17) The ***information rights of various business and government units*** frequently are not determined exactly. These rights are frequently not well documented and can not be operationalizable in traditional organizations. Rights of a unit may be decentralized and designated to its sections or departments. That means, when a section or department is authorized to act under its own name, that section or department name substitutes only the name of the whole institutional unit when it acts in certain functions. By this, no new actor appears on the scene, just an actor delegates certain functions to certain individuals.

18) ***Computer networks*** record the privileges of the accounts and users. Within computer networks various units (users' groups) have been defined. These inventories of ***access rights*** and ***privileges*** provide a sound and operationalizable basis for making statistics on transactions made on or by computer networks. These groups define various units called ***"virtual communities"***. Such communities may become included as institutional units. The rules of institutionalization of such groups will greatly define "information household" in the future information societies. Official statistics on computer networks provide important cues to understand the very nature of information society. Their inclusion into national-level statistics may be important in the future.

19) At present, one cannot see which of the solutions would be the best. It is clear that any definition should rest on validable, identifiable facts. At present, the ***acception of the institutional units in SNA*** -- with the extension made in the previous sections, to include individuals -- seems to be the best solution.

c. Institutional units and transactors of physical information flows

20) As it has been mentioned earlier, the ***recorded elementary transactors of physical information flows*** in SNIA are (capacities of) individuals and machines. For defining information flows of the complex units with physical information flows, the System should define their physical interfaces.

21) Obviously, one can easily identify the ***information machines*** owned by a "corporation", "society", "government agency" as such that can be considered as disjoint objects belonging to these units and their input/output interface provides an interface for measuring internal or external communication with the unit that owns them, information flows within, to or from the unit. By this, internal interfaces inside a machine and interfaces between various machines in the property of the same institutional unit will not be considered.

These flows will easily be aggregated into the system and the machine interfaces will be used only for the identification of interfaces of flows between individuals and complex units, the normal transactors of the system.

22) The "physical ownership" relation defines physical borders of a complex institutional unit in the realms of material objects. While the borders of institutional units can hence mostly easily be delineated among machines, this is not the case with their employees. How one can define a physical interface between a corporation or a government agency and its employees?

23) The answer obviously depends on how is advisable to view at ***humans, human information processing faculties, employers; corporations, agencies*** and the

relation between an employee and his employer defined by law. Some of the opportunities will be outlined in the foregoing paragraphs.

> "Employment" means mostly ***hiring whose analogy is "rental" among inanimates***. This analogy may help to find the best solution to the treatment of problem of "Who consumes information in the System?"
>
> Assuming that the situation is analog with renting a car, information is analog with gasoline, the renter with the employer and the employee with the car, who is his owner. The analog question is "Who is the consumer of gasoline?"
>
> a/ Under a construction when the company provides free gas in the frames of the rental contract, it is evidently the intermediate consumption by the rent-a-car company, whose service then will be supplied to the renter.
>
> b/ Under an agreement in the frame of which the renter buys gas, this should be considered as consumption by him.
>
> The analogy suggests that the original question should be reformulated as "Who consumes which information?" and then answered accordingly to version a/ or b/. This analogy suggests that ***information owned by employers after all should be viewed as also consumed by them even if physically those are employees who consume it***.

d. The treatment of employees

24) Law acknowledges the concept of "an individual in some capacity (quality)". This means, the very same individual may be considered for a definite, ***limited duration of time and extension of place being not equal with himself***, may have more or less rights than the individual he is usually has. This can be examplified with the capacities of "a policemen", "a policeman in duty", "an eligible voter" and others. In principle, one can act in more than one capacity at any time, but conflicts between different capacities may occur.

25) In general terms, a capacity of an individual is defined in law in terms of

- extension of capacity; whether or not it extends to various conditions and acts
- permanency of capacity ; whether or not it is permanent or bound to a fixed time intervall,

26) Individuals in information transactions act in some capacity, of which in SNIA most important are capacities of private individuals and of employees. Economic theory itself also considers the very same individuals in two capacities as "households" and "labor". The latter is considered in employers' sector, when considering value added and in household sector when considering incomes.

27) Employment is a relation which is usually defined in law and other regulation in terms of

- duties / obligations and
- benefits / rights of both parties.

The former is defined as a relationship between employee and other employees (including communication), objects (including information goods and services) and instruments of labor (including computers, and other information resources of employer).

28) What concerns information flows,

- the permanency and extension of

-- "ownership" (as defined by controll or access rights of reading and writing) and claims over knowledge of individual, and
-- ownership and claims over employer's information resources and

- sectoral classification of employees should be defined.

29) Real properties, machines and tools of a complex legal unit in the physical world may be imagined, as being separated by a thin ***invisible membrane*** in the physical space. Its "membrane" would determine a more or less ***real space*** for any legal unit. The membrane would be imagined sometimes even visible as taking the form of walls and bars. Rules of law and internal regulation define whether individual in his / her capacity of an employee should be seen as internal to complex legal unit or external. Then his / her external or internal position at any time can be conceptualized as a relation to this invisible membrane.

Below various models of employees and complex units will be visualized with their "invisible membrane". As far as "invisible membrane" determine information assets of employee, and the concept of information transaction has been bound to the concept of information assets a unit owns, the set of information flows an employee can in principle take part is different in different models. A summary of the treatment of various information transactions made

by individuals as employees and private individuals under te conditions of various models will be given later.

(i) The assumption of "independent employers"

30) One might assume that a complex (legal) entity has nothing in common with its independent "agent-type" employees. Employees can be imagined as being fully outside of the virtual space for legal units, so that the latter could embrace its physical assets only. More formally, this means that information assets of employees and complex units are disjoint; individuals own their knowledge even in their capacity as employees, and employer owns its information resources, they have no control over each other. Individuals as employees act as individuals for the benefit of their employer. Information assets then will be mutually allowed for limited use by other side. In this case employees should belong to the household sector.

31) This assumption leads to ***inconsistency*** within the system: if a piece of information arrived physically to a machine of the corporation, then it would be accounted as a flow to that corporation, but if it arrived to one of its employees, then it would not be recorded as consumption of the corporation. Also outputs by employees should be considered as theirs.

(ii) The assumption of "employees as physically embedded units in institutional units"

32) This model assumes that "invisible shell" contains staff -- the employees ***while they are working*** -- of a complex unit so, that

- it does not separate the employees themselves from each other, and
- virtual space of legal unit embraces but does not include or intrude employees; employees maintain their individuality.

33) This is equivalent with the more formal assumptions that

- private individuals sustain to own their knowledge, can and may acquire new knowledge by using employer's information during working hours, and can and may use this knowledge beside worktime, employer has no controll over employee's information assets,
- private individuals act on behalf of their employer: intended information transactions of individuals in capacity of an employee with an external party, when employee represents employer, would be seen as automatically "virtually repeated" by their "virtual employer". Invisible membrane would repeate messages of employee and external to employee world.

34) Then any information would "per definitionem" first reach the virtual complex unit and then it would be transferred to its employee and vice versa, any information produced by the employee would then be consumed by the virtual employer as an intermediate information consumption and then would be outputted. While using the phone of employer this is what even physically happens.

35) The unacceptable consequences of this model are obvious:

- human knowledge acquired in worktime should be viewed after worktime as that of the private individual.
- human knowledge of the individual should be viewed as that entirely controlled by the complex unit during worktime. Employees are supposed to devote their professional skills and knowledge entirely to their employers but far not all of their skills and knowledge, only certain parts defined by law and agreement.

(iii) "Schizoid individuals" with split brains and capacity-bound accessibility to them

36) Individuals, mostly are not allowed to use the information they accessed and acquired as employees. From this aspect individuals, particularly their knowledge remain under the control of their employees after they had left workplace or employment.

37) Law and other institutions of modern Western countries view at ***individuals as sovereign entities,*** as integrated whole of their all parts and faculties. This implies that at any time all parts, and faculties -- even if discernible by cognitive sciences of a human -- should be considered as belonging or "owned" exclusively to the individual. If a partition still would be acceptable and legally allowable, complex legal units could be viewed, as physically existing "wired in" ***internal faculties: a "partition" within the mind*** of their employees, with knowledge and rules of behavior.

38) According to the assumption of "schizoid individuals", "to be an employee" is a temporary and temporal relation between an individual as a whole and a legal unit, a capacity which is valid for the duration of worktime and extends to his / her acts, but that does not extend to his / her private knowledge.

39) According to this model, individuals would have "split brains" with two parts of their knowledge, one of which could be accessed and used by employee, the other by the private individual after working hours. Within this model, invisible membrane would embrace and include employee so that he / she would "merge" into complex unit, "dissolved" and "loosing individuality" during working hours. After working hours, knowledge of employee would be covered by "invisible

membrane" shaping an isolated island not accessible to the private individual the employee is. Accordingly:

- individual in information transactions during working hours "in capacity of an employee" should be treated as its employer, the outer interface of an employee like this should be treated as that of the employer, bu
- his / her private knowledge wil not be transferred to and from employer and sector. Having his / her workplace left, he / she is to be considered as a private individual. knowledge of

At this, no information flows between the schistic "employee-self" and "individual-self" of the same person would exist.

40) In neurophysiology and psychology, the term "split brain" is reserved for brains with intersected corpus callosum. The very same term will be used here in a completely other context and meaning for denoting functionally disjoint parts of brain.

41) This assumption seems to be in ***controversy with the facts*** that private individuals' knowledge is obvously determined by the information they receive as employees, and employees frequently do not behave as their role "employer" would it require. These phenomena and a number of others cannot be reflected in this model. The application of this model would a priori exclude the study of worktime information acquisition by private individuals, though this relation is even subject to legislation.

(iv) The assumption of "split brains with limited general accessibility"

42) In the formulation of previous paragraphs we assumed that parts of human knowledge can be considered as being permanently under controll of or belonging to employers while other parts remain under permanent controll of private individual. It was also assumed that employer's knowledge can only be accessed by individual whenever he / she is in capacity of being an employee and private knowledge can be accessed whenever he / she is in his / her capacity of a private individual.

43) We also may assume that various capacities of the same individual, succeeding each other in charge of control, can conduct an asynchronous communication with each other. That means individual in his / her capacity of a private individual has a limited access to knowledge of employee he is and in his / her capacity as an employee has a limited access to knowledge of private individual he is. While he acts in his / her capacity of an employee, he / she can add knowledge to that of employee, and of private individual and private individuals in their capacity add to knowledge of the private individual and of

employee they are. That means different "selves" of these individuals can maintain a limited communication with each other through receiving and posting messages into their own halves of memories.

44) "Selves" would ***share a physically common communicating interface*** used either in their capacity as of an employee or as of a private individual.

45) One also can suppose ***complete transparency of communication*** for both capacities. For instance, whenever an individual in his/her capacity as an employer received a communication, he/she would transfer this to his/her employer (being actually a partition in his/her mind under the controll of employer). Then employer outputs a message to employee who in his/her capacity consumes this and engages in an information transaction; outputs information, acquires human knowledge.

(v) The assumption of "employees in double roles and with double independent knowledge representation"

46) This approach assumes that employees -- during their worktime -- are physically at the same time private individuals and employees of a legal unit, and that this dual "ownership" and control is not shared. That would mean the "invisible membrane" of complex legal units would "penetrate" into their employees and embrace a part of their brain. At the same time the rest of their brain would functionate as of a private individual. Also any inward flow would involve both of them; both would consume personal or telephone communications received.

47) Consequently, there were ***two communications*** (information services) supplied by the external partner, one for the employee, and one for the employer. At the same time, each of these communication were used separately by the employee and by the employer, and so is to be taken into account twice as information use.

48) The presence of ***overlapping dual controll*** makes the account technically more complicated but this handicap may be balanced with the advantages of manifold representation.

(vi) Individuals as "society of coexistent actors"

49) One also may assume that any individual should be viewed as a society of competing actors, each of them with various abilities and skills and acting in various capacities. This is in a good agreement with such modern ideas on brain, as Minsky's hypothesis in his "Society of Mind". The individuals of this sort

might have several capacities at the same time, and parts of their knowledge would be under synchronous control of several of them.

(vii) The pragmatic model of employees and employers

50) The previous models might have revealed the problems with definition of concept of employees in terms of physical information flows and information assets. The following assumptions will be suggested for consideration as to be made in SNIA for accounting stocks and flows of institutional units of the System starting from the figures concerning physical information flows. Keeping estimation in view, the model is radically simplified.

51) Individuals (with one employer), ***act in two capacities:*** either as a private individual or an employee.

52) These ***capacities are discernible in time.*** In computations, individuals in their free time will be considered to act as private individuals, and during working hours as employees. This assumption is not true, but other assumptions can not be implemented.

53) Due to general rules of SNA, the units controlled by other units must not be treated as independent units of the system. Complex units in SNIA control their employees, thus ***employees should be considered as belonging to them***. Accordingly, output of services of employees and human information consumption on workplaces will be recorded in the employer's sector only, as a non-market output.

54) Private individual owns his/her brain. ***Employee and private individual have control over*** a part of individual's knowledge. These parts will be referred as to their knowledge. Employer obtains a claim for employee's knowledge with establishing the employment relation. The claim is valid for employee's knowledge by the end of employment.

55) ***Employee's knowledge*** will be assumed to contain

a) knowledge he/she has acquired during his/her employment at the present employer except skills; This knowledge is a part of proprietary knowledge of employer,
b) skills he/she acquired during his/her employment at the present employer,
c) skills he/she acquired during previous employments,
d) skills and knowledge he/she acquired during education and training.

56) ***Skills*** will be defined for the purposes of the system that lasting, long-term knowledge produced by the employee using and transforming information he / she received. This is a narrow interpretation of the concept of skills.

57) Under continuing computer monitoring, 55a can be operationalized and directly measured, 55b and 55c can be computed from model computations.

58) As far as knowledge of employee and of private individual are physically (but not in time) overlapping, employee and private individual have a limited access to knowledge of each other. The extent an employee actually uses the knowledge of individual he is, will be assumed to contain all those element over which he / she has controll.

59) ***Private individual's proprietary knowledge*** will be assumed to contain all his knowledge except proprietary knowledge of present and past employers. Use of proprietary knowledge of present and past employers is crime, its recording would be recording of crime as transaction that would be against rules of SNA. Hence it was supposed that

60) ***Employer's proprietary knowledge*** will consist of the parts of its proprietary knowledge.

61) Information transaction of a unit has been defined as a general concept as an action that leads to a change in the knowledge-state of the unit.***Information transaction of an employee*** is that changes his information assets, particularly knowledge. Information transactions made by employees will be treated as those of employer's.

62) ***Employees can output and receive/consume information without the mediation*** of the private individual they are.

63) The frequent ***daily change of controll over elements of knowledge of individual*** creates difficulties in accounting information assets on balance sheets. The recording of volume of assets at the point of time of beginning and end of year can not be completed. While physically these assets are not permanently available for employer, they are available at any time when employee needs them, and the claim for them persists. Claim of employer should be considered as persistent, but volume of information claimed is subject to change. This may justify to assume this asset to be virtually present permanently and to treat them for practical purposes to be shared property.

64) Daily fluctuation in the volume of knowledge available for employer causes difficulties in accumulation accounts. Due to definitions accepted, daily starting

and stopping work should be seen as an information transaction between employer and employee, consequently it should be recorded in Capital Account as a memorandum item, even if balance of these transactions would be near zero, and consequences of daily fluctuation would dominate Capital Account. This might justify to treat daily fluctuation as a capital transfer or leave it out of consideration.

65) ***New skills acquired during employment*** will be treated as output and human capital formation by employee and asset of the private individual. The "transfer" may be treated as a compensation by employer in form of disposition of human capital.

Human capital formation (+-) should also be recorded at employer ***whenever a new employee enters or leaves employment***.

2. Sectors and sub-sectors: a summary

a. Sectors and subsectors of SNA

66) In the SNA, sectors and subsectors are defined as groups of institutional units. Purpose of grouping is to classify together the institutional units whose ***economic objectives and behavior (the way they participate in the production and use of goods and services) are similar***.

67) [SNA92] distinguishes five domestic institutional sectors:

Non-financial coporporate sector
Financial corporate sector
General government sector
Household sector
Non-profit organisations serving households.

68) ***Non-financial corporate sector in SNA*** consists of corporate enterprises which are engaged on the production of goods or non-financial services. Also, it includes non-profit institutions selling at prices which cover costs or which are created to provide services to non-financial enterprises, households and governments which behave like non-financial corporations and whose accounts are sufficiently articulated to enable them to be treated as if they were separate corporations (quasicorporations).

69) ***Financial corporate sector in SNA*** comprises all corporations whose principal activity is financial intermediation or facilitiatation of financial intermediation. It

also includes financial quasicorporations and non-profit institutions serving financial corporations.

Most services of financial institutions (banks, clearinghouses etc.) deal with information. As it has been mentioned earlier, money itself carries nominal information (the text on the banknote, picture) and also its handing over carries information. Existence and in-details analysis of electronic interbanking, funds transfer, electronic burse, accounting and ledging has proved that these activities can mostly be considered as information activities. From the point of view of SNIA, no distinction is needed between financial and non-financial corporate sector.

70) ***The general government sector*** covers all units of central, local and state governments. It also includes social security funds financed and controlled by government units.

71) ***The household sector*** consists of all households plus non-profit institutions serving households. Considered as institutional units, households are not only simple consumer units. They also include unicorporated enterprises owned by household members as integral parts of the household in question. The ***individual members of multi person households*** are not treated as separate institutional units in SNA, because many assets are owned together and the income received may be pooled for the benefit of all members.

72) ***The national economy*** is viewed as if it were a supersector comprising all resident in the economic territory of the country institutional units.

73) Sectors could have actually been defined as ***groups of capacities of institutional units.*** For instance, individuals of households can be classified in their capacity of employees and private individuals. A more detailed classification of capaicites and sectoring would allow a more detailed modelling of behavior of actors.

b. Sectors in SNIA

74) A great number of classes of subjects defined by information law, ***do not require comprehensive treatment*** within SNIA. For instance, while statistics about the number of "complainants at court of District Columbia in privacy lawsuits due to Privay Act of 1974 of the U.S." may be important for monitoring the effects and effectuation of the Act but these complainants do not represent a group whose information flows and stocks in common units would be surveyed. These flows are probably not to be compared and hence commeasured with flows of the country or of government agencies.

75) The economic behavior of institutional units determines the behavior of these units in information transactions to a great extent. Henceforth the ***sectors of SNA represent an important classification in SNIA***. The distinction between financial and non-financial corporate sectors is not relevant to SNIA.

76) The traditional distinction between corporate, general government and household sectors is not suitable for the description of the relations in a socialist state where these sectors all are under the controll of the power "centrum". Henceforth appropriate sectors should be used in historical studies. For such reason, the ***"state*** (= socialist)" and ***"private"*** sectors were introduced in a former study, which are defined according to the then Hungarian official statistical classifications.

77) A number of important groups of actors of "information households" of a major group of countries has not been defined in SNA. The separate treatment of ***individuals altogether, ethnic groups and ethnic communities*** will be desirable. The treatment of***races*** may be desirable in some countries where such groups play political role.

78) Two new kinds of supersectors; the ***society*** and the ***ethnic community***, will be defined. Besides, ***information economy***, and a number of sectors; ***ethnic groups*** and the ***individuals subsector*** within the households sectors may be defined in SNIA as new sectors and subsectors.

79) The domestic sectors ***ethnic groups*** are defined as those resident individuals who declare themselves to belong to the given ethnic community and the institutional units owned by these residents or non-residents.

80) Statistics for "minority population", "minority education", "minority broadcasting", "minority-owned businesses", "foreign-owned businesses" have been made for decades by official statistical offices. The supersection ***ethnic community*** will be defined as the individuals resident in different countries and declaring themselves to belong to that ethnic community and institutional units owned by individuals belonging to that ethnic community.

81) From the aspect of information, a sectoring or subsectoring according to ***language communities*** would be desirable. A great number of political issues arise at the level of central government, concerning mass communication, education, publishing, representation in governments and others, that should or can be treated as problems with flows within or among language communities. Between language communities those of ***native speakers*** and ***speakers*** at some level of proficiency should be distinguished. There is some statistical evidence that such

a classification is feasible, although many difficulties may arise. A classification of all units into language communities seems practically impossible in many countries.

82) Besides interpreting economy and society as classes of subjects, they can also be interpreted as classes of actions, i.e., ***classes of flows***.

83) ***National economy*** will then be understood with those flows that have been accounted in SNA. National economy includes primary and secondary information economies and non-information economy.

84) ***Primary information economy*** is defined as: those institutional units whose dominant output is an information good or service,

85) ***Non-information economy*** is national economy less primary information economy.

86) ***Information sector*** is primary information economy plus those units that produce information machines or materials as defined in earlier studies.

87) ***The society*** is defined as all flows of all institutional units including those that are extending over the production boundary of the SNA.

3. The relationship between sectors and types of institutional units

88) The relationship between sectors and institutional units ***when both borrowed from SNA*** remains the same. That means, "all non-financial corporations and quasi-corporations are allocated to the non-financial corporate sector, all financial corporations and quasi-corporations are allocated to the financial corporate sector, all government units and social security funds are allocated to the general government sector and all households are allocated to the household sector." The qualification of NPI-s will follow that in SNA.

4. Residence

89) The concept of residence is important in the definition of production, exports and imports.

90) "An institutional unit is said to be a ***resident unit*** for purposes of the system when it has a centre of economic interest in the economic territory of the country. A unit has a ***centre of economic interest*** in a country when it is engaged in a substantial amount of production in the country and maintains at least one production establishment which it plans to operate either indefinitely or over a long period of time. ***Economic territory of a country*** consists of the geographic territory

administered by the government within which persons, goods and capital circulate freely.

91) Thus, ***residence*** is not based on nationality or legal criteria (although it may be similar to the concept of residence used for tax purposes in many purposes). It is identical with that used in the draft fifth edition of the Balance of Payments Manual of the IMF.

(1) All members of the same household have the same residence as the household itself, even though they may spend periods of time abroad. If they work or reside abroad, so long they acquire a centre of economic interest abroad, they cease to be members of their original households

(2) Unincorporated enterprises have the same residence as the housholds to which their owners belong. If an unincorporated enterprise maintains a branch, office or production site abroad for a long period of time, the branch, office or site is considered to be a quasi-corporation, resident in the country in which it is located.

(3) Corporations and NPI-s are resident in the country in which they are legally constituted and registered. If a corporation maintains a branch, office or production site abroad over a long period of time without creating a subsidiary corporation for the purpose, the branch, office or site is considered to be quasicorporation resident in the country in which it is located. Subsidiary corporations may be resident in different countries from their parent corporations."

92) These SNA rules impose a large number of ***problem areas.***

93) The ***approach itself can be debated.*** SNIA addresses political decision making mainly by the central governments. Thus the classes of units defined or concerned by law (citizens, resident aliens, etc.) should also be accounted. Besides, those are not only the units on the economic territory of the country but the units owned by citizens and having centres of economic interest outside the legal authority of the government are also worth studying.

94) This particularly involves classification of radio- and TV broadcasting stations and programs and private networks of multinationals.

95) It is not only the economic area but ***space*** that is to be considered in SNIA. Definition of space of a country raises several issues.

96) Central governments are assumed by a number of authors to ***weaken and to lose control*** of economic and information processes taking place in their country.

97) Multinational corporations are assumed to gain place and maintain control over their multinational information flows. The huge internal international information flows of multinationals should be statistically surveyed.

98) Altogether the ***temporary acception*** of the SNA definition is suggested with the modifications suggested above.

99) The final definition to be accepted here should depend on how the SNIA-standardizing community conceptualizes the ***general rights of governments to control*** institutional, particularly economic units and which units.

5. Sectoring and behavior

100) ***Economic behavior*** of an institutional unit can be described by its habits to engage in economic transactions and during these transactions.

101) Behavior of an institutional unit in information affairs can be described by its habits to engage in information transactions and during these transactions.

102) The information-related ***objectives and behavior of institutional units belonging to an ethnic group*** are assumably determined by their kind (their classification as private or paublic corporation, individual, unincorporated enterprise, etc.) and that they belong to that ethnic group.

103) The considerations of SNA for the ***economic behavior of units of institutional sectors of SNA*** should be considered valid. SNA sectors group together institutional units with similar economic objectives, functions and behavior.

104) The ***behavior of units in non-economic information transactions,*** like behavior of government radio-stations in broadcasting is less known.

105) Still less is known for ***behavior of such sectors as "ethnic groups", "ethnic communities" and "language communities"***. The actual common momentary goals, objectives, targets and behavior of the institutional units that belong to various ethnic groups communities varies on a wide scale. The study of general laws of their behavior in various information transactions is a major scientific and practical problem area. It is just SNIA that may open up avenues to study these areas.

106) The legitim ***information-related objectives of ethnic groups*** -- as conceptualized by their representatives and a number of international documents -- are to assure the right of cultural and national identity, national language education, natural language media, representation in the legislation, courts and administration, free usage of language at workplaces, courts, and public authorities, free flow of information between ethnic minority groups and mother-country, and personal or territorial autonomy can mostly be formulated in terms of general SNIA categories.

107) Accordingly in terms of SNIA, ***ethnic groups may be supposed to set the objective*** to maintain or grow the information output, consumption, use and assets of national language and or culture and maintain or intensify information flows that result in this. In some countries these goals should be considered as primary, in other countries these are only tools or means in achieving other types of goals. To achieve these goals, they can be interested in maintaining or growing particular kinds of information goods and services. These purposes can be reached by positive incention or oppression.

108) What concerns the ***information-related objectives of an ethnic community,*** i.e. those individuals that declare themselves to belong to it, it can be assumed that many of them coincides with those of the ethnic groups belonging to the ethnic community.

109) According to SNA "the ***economic objectives, functions and behavior of government units*** are quite distinct. They organize and finance the provision of non-market goods and services, including both individual and collective services, to households and the community and therefore incur expenditures on final consumption. They engage in non-market production."

110) This explanation, however do not tell much about the ***actual economic objectives and behavior of actual governments***, particularly central governments. While most corporations are profit orientated indeed, objectives and behaviors of central governments are manifold and changing. Some central governments sometimes to cut budget, some of them would like to increase government income, others impose the objective of increasing national income. Even various government agencies may conduct various economic policies.

111) Actual economic objectives and behavior of government units may depend on or determined by non-economic factors. Meanwhile governments, particularly ***central governments may have codified information related objectives and behaviors***. The related documents may be laws, policy guidelines, directives and standards. These documents allow the modelization of information -- and related economic -- flows.

112) The distinction of ***information economy***, those institutional units whose function is to output information is important. These institutions have obviously different objectives and behavior from those who produce information primarily for own consumption or just consume it. Within this, the ***market and non-market producers*** have obviously different objectives and behavior.

B. Institutional Units in the form of Legal or Social Entities

1. Corporations

113) SNA does not provide a precise, legal ***definition*** of "corporations", emphasizing in Chapter IV. p. 6. that it is not even feasible.

114) The ***concept of corporations*** will be accepted here as SNA applies it with all limitations and extensions.

115) While SNA declares that a corporation cannot be a final consumer, SNIA allows that corporations may be ***engaged in non-productive, final information consumption***.

a. Ownership and control of corporations

116) The classification of a corporation takes place according to the unit actually controls the corporation. ***Control*** is defined as the ability to appoint its directors, and to determine general corporate policy. Control of a corporation is ultimately excercised by the shareholders collectively. A small, organized minority of active shareholders may be in a position to control the policy and operations of a corporation.

117) The ***public, national private*** and ***foreign controlled*** corporation subsectors will be defined like in [SNA92].

118) ***Public corporations*** are subject to control by goverment units.

119) ***Foreign controlled corporations*** are controlled by non-resident institutional units.

(a) Subsidiary corporations

120) A corporation A is said to be a ***subsidiary*** of another corporation B, when:

- either corporation A controls more than a half of the shareholders' voting power in corporation B or

- corporation A is a shareholder in corporation B with the right to appoint or remove a majoirty of the directors of corporation B."

(b) Associate coporations

121) "A corporation B is said to be an associate of corporation A when corporation A and its subsidiaries control between 10 and 50 per cent of the shareholders' voting power in B so that A has some influence over the corporate policy and management of B."

(c) Groups of corporations and holding corporations

122) "The principal function of a corporation may be to control and direct a group of subsidiaries, without having any significant (non-information I.D.) production of its own. Such a corporation is described as a "holding corporation" or "holding company" ." Holdings are par excellence information producer units, producing mostly normative information.

2. Ancillary corporations

123) An ***ancillary corporation*** is "a subsidiary corporation that is wholly owned by a parent corporation or group of corporations under common ownership and control whose productive activities are strictly confined to providing services to the parent corporation or group of corporations."Ancillary units are not treated as separate units in SNA, because they are considered to be artificial units created to avoid taxes.

124) The presence of ancillary corporations in SNA introduces a major bias into the system. Particularly, just those units that output information are frequently classified as ancillary corporations and thus their information output is classified as non-information.The separated treatment of these units would be desirable to achieve a harmony between bit-acccounts and twin tables.

3. Quasi-corporations

125) A ***quasi-corporation*** is

- either an unincorporated enterprise owned by a resident institutional unit that is operated as if it were a separate corporation and whose de facto ownership to its owner is that of a corporation to its shareholders, or

- any unincorporated enterprise owned by a non-resident institutional unit that is deemed to be resident because it engages in production in the economic territiry over a long or indefinite period of time."

4. Non-profit institutions

126) "***Non-profit institutions*** are legal or social entities created for the purpose of producing goods and services whose status does not permit them to be a source of income, profit or financial gain for the units that establish, control or finance them."

127) "The ***purpose of these units*** is stated in an "Articles of Association", "Constitution", "Bylaws" or a similar document."

5. Government institutions

128) ***Definition of institutional units within general government*** is one of the problem areas in SNIA.

129) The general definition of an SNA unit requires that it

a) should be entitled to own goods or assets in its own right,
b) it is able to take economic decisions and engage in economic activities,
c) is able to incur liabilities on its own behalf and
d) it would be possible and meaningful to compile a complete set of financial accounts for the unit if they were to be required.

Accordingly, " a government unit -- whether at the level of nation, a region or localty -- must have funds of its own either raised by taxing other units or received as transfers from other goverment units and the authority to disburse some, or all, of such funds in the pursuit of its policy objectives."

130) For ***central government*** SNA92 declares that "central government is considered as a large and complex sub-sector in most countries which is generally composed of a central group of departments or ministries that make up a single institutional unit plus, in many countries other institutional units".

131) As a contrary to this, what is ***experienced*** in central governments of most countries is a large set of institutions having ***different degrees of informational and economic autonomy and distributed control.*** In Hungary none of them has the right to own goods or assets and most units have the rights b) and c). The soft condition d) seems to be met even for territorial units of ministries.

C. The Non-Information Corporate Economy and its Sub-Sectors

132) This SNIA sector includes

(1) all resident non-information corporations, irrespectively of the residence of their shareholders,
(2) all resident non-information quasi-corporations including all the branches of foreign-owned non-information enterprises that are established on the economic space on a long-term basis,
(3) all resident NPI-s whose principal activity is the production of non-information goods and services for the market.

133) Non-information corporations are complex units that ***can act*** by or through their machines, employees, elected heads or owners.

134) Similarly to SNA three ***subsectors*** will be applied:

(1) public non-information corporations,
(2) national private non-financial corporations,
(3) foreign controlled non-financial corporations.

135) ***Public non-information corporations*** are those corporations that are subject to control by government units. The control is secured by owning more than half the voting shares or as a result of special legislation.

136) ***National private non-information corporations*** include all corporations and quasi-corporations that are not controlled by government or non-resident institutional units and whose principal output is non-information product.

137) ***Foreign controlled non-information corporations*** include

(1) all subsidiaries of non-resident corporations excluding their associates,
(2) all corporations controlled by a non-resident institutional unit that is not itself a corporation: for example,a corporation which is controlled by as foreign government, it also includes corporations contorlled by a group of non-resident units acting in concert,
(3) all branches or other unincorporated agencies of non-resident corporate or unincorporated enterprises that are engaged in production on the economic space on a long term basis.

D. The Information Corporate Sector

138) This sector consists of corporations whose main output is information good or service.

139) Information corporations are complex units that ***can act*** by or through machines, employees, elected heads or owners.

140) The production, consumption and accumulation of information in the ***private information corporate sector can be modeled and explained*** in the frames of economic theory.

141) ***Financial institutions*** represent a significant information flow, more and more subject to electronic treatment. A detailed analysis of information outputs and flows during various financial transactions is still before us. A number of similar transactions is now accounted as telecomunications.

E. The General Government Sector and its Sub-Sectors

1. Introduction: governments as institutional units

142) Government units are complex units that ***can act*** by or through their machines, employees or elected leaders.

a. Government units as producers

143) SNA deals with ***government units as producers***. The details of production boundary are discussed in depth in Chapter VI. The text there obviously focuses the attention to "government as an actor in the sphere of material market production". In the information age this may seem completely or partially obsolete.

> Experience in the past socialist systems shows, that the overemphasizing of a narrowly interpreted "material production" is harmful for the whole economy and society. For ideological reasons some of the most profitable industries haven't been there developed or were even hindered.

144) Government units are ***mostly engaged in information production*** even if they do not output "material goods", or priced (market-priced) goods and services. These goods and services may be not included into standard official statistical classifications of commodities. Information production should be recorded by partitioning these transactions.

145) Goods and services are called ***common goods or services*** if the entrance of a new consumer do not raises the costs of production.

146) The goods and services that are supplied free by public institutions or corporations are called here ***public information goods and services.***

147) ***Government units*** themselves may produce the goods and services in an establishment that is not legally separated from the government unit. Then this establishment should be treated as a ***quasicorporation*** if charges prices for its outputs that are economically significant, is operated and managed in a similar way to a corporation, and has a complete set of accounts that enable it to measure operating surplus, savings net worth, etc.

148) The term ***"government information"*** has been used in various meanings. It may cover:

a) The direct result of an government action, created by the government (e.g. legislation and regulations),
b) Created by the government not as a result of governmental action, but as a necessary component of meeting functional needs (e.g. cataloging data produced by the Library of Congress),
c) Created by the government for others, based on data obtained from the public (e.g. statistical data compiled by the Bureau of Census)
d) Obtained for government by contractors (e.g. the reports from government-sponsored research and development projects included in ERIC clearinghouses)
e) Derived by processing data from both public and private sources (e.g. indexes to current literature in specific subject fields)
f) Taken essentially verbatim from private sources (e.g., data from private database services retrieved and stored in government databases.

149) This list can be extended with

g) Documentation received from individuals or corporations and hold by government units: courts documents, documents of law enforcement authorities, originals of statistical questionnaires,
h) Documents created along the course of the activities of various authorities: certificates, proofs, permissions etc.
i) Financial and economic documentation.

150) These items can be related to a large number of transactions and classified in terms of SNIA as follows:

a) government information output or if printed copies are contracted out output of the corporation (perhaps public corporation) sector,
b) information production of government for internal use and internal information consumption of government, intermediate information consumption of the government, fixed information capital formation and use
c) government information production, fixed information capital formation in the government, government information assets
d) output of and flow from the corporations or public sector to the government sector, fixed information capital production in the government, government information assets,
e) use of fixed information capital, intermediate information consumption of government, information production of government,
f) information capital transfer to government, liabilities, information capital use, information capital consumption, information production of government,
g) information capital transfer,
h) information capital transfer, information assets,
i) government information production, intermediate information consumption, use, sometimes information capital formation.

151) The ***term "government information"*** covers goods or services that are related to various transactions of government rather then special appropriate products, whose output would be characteristic for the government.

152) Government information of type a) and h) is not a byproduct of the activities of government units but it is the most ***functional output*** of these organizations.

2. Social security funds

153) ***Social security funds*** are special kinds of institutions which are operating together with state-government units on central, state or local levels. They provide services for individuals, which are on a wide scale. The character of economic flows these funds maintain is different in various countries. While doing this, they maintain huge information assets and their information output is also significant. The detailed study and understanding the essence of information flows from, to and within social security funds is still before us.

154) A significant part of information in forms of various reports from employers or health care institutions belongs to the class of ***"obligatory transactions"***. This information then will be exploited as "information capital".

3. The general government sector

155) This sector of SNA consists of

"(1) all units of central, state and local government,
(2) all social security funds,
(3) all non-market NPI-s that are controlled and mainly financed by government units."

156) According to [SNA92] "governments as institutional units may be described as unique kinds of legal entities established by political processes which have legislative, judicial or executive authority over other institutional units within a given area. Viewed as institutional units the principal functions of government are to assume responsibility for the provision of goods and services to the community or to individual households and to finance their provision out of taxation or other incomes: to redistribute income and wealth by means of transfers: and to engage in non-market production."

This may be considered as

- a pure ***description*** of the activities called "government activities" in various countries ,
- a normative ***prescription***, a rule which defines, which units should or expected to be included in general government sector while compiling SNA.

157) Statisticians in a given country may or may not be in the situation to ***define general government sector or just to follow local legal, accounting and budgeting regulations***. There is nothing to do with those offices who are obliged to follow local political will. For these countries the data for the government sector will reflect that what is referred as government in that country. This obviously makes difficult any comparison with other countries. For those statisticians who aren't obliged to follow local will, however, there are more ways open. Even for these statisticians it may seem straightforward to accept the local definition of "government sector". The endeavour of central government and other users to have a picture about the area it are responsible for should be considered lawful and right.

158) Anyway, a more definite hint; how government-type-activites were desirable to be defined would be useful for SNIA and SNA. Such a definition may be based upon a list of government activities, made only or "par excellence" by governments. This also imposes a methodological problem; that of ***definition of government(-type) activities***. For instance, local or central governments may be

engaged in producing electric energy. Electric energy, however, will not be classified as something which is a typical output of government activity.

159) Classification of Government Activities (COFOG) of UNSO comprises all actual activities of governments, thus it is not suitable for this purpose. SIC, ISIC, NACE and other classifications fail to go in depth. HS obviously avoids the area. A detailed and standardized list of all typical proper outputs of governments -- goods and services -- such as passports, visa, court decisions, driving licenses, health or professional certifications and others obviously isn't available in most countries. Nevertheless, this should be a base of a standarized definition of the ***output-based concept of government sector***.

160) The rudiments of such a list will be soon available when enterpreneurs appear on the scene and wish clearly delienate their tasks. Such a list of goods and services is also a prerequisite of any real account of information production, consumption, use in the government sector and the distinction between information and non-information parts of governments.

161) There is also a mess around the ***qualification of roles and account of government activities***. defined in one of the possible ways. Most government activities even such as legislation are assumed without any detailed analysis to be classified as final consumption being collective services for the benefit of the community as a whole. At the same time, such products of central governments as laws, licenses, inventories and others are obviously used in material production sector; some of them extensively, some of them just in some industries or by households. The quality and amount of these ***government produced goods and services significantly influence the production and consumption processes and economy*** as a whole.

162) These products can even ***become factually capital goods*** in economic sense in cooperation with the private sector. Good examples are the government statistical and other type databases that are used in several countries by private profit-enterprises for supplying various information services. With computerization, a number of government agencies necessarily become productive.

163) The clear distinction and definition of outputs and its use may be ***against the interests of national security, of some government agencies***, some of their departments or some people. Management and tax-payers may still require they know processes to increase the effectivity of office or paperwork. Those are systems analysts and designers which usually clearly describe outputs and transactions in government agencies, and sometimes fit a statistical monitoring system as the part of the management information system. These data however scarcely become known for the public and even for such central statistical

agencies as Bureau of Census. Clear definition of outputs, nevertheless, may be one of the ways to cut at least a part of unnecessary expenses spent under the vast general umbrellas in some countries.

164) This again concerns the issue of ***independence of statistical services.*** Intradepartmental services may not be interested in clearcut definitions and surveys. An independent statistical agency may have the advantage of objectivity and controllability by the central executive or legislative power with all handicaps of outsiders.

165) A possible feedback to SNA and to the endeavour to ***reinvent government*** is possible.

4. Subsectoring within general government

166) Subsectoring of the general government sector into ***central government and local or regional governments***. and ***social security funds*** according to SNA should be followed.

167) The subsectoring into ***non-market and market producers*** is of primary interest. Socialist regimes maintained overdeveloped government market and non-market sectors, while production for the market is not a typical government activity in the Western civilisation.

5. Central government

168) In the long range the organizations of central legislation, administration, courts and their local outposts, should be classified as central government. In the short term the units classified as central government in SNA, and only those, should be classified in SNIA in the same way.

169) ***Central government*** is generally composed of a central group of departments or ministries that make up a single institutional unit, plus other institutional units.

6. State government

170) The units classified as state government in SNA should be classified in the same way in SNIA.

7. Local government

171) The units classified as local government units should be classified so in the SNIA, too.

F. The Non-Profit Institutions Serving Households Sector

172) In SNA and SNIA this ***sector ".. includes*** the following two main kinds if NPI-s...:

- trade unions, professional or learned societies, consumers' associations, political parties (except in single party states), churches or religious societies (including those financed by governments), and social, cultural, recreational and sports clubs.

- charities, relief and aid organisations financed by voluntary contributions in cash or in kind from other institutional units."

173) NPI-s are complex units that are ***able to act*** by or through their employees or representatives.

G. The Household Sector and its Sub-Sectors

1. Introduction: households as institutional units

174) The ***definition of SNA for households*** will be accepted as follows: "a small group of individuals who share the same living accomodation, who pool some, or all, of their income and wealth and who consume certain types of goods and services collectively, mainly housing and food.

175) A household is a complex unit as it was defined earlier and it is able ***to act*** by or through its members and machines.

176) The collective consumption of hosueholds ***extends to certain types of information goods and services,*** and ***information consumption*** either.

177) Individuals are treated in ***three qualities***, as employees, members of households and private individuals. These three qualities will be discerned in time and space.

2. Households as producers

178) The ***interpretation of the economic production in the household sector*** in present SNA is limited to "unincorporated enterprises". Unincorporated enterprises are not incorporated as a separate legal entity, they have no legal personality, cannot engage in transactions with other institutional units.

179) ***Information production*** in households is not limited to unincorporated enterprises. Individuals of the household, unincorporated corporations of the members of the household and households themselves may produce information. Households are the most important producers of human knowledge and a number of information services which make the bulk of information output.

180) The bit-accounts of the household sector should be based on ***time-use studies***. As for now, the amount of statistical information available for the Individuals subsector doesn't allow its study in details and its representation in the whole system of accounts.

3. The household sector and its sub-sectors

181) The ***household sector*** of a country in the SNA consists of all resident individuals and households. Defined as institutional units, household sector also includes unincorporated enterprises owned by households as integral parts of those households. Only those household enterprises that constitute quasi-corporations are treated as separate institutional units.

182) ***Subsectors of the households*** in [SNA92] are ***resident households proper*** and ***resident non-profit institutions serving households***. Majority of storytellers, poets and other creative people are individuals coming from the households. Intra-household inter-individual information services play an important role in "information household" of countries. Hence in the SNIA, individuals and households will be distinguished within proper households.

183) The issues of privacy will be studied in the frames of SNIA by defining appropriate sets of information flows instead of making an attempt to distinct between ***formal and informal sectors*** of the society.

H. The Supersector "Ethnic community"

184) The supersector ethnic community has been ***introduced to study*** the flows between units that transcede the boundaries of countries and define themselves on language, cultural or racial basis.

Of ethnic communities, information flows of language communities can be estimated using raw data collected by official statistical surveys. The recording of information flows between racial communities not defined by an own language -- as African Americans and whites in the U.S. -- represents special difficulties.

I. The Rest of the World

185) This sector ***consists of*** all non-resident institutional units that enter into information transaction with resident units. Only those accounts are prepared that are reasonable for accounting domestic phenomena and processes.

1. International organizations

186) International organizations accounted in SNA and SNIA are the entities that have been ***established by*** intergovernment or interagency agreements or agreements between international organizations.

2. Subsectors of the rest of the world

187) Rest of the world contains all non-resident institutional units which enter into transactions with resident units. For the purposes of analysis the sector may be classified into the class of neighbouring countries and some other geographic classes. Classes according to language relations may be introduced like "English-speaking countries".

J. An Overview of the Sectors and Subsectors of the System

188) The ***standard sectors and subsectors*** of the system can be summarized as follows:

The total ethnic community

Ethnic groups of the ethnic community outside the country

The total society inside the country

1. The corporate sector

1.1. Public corporations
1.1.1. Non-information
1.1.2. Information

1.2. National private corporations
1.2.1. Non-information
1.2.2. Information

1.3. Foreign controlled corporations
1.3.1. Non-information
1.3.2. Information

2. The general government sector

2.1. Central government
2.1.1. Non-information
2.1.2. Information
2.2. State government
2.2.1. Non-information
2.2.2. Information
2.3. Local government
2.3.1. Non-information
2.3.2. Information

3. The non-profit institutions serving households sector

3.1. Information
3.2. Non-information

4. The household sector

4.1. Individuals subsector
4.2. Others

5. The Rest of the World

K. Aggregation of Stocks of and Flows from and to Elementary Transactors

1. Introduction

189) The System distinguishes ***transactors of physical information flows*** as machines and (capacities of) individuals, and the ***complex units*** over them as households of (private) individuals, and corporations or government units which employ individuals as employees and own or possess machines.

190) When studying the ***consumption of TV-broadcasting signals***, it is doubtlessly set-owner; an individual, a household (if the set belongs to common property) a corporation or a government organization who consumes them while (with their set) produce a visible for the viewer programme.

191) The situation is less simple with the information -- as personal and written communications by business or office partners -- consumed at workplace by an employee. Who does consume indeed a phone communication from an external/internal partner to an employee? Who consumes the personal

communications of external partners and colleagues at a workplace? These problems can be conceptualized as "relations of physical level transactors to institutional units of the System".

This is a fundamental issue, whose conceptualization and regulation influence radically both information flows (the figures) and our understanding their role in the society. To find a good solution we shall have a look at physical information flows in this process. For this purpose we should identify those objects between which information flows and try to allocate the physical "frontiers" of a "corporation", of a "government agency", "private individuals" and "employees".

192) The very similar problem exists for information outputs of employees. A suitable treatment is needed for human knowledge produced in employment relationship and existing as information asset.

193) Various models of employees have been discussed in the paragraphs about individuals in this chapter. A summary of treatment of employees will be given later.

V. ESTABLISHMENTS AND INDUSTRIES

A. Introduction

1) The introduction of the ***concept of "industries" aims*** at a more detailed description of production, generation and use of income.

B. Productive Activities

2) ***Production*** consists of productive activities carried out under the control and responsibility of institutional units that use inputs of "labor", "capital" and products to produce outputs of new products.

3) Statistical systems make distinction between products and activities. The concept of products will be discussed in the chapter on the Information Production Account.

4) A ***productive activity*** -- per definitionem -- may be described and classified by
- the type of output-products, i.e., type of goods and services,
- the type of inputs -- in SNA per definitionem: products, "labor", "capital" used or consumed,
- the technique of production employed,
- the ways in which the outputs are used in the production process.

5) In the SNIA, ***input should also be classified by kinds of products;*** that means contribution of "labor" should be partitioned into constituent information and non-information "services of employees", and "capital" should be partitioned into those constituent information and non-information products that embody capital. In the very same partitioning process "technique of production employed" will be built in "services of employees".

6) Of those constituents, information products will be aggregated in SNIA accounts.

There are long traditions in official statistics of classification of commodities, both goods and services (HS, CPC), and of classification of institutional units. Commodities can be classified by classes of producers and consumers -- institutional units. Institutional units can be classified by the kind of their main activity (ISIC) defined in some way by the commodities they output. Several

decades of efforts to harmonize various national and international classifications have not yet lead to conclusive results.

1. Classification of activities in the system

7) SNIA uses a modified and extended ISIC for classification of productive activities.

2. Principal, secondary and ancillary activities in SNA and SNIA

8) SNA defines ***principal activity*** of a producer unit as whose value added exceeds that of any other activities. ***Principal information activity*** of a unit can be defined in an analog way.

9) A ***secondary activity*** is carried out within a single producer unit in addition to the principal activity and whose output must be suitable for delivery outside the producer unit.

10) The output of an ***ancillary activity*** is not intended for use outside the enterprise. Ancillary activities produce services and goods that may not become a physical part of the output of the principal or secondary activity. Extended information activities, as
- keeping records, files or accounts in written form or on computers;
- communicating in written form or by telephone, telex, telefax, direct computer links, etc. or by messengers, couriers, etc.,
- hiring, training, managing and paying employees,
- providing surveillance

are typical ancillary activities, according to SNA.

11) As SNA admits, "...existence of ancillary activities is not explicitely recognized in the System or in production statistics generally, and this is a serious disadvantage for analysing ... the impact of "information technology" on productivity when the processing and communication of information are typical ancillary activities." While it might be difficult and costly to obtain detailed information about the entire range of ancillary activities, organization annd computerization of these activities allow or even suggests their reclassification as producing units.

12) Hiding of information producing units as "ancillary units"
- distorts the figures of productivity in other ("material") industries, as manufacturing, etc.,
- with biasing figures of productivity and even prohibiting in ancillary units, it is a major obstacle to improving productivity of national economy

when these units may have a part of national economy of information age as great as more than a quarter of economy.

13) The treatment of information activities as an equal with the rest of acitivities, "white collar" managerial, clerical and professional employees with "blue collar" colleagues, is a ***necessary economic prerequisite to transition into a real information society***. Such a non-discriminative system of national accounts is an important element of its infrastructure enabling it to extend competition and favoring to commoditization, and it will revolutionize economy.

14) In SNIA, information production in ancillary units will be treated as non-market information output in the appropriate broad categories of carriers. SNA should take information activities out of ancillary activities

C. Partitioning Enterprises into More Homogeneous Units

15) In the SNA, an ***enterprise*** is an institutional unit while engaged in production. Government units and households are classified as enterprises in their capacity as producers.

16) The groups of units resulting from their classification by main activities is heterogenous because several enterprises have secondary activities. To obtain more homogenous groups of producers, enterprises must be partitioned into units whose activity is more homogenous.

16) As far as SNIA records productive activities by groups of products, for the purposes of SNIA,those are not enterprises, but products that should be partitioned into more homogenous units when more detailed production data are needed.

1. Kind-of-activity units

17) ***Kind of activity units*** are enterprises or parts of enterprises which engage in one kind of productive acitivity or in which principal activity accounts for most of the value added.

2. Local units

18) A ***local unit*** is an enterprise or a part of an enterprise which engages productive activity at or from one location.

3. Establishments

19) An ***establishment*** is an enterprise or part of an enterprise engaging productive activity in which the principal activity accounts for most of value added. Establishments fail to meet the criteria of institutional units.

D. Industries

20) ISIC, SNA and SNIA defines ***industries*** as a group of establishments engaged in similar activities for the purposes of input/output analysis.

> SNIA has been based upon accounts on kinds of information carriers. The fundaments for the investigation of information flows in bit units between various industries are mostly not available. The value estimates of twin tables, however, should be based upon data on appropriate industries.

1. Market and non-market industries

21) Producers in an industry may be classified into the groups of market and non-market producers, according to the character of their output.

2. Industries and products

22) There is no one-to-one correspondence between activities and products and hence between neither is between industries and products. When two or more products are produced together simultaneoulsy due to the technology applied, they are called "joint products".

E. Units of Homogenous Production

23) For the purposes of input/output analysis in SNA, homogenous units of production are used. A unit of homogenous production is a producer unit, in which only a single (non-ancillary) productive activity is carried out. Data for these units are often derived from data collected for enterprises, on the basis of assumptions and hypotheses.

VI. THE INFORMATION PRODUCTION ACCOUNT

A. Introduction

1) In order to be able to describe important processes for science and policy making as the given society views at them SNIA should be able to ***cover the important or significant acts, actions and activities.*** that lead to changes in the quantities of information and their***objects.*** These are defined in actual legal rules.

2) ***Law defines a great number of information acts, actions and activities***.

> For example, the Privacy Act of 1974 of the U.S. sets up: "maintain, collect, disseminate, disclosure, obtain, use and routine use of record", "have a need for record", "plan and carry about a census", "civil or criminal law enforcement activity", "trasmit a notification", "account disclosures", "retain the accounting", "inform any person or other agency about any correction or notation of dispute", "access to records", "gain access to records", "review a record", "request information", "permit the individual to request", "acknowledge receipt", "make correction", "believe something", "to amend the record", "refuse a proposal", "disagree with refusal", "complete a review", "notify an individual", "disclosure information", "contain information", "collect information directly from the subject individual", "supply information", "publish information", "publish notice", "define times, places", "establish procedures", "order", "willfully request", "promulgate rules".

3) Most such acts, actions and activities, as "plan and carry about a census" or "account disclosures" while important in some aspects, yet are of particular interest when viewing the whole of "information household" just because of their ***limited dimensions***, or beacuse of their ***limited political significance*** concerning an agency or an industry only. Their comparison as such with other activities at national level is not worth affording attention. These acts, actions and activities will be accounted only together with others under general terms. A number of other acts, actions and activities are ***unapt for operationalization.*** This is the case of "believe".

4) A number of these actions or activities can be recognized and classified as "producing" an object or a status. These category is the ***generalization*** of the many concrete actions made by institutional units.

5) While the ***formation of new ideas,*** concepts and other creative phenomena is an important process, the term "production" covers the formation of physical objects and physically existing signals.

6) What concerns the object of acts, actions and activities, ***law*** extends both to physically existing ***information carrying objects*** and to ***their contents*** and the number of various kinds of such objects and contents-classes is enormous.

> For example, the Privacy Act of 1974 of the U.S. discerns: "separate form to be retained by the individual", "record", "data", "item", "system of records", "statistical record", "record describing how an individual exercises rights guaranteed by th First Amendment", "public record", "archival records", "categories of records", "source of a record", "information pertaining somebody", "information being contained in a system of records", "copy of information", "comprehensible form of information", "written statement", "adverse determination about an individual's rights, benefits and privileges", "name and location of the system", "Federal Register", "request concerning the amendment", "mailing list", "an indivdual's name and address", "investigatory material", "rules of conduct", just to mention some of the information carrying objects and their contents groups.

7) ***Physical-objects-categories*** are less used in statistics than contents-categories. For operationalization of measurement of volume of information, these object-categories are fundamental. a comprehensive information-statistics and policy, that deals less with content classes of information .

8) ***Contents-categories of objects*** are extensively used in mass communications statistics, including in those of UNESCO. While the study of contents such that coverage extends to all media is obviously ***important, for making distinction between various kinds of information use***, operationalizational difficulties are obvious.

9) ***Stocks and flows of information on individuals*** represent an issue of great political importance. In a number of countries the records on individuals are strictly monitored, and their quantity is known even if not published.

B. Production

1. Production as an economic activity

10) ***Production in an economic sense*** is an activity that -- using inputs of "labor", capital and goods -- produces goods or services which are capable of being delivered, or provided, to other economic units." "A purely natural process without any human involvement or direction is not production in economic sense."

a. Goods and services

(i) Goods

11) In SNA "***goods*** are physical objects over which ownership rights can be established and whose ownership can be transferred from one institutional unit to another by engaging in transactions in markets. They must also be objects that some units wish to own: that is for which a demand exists." These goods can better be called ***tangible goods***.

12) Paintings on aeroplanes, or ubiquituos inscriptions on and inside of buildings, and everywhere, even on such things like pencils or T-shirts are good examples of ***durable signals on or in non-information goods.*** Durable signals on/in non-information goods are also obtained with inserting of tables, pre-programmed chips, and other information goods in them.

13) As a rule, durable signals, in/on an object, although are persistent objects, and have their producers and users, but ***have no other proprietor, owner and consumer than that of the object's***. Their output will be considered as output of an information service.

14) Radio/TV broadcasting towers, direct broadcasting satellites, sensors of electronic railway supervision systems and several other devices and instruments supply ***non-durable electromagnetic signals***. These non-durable signals - being invisible and inaudible - are not subject to human consumption but are receivable by receiver sets referred here only as "information machinery". Human speakers' speech or the sound emitted by consumer electronic devices, light signals of beacons and traffic lamps, each and other objects are examples of ***perceptible (and also receivable) non-durable signals.*** These play an important role in the society and some of them are also surveyed by official statistics. The signals which are described here are always existing physical signals whose presence is defined and bound to contourable space and time domains.

15) While non-durable signals are doubtlessly physically existing transient phenomena, they probably cannot be classified as "objects", no ownership can be

established over them and so ***are not economic goods***. Their supply, rendering is usually qualifies as a service.

(i1) Information goods

16) ***Information goods*** are physical objects
- that are to carry or convey information, and
- over which ownership rights can be established, and
- whose ownership can in principle be transferred.

17) The interpretation of "ownership" here as physical owning over physical objects doesn't imply complications.

18) The interpretation of "owning" a product as "having intellectual property rights over it" may lead to complications in a number of accounts of the system.

19) The SNA accounts ***both physical and intellectual ownership*** in economic value terms. In the SNIA, however, several complications might arise if both kinds of ownership were considered. Each copy of a work under copyright protection would then be considered twice in the accumulation and capital accounts, once at the author's, once at the owner's.

20) Thus intellectual ownership (property) will be considered as a right and treated similarly to other rights, and the ***ownership over physically existing copies of works will be accepted in SNIA*** and elaborating the balance sheets and other accounts.

21) This ***definition does not require*** that

- the good should be at any moment of physical existence apt for alienation or
- for market alienation, and
- demand should exist for the object or that kind of object at any moment of its existence

22) Those are not only information goods that carry or convey information. The class of "information carrying non-information goods" is too wide to be included in the concept of accounted information production. Neither all information-goods and services will be accounted.

23) The question ***whether money is an information good*** can be reduced to the question: Does a banknote or a coin ***functionally*** carry or convey information?

24) A ***banknote*** is a printed matter. The printed signals (characters, words, pictures) of a dollar-sized banknote convey approximately 1-2 Mbit information

altogether at sensory level. This information is transferred/transported while paying. No new information forms in this transfer on or in the banknote.

25) The ***transfer of a banknote*** -- an action -- conveys information as well. This emanates and is communicated by the payer/owner at any time while paying with it. The information -- thought indeed, not verbally expressed -- which flows at perception level when a $100 banknote is transferred is tentatively about "This a $100 banknote." or consequently "I have my right to buy things in value of 100 $ and hereby I transfer my right to the payee". This communication cannot be exactly formulated and so measured, but a round 1 Kbit can be obtained with assuming 17.6 bit/stroke. At the same time, it is practically almost completely insignificant in this transaction, what is written or seen on the banknote or on the coin, if it is publicly accepted as a banknote or a coin, as a legal tender.

26) The ***function of a banknote***, i.e. its function is not to be read but to be infallibly recognized as being a banknote and then to pay with it, i.e. transfer the message "I have...". What is important regarding to these goods, it is unimitability. The thousand times as much visual information printed on the banknote is merely to make sure the truth of the 1 Kbit of "I have my...".

27) ***Banknotes should be considered as information goods,*** whose volume of information should be taken into consideration as the production of the printing office and as transport at paying. The quantity of information on the banknote will be defined as that of its picture. Nevertheless are banknotes goods whose function is to produce and supply an information service while paying. As such, banknotes are ranked as information capital. Volume of information carried by the banknote as a whole while paying will not be measured.

28) Digital substitutions of "transferring banknotes and coins" are the signals of ATM machines and other electronic banking networks.

(i2) Non-information goods

29) ***Non-information goods*** in the SNIA are those goods that are not classified as information goods. This implies that non-information goods are goods as it has been defined in SNA.

30) There is a great number of ***non-information goods produced with embedded knowledge*** of variegated forms. The estimation of the volume of information non-information goods carry altogether seems not to be resolvable in the conceivable future.

31) The knowledge embedded forever or resident temporarily in forms of durable signals in various kinds of ***computers*** and other ***information machines***

plays a more and more important role in society and given the rapid growth of computer stores, their participation in accumulations and stocks of information probably is growing. This may make timely their inclusion into the system. To find the proper treatment of knowledge embedded or resident temporarily in various forms of stores of various kinds of information machines requires a separate in-depth study.

32) Besides those non-information goods mentioned in the previous paragraph, that contain knowledge embedded during their production process, there is a great number of ***goods that are supplied with durable signals after they had been produced and outputted*** without being converted to another kind of information or non-information good.

(ii) Services

33) [SNA92] defines the ***general concept of a service*** as follows: "Services are ... outputs produced to order and typically consist of changes in the conditions of the consuming unit realised by the activities of producers at the demand of the consumers. By the time the production of a service is completed it must also have been delivered to the consumer or user."

(ii1) Information services

34) Reparation, transformation or mending of information goods, creation of durable signals on or in non-information goods so that no new good will be created and supplying non-durable signals are ***called information service***.

35) Updating a database, repairing a book, counselling, teaching, radio-broadcasting are ***examples of information services which are classified as economic services*** in SNA as well. A number of SNIA-accounted information services are beyond the production boundary of SNA.

36) The information services that are not considered as (economic) services will be determined by ***explicit enumeration and description***.

37) ***Non-durable signals*** can be supplied to a number of consumers who consume them. Copies of non-durable signals have producers, consumers and users. Their producer may have intellectual property rights, but no physical ownership can be established over them.

38) Of all non-durable signals which are present everwhere, only those will be accounted that have been supplied intensionally by a unit for another unit, which consumed i.e received them. Then, the general definition given for services in SNA well fits the provision of durable and non-durable signals. Therefore, the

supply of durable and non-durable signals classified ***as information services***. As [SNIA92] emphasizes, "Changes in the "mental conditions of persons" is a usual output of services."

39) Some "mass" services can be produced in a single process of production. Examples of such services can be broadcasting, classroom education and transportation. The fact that a certain number of these services are produced in a single production process does not influence the fact that a service is rendered to each such a consumer. There are economic (and if the service is an information service then also information flows) between the producer and each consumer.

40) A number of information services, as telecommunication services ***are held tradable***. By this an enterpreneur may purchase right to use the telecommunications devices of another enterpreneur and then offers telecommunications services to the public on his own name. Similarly, broadcasting corporations may buy broadcasting capacity or borrow braodcasting devices from other corporations and then on his own name provide broadcasting programmes. Cable television corporations may buy copyright or right of distribution of pictures and then using the pictures provide cable television signals to their subscribers. The identification of the true producer of the information service in similar cases sometimes may be difficult. This is mostly, however, not real trade, but a kind of cooperative production. With development of division of labor, rights of use of more and more kinds of means of production are offered on the market.

(ii2) Non-information services

41) ***Non-information services*** are those services that do not belong to the class of information services. Non-information services are economic services.

(iii) Rights and intangible goods

42) ***Rights*** are objects that

- do exist "in the minds" of subjects of law in the country,
- can persist for a long time,
- ownership can or may not be established or is automatically established over them,
- ownership may or may not be alienated under
- market or non-market conditions,
- may or may not represent an economic value.

43) Rights are in many aspects similar to goods. SNA does not treate rights as a separate class of entities or objects. Provision of rights is mostly qualifies as a service and some rights are treated as capital goods.

44) ***Rights*** are not treated as a separate general item or a self-contained category of outputs in SNA and SNIA.

45) ***Intangible goods*** will not be introduced in SNIA as a general category, a special class of outputs. The individual kinds of intangible goods referred to as "goodwill", "production experience", "market share", "option", "intellectual property", "software", "trademark", "patent", "copyright" will be analyzed one after the other and then treated found in one of the basic categories according to their properties.

(iv) Human knowledge

46) Concerning human knowledge, SNIA should adopt the advanced models and data of cognitive sciences and ***adopt an advanced reasonable model of human brain, mind and mental activities***.

47) Human knowledge is kept to be recorded and accumulated in neural system. Neural structures carrying physical skills, and several abilities reside in peripheral nervous system. Mind and memory reside in brain. ***Memory*** consists of working memory, long-term memory and buffers of senses (visual and auditory).

48) ***Working memory*** (short-term store) is a part of human memory that according to [Card93]: "functions as a

(1) place to hold operands, things to be operated on by operations of cognitive processing,
(2) a cashe to hold in a rapidly accesible state recently input or used information,
(3) a buffer between processes that happen at incommensurate rates." In average, it lasts a few seconds.

49) Relevant attributes of ***short term memory*** [Card 93]:

- The knowledge accumulated in it "decay: When people are given a list to recall (and prevented from rehearsing), the amount they can recall decays exponentially with the time elapsed before recall",
- Its capacity "immediate memory span": When people are given a list to recall, the number of items they can recall is about five to nine, of these three to four reliably.

50) ***Human long-term memory*** (long-term store) lasts hours or years. Relevant attributes of knowledge accumulated in it are [Card93]:

- "The amount learned is proportional to the amount of time spent learning", assuming the same individual and conditions.
- "The longer an item spends in working memory under elaborative rehearsal (in which its associations are elaborated), the greater is the probability that it will be recalled. However, maintenance rehearsal, in which an item is rehearsed without thinking about it, does not improve the chances of later reacall."
- "The probability of recalling an item is proportional to log (DT / T), where DT is the time interval between the presentation of items and T is the total elapsed time at recall."

51) Human knowledge is obviously analogous to the knowledge embedded in machinery. In accordance with the trend of general commoditization, ***human brains with recorded knowledge inside, will also be considered as a special object***. As far as possible, its stocks, production, use and consumption should be attempted to account in the frames of the very limited opportunities available.

52) "Ownership over brains" is legally inconceivable. The "brain" and "mind of an employee" is mostly under the exclusive possession of the individual he / she is and this cannot be transferred to another person. Ownership rights and property of other persons cannot be established over it, it does not satisfy the criteria of the general definition of goods. The scope of his / her rights to use his / her knowledge may be limited by others or the law.

53) The legal institutions of "authorship" and "intellectual property", "employment", however, acknowledges others' rights over pieces of produced human knowledge. This issue has been discused in the previous chapter.

54) Employers, in frames of law on industrial secret, law on labor, law on civil servants and employment agreements, may acquire licenses of ownership

55) The most important ***licenses of ownership*** are

- disposition over the item (sell, embed, transform, dismount, annoy, and so forth),
- taking use of the item (lend, use as a tool controlled by it, and so forth).

56) As a rule, ***right of disposition*** can not be practized over knowledge in others' brain, actually use of others' brain, because the external person is not able to

control internal processes of information use. Constitutions of several countries even protect freedom of thinking. Right of disposition can be practized over what is called altogether "transfer": plagiaring, disclosing, leaking, unveiling, etc. , that is, using the knowledge for unauthorized producing of speech, writing, keyboarding and other outputs and producing such outputs. This can be observed and proved.

57) The employer has also the ***right of owner to take uses of the item*** when is licensed to take uses of knowledge in employee's brain. The limitations to its licenses -- patents and authorship of employees -- differ in various countries.

58) ***Creation of human knowledge*** may be an intentional (learning in educational institutions) or an unintentional (sponetaneous learning by doing, sensing or perceiving) process. The former should be included in information production, while the latter should not. Both produced short-term and long-term knowledge will be recorded.

59) Creation of human knowledge of individuals in their capacity as employees,

- while using employer's information,
- while using his / her knowledge

may be considered as ***output in the employer's sector or output in the household sector***, depending from character of employment relationship. Producing employee's human knowledge will be recorded as output in the employer's sector.

2. Information production

60) ***Information production*** can be defined as an activity in which an institutional unit consumes inputs of goods, services and human knowledge (including those that are treated as "labor" and "capital" in SNA) to produce information outputs. Of those goods and services volumes of information goods and services will be recorded in the bit-accounts of SNIA.

61) Those are ***not only the activities whose output is an information good and service with completely or to-someone "new" knowledge*** or ideas or inventions is to be considered as information production. New information cannot even be operatively - for economics and statistics - defined.

> The vast majority of the knowledge produced and consumed is not new at all. As illustrated by continuous republishing the Greek and Latin classicals or the fourth edition of Roget's Thesaurus (published first in 1911 and last in 1990), it is not only new information which is

valuable and object of change between economic partners.

62) It is obvious, too, that the concept of information production should ***cover those activities whose outputs are information products either that haven't been included into official statistical product classifications,*** as law drafts and bills, criminal files of the investigation bureaus, payrolls, contracts, private diaries, phone notebooks, etc. though these objects are hardly apt for measuring by present official statistics.

63) ***Information production is (accounted/non-accounted) economic production*** whenever output or input represent (accounted / non-accounted) economic flows.

3. The production boundary of SNIA

64) SNIA in twin tables should account both information output in bit and value terms and output in value terms. Thus the production boundary of SNIA should be ***determined by the concepts of production and information production***.

65) As far as goods and services as well as information goods and services -- possible outputs of production and information production -- have been defined and a general definition was given, a more accurate interpretation may follow.

a. The general production boundary

66) While production processes of products are mostly well identifiable with a prefixed set of standard goods, ***services could sometimes be accounted in various ways***. The very same service can be imagined either as a single service or a set of consecutive services. The contracts between supplier and consumer mostly provide information for the true nature of the transaction. Standardization of services at big suppliers as at financial institutions, telecomm companies and administration makes the services more discernible and recognizable. More and more services are service-marked: a sign of mass production and general commoditization of services.

b. The production boundary in the system

67) Like in SNA, the practical production boundary in the SNIA, that is "information production accounted" is more restricted, than the general production boundary. The following information flows will ab ovo not be considered:

- output of non-information goods and services,
- creation of non-produced human knowledge,

- production of durable signals on or in non--information goods except recording in the memories of information machines.

68) Activities that fall within the production boundary of SNIA may be summarized as:

- production of information goods and services that are supplied to to units other than their producers,
- "own account" information production of information goods and services, including "services of employees",
- recording information in memories of information machines,
- creation of produced human knowledge.

c. The production boundary within households

69) The ***own-account production of domestic and personal services by members of the household for their own final consumption*** have been excluded from accounted production in SNA.

70) SNIA ***adds certain information services of households*** to the system. These are particularly:

Information services of private individuals or households:

- supplying TV or video show or radio programmes (using broadcast signals, videocassettes and own set),
- training and instruction of children,
- taking active (communicative) part in free-time conversations, family and friendly conventions,
- religious, spectacular sports and entertainment activity (excluding physical recreational activities).
- conscious learning, self training,

Information services of employees:

- active personal communications,
- active phone communications,
- handwriting, drawing, painting,
- keyboarding, mouseing, typing,
- producing human knowledge using employer's information assets,
- producing human knowledge using their information assets.

71) A number of these services as training and instruction of children, or sometimes supplying TV show is an ***economic service indeed that is still beyond the practical boundary of the system*** of SNA-accounted production. The estimated economic values of these services will be imputed in twin tables, and all the margins will be corrected accordingly.

72) ***Employees' services*** are accounted under the general term of providing "labor" in SNA. The consequences of the distinction recommended here, should still be studied later in details.

73) Most important ***kinds of information goods produced by households*** (excluding those of unincorporated corporations) are:

- recorded copy-books of schoolchildren and students,
- home-made photoes, slides, moving pictures,
- home-recorded videocassettes,
- home-recorded audiocassettes,
- home-recorded digital media: home-made entertainment programs, hobby data files,
- paper-based personal home records: diaries, phone-books and notice-books,
- private advertisements, postings, handbills,
- paper-based records for corporations; applications, mails to utilities, etc.,
- paper-based records for governments; tax returns, applications, etc.,
- paper based records for other private individuals, private mails, greetings, notices and so forth.

74) The estimation of ***own-account production of these information goods*** will be based upon nationwide production of recorded media, representative surveys and estimation of the share of households.

75) The ***storage of information goods*** (as of books, records and documentation) is an economic service which is a non-information service.

76) ***Decoration*** (including do-it-yourself decoration) is not considered as an information service.

d. Illegal production

77) There are practical difficulties in obtaining data on illegal production. In SNA, there are two ***kinds of illegal production:***

a/ "The production of goods and services whose sale, or distribution, is ***forbidden by law*** " like espionage, pornogrpahy or racist publications in several countries;

b/ The production activities which aren't illegal in themselves but which become illegal when carried out by ***unauthorized producers***; e.g. unqualified medical practitioners, jurists, heads of units tapping or filtering messages and communications of employees, the same illegal actions of secret services or as illegal copying of videocassettes.

78) [SNA91] recommends that both kinds of production are included and this is recommended here. These activities will be ***treated as information production***.

e. Concealed production and underground economy

79) The underground economic activities should be within the production boundary of SNIA. [SNA92] applies the term "concealed production". This is production which was concealed to avoid payment of income, value added and other taxes, copyright fees, social security containments, minimum wages or completing statistical questionnaires.

C. The Measurement of Information Production

1. Introduction

80) The ***measurement of information production*** takes place with measuring of volume of information output as related to intermediate information inputs and fixed information capital consumed. Gross and net information added can be computed in this way.

2. Information Supply and Acquisition

81) There are many ways how information goods or non-durable signals are supplied by a unit to another subject being the new owner or the consumer.

82) ***Gross information supply*** of a unit is the volume of information conveyed by ***all copies*** of information goods and services supplied by him; either produced, or acquired in other transactions. Unusual in the economy forms are widespread in the supply of information goods particularly in the households sector.

83) ***Gross information acquisition*** of a unit will be defined as volume of information conveyed by all copies of all information goods and services received by the unit from another unit for purpose of consumption, use, reselling or transport.

3. Output

84) SNA defines the ***output of an institutional unit*** as "the sum of the outputs of the individual establishments of which it is composed. The output of an establishment is the goods and services produced within that establishment and that become available for use outside that establishment."

85) "***Economic value of output*** is defined as the values of total sales sold, bartered, used for compensation in kind, to be used as intermediary input plus the value of changes in the inventories of goods produced as outputs and that of work in progress. Economic value of output is recorded in the right, "resources" side of the Production Account, since the accomplishment of the production process (creation of a new product) is a transaction that enriches the unit, increases its income. Its letting to use (sale) increases and decreases its economic worth by the same value when the product leaves and counterpart arrives to the unit.

86) ***Information output of an institutional unit*** is the sum of the information outputs of the individual establishments of which it is composed. ***Information output of an establishment*** is the goods and services that carry or convey information produced within that establishment and that become available for use outside the establishment.

87) Information carried or conveyed by the goods and services created by an establishment belong to its ***information output. Output by employees will be considered***

88) Internal financial and economic documentation, personnel documentation, etc. ***(information goods that are not economic goods s.s.)*** will be considered as part of information output, to be consumed as intermediate information consumption or information capital formation.

89) ***Volume of information output*** is the sum of volumes of information carried by the goods and services within its information output.

90) Volume of information output should be recorded in the ***"resources side",*** when the production is accomplished, because the "creation" increases the volume of information that is available for the unit. As a contrary to accompanying economic flows, however, no information counterpart is supplied when the product leaves the unit as sales or in other kinds of transactions. This implies that this transaction should be treated separately by SNIA to show that the volume of information the unit (and its sector) owns decreased. This will be called "transactions with economic counterpart" and treated in the Allocation of Primary Information Account.

91) Output goods and services ***may be used*** for intermediate consumption by receiving establishment, but they may also form part of its gross capital formation.

92) ***Information input*** in the SNIA is the consumption of information goods and services that are consumed as materials, works in progress, parts and accessories and fixed information capital. It is necessary to remind the reader that in the SNIA definition of input the term "consumption" may not be substituted with the term "use".

93) Volume of information contained/conveyed by information goods, and services in forms of non-durable signals and durable signals on non-information goods, repair of information goods received from unit i to consume in information production will be called ***information input of unit j from unit i*** .

94) ***Gross information output*** and ***gross information input*** can be defined as sum of information outputs to receivers j and sum of information inputs from sources j.

95) In this approach "input" is input to/of a production process, which ***does not contain*** the goods/services purchased to be transferred in an unmodified form. In ***general theory of transport processes*** (GTTP) "input" is the complex of ***all*** elements that enter the system, i.e. "acquisition". Similarly supply is called output in GTTP.

In [SNA92], the inputs are recorded and valued at the time at which they enter the process, while completed outputs are recorded and valued when they emerge from the process. The increase in value between the inputs and the outputs measures the gross value added by the production process.

96) Output and input may consist of information goods and services. ***Human knowledge*** (the individual's brain and mind) itself is an explicite subject to submitting for employers putting it under their controll. Output and input will also be interpreted for produced human knowledge.

97) In the twin table, the economic values of output of SNA accounted and non SNA-accounted information goods and services will be recorded. The national figure for output will be corrected due to the non SNA-acounted products.

a. Market and non-market ouput

98) In SNIA, the ***distinction between market and non-market output is essential,*** beacuse

- the economic valuation of these goods is different in twin tables, and
- the underlying mechanisms and behaviors of producers are different for these groups.

(i) Market output

99) For ***economic goods and services "market output*** is output that is sold or otherwise disposed of on market, or intended for sale or disposal on the market, excluding output sold at prices that are not economically significant."

100) The term "market information output" is ***meaningful*** only for those information goods that are economic goods as well.

101) ***Clients of public institutions*** are charged when consuming a great number of ***administrative and judiciary services.*** These are mostly information services. The counterparts to be paid may be not economically significant. At a number of such services, however, the charges contain a significant element of surplus, when compared to costs. The charges are determined so as to burden luxurious consumption, decrease demand or other bases aiming at social targets. These prices are significant, but are not subject to market laws, consequently these services will not be considered as market output.

(ii) Non-market ouput

102) Goods and services produced for own final consumption or gross fixed capital formation, supplied free or at prices that are not economically significant and the value of changes in inventories of finished work and work-in-progress is considered as ***non-market output*** in SNA. Practically sales may cover less than a half the costs of production. Such output must be double counted once as market, once as non-market output.

103) ***R+D undertaken by non-profit organisations*** constitutes the production of a collective service in SNA -- with a non-market output. R+D is a complex activity defined in official statistics sometimes by its purpose, sometimes by outputs as research reports, written or oral scientific communications or patent submissions. Its volume will not be measured separately from other services in SNIA because of operationalizational dificulties. Though R+D is an extremely important activity, its volume of information is probably not significant, when related to gross information output of a country.

104) A number of information goods and services -- as public radio and television broadcasting, primary education, information in freedom of information, and government in the sunshine affairs and so on -- are provided free for the households by governments. Many services -- as jurisdiction in civil

lawsuits -- are offered at economically non-significant prices. The ***classes of such goods and services and principles of definition of such goods and services*** partly are, partly should be defined in policy principles declared in public law.

105) A number of information goods and services -- as official statistical data, directories, research reports prepared for governments, and so on -- are provided free or economically non-significant prices to market corporations by governments. The ***class of such goods and services and principles of definition of such goods and services*** partly are, partly should be defined in policy principles declared in public law.

106) ***Services of employees*** to employers as typing, oral communications, keyboarding, etc. and of ***individuals to family members*** will be recorded as mostly non-market services.

107) ***Government information producers also supply goods for purposes of intermediate information consumption or information capital formation*** of other government agencies or corporations but which do not recover their production costs from sales (government printing agencies, computer and telecommunication agencies).

108) The ***amounts and distribution of non-market goods and services produced for corporations, households and governments*** reflect the general social and political objectives and priorities of central government, the character of the state.

109) The law that obliges central government to provide collective or individual services free or almost free to households, doesn't oblige the government also to engage in their production with the possible exception of defence, legislation and administration. Thus governments may contract private or non-profit suppliers to provide the service free. These goods and services are ***market services and goods substituting for non-market output***.

b. Market and non-market producers

110) A ***market producer*** is an establishment or enterprise most or all of whose output is market output.

111) ***Non-market producers*** supply the goods or services they produce free, or at nominal prices not determined by costs, to individual households or to the community as a whole.

112) Market producers and non-market producers and market and non-market industries are used in [SNA92] for the detailed study of production and

products. Taking into consideration the role played or to be played by the market, this classification should be applied in the SNIA.

D. The Measurement of Market Information-Output

113) SNA distinguishes ***five types of uses of market output*** and describes the way when sales, barter transactions, compensation in kind, changes in inventories of outputs, deliveries between establishments belonging to the same enterprise should be recorded and how should be valuated in economic value-terms.

114) The ***time of recording*** in sales, barter transactions and compensation in kind is when the ownership of the goods passes to the receiver or the services are provided. The time of recording of finished goods is the time they were finished, and of work-in-progress is the the time such work is completed or the end of the accounting period. These ***rules*** should be followed when elaborating twin-tables of SNIA.

115) ***Actual event recording*** should be made in SNIA whenever it is possible in accounting the volumes of information. This introduces a systematic bias into the system. In most cases considered here, however, the time lags are not significant and are not believed to undermine the integrity and usefulness of twin tables.

116) The time needed to produce such goods for such products as databases, encyclopedia, etc., may range several months to several years. When the ***process of production takes a long time*** and necessitates cooperation between the interested parties, and a long testing and approbation period is needed, the output -- as a large-scale information system -- may be supplied in parts and accordingly the payment is due in parts. In such cases the ***agreement*** between the partners is definitive on the object(s) of transaction, and the accounting should reflect the essence of the transactions.

117) Valuation of ***work-in-progress in natural units of measurement*** should be done with bookkeping the progress.

118) For large-scale software projects, bookkeping the progress in natural unit terms would be feasible. The number of affairs open -- work-in-progress -- and closed is usually recorded in such institutions where the time of throughput and the volume of unclosed affairs is politically important, and characterizes the quality of service, as in institutions of law enforcement and jurisdiction. These figures can be used for elaborating estimations for the amount of work-in-progress in these institutions. Producers of books, newspapers, journals, audio cassettes, video cassettes maintain bookkeeping on works-in-progress. These records mostly are not suitable for making good estimates for the whole volume

of information represented in these works-in-progress. Computerized management information systems may hold data for the work-in-progress inside the system.

119) More and more ***information is produced in public networks***. Standardization of statistical monitoring in large scale networks is desirable. Monitors should report the volume of information produced, used and consumed by users and users' groups.

120) The standardization of all these processes would or will take long time. The ***measurement of work-in-progress*** concerning information goods and services in the near future in natural units is obviously beyond the opportunities and scopes of official statistics.

121) The volume of ***work-in-progress should be estimated*** at national level, based on value data, or should be neglected.

E. Measurement of Non-Market Information-Output

1. Introduction

122) Non-market output has been defined in one of the earlier chapters, as that is not produced for sale or other "market-type use".

123) The ***time of recording of economic transactions*** in value terms will be the time SNA defines. The time of recording the transactions in natural units will be the the ***actual time*** when outputting physically takes place, the information goods or services physically get to their new owner.

124) The ***economic valuation of non-market information output*** will be used in twin tables.

125) The ***value of output of "services of employees"*** should be proportional with time spent with delivering these services and an average price of time spent for these services.

2. Own-account production of services in households

126) In [SNA92] the value of ***services produced for own consumption within households*** is not included in the accounts of the system, whereas the imputed value of goods produced for own consumption is included. The exclusion of own account services is justified on three grounds [SNA91]:

- "Services are consumed as they are produced so that services produced for own consumption could never have been intended for the market." I don't agree with this argumentation. A service can be intended both for the market or own consumption before its supply would be commenced. Just before commencing of the supply, such a decision becomes impossible.

- "The volume of such services is so large that it would be very difficult to impute economically meaningful figure for them." The argument is weak again. The larger the volume is the more its imputation is desirable.

- "Such a large imputation would tilt the balance of the system away from monetary transactions and greatly reduce of the system as a whole for purposes of policy making." Totalistic regimes tend to annoy economic and not only economic activities in the households and eliminate all kinds of privacy. Share of economic and information acitivities by socially non-organised houeseholds and families is an important factor. Neglecting the household production leads to anomalies like formal growth of GDP while it actually declines. Neglection also may lead to the real growth of the organised sector. Instead of neglecting non-monetary transactions, statistics should measure share of non-monetary transactions as an important indicator of the society. For instance communistic regimes tend to annoy economic and not ony economic activities in the households while eliminate most kinds of privacy.

- "The own-account production of services is a completely self-contained activity with relatively little impact on the rest of the economy." This is not true. When an individual decides to produce an own-account service in his/her household, he also decides not to produce a good which would be taken into account in SNA. By this, he also directly influences volume of production as defined and computed in SNA.

- "The vast majority of domestic and personal services are produced within households for own consumption. There are, therefore, no major markets whose prices can be realistically used to value household services."

127) This ***problem is not relevant*** to accounting information. The very same techniques of estimation can be used for volumes of information conveyed by home and school education. Households when bringing up and educating new generations, produce human knowledge which is dominant in knowledge accumulation. Information exchange in the families is a factor which also cannot be neglected. The production and consumption of household information services will be included in SNIA.

128) The ***value of output of household information services*** will be estimated by time spent and an average price of time spent for these services.

F. The Information Output of Particular Products

1. Introduction

129) The general rules defined above should be ***refined*** when accounting individual information goods and services.

2. Output of various kinds of products

a. Recorded ROM, RAM, hard disk

130) ***ROM-s,*** and ***RAM-s*** in operation carry a significant and rapidly increasing amount of information even if not yet dominant in information output and assets, what might be desirable to be covered by SNIA.

131) ***Unrecorded ROM-s and RAM-s*** are non-information goods. While the manufacturing of these devices has been statistically surveyed, the volume of information these devices eventually carry after recording but prior to their embedding and after it, during their usage, is not known.

132) RAM-s are recorded only after their embedding into non-information machines. One can not interpret ***"output of recorded RAM-s"***, because those are computers, copiers, washing machines, etc. that are outputs of production process. These were classified as non-information goods, and as such, are beyond the production boundary of the system.

133) Whenever unrecorded ROM-s will be recorded, the result will be classified as information output because the recorded ROM-s are new products that fall in another class of goods that is different from that of unrecorded ROM-s. The yearly output of recorded ROM-s may be roughly estimated by the yearly production of unrecorded ROM-s. This is a positively biased estimation.

134) The ***valuation of output of ROM-s*** in bit units will take place by using their nominal storage capacity. This is a positively biased estimation. The average volume of (useful) "information carried" by ROM-s may be between 70-95 percent according to various definitions of (useful) "information carried". The valuation of output in value terms should be made using industrial statistics.

135) The volume of information newly recorded on ***hard disks*** of personal computers and various network servers should be treated as information output.

Both the files produced by data entry or processing and the files "received" by gophers, ftp, or any other way and created on own hard disks should be recorded as output. Value of this output should be estimated as non-market output from average exploitation costs of the system.

136) This output should be recorded as ***output by the user*** whenever user is an external client, or employee of an external client, and as output of employer, whenever the system belongs to empoloyer and user is an employee.

137) "Although a ***distributor*** actually sells goods, his productive activity is construed to be the provision of services by obtaining and storing goods in a location which is convenient for his customers. The goods themselves are not regarded as being significantly transformed in the process and are therefore not treated as intermediate inputs into the distributor's own porocesses of production." In consequence, the goods sold do not form part of the output of the distributor whose services are measured by the trade margins he realized."

138) In accordance with this, ***information-distribution*** will be understood as a commercial activity during which information goods and services are distributed in transactions 18, 28 and 38.

139) A number of standard studies define ***teachers, journalists*** etc. as distributors of information opposing them to scientists; creators of knowledge. These professionals reproduce -- that is produce -- information rather than trade with it. What can be thought distributed by teachers and journalists, it is "ideas" that are beyond the scope of the present system. Similarly, broadcasting and cable TV services are thought to be rather productive than distributive activities.

140) At the same time ***wholesalers and retailers of information goods*** like a bookshop doesn't produce information goods, their activities aren't information activities, their output and production cannot even be measured in bit terms except internal business and management information, as opposed to their supply. As it has been mentioned, the volume of information in or on information goods may grow with the passage of time and there is a general "oblique inflation" as a consequence of technical development. This should be treated as a ***holding gain.***

141) "Information-distribution" should be distinguished from "social distribution of information" which latter refers to the process how information added is distributed through actors of the society.

c. Transport and storage of information goods and durable signals

142) ***Transport and storage of information goods and durable signals*** are not considered as information output.

143) Various documents of ITU, ICCR and other international organisations and agreements provide a definition to the ***notion of "carrier"***" and ***"common carrier"***. Telecommunication companies are eventually called carriers of communications.

144) Nevertheless, what ***telephone companies*** actually do during an intra-LATA, or inter-LATA call, ***it is not transport*** of signals from a speaker A to another speaker B, but, while using an input signal -- oral communication "a"-- made by A, it is production of a new signal, a copy of "a" to B. These companies ***may be considered as producers***, active agents. Then telecommunications is an information activity because it provides information services to its consumers.

d. Telecommunication, broadcasting

145) Telecommunications services -- as services provided by supplying non-durable electromagnetic signals, a separate class of media -- will be and can be ***separately surveyed*** independently of the nature, contents or meaning of these signals and the industrial classification of the producer. Various kinds of these signals will be studied in quality of "of which" items.

146) The information ***output of a "telephone service"*** is the ***acoustic signals*** generated by the loudspeaker of the set to the hearer, whenever the corporation provides a service to one of its subscribers, and an ***electric signal*** in any other case. The volume of this information can be estimated as the average channel capacity of the line between the two parties multiplied by the time of conversation or line usage.

147) The ***definition of both indicators*** raises several methodological issues that should be resolved by an authoritative international body of experts.

148) As it has been described in the previous chapter, ***a telephone service*** can be viewed as an information output by the local telephone company.

149) ***A telephone service*** may also -- less obviously -- be considered as an information activity made by the caller (and the called) or the payer using the equipment borrowed from the telecommunications company. In this approach the service the telecommunications company supplies is a non-information service.

150) The amount of information outputted altogether in both methods of accounting is the same, however the sectoral distribution of output may be

different. Service conditions of the common carriers and other service suppliers contain hints and should be studied to resolve this dilemma.

> The present version of SNIA recommends to follow the second approach for the U.S..

151) Both information inputs and outputs of ***long-distance and international carriers*** are electric signals.

152) There are sophisticated problems with ***data communications, "value added" services, and gateway services***. They may provide a "platform", a "user environment", "passwords", a "gateway" or "access to a database", "use of database", a "table", a "record", actually pieces of information or processing capacity. Some of these services represent nothing more than provision of rights, some of them provides physical computing or switching and subsequent prodcution and provision of non-durable signals. Many times neither names of fees are always orientating on replying the question: "Who outputs what?". The clear-cut distinction contributes to demystification of computers and electronics.

153) The volume of information output of digital electronic services should be defined by number of bits outputted, i.e. displayed or recorded for the consumer. This sometimes can roughly be estimated by the channel capacity of the digital channel on which the service has been supplied.

154) Under the conditions of an extended, broadband, point-to-point communication, the ***internal servicing information***, the information overhead of the networks should be recorded as non-market output and intermediate consumption at the owner or operator of the network.

155) The ***services supplied on closed and private networks*** are integral parts of the national information output and should be accounted.

156) ***ITU*** should move forward and add new standardized statistics to the existing, mainly phone oriented statistical reporting system, to survey new kinds of telecommunications.

157) In telecommunications statistics, the ***output of broadcasting*** has been ***traditionally characterized*** by figures in kW-s, or the size of broadcast area, or the size of population achieved. These indicators do not actually characterize the volume of service provided by the broadcaster. Providing a service always assumes two sides, the producer and the consumer. The volume of the service outputted by a broadcaster (and consumed by consumers) should be

proportional with both the amount of programs supplied and the number of receivers.

158) According to the ***principles of SNIA,*** volume of output should be determined by accounting all services rendered even if those are supplied in the frames of a single production process.

159) The ***broadcasters provide electromagnetic signals for all sets of all set-owners*** present at the given moment either is the set switched on or off. These signals can physically be detected on the antennas of sets and are actually consumed (but not necessarily used).

160) Thus the ***appropriate indicator of the output of a broadcaster to a r**eceiver*** (household or individual mostly) is the sum of volumes of information the former supplied to the latter's sets. This can be estimated using average channel capacities and time of broadcasting. If a broadcaster supplies signals on more than one channel -- even if it supplies the same program -- the volume of information supplied physically on each channel should be summarized. The output of broadcasting can be determined as the sum of these figures taken for all broadcasters and all consumers.

161) ***In practice, the account*** takes place with surveying and contouring the areas where broadcasting of a station can be received ("market areas" in the U.S. are estimations of that), determining the number of households and sets per households resident on the area and capable to receive that broadcasting. Then average times when broadcasting is available are determined and these figures are summed up through channels available.

162) By this, ***all receivers, both located and owned, domestic and foreign*** should be considered.

163) The ***identification of the unit who outputs the information service*** is important in the sectoral items of the accounts. In some cases a unit owns broadcasting equipment and studios for program-making. As a consequence of developed division of labor, many "broadcasters" do not own broadcasting equipment and neither own programs. Broadcasters are owned by government and private shareholders and are financed from various sources. The broadcasting stations that hire equipment and play licensed for them programs will be considered as "information outputters". Also the broadcasters that own equipment and play licensed for them programs will be considered as "information outputters".

164) There are several ***methodological problems*** regarding to the definition and measurement procedure above. These problems should be resolved by an appropriate international body of experts.

165) Considering the increasing importance of broadcasting in the economics and culture of member countries, ***UNESCO and ITU*** should take the responsibility to initiate the regular survey of outputs of domestic and foreign broadcasters based upon receiver-hours.

166) The volume of output of ***private radio*** (air, road, maritime etc. services) transmitters and stations should be proportional with channel capacity, number of actual receivers and time of transmitting messages.

167) The ***volume of output of cable TV services*** should be proportional with average per hour channel capacity of channels per set, average number of programmed channels per set, and number of sets.

168) The ***volume of information output of cable TV services*** should be proportional with length of time of supplying signals per channel, number of channels altogether, average channel capacity per channel and set and number of sets.

169) The value of output of telephone, broadcasting, cable TV and other telecommunications services will be determined from the industry figures, respectively.

e. Output of financial intermediaries

170) ***Information output of financial intermediaries*** is realized mostly in outputting paper-based documents (accounts, bills, billing reports, invoices, cards, etc.), digital magnetic media and electromagnetic signals by means of telecommunications equipment.

171) Present official statistics do not contain satisfactory data that could be used in tables of raw data of natural units to make estimates for the volume of information output of financial intermediaries. Thus their ***information output will be included in the media-based tables***. The estimates sometimes can be made for particular financial services, will be of type "of this".

172) While gross estimates cannot be made for the information output of financial intermediaries altogether, it is still necessary to ***define the concept of information output in this industry***. Which part of output of insurance and financial enterprises should be considered as an information good or service?

173) For instance, ***insurance policies*** are mostly filled in and signed printed forms. However, a signed policy appended with enclosures and attachements is not just a form any longer, it is a new kind of information goods, which can be issued by the company only. It is the information output of the company, a tradable or non-tradable good. Unfilled forms are printed matter, a kind of information goods, consumed as intermediate information consumption.At this information added will be found to be limited indeed. (Signatures, some of the attachments, filled-in information on questionnaires).

174) Furthermore, there are vast intra-unit information stocks accompanying to insurance institutions. The internal information transactions accompanying to monetary insurance transactions are more voluminous than the information output issued by the company to the consumer.

175) It is not the volume of information what is significant in external insurance transactions. The fee one pays for buying sa policy, is not the pay for using the information on the policy. It is a pay for the policy itself, which - as a unit - entitles its owner to participate in the services of the company. Like with banknotes one buys "rights" and "liabilities" with the policy.

176) ***Credit cards, ATM cards, phone-cards*** should be considered as special information goods, whose output is characteristic for financial institutions. ATM and other magnetic card or user initiated financial transactions will be recorded as telecommunication services, and financial services, depending the data sources available.

177) ***Interunit electronic funds transfer*** will be considered as an information activity done by the financial institution or other transferer while eventually using non-information telecommunication services.

178) ***Pension funds*** output various information on monthly pensions: modification of the pensioners state (rise etc.), resolution on commencing/ending rendering payable the pension.

179) The value of information output by financial intermediaries will be determined mostly as non-market output by average cost figures.

f. Output of publishing houses

180) In the course of traditional paper-based technological process, ***publishing houses*** produce and use a lot of intermediate goods as ***authors' manuscript***, ***revised and modified manuscript***, ***accepted manuscript***, ***edited manuscript*** and ***camera-ready***

manuscript. This products should be considered as non-market output. Printing offices produce publications in their final form.

181) The ***information output of book publishers*** -- separated from that of printing offices -- can be estimated using figures for the number of titles and the average volume of each title.

182) The ***information output of publishers of audio records*** -- separated from that of record producers -- can be estimated using figures for the number of titles and the average volume of each title.

183) ***UNESCO*** should initiate the account of publishing of such significant media as videocassettes, software products on magentic media and CD-ROM. Some of these media are to carry more information than those works UNESCO surveys now. Negligence of these media makes the statistics of UNESCO incomplete and unable to detect the processes just on the hottest scenes.

g. Output of paper-based media

184) ***Output of paper-based media will include*** books, brochures, textbooks, journals, magazines, newspapers, other kinds of published matter, non-published printed matter and non printed matter including of those made by handwriting, typewriting, xerocopying, keypunching or any other way. An important class of these documents is that of copyrighted manuscripts.

185) The volume of information output in the sensory-level account ***should be proportional*** with the mass and surface of the paper consumed at the output of paper-based media and an average "per metric ton" and "per m^2" equivalent.

186) ***UNESCO*** surveys the yearly amount of consumption of writing and printing paper. These figures should be used in a revised definition to estimate volume of information outputted with paper-based media altogether.

187) An authoritative international body of experts is needed to determine the actual value of a ***"per m^2"*** and a***"per metric ton" equivalent*** that will be used in the transformation to bit units.

188) The output of important individual kinds of paper-based information goods to be measured (books, journals, newspapers) should be proportional with number of units (copies) issued (circulation) and their size (per copy number of pages, per copy number of printing or authors' sheets, per copy "n"-s).

189) ***UNESCO*** already maintains surveys for measuring circulation. It should encourage local official statistical offices to conduct studies to measure the per copy size of these publications in a representative way.

190) Volume of information output represented by books, journals and newspapers should be determined from these figures multiplying them by average ***"per sheet" or "per copy" or "per n" equivalents***. These equivalents will be determined by a body of experts.

191) ***Value of market output*** should be determined from figures for industries. ***Value of non-market output***, including business, government and household records, will be determined by average costs estimates.

h. Output of digital media

192) All kinds of digital magnetic diskettes, cassettes, videocassettes and tapes should be considered here.

193) The surveying of ***output of recorded digital magnetic and optical media*** at its main producers as software houses, data-banks and managements information systems is a prerequisite of accounting knowledge stocks in the future.

194) These surveys should be extended to ***recorded videocassettes***.

195) The measuring of ***stocks, output, exports and imports of unrecorded digital magnetic media*** by official statistical organizations, however, is now feasible and even unavoidable. The importance of these products was recognized lately by "manufacturing oriented" statisticians. Magnetic media, as diskettes and tapes nevertheless are standardized, the number of big producers is limited and a complete balance of magnetic media, like those of writing and printing paper can be elaborated.

196) ***UNESCO should move*** forward and recommend member countries to survey these products (titles and circulation) -- now already registered under separate codes in such international systems as HS and NACE. Both the survey of copies sold in retail trade and production of copies at producers can be feasible.

197) ***Concealed and illegal production*** may cover as much as 70 or 80 percent of output of digital magnetic media in some countries. Thus the data from official surveys should be revaluated for the purposes of the system. For the resolution of the statistical methodological problems of concealed and illegal production an appropriate international body of experts should be established.

198) The survey should be made in ***piece units***. These figures then could be used for transforming them to bit units assuming average "per diskette" or "per tape" ***equivalents***. The equivalents should be defined by an appropriate international body of experts.

199) The value of output for prerecorded cassettes should be determined from industrial statistics. The value of output of home and other non-professional recordings should be estimated from costs.

i. Output of analog magnetic media

200) All kinds of analog magnetic media, audiocassettes and tapes should be considered here.

201) ***Output of recorded magnetic audio tapes*** by commercial producers has been measured by statistical surveys of various countries.

202) ***UNESCO should move*** forward and recommend member countries to survey the output of these products completely (not only titles, but copies) -- now already registered under separate codes in such international systems as HS and NACE. Both the survey of copies sold in retail trade and production of copies at domestic producers can be feasible.

203) ***Concealed and illegal production of recorded analogous magnetic media*** may cover as much as 70 or 80 percent of output of analogous magnetic media in some countries. Thus the data from official surveys should be revaluated for the purposes of the system. For the resolution of the statistical methodological problems of concealed and illegal production an appropriate international body of experts should be established.

204) UNESCO should initiate ***standardized survey of unrecorded analog magnetic media***.

205) The ***common unit of measurement*** may be "equivalent running metre". These data then could be converted to bits. The "per metre" equivalents should be determined by an authoritative international body of experts.

206) ***Statistical standard setting*** should resolve such problems like repeated processing (cutting, packaging) of magnetic tapes. Similar methodological problems have been successfully solved at surveying consumption of paper.

207) ***The value of output of professional recordings*** should be estimated from industrial statistics, that of ***non-professional recordings*** from costs estimates.

j. Output of films

208) All kinds of ***exposed-and-non-developed*** and ***exposed-and-developed*** sheet and roll films should be taken into account here.

209) The balance of unexposed and undeveloped photosensitive positive and negative films can be estimated for the developed countries. These films are non-information goods. Their volume however can be used as an estimate for the yearly ***output of exposed and exposed and developed films***.

210) Of those all kinds of films -- X-ray, printing, other industrial, amateur, professional cinematographic and photographic, and so on -- titles of domestically produced ***long cinema films*** are surveyed by UNESCO.

211) The significance of various kinds of films in knowledge stocks and information flows is not negligible. ***UNESCO*** should take initiatives to recommend surveys to cover the ***balance of unrecorded (unexposed and undevelop) films*** as it exists for writing and printing paper and was recommended here for other media.

212) The ***common natural unit of mesurement*** of various kinds of films may be the ***size of the area***. expressed in m^2.

213) Volume of information output should be proportional with the size of area and a ***per m^2 equivalent*** which should be defined by an appropriate internationial body of experts.

214) The figures for value of output by industries should be estimated from industrial statistics. The output of households should be estimated from costs.

k. Output of education

215) ***The term*** education will be understood to cover the education activities conducted in units of schooling system, adult education and training (mostly market based), and education in families. Schooling system is most covered by official statistical data, adult education, and education in families are less known. Educational channels and programs of radio and TV will be accounted there.

216) ***The information output of education and training*** should be treated differently inside and outside the households sector.

217) According to the ***principles of SNIA*** volume of information output should be determined by accounting all services rendered even if those are supplied in the frames of a single production process.

218) In various forms of classroom education within the codified system of education, a service is rendered to all students or schoolchildren who are present, whenever the teacher teaches them. That means the service provided altogether by a teacher for a class should be the sum of the services rendered for each of the students.

219) The information output of education for an institutional unit should be accounted as the sum of these figures for all classes and all teachers. The ***information output of education in a country*** is obtained by summarizing the information output of all institutional units.

220) It is assumed that when the teacher does not communicate -- for instance the students do exercises, or one of them gives an account of his/her knowledge -- the same "per second volume of information" is supplied to the rest of the class -- by the educational unit. The contribution of the classmates should be assessed.

221) Various kinds of ***absences, phsyical education*** should be taken into correction.

222) Then assuming an appropriate ***"per student-hour equivalent"*** these data should be converted to bit units. By this an average visual and audial channel capacity should be used. These figures should be ***determined by an authoritative international body.***

223) As for now, ***UNESCO*** surveys the number of students enrolled in primary, secondary and third-level schools.

224) The average number of days in a schoolyear and the average number of classes or hours given on a day are varying on a wide scale in time and space among various countries. Thus, the performance of the education system should be measured -- even for the non-comprehensive purposes -- in ***student-hours***. UNESCO should initiate the survey of student-hours for a better measuring of performance of educational system, that of teachers and burden of students.

225) Children of age between 3 and 6 in ***preprimary schools*** are also supposed to receive education. Experimental data are needed from the countries interested to provide a solid foundation to determine the number of hours when such children receive education.

226) ***Volume of information output of education and training in the households*** should be imputed using time-use surveys based upon the number of hours spent with education and training.

227) ***Value of output*** by educational institutions will be taken from official figures. The value of (non-market) output by households will be estimated from costs.

l. Output of research and development

228) There are various material forms of ***output in research and development***. The ***manuscripts of articles*** to appear in scientific journals, ***research reports*** bound to grants, ***submissions for patents*** protection and ***oral presentations at conferences*** are considered as examples of typical outputs of research activity. Printed scientific books and journals will be considered output of printing industry rather than of research and development industry.

229) As a consequence of extended use of electronic networks as Internet, a greater and greater part of scientific production takes place on or is entered into ***electronic systems.*** Scientific information is not easily discernible in these systems from other kinds of information. No official statistical data are available on the flow or amount of scientific information in these systems. A classification of information flowing or being available on the networks according to contents-categories seems hardly feasible.

230) The ***volume of information output of research and development activities*** -- as defined by ISIC -- will be understood here as the sum of volumes of all information outputs recorded on all kinds of media. This is not commensurable with output of new scientific knowledge measured in terms of ***scientometrics***.

231) Outputs of research and development -- both volume and value -- will be ***accounted within that class of media*** they are recorded on: non-durable electromagnetic signals, paper-based documents, magnetic media, both digital and analog, and film. Some scientific services and goods then can be measured as items of type "of those".

232) In the process of R&D, various ***intellectual property rights*** can also arise. The ownership rights over various outputs of scientific research -- particularly over those produced under government contracts -- are not always clear.

233) ***Output of exploration for raw materials*** -- i.e. exploration documentation and reports is obviously an information good.

m. Output of spectator sports institutions, movies, theatres, musei and other institutions of culture and entertainment

234) ***All kinds of services*** of spectator sports, theatres, musei and other institutions of culture and entertainment should be considered here. Value of output should be estimated from industry-level figures.

235) According to the ***principles of SNIA,*** volume of output should be determined by accounting all services rendered even if those are supplied in the frames of a single production process.

236) Assuming a constant average channel capacity for viewers, this implies that volume of information output should be proportional with ***attendance*** , ***length of the program and a "per attendent-hour" equivalent***.

237) Common natural unit of mesurement of these services should be ***"attendant-hour"***.

238) These figures then can be transformed to bit units using "per attendent-hour" equivalents. The equivalents should be defined by appropriate international body of experts. The application of the very same equivalent for all of these services is desirable to minimize the effects of arbitrary imputations.

239) ***UNESCO*** surveys cinemas: their number, seating capacity, annual attendance and box office receipts. It should initiate the extension of the survey to the rest of the services in this group.

n. Output of "TV shows" and "supplying radio programs"

240) TV and radio set owners -- consuming the signals of broadcasting -- produce a "TV show" or a "radio program" for their watchers or listeners. "Watchers" and "listeners" may include themselves, members of their household, visitors or consumers (in catering industry). This service is beyond the production boundary of SNA.

241) The separate treatment of this kind of services is ***justified*** by the significant volume of information produced and consumed.

242) The service discussed in this section is supplying the program to a viewer or listener. This ***do not involve the process*** that takes place after he/she consumed this service, i.e. the processes of learning, reacting, emotioning, processing, remembering and so on.

243) According to the ***principles of SNIA*** volume of information output should be determined by accounting all services rendered even if those are supplied in the frames of a single production process.

244) Rendering a service is a transaction that assumes two sides, a producer and a consumer. Thus the ***volume of information output*** produced by a set-owner to a consumer (viewer or listener) should be ***proportional*** with the length of program a consumer actually consumes, i.e. views or listens, and the number of consumers. Switched off hours should not be recorded as the output of this service.

245) The fact that the viewers or listeners consume a program does not mean that they also use it.

246) Thus the volume of information ***output of all producers*** can be approximated as the sum of all viewer or listener hours multiplied by the average channel capacity. An authoritative international body of experts should determine the value of "per viewer hour" and "per listener hour" equivalents. The ***value of output*** should be estimated on average costs basis.

247) ***UNESCO*** should initiate the international standardization of methodology to survey switching on ("set-meters"), primary and secondary watching ("people-meters") and listening.

o. Output of personal communications

248) Personal communications are not treated as a ***separate service*** by SNA.

249) Services in a number of codified classes of economic services in standard national classification systems and ISIC are fully or partly accomplished by supplying personal communications by employees. The ***examples*** of such services can be legal counselling, psychological consulting, and kinds of classroom education. In such cases reclassification seems to be justifiable and information flows are obviously associated with economic flows.

250) To provide operational measurability or estimatability, these services should be partitioned in SNIA, that is, distributed into parts: "personal communications" including "personal communications" and the "rest part of the service".

251) According to the scarce surveys available, the contribution of personal communications to the information flows of society is considerable, significance is great and ***in a national information account should be considered as a separate item***.

252) ***Churches and political parties*** output journals, newspapers, and brochures. This outputs are covered there. Besides these, they organize advice, meetings, conventions, missa where deliver proper information. These services are partly covered by time-use statistics and will be treated within oral communications.

253) Personal communications will be treated as ***produced information services*** . Value of market output should be based upon industrial statistics. Value of non-market output will be estimated on costs basis. Figure of value of output will be corrected considering personal communications non-accounted in SNA.

254) According to general rules of SNIA, transactions -- among others output -- of complex institutional units should be for measuring purposes reduced to outputs of elementary actors of the complex unit. ***Outputs of employees will be considered in the sector of their employer***.

255) All kinds of personal communications made at workplaces and homes or during travelling by employees and private individuals directly to one or more partners should be taken into account here.

256) Volume of information output of personal communications by an individual i to another individual j should be proportional with the duration of the communications. ***Volume of information output of personal communication services*** in a unit should be proportional with the sum of time spent with communications to all listeners by all active communicators, expressed in "listener-hours".

257) ***Volume of information output in bit units*** should be defined by multiplying this figure by the average " per listener hours" equivalent. The equivalent -- average channel capacity of personal and oral communications -- should be defined by an authoritative body of experts. "Personal communications" is more than speech delivery; both audio and visual channels should be considered and the channel capacity of teleconferencing systems should be adopted as an estimate.

258) Personal communications ***can be supplied by private individuals and employees.***

259) Most information services and goods outputted outside the household sector are ***collective products***, they are the results of the contribution made by several employees and machines of the employer. Personal communication, however, is a special service that -- when physically outputted by an employee -- is (his / her) personal output. Employees act on behalf of their employees.

260) It is not uncommon that an official announces something, remaining unidentified, or refers to his communication as a private communication. Similar cases call the attention that the ***relation between employer and employee may be different and may be accounted in various ways during personal communication*** and these transactions need some clarification. This issue can shortly be formulated as: "Who outputs a personal communication, the employee (on behalf of its employer) or the employer itself?". The actual resolution of this problem has a significant effect on intersectoral flows of information.

261) ***Output of personal communications made by employees*** should be recorded in the corporation and government sectors, made by private individuals is to be recorded in the household sector. In the input/output tables personal communications made for employees are recorded in the corporation and government sector, and in the household sector when made for private individuals in the "resources" side of input/output table.

262) Personal communications supplied by private individuals are referred and reported as "conversations", "social or family convention" and others.

263) Time use statistics report the average time spent by a data-supplier i in a period for multi-participant conversation. A person i, in a particular ***multi-participant conversation*** k between the members of a closed company consisting of n participants, outputs personal communications of duration t_{ki} for n-1 partners and himself. Volume of information outputted is

$$O_{ik} = n * t_{ik}$$

Volume of information carried by communications of all speakers is

$$O_k = n * t_{ik} = n$$

$$t_{ik} = n\, t_k$$

This leads to the conclusion that published statistics are good for estimating output of personal communications, independently of the number of participants.

p. Production of "Originals" and "Copies"

264) [SNA92] pays great attention to the production of objects, whose original is qualified as ***"intellectual property".*** "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 the copies of the original. "

265) "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 output of the first stage belongs to the originator (author, film company, programme

writer etc.) It is treated as a fixed capital asset. Thus the first stage is the production of an intangible fixed asset possibly for sale or possibly for own-account gross fixed capital formation by the originator. ... If the original is sold, when it has been produced, the value of the output of the original is given by the price paid. ... 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 usually. 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. ... In these cases, the owner is treated as providing services to the licensees that are recorded as part of their intermediate consumption."

266) This treatment in more aspects ***doesn't cover the facts. completely***. Some arguments will be given below.

267) With origination, the ***originator of such a good attains to certain rights*** (copyright, patent rights etc.) and possibly to one or more copies of some information goods. Singers, actors etc. may not come by copies of information goods, but their performance is also under protection.

268) The ***rights are not bound to "originals"***, but to the original web of thoughts in the mind of the creator or inventor, that is to the produced or non-produced knowledge of creator.

269) As a rule, the authors of ***computer programs*** write source code and distribute object code but both have an "original" and copies. In case of computer programs, an "original" may even be physically indiscernible from the copies.

270)***The transfer of an original copy (e.g. that of a manuscript) doesn't inevitably involve the copyright*** and vice versa.

271) Both originals and copies will be recorded in SNIA in the appropriate broad media/carrier categories. The volume and value of copying in a wide sense, will be recorded as "use".

q. Output of human knowledge

272) Due to general definition of concept of production, ***human knowledge*** -- as an object -- should be viewed as that is partly produced (product) and partly non-produced.

273) The term "creating knowledge" can be interpreted as creating "integral minds" and producing "contributions to knowledge in human minds". Both

should be covered in SNIA. ***The term "output of human knowledge"*** refers to human knowledge as a produced object, a product, producing "contributions to knowledge in human brains".

274) While accounting production, SNA doesn't cover the ***contribution of nature*** to the creation or transformation of goods and services but covers those outputs that contribute to growth of natural wealth. Changes in assets as a consequence of natural processes should be accounted in the accumulation accounts. In an analogous way, the contribution to natural growth may be considered as production.

275) Though produced and non-produced parts of human knowledge in no way can exactly be distinguished or separated, it may be desirable to ***introduce some distinctions.***

276) It will be assumed that ***produced human knowledge will be outputted,*** whenever one acquires knowledge in short-term memory in transactions, institutionalized forms of knowledge acquisition, i.e. consuming information services.

277) The ***production of long-term repeatedly usable knowledge in the long-term memory*** will be assumed to take place while consuming education, training, reading, learning, some kinds of educational radio and TV broadcasting and some other kinds of services. This will be qualified later in the Capital Account as human information capital formation.

278) The ***knowledge acquired outside organized, institutionalized forms of knowledge acquisition*** will be treated as natural growth of non-produced human knowledge.

279) It will be assumed that consumption of entertainment services leads to the production of non-lasting knowledge that is consumed as intermediate information consumption or final (improductive) information consumption, and does not contribute to human capital formation. TV program categories to be considered here should be defined by an appropriate body of experts under UNESCO.

280) While the procedure of determination of volume of information input consumed at ***output of "contributions to minds"*** can be operationalizable, it is difficult to operationalize the that of volume of information output itself. Thus volume of information input must be used as a rough overestimation of volume of information output.

281) In the SNIA accounts, the production of human knowledge and its natural growth should be considered both in the employer's sector and households sector.

282) ***Value of output of produced human knowledge*** will be recorded as non-market output and estimated on costs basis. SNA figures for value of output should be corrected due to output of human knowledge.

r. Writing, keyboarding, "mousing"

283) In the early years of data processing, ***keypunching*** has been used as the most important means of data entry into computers. Data entry machines

- were able and used to enter sequences of characters,
- were not able and used to record the behavior of the keypuncher.

284) Present-day ***workstations*** continuously monitor the transactions made by user, as keyboarding and mousing and keep records on them and may keep records of them. This implies that the rate of output, the information transfer from employee to workstation has tremendously grown. The increased volume of information outputted by employers in form of ***keyboarding, "mousing", voicemailing***, and so on, and the economic potential of using this information and consuming as intermediate information consumption or information capital formation, makes the treatment of these services desirable.

285) The estimation of output of these services should be based upon representative time-use surveys at workplaces. The volume and value of ***output of wiriting*** should be proportional with time spent with writing and an average factual spped of writing which is considerably less than average speed of continuous writing. The volume and value of ***output during computer use*** (keyboarding, mousing) should be defined as number of transferred bits. The national figures for value of output will be adjusted accordingly.

3. Output of elementary transactors and complex units

286) Output of complex units should be aggregated from products of elementary, physical-level transactors. Various accounting procedures can be applied for the determination of output of corporations, individuals and government institutions when considering such contributions of employees, as their oral communications, keyboarding, typing, writing, phoning, etc..

287) These procedures and the underlying models are described in the previous parts of this chapter and in the chapter on institutional units.

G. The Concept of Information Consumption

1. Introduction

288) SNA makes no ***distinction between "use" and "consumption"***. Economic use or consumption is considered as a process with a definite duration. Goods are assumed to be used and consumed at the same period when measured in value terms according to the principles of SNA.

289) SNIA applies classes of goods and services inside of which volume of information that individual goods and services carry can be estimated. The term "use" as "use of books", "use of a book", "use of software" has already a more or less clear physical and legal meaning for these goods and services and this cannot be missed for the term "consumption" as "consumption of books", "consumption of a book" or "consumption of software". Use of information is one of the fundamental acts that determines production, consumption, distribution and accumulation of information and knowledge, hence it should be treated in SNIA. When comparing to SNA, the concept of "use", as a separate fundamental category, lends a new aspect to the system.

2. Economic consumption and information consumption

290) Under ***consumption of a copy of an information good or service*** its reversible or irreversible physical disappearance (annihilation or transformation) will be understood either as a consequence of repeated usage and succeeding sorting out, or building it into a certain new good (like embedding, e.g. firmware chips). In SNIA, consumption of a particular good or service is a ***process*** which ends at a definite point of time and which is accounted after it had been completed. The place and situation of consumption defines the consumer.

291) Non-durable signals and the information goods that will be built into some other good (in quality of a part or accessory) are to be consumed in a single production cycle. Copy-books, records, journals are generally not consumed at one use. Computer programs, canned software, books, files etc. have been being used for several years and ***then*** are consumed. The information goods that are being used for repeated reading or display are consumed in more production cycles exhibit the features of capital goods.

292) Under ***volume of information consumed by an institutional unit*** (termed shortly as information consumption of the unit), the sum of volumes of information consumed on all copies of information goods and services will be understood.

293) The set of all goods and services consumed (as consumption was defined in [SNA92] might in principle be considered and the ***volume of information carried by***

all goods and services consumed could in principle be estimated. Information consumption could be defined as which is proportional with consumption of value, when the good is consumed in several cycles of production.

a. Kinds of information consumption: embedding, transformation and annihilation of information goods and services

294) An information good can be consumed so that it will not exist any more ***in its kind***, i.e. it is "transformed" sensu lato. A ROM-chip built into a computer or a photo glued into an album may be the examples of a similar action called ***embedding***. However, the chip and the photo embedded can be taken out of the incorporating good again and sold as a second-hand good.

295) An information good can also be consumed by its complete physical ***annihilation***, when a book is teared or a newspaper is lit and committed to the flames. Piéces of exposed but undeveloped photographic paper turn to photoes when developed. This called ***transformation s.s.***. The latter cases are called ***real consumption***.

296) Information can also be consumed with ***partial deterioration or loss*** of information goods or services.

297) Information consumption is embedding, transformation, complete annihilation or partial deterioration.

3. Information consumption and use

298) ***Use of information goods and services*** (shortly information use) is understood here as occurrence of a physical access to them and "copying" for recording, modifying or for any other purpose.

299) While speaking about "information use", ***"copying"*** will mean the creation of electromagnetic or other non-durable signals taken from the original information good or durable / non-durable signal, while the original remains intact or disappears.

Contrary to information consumption, information use mostly ***leads to growth of information assets and knowlegde***. This will be later detailed by kinds of information products.

300) ***Use can physically be accomplished*** by elementary units; humans and machines.

301) Relation of ***human and machine information use*** should be an important long-range social indicator of an information society. Obviously, in technically advanced societies the function of information use is more and more provided by machines.

302) Information capital goods -- which are used continuously or repeatedly for a significant time in information production processes and carry a significant amount of information -- as well as non-capital information goods and non-durable signals supplied by information services ***can be used***.

303) Use -- "copying", as understood here -- sometimes may not require conscious effort from the holder of the good in such information transactions. In such cases the "copy" of information good itself -- and the volume of information it carries -- coming from using of information good, could be treated as ***natural growth of knowledge.***

> "Seeing printed matter" is -- at sensory level -- automatic or spontaneous. Lightwaves arrive spontaneously to human eyes from the pages of the printed matter.

304) Both human reading and electronic access mostly still requires an active conscious contribution from the side of reader or accessor in order to get, hold and process "copies" and integrate it into his/her "mind". Generally speaking, while using an information good, the user may rather be seen as an actor who ***actually renders a self service*** for himself and this own-produced service will at once be consumed to output produced human knowledge.

305) While machine use of information goods or non-durable signals -- as at phone services or radio broadcasting -- does not require the use of other kinds of information assets, human use; reading, listening to radio programs, or oral communications assumes the simultaneous use of his/her produced or non-produced knowledge. Thus at any time, ***during human reading, listening, etc., the use of two kinds of objects of use ought to be accounted***, particularly that of human knowledge and of the good or non-durable signal.

306) While information that is the result of a machine use should be classified as produced output, the classification of the result of human information use is questionable: There are always two things to be used simultaneously, a book, newspaper, etc., and human knowledge. Use of human knowledge may be considered either as a natural or a production process, or both. Provided use of human knowledge is a natural process, the contribution to this knowledge that results from use, it ***ought to be classified as its natural growth***.

307) However, "human information use" is mostly deeply embedded in production processes and sometimes itself is subject to receiving a counterpart in exchange. Under such circumstances, human information use of produced goods and signals in information transactions***will be classified as leading to a production process***, within which the individual produces a contribution to his/her produced knowledge.

308) These distinctions are important when accounting "use of information by employers and employees". The national figures for the***volumes of information consumption, information output, information added, information capital formation and their sectoral distribution are heavily influenced*** by the way these processes are accounted. The details of accounting will be described in the later chapters of the present manual.

309) ***Volume of information used by an economic unit*** i during a period of time, is the volume of information carried by all copies of information goods and services used, also considering the number of uses. Volume of information used in the country is the sum of all information used by the resident economic units. Human use mostly takes the form of "reading", "sensing" or "perceiving". Use of information goods and services will be shortly referred to as "information use".

310) In the twin tables, value of information use will be estimated by costs.

a. Use of individual kinds of information goods and services

(i) ROM, RAM, information on hard disks

311) The ***volume of use of a recorded ROM*** can be in principle determined according to the general definition given above as the volume of information on it multiplied by the number of accesses or the number of copies made. Though this is a sound, operationalizable definition at the level of individual chips, it does not provide an operationalizable procedure for statistics at national level. Estimation of the national figures should be based upon representative statistics on operation of devices equipped with ROM-s.

312) Statistics provided by operating systems and network monitors should be used for etimating the volume of information used from ***files on hard disks***. Receiving information from external (eventually remote) sources by ftp, gopher or any other procedure should be recorded as use of external sources on hard disks.

(ii) Distribution and retailing

313) Distribution and retailing of information goods does not implement or imply their use.

314) The use of information products outputted by distribution and retail trade institutions will be considered within appropriate broad media categories -- classes of HS.

(iii) Transport and storage

315) ***Transport and storage of information goods*** do not constitute information use.

315) The ***information goods and services that escort to transport and storage*** will be included into the appropriate broad media categories.

(iv) Telecommunication, broadcasting

316) ***Telephone service*** will be considered as use in the listener's sector. Oral communications of both partners during the calls will be classified as use and consumption at the local phone companies in the process of producing phone services. The volume of use of phone service is asusmed to be equal with consumption.

317) Volume of ***use of cable TV services*** should be proportional with average "switched in time of the sets", number of sets connected and average per hour, per channel channel capacity. (The latter is not equal with channel capacity of a cable.) It should be recorded in the listeners' sector.

318) Volume of use of data communication services on ***packet switching networks*** should be proportional with the number of bits received.

319) ***Volume of use of broadcasting*** should be proportional with the average number of "switched on receiver hours" when the signals of broadcasting have actually been used off-air, that is a new set of signals were generated by them, the "per receiver hour" equivalent and number of sets. It should be recorded at the listeners' sector.

320) Components of use of broadcasting, namely ***use of domestic (sectorally) and foreign broadcasting*** represents an issue of a considerable political interest.

321) ***Volume of use of cable TV services*** should be proportional with aggregated number of receiver-hours when sets were switched in on a cable TV channel and the "receiver-hour" equivalent .

322) ***Value of use of telecommunications services*** should be elaborated on a costs basis.

323) ***UNESCO*** should encourage national studies for surveying the use of these services.

(v) Financial institutions

324) ***Volume of use of products of financial institutions*** will be accounted in the appropriate main classes of media. Volume of use of electronic banking services can be estimated as well as that of paper-based goods outputted by financial institutions. Use of money (coins and banknotes) in principle can be determined as an "of that" item with the data that are available for money circulation, but probably should remain beyond the "use boundary" of the system.

(vi) Publishing houses

325) Volume of use of products of publishing houses will be considered among other products in the appropriate broad classes of media.

(vii) Paper-based products

326) ***Use of these products*** will be determined as their
- reading or browsing for textual information,
- viewing for other kinds of information
- xerocopying, photocopying.

327) In case of books, journals and newspapers the volume of information should be proportional with the time spent with browsing and reading and average ***"per hour"*** equivalents, i.e, ***reading velocity, browsing velocity***. Reading and browsing velocities can be measured in character/hour (perception level approach) and m^2/hour terms (sensory level approach). Then both can be transformed to bit units.

328) ***UNESCO*** should encourage the efforts to standardize time-use studies and in accordance with this, national surveying of time spent for reading various paper based media.

329) ***Volume of use of individual paper-based media*** should be measured based upon the data available on time spent with reading books, journals and newspapers and appropriate "per hour" reading equivalents. The time spent for viewing can be taken into correction in various ways, when the areal percentage of non-textual information is available.

330) Value of use will be estimated from costs.

(viii) Digital magnetic media

331) ***Volume of use of a piece of a digital magnetic media*** has been in principle defined as its volume of information recorded on it multiplied with the number of accesses when new electromagnetic signals were generated.

> Although the volume of information used could actually be read out whenever a given ***magnetic diskette*** or ***tape*** is accessed, this information is usually not recorded. That means, volume of information use can not be determined in this way, instead, a representative statistics should be applied.

332) Value of use should be estimated from average costs.

(ix) Analog magnetic media

333) Use of pieces of analogous magnetic media is interpreted as their ***playing***. Both playing for copying and playing for listening will be considered.

334) Volume of use should be proportional with the average per individual time they were listened, number of individuals surveyed, average number of listeners present while playing and a "per hour equivalent".

335) ***Per hour equivalents*** should be determined by an authoritative body of experts.

336) Value of use will be estimated from costs.

(x) Films

337) ***Use of films*** is physically interpreted as their

- viewing or projecting for photographic films,
- copying in technical sense for every kind of films
- playing for moving pictures.

338) Volume of use of films should be proportional with the area of surface of the film used and an average ***"per m^2" equivalent***.

339) Per m^2 equivalents should be determined by an authoritative body of experts.

340) Value of use will be estimated from actual and estimated average costs.

(xi) Education

341) Use of education (by students) will be understood as ***"listening to the class".*** This may not be equal with the time spent in classes.

342) It should be assumed that output of education will ***completely be used.*** Operationalizability of other approaches seems to be questionable.

343) Volume of information used should be proportional with numebr of students, average per student number of hours spent with listening to the class and a ***"per listening-hour" equivalent*** that should be determined by an appropriate body of experts.

344) Per listening hours equivalent should be defined on the basis of channel capacity of ***teleconferencing systems***.

(xii) Research and development

345) ***Use of research and development*** will be understood as use of pieces of the particular media on or in which scientific output is recorded. That means, volume of use "research and development" could in principle be determined by taking the outputs of research and development services, as;

- oral communications,
- scientific manuscripts (research reports, manuscripts of books, conference papers, articles),
- other paper based documents of R&D (lab records etc.),
- phone and other electronic communications,
- magnetic recordings,
- other information goods and services carrying scientific information

and then having added the volumes of information used of these.

346) The measures used in ***scientometrics and citation studies*** for "output", "input" and "flow" of "new scientific information" are not commensurable with volume of information as defined in SNIA.

347) Given the difficulties concerning the definition of the nature of "scientific oral communication", "scientific manuscript" etc., the estimation of use of outputs of scientific institutions seems conceptually more sound, but practically equally ***uncertain***.

(xiii) Spectator sports institutions, movies, theatres, musei and other institutions of culture and entertainment

348) Use of these services will be understood as ***"watching or listening to the performance".*** This may not be equal with the time of attendance. Attendence will be considered as a good estimate of listening.

349) The volume of information used should be proportional with number of hours spent for watching or listening to the performance and a ***"per hour" equivalent*** that should be determined by a body of experts.

(xiv) TV show and supplying radio program

350) Use of these services will be understood as ***"watching or listening to the program".*** This may not be equal with the time of presence. Both primary and secondary watching and listening may have been considered. Neglection of background listening seems to be more realistic.

351) Volume of information used should be proportional with the number of hours spent with watching or listening to the program and a ***"per watching hour"*** and a ***"per listening hour"*** equivalent that should be determined by a body of experts.

(xv) Personal communications

352) ***Use of personal communications*** should be accounted whenever one listens to another individual's personal communications. This is independent of the fact that he was directly addressed or not.

353) Personal communications during classroom education and home training should be included there. Radio or phone transmitted personal communications should be recorded there applying the "per unit" equivalents of radio and phone services.

354) ***Transactions of personal communications*** are not recorded on the spot, their measurement should take place on samples with monitoring time-use.

355) ***Volume of personal communications used*** should be proportional with the number of individuals-listeners, the number of hours spent with listening to personal communications and a "per listener hour" equivalent that should be determined and standardized by a body of experts.

(xvi) Human knowledge

356) The application of the general definition of the concept of use faces some difficulty when applying to ***human knowledge***. It's obvious that human knowledge can be accessed and used in some way by the individual, but the details of this process are not clearly understood. It is also not known what parts of the brain are accessed. The use of the individual's knowledge by himself is thus best assumed to be permanent, not to be subject to a discrete number of accesses and extended to the whole brain. This implies that human information use could be measured in bit*time units rather than in bits alone.

357) This problem can be resolved considering ***operating frequency of the brain*** which is at about 1/100 millisec. This is ten--hundred times slower than the operation of individual neurons. As far as number of neurons and particularly storage capacity of brain aren't known exactly, the ***estimates of orders of magnitude*** can be applied. These are of highly hypothetic character and should be treated with precaution as orientating figures for limited purposes.

358) ***Produced and non-produced knowledge*** is used simultaneously. Their distinguishing seems no feasible.

359) In the foregoing chapter we shall deal with the problem of "information consumption by employees". The very same approach may be applied for ***information use by employees,*** so as to provide homogeneity of the system.

360) The use of information goods that are qualified as capital goods and that of human knowledge will be called ***information capital use***.

(xvii) Keyboarding

361) The monitoring of employees and other users in electronic networks and the use of this bit-flow level information stand in the focus of political debates. This is not only a privacy/surveillance issue concerning the power aspect of information, but may tend to be also a major economic issue. On the bottomline, employees monitored supply much more information and potentially more economic value for employers than those not monitored. While those are clearly employees who supply this information or at lest contribute to it, current law on intellectual property is less suitable to protect and honor these contributions.

362) ***Consumption of information goods by employees*** is less problematic. Obviously the consumption of information goods being in the property of a legal unit and done by an employee should be treated as consumption by the legal unit considered.

363) As far as the concept of "consumption" doesn't exactly coincide with that in SNA, its subclasses, intermediate consumption or productive and final consumption also will differ.

H. Intermediate Information Consumption

1. Introduction

364) In the ***general production model of SNA***, institutional units while producing goods and services, also consume other goods and services for this purpose. Value added by the production process is then obtained by deducing intermediate consumption from output. Similar approach will be accepted in SNIA.

2. The timing and valuation of intermediate consumption in SNA and SNIA

365) In [SNA92] the intermediate consumption of industries consists of non-durable goods and services which are transformed or used up in production within the accounting period. In principle non-durable goods are goods which have an expected lifetime of use less than one year.

366) Two types of intermediate inputs can be distinguished. The first is that of materials and semi-processed goods. These re-emerge in the process of ***transformation*** to happen in the categories of ISIC A to F. The second type of intermediary inputs consists of finished goods which may be used for not only intermediate consumption: books, kinds of office materials, business services etc. These kinds of goods or services are generally entirely consumed. Transformed or consumed these goods must be ***entirely absorbed*** by the process of production during the period of accounting.

367) The intermediate consumption is recorded when the good or service enters the production process. The relevant purchaser's price is that prevailing at the time the intermediate input enters the production process.

368) Various technology-oriented subcategories of transformation and absorbtion were ***operationalized and specified for information goods*** in the previous chapters of SNIA and these will be applied here. Intermediate information consumption should be recorded when the goods and services are physically consumed.

3. The difference between intermediate and final information consumption in SNA and SNIA

369) The distinction between intermediate and final consumption is ***ideology-based***.

370) ***SNA's ideology*** rests upon the idea that society can and should be divided to the sphere of production and the sphere of final consumption. These spheres are closely related to the main sectors of the society.

371) Governments should have the ***vision of a transitional dual society*** and a new information society with newly drawn boundaries between organized and non-organized spheres of society, households and corporations, governments and corporations.

372) Recording of intermediate and final consumption is a necessary element of computation of value added and intermediate and final information consumption is a necessary element of computation of information added, to avoid multiple accounting of items. That means the ***need for a distinction*** between intermediate consumption, capital formation, capital consumption, and final consumption and their analogs remains relevant but should be filled with a new content.

373) ***In an information society***, whereover people are involved in information production mostly and this is done as home activity as well as office work, in a world of global business, when business and private life does not separate any longer in a rigid way, this rigid, sector-based distinction between intermediate and final consumption becomes artificial and misleading.

374) ***Output of most government activities may not be viewed as final (and final infomation) consumption***. Ministries, agencies, departments and courts output information goods and services. The consumption of these goods and services is vital for economy and should be better qualified as intermediate consumption.

375) In these circumstances ***households'consumption*** cannot be considered any longer automatically as final consumption.

376) ***Societies can and will say the last word in the question of classification***. For example in the Eastern European countries, where people frequently refuse having more than one child, it is frequently heard that the state should cover the expenses of bringing the children up. In an alienated society like this, people view at these self-services so as if they were external services for othersthan family members or for themselves, and by doing so, "bringing up children" became truely an external service indeed supplied for the state/nation, which will even not be (and really isn't) supplied if not covered (by the state).

377) SNIA should apply a ***"preconceptionless", technical, "real world" definition*** for final and intermediate information consumption which may serve as a basis for SNA either.

378) When an information good is annoyed in a process of information production so that this is associated with its
- embedding into an information good,
- transformation into another information good,
its consumption will be called ***productive consumption s.s*** . , independently who the consumer is and the new information good or service will be marketed or not.

379) Information consumption (of certain information goods or services) will be called ***intermediate information consumption***, when it
- is productive information consumption, or
- follows their one-time use -- i.e., their one-time, non-repeated copying in a process to produce another information good or service.

380) Intermediate information consumption as defined above will be applied in ***computing information added.***

381) Intermediate information consumption and information capital consumption (See later!) are ***productive consumption s.l.*** which is opposed to improductive consumption s.l., independently who the consumer is and the new information good or service will be marketed or not.

382) While final consumption in SNA should partly be associated with ***objectives of society,*** this is not the case for SNIA. Growth of non-productive information cosnumption is irrelevant to the objectives of society and is rather a ***non-desirable phenomenon*** related to waste. In the SNIA, objectives of the society can better be associated with

- economic effectivity and efficiency of transactions with information,
- per capita use of information by individuals, and
- per capita growth of produced human knowledge.

383) An important case of productive information consumption is when the ***information good or service is consumed in order to produce human knowledge and lasting human knowledge that then will be converted to own-account information capital formation.***

Productive information consumption bound to production of human knowledge and lasting human knowledge is not easily contourable.

> Consumption of education and training certainly belong to this category. Consumption of entertainment services cannot mechanically be qualified as non-productive, it can be accounted in an analog way with "repairs" as intermediate information consumption. Fundamental human situational and behavioral patterns are many times acquired during free-time programs and a part of them should be classified as procedural knowledge. The approach recommended in SNIA is described in the chapter on output of human knowledge.

384) When information flows are considered, ***bringing up children*** is a significant information-producing activity of the parents whose consumption must not be considered as final information consumption.

> A similar view was expected for economic flows when computing GDP of the U.S. primary information economy. These computations gave a $ 150 billion amount for the U.S. in 1980 as a contribution of families with home education to GDP.

385) In accordance with the general definition above, ***consumption by governments*** is mostly not improductive information consumption in SNIA; governments are producers of information. Contribution of governments in form of legislation, authoritative activities etc. is an essential contribution indeed to society as well as economy. Failure of countries with ill construed government and state proves that a rigid separation of government from economy is harmful and doesn't reflect the processes present in the society.

Sectoral distribution of productive and non-productive consumption s.l. is an important descriptor of a society.

386) Sometimes a copy of an information good or service is consumed without using it.

> When radio signals arrive at the antenna of a set which is switched off, the signals produce heat but aren't used. Also the parts of a copy of a newspaper with text that remains unread are not used. These examplify ***useless information consumption***. These signals will not be embedded or transformed to another information good or service, are consumed improductively.

387) The issue of ***consumption of office-information by employees*** has been discussed in the foregoing paragraphs.

388) "Certain goods and services used up during the course of production do not enter directly into the process of production itself but are consumed by employees who are themselves working on that process." When the goods and services are consumed (that is, in SNA used) by the employees at their own discretion and in their own time, their provision must be treated as ***remuneration in kind*** in [SNA92]. When employees are obliged to use the goods or services, this should be considered as intermediate consumption.

389) Goods and benefits acquired to the employees classified as payments i.e. final consumption in SNA, but ***the working tools employees are contractually obliged to purchase*** is intermediary consumption.

In SNA, no adjustements are to be made for the fact that many expenditures by individuals such as an expenditure on the journey to work contain an element akin to business expenses. On the other hand, travel entertainment and similar expenses which are incurred by employees in connexion with the business of their employer and for which they are reimbursed should be classified as outlays on intermediate consumption.

390) Employees are obliged to consume and use the ***workplace information employer provides them for its purposes***. This information should be partly viewed as that has been consumed to produce knowledge and should be accounted accordingly.

391) Employees, however, are not forced to use this knowledge for long term memorization (human capital formation) and to reuse this in their own time at their own discretion. In accordance with this, information consumed and used at workplace by employees has been partly considered as compensation of kind of employees.

4. The boundary between intermediate consumption and gross fixed capital formation

392) ***In the SNA, making working tools and small items of equipment*** is shown as intermediate consumption though some of these outlays should be recorded as capital formation.

393) ***A part of repair and maintain activities***, the outlays which lengthen the expected lifetime of a fixed asset or increase productivity or profitability is to be accounted as capital formation. The maintenance and repair of a capital good which is already in use in production must be treated as intermediate consumption. Outlays on the repair and maintenance to keep fixed assets in proper working condition is intermediate consumption.

Major renovations, reconstructions or enlargements of information assets which both enhance their productive capacity and prolong their working time. should be handled as gross fixed capital formation.

394) When industries or non-profit bodies supply services or goods to individuals directly which are paid for entirely or in part by the government service considerations should be taken for the degree to which government service organizes and controls the provision of the item and the extent to which the individual can choose the unit. If the individual is not free, then the government is the purchaser of the service. If the individual is free, the government's contribution is an economic transfer.

395) When a government service provides goods and services directly to persons, ***the items acquired from industries or private non-profit services*** which are consumed in this activities should always be included in the intermediate consumption.

396) The goods purchased by government agencies for purposes of ***stocks of strategic material*** are excluded from intermediate consumption.

397) Durable ***goods acquired primarily for military purposes*** belong to intermediate consumption except durable goods purchased primarily for civil defense which is classified as capital formation.

398) The rules above -- mutatis mutandi -- should be valid for SNIA.

399) In SNA a sharp ***distinction is done between commodities (imported, produced or secondhand) and other goods and services*** in intermediate consumption due to valuation problems. In SNIA similar distinction is not needed for valuation purposes but is made.

400) ***The used information goods*** are also recorded as intermediate information consumption whenever they meet the criteria of definition.

401) The criteria of ***distinction between intermediate consumption of produced human knowledge and human capital formation*** has been discussed in the chapter on output of human knowledge.

5. Intermediate consumption of individual information goods and services

402) The Production Account accounts information production by groups of kinds of individual information goods and services, chosen for practical reasons of operationalizability. While accounting intermediate information consumption

consumed in the process of production of a certain kind of information goos or services, ***all kinds of goods and services should be considered*** that have been actually consumed in the process of production of the given kind of good and service. That means, those are not only the copies consumed of the same kind of good were considered as productive consumption, but all kinds of information goods and services that are accounted in the system.

> For example, intermediate information consumption accounted on the account of "books" should cover all kinds of information goods and services consumed as intermediate consumption while producing the output of books recorded in the same account.

403) The estimation of the volume of information consumed as ***"intermediate information consumption" along the production of a certain kind of information goods and services*** is often not feasible. Particularly, few data are available for the consumption of oral communications and other services of employees.

404) At the same time, ***intermediate and productive consumption can also be reported by kinds of products.*** In such a table, productive or intermediate consumption of each individual kind of information goods and services appears separately. National and sectoral aggregates of intermediate consumption and information added can easier be deduced from these tables. Then gross information added can be distributed among various goods and services. This way is suggested and the statements below mostly refer to productive consumption <u>of or from</u> individual kinds of information goods and services and not productive consumption <u>at production of</u> individual kinds of information goods and services.

<u>a. Recorded ROM, RAM and records on hard disks</u>

405) The estimation of productive information consumption of non-embedded ***recorded ROM***-s should be made using data for the output of unrecorded ROM-s.

406) The present version of SNIA envisages the recording of information consumption in ***embedded stores of computers*** and other information machines. The definition of main categories should be mutatis mutandi applied as described in the paragraph on intermediate consumption of digital magnetic media.

<u>b. Distribution and retailing</u>

407) ***Distribution and retailing of information and non-information goods and services*** are non-information activities, so intermediate information consumption will not be recorded here. Numerous types of information goods and services

accompanying to distribution and retailing will be treated within the broad media categories that carry this information (HS classes and extension).

c. Transport and storage of information goods

408) ***Losses and damages of information goods*** are frequently associated to transport and storage of information goods. As far, as transport and storage are not treated as information activities, these losses and damages will be considered as improductive information consumption s.l. .

d. Telecommunication and broadcasting

409) ***Telephone services*** will be treated as intermediate information consumption at producing oral communications or producing human knowledge. The latter approach is more plausible but introduces more uncertainty into the system. In the accounts, the sector of caller and callee should be considered as participating equally from output and consumption. Other approaches may also seem reasonable and numerous data are available for making a more subtle subdivision.

410) ***Cable TV services*** will be recorded as intermediate consumption, whenever have been used for producing services, i.e. the output related to the channel viewed or listened. Sometimes the same program is available off-air and on cable at the same time for a group of consumers. As far as viewers rarely plug out cable, intermediate information consumtion should be assumed in such cases.

411) Consumption of ***on-line services,*** as well as that of ***e-mails*** should be recorded as intermediate consumption.

412) ***Broadcasting services*** are recommended to be acccounted as intermediate information consumption at producing TV show and supplying radio programs and improductive consumption, waste. By this, only that part of output will be considered later as intermediate consumption that is actually used for producing services, i.e. the output related to the channel viewed or listened.

e. Financial intermediation

413) Various types of ***information goods and services outputted by financial intermediaries*** will be treated within those broad media categories that carry this information.

f. Publishing houses

414) Various types of ***information goods and services outputted by publishing houses*** will be treated within broad media categories.

g. Paper-based media

415) ***Most paper based information products*** such as photoes, labels, postage stamps, printed envelopes, printed forms and questionnaires, the bulk of paper-based information goods as books, newspapers journals, playing cards, posters and others are not subject to productive consumption s.s..

416) At the same times these goods are usually used once or several times before consumed, thus their consumption should be qulaified as intermediate or final information consumption.

417) Intermediate information consumption of ***informatioon goods that are used partly***, would be assumed to be equal with their use.

For instance, figures of time-use statistics and average velocity of reading allow to conclude that a significant part of newspapers remains unread. Interı

h. Digital megnetic media

418) Recorded digital media can be classified into two main groups. Those ***produced by professional producers*** -- industrial corporations in software and database industry -- as packaged or canned products called hereafter as "professional products" and those ***produced by end-users***.

419) ***Professional products***, usually copyrighted, will usually be not overwritten during a longer period of repeated use. They may be overwritten then and used as "media produced by end-users" or may be sorted out. Both represent information capital consumption.

420) Owners of ***databases*** are obliged to undertake periodically ***updating*** which are not intended to bring about a change in its performance. During updating out-of-date records or files are deleted. with appending new records or files. This should be classified as intermediate information consumption.

421) Multiple use of digital recorded magnetic ***media produced by end-users*** is characteristic. Once the information recorded did not represent value for the owner, it would be ***overwritten***. Formally, ***reformatting*** of a recorded diskette would represent production of a new product of another HS code, namely of an "unrecorded diskette". ***Deleting files*** from a diskette -- when it is not necessary

any longer -- constitutes non-productive consumption. ***Moving the file to another diskette*** in principle constitutes productive consumption.

422) Given the number of computers and technology, the ***monitoring of all individual transactions of end-users*** is well beyond the scope and capabilities of any present-day national accounting system. Statistical surveys of data obtained from various operating and server systems may provide data for following these processes. Representativeness is a serious problem here.

423) As a consequence of their long lifetime and rapid development of technology, digital magnetic media of end-users are sorted out, -- that is annoyed physically -- together with technology. This provides opportunities for ***model computations*** to be used both for the estimation of volumes of information consumed and of volumes of information carried by stocks.

i. Analog magnetic media

424) ***Playing of analogous magnetic media*** will be considered as their use; a self-service. Then the audio or video signals produced as a result of this self-service will be assumed to get to intermediate consumption. After all, consumption of analog magnetic media is productive consumption, but mostly information capital consumption.

j. Films

425) ***Showing or projection of rolls of films*** should be considered as their use while producing pictures both moving or still which service then will be considered as intermediate consumption at cinemas. Consumption of (copies of) ***positive cinematographic films*** -- mostly having been shown several times for a long period -- should be qualified as information capital consumption. ***Negative photographic films*** typically are consumed after a one-time use, those should be qualified as intermediate information consumption. ***Medical X-ray films*** may be used once or more, the typical use of ***industrial films*** is one-time. ***Diapositives*** will be assumed to be projected several times in a long period.

k. Education

426) Volume of information consumption of education will be estimated as equalling with its information output. ***(Information) consumption of (that is, from) education services*** should be qualified as intermediate consumption at producing human knowledge that will be converted to own-account human information capital formation in the household sector.

l. Research and development

427) In SNIA outputs of ***research and development*** are treated together with other goods in services in broad media categories. Consumption of individual kinds of outputs of research and development may be studied as "of this" items.

428) The information outputs of research and development typically are not embedded or transformed. Thus, their intermediate information consumption depends on their use or non-use.

429) The ***estimation of volume of use of documentation*** of basic research, recorded on various media, should be based upon citation statistics. The documentation on researches, publications on which have been citated for a long time repeatedly, should be classified as fixed information assets and its consumption should be treated as information capital consumption. Percentage of all works completed in the reporting period and used repeatedly will be determined and used for the pruposes of the system.

> This is a rough estimation. Original research documentation is used less frequently than scientific publications and scientific publications are citated less than used (read). Various kinds of correction must be made for differences of time between completing and publishing, the delay of publishing of citation and other factors. Repeated use can be established years after teh R&D work has been completed.

430) The procedure above does not provide hints for estimating the volume of use of documents of ***applied research and development***.

431) ***Scientific oral presentations*** should be classified as consumed as intermediate information consumption.

m. Spectator sports institutions, movies, theatres, museums and other institutions of culture and entertainment

432) ***Information consumption*** of these services is assumed to be numerically equal with their information output and information use.

433) This consumption may be ***qualified*** as intermediate information consumption -- consumption at the production of human knowledge -- contributing to human information capital formation or not or waste. Various decisions can be made according to the kinds of programs. The major part of this information will probably be forgotten soon during or after the event and must not be classified as intermediate information consumption or information capital formation.

n. "TV show" and "supplying radio programs"

434) The definition of these services has been given in the chapter on information output. Information consumption of "TV show" may represent intermediate information consumption at producing human knowledge or waste. That human knowledge partly can get to ***human information capital formation***. Other approaches may also seem reasonable and numerous data are available for a subdivision of broadcasting time according to categories of programs. One of the approaches would allow human capital formation if and only if the information consumed would be lasting and / or recallable.

o. Personal communications

435) Personal communications of the ***employees made for corporations and governments*** represent intermediary consumption recorded at the corporations and government sector both in "uses" tables of the Production Account. Personal communications ***made for private individuals*** may constitute waste or intermediate information consumption at producing human knowledge in the individuals subsector.

p. Intellectual property

436) The approach applied by SNA has been described in the paragraph on "Originals and copies". In SNIA all those copies that are functioning as capital goods will be considered as information capital and then their consumption will be qualified as capital consumption. The ***details are described elsewhere*** at the paragraphs devoted to the information capital consumption of various media.

437) ***Intellectual property rights*** are not treated as information capital, thus capital consumption will not be recorded for them.

q. Human knowledge

438) Human knowledge is treated in SNIA as a partly produced and partly non-produced asset.

439) Accordingly, decrease of human knowledge consists of at least ***three parts***. Growth and decrease of "integral minds" should be treated as a change in the non-produced assets, discussed there, and consumption of produced "knowledge embodied within integrated minds" should be treated as information capital consumption or intermediate information consumption depending on the allocation of knowledge (long or short term memory). The contents of the short term memories get to intermediate information consumption.

440) The definition and treatment of consumption of human information capital to be accepted by the standardizing body ***should reflect the views of nations*** on role of entertainment, learning, and human knowledge in the society.

I. Consumption of Fixed Information Capital

1. Introduction

441) ***Consumption of fixed capital (assets) in SNA*** is the decline of current value of the stock of fixed assets held by producers resulting from physical deterioration, normal obsolescence or normal accidental damage. It excludes fixed assets destroyed by acts of war and natural disasters.

442) The value of consumption of fixed capital as defined in SNA may ***deviate*** from depreciation recorded in business accounts or taxation documents, especially when there is an inflation. Historic costs may be misleading.

443) The ***concepts*** of information assets, fixed information assets and produced human knowledge are defined in the chapter on the Information Capital Account.

444) ***Consumption of fixed information assets*** is the consumption of capital information goods at the information producers. For fixed information assets mostly are not used (exploited) at their producers, the term "consumption of capital information goods" will also be used. This approach provides an opportunity to study the ***exploitation of capital information goods***.

445) ***Capital information goods*** are information goods

- of those each carries a significant amount of information,
- that are durable, persisting for a longer period of time and
- can be used repeatedly or continuously in more cycles of information production (longer than one year).

446) The ***examples*** of this kind of goods are books, (one-time read paperbacks less and ecyclopedia more, dictionaries, bibliographies, monographies), databases, records, computer software and banknotes. Newspapers, retail bills, tickets and magnetic diskettes with temporary files are ***non capital information goods***.

447) The ***volume of capital information goods consumed*** should be determined according to the general principles of valuation, at the technical level of the moment when the valuation is done about the changes that took place in the reported period.

448) The examples when ***capital consumption*** (information consumption of fixed assets as defined by SNA) is ***not associated with information capital consumption*** (consumption of fixed information assets) at an institutional unit may be the consumption of fixed capital in manufacturing industries, agriculture or other non-information industries or related to machines, building or financial assets (eventually money, an information-good).

449) The examples ***when information capital consumption*** (information consumption of fixed information assets) ***is not associated with capital consumption*** (consumption of fixed assets) are weeding out books and consumption of produced lasting human knowledge.

450) Capital consumption of human knowledge -- separated from other kinds of information capital consumption -- may or may not be included in the accounts.

2. Consumption of fixed information capital and rentals on fixed information assets

451) ***SNA*** should treat various payments as interest costs, reduction in the value of assets, and losses of interests associated with rentals on fixed assets.

452) In the ***SNA,"The calculation of consumption of fixed capital"*** is a forward looking measure that is determined by future, and not past events. The future rentals on which its value depends themselves depend upon the benefits which institutional units expect to derive in the future from using the asset in production over the remainder of its service life. The value of a fixed asset at a given moment of time depends only on the remaining benefits to be derived from its use, and consumption of fixed capital must be based on values calculated this way.

453) While in principle, it would be feasible, SNIA does not valuate information capital with***volume of uses to be made in the future***. Intellectual property could also be valuated in this way.

454) In the***SNIA, however, the calculation of consumption of fixed information capital*** should mean factual consumption, mainly annihilation (and least probably embedding and transformation) taken place in the reporting period of time directly or indirectly connected to information production.

455) ***In SNIA,*** renting information assets from ***libraries, discotheks and videotheks*** (that is, borrowing books, videos or records) should be treated as purchasing a service. This is a non-information service, beacuse it does not influence the net

volume of information owned by the sides taking part in the transaction. Then the borrowed asset will be used by the patron, and as a result of its self-service, information he / she will be output information.

456) The very same transaction could have been recorded also as capital transfer at both sides, liabilities (at the borrower) and as assets (at the owner). In various leasing constructions, this approach might be applied by the time when the ownerships is trasferred. From that time the asset will be treated as capital transfer and capital information good (probably information capital) at the new owner. By these processes, no consumption of fixed information capital will be accounted.

457) Due to those said in the previous paragraphs, no interdependence between consumption of fixed information capital and rents exists in SNIA.

3. The calculation of consumption of fixed information capital

458) The calculation of consumption of fixed information assets***will not consider*** the decrease of future uses of the asset.

459) While fixed capital mostly ***loses its economic value gradually,*** volume of information of fixed information assets may remain the same for a considerable period of time. A permitted withdrawal (and succeeding annihilation) of an information asset leads to its immediate and complete disappearance from among the assets. Gradual loss of volume of information carried by an information asset may be a consequence of its non-intended partial damage or deterioration.

460) The consumption of fixed information capital due to ***withdrawal*** should be calculated from direct, bookkeeping or survey data whenever it is possible (reports of libraries, archives and others). Data for average lifetime, longevity and durability of capital goods or data for stocks and accumulations can be used for the estimation.

461) ***Gradual loss*** is an important factor in information capital consumption. Experimental data for the rate of average gradual loss of information should be used to estimate the volume of consumption of fixed information capital due to natural ***aging*** .

4. The coverage of consumption of fixed information capital

462) The consumption of fixed information capital ***should be estimated*** for capital information goods in production. The ***consumption of capital information goods***

altogether provides a measure for characterizing the change in composition of these goods.

463) While an attention should be given in SNA to the ***decrease of demand and moral destruction*** of capital goods being obsolete, the valuation of information goods in SNIA is not influenced by these factors.

464) ***Predictable losses*** due to normal accidental damage are also included under consumption of fixed capital so that they could be considered in the Production Account.

465) The purpose of Production Account is to determine the amount of value added that has been created as a result of production. Capital consumption is substracted from value added gross when value added, net is computed in SNA, because
- it is asumed that economic value will be "transferred" into the new product from the capital good during the production, or
- it is thought to be a natural side-effect of production that capital goods are being depleted and that this should be accounted at computing "new value".

466) Consumption of capital information goods is ***not a so much organic part of information production*** as consumption is of capital goods in production.

> While consumption of capital information goods due to withdrawal and annihilation may be a natural consequence of their use in production processes, it happens in a later point of time and can not be tied to production itself.

467) This would require that only productively consumed capital information goods -- that is, those, that are consumed directly in a process of transformation or embedding -- and gradual loss of information carried by capital should be recorded as "capital consumption" in the Production Account. This approach also would it make straightforward that the recording should be made in the time when those happen.

468) The latter approach, however, may allow that a kind of ***"smeared" recording over a time*** be implemented, whenever withdrawal is a consequence of continuous use of information capital, or takes place after a period of continuous or repeated use, even if consumption is not "transformation" or "embedding" and no gradual loss of information was recorded.

5. Consumption of individual kinds of fixed information capital and human knowledge

469) As far as services can not be stored, only information goods and human knowledge can play the role of information capital. Thus consumption of fixed information capital and produced lasting human knowledge at producers represent ***information capital consumption***.

a. Paper-based goods

470) Posters, newspapers, journals, brochures and several other kinds of paper-based information goods are not capital information goods since they are mostly used once. Books, library materials (e.g. bound issues of journals and newspapers), business and government documentation will be considered as capital information goods, because they are used several times during a long interval of time.

471) ***Capital consumption of paper-based information goods*** will be interpreted as physical annihilation of paper-based information capital goods at producers. Paper-based information goods -- though losing readability -- still will be treated as maintaining their volume of information during their lifetime.

> This deviates from the ***consumption of paper-based capital information goods*** which grasps annihilation of these goods altogether.

472) Capital consumption of paper-based documents should be ***estimated*** and inputted using data for various types of goods belonging to this class.

473) ***UNESCO*** should encourage national studies to reveal habits of population with paper-based information goods and magnitudes of their stocks.

b. Digital magnetic media

474) ***Professional canned software and data products and own-produced public and in-house databases*** should certainly be qualified as information capital goods.

475) ***User-recorded personal digital media*** in principle either may satisfy the criteria of capital information goods or may be subject to intermediate consumption. As these goods are typically used as intermediate products, and no surveys are available, all these goods will be considered as intermediate consumption. This simplification will not influence the figures for information added, net.

476) ***Capital consumption of recorded digital magnetic media*** will be defined as complete or partial physical annihilation or transformation of these goods at producers. "Producers" in this context will be defined as the users of these goods.

Producers, dealers and distributors of these digital magnetic media are excluded from among "producers".

477) ***A typical example of partial annihilation and transformation is*** updating databases. Capital consumption of recorded digital magnetic media is less than the ***consumption of recorded digital magnetic media*** altogether.

478) A ***natural loss*** of bits can be observed with aging and intensive use of digital magnetic media. The average rate of future deterioration can be concluded from data taken from heavy-duty lab experiments. Natural loss of information on digital media qualified as capital information goods should be recorded here.

c. Analog magnetic media

479) ***Professionally prerecorded magnetic media*** should be assumed as capital information goods. Consumption of users' records will be treated as intermediate consumption or final information consumption.

480) ***Capital consumption of recorded analog magnetic media*** will be defined as complete or partial physical annihilation or transformation of these goods at producers. "Producers" in this context will be defined as professional and household players.

> Capital consumption of recorded analog magnetic media is less than the consumption of recorded analog magnetic media.

481) A ***typical example*** of partial annihilation and transformation of recorded analog magnetic media is selective rerecording of magnetic tapes.

482) ***Gradual loss of information*** also should be treated by the system. Audiotapes become noisy as a consequence of aging; storage and use. This can be recorded at an average yearly rate.

d. Films

483) Of all kinds of films, ***cinematographic films*** should be recorded as capital information goods being used several times in cinemas. Some other kinds of films like medical X-ray films and diapositives also may satisfy the criteria of capital goods, but their survey is not solved, thus their consumption should be considered as intermediate or final information consumption. Exposed and undeveloped films and negative films are obviously consumed as intermediate information consumption.

484) ***Information capital consumption of cinematographic films*** will be defined as their complete or partial annihilation at producers. Producers will be defined as players.

> "Consumption of films as capital goods" is a broader concept than "capital consumption of films".

485) ***Examples*** of capital consumption are their withdrawal (sorting out), cutting and montageing.

486) Films, particularly color films ***gradually lose color, resolution and contrasts***. The system should treat this loss, but given the non-digital character of films, and the definition of volume of information this faces difficulties.

e. Human information capital

487) Many may consider the inclusion of human information capital as of questionable value. Leaving it out of consideration introduces a major bias into the system which records the volume of output of produced human knowledge. Thus, consumption of human information capital ***should be included*** in the computations in a separated form.

488) Due to definition of information assets, only depletion of volume of long-term memories will be recorded here. Consumption of (produced) human information capital due to ***deaths*** may be assessed in arbitrary conditional units and must not be added to the consumption of fixed information capital, but should be considered in a separate item.

489) Gradual loss may be defined here to be proportional with average natural rates of ***forgetting*** . Though several data are available on this, a considerable research effort is needed still to define a suitable methodology of estimation to be applied here.

490) In adults, the ***repeated use of a piece of knowledge*** leads to consolidation of imprinting (decreasing of response time and growth of processing speed) and extension of linkages of chunks of information at the expense of forgetting other pieces of knowledge. Thus repeated use of a piece of human knowledge - to some extent - may lead to natural growth and deterioration of other pieces, consumption of human knowledge. In children, the repeated use of a piece of knowledge influences consumption to a less extent.

f. Hard disks records, ROM-s

491) Deleting of database and software files recorded on hard disks used repeatedly or continuously for a long time (for instance, as ftp sources) are the examples of information capital consumption.

J. The Valuation of Inputs and Outputs

492) SNA turns much attention to the prices and times of valuation. Those are "per hour", "per roll", etc. equivalents that are analog to prices but these are defined independently from their source and the situation of valuation. Time of evaluation has been concerned in the former paragraphs.

493) Each of the ways of economic valuation -- producers' price, basic price, purchasers' price -- can be used in ***twin tables***, depending on the purpose of the analysis.

K. Gross and Net Information Added

494) The volume of information conveyed by all copies of all information goods and services (durable and non-durable signals) and human knowledge of all individuals produced within a period of time will be called ***gross volume of information produced***. Accounting production on this level is biased by multiple recording of the items consumed in the production process.

> ***For instance, a usual mail*** may consist of a letter (possibly with a preprinted heading and footing), enclosures (possibly xerocopies, printed matter, photoes etc.), an envelope (possibly printed) with the address, and postage-stamps. Volume of information carried by the mail may be computed as volume of all these as a whole. Volume of information of the printed matter and photoes, however, will be recorded twice, once at the printer, once at the writer of the mail.

495) In SNA, production is a process in which land, labour and capital goods are employed to produce outputs of goods and services by transforming, or consuming inputs of goods and services. In accordance with this, to avoid multiplication, the resources consumed in the process of production are subtracted from the output.

496) Information goods and services as well as other goods and services are also produced by consuming (Attention; not "using"!) resources, particularly information resources. When the volume of information conveyed by the information goods/services consumed, will be subtracted, then volume of ***information added can be obtained. as a balancing item***. ***Information added sometimes***

can also be directly measured. To avoid multiplication, this is the indicator SNIA offers.

> The one who outputs the mail - while writing the letter and address - adds information to volume of information contained in the heading, footing, preprinting on the envelope, enclosures and post stamps. His contribution is just the letter and the scripts on the envelope.

497) Vice versa, gross volume of information produced can in principle be measured by adding individual IA volumes of the letter, enclosures, stamps etc.

498) A long production/use/consumption/production ***technological chain*** is known at broadcasting where each element of the chain is a user/consumer of the product issued by the foregoing and the producer of the product used by its successor. The chain can be simplified as:

Author - typist - typographer - printer - actor, singer - producer of the record - producer of a TV program - broadcasting corporation - set-owner - viewer.

Sometimes the interfaces between succeeding units aren't clearly detectable.

499) ***Information added*** at an economic unit i, ***gross***, can be defined in accordance with [SNA92] as its information output, minus intermediate information consumption, consumed at the production of all output information goods and services.

> Owing to the lack of data, IA cannot be measured for each good and service separately, for input is frequently not recorded. While volume of newspapers, magazines and books is well known, the information consumed to produce this output can only be estimated at national level.

500) ***Information added, net*** can be obtained as the difference between information added, gross and fixed information capital consumption.

501) While SNA distinguishes GDP at basic prices, producers' prices, purchasers' prices, market prices, at factor costs such ***distinction is meaningless in SNIA***.

502) The accounting ***rules to be used for computing information added are determined by the approach to be adopted for making a distinction between elementary physical-level and complex actors.*** These rules have been discussed in the chapters on information use, output and consumption.

VII. THE PRIMARY DISTRIBUTION OF INFORMATION INCOME ACCOUNT

A. Introduction

1) ***Information income*** is the new information goods and services becoming newly available for the unit during the time intervall reported.

2) The ***primary information incomes*** are information incomes that accrue at the institutional units due to

- their direct participation in information production processes or
- their involvement as owners of information assets in quality of users or
- their capacity to receive information as components of economic transactions.

3) The primary distribution of information income ***accounts include*** the Generation of Information Income Account, the Allocation of Information Income Account, and the Enterpreneurial Information Income Account.

4) There are ***fundamental difference***s between the treatment of compensation of employees, taxes and subsidies on production and imports in SNA, and their analogs in SNIA; contribution and compensation of employees, obligatory and free information components of economic transactions.

5) The way of accounting in the SNA reflects the view that government has a special, non-productive role in economy. The more governments apply industrial technologies of information production, the more this view becomes questionable.

6) While there are great differences between SNA and SNIA in the treatment of primary economic income and primary information income (in value and volume terms), the ***separation of categories of obligatory and free information components*** seems meaningful, because it represents a major policy and modelling issue, and more flexible.

7) The ***purpose of recording*** "compensation of and contribution by employees" is also to provide estimations for the magnitude of flows of information from the household sector to the sector of employee and provide sound basis to estimate price of human knowledge and productivity assessments.

8) Given the fundamental differences, and various possible social systems for distribution and redistribution of information, ***various versions*** of information income accounts may be conceptualized.

1. The Generation of Information Income Account

9) In the SNA, this account is generated for resident units to show the primary incomes accruing to units participating directly in production and to government units. The account shows the sectors, subsectors or industries, in which the primary incomes originate. ***Primary income*** is conceptualized to be generated from value added subtracting "charges that producers have to meet out of value added".

10) In SNIA, ***primary information income*** -- at the level of all information products -- will be defined from information added subtracting generation of information income can be conceptualized in various ways depending on how employees have been conceptualized.

11) In natural unit terms, the ***"resources" side*** contains only one element, information added, taken from the Information Production Account.

12) On the ***"uses" side*** of this account, there are

- "information compensation of employees"; the information income employees receive in the production process, payable,
- "obligatory information components to economic transactions, payable", and
- "free information components to economic transactions, payable" will be recorded to show the primary information income government and other sectors earn.
- information outputs provided to another unit in a transaction with an economic counterpart (non-transfers), payable, and

13) ***Information compensation of employees, payable should be deduced*** -- as it is done in SNA.

14) The purpose of measurement of "obligatory information component to economic transactions" is the recording of an element of primary information income. SNIA should recognize the fact that it is not only government, but other sectors also may receive obligatory information components. It is becoming a major and probably growing source of information income in the corporation sector, and a concern of privacy and legislation. Nevertheless, the Account shows

the primary information government and other sectors receive in form of "obligatory information components to economic transactions".

15) Obligatory information component to economic transactions will be distinguished in non-information and information transactions.

16) The items concerned should be ***recorded under the "uses" side*** in those sectors that supply such obligatory or free information.

17) ***Obligatory and free information components to economic transactions, receivable*** will be recorded in the Allocation of Primary Income Acount. Receiving obligatory information is not bound to the government sector.

18) In full agreement with the SNA, the ***balancing item*** of information added (+), compensation by employees (-), obligatory information component to economic transactions, payable (-), and free information component to economic transactions, payable (-), information transactions with economic counterpart, payable (-), will be called ***operating information surplus*** or -- in the household sector -- ***mixed information income*** .

19) In the twin table to this account, the ***operational definition of economic values*** related to compensation of employees, obligatory and free information may be given in various ways.

20) Economic values of ***compensation of employees*** will be estimated according to the rules of SNA to estimate compensation in kind.

22) Economic values of ***obligatory and free information components to economic transactions*** can be defined as costs/expenses related to providing this information. These values, should be treated in the twin tables analogously with "taxes and subsidies in kind" on products, should be introduced as a kind of primary economic income.

2. The Allocation of Primary Information Income Account

23) This account focuses on resident units or sectors in their capacity as ***recipients of primary information income*** rather than as producers of income .

24) On the ***"resources" side*** of this account the pimary incomes of the kind already recorded in the Generation of Information Income Account

- operating surplus or mixed information income,
- compensation of employees, receivable,

- obligatory and free information components to economic transactions, receivable, and the
- information outputs provided to another unit in a transaction with an economic counterpart (non-transfers), receivable, and

- "information contribution" by employees receivable in employer's sector as a memorandum item.

should be introduced.

25) When central government supports local governments in providing such collective services as primary education, based upon the number of eligible individuals this may be qualified as a current ***secondary information income transfer.*** Beneficaires of the support and users of an information service may or may not be the same unit.

26) The issues related to ***information capital transfer and exploitation*** will be discussed in the chapter on Information Capital Account.

27) In accordance with the bookkeeping convention, volumes of information connected to "information transactions with economic counterparts", ***receivable*** will be recorded in the right, "resources" side and volumes of information ***supplied*** (c.f. payable) will be recorded in the "uses" side.

28) The balancing item of this account recorded under "uses" is ***balance of primary information incomes, receivable and "to be supplied"*** which is called at the level of the total society as ***national information income, gross or net***.

3. The Enterpreneurial Information Income Account

29) ***Enterpreneurial information income*** (B.4) is defined in SNA as the balancing item of mixed income or operating surplus, property income receivable (+), property income payable (-), .

30) This account is for showing the profit-like elements of production that may be useful for market producers. It will not be introduced into SNIA.

31) In any macro-level assessment, employees and labor are important categories. Hence, Allocation of Information Income Account showed the information income employees generate, that is contribution by employees receivable. The balancing item the difference between operating information surplus and contribution by employees receivable is an indicator that characterizes ***"information added collectively"*** by each of the sectors.

4. The Allocation of Other Primary Income Account

32) ***The purpose of this account*** in SNA is to provide a feedback to the main stream of accounts. In the SNIA this account will not be introduced.

33) Under ***"resources"*** it includes enterpreneurial income, compensation of employees, receivable by households, taxes less subsidiaries to be payable and property incomes receivable. Property income to be payable is under ***"uses"*** .

34) The ***balancing item*** is identical with that of the Allocation of Primary Income Account; balance of primary incomes.

B. The Contribution and Compensation of Employees

1. Introduction

35) There is a fundamental difference between SNA an SNIA in the treatment of "compensation of employees". In the SNA, the very same term is used for the income generated and used. It is assumed that "compensation of employees" completely covers that part of value added, which has been ***generated*** by employees. At this, "labor" is a generator of income, which is not represented in Production Account.

a. The contribution by employees

36) In SNIA, the term "compensation of employees" denotes the volumes of information received from employer, used and ***consumed*** by employees. This will be shown in the Allocation of Primary Information Income Account. The information income ***generated*** by employees will be called as "contribution by employees". This will be shown in the Generation of Information Income Account. Compensation of and contribution by employees may be different.

37) While in the SNA ***independent sources of data*** are available for estimating the value added by employees, particularly wages and other economic compensation of employees, in SNIA the very same sources are available for the determination of information added by employees as for the Production Account: working hours and statistics on the distribution of worktime.

38) In the SNIA, employees' information output and information added has once already itemized and completely been considered in the broad categories of information goods and services in the Information Production Account.

39) The problems related to definition and accounting of information ***output by employees*** and employers have been discussed in the chapter on output.

40) ***Contribution by employees*** will include

- human knowledge produced by
  use of employer's information by employees (accounted in employer's sector)
  use of employee's information for the purposes of employer (estimated but not
- output by employees (in kinds of employees' services as of personal communications, keyboarding and writing, accounted in employer's sector)
- (personal) data obtained by monitoring the transactions of employee and recorded by employer (accounted in employer's sector).

41) Employee consumes and uses various kinds of information arriving to the employer including

-use of other employees' information
- use of clients information,
- use of employer's information goods.

42) The ***volume of information used by employees*** will be assumed to be proportional with their number and the "average per capita employee use of information". The latter should be proportional with "average number of hours spent with information activity i" and "per hour volume of information use during information activity i".

43) The ***economic value of free use of employer's information*** should be proportional with the time spent with information activities as related to worktime and with compensation of employees. The value of elements of information contribution of employees will be estimated by constituents of wages and salaries.

44) Difficulty of enumeration of all kinds of outputs of employees is a major problem here. While employees contribute to a great number of other kinds of services and goods, telephone calls, oral communications, typing, keyboarding and writing will be considered as ***proper employee's outputs***, while the output of others will be considered here as output of the complex unit.

45) National rules of civil law, the provisions of trade and industrial secret, intellectual property rights and labor law regulate the ***rights and obligations of employees in various ways***. These rights and obligations determine the forms of their information output and income they enjoy. Civil servants are subject to further limitations concerning their civil rights. Collective agreements between employers and trade unions also may contain regulating provisions.

46) The information flows between employees and employers, particularly in electronic networks, will soon be a major issue which fundamentally determines roles, ***incention or inhibition of employees*** and ***character of the society.***

> Longtime permanent monitoring of employee's transactions during computer sessions allows the employer to receive from employee not only special services required and made by using his/her knowledge, but to build a a copy of his/her produced knowledge as well. In the lack of protection, this may lead to a devaluation of his/her information assets.

47) The information produced by ***computerized monitoring the transactions of employee should be considered in the accounts as his/her contribution***. In accordance with this, an appropriate copyright regulation should be introduced to cover this kind of information flows.

48) As a rule, ***economic values can not be assigned automatically to "information contributions by employees"***, because wages and salaries -- as for now -- can not be viewed as direct counterparts to these information flows, covering all work activities of employees. In a number of industries however, salaries of white collar employees may be considered as an economic counterpart for their "information contribution".

b. The components of compensation of employees

49) ***The term "compensation of employees"*** needs some clarification. In the previous chapter, employees and private individuals were suggested to be seen as two different capacities of individuals. This implies that a distinction should have been made between flows from employer to employee and to the private individual he is. Employee is controlled by employer and should not be compensated. It is private individual who has to be compensated, that is information compensation of the private individual that should be monitored. In other words, information that can be used only for employer's purposes can not be seen as compensation. Only information receivable by employee and transferable and usable freely for the purposes of private individual he is, can be viewed as compensation. That means the term "compensation of individuals" would be more correct, but traditional term will be preserved.

50) Employed and self-employed persons and outworkers -- as these categories have been defined by SNA -- enjoy ***several forms of information income*** from their employers. White collar job offers frequently contain generous ***free education and training*** options. This is straightforward when lifelong learning for employees is

inavoidable. When these free information services are included into the conditions of the employment, it should be considered as a form of compensation. This can be considered as an extension of the human knowledge of the private individual who the employee is. The economic value of free information services receivable will be estimated as other compensations of kind.

51) It is also unavoidable that the employee receives the ***information that is object, input or output of his/her activity during his/her job***.

Several lawsuits among them such like the Lopez-General Motors affair indicate, that particularly CEOs, heads of departments, principal investigators of major research efforts, etc., in form of use of employer's information, get to an information income that it is an essential element of the employment relationship and is of great importance.

52) Information income emanates from ***use of information goods and services*** of the corporation by employee to acquire knowledge. Then this knowledge will be used by him/her for human capital formation (extension of his/her produced skills), or intermediate consumption (or "repair"), or waste.

53) ***Skills employee acquires*** -- and transmits to private individual he/she is -- should be estimated as knowledge acquired in long-term memory.

54) The issues of ***information output and use by employees*** have also been concerned in the chapter on institutional units. The chapter on input/output contains a part devoted to the issues of accounting stocks and transactions of employees.

55) Altogether, the components of compensation of employees will include

- free information services supplied by employer (e.g., training),
- skills he/she acquired during his/her employment at the present employer.

c. Employers' social contributions

56) Employers supply a number of information services that can be viewed as their social contributions.

Big corporations in some countries maintain ***libraries and other institutions of culture and entertainment***. Free entrance or free usage in these institutions is frequent for employees and their members of family. Institutional units provide opportunity for the children of their employees for a ***limited free computer usage*** or computer

courses. Providing ***legal assistance*** to the employees in their private affairs is a usual form of the free services. It is typical to provide a ***limited access to computers and other information resources of the employer for the private purposes of employee.*** Writing letters, private phone calls from the workplace, copying the copywrighted software of the employer for use in home computers are the examples of similar transactions. The very same transactions sometimes should be classified as illegal or even crime.

57) ***Services of libraries of trade unions*** both those of central and local organizations should be considered in the NPI-s serving households sector.

C. Obligatory Information Constituents of Economic Transactions

1. Introduction

58) Government sector with its ability to levy taxes on products and import and enjoy tax income is a special actor in SNA. A major objective of The Generation of Income Account of SNA is actually to show and reveal a part of this special taxation process. The payment and receipt of these ***taxes themselves are not counterparts bound to a special service***.

2. Definitions and classifications

59) In the primary distribution of information income accounts, ***obligatory information constituents of economic transactions*** will be shown. In all these situations supplying information is supplied obligatorily as an essential element and inseparable part of an economic transaction. While the underlying economic transactions can technically be partitioned into an information flow and the rest of the transaction, for the purposes of estimation and measurement, information flow constitutes the organic part of the underlying non-information or information economic transaction, it must not be treated as a self-contained flow.

60) ***Examples*** for this are:

- Information ***for soliciting business services:***
  - all goods and services: orders, specifications
  - postal and telecomm services:
    - mail address
    - phone, e-mail dialling
  - financial services:
    - checking account (consumer transactions)
    - savings accounts (consumer transactions)

ATM transactions of consumers
credit card transactions of consumers
application for a loan
application for a credit card
medical services
data supply by patient
- Copies of ***contracts and agreements***
- Information on ***delivery of goods and services:***
retail bills and receipts
invoices
- Information provided ***to consumers on goods and services:***
notice of usage
contents, ingredients and nutrition information on food
- ***Payment*** information
- Information at ***applying for a job***
- Information provided ***for courts***
by ensuer in civil lawsuits
by subpoenad witness
- Information provided ***for authorities***
for a driver's license
for recording birth
for getting permission to
conduct a profession
produce drugs
distribute films
sell alcoholic beverages.

61) ***Creation*** of "obligatory information constituents to economic transactions" should possibly be recorded as output which is to be accounted at the producers at various broad titles of information services and goods in the Information Production Account according to the general guidelines of SNA.

62) Obligatory information supply should be interpreted as ***information income*** at the receiver.

3. The recording of obligatory supply of information

63) Though obligatory information supply is a crucial social issue, little is known on it. Considering the variegatedness of the items under this title, several statistical surveys will be needed. ***Surveying*** obligatory information supply is a prerequisite of understanding information stocks and flows of an information society.

64) The ***measurement*** of obligatory information components to economic transactions altogether is troublesome. It should be estimated by aggregating all items that can be estimated or measured, including those in the previous paragraph. This is clearly a brutal underestimation and a detailed analysis is needed just to state and contour the problem area.

65) The operationalization and recording of "obligatory information components to economic transactions" in computer networks is desirable.

D. Free Information Components to Economic Transactions

66) ***Subsidies,*** closely connected to production or export which are important means of government economic policies, are important factors of distribution of primary incomes. Subsidies are supplied for a producer by governments, a third side different from producer and consumer. It is free information closely connected to production that is analog to subsidies.

67) ***Free information components to economic transactions*** should include all kinds of information that is supplied voluntarily to and received free by a unit, as a real, integrate component to an economic transaction. It can be viewed as an "information subsidy in kind", mostly by a participant of the transaction.

68) ***Examples of free information components to economic transactions*** can be

- personal communications by employees of public authorities to their clients,
- service and product information other than advertisement in the business sphere: traffic information supplied by the transportation corporation, salespersons' shopping information to private individuals
- business requests and offers,
- communications by medical personnel to patient during his/her curement.

69) Pilot studies and surveys are needed to explore and identify the main classes of free information components to economic transactions.

70) Operationalization and recording of "free information components to economic transactions" in computer networks is particularly desirable.

E. Operating Surplus or Mixed Information Income

71) In accordance with SNA, ***operating surplus or mixed information income will be defined as*** information added minus contribution of employees to be supplied

minus obligatory supply of information plus free information closely related to information production, received.

F. Property Information Incomes

1. Introduction: property income in the SNA

72) ***Property economic incomes*** are received by the ***owners*** of financial assets and tangible ***non-produced*** assets, mainly land and sub-soil assets. They become receivable when the owners of such assets ***put them at the disposal of other*** -- producer -- institutional units, that is, ***when*** they are rented or lent. It is received from the users of the non-produced property in form of interest, dividends after financial assets or rents. Property incomes, both payable and receivable are bound to a special state, when the rights to use a property are being transferred to another unit. Rental of non-produced assets is a two-sided transaction, an exchange. No property income is bound to the process when the assets are actually used, but property incomes payable should be proportional to capital consumption assuming a equivalent substituting own asset.

73) Property income is proportional with the magnitude of property itself. ***Forms of property economic income*** in SNA are interests that are receivable after:

- deposits,
- securities other than shares (bills, bonds, debentures),
- loans,
- other accounts receivable.

74) Human knowledge, particularly non-produced human knowledge is not considered as an accounted economic asset in SNA. Still the ***waging systems*** that are based upon actual performance (premium, bonus), education/training, experience and skills of white-collar employees, probable can be viewed as efforts to provide payments for their information output, and the right to use of produced and non-produced knowledge of the individual they are. Accordingly, part of such "wages" should be recorded as property incomes of individuals.

75) Property economic income would also be recorded after ***rentals of non-produced information assets*** other than human knowledge -- whenever they are economic assets. The class of such objects, however, recently is very limited.

76) ***With putting*** non-produced assets ***to disposal,*** also other kinds of economic flows other than flows of income, particularly the ***flows of assets*** themselves, may be considered. While their ownership will not change, still their productive

capacity obviously represents an economic value which should be recorded in bokkeeping.

77) The ***rentals of produced assets*** should be treated in SNA as supplying / purchasing services. This is again, mostly also associated with the economic flows of assets as they physically exist. Operating leasing is mostly ***providing produced assets***. The lessors engage in gross fixed capital formation in order to acquire the assets and incur consumption of fixed capital in respect of the assets they lease.

78) On the other hand, the ***use of property*** may imply the production of ***economic values at the user***. This economic value that appears at the user of property, is recorded within its output and is not qualified as property income.

2. Definition of property information income

79) In the chapter on the Information Production Account, the ***use of own information products*** has been qualified as a one-sided information transaction, a self-service, during which non durable signals, "copies" of the originals are produced, while the original maintains its consistency. Examples, as reading and electronic accessing, were mentioned. This concept is suitable to describe transactions when information capital goods are involved, particularly transactions like "copying".

80) The lawful ***use of alien information goods or services*** in the frames of rent is also an information self-service and an economic counterpart for the right to use them may be proportional with the actual or envisaged time of use (rental fees), the volume of actual or envisaged use ("royalties") or the actual volume or value of the good or service used (access fees).

81) In this subchapter the ***ways how property information incomes are connected to use of information assets*** and to putting them to the disposal of another unit in SNIA will be concerned. This is an important topics, beacuse it determines the economic treatment of fixed information assets and human knowledge. The issues to be decided here include:

- how to define the objects, after which property information income should be recorded -- including or excluding human knowledge, including or excluding produced information assets,
- assume or deny a relation between property information incomes and volume of information of information assets used -- a depreciation of volume of information equalling with the volume of use might be assumed to comply with economic flows,

- how to account fixed information assets, human knowledge and property information income at the user and the owner after the former were rented.

82) A possible SNA analog ***definition of property information income*** (Definition #1) determines it as information income receivable by the ***renters*** of non-produced information assets including those of non-produced human knowledge. That means, for instance, employers would enjoy property information income whose volume might be numerically equal with either the output of employees or of use of their non-produced proprietary knowledge.

> Property income, however, the rental fees, are proportional with the duration of rent and not with volume of the actual use or with the volume of output produced using the asset rented. This suggests that property information after employees' non-produced proprietary knowledge may not be defined by their output.

83) Property information income can also be defined as what emenates ***at the user*** of an own or alien non-produced information asset and its volume might be numerically equal with the volume of use ***(Definition #2)***.

84) ***Personal communication and other human information output*** by employees could simply be treated as information income coming from "renting the employees' non-produced knowledge". This would be receivable by the renter and payable by the employee.

85) This definition might also imply that copies of a proprietary work might be viewed as property information income -- a plausible assumption. However, most proprietary intellectual works surely are outputs of organized production processes rather than non-produced information assets.

86) The information stocks and flows during the interconnected processes of renting and use of non-produced information assets or human knowledge ***can be recorded in various ways***. Each treatment assumes a whole series of succeeding transactions. This shows the ***complicatedness of the subtle mechanisms*** regulating the mechanism of human communication and information transfer in various societies between various units and sectors.

87) The fact that human knowledge is partly produced, partly non-produced, implies that personal outputs of individuals should be considered both as property information income and information service, and property incomes and rentals are to be receivable for them.

88) The rental transactions of produced information assets will be considered as non-information services either is the object an information good or produced human knowledge.

89) Due to the fact that so far

- none of the definitions seems to be in accordance either with SNA or the definitions accepted in the main chapters of SNIA, and
- the treatment of capital information goods can be solved without introducing the concept of property information income, and
- rental of information goods is not an information service,

property information income will not be introduced in the System

4. Distributed income of corporations

90) This item is not relevant to SNIA.

G. Output Provided to Another Unit in a Transaction with an Economic Counterpart

91) As it has been mentioned in the chapter on the Production Account, the major part of information output and information added may get in the process of producer's sales or similar information and economic transactions to a user/consumer unit which is different from the producer. This information flow should be recorded here, because it changes the net volume of primary information the units hold or own.

92) These flows will be referred shortly as to "information transactions with economic counterparts". Both market and non-market output will be considered here, except commercial flows, transportation, free and obligatory information.

VIII. THE SECONDARY DISTRIBUTION OF INFORMATION INCOME ACCOUNTS

A. Introduction

1) ***Secondary distribution of economic income*** includes all current transfers, cash or in kind.

2) ***A current transfer*** is an economic transaction in which an institutional unit provides an economic value that is not asset to another unit without receiving an economic value as a counterpart. While the verbatim interpretation of this definition includes taxes and subsidies on production and import, these are traditionally excluded from current transfers.

3) An ***information transfer*** is an information transaction in which an institutional unit provides an information good or service or asset to another unit without receiving from the latter a good, a service or an asset as a counterpart.

4) A ***current information transfer*** is an information transaction in which an institutional unit provides an information good or service (excluding fixed information assets or human knowledge) without receiving an economic value as a counterpart.

5) In accordance with SNA, the ***secondary distribution of information income accounts show*** how the balance of primary information incomes of an institutional unit or a sector are transformed into (adjusted) disposable information income as a consequence of current information transfers.

6) Due to the lack of meaning of information income "in cash" in SNIA, the Redistribution of Income in Kind Account will contain all the related items and SNIA has no separate Secondary Distribution of Information Income Account.

1. The Redistribution of Information Income in Kind account

7) ***The balancing item*** of the Redistribution of Information Income in Kind Account is (adjusted) disposable information income.

8) Obligatory and free information receivable or "to be supplied" will be recorded as ***"resources"*** and ***"uses"*** .

B. Information Transfers

9) ***Supplying obligatory or receiving free information*** is mostly information transfer. "Obligatory and free information components to economic transactions" have been taken out of transfers, because they are not self-contained transactions and henceforth not transfers, and classified as belonging primary distribution of income.

10) Transfers are mostly introduced to help ***social purposes of the society,*** but a significant part of information transfer is originated in the market sector and serves ***economic purposes of individual units***.

11) Typical examples of information transfer are:

- free services in households and families,
- free services supplied by public institutions,
- unsolicited gifts.

1. Introduction.

12) The ***definition of purposes and various kinds of current social information transfers*** in a country and at international levels is a prime importance policy issue. It determines the character of the state and society and its long-range development.

13) Social purposes of the society -- represented by governments -- on the field of information may concern:
- diminishing the differences between ***information haves and have-nots*** or keeping these differences under a limit,
- provide ***equal access*** to information to members of various ***ethnic groups*** inside the country,
- provide equal access to information to rural and urban communities, various ***regions of the country***,
- provide equal access to members of one or more ***ethnic community spread over a number of different countries***,

or other purposes.

14) The achievement of these social purposes may be codified as fundamental social and other functions of government and state.

15) These social purposes can be achieved by direct monetary transfers to consumers (have-nots, domestic or foreign minority ethnic groups, backwarded rural communities) and subsequent market transactions between producers and consumers in the frames of ***market-conform systems*** or by monetary transfers to producers and subsequent information transfer from producer to consumer in the frames of ***natural distribution systems***.

16) Public education, public broadcasting, public information services, free information flow between government agencies and conversation between private individuals will be treated as current transfers.

2. The distinction between current and capital information transfers

17) A transfer in kind is ***information capital transfer*** when it consists of the transfer of ownership of an information asset, other than inventories.

18) ***Current information transfers*** consist of all transfers that are not transfers of information capital.

3. The recording of transfers

19) The recording of transfers in principle should be accomplished at each institutional unit taking part of the transfer among "resources" and "uses". Transfers to and from the households are mostly recorded only at the "non-household" actors.

C. Obligatory Information

20) ***Obligatory information supply*** has been defined as what is obligatory by law or provision of authorities, or what is a condition of requesting, receiving, using or consuming something from another institutional unit and the supplier of data will have no counterparts in exchange.

21) Obligatory information to be supplied to government units by other kinds of units and not classified as closely related to production -- majority of obligatory information -- will be included here. This information is also free for the recipient, however, should not be recorded under "Free information".

22) The concept of obligatory information supply ***shall cover*** the questionnaires, forms or other documents to be supplied, but shall not cover the information produced by the recipient of the obligatory information with using these documents provided and the data items on them.

For instance, questionnaires of the official statistical surveys will be

> considered as obligatory information supply, but the data files and publications of the statistical offfices that have been made by recording and processing of these data, will not be qualified as obligatory information supply by those who fill in the forms. Generally speaking, it is not information, or data that are obligatory, but their supply.

23) Certain ***government agencies*** -- as Congress -- are also forced by law to conduct records. These records also should be classified as obligatory information. The acquisitions of depository libraries, should also be classified as obligatory information, whenever the library materials will be received from publishers, under law, free. Annual reports submitted under the Paperwork Reduction Act are examples of obligatory information.

24) The obligatory information to be supplied should also be ***classified according to the data subject concerned*** into three groups, obligatory information on objects, subjects, and actions.

25) The data supply relates to a subject -- ***supplying personal data*** -- if the person of the data-subject can be identified. Obligatory supply of information on individuals represents a considerable social interest and legislation.

26) The volume of obligatory information should be ***proportional*** with the number of data suppliers and the per capita volume of information to be supplied for each kind of data supplies.

> In the U.S., reports under the Federal Paperwork Reduction Act provide data for the burden in hours concerning ***obligatory statistical and taxation government information***. The volume of obligatory information supplied to ***courts and law enforcement authorities*** should be estimated from the figures of justice statistics and "per case equivalents". The ways of estimating and surveying of obligatory supply to ***non-government units*** should still be elaborated.

27) Central government can not fulfill its regulation function without ***maintaining a large-scale extended automatized statistical monitoring system of contents of bit flows in telecommunications networks***. The supply of this information should be classified here. The statistical monitoring of transactions, ***using the network information without violating privacy***, provides a plentiful of information for preparing and following up government decisions concerning regulation of information flows, identification of issues of public interest, lifestyle, and more. Statistical intelligence from these networks provides a sound basis for planning provisions to redistribute information for economic, and social purposes.

28) The output of ***market-based statistical monitoring systems of contents of telecommunications networks*** should be classified as market information output.

D. Free Information

29) ***Important examples*** of information goods and services that are frequently disseminated free both in developed and undeveloped countries include:
- foreign broadcasting,
- domestic (non-pay) public broadcasting,
- domestic (non-pay) commercial broadcasting,
- advertisements, commercial promotion material,
- government documentation distributed due to legal provisions,
- public education,
- public local information: announcements of local authorities, crime, road and transportation, weather, taxation, employment,
- enlightment of charity organizations: mothercare, medical care,
- election documents: posters, brochures,
- campaigns of non-profit organizations
- free services of churches.

1. Schooling systems

30) Some "distilled" situations will be discussed here that illustrate the opportunities to organize schooling systems and represent them in SNIA. Our concern will not extend to the investments made in the schooling system, only to its exploitation.

a. Free schooling as an information transfer from government to households

31) Free schooling can be recorded as if government would buy a non-market education service and then transferred it to the students. This should be recorded as a non-market economic and information output by the sector of the school involved and then an economic and information transfer (with social or economic purpose) to the household sector.

32) Free public education might be recorded as a free contribution to the production of human knowledge. However, free education is also thought to be a major social contribution not closely connected to production, and as such can be recorded in the Secondary Distribution of Information Account. Subsidies on products -- that are analog with free information closely connected to production -- aim economic targets. It is highly questionable whether the aim of

the free public schooling system is mainly social or mainly economic. Philosophy of SNA probably suggests the former and phylosophy of SNIA the latter.

33) This approach may be straightforward in those countries, whereover government has a decisive role in school affairs, ***completely controlling the schools***.

b. Free schooling as an information output by the government sector to households

34) A government that may have viewed as buying an "educating capacity" and then exploiting this capacity would be the producer of education services. This should be recorded as a capital transfer (non-information transaction) from the government sector to that of the school, and a non-market economic and information output by the government sector.

35) This approach may reflect the situation in those countries, where government determines the curricula, and other aspects of output only, but leaves ***internal autonomy for schools***.

c. Free schooling as information output by schools to households

36) The system can also be conceptualized as consisting of two transactions. The first of them is a two sided economic and information transaction between school and students. The second is a one-sided transaction, a current economic transfer from the government sector to the sector of the school.

37) This treatment may be advantageous in the "per capita support" systems when schools are autonom, free in definition of educational services and enjoy a ***"per student" support*** from governments.

38) The classification of public education services should consider that priamry public education is ***obligatory for the consumers*** of such services.

For the ***United States*** the application of the third approach seems to be reasonable.

39) The ***volume of free information supplied by public schools*** should be determined from their output which has been defined in the chapter about the Production Account.

2. Broadcasting

40) Similarly to schooling systems, ***free broadcasting by public broadcasters*** can be treated in various ways; as information output by government or schools to

households or information transfer from government to households depending on "Who owns the media?", and how ***"owning of media"*** will be understood.

41) ***Free broadcasting by commercial broadcasters*** should be treated in a radically simplified situation as consisting of transactions of two main types. In the first type of economic and information transactions, "broadcast time" is bought by advertisers and promotion information (commercials) is transferred. This is an economic output by the broadcaster. It is the latter transfer why this transaction should after all be considered as an information transaction. In the transactions of the second kind, the broadcaster outputs non-market information to households. This is information transfer, which though is not the result of law or government mediation, will be grouped here.

42) The ***volume of free information supplied by broadcasters*** should be determined from their output which has been defined in the chapter on the Production Account.

43) As at schooling systems, ***free broadcasting by public corporations*** should be treated according to the character of the relationship between government and broadcaster.

3. Advertisement

44) Several kinds of media are utilized to distribute advertisement information to interested consumers. ***Free advertisement information altogether*** should be estimated by adding the volumes carried by various media.

45) The ***advertisement attachements to periodicals*** and ***advertisement pages*** should be considered here.

46) The distribution of ***self-contained free printed promotion and advertisement materials*** (brochures, leaflets, posters) is accomplished in several business-constructions.

> In the simplest case the interested advertiser itself produces the materials and distributes it as a free (non-market) information output by messengers, or in mail. At the same time, these costs of advertisement and promotion will not be classified as economic output. In a somewhat more complex situation the interested advertiser hires an agent which hires a printing office. Information output -- the materials -- may be rerouted. Then the situation can be conceptualized as consisting several succeeding market transactions.

47) ***The volume of information*** self-contained and attached printed materials carry should be estimated in the way it has been described in the chapter on the Production Account at the paper-based documents using the statistical data available for advertisement.

48) The volume of ***advertisement in free broadcasting*** , ***advertisement in TV show*** and in ***supplying radio programs*** should be estimated from the broadcast time of commercials and average per minute equivalents of broadcasting used in the Production Account.

49) Advertisement in form of paintings, labels, tables etc. are beyond the production boundary of the system.

4. Free government information

50) Free government information ***includes*** among others

- oral communications by government employeees in various affairs and situations,
- documents supplied in the frames of freedom of information, and government in the sunshine,
- pamphlets, propaganda materials, press releases, disseminated free,
- free on-line access electronic government information (e.g., patent searches),
- free information supplied by government libraries and information centers
- free government broadcasting (particularly to abroad),
- inter-agency telecommunication.

The receivers of free government information are other government agencies, depository libraries, archives, press agencies, broadcasting corporations, individuals or business corporations.

51) The government information whose receipt is bound to payment of duties or fee stamps will not be considered as free information.

52) ***Volume of free government information*** should be estimated according to the methods described in the chapter on Production Account for various kinds of media and the statistical reports of government agencies.

5. Free household information

53) This ***includes*** free home education and training, most private oral comunications, private mails, phone calls, TV shows and supplying radio programs provided by individuals or hosueholds. The volumes of information

should be determined as it has been described in the chapter on the Production Account. Both intra-household and inter-household flows may be considered.

IX. THE USE OF INFORMATION INCOME ACCOUNTS

A. Introduction

1) The ***purpose*** of the use of information income accounts is to show how the institutional units and main sectors allocate their adjusted disposable information income by final information consumption and saving.

2) The Use of Disposable Income Account is for recording disposable income (from the Secondary Distribution of Income Account) and final consumption expenditure.

3) As far as SNIA has no Disposable Information Income Account, for the reasons described there, this group of accounts has only one account called the Use of Adjusted Disposable Information Income Account.

1. The "Use of Adjusted Disposable Information Account"

4) The account should be prepared for institutional units and sectors rather than for individual information goods or services.

5) Adjusted disposable information income is brought forward from the Redistribution of Income in Kind Account and is put on the right side as ***"resources"***.

6) In the ***twin table*** to the use of information income accounts, the information added by goods and services consumed as final information consumption should be determined.

7) ***Saving*** is the balancing item in the Use of Income Account. This is that part of disposable income that has not been consumed as final consumption.

8) ***Information saving*** is the balancing item in the use of information income accounts. Its value is adjusted disposable information income less actual final information consumption. As far as information goods are lent to a much less extent then economic (financial) assets and that transaction is recorded as a service, information saving is actually mostly classified as acquisition of information assets and human knowledge.

9) Accordingly in the ***twin table,*** the economic value of information goods saved (as assets or lent) and acquisition of human knowledge will be shown.

B. Expenditures, Acquisitions and Uses

10) ***Expenditures in SNA*** are defined as "the values of the amounts that buyers pay, or agree to pay, to sellers in exchange for goods or services that sellers provide to them or to other institutional units designated by the buyers.

11) ***Final information consumption expenditure*** in SNIA may be taken as an analog with those volumes of information that have been received for non-productive consumption by the institutional unit or sector as a counterpart of expenditures.

12) In accordance with those said in previous chapters, SNA declares that "goods and services are acquired by institutional units when they become the new owners of the goods or when the delivery of services to them is completed." The volume of information that those information goods and services carry that have been acquired in the reporting period to be consumed as final consumption, is different from that volume that has actually been consumed, particularly actual final consumption.

13) In accordance with those said in the previous chapters, use of information goods and services is different from their acquisition and consumption.

14) Final information consumption expenditure will not be considered in natural units of measurement in the SNIA.

C. Consumption Goods and Services

15) ***SNA*** defines ***(final) consumption goods and services*** as "used without further transformation in production as defined by the System by households, NPI-s serving households or government units for the direct satisfaction of individual needs or wants or the collective needs of the members of the society."

16) ***SNIA*** does not make a principial distinction between kinds of "consumption information goods and services" and other kinds of goods and services. It also does not tie the definition of consumption of goods and services to certain sectors. In principle, it considers non-productive (final) consumption in ***all sectors*** irrrespectively of the kind of good and service adhering only to the general definition of consumption and facts.

17) SNA makes a distinction between individual consumption goods and services on the one hand and colective consumption services on the other.

Collective services are provided simultaneously, and acquired and consumed automatically by all members of the community or group in a particular region, without any action on their part. Typical examples in SNA are "public administration" and the "provision of security". Collective services are kept equal with the "public goods" of the economic theory.

18) Several collective services prove to be non-collective after being partitioned into operationalizably measurable information goods and services and "the rest" in SNIA, as it has been mentioned in the introductory chapters.

19) The consumption of ***broadcasting services*** assumes that the consumer (purchased) has a set. Without having a set, the service - per definitionem - will not be rendered. Broadcasting can be viewed as a collective service for the set owners.

20) ***"Administration"*** will be accounted as a number of different services and goods, most of them is not collective.

D. Final Consumption Expenditure of Households

21) ***Final consumption expenditure of households*** is the purchase of new durable and non-durable goods and services reduced by net sales of second hand goods scrapes and wastes. Resident and non-resident households classified into outlays on commodities, other new goods and services and second hand. Two concepts are employed as final consumption on the domestic market and final consumption of resident households.

22) The direct purchases that ***resident households of a given country make in abroad*** are part of the non-commodity imports of the country and of oputlays of the households on other goods and services. Tourists, diplomatic and military personnel, seasonal workers, refugees, guest workers, A business traveller's information import for which company / agency provided.

23) Final information consumption expenditures will not be recorded separately in natural units of measurement in SNIA.

E. Actual Final Information Consumption of Households

24) This item ***should contain*** the goods and services households had got as a counterpart for their final consumption expenditure and through social transfers or produced and actually consumed as final information consumption.

25) In the SNA, actual final consumption of households is an indicator, whose value indicates a positive process. The society, however, is not interested in the growth of the volume of actual final information consumption of households. It may be interested in the growth of its information assets, of human knowledge or other indicators, depending of dominating values, ideology or philosophy.

26) ***Collective information services for the households are not necessarily services consumed*** as final information consumption and vice versa.

27) Actual final information consumption contains ***non-productive consumption of capital goods*** either. This is a major item in SNIA.

28) ***Major parts*** of actual final information consumption of households are
- non-used part of broadcasting, TV show and supply of radio programs services, consumed,
- non-used part of consumed information goods as non-read newspapers and paper-based advertisement.

29) Use and consumption of broadcasting, TV show and supply of radio programs and the way their volume should be estimated has been defined in the chapter on the Production Account. Non used part of consumed information goods should be estimated from time use statistics and average reading velocity.

F. Actual Final Information Consumption of General Government

30) For technical reasons, the ***economic value of the actual final consumption of government units*** in SNA is assumed to be equal with the value of the expenditures they incur on collective services. This is equal to all final consumption expenditures of government less expenditures on individual goods and services provided as social transfers in kind to households.

31) Government consumption and households consumption are frequently ***running into other*** and the situation provides an oportunity to raise their consumption under the umbrella of final consumption and finally to skyrocketing of state budgets.

32) The ***acception of the view*** that has been described at the secondary distribution of information accounts would create a situation, when the roles were less confused, and the ***information and economic flows are more transparent*** which may be against the interests of bureaucracies.

33) In the SNIA, the definition and actual volume of final information consumption of government do not depend on the definition and actual volume

of information consumption of other sectors. The ***volume of information general government consumes as final information consumption*** should contain all information services and goods that are consumed as final consumption by government units.

34) Final information consumption should be directly estimated in the twin table.

G. Final Information Consumption

35) As it has been described in the chapter on Production Account, ***final information consumption*** of information goods and services is identified in the SNIA with their non-productive consumption, that is with a consumption, when they are annoyed so that this is not associated with their
- embedding into an information good,
- transformation into another information good,
- use -- i.e., their copying in a process to produce another information good or service.

36) This implies that the extension and intension of this concept depends heavily on how widely the ***"process to produce another information good or service"*** is interpreted. The volume of final information consumption will be determined by the volume of productive information consumption.

37) Productive consumption can be ***clearly identified*** in the case of embedding, and transformation and can be clearly excluded in the case of never-used non durable signals.

38) ***Consumption of an information good should be qualified to happen in a productive process*** whenever the pre-annihilation critical physical state of the good involved is a consequence of its continuous use or its physical deterioration can be attributed to processes closely related to use.

39) In ***other cases,*** as with the goods that are to be consumed after a period of intensive use because they become obsolete, the classification may be ***problematic***. Also the fact of use -- as it has been defined here -- may sometimes be difficult to establish. Certain information goods may have been never used or just used for other economic purposes in another way.

40) Consequently, as it has been noticed earlier, the boundaries between final information consumption and intermediate information consumption, and between capital consumption and final information consumption are sometimes ***diffuse and subject to interpretation***.

41) Nevertheless, the ***final consumption boundary of SNIA*** is considerable narrower (and accordingly the intermediate consumption, fixed capital formation boundaries are wider) than it is in SNA, because most information services supplied by households and government are productive.

42) Economic income is durable; once a claim has been created, it persists. Information income has been deduced from information added by outputting information goods and non-durable signals (information services). ***Information income is not durable.*** That means, net saving can not be deduced in SNIA in the same way as it has been done in SNA. Final consumption should automatically be recorded for information services consumed non-productively. No intention "to consume something finally" is needed by the consumer of a non-durable signal to record final consumption.

43) Final information consumption can not be associated with ***positive social values.***

44) In the SNA, ***corporations*** are not assumed to make final consumption expenditures. This assumption consequently is not hold in SNIA for final information consumption.

X. THE INFORMATION CAPITAL ACCOUNT

GENERAL INTRODUCTION TO THE INFORMATION ACCUMULATION ACCOUNTS AND BALANCE SHEETS

A. Introduction

1) The balance sheets and accumulation accounts ***reflect*** the state of affairs and changes of information assets and liabilities of institutional units or sectors. They can be recorded for individual kinds of information goods and information carrying goods or institutional units and sectors.

2) ***Balance sheets*** should reflect the volume of information of stocks of assets or liabilities for the beginning and the end of the accounting period.

3) The total volume of assets owned minus the volume of liabilities is the ***net volume of information*** of the unit or sector.

4) The accumulation accounts are flow accounts, record the changes in assets, liabilities and net volume of information.

B. Assets of Information

5) ***Economic assets*** in SNA are entities (goods and rights),

#1 over which ownership rights are enforced by institutional units, individually or collectively;
#2 and from which economic benefits may be derived by their owners by holding them or using them, over a period of time.

6) ***Kinds of economic assets in SNA*** are financial assets, produced and n0n-produced non-financial assets. ***Produced assets*** are fixed assets, inventories and valuables.

7) ***Kinds of information assets*** are produced and non-produced information assets. ***Produced information assets*** are fixed information assets, information inventories, valuables and produced human knowledge. Fixed information capital and human capital constitute ***information capital***.

8) Economic benefits emanating from owning ***capital information goods, are based on a fundamental property of these goods*** which has been noticed by several researchers, that these goods can easily be copied, their use provides information income to the user. This property has a decisive influence on the production, distribution and consumption of information and knowledge. Property incomes are also closely related to the concept of information use.

9) Accordingly, ***capital information goods*** will be defined as those information goods that ***can*** be used repeatedly or continuously for producing information goods or services. The definition rests on the concept of "use", discussed in the chapter on the Production Acccount.

10) The ***"ownership" over information recorded*** about the transactions of employees or recorded by employees on magnetic and optical stores of computers owned by employers has often been debated, particularly in terms of academic freedom, copyright and privacy. Regulation of these issues will determine world of labor as well as architecture of society.

11) Knowledge of human individuals can be ***interpreted not only as newly created object, a flow, but stock. Average magnitudes of order*** can be estimated, the practical opportunities for definition and measuring are very limited. ***Human knowledge,*** both produced and non-produced, can be used repeatedly or continuously for producing information services or goods. It will be qualified as a special kind of information assets.

12) Actually, it is (a part of) produced or non-produced knowledge of the creator -- as having been embodied in his brain -- which should be called ***intellectual property***.

13) The ***importance of distinction*** between capital information goods, information capital (human knowledge and fixed information assets) and non-capital, lies in its capacity to serve as a basis for the distinction between assets, capital and non-capital in economic sense whenever a demand is formed. The treatment of "originals and copies" in the SNA can be seen as an effort to the solution of economic treatment of information capital.

14) ***Intangible fixed assets*** are considered as produced, as outputs from processes of production in SNA that are repeatedly or continuously used in other processes of production. The terms "enhancement" and "extension" is more appropriate for these goods than "enlargement" and "renovation" for tangible assets.

15) ***In SNIA, intangible assets*** will not be accounted as such. The copies of capital information goods, whether original or not, when to be used for making copies will be qualified as information assets.

16) The static ***rights connected to intangible assets and intellectual property*** will not be considered as products with a measurable volume of information they would carry or convey. Transfer of rights is considered as a service, as a result of which the works can be used by the licensee, and this service may or may not be considered as an information service. In a positive case, the volume of such a service may be equal to use of works. This service may then be assumed to be consumed as productive consumption by the licensee. By this, capital consumption will not be recorded.

17) What concerns non-durable signals, they cannot be stored and so accumulated. Thus volume of ***accounted information assets*** of an economic unit i (corporation, individual etc.) at a time point t will be defined as the volume of information in or on all copies of all information and non-information goods owned by the unit individually or collectively.

18) Most pieces of information assets satisfy the criterion #1 of economic assets, but some of them fails to satisfy criterion #2.

19) ***Information assets, accounted*** will be defined as assets of information goods at producers. This is less than the volume of information assets.

20) Inside the category of information assets, produced and non-produced assets can be distinguished. ***Produced information assets*** are those that have come into existence within the production boundary of the system. ***Non-produced information assets*** are those that have come into existence in processes other than production.

21) Produced information assets include:

* ***fixed information assets*** (produced goods that are used repeatedly or continuously in processes of production of information for more than one year), and

* ***inventories*** of

- stocks of information outputs that are still held by units that produced them prior to their being further processed, sold, delivered to other units or used in other ways,
- stocks of information goods acquired from other units that are intended to be used for intermediate consumption or for resale without further

processing,

* ***valuables*** (information goods of considerable volume that are not used primarily for purposes of production or consumption but are held as stores of information or value over time and

* ***produced human knowledge.***

22) (A copy of) an information good is considered to be ***waste*** if cannot be classified to any of the previous classes.

23) ***Non-produced information assets*** are those that are needed for production or consumption but hemselves have not been produced.

24) There are kinds of ***information goods that are evidently, typically used as fixed assets (information capital).*** Books, records and videocassettes of libraries, software exploited in computer centers, films lended by distributors and databases at database services belong to this category.

25) There are ***goods which clearly don't fall into the category of information capital.*** This can be examplified by newspapers that are used only once, receipts, medical recipes etc. at households and inactive business documentation still witheld due to provisions of law on taxation, labor and others at corporations, and huge amounts out of records in state archives. Their stocks can sometimes be classified as stocks of valuables (books), or waste.

26) Last but not least, there is a wide zone of kinds of goods and objects whose ***classification is problematic*** like photoes, films, books, records and computer games' software in the households, public non-profit databases, private companies' business management files, e-mail messages, computer files on public networks etc.

27) ***Stocks of accumulated human knowledge*** -- including produced human knowledge -- is of primary importance in information processes and phenomena but not exactly measurable. Since von Neumann's pioneering attempt [Neu59], several efforts were made to quantify the average storage and processing capacity of human brain. It will be expressed in arbitrary units as "x*terabits", where x is an unkonwn number.

28) Stocks of accumulated produced human knowledge ***might be assumed to be proportional to IQ*** (whose average is a well studied function of age), but it is known that IQ is not directly related to the extent of "lexical" knowledge, it is

related rather with the extent of short memory and operation speed than the extent of the long term memory.

29) Actual volume of information carried by the stocks of ***produced human knowledge*** should be the margin of output and consumption of "contribution to human knowledge".

30) ***Intellectual property*** can be considered as a kind of "Non-produced human knowledge" and its volume might be determined as volume of information carried by the existing and to-be-produced copies of the work involved.

31) Volume of ***accumulated information in a region or country*** will be defined as sum of accumulated information of all economic units resident on the area of the region or country.

32) Only those assets will be included that belong to units considered in the system. ***Assets of external units*** should be left out of consideration.

33) Similarly to non-produced genetic information, assets of ***produced genetic information*** encoded in DNA -- like their production, consumption and use -- will be left out of consideration.

34) [SNA] is operating with the concepts of ***assets and liabilities***. Most information products are also owned / held by the proprietor. Remarkable exceptions may be borrowed books or records, bankable bills, databases used by resellers, value added resellers or gateway services, or in some other sophisticated ways of databanking, and exposed films to be developed. A complete account of "liabilities" and "assets" in natural unit terms - as it is done in financial terms - is irrealistic. Hence accumulations / assets will be taken into account at the proprietor and not at the unit which actually uses the assets.

35) Stocks are generally ***recorded at one point in time*** when inventories are taken and continuous bookkeeping doesn't exist in this respect.

36) ***Documentation of mineral exploration*** is a typical own-produced or purchesed capital information good to be used for supplying services or to be sold. The expenditures incurred on it are assumed in SNA to be spent on the acquisition of an intangible fixed asset and included in the enterprise's gross fixed capital formation. The value of the resulting asset includes costs of drillings, borings and tests and surveys, is not measured by the value of new deposits but by the values of the resources allocated to exploration during the accounting period. Consumption of such assets may be calculated by using average service lives.

37) There is a considerable mess in SNA over the treatment of ***software***. This has also been concerned in the chapter on the Production Account as "Production of originals and copies".

38) Computer software ***to be used at an enterprise*** for more than one year in SNA is an intangible fixed asset, acquisitions are treated as gross fixed capital formation. The treatment of data bases expected to use in production over a period of time more than one year is the same.

39) SNA suggests that the ***economic valuation of software and entertainment, literary or artistic originals*** -- more precisely and taking into consideration the remarks made earlier; ***of their copyright*** -- should be made by the determination of the future benefits expected to derive. In the absence of other information or if such benefit is not expected the costs of development / production should be used.

40) SNIA should make a distinction between
* ***physically existing separate copies*** recorded on magnetic or other media of
- software products owned by the unit (even if some rights have been reserved by the producer or distributor, like rights of reselling, or the rights of copying for business purposes)
- software owned by others, and
* intellectual property rights over an intangible "software work".

41) Physically existing, ***recorded copies of software*** on medias separated from computers should be valuated "as they are". Intellectual property rights -- as rights generally -- should be not recorded and hence not valuated in SNIA. The very same treatment is suggested for ***"entertainment, literary or artistic originals"***

C. Balance Sheets and the Sequence of Accumulation Accounts

42) In accordance with SNA, ***the basic identity*** between the elements of balance sheets and accumulation accounts can be summarized as:

#1 the value of the information assets in the opening balance sheet, plus
#2 the total volume of the information assets acquired, less the total volume of information plus
#3 the value of other positive and negative changes in the information assets held plus
#4 the value of the positive or negative nominal holding gains is identical with
#5 the value of the information assets in the closing balance sheet.

43) A similar identity should be ***valid for assets of information goods and for***

human knowledge.

44) The volumes of information of fixed information assets is the sum of assets of various information goods. The ***estimation of the volume of assets*** of books, newspapers, records, and audio records in the public sector should be based upon the reports of libraries and archives on their stocks. The stocks of households should be based upon representative surveys. The stocks of digital magnetic media and paper based business and government documentation should be estimated at national level from their yearly production and consumption data and per capita data.

THE INFORMATION CAPITAL ACCOUNT

A. Introduction

45) The ***purpose of the Capital Account*** is to record the information assets that are acquired or disposed of by resident institutional units by engaging into transactions and also to show the changes of net information volume that these transactions imply.

46) Assets should be recorded on the ***left side*** and liabilities and net volume of information on the ***right side***.

47) The right side of the Capital Account records those resources that are available for the accumulation of assets

- net saving of information (+),
- information capital transfers, receivable (+) and to be supplied (-).

48) The left side of the Capital Account contains consumption of fixed capital (-), and gross fixed capital formation (+).

49) The ***balancing item*** is net lending (+), which measures the net volume of information a unit or a sector made available for other units and sectors or net borrowing (-) the volume of information a unit or a sector finally has been obliged to borrow from others..

50) ***Valuation of information capital goods*** may be defined on their ***actual volume*** or volume of the copies to be made in the ***future*** using them by

- applying the actual valuation procedure at the moment of valuation for the gooods, or
- applying the actual valuation procedure for the goods and all their copies to be made in the future. fixed or moving value of capital

51) In the latter case ***depreciation*** could have been in principle computed. Information assets will be valuated on their present volume.

52) The general procedure for definition of volume of information can be applied to ***unrecorded media***, as unrecorded magnetic tapes, or free broadcasting channels, too. Unrecorded media, however, do not belong to information goods or non-durable signals, thus they are beyond the accounted asset boundary of the system and hence their volume of information will not be included in assets.

53) An ***alternative approach*** would also take into account the unrecorded media, including non-allocated frequencies, allowing their consideration in policy making. Then, the production of recorded media might be accounted as an information adding process. This would be particularly useful in the case of broadcasting channels where allocation and management of channels is an important issue. "Frequencies" are scarce, have economic value and belong to national wealth but are beyond the production and asset boundaries of the system.

54) This would require that the definition given for the concept of "volume of information" be extended with a definition that accounts "volume of recorded information". This could be operationalized in various ways in the case of printed matter, magnetic media or broadcasting channels.

1. Changes in information assets

55) The ***left side of the Capital Account*** should record the volumes of information assets acquired, or disposed of in transactions of various kinds. The assets may be bought or sold, or acquired or disposed of as a result of capital transfers in kind, barter transaction or production for own use.

56) In accordance with SNA the following ***categories of changes in information assets*** will be distinguished in the Information Capital Account.

- gross fixed information capital formation,
- consumption of fixed information capital formation,
- changes in inventories of information goods,
- acquisitions and disposals of valuables,
- acquisitions and disposals of non-produced information assets.

57) ***The gross fixed information capital formation*** of an institutional unit is defined by the volume of information of its acquisitions less disposals of new or existing fixed information assets.

58) In libraries and archives, the volume of gross fixed information capital formation should be ***proportional*** with the average per item or per shelving metre volume of information and the difference of number or shelving metres of new items and the number or shelving metres of out items.

59) The ***"per item" and "per shelving metre" equivalents*** should be determined by appropriate body of experts.

60) The changes in inventories of information goods at their dealers and distributors should be proportional with

61) The ***consumption of fixed information capital*** should be recorded as a change in assets in the left side of the Information Capital Account.

2. Saving and capital transfers

62) Capital Account records net information saving and information capital transfers receivable and payable. The sum of the "resources" is "***Changes in net volume of information due to saving and net information capital transfers"***.

63) ***Information capital transfer*** in the household sector includes gifts and inheritance of capital information goods used in information production.

3. Net lending or borrowing information

64) The balancing item of the Information Capital Account is ***net information lending or borrowing***. It has been defined as:

- net information saving
plus
- information capital transfers receivable
minus
- information capital transfers payable
minus
- the acquisitions less disposals of information assets
minus
- consumption of fixed information capital.

B. Gross Information Capital Formation

65) ***Gross information capital formation*** is measured by the total volume of gross fixed information capital formation, changes in inventories of information goods,

acquisitions less disposals of information valuables and changes in produced human knowledge.

1. Gross fixed information capital formation

66) ***Gross fixed information capital formation*** is defined as by the producers' acquisitions, less disposals of fixed information assets plus certain additions to the volume of information of non-produced information assets by the productive activity of the institutional unit.

67) ***Fixed information assets*** are assets produced as information outputs from processes of information production that carry a significant amount of information and are repeatedly or continuously used in other processes of information production for more than a year.

68) ***Produced human knowledge*** should be treated in an analog way with fixed information assets but not included in.

69) The following ***types of gross fixed capital formation*** are important:

- acquisitions less disposals of new or existing fixed information assets: capital information goods,
- major improvements to existing fixed information assets.

70) ***Acquisitions and disposals may take the form*** of purchase, barter, transfer in kind, retaining products of own production, demolishing products by the owner.

71) ***The time when acquisitions less disposals are recorded*** is the moment when those goods, services or assets are physically transferred to the owner.

72) ***Military information goods*** (jamming software, virus programs, military logistic programs and databases, encoding and decoding software,) should be considered as fixed information assets or intermediate information consumption according to the general definition.

73) ***Small "tools"***, cheap software packages, brochures, etc., will be considered as intermediate consumption.

74) In accordance with SNA, the ***acquisition of originals*** of entertainment, literary or artistic originals by producers should be considered as gross fixed information capital formation.

75) Sales or other disposals of ***existing information goods*** by an institutional unit should be recorded as negative acquisitions. Transactions with existing assets can not be estimated at the national level.

76) ***Major improvements to fixed information assets*** are those activities that significantly extend the volume of information of an information asset. Those should be confronted with such information activities that must be undertaken regularly in order to maintain a fixed information asset in working order.

77) Updating a inventory or a database should not be considered as a major improvement. The extension of a database with new fields or new items on a new geographic or subject area is a major improvement.

2. Changes in inventories

78) The ***way of treatment of inventories in SNA*** should be applied in SNIA. When a good is entered into inventories, it is acquired as an asset of the owner. When a good leaves the inventories, it may represent its disposal by sale or other ways to another unit or an internal transaction within the unit implying that it has got into production at the same unit. The unit may obtain goods and services to be consumed as intermediate consumption either by purchasing them or by internal transfers from the inventories.

79) ***Changes in inventories of information goods and services*** should be recorded as those of

- materials and supplies (to be consumed by the owner in transformation or embedding during production)
- work-in-progress (to be consumed by the owner in transformation or embedding during output),
- finished goods (own products to be supplied without further processing as output),
- goods for resale.

80) ***Work-in-progress*** consist of goods and services to be outputted but not yet finished. The volume of that part of output is to be estimated that will be embedded into the finished information good. ***Uncompleted fixed assets*** that are being produced on own account by users should be recorded as gross fixed capital formation.

81) ***Materials and supplies*** consist of goods that a unit holds in stock with the intention of of using them as intermediate inputs. Unrecorded media should be assumed as carrying no information.

82) The concept of ***finished information goods*** is clear when they are also accounted economic goods. The operationalization of the concept among information goods that are not accounted economic goods is awkward.

83) ***Rules of automatic accounting*** of materials, supplies, work-in-progress and finished goods in computerized information production and authoring systems under the conditions of networking should be identified.

3. Acquisitions less disposals of information valuables

84) ***Information valuables*** are information goods that are not primarily used for production or consumption but are acquired and held primarily as stores of value or information. Their acquisition and disposal in transactions should be recorded here.

4. Changes in the volume of produced human knowledge

85) Changes in the volume of produced human knowledge ***should contain*** volumes of information that individuals acquire in transactions. This include learning during various kinds of education and training (together with reading), radio programs and TV shows, cultural and entertainment services. Acquisitions into the short term memory will not be considered. Acquisition into long term memory has been discussed in the chapter on output.

86) On the micro level, the changes in the volume of produced human knowledge of employers might be recorded here due to ***changes in employment*** .

C. Consumption of Fixed Information Capital

87) ***Consumption of fixed information capital*** is the negative change in the volume of the fixed information assets used for production due to physical deterioration, and normal rates of obsolescence and accidental damage.

88) For produced human knowledge, ***natural forgetting*** should be recorded separately, but analogously with consumption of fixed information capital. Due to uncertainties and measurement problems these figures must not be added to consumption of fixed information capital.

D. Acquisitions and Disposals of Non-produced Information Assets

89) Acquisitions and disposals of non-produced information assets resulting from transactions with other institutional units should be recorded here. SNIA

records only one kind of non-produced information assets, non-produced human knowledge.

90) ***Entering in employment*** and leaving employment might be considered here as acquisition / disposal of non-produced human knowledge by institutional units.

91) ***Natural growth and decline of human knowledge*** in form of deaths and births will be considered in arbitrary units in the Other Changes in the Information Assets Account.

E. Information Capital Transfers

92) Transfers of fixed information assets will be considered as information capital transfers. Several examples, as donation of book collections by individuals to libraries or archives can be mentioned.

XII. OTHER CHANGES IN INFORMATION ASSETS ACCOUNTS

GENERAL INTRODUCTION

1) This chapter deals with the recording of changes in information assets, liabilities and net volume of information that result from flows that are not transactions. The kinds of changes concerned are changes of non-produced human knowledge due to births and deaths, maturing and ageing, destruction or growth of information assets due to war or other political events, and changes due to way of revaluation.

2) The changes of non-produced human knowledge should be imputed into the system at the national level. Institutional units are not supposed to deal with these issues.

THE OTHER CHANGES IN VOLUME OF INFORMATION ACCOUNT

A. Introduction

3) The entries for changes in assets are on the left, produced and non-produced information assets separately. The entries for changes in liabilities and the balancing item, change in net volume of information are on the right side.

4) The compilation of the twin tables of this account faces serious difficulties.

1. Functions of the Other Changes in the Volume of Information Assets Account

5) Function of the Other Changes in the Volume of Information Assets is to record the changes of produced and non-produced information assets as a ***consequence of flows other than transactions***.

6) Natural growth of human knowledge due to births and maturation, and decline of human knowledge due to deaths can be considered as ***"interactions between institutional units and nature"*** thus contrasting with entrances and exits of volumes of information that take place as a result of transactions, that is interactions by mutual agreement between institutional units.

7) In Accordance with SNA, this account should serve the purposes of recording the effects of ***exceptional events:*** wars, natural disasters. A thired function should be the recording of changes due to ***changes in classifications***.

2. Categories of changes in assets/liabilities and their valuation

8) In accordance with SNA, should refer to the following ***types of changes***

- Economic appearance of non-produced information assets
- Economic appearance of produced information assets
- Natural growth of human knowledge
- Economic disappearance of non-produced information-assets
- Catastrophic losses of information
- Uncompensated sezures of information goods
- Other volume changes in information assets NEC
- Changes in classifications and structure

9) ***Economic appearance*** will be understood here as when something is deemed to move inside the asset boundary of SNIA, to appear on the Balance Sheet of SNIA. This is not the same as "economic appearance in the SNA".

10) ***Economic disappearance*** refers to the effects of exceptional events on assets already within the asset boundary of the SNIA.

B. Economic Appearance of Non-Produced Information Assets

11) SNIA considers only one major class of non-produced information assets; that of non-produced human knowledge.

12) Non-produced human knowledge will be assumed ***to enter the system in two ways:*** births and natural maturation of individuals. Changes in the quantity of human knowledge due to immigration and emigration, will be treated in the Rest of the World Account.

13) ***Live births of residents*** will be considered as gross addition to human knowledge: economic appearance of non-produced information assets.

14) Volume of information carried by births should be proportional with number of resident births and a "per birth average".

15) It will be assumed that unknown "average volume of knowledge of a human individual" is equal with $n*O(10^{14})$ bit, whereover n is an unknown number, a function of age. This way of treatment of unknown figures is usual in

engineering and physics. These figures will not be added to more exact statistical data or estimates.

C. Economic Appearance of Produced Information Assets

16) The produced assets whose appearance is recorded here in the SNA are valuables and historic monuments, both newly recorded and already recorded as such.

17) Many of information goods as books, records in private libraries can be treated as ***"information valuables"***, to be stored for storing value or information without exploiting them as information capital. The entries into these collections should be recorded here in the SNIA.

18) The function of exhibits allocated in museums, memorial parks and theme parks is obviously to provide an opportunity to acquire human information. As such they might be treated as produced information assets. At the same time these objects can not be treated as information goods, they do not carry information, can not be measured in natural units of measurement.

D. Natural Growth of Knowledge

19) Individuals maintain a permanent interaction with their environment through their senses. This is mostly a non-conscious process and "Environment" is not a transactor. Thus the more or less permanent flux of information at the input and output of (neurons of) senses mostly should not be treated in the system.

20) Natural growth of human knowledge will be recorded in ***conditional units*** to be treated separately from information goods and services. Several studies indicate that natural declines of various skills and abilites follows a similar trajectory with time. The volume of natural growth of human knowledge may be estimated by "composite primary mental ability".

21) ***Average "composite primary mental ability"*** is a known function of age. This function will be used for characterizing changes of non-produced human knowledge.

22) The change of quantity of non-produced human knowledge of an age-group should be proportional with the number of residents in the age group and a "per age group" average. "Per age group average composite mental ability" should be proportional with "relative per group average composite primary mental ability" and "average volume of human knowledge", expressed in conditional units.

"Relative composite primary mental ability" will be defined as percentage of the age-group 66-70.

23) Non-produced human knowledge of an individual ***might be assumed to be proportional to his/her IQ,*** whose average is a known function of age and determined mostly by genetic factors and by the very first years of lifetime.

E. Economic Disappearance of Non-Produced Information Assets

24) ***Deaths of resident individuals*** should be treated as economic disappearance of human knowledge. Economic disappearance of non-produced information assets will be recorded in conditional units and treated separately from information goods and services.

25) Volume of information lost due to deaths, should be proportional with number of individuals in the age-groups of deaths and a "per age group average" determined from "composite primary mental ability".

26) SNA here records depletion of natural economic assets, quality change in non-produced assets due to changes in economic uses and degradation of non-produced assets due to economic activity. Accordingly, ***natural decline of human knowledge*** due to ageing will be recorded here, possibly due to changes in "composite primary mental ability".

F. Catastrophic Losses

27) Consumption of fixed information capital extends to cover normal accidental damage to the various categories of fixed assets. The volume changes recorded here are the results of large scale, discrete and recognizable events that may destroy assets over the whole spectrum.

G. Uncompensated Seizures

28) Uncompensated seizures of information goods should be recorded here. Data-bank break-ins, hackers' "information stealth" should be considered as illegal use and output of information (copying).

H. Other Volume Changes in Information Assets

29) This item contains the changes in the volume of fixed information assets as a consequence of
- unforeseen obsolescence,
- differences between allowances included in consumption of fixed capital for

normal damage and actual losses,
- degradation of fixed information assets not accounted for in consumption of fixed information capital
- abandonment of production facilities before completion or being brought into economic use
- exceptional losses in inventories; large-scale ***damages caused by hackers or other intruders in data-bases*** can be recorded here.
- other volume changes in information assets NEC.

I. Changes in Classifications and Structure

30) This ***item contains*** changes in sector classification and structure and changes in classification of assets and liabilities.

1. Changes in sector classification and structure

31) In accordance with the SNA, reclassifying an institutional unit from one sector to another implies changes in balance sheets and sector assets. These changes can be followed only if a micro level information-accounting system is available.

2. Changes in classification of assets and liabilities

32) Changes in purposes of assets of institutional units imply changes in the assets. These changes can be followed in a micro-level information-accounting system.

THE REVALUATION ACCOUNT

A. Introduction

33) While SNIA does not rest on micro-level information accounting, the Revaluation Account should be elaborated on aggregated, national level, using statistical data.

34) The Revaluation Account records the positive and negative holding gains. Holding gains on assets -- both positive and negative -- should be recorded on the left side and on the liabilities on the right side.

35) The balancing item in the Revaluation Account is ***changes in net volume of information due to nominal holding gains or losses.***

1. Nominal holding gains

36) In the SNA, ***nominal holding gain*** on a given quantity of an asset is defined as the value of benefit accruing to the owner of that asset as a result of a change in its price or monetary value over time.

37) Accordingly in the SNIA, ***nominal information holding*** gain will be understood as change of volume of information of the asset due to average level of digitizing technology over time.

2. Neutral holding gains

38) ***Neutral holding gain*** is defined as the value of the holding gain that would accrue if the price of the asset changed in the same proportion as the general price level - that is kept pace with the general rate of inflation.

39) ***Neutral information holding gain*** (loss) should be defined in an anlog way as the volume of information holding gain that would accrue if the "per unit equivalent" of the asset changed in the same proportion as the general "per unit level" - that is kept pace with the general rate of "information density" of media.

3. Real holding gains

40) Real holding gains may be obtained by subtracting neutral from nominal holding gains.

XIII. THE BALANCE SHEETS

A. Introduction

1) The balance sheets show the state of affairs of information assets at the beginning and end of the reporting period and the changes accumulated during that time. They can be drawn up for institutional units or sectors. The balance sheets can be viewed as an information indicator, showing the ***information-poor*** or ***information-rich*** shape of the unit, the sector or the country.

2) The value and volume information in twin tables of SNIA allows the study of interrelationships of economic and information flows and their relation to stocks of economic value and volume of information.

3) Similarly to SNA, a ***basic accounting identity*** exists between Opening Balance Sheet and Closing Balance Sheet for the volume of information of a given information asset, though the relation does not the same as that valid in SNA. This equation can be written as:

(1) The volume of the information asset in the Opening Balance Sheet,
plus

(2) the total aggregated volume of the asset acquired, less the total volume disposed of, in transactions (repair, extension, deterioration etc.) that take place in the accounting period recorded in the Information Capital Account
plus

(3) the volume of other positive or negative changes in the volume of the information asset held (war, natural disaster) with these changed recorded in the Other Changes in the Volume of Information Assets Account.
plus

(4) the volume of the positive of negative nominal holding gains accruing on a non-digital information asset during the period resulting from a change of its "per" equivalent, with this recorded in the Revaluation Account
is identical with

(5) the volume of information of the asset in the Closing Balance Sheet.

1. The structure of balance sheets

4) The balance seheets include three tables: the Opening Balance Sheet, the Changes in Balance Sheet and the Closing Balance Sheet.

5) The right side of sheets shows "liabilities" and "net volume of information", and the left side shows "assets". Liabilities, however, though can be interpreted in SNIA, have a minor importance.

6) SNIA has no financial assets.

2. Main categories of information assets

7) The concepts applied in balance sheets have been introduced and discussed in the previous chapters. For recapitulation, a summary of the definitions and new considerations will be given.

8) ***Capital information goods*** are those information goods that technically can be used for producing information goods or services. Many of these goods are actually not used productively, because they are not at producers (stocks at dealers or distributors), or they are actually out of use at producers.

9) ***The two main groups of information assets*** are produced and non-produced information assets.

10) ***Produced information assets include*** fixed information assets, inventories of information goods, valuables and as a memorandum item produced human knowledge.

11) ***Information wealth*** includes all goods that
- are held by resident units,
- carry information.

12) ***Information wealth, accounted*** includes all information goods that
- are held by resident units,
- carry information.

3. Financial leasing

13) The ***timing of the change of ownership*** over a finacially leased information asset will be equal in SNIA with SNA. The whole volume of information should move simultaneously with ownership. The loan in principle should be shown at the bank's accounts both in value and volume terms. The implementation of the

institutional unit level accounting seems to be difficult. No macro level data are availbale to substitute the micro-level aggregates.

4. General principles of valuation

14) In the SNA, assets and liabilites are to be valued using current prices that relate to the date on which the Balance Sheet relates.

15) As a rule, market prices are used except for non-produced intangible assets (purchased goodwill and patents) where "written-down replacement costs", and for the assets with delayed returns (timber), or spread over along period where "discounting" should be applied.

B. The Entries in the Balance Sheet

1. Produced assets

a) ***Fixed information assets*** are those information goods that are used repeatedly or contnuously for more than one year for information production. Fixed information assets should be recorded at the producers of information.

b) The concept of ***"inventories of information goods and services"*** covers stocks of work-in-progress of information goods and services to be outputted, of own-products, of materials and of commodities purchased to be sold in unchanged form. Inventories should be recorded at the producers, retailers, dealers and distributors of these goods. The inventories of producers in principle should contain items for services-in-progress.

c) ***Valuables*** are those information goods that are held for storing value or information.

d) ***Waste*** the stocks of information goods that cannot be classified as belonging to one of the previous categories are called waste.

e) ***Produced human knowledge*** is the result of its accumulation along the course of the accounting period and drop as a consequence of natural forgetting.

2. Non-produced information assets

16) ***Natural growth and decline of non-produced knowledge*** of individuals should be considered as a change in the non-produced assets of the household sector or the sector of employer.

17) Actual value of ***stocks of non-produced human knowledge***. should be the margin of natural growth and decrease of "integral minds".

18) Anyhow, ***creation of "integral minds"*** -- a natural process -- should first be proportional in some way with birth of new human individuals.

19) As it has been described earlier, ***decrease of "integral minds"*** should be proportional with the number of deaths and average "average per capita volume of human knowledge" or "average per capita volume of human knowledge at the age of death".

20) At this, it might be assumed that unknown but existing "average volume of knowledge of a human individual" is a number $n*O(10^{14})$ bit, whereover n is an unknown number. This way of treatment of unknown figures is usual in engineering and physics. This provides an opportunity to make some computations. These figures will not be added to more exact statistical data or estimates and figures of produced human knowledge.

21) Second, creation and decrease of non-produced human knowledge should be proportional with ***natural growth and decline of human knowledge*** of alive residents with ***ageing*** .

3. Financial assets / liabilities

22) Financial assets and liabilities have no analogs in SNIA. They shall be treated only in the twin tables of the system.

4. Net volume of information

23) ***Net volume of information*** is the difference between the volumes of all information assets - produced and non-produced - and all liabilities at a particular moment in time.

24) As information liabilities are usually not recorded in aggregated statistics and probably play a less important role in economy, net volume of information can be approximated with the volume of all information assets. Micro-level digital information accounting may relate information liabilities with the inter-unit "call"-type statements made in the application layer.

5. Special items

25) SNA records ***consumer durables*** only as memorandum items, assuming that these items do no serve the purposes of production.

C. The Changes Between Balance Sheets Account

26) The Changes Between Balance Sheets Account summarizes the entries in each of the accumulation accounts.

27) The change in the volume of a kind of information good between opening and closing items may be reduced to the following items:

- Changes due to information transactions in the item in question,
- Changes in the volumes of assets that are flows other than transactions,
- Nominal holding gains / losses.

XIV. THE REST OF THE WORLD ACCOUNT

A. Introduction

1) SNIA should be closed in the sense that both ends of every transaction should be recorded. The Rest of the World Account of SNIA follows the general accounting structure and captures the full range of transactions that take place between the total society and the rest of the world. All transactions between resident and non-resident units are captured here. The account consists a number of subaccounts mutatis mutandi the same as in SNA.

2) In the SNA, residence of an institutional unit is ***defined by its centres of economic interest***. If an institutional units has a centre of economic interest in a country, it should be considered resident of the country.

B. Residence

1. The economic space of a country

3) SNA defines the concept of residence with the concept of ***economic territory***.

4) ***Non-durable electromagnetic signals*** play an important role in transborder information flows to be recorded in the Rest of the World Account of SNIA. These signals circulate freely in the frequency domains administered by the goverment in the frames of international telecommunications agreements. Thus, the definition of residence in SNA should be modified in SNIA so that these signals should be added to the things which can circulate, and "economic territory" should be changed for "***economic space"*** which would include the space over the territory under the authority of national telecommunications agency.

5) It is also desirable ***to change the SNA definition*** in accordance with international agreements for the use of space and underground activities. For several years "territory" hasn't meant just a two-dimensional surface, for underground activity -- including mining -- has always fallen in the competency of the countries.

6) ***Federal countries*** can be studied at the level of the federation and at the level of republics. The "Rest of the World" shall be defined accordingly.

In a country like the late Yugoslavia or Czech-Slovakia, republic-level account is preferred. In the latter, units are classified to the classes of republical and federal units.

2. Centre of economic interest

7) The ***definition*** of the concept of centre of economic interest should be valid in SNIA.

> An ***institutional unit is said to have a centre of economic interest*** within a country when there exists some location -- dwelling, place of production, other premises -- within the economic space of the country on or from which it engages, and intends to continue to engage, in economic activities and transactions on a significant scale, either indefinitely, or over a finite but long period of time.

8) While economy-oriented definition of SNA for the ***concept of residence*** should mostly remain valid in SNIA, purposes of analysis may still lead to a different interpretation of residence.

9) The concept of centre of economic interest should be interpreted according local rules of law in ***federal countries.***

> In the late Yugoslavia central (federal), state (republic level) and regional programs were distributed by a number of stations deployed in various republics and owned by a federal organisation. Obviously, federal organisation has a centre of interest in the republics, thus their activities has to be considered as coming from the republics. This treatment may provoke critics. This imposes difficulties when defining "domestic producer" and "abroad".

3. The residence of households and individuals

10) The rules of SNA for identifying the residence of households and individuals in a country should mostly be valid in SNIA.

> A household has a centre of economic interest when it maintains a dwelling or succession of dwellings within the country. Students, diplomats, military personnel, travellers and tourists, seasonal- and border workers, locally recruited staff of foreign embassies, the crews of ships and medical patients should be treated as residents of the country from which th

11) ***Students*** should be treated as residents of their country of origin however long they study abroad, provided they continue to form part of a household in that country. Students from households of non-resident legal or illegal immigrant aliens and refugees may be treated as residents or non-residents depending on the length and character of their stay in the country.

12) For the purposes of ***policy analysis*** the introduction of a different treatment of individuals; a definition of their residence based upon ***citizenship or other legal criteria*** may be desirable. Refugees, legal and illegal immigrants and their children will mostly be classified as non-residents.

4. The residence of corporations and quasi corporations

13) The rules of SNA for ***identifying the residence of corporations and quasicorporations*** in a country should mostly be valid in SNIA. Production by site offices and "offshore" units should be treated as domestic production in the country they are operating if they are engaged in a significant amount of production of goods and services there, or own kand or buildings there. They mus maintain at least one (information) production establishment there which they plan to operate over one year or more and maintains a complete and separate set of accounts of local activities, pays income taxes to the host country, etc..

14) It is not the whole corporation, but its local branch, subsidiary, etc. only that is qualified as domestic.

15) This issue is particularly important when recording contribution of employees.

16) For the purposes of accounting information flows, ***other criteria***, as their recording as local subscribers of postal and telecomunications services, would be desirable.

17) If the ***mobile equipment*** is operated in international waters or airspace these activities should be attributed to the country of residence of the operator.

> ***Direct broadcasting satellites*** supply services from a mobile equipment. The outer space where satellites broadcast, is outside the territory of countries, so the broadcasting corporation is resident in the country in which the headquarters are located. Such a corporation also can be treated as a "regional central bank".

18) If the unit is ***operating a mobile equipment for more than a year in another country***, the unit is resident of the country in which the production occurs.

> A satellite broadcasting corporation has a centre of economic interest in a country if it broadcasts a program on a contractual base to that country. In other cases it is accounted as exports, imports or externality.

Aircrafts, vessels and road transportation units of foreign companies will not be considered as resident producer units.

Non-resident individuals and institutional units operating devices for using mobile services as cellular phones, pagers should be treated as non-residents, even if the system allows their direct dialling in the host country.

5. The residence of non-profit institutions

19) The rules of SNA for identifying resident non-profit institutions should remain valid in SNIA.

6. General government

20) The rules of SNA for identifying ***resident government agencies*** should remain valid in SNIA.

The general government departments, establishments, bodies of central, state and local governments of a country, located on its territory and its embassies, military establishments and consulates should be treated as residents of that country.

21) ***International organisations*** are extraterritorial for every country, corporations that are owned jointly by two or more governments should be considered as residents of the countries on whose territories they operate.

7. Regional central banks

22) "A ***regional central bank is*** an international financial institution which acts as a common central bank for a group of member countries." Each ***national office*** of such a bank must be treated as a separate institutional unit and resident in the country it is located.

8. Individuals with multiple residences

23) The treatment of individuals in the SNIA, who have several international residences, where they remain for short periods of time should follow their treatment in SNA.

9. The residence of ethnic groups and communities

24) An ***ethnic group is resident*** in a country where its members; individuals and other institutional units are resident. The supersector "ethnic community is

resident in all countries where has an ethnic group. Some ethnic communities have a single country as their ***"motherland".***

C. General Accounting Rules

25) SNA makes ***distinction*** between "free on board at the frontier" (f.o.b) prices of goods regarded as purchaser's price that would be payed by the importer at the border of the exporter and "costs, insurance, freight" (c.i.f.) prices regarded as purchaser's price that would be payed by the importer taking delivery at his own frontier.

26) The method of valuation implicitly determines the boundary between exports and imports.

27) ***Exports and imports of goods*** should be recorded f.o.b. at the customs frontier of the country from which they are exported.

28) ***Exports and imports of services*** in SNA are to be valuated at the actual price agreed upon.

29) In case of ***information services*** at least the following main groups should be distinguished:

- undirected transborder flow of signals in-air
- directed transborder flow of signals in-air
- transborder flow of signals through cables,
- an information service produced and rendered in the country of importer without transborder flow of non-durable signals, as programming,
- an information service produced and rendered in the country of exporter to a non-resident unit, as with education or entertainment services for foreigners,
- an information service rendered to the buyer in a third country.

30) In case of ***undirected in-air transborder flow of signals*** no transit will be accounted, because radio waves are propagating in the whole space, distinction of transit would be meaningless. For such services, as broadcasting, no meaningful interface exists between exporter and importer other than the consumer itself. Hence, the volume of services will be measured at the consumer, inside the importer country.

31) In ***OSI networks,*** the volume of information exported or imported should be defined in the first layer. In the case of ***phone services*** the volume of information carried by the international carrier should be recorded as export/import, while

those carried by local companies will not recorded as that. The traffic between ***resident subsidiaries of a foreign/multinational company and foreign branch offices*** should be accounted as export/import.

32) In case of ***directed transmitter chains*** (radio-telecommunication, microwave transfers) "transit" and "reexport" are meaningful.

33) During "international traffic"of ***telecommunication services through cable,*** a physical interface exists at the first transmitting, amplifier (receiver or sender) station at the frontiers of the countries or inside. Transit services should actually be paid and are to be accounted in SNIA as services imported. The incoming signals that will later be "multiplied" and distributed in the importer country, as signals of cable-TV, should be accounted at the border, and the multiplication will be considered as domestic production.

34) In the case of ***information services produced and rendered in the importer country*** or in the ***exporter's country or in a third country*** the meaningful interface is the buyer or consumer.

35) Distinction needed between buyer, user and beneficary of the service.

36) As it has been mentioned earlier, ***SNIA envisages the accounting of externalities;*** both domestic externalities of foreign output and foreign externalities of domestic output.

37) Estimation of ***domestic externalities of foreign output*** can be realized in the frames of domestic services. The quadruple entry principle will not be followed here. The imputation of foreign externalities of domestic output can only be implemented by cooperation at the international level or mutual cooperation. International standards on this area are particularly desirable.

38) The ***distinction between externalities on one hand and export and import*** on the other, should be made according to the intention of the sides. Externalities are important only in the case of in-air transborder flows of terrestrial and satellite broadcasting. In this context those are not the interested consumers in the receiver country who will be considered, but the target area negotiated by member countries and allocated by international telecommunications organizations.

D. The External Accounts of Goods and Services and of Primary Incomes and Current Transfers

1. The External Account of Goods and Services

39) The External Account of Goods and Services shows exports and imports of goods and services with the balancing item "External balance of goods and services". Exports of goods and services consist of sales, gifts or grants of goods and services from residents to non-residents, while imports of goods and services is the same from non-residents to residents.

40) ***Information exports and imports*** are flows of information goods and services to and from the rest of the world. Volume of information exported/imported is that which is carried on/in all copies goods and services whose property was transferred to or received from a non-resident unit. Rephrasing: transactions which go with changes of domestic information assets to the debit of other countries.

41) This ***consists of*** volumes of information carried by information goods and services plus the volume of information carried by non-information goods and services plus volume of information carried by humans as their knowledge.

As the latter is much more than the first two members in the sum and is not yet measurable, will be left out of the accounts.

42) ***Foreign information consumption of residents*** is considered as information import. Foreign experience of individuals -- foreign acquisition of human knowledge -- plays an important role in the development of the countries. Not only technology transfer alone but the information for living, that is "innovation as seen by man on the street" are important factors of social motivation and adaptation. Some elements of the consumption of information by resident individuals in abroad - like students and tourists - can in principle be estimated.

43) There are several problems which should be faced when applying this general definition. Some of them are as follows:

a. Goods

44) Paper money, coins, in or out of circulation, securities, mails issued and unissued, government exports and imports should be included into exports and imports of information goods.

(i) Examples of goods which may be sold as exports or purchased as imports without crossing the country's frontier are goods that are consumed in resident-owned off-shore installations.

(ii) Examples of goods which may cross frontiers but are excluded from exports or imports goods is transit from the country, goods on consignment, copies of

information goods (software, notes, mastercards, imagery of integrated circuits) used for repair of equipment, demonstration or show and returned in their original state and without phyiscal change and change in ownership. Also information goods shipped to or from a country's enclaves, as Embassies, military bases should be considered as exempt from export and import.

45) In SNA, ***non-financial assets*** belonging to an enterprise, including land, structures, equipment and inventories and a change of ownership of these assets resulting from the acquisition of an existing enterprise is treated as a financial transaction and is not included in exports or imports of goods, except to the extent that such a change of ownership is actually accompanied by a physical movement of goods. Physical movement of information goods - even in this case - should be recorded as exports or imports of information capital goods.

b. Services

46) ***Export of education*** is the education of non-residents, whose permanent residence is outside the boundaries of the country. Foreign pay and non-pay guest students, immigrants, refugees should be considered here. Export should be proportional with the number of students, average daily number of hours spent in education and a "per hour equivalent" discussed in the chapter of the Production Account.

47) ***Imports of education*** is the foreign education of residents, including domestic students learning in abroad at the third level, domestic residents taking part in abroad in adult education or training, and children of domestic - non-tourist - residents receiving education in foreign primary or secondary schools.

48) The attendance of non-residents at ***spectator sport, entertainment and cultural events*** should be considered as the export of these services. Export should be proportional with the number of foreign attendants at domestic events, average length of a performance and a "per hour equivalent" discussed in the chapter of the Production Account.

49) Import of spectator sport, entertainment and cultural events should be proportional with the number of domestic attendants at foreign events, average length of performance and a "per hour" equivalent.

50) When accounting the ***programs in broadcast***, they should be classified according to the residence of the "supplier station" (Program). This should be defined in more details.

51) If broadcasting is considered, it is not uncommon that broadcasting stations transmit/transfer foreign programs, like Tanger transmirrored and replayed Voice of America, or foreign broadcasters braodcast domestic programs, or foreign broadcasters broadcast foreign programs.

52) In principle, two constructions are known. The first is ***when a broadcasting corporation purchases programs and then broadcasts them***. This is typical for commercial broadcasting corporations.

53) The second is, when ***a "program" or "station" purchases broadcasting capacity*** and then makes its programmes distributed, which is typical for national (non-commercial) broadcasting corporations. In both cases location of towers was used in classification.

54) By this, ***when the central program is adopted by a republican station***, like Zagreb I, this may be classified in various ways. It should be classified first for Croatia as use of the imported central (with a residence in Yugoslavia) program if the republican station is just an establishment of the federal organisation and should be classified as use of the imported federal program and production by the republican Program if it is independent from the Central Program and is resident in the republic.

55) The provision of domestic broadcasting for non-residents will be considered as the export of these services. Volume of export should be proportional with the number of attendants, average length of viewing or listening and a "per hour equivalent" discussed in the chapter of the Production Account.

56) The provision of ***"TV-shows", "radio-programs"*** by non-resident set-owners to non-residents, home education and training to their family-members, "conversations" etc. should be considered as output and consumption of the country where they are residents.

57) Both direct broadcasting and telecommunication satellites supply information to those who have parabolas, i.e. to cable-TV companies, micro AM replay companies and households with equipment capable to receive the program directly. ***Cable-TV companies should be considered as domestic producers*** when provide amplified satellite programs to the end-users wired to them.

58) Due to the view accepted in SNIA regarding the caharcter of telecommunication services, ***on-line information sent to abroad to process***, should be recorded as export, even if later "it" will be returned in "processed form". Also the on-line processed information should be recorded as import.

59) Computer programmming services accomplished by foreign programmers hired at domestic firms on an hour or monthly base, should be considered as domestic information output.

c. Movement of individuals

60) Temporary and permanent ***movements of resident individuals to abroad and of non-residents from abroad*** represents the flow of human knowledge. Short-term, temporary movements (tourism, business trips, foreign service of employees, domestic students in abroad) may or may not be recorded, while migration (emigration, immigration) should be accounted mostly on the other Changes of Volume of Information Account.

2. Time of recording

61) Time of recording should be mostly the change of ownership for information goods. Transportation may precede or or lag behind the change of ownership.

a. Goods

62) International leased goods should be recorded as export or import when the lessee takes possession of the good, although the time at which the good crosses the frontier may be used as a proxy for this.

63) The information goods shipped to a resident subsidiary of a corporation in another country should be considered as export/import.

64) The activities of merchants and commodity dealers who buy commodities from non-residents and then sell them again to non-residents within the same accounting period without the commodities actually entering the economy in which the merchant is resident, will not be considered.

65) Information goods sent to abroad for processing and returned may be recorded as exports and imports or may not be recorded. In the latter case the information added during the processing procedure should be recorded as export/import of an information service. This can be examplified with printing.

b. Services

66) The time of recording an information service is when the service is rendered.

c. Primary Incomes

67) ***Contribution by non-resident employees of a resident institutional unit*** should be considered as domestic output.

68) ***Contribution by resident employees of a non-resident institutional unit*** (including international organizations) should be considered as foreign output.

69) ***Free and obligatory information closely related to production*** and ***information bound to economic transactions*** should be recorded when they occur.

d. Transfers

70) Information transfer should be recorded when it occurs.

E. The External Accumulations Accounts

71) The External Accumulations accounts consist of Capital Account and Other Changes in Assets Account.

1. The Information Capital Account

72) Acquisitions less disposals of non-produced information assets appear on the changes in assets side of the account, recording changes in volume of information resulting from transactions of non-residents with residents.

2. Changes in net worth and net lending or borrowing

73) This account should record changes in net volume of in formation due to transactions with foreign institutional units.

3. The Financial Account

73) SNIA has no financial account, consequently external financial account.

4. Other Changes in Information Assets Accounts

74) The left side of the account records changes in information assets of the rest of the world, the right side changes in the information liabilities and changes in classification and structure. Uncompensated seizures of information assets owned by non-residents. On the right side of the accounts (changes in liabilities) changes in classification and structure.

75) The External Revaluation Account applies only to financial assets and liabilities.

76) It was mentioned earlier that volume of information of information goods may grow or drop ***in a new revaluation*** in accordance with the average state of the arts in data capture and recording. That's why stocks should be revaluated in bit terms as well as in value terms. Accordingly, ***nominal holding gain or loss*** may appear. The latter occurs if the media becomes obsolete and cannot be used any longer (like with punchcards) or new compacting and compressing technologies.

77) Specific information density of the information goods may grow or drop at a 5-10 percent annual rate. This makes admissible that stocks left after the production or purchase of the year will not be revaluated. However, stock of the production or purchase in the earlier years should be revaluated.

F. The External Assets and Liabilities Account

x) SNIA has no Financial Account and thus External Assets and Liabilities Account.

XV. SUPPLY AND DISPOSITION TABLES AND INPUT-OUTPUT

A. Input-Output in the System

1. Introduction

1) As in the SNA, the Information Goods and Services Account provides the basis for the elaboration of input-output tables.

2) In the SNIA tables analog with both "supply" and "use" tables and symmetric input-output tables can be elaborated. As far as SNIA focuses mostly at social and policy issues, for these purposes the system recommends tables of intersectoral net flows of information to be prepared for the main sectors of the society and for various ethnic groups.

3) The ***purpose of the compilation of input-putput tables in SNIA*** -- together with their twin tables -- is understanding the character of supply and disposition of information goods and services, the processes and flows -- including commodity flows -- during social reproduction of information. It should be integrated into macroeconomic and society-level models in order to analyse the link between information output and information demand, output and information output.

4) Input-output tables of SNA has been used for checking the consistency of statistics on flows of goods and services obtained from different kinds of sources. Due to the fact that sources of SNIA are much less coherent that those of SNA, this function of input-output tables is less significant.

5) The chapter will explain the information goods and services accounts, information supply and use tables and analytical input-output tables.

2. The input-output context

6) "In national accounting and economic analysis two kinds of input-output tables (or matrices) are referred to:

(1) supply and use tables;

(2) symmetric input-output tables."

7) The ***concepts and definitions in the information supply and disposition tables*** are the same as elsewhere in the system.

The most important concepts to be applied here are: "information added", "actual final information consumption", "gross information capital formation", "information exports" and "information imports".

8) The same statistical units, kinds of products (information goods and services) and transactions will be used here as elsewhere in the system.

3. Statistical units for input-output

9) SNA suggests that for the detailed analysis of production institutional units should be partitioned into separate homogenous establishments each of which engages in only a single kind of productive activity at a single location. Industries are groups of establishments engaged in the same kind of productive activities.

10) Actual institutional units and establishments engage in more than one kind of activities and concerning them one can distinguish:

- ***principal activity*** (whose gross value added exceeds that of any other activity c arried out within the same unit,

- ***secondary activities*** carried out in addition to the principal activity,

- ***ancillary activities*** -- "supporting" activities which are undertaken to create the conditions within which the activities of an enterprise can be carried out

11) ***Outputs of ancillary activities*** are not explicitely recognized and recorded in SNA, and ***inputs of ancillary activities*** are treated as inputs into the principal and secondary activities.

12) A number of information activities, as ***"management", "data processing",*** are mostly classified as ancillary activities in practical accounts of corporations. This introduces a bias into the system. As the case of holding companies and management consultants show, management may be a self-contained activity. These activities should be treated in the very same way as the rest of the activities in the SNA in an information age. SNIA should treat these information activities as primary and secondary activities in dependence of their volume.

13) ***SNIA is "product oriented"*** it should record the information outputs and inputs in institutional units -- by groups of information goods and services -- independently that their production is kept to be a principal, a secondary or an ancillary activity.

B. Disaggregation of Information Goods and Services Account

1. Information Goods and Services Account

14) The Goods and Services Account ***shows*** for the society as a whole and for groups of goods and services the total resources in terms of information output and imports and consumption of goods and services in terms of intermediate information consumption, final information consumption, gross information capital formation and exports.

15) Goods and services are traced through the society from their original producers (domestic or abroad) to their consumers (domestic or abroad).

16) The ***rows of this account*** show information output, information import (with domestic externalities of foreign information output), intermediate information consumption, information exports (with foreign externalities of domestic information output) by groups of goods and services.

17) The ***product (good and service) groups*** constitute the ***lines of "supply" and "use" tables***. The product classification system should be a properly chosen aggregation of Central Product Classification for the information goods and services there available (broad media classes), enlargened by the kinds of goods and services not included there, particularly TV shows, supplying radio programs, oral communications and produced human knowledge. Non-information goods and services will be shown in one or more lines to provide the completeness of the system in the twin tables.

18) Similarly to the SNA, the ***basic balance-equation of preservation of volume of information*** is

Information output + Information imports (including domestic externalities of foreign information output)
=
Intermediate information consumption + Information exports (including foreing externalities of domestic information output) + Final information consumption + Gross fixed information capital formation + Changes in inventories

2. Valuation

a. Valuation concepts and their interrrelationships

19) The considerations concerning economic valuation of flows SNA are mostly irrelevant here, those should be applied in the twin tables only. Trade and

transport do not influence significantly the volume of information carried by the goods and services traded.

b. Valuation of product flows

20) Obligatory and free information closely connected to production should -- in principle -- be deduced at valuation of volumes of information product flows. Due to practical difficulties of estimation, these flows will be considered separately in the broad media class they belong and will not be considered as a valuation factor of the economic transaction (information product flows) they are connected.

21) The valuation of information output, exports, imports and consumption in twin tables should follow the rules of SNA.

C. Supply and Disposition Tables

1. Format of the supply and disposition tables

22) The ***term "disposition tables"*** has been used here for denoting the analog of "use table" of SNA. The reader should pay attention that SNIA makes distinction between "use" and "consumption" and that input-output tables in SNIA show information consumption and not information use. The new name has been introduced, because these tables have not much in common with "information use" or "use of information goods and services" as defined in the previous chapters.

23) SNIA defines three kinds of supply and disposition tables. ***Product-industry tables*** will show output of individual groups of information goods and services altogether and by ISIC industrial groups of producers, and imports.***Product-sector tables*** show the output of individual groups of information goods and services altogether and by sectoral groups of produecrs and imports. Product-industry table should contain a disaggregation according to market and non-market industries.

24) In both tables, adjustment items: trade and transport margins, taxes and subsidies and Cif/Fob adjustments will be left blank.

25) The recommended supply and disposition tables of the System are presented in the enclosures. Some groups -- as that of paper-based information goods -- can be more disaggregated.

2. The supply table

26) The supply table ***shows*** the supply of products through classes of producers; industries or main sectors. It gives information about the resources of information goods and services. In the rowsthe various groups of products are presented.

3. The disposition table

27) The use table ***shows*** the intermediate consumption of individual kinds of information goods and services by industries or main sectors. The table also shows the production and generation of information income and use of information income by services and main sectors.

28) The table has three ***quadrants***; the "intermediate information consumption quadrant", the "final use quadrant", the "information added quadrant".

29) The intermediate consumption quadrant shows intermediate information consumption by industries or sectors by column and by products on rows. The final use quadrant shows information exports, final information consumption and gross fixed information capital formation, each classified by groups of information goods and services on the rows. In this context, the term "final use" has nothing in common with the term "information use" or "use of information goods or services". The information added quadrant shows compensation of employees, obligatory and free information closely connected to production, consumption of fixed information capital, mixed information income and net operating surplus.

D. Derived and Analytical Input-Output Tables

30) The System recommends two kinds of analytical tables; ***sector-sector tables*** and ***product-product tables***. The sector-sector table shows the volume of information output and consumption by main sectors, the product-product table shows the information output and consumption by main groups of information goods and services.

E. The Treatment of Employees' Stocks and Flows

31) Due to the significance of treatment of information transactions made by, or with information assets owned or used by employees, a short summary will be given in the next paragraphs; how the information flows between typical parties and in typical situations and information stocks should be treated in succeeding accounts. This summary is not an organic part of the present chapter.

32) Under the assumption of ***independent employees*** various types of communication should be treated as:

1 Private collegial communication: information output by the household sector, information consumption by the household sector.

2 Official interemployee communication: information output by the household sector, information consumption by the household sector.

3 Private communication: information output by the household sector, information consumption by the household sector.

4 Official communication to private clients: information output by the household sector, information consumption by the household sector.

5 Official intercorporation or interagency communication: information output by the household sector, information consumption by the household sector.

6 Internal communication: meaningless.

7 Interemployee semiofficial: Information output from the household sector, information consumption in the household sector.

8 Official active use of employer's equipment: output by the household sector, comsumption (and occasionally output) by the sector of employer.

9 Active private use of employer's equipment: output by the household sector, comsumption (and occasionally output) by the sector of the employer.

10 Intracorporation interequipment: not accounted.

11 Official use of alien equipment: output by the household sector, consumption by the sector of the owner of the alien equipment.

12 Private use of corporation equipment: output by the household sector, comsumption (and occasionally output) by the sector of the owner of the equipment.

13 Intercorporation interequipment: output by the sender corporation and consumption by the receiver.

33) Under the assumption of ***"embedded employees"*** various kinds of physical information flows between employees and other sides should be treated as:

1 Private collegial communication: information output by the household sector, information consumption by the household sector.

2 Official interemployee communication: information output by the household sector, information consumption by the household sector.

3 Private communication: information output by the household sector, information consumption by the household sector.

4 Official communication to private clients: information output by the household sector, information consumption and output by the sector of the complex unit, information consumption by the household sector.

5 Official intercorporation or interagency communication: information output by the household sector, information consumption and output by the sector of the complex unit, information consumption and output by the sector of recipient, information consumption by the household sector.

6 Internal communication: meaningless.

7 Interemployee semiofficial: Information output from the household sector, information consumption and output in the sector of employer, information consumption in the household sector.

8 Official active use of employer's equipment: output by the household sector, comsumption (and occasionally output) by the sector of employer.

9 Active private use of employer's equipment: output by the household sector, comsumption (and occasionally output) by the sector of the employer.

10 Intracorporation interequipment: not accounted.

11 Official active use of alien equipment: output by the household sector, consumption and output by the sector of employee, consumption by the sector of the owner of the alien equipment.

12 Private use of corporation equipment: output by the household sector, comsumption (and occasionally output) by the sector of the owner of the equipment.

13 Intercorporation interequipment: output by the sender corporation and consumption by the receiver.

33) Under this assumption of ***"schizoid individuals"*** various kinds of physical information flows between employee and other sides should be treated as:

1 Private collegial communication: information output by the household sector, information consumption by the household sector.

2 Official interemployee communication: information output by the employer's sector, information consumption by the sector of the complex unit.

3 Private communication: information output by the household sector, information consumption by the household sector.

4 Official communication to a private client: information output by the sector of the employer, information consumption and output by the household sector.

5 Official intercorporation or interagency communication: information output by the employer's sector, information consumption by the sector of the recipient.

6 Internal communication is not allowed.

7 Interemployee semiofficial: Information output from the household sector, consumption in the sector of the employer.

8 Official active use of employer's equipment: output by the employer's sector, comsumption (and occasionally output) by the sector of employer.

9 Active private use of employer's equipment: output by the household sector, consumption (and occasionally output) by the sector of the employer.

10 Intracorporation interequipment: not accounted.

11 Official use of alien equipment: output by the employer's sector, consumption by the sector of the owner of the alien equipment.

12 Private use of corporation equipment: output by the household sector, comsumption (and occasionally output) by the sector of the owner of the equipment.

13 Intercorporation interequipment: output by the sender corporation and consumption by the receiver.

34) Under the assumption of ***split brains with limited general accessibility*** physical information flows between employee and its communicating parties should be treated as follows:

1 Private collegial communication: Information output by the household sector, information consumption by the household sector.

2 Active official interemployee communication: Information output by the employer's sector, consumption by the sector of the employer, consumption by household sector (at listener or at both of them).

3 Private communication: Information output and consumption by the household sector, consumption by the employer's sector (at listener or at both of them).

4 Official communication to a private client: Information output by the employer's sector, consumption by household sector, consumption by the employer's sector (at the client) plus possibly consumption by household sector (at the server).

5 Official intercorporation or interagency: Information output and consumption by the sector of the sender and receiver, information consumption by household sector (at receiver) plus possibly at sender.

6 Internal: information capital transfer from and to the household sector.

7 Interemployee semiofficial: Information output by the household sector and consumption by the sector of the employer and household sector (at listener).

8 Official active use of employer's equipment: Information output and consumption by the employer's sector.

9 Active private use of employer's equipment: Information output by the household sector and consumption by the employer's sector.

11 Official use of alien equipment ("send" info) : Information output by the employer's sector, consumption by the sector of the owner.

12 Active private use of corporation equipment ("send" info): Information output by the household sector, consumption by the employer's sector.

13 Intercorporation interequipment: output and consumption by the sectors of the "sender" and "receiver".

35) Under the ***assumption of employees in double roles*** physical information flows should be treated as follows:

1 Private collegial communication: Output from the household and the employer's sector, consumption by the household and the employer's sector. That means two outputs, each of them outputted in common.

2 Official interemployee communication: Output from the household and employer's sector, consumption by the household and the employer's sector. That means two outputs, each of them outputted in common.

3 Private communication: Output by the household sector, consumption by the household sector.

4 Client<--server communication: Common information output by the household and employer's sector, consumption by the client's sector.

5 Official intercorporation or interagency: Output from the household and employer's sector, consumption by the household and the employer's sector.

6 Internal: Meaningless.

7 Interemployee semiofficial: Information output by the household sector, consumption by the household and the employer's sector or vice versa.

8 Official use of employer's equipment ("send info"): Information output by the household and the employer's sector and information consumption by the employer's sector or not accounted.

9 Private use of employer's equipment ("send" info): Information output by the household sector, consumption by the employer's sector.

11 Official use of alien equipment ("send" info): Information output by the household sector, consumption by the owner's sector.

12 Private use of corporation equipment: Information output by the household and employer's sector, information consumption by the employer.

13 Intercorporation interequipment: Information output and consumption by the "sender" and "receiver".

XVII. POPULATION AND LABOR INPUTS

A Introduction

1) The population and labor inputs of SNA should be applied in the raw data tables of SNA.

x) The ***census*** data, that ascertain the number of people present on a specified night, should be applied at estimation of the volume of non-produced human knowledge.

x)***Population*** data -- the annual average number of people present in the economic territory of a country -- ***employment*** and***total hours worked*** should be used in estimations of volume of production and use of human knowledge and related information services.

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Appendices

Table of Contents

A. The Standard Accounts

B. Standard tables for publication

C. Standard Raw Tables

A. The Standard Accounts

1) SNIA can be implemented at various levels of detailedness. The standard tables described here are planned for an ***implementation at a highly integrated level*** that is characterized by the lack of supersector "ethnic community" and sectors "ethnic groups", classification of foreign countries, and a detailed classification of kinds of redistribution of information income. No input/output table is envisaged in this version. The number of tables was minimized to decrease costs which is at the detriment of accuracy and precision.

2) ***Aggregated national accounts*** are shown only that are to be elaborated for all information goods and services. Some accounts of institutional units are shown in Appendix C as "Raw tables".

B. Standard Tables for Publication

1) The system does not put a limit to the number of tables to be prepared from the figures of the accounts for various purposes of publication. The ***tables shown here***
- reflect national figures
- mostly can be prepared from the standard accounts of Appendix A and standard raw tables of B, and
- do not contain the twin tables.

2) Even in this circle, the ***tables shown should be looked as samples, illustrating various uses of the system.*** For example no tables are recommended here to cover the subject area of current social and business information transfers, social system of redistribution of information, though the system provides several opportunities for describing these processes.

C Standard Raw Tables

1) The tables shown here, as tables C2--C6, are mostly both for use at the level of insitutional units and at the level of nation.

2) The number and kinds of raw tables depends of the options of the standard accounts and tables for publication to be elaborated. The raw tables shown here are ***for the compilation of the standard accounts shown in the Appendix A*** excluding those that are needed for the compilation of twin tables.

3) Several tables shown are mostly ***synthetic tables***, they should be compiled from elementary survey tables. A number of tables is based upon more than one surveys.

This can be examplified by the tables for TV broadcasting. Figures expressed in receiver-hour units should be computed per market, per station; from number of TV households on the market, from average number of sets per TV household and annual number of broadcast hours. Then these figures should be aggregated. Also, tables C11-C19 should be compiled form different sources: the survey of industries and of foreign trade.

4) Though these elementary tables and definitions to the concepts are not included, the knowledgeable reader will recognize ***several traditional elements*** of labor statistics, industrial statistics, cultural statistics, government statistics, household statistics, time-use statistics, telecommunications statistics, etc.

5) The introduction of SNIA, however requires their extension and a number of methodologically ***new representative surveys***, as for use of computer resources or time-use of employees. Though some research has been made on these areas, no official surveys are available.

6) The form and appearance of tables should be ***adapted to the actual surveys of international organizations.*** It is their ***content only*** that is to be considered here.

7) The tables for the determination of "per" equivalents and some other tables are ***not included*** into the text.

8) The tables here assume that they will be implemented under the conditions of ***present level of technology*** of information production, consumption and use, in the not very far future. The surveying of the volume of paper-based information goods, phone and other telecomm services should be based on other indicators in a "more electronized" world.

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Glossary of terms