The Strategic Planning of the Informatization in Romania. Some General Technical and Managerial Considerations

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Abstract: Romania is one of the few countries which decided to elaborate a strategic planning of the informatization. After the approval, in 1992, by a Governmental Steering Committee of the final report of the strategic planning of the informatization in Romania [PDIR,1992] ,a White Book [cartea,1992] for the general public was printed. The problems of the basic permanent registers were further discussed in a feasibility study [RPC,1992]. The approach and the main options are presented. The main conceptual and managerial problems are discussed. A number of general conclusions are proposed.The relevance to other countries in a socio-economic transition process is presumed.
Keywords: Strategic planning, information technology, information system, invariants, compatibility, coherence, administrative information systems, standardization.

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Terminology

The terminology used tries to be pursuant to the usual European definitions [e.g. OECD,1992].

The term "permanent register" is used in the acceptance of an updated informatized administrative register. Such usual abbreviations as IT for information technology, IS for information system, MIS for management information system, MRP for material and requirements planning, GIS for geographic information system and EDI for electronic data interchange are used. Other abbreviations are: IT/C for information and communication technology; INFOR for the strategic planning of the informatization in Romania (the Romanian abbreviation is PDIR); CNI for the National Commission of Informatics-Romania; ICI for the Research Institute for Informatics-Romania. SPP is the generic abbreviation for strategic planning project and CA stands for computer- aided.

1.The Context of INFOR

The examination of the context within which the strategic planning was elaborated is important for two reasons: a)to evaluate the general frame and b)to evaluate the generality of the approach and its conclusions. The context can be considered from a general,rather international point of view ,which will be designated as the "general context" and from a specific national context, which will be designated as the "national context".

1.1 The General Context

The general context is that of a wide recognition of the IT growing importance for the socio-economic development, as an important industry. More than one major trend [Naisbitt,1984] the modern

society could be viewed as an "informational society" [Masuda,1980; Draganescu, 1987]; "macroeconomic informatics" and "societal informatics" are also proposed concepts [Costake, 1985;1992].Recent papers and documents [Englebrecht,1986; Katz,1990; Karunaratne, 1986; Poirier,1990] define as IBE (information-based economies) those economic systems in which IT has a major contribution to determining the economic structures. The IT sector tends to represent worldwide some $ 1,000 bn in 1995 and perhaps, it will become the leading industrial sector in the year 2000, with software approaching 50% of the output value. Some authors'opinion [Baltac,1989] was that,even as back as 1985, the IT sector contribution,either directly or not, was of more than 50% of the total EC's GNP and that cca.50% of the working population of the developed countries were occupied in data collection, processing, storage, retrieval, transmission or dissemination. Various statistical data suggest that during the 80s the investment in IT, not including the public administration, reached $ 400 per capita in the USA and Japan (perhaps 2.5 in Romania) with 20% as the part of acquired software. The public administration is an important IT user, the 1990 annual reports of large IT companies, such as IBM and DEC, suggesting a proportion nearing 40% of the total sales. EC statistical data [Jackson,1993] show values of 30-40% in the years 1990-1993. Developed small countries such as Denmark show a similar pattern as the average number of informatized keyboards per person reached 0.4 in the Danish public administration in 1990 [finans,1992]; the same year,its IT budget was of about $ 600 mil. (perhaps 5% in Romania).

A general qualitative economic model [Iliescu,1992], counts the IT sector among the components of the economic infrastructure. Together with telecommunications, information systems shrink the performances of the structural sectors, no matter if there is an economic growth or an economic decline.

The specific importance of the IT sector for developing countries has been frequently mentioned [Mzali, 1982; Perez, 1992] even if some could not escape scepticism [Krasteva, 1992] in contrast with other points of view [e.g. enstinet, 1991].

Apart from the particular infrastructural role, the economic importance of IT is,undoubtedly, also due to the characteristic fast technical and technological progress. A long-term tendency towards an annual decrease of 20% of the cost/performance ratio, the integration of computer-communication systems, a steady evolution of the MTBF beyond 10 khrs, commercial open systems (broadly speaking), the distribution of the IT resources at the level of PCs (and laptops) connected in LANs as clients served by servers connected via WANs to GB mainframes which can directly access thousands of GB of memory, the spread of paralellism, the post-4GL, the IA and IA-like software products,integrated enterprise, corporate, national and international IS a.s.o.are some of the keywords which make the bc/ac (before computer / after computer) marking of history more and more relevant.

The ever greater importance of IT obviously drew the attention of governments to generating national and international actions.

At the national level at least the following specific governmental actions have been taken:

(i)   organization of centralized administrative IS,for functional and/or economic purposes. In Europe,such actions commenced in the 50s (e.g. the creation of the enterprises/ establishments register in France) and continued in the 60s (e.g. the creation of a governmental edp organization in Denmark, which developed integrated administrative IS). These integrated administrative ISs continued to be developed and got an undisputable reputation. A number of theoretical approaches have been made [Orman, 1989].

(ii)   adoption of programmes for the creation and/or development of the IT sector,as a strategic national sector. Some prominent examples are the French Plan Calcul, the Romanian IT and EDP Programme, the West German 1984-1988 Programme for the development of microelectronics, IT and telecommunications,the UK's IT R&D Alvey

Programme, the 5th generation computer programme of Japan.

These programmes had an important impact on the industrial development of the IT sector, including specific R&D and education, being typically "supply-side" oriented programmes (SSOP), and, therefore, of limited long-range efficiency.

The US recent Computer Systems Policy Project (CSPP) is an example of a "demand-side" oriented programme (DSOP) [Branscomb,1992]. INFOR is also a DSOP.

(iii) adoption of national informatization programmes aimed at introducing modern IS for priority sectors, as part of administrative reforms. A recent case is that of Malta [Bates,1993]. INFOR can also be considered in the category of national IS level gap-filling programmes. Regional programmes and associated difficulties have been reported as well [Madon,1992].

(iv) adoption of a specific IS strategy, not necessarily a formal programme. Perhaps, such an example is offered by Singapore [Hon,1990, Gurbaxani et al,1990]. The creation of specific national governmental agencies such as CIIBA in France,OFI in Switzerland,CCTA in the UK, etc. surely justifies states' need for a coherent and medium- to long-term oriented IT/IS strategy.

At the international level the importance of IT for development received an early recognition by the UN [UN,1968]. One may consider at least the following international activities:

(i) the UN specialized agencies or working groups activities.To quote just two examples: recommendations for the governmental IT [UNDTCD,1989] and the reports of the UN-Geneva based working group for edp, mainly statistics oriented [Sundgren, 1988];

(ii) generation of standards by ISO.The open systems recommendation [ISO,1976] is by now a famous example. The European norms (EN) can be considered as an extension of the ISO recommendations. It would perhaps be interesting to mention the OSI standard as an example of an European specification with world- wide acceptance in spite of different de facto standards such as IBM's SNA or DEC's DECnet;

(iii) generation of recommendations by the EC, e.g. on personal data privacy [council,1981];

(iv) OECD studies and recommendations [e.g. OECD 1990,1992];

(v) EEC programmes for R&D e.g. ESPRIT ,in which the IT field is a very important component (30-40 % of the total funding);

(vi) EEC directives e.g. for software protection [directive,1991]and procurement guides e.g. for procurement [EPHOS,1991; PHARE, 1992] or administrative IS [guide,1990].

The governmental international activities seem to take two main ways:

a) studies,recommendations and standards protecting a large market in a clever way

and

b) R&D financing, in general SSOPs.

1.2 The National Context

The national context is that of a society in a transient state characterized by:

(i) economic decrease, generating unemployment and a very high rate of inflation;

(ii) generalized legislative,institutional and behavioural changes, parallel economy and corruption being implicitly encouraged.

One can affirm that in Romania,the early 1990's explicit or implicit belief that decentralization, deregulation and privatisation would automatically get aboard an advanced European market economy showed itself not quite true. Having also in mind that the insufficiently integrated and technologically poor IS was one of the causes,even though not the principal one,of the performance degradation of the former communist regime,one may conclude that the problem of the informatization in Romania is also a political,not only a technical-economic one, being a top priority. It is natural, therefore, that the decision on starting a strategic planning project should be made by the Romanian Government.

The initial (1990) state of the Romanian IT/IS was characterized by a quantitative lag of 1-2 orders of magnitude in terms of $IT per capita or $IT per $GNP and a qualitative lag of 3 to 20 years or so in terms of typical IS and IS design methods and techniques. No public data packet, data transport network, and no public data bank could be invoked. The exception of Romania was its quite insignificant number of mainframes (including IBM or IBM compatible mainframes; e.g. less than ten IBM and less than ten East German ESER IBM 370 copies were imported).

A Romanian IT industry was started in the late 60s, mainly based on a French CII licence for the purely proprietary IRIS 50 computer (a Romanian - developed enhanced and modernized version being still in production in 1990).True DEC PDP 11 compatible (not copies) minicomputers (VAX 11 compatible developed), IBM XT and AT compatible, Spectrum compatible and 8080/Z80 microcomputers were also in production. Refraining from imports for production and investments also explains the technically and financially viable but not growing Romanian-American joint venture of the mid70s RomControl Data Factory in Bucharest. In spite of the late 80s efforts for starting a Romanian software industry, the endeavour of selling microcomputer programs was quickly repressed by a financial control which found this kind of activity as being illegal.

2.The General Managerial Approach

An acknowledgment of the necessity for defining a national IT strategy came early 1990,on setting up the National Commission of Informatics (CNI), reporting to the Government [law,1990; decree,1990].

The national context entered two obvious restrictions: the practical impossibility of considering the existing IS modernization (due to radical economic changes) and the need for working with invariants. Though IS analysis and design invariants are largely accepted [Alakl and Lalanne,1989; Malgoire, 1991], the national character of the project implied a maximum level of abstraction.

The described state of the IS/IT sector made West European consultancy if not mandatory,at least highly desirable. In 1990 SEMA-Group of France declared their interest in the participation in the INFOR and received funding from the French Government. This permitted a close co-operation with the Romanian team for about half a year starting January 1992, i.e. at the end of phase 2.1 (analysis of the state-of-the-art), and a good timing. In 1991 Data Centralen from Denmark also showed their interest in participating in the INFOR. As the Danish Government provided the necessary financing, the Danish consultants also continued the West European IS/IT experts co-operation in 1992. Early 1992, a UK delegation expressed a potential interest in a CCTA participation; unfortunately, this idea could not be materialized (the experience of CCTA in the field of public administration IS is well- known [e.g. CCTA, 1988]).

Taking into account the fact that the strategic planning was to be proposed to the Government, its scope had been limited to the interministerial (intersectorial) IS problems of public administration, in order to lay the background for a coherent development of public administration sectorial IS, as well as of the socio-economic agents' IS, according to their own strategic planning. The ISs of the Parliament and of the Presidency had not been taken into consideration as they belonged to an upper hierarchical level; however,the general frame should be applicable to these ISs too. The Government's own IS was not considered,as a distinct strategic planning project was under way; the same mention as above keeps valid.

The INFOR project was started according to the Romanian Government's Decision [decision,1991] which stipulated that CNI,together with the concerned bodies, were to present a strategic planning, define their strategy, their main technical options and the resources necessary for implementing the strategy. The organizational structure (Figure 1) included, apart from the
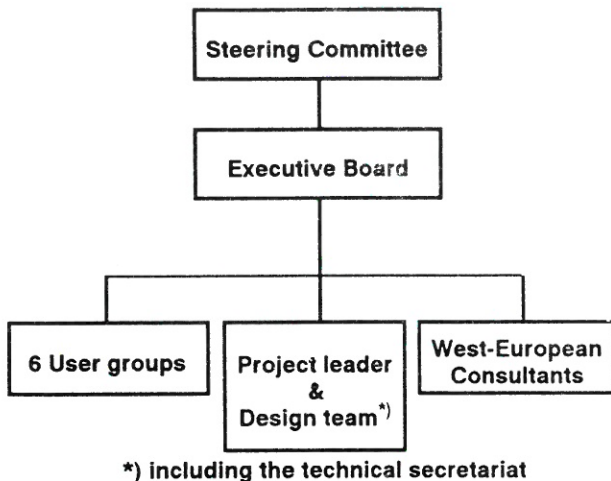
Figure 1. The Organizational Structure of INFOR

*) including the technical secretariat

Steering Committee, an Executive Board. The project leader was nominated within CNI. Six user groups were formed: general problems of information integration; finance, banking and trade IS specific problems; industrial, agricultural, transport, construction and other economic IS specific problems; social security, labour, education and culture specific problems; R&D IS specific problems; information products and services and IT management specific problems. Approx.80 specialists, end-user oriented and IS oriented, from ministries, other public bodies, universities, banks and other state- or private-owned companies, took part in the user groups. A temporary ad-hoc user group discussed problems related to the future public data network.The design team,including a technical secretariat and the project library, was based on specialists from ICI, an institute subordinated to CNI. IPA-the Design Institute for Automation and ITC-the Research Institute for Computer Technique co-operated in specific fields including a general DBMS appraisal and an evaluation of the national IT sector perspectives. The foreign consultants mainly assisted the project leader and the design team, also taking part in the meetings of the Steering Committee and of the Executive Board and, whenever possible, in the meetings of the user groups.

The classical RACINES steps were followed:

1-project specification; 2.1-analysis of the state-of-the-art; 2.2-requirements and orientations;

3-scenario generation and selection; 4-plans of actions; 5-final report, follow-up and update mechanism. Once approved by the Steering Committee, the final report was submitted to the Government and a corresponding draft of a Government's Decision was proposed.A "white book" [cartea,1992] mainly containing a general description of the steps 2.2 and 3 was edited and distributed.

A feasibility study concerning the permanent registers, later worked out,brought new clarifications. The post-INFOR user group no. 1 meetings were largely attended.

A total period of nine months, initially set for, could not be stuck to; however, the delay was smaller than 10%, i.e. about two weeks. The delay seemed to be quite reasonable for such an exercise and was certainly much smaller than the delay occurred in approving INFOR's propositions and recommendations.

In general, the user groups worked on an expert's opinion basis.In phase 2 some international and, unfortunately, hardly specific national statistical data were used. Some general data and some opinions were collected using ad-hoc questionnaires. One of these data collections referring to intra- and interministerial information flows needed a standard file processing software,such as dBASE; the processing also permitted that the differences in the definitions given by various bodies and a poor integration of information into a minimal intersectorial information flow should be remarked. Phase 4 could be completed in a reasonable period of time due to a project planning software product (in this case Microsoft's "Project Manager"); a member of the design team was assigned the task of learning this product for becoming a computer-aided planner assisting the project leader.

One of the by-products of the ICI participation in INFOR and other SPPs was the generation of a Romanian in-house RACINES computer-aided analysis and evaluation system, called ASIST-PD [Trandafir et al,1992]. This tool is now used in some sectorial SPPs started in 1993.

3.The Major Invariants of INFOR

Independently of any economic or political characteristic, the normal activity within any socio-economic (sub)system and its management need information about the basic elements and their associated relationships be available. It points to the fact that a basic invariant general model of an informatized socio-economic system is possible. Some fundamental works have been done [Sundgren,1991].

The definition of the socio-economic indicator [Costake,1981] the data-oriented model is based on:

$$i:: = \{m,\{e\},[\{r\}],(\{c_g\},\{c_s\},[\{c_t\}],t,u),v\} \qquad (1)$$

where:

m   –   socio-economic variable

e   –   identification of the entity(entities) which the variable is associated with

r   –   spatial co-ordinate(s)

c_g –   values according to the relevant general classifications

c_s –   idem, specific classifications

c_t –   temporal characteristics, e.g. cumulative value starting ...

t   –   current time

u   –   unit of measure

v   –   numeric value of the socio-economic variable

The model used in INFOR is presented in Figure 2.

Being altogether of a general interest, it is obvious that the information related to this basic model :

(i)   renders the general information coherence,and makes the associated unitary classifications of a general use;

(ii)   makes its creation and updating be mandatory for all the activities of public administration.

The following conclusions can be drawn:

(i)   a set of general interest classifications (nomenclatures) for informatization can be produced. The list proposed in INFOR is given in Table 1;

(ii)   a number of basic permanent registers should be obtained: persons; socio-economic units(agents) as juridical entities (e.g.enterprises) and physical entities (e.g. establishments);administrative-territorial units (e.g.regions, cities, streets); cadastre, including parcels and constructions;

(iii)   a reference geographical database,storing the mathematical model of the ground and general interest cartographic characteristics, is needed to make the spatial indexing of the socio- economic information possible; the cartographic output may be of a particular value for the system's general management;

(iv)   a juridical data bank is required for defining the entities and their relationships.

Table 1. List of the Classifications (nomenclatures) of General Interest for IS

| No.	Description	Comments
1	2	3
1	Basic socio-economic coefficients	Including the state of the environment
2	Activities	
3	Specialities	Including R&D fields
4	Occupations/positions/ qualifications	
5	Products and services	
6	Goods (trade)	
7	Units of measure	
8	Types of socio-economic units	According to a number of criteria
9	Types of administrative-territorial units	According to a number of criteria
10	Countries/nationalities/ citizenships	
11	Postal codes	
12	Accounting codes	
13	Currencies	
14	Conditions for payment	
15	Types of properties	ibid.
16	Conventional cartographical signs	
17	Types of constructions	ibid[*)
18	Types of quality of the ground	ibid[*)

*) assumed as sectorial
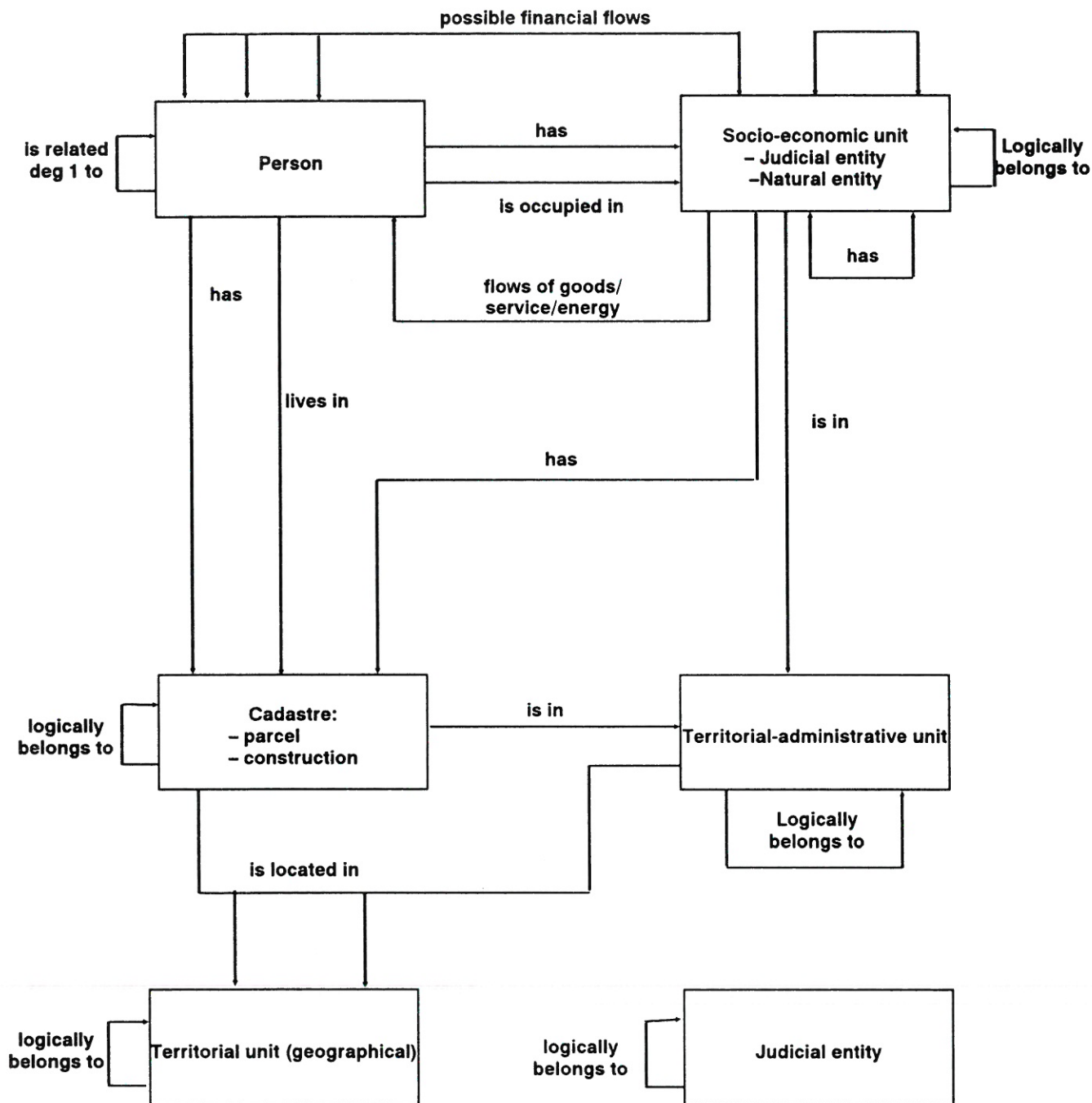
Figure 2. The Model of the Basic Entities of a Socio-Economic System

The above (i)-(iv) set can be considered as a **coherence kernel** of the ISs within the socio-economic (sub)systems.

Independently of any economic and political characteristic, there is an invariant structure of the state, having, apart from population and the basic economic and non-economic organizations:

(i)   a symbolic person who represents the state and whose powers may vary from symbolic to total;

(ii) a collective legislation generation body (e.g.the Parliament);

(iii) a Government;

(iv) a central public administration;

(v)   a local public administration;

(vi) a juridical structure which solves the legally detected infringements.

This structure induces a structuring of the state IS.

Independently of any economic or political characteristic, a general model of the socio-economic system informatization can be defined. The model used in INFOR is shown in Figure 3 [Costake, Jensen, Melenciuc, Neagu, Sorensen, 1992].

By way of convention, the juridical IS was not represented distinctly in this Figure, in order not to complicate the representation. The juridical IS can be considered as a dual of the public administration's IS, being aware of the fact that the juridical data bank is updated by the legislation component of the context.

The Figure 3 model supports the following messages:

(i)   ISs are created and operate in an environment called the "informatization context". This environment contains, for instance, relevant general and specific IT/C and IS legislation, general classifications, IT/C and IS standards and technical recommendations, procurement procedures, telecommunication infrastructure, IT instruction and education infrastructure, IT management procedures a.s.o.;

(ii) the ISs of the socio-economic agents and of the public administration are connected to the coherence kernel, their updating being performed by the local public administration.

Independently of any economic and political characteristic, there is a general prerequisite for managerial effectiveness, which can also be interpreted as a non-determination relationship [Costake, Vasile, Kovary, 1992], as follows:

(i)   as any socio-economic (sub)system can be very complex, its description contains a set of interconnected specialized aspects [Haimes,1981]. Their number is, say, n;

(ii) every aspect identifies a number of elements (entities, relationships, etc).Their average number per aspect is,say,m;

(iii) data collection, processing, storage and distribution can be organized in parallel flows. Denoting by p the number of these parallel flows and by g the IT/C generation used,a function $p(g)$ can be defined;

(iv) in order to gather relevant information,the aspects must be observed for a certain time. This may depend on the nature of the aspect and also on the type of the algorithm(s) used. Denoting by To the average required observation time per aspect and element and by a the representative algorithm class in the sense of the evolution of a theory, a function $To(a)$ can be defined;

(v)   in order to generate relevant management information,a final processing is to be done. The average processing time per aspect is denoted by $Tp(a,g)$;

(vi) the total time necessary for management information generation,denoted by Tem,is:

$$Tem(a,g) = n(Tp(a,g) + mTo(a))/p(g) \quad (2)$$

(vii) in order to generate a rational decision, a time, say, Td is needed. This time depends on the manager's education and experience, denoted by e. A function $Td(e)$ can be defined;

(viii)the decision implementation needs a time, say, $Tdi(g)$;

(ix) the management objective(s) may be defined in terms of objective functions, using acquired and perhaps processed information. Under

The national informatization context
(specific legislation, unitary classifications,
standards, public data transport facilities, etc)

The management of the
socio-economic units

The IS of the socio-economic agents

CA

Population

The IS of the central public
administration & central juridical IS

CA

The IS of the local public
administration & local juridical IS

CA

Unitary definitions
Unitary nomenclatures
Basic permanent registers
Juridical data bank

DSS, databases and socio-economic
models

The management of central and local public administration

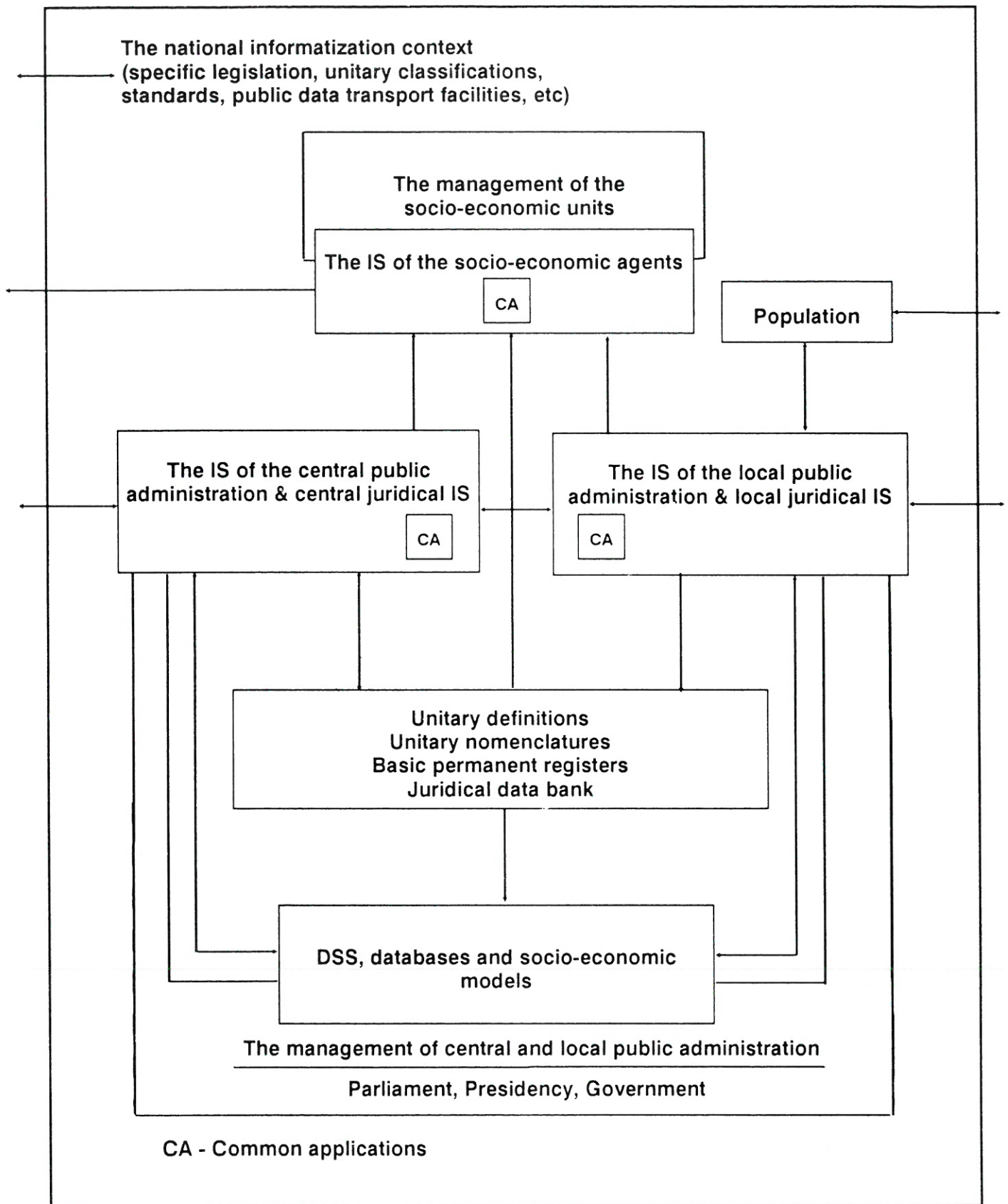Parliament, Presidency, Government

CA - Common applications

Figure 3. The Model of the Informatization of the Socio-Economic System

certain conditions, optimal values can be computed;

(x) an admissible time, say, Tca can be determined on the ground of limitation of the maximal dynamic error versus the maximal speed of variation of the objective function(s) or in response to and/or anticipation of disturbances [Costake, 1966].

(xi) a general condition can be written:

$$Tem(a,g) + Td(e) + Tid(g) < = Tca \qquad (3)$$

The relationship (3) can be interpreted as a non-determination relationship. Taking into account that, in general, $Tp(a,g) < mTp(a,g)$:

$$nm < = (Tca-Td(e)-Tid(g))p(g)/To(a) \qquad (4)$$

The relationship (4) suggests that the relevance of the reality modelling is restricted by the scientific (a) and technological (g) levels and is influenced by the managerial education (e).In other words,the informatization context may drastically limit the overall performance of its socio-economic (sub)system. To put it differently, the informatization context counts a lot in setting out an informatization policy.

Independently of any economic and political characteristic,the technical and technological progress,with excellence in the IT/C field:

(i) fastly acts in the direction of cutting down the cost- effectiveness coefficients;

(ii) diminishes the manpower component mainly in the hardware costs;

(iii) extends the market segment per a cumulated investment ratio;

(iv) increases the proportion of software and services in the total IT/C output;

(v) diversifies the application areas of the IT/C.

At the same time, one can identify a number of IT/C applications which can be defined as "common applications", which change very slowly in time, in terms of problem formulation. Common applications are usually associated with such fields as MIS, MRP, accounting, budgeting, human resources management and some others;

(vi) widens the gap between various countries as to their degree of IT/C literacy. Perhaps the

domain of decision support systems [Filip, 1989, 1991] is a typical case.

Independently of any economic and political characteristic:

(i) joint use of IT/C resources;

(ii) transparent centralized procurement of IT resources according to published procedures;

(iii) clear-cut distinction between the end user who pays and the specialized executor;

(iv) standardization of the IT/C resources and procedures;

(v) co-ordinated and distributed management and IT/C instruction and education,

generate important human, physical and financial savings, also increasing labour productivity.

Practically independent of any economic and political characteristic of the socio-economic system, there is a growing interdependence in the modern world,including the formation of regional economic communities and multinational societies. This interdependence asks for:

(i) standardization of administrative formats and procedures at national and international level;

(ii) standardization of hardware and software interfaces and procedures in order to achieve interoperability;

(iii) introduction of IT/IS specific legal provisions and their compatibility or even unification at international level.

Two consequences appear:

(i) the foreign trade activity depends on the effectiveness of the implied IS;

(ii) under certain conditions,countries can be eliminated or protected via standardization and/or legal provisions.

These two possible consequences leave no choice: conformity to internationally accepted norms is mandatory,at least on medium- and long-term. In the case of Romania, UN and EC are obviously the main poles. This situation clarifies the strategical and technical choices, mainly those oriented towards the contextual

problems.

Practically independent of any economic and political characteristic of the socio-economic system, there is an important interrelation between macroeconomic IS and microeconomic activities/IS, some examples being shown in Tables 2 and 3.

This interdependence leads to:

(i) informatization of a socio-economic system implying the co-operation between public administration and economic agents;

(ii) efficiency of the national IS viz.IT/C sector not resulting automatically from the microeconomic activity viz. informatization;

Table 2. Examples of Macroeconomic IS Bearing on or Important for the Efficiency of the Microeconomic Activities

No.	Microeconomic activity (examples)	Examples of related macroeconomic IS	Comments
1	2	3	4
1	Marketing based on statistically representative samples	– Foreign trade by goods and country statistics – Persons, business and non-business units, administrative-territorial units, and cadastre interrelated informatized permanent registers	Specific registers and VAT databases can be built on this basis
2	Banking	ibid. – reliable public data networks	
3	Person-oriented activities: - education - social security - health - property evaluation and/or assessment - terrorism and other antisocial conducts prevention	ibid.	Internationalization of the organized crime and the increased mobility of persons imply a global approach
4	Long-range planning of the business units	– CA law and decrees generation and/or voting – DSS for Government decisions based on socio-economic mathematical models (an integrated statistical information system is included)	Because of errors in governmental or Parliament decisions possibly generating large and long-term losses, it is highly advisable to first simulate the effects
5	Long-term retrievable information preservationfor legal actions	Optical disk based administrative archives	
6	Secure&high speed commercial transactions and communication	EDI — reliable public Electronic mail — data network EFT — support	
7	State subsidies for selected industries and business units	Financial (taxes, customs, budget) IS Social security IS	A state financial policy implies performant financial, statistical and social security Is

Table 3. Some Examples of Microeconomic IT/IS Solutions Well Serving Macroeconomic IS

No.	Microeconomic solution	Macroeconomic implications
1	Banking IS, including the credit cards use	The payment of wages and other revenues via bank accounts can be generalized. also simplifying tax collection.
2	EFT and interbank compensation	The reduction of imobilized transaction funds
		The increase of speed in economic transactions, while stimulating commercial activities
3	Generalization of informatized data acquisition e.g. the use of barchart codes	Larger possibilities for a differentiated VAT IS.
4	The periodic statistical reporting of data by socio-economic units within the socio-economic system. supported by the basic permanent registers system	The possibility of management-oriented information output. including the cartographic one
		The possibility of building detailed mezo and macroeconomic models. capable of simulating the likely socio-economic consequences of new legal provisions.

(iii) economic efficiency of the activities within a socio- economic system depending on the technical level, the integrity and performance of the IS at macro and micro levels. Once again, an informatization strategy is not only an economic,legislative and technical matter, but also it bears on the political sphere.

4.The Main Proposals of INFOR.

4.1 The Model of the IS Integration

The model of the IS integration proposed in INFOR is shown in Figure 4.

This model allows the creation of coherent logically layered databases.

4.2 The Components of INFOR

CN1-Specific Legislation

Here is the specific legislation taken into consideration :

a) **the software protection law**, based on the EC directive [directive,1991]. Many countries integrate software protection in the law of the protection of intellectual property.In order to simplify a bill passing, INFOR recommends a distinct law specifying the protection of the software property;

b) **the personal data protection law**. No full

agreement has been reached in this field even by the EC [e.g.project,1991; SEMA, 1992], the 1981 Convention of the Council of Europe not being ratified by all its member countries and the proposed EC directive still being under discussion [proposal,1991]. INFOR proposes that the OECD recommendations are adopted [recommendation,1982], in a way similar to that of the corresponding Danish legislation [i.e. registration,1978; administration, 1985: access, 1985; register, 1987; register, 1991]. The proposed law should provide for both an autonomous Data Surveillance Authority ("Informatique et liberté") and the regulations concerning the administrative data integration. One view held is that that the French law [informatique,1976] is too restrictive for the state-of-the-art in the IT and may have a by- product protective effect for legally incorrect people and agents. Important savings have been generated by the Danish law by largely using permanent registers (e.g. the elimination of periodic large batch data collections and processings as for censuses, the minimization of data acquisition and the automatic updating of coherent data within ISs, etc.). They point to an important economic interest as well.This protection law might also cover data communication aspects, with a particular emphasis put on EDI and ISDN;

c) **the software fraud law**. This specific legislation should cover various frauds, such as virusing;

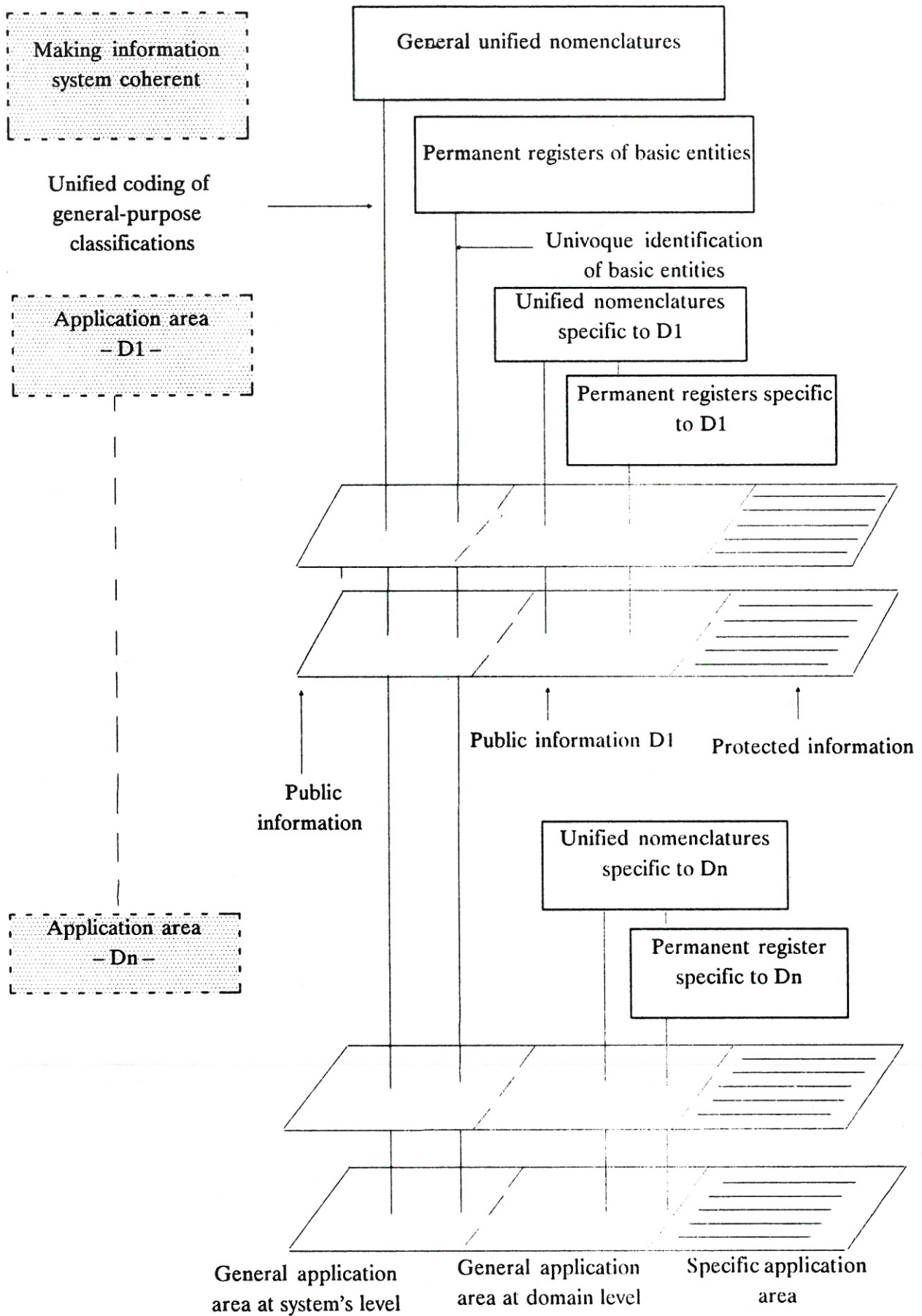d) **the legal recognition of electronic documents and signatures**, of which technical, economic

Figure 4. The General Diagram of the Layering of the Information Systems in Public Administration

and financial implications are of large consequence. Governmental electronic mail [e.g. TEDIS], EDI,electronic fund transfer and electronic archives are examples of the merge of IT and telecommunications, with a large impact on trade and banking and on the public administration activity. Technical and legal problems of these areas have been investigated [Wright,1991; Stoven, 1990 etc.];

e) **other aspects.** INFOR also proposes that, under certain conditions, bills or decrees(Government's decisions) should be checked with respect to affecting certain provisions on IS; perhaps affecting is implicit and makes some of the provisions and/or dates superfluous or non-realistic, even a possible resources waste may result. INFOR took into consideration a number of real cases.

CN2-Unitary Classifications

A list of general-purpose unitary classifications was presented in Table 1. Obviously, creating and maintaining most such classifications is part of the current activity of the national statistical offices. The main proposals refer to:

a) the compatibility with UN and EC classifications, that is co-operation with Eurostat;

b) the obligation for transmitting updates copies or updates on magnetic support and/or for organizing direct access via WAN.

CN3-Standardization

Standardization gets ever more important and no one denies it.The field of IT/C is an excellent example of direct and indirect economic benefits.Economies of scale made it possible, by interchange and interoperability, the technical and technological advances implementation by minimizing the user's specific effort and by rendering most of the existing investment perennial, and larger independence of proprietary solutions of some unique vendors becoming apparent in the modern IS [e.g.CNI- CIIBA, 1991, etc.]. The literature on this subject is very productive. A very good introductory manual is Digital's [DEC,1991].The first standards and compatibilities proposed in INFOR are shown in Tables 4 [guide,1990] and 5.

Viewed as a gradual process, standardization

based on technical recommendations and followed implementation guides. The list of the first INFOR generated technical recommendations is given in Appendix A.

Table 4. Code of Priority ISO Recommendations

No.	Domain	ISO code
1	General technical characteristics	
	a) Connectivity (levels 1-4)	7498, ADD1
		7498-2
		7498- 3
		7498-4
	(i) WAN	7776, 8878
	(ii) LAN	8802-2, 3, 4
	(iii) optical fibre interface	9314-1, 2, 3
	b) Applications (levels 5-7)	
	(i) file transfer (FTAM)	8571-1,2,3,4,5
	(ii) e-mail	10021-1,2,3,4,5,6,7
	(iii) EDI	9735
	c) Security	7498-2
	d) Portability	
	(i) operating systems (POSIX)	9945-1
	e) Languages	
	(i) C	9899
	(ii) FORTRAN	1539
	(iii) PASCAL	7185
	(iv) COBOL	1989
	(v) DB interrogation language (SQL)	9075
	f) Office automation	
	(i) Standard generalized marking language (SGML)	8879
	(ii) Office document architecture (ODA)	8613-1, 2,3,4,5,6,7,8,10
	g) Computer graphics	
	(i) Image memory and transfer metafile	8632- 1,2,3,4
	(ii) Graphic interface kernel (GKS)	8651-1,2,3,4
2	Information support	
	(i) Magnetic tapes 1/2":	
	- unrecorded	1864
	- recorded 1800 bpi	1863
	- recorded 6250 bpi group coded	5652
	- labelled	1001
	(ii) Diskettes	7665, 7901, 6596- 1,2
		7487-1,2,3
		8378-1,2,3
		8630-1,2,3
		8860- 1,2
	(iii) Magnetic cards	
	- physical characteristics	7810
	- magnetic recording	7811
	(iv) Barchart code	EAN (de facto standard)
3	Design methods	RACINES
4	Public administration architecture	EC guide

Table 5. Recommended Compatibility and/or Interfaces

No.	Product category	Platform type			Comments
		Computer	Minicomputer/ departmental computer	Microcomputer	
1	2	3	4	5	6
1	Hardware	–	–	IBM/Apple	de facto standard
2	Operating system/develop. environment	Interface	UNIX5. X, XWINDOWS (AS400, VMS) EPHOS-OSI Interface	UNIX5.X, WINDOWS (MS DOS, OS2, MAC)	de facto standard POSIX under development
3	Communic. managem.	OSI/(TCP-IP*)) X25/X32 ISO 8802 -2,3,4	OSI X25/X32 (TCP-IP*)) ISO 8802 -2,3,4	OSI X25/X32 (TCP-IP*), SNA*)) ISO 8802-2,3,4	if advised by the data carrier
4	Text processing	1)	1)	Word, Word Perfect, Pagemaker (Ventura, Wordstar)	de facto standard information exchange
5	Translators	C, Cobol (Fortran, Pascal, Prolog)	C, Cobol (Fortran, Pascal, Lisp, Prolog)	C, Cobol (Fortran, Pascal, Lisp, Prolog)	standards
6	Table generation/processing	1)	1)	Excel, Lotus, Quattro	de facto standard information exchange
7	File/DB management	SQL user interface Oracle, ISIS 2)	Oracle, Isis 2)	dBase, Foxpro, Oracle, Isis	de facto standard information exchange
8	Analysis and design methods	Racines/Merise	Racines/Merise	Racines/Merise	de facto standard

1) any software product
2) DB only

INFOR expressed the necessity for forming a competence kernel, i.e. an information and consultancy centre for public administration in such fields as UNIX, RDBMS, LAN, WAN, client- server architectures and CASE. Of course,the creation of such a kernel with about 50 specialists supporting the central and local public administration, supposes a technology transfer oriented organization, perhaps with open show rooms and conference rooms and also an information centre.

The EC guidelines to the IS architecture [guidelines, 1990] provide a good basis for the development of integrated hierarchical IS, using not only PCs and WSs but also departmental minicomputers and mainframes.

CI1-IT Procurement Procedures

The important customer position of public administration makes IT procurement procedures capable of showing effectiveness, quality, performance and economies of scale , an attractive instrument of public administration,used in many advanced countries.A special reference should be made to the UK's CCTA,where the procurement procedures have a specific role within de IS design cycle. [Jones and Goldberg, 1991]. The World Bank produced evaluation recommendations for complex systems [e.g. WB,1991], Denmark adopted a standard frame contract [frame,1992], etc. INFOR proposes to supplement specific IT procurement procedures by a follow-up IS.

CI2-IT and Management Education and Training Programmes

The necessity for promoting an IT assisted management training quite obviously led to the analysis performed at step 2, the respective proposal being contained in INFOR.

CI3-Specific R&D, International Co-operation and Technical Support

The development of an integrated IS and, in general, of effective IS, is also conditioned by a good communication support, at least in the classical form of a medium-speed packet switching public WAN, if not an ISDN support. Such actions were initiated by both the state and the private sector in Romania.

The following specific R&D domains were recognized as priority domains for Romania in the IT field:

a) integrated DB & KB ISs, including administrative ones;

b) secure open systems;

c) computer- aided system engineering;

d) electronic data interchange,including LAN,MAN and WAN; access to international networks;

e) automatic data acquisition;

f) computer modelling and support of analysis and decision in socio-economic systems;

g) computer-aided instruction and technology transfer;

h) small competence centres with regard to the European countries,in the R&D domains outlined by the international co- operation programmes and the IT borders.

The international co-operation including international technical assistance and economic aid in the IT field may cause national and international co-ordination problems, as:

a) nearly every domain of economic aid, promoted by a specialized agency,has a more or less important IS component;

b) foreign experts are usually user-domain oriented and, naturally, not willing to consider the IT resources sharing problem;

c) international programmes such as PHARE have not defined an official general policy of the national IS developments yet.

In this respect INFOR was proposed as a co-ordinating technical instrument in Romania.

CI4- Management of the IT Activities in Public Sector

Two main orientations have been considered:

a) setting up of a small number of interministerial (intersectorial) advisory committees (IS integration, IT/C co-ordination, specific legislative problems, IT/IS education and training).

b) making a distinction between:

- the financing end- user and the IT system designer and service provider;

- the information-owner and the information processor.

(ii) The IS Coherence Kernel.

SG1-Unitary Nomenclatures Server

The proposed IS should let national and international users get standardized access to the nomenclatures, including multilingual descriptions and, possibly, partial translations of (conversions to) other existing nomenclatures of international and/or national use.

SG2,SG3,SG4,SG5-Basic Permanent Registers

The basic permanent registers reflect the entities presented in Figure 2.These registers should contain data of general use, as well as pointers. The basic registers make it possible to use unique identifiers for the basic entities of a socio-economic system. They are used in relationship with public administration and with the economic agents' activity. They simplify the automatic identity data acquisition and validation and testify on the level of civilization. Due to its public character,the information contained by every register should be the property of a public

administration body or governmental agency responsible for the associated metainformation, for data collection, validation, storage and security methodology and working procedures, for granting access to information to other organizations as an on- line or off-line file transfer or as ad-hoc interrogations, according to legal provisions.

In parallel with the information ownership by several specialized public administrative bodies,the edp realization of the permanent registers in a single specialized organization may determine firmer security and sensible savings (up to 70% in hardware,5o% in software and 15% in personnel costs), as suggested by Data Centralen of Denmark's experience [RPC,1992]. The edp support and organization of the permanent registers as a public information resource may also induce a better uniform service for various users and simplify the implementation of the unique desk ("guichet unique") concept.Of a great importance does this concept prove for higher performance and quality in public administration as service provider to natural and judicial persons [e.g. guichet,1991]. According to this concept:

a)   a person may address a single office and ask for information and assistance in his/her relationship with public administration;

b)   the individual information input is validated and the acceptance confirmed;

c)   updating of a record in a basic register is (automatically) propagated to other public and other accepted user files;

d)   detection by a public agent of a non-reported updating situation initiates an updating action, followed by a confirmation to the agent and to the entity concerned.

The unique desk concept is presented in Figure 5.

The data structure of the basic permanent registers has some general pattern.Under certain conditions,pieces of information in the permanent registers provide the informational support for public value added data bank services.

SG2-The Population Permanent Register

The proposed data structure is shown in Figure 6, the information contents being proposed in Table

6. A unique identification of persons eases the introduction of credit cards and of other similar automatically readable documents, while reducing cash necessities. This permanent register is considered as a database containing public information of general interest,in the sense used in Denmark [e.g. population,1992].In some other countries , France for instance,the use of the population permanent register is legally restricted to social security (the identification code being named "social security code").A detailed consideration of the joint use of administrative personal files is rather too complex to be dealt with in the present paper.

SG3-The Economic and Social Agents' Permanent Register

INFOR proposes the creation of a permanent register for economic and social agents i.e.all the organisations and identifiable parts on/off the socio-economic system.This is more than a "business register" or an "enterprise register" which only refers to economic agents .

The concept of agent has to be carefully defined.In fact,this concept contains,in general,a duality of a judicial entity (the agent seen as an organisational,economic and social unit) and a natural entity (the agent seen in his/her property and commercial relationships) [Pommier, 1992]. For instance, a person may have a legal entity,but work in a natural one. Details of the problem associated with the French SIRENE permanent register were published [e.g. sirene,1986, 1988,1991]. The data structure proposed in INFOR is shown in Figure 7 and the information contents is presented in Table 7.

Due to a great mobility, the agents register and the population register are necessarily, at least logically, central registers with territorial selections, for increasing the performance/cost ratio of most of the interrogations.Fast updating of their contents including the inter-register pointers is very important for the general socio-economic activity.

SG4-The Territorial-administrative Units Permanent Register

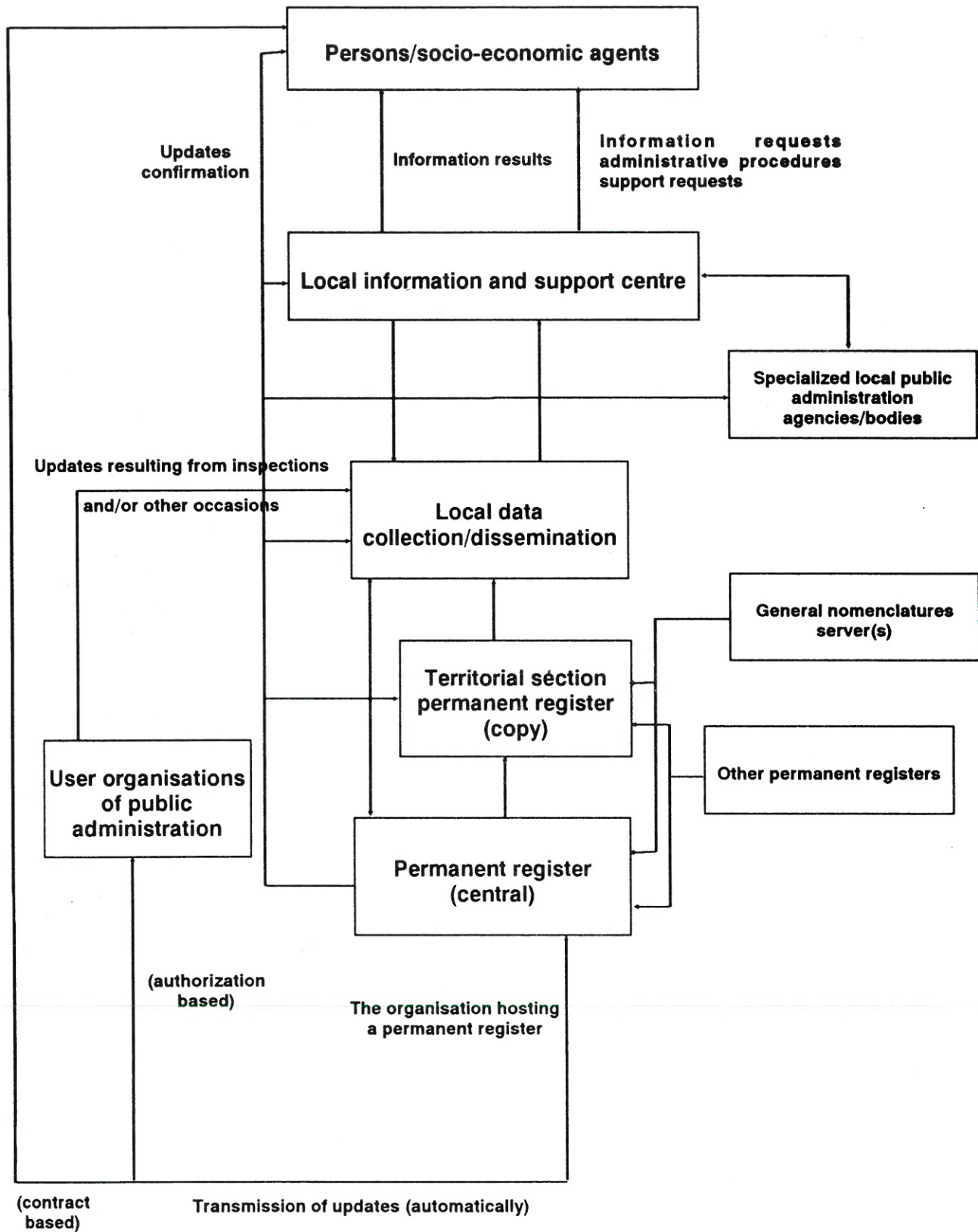The territorial-administrative units permanent register refers to human collectivities. Apart from
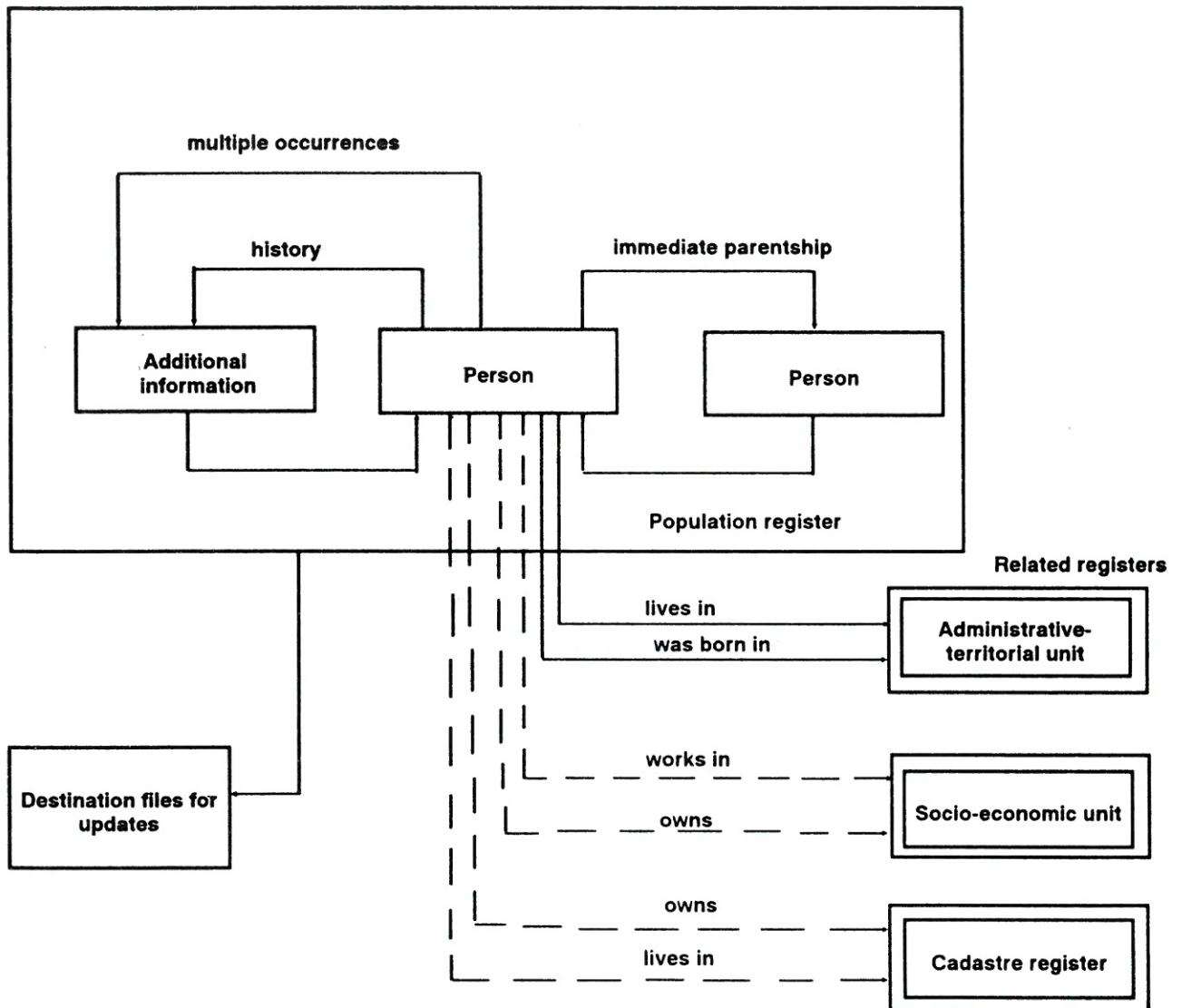
Figure 5. The Unique Desk Concept

Figure 6.   Population Register Data Structure

Table 6. Population Register Information

No.	Description	Possible		Comments
		history	multiple occurrences	
1	2	3	4	5
1	**A. Identification**			
	Identifier		–	including date of birth and sex
2	Name/Forename	X	–	
3	Permanent home address	X	X	
	B. Characteristics			
4	Citizenship	X		
5	Nationality	X		
6	Marital status	X		
7	Record status			
	C. Pointers			
8,9	Parents	X		possible adoption
10	Spouse	X		
11	Children		X	
12	Socio-economic unit - working place		X	optional
13	Idem - property	X	X	idem
14	Parcel - property		X	idem
15	Construction - property		X	idem

Table 8. Territorial-administrative Register Information

No.	Description	Possible		Comments
		history	multiple occurrences	
1	2	3	4	5
	A. Identification			
1	Identifier	–	–	
2	Description	X	–	
3	Geographical location		–	centre
	B. Characteristics			
4	Unit type	X	–	
5	Validity (updated/outdated)			
	C. Pointers			
6	Logically super-ordinated territorial administrative units	X		

large historical and administrative divisions such as provinces, regions, counties, municipalities, towns, communes, villages, roads and streets, even street segments (i.e.between two intersections) are included in this register.

The proposed data structure is shown in Figure 8, with the information contents being presented in Table 8.

SG5-The Cadastre Permanent Register

In INFOR acceptance the cadaster permanent register hosts two register-type entities:parcels and constructions.In fact, a set of inter- related permanent registers could be considered: parcels register, buildings and dwellings register, industrial and other economic constructions register a.s.o. By convention,the alphanumeric information is only considered , including pointers to cadastral maps,which are supposed to be archived.After the conversion of maps on optical disks and/or their digitizing,the set of numerical cartographic information can open the reference geographic database-SG6.

The data structure of the cadastre permanent register is shown in Figure 9 and its generic information contents in Table 9.

The last two permanent registers (SG4,SG5) being spatial oriented and including low mobility elements,can in principle be approached locally. However, not depending on organisational changes means the same centralized registers with territorial selections concept as mentioned above.

Coherence Public Data Banks

The **geographic reference database (SG6)** has already been discussed in the context of the cadaster permanent register. INFOR considers the geographic reference database as the first application layer of a logically unique geographic information system,whose application layers are created and maintained by specialized governmental and non-governmental organizations;there is a plethora of books on this subject [Burrough,1986].

INFOR considers the **administrative data dictionary (SG7)** as a specialized data bank whose

data structure is presented in Figure 10.This structure complies with the international standards. The administrative data dictionary can be considered as a register containing the information pieces used by public administration. It is viewed as a dynamic component of which next phase consists in the four layers defined in the information resources dictionary system standard [IRDS,1990].

The **legal data bank (SB1)** plays a prominent role in the socio- economic transition,when a large number of national laws are enforced and when knowing international laws and regulations and some other countries' laws tends to be more and more demanding. As an international experience in this field exists [e.g. legal,1991], INFOR proposes:

a) generation and maintenance of a data bank storing texts in their original formats (as well as official translations for non- Romanian-written texts), using powerful text retrieval facilities: DBMS (UNESCO's ISIS can also be taken into consideration) and, perhaps, optical storage.

b) simultaneous creation of a register of normative documents, including an unique official document identifier, as, for instance, the French experience [circular,1986].

c) examination of the draft normative documents from the point of view of the IS implications and/or integration problems. A structure proposal of a standardized document and quality assurance manual and procedures may follow up.

The existence of a specialized division or of an agency of the Ministry of Justice,capable of certifying the conformity of the stored information , is supposed by all these activities.

(iii) Data Communication, Archives and Interface Components

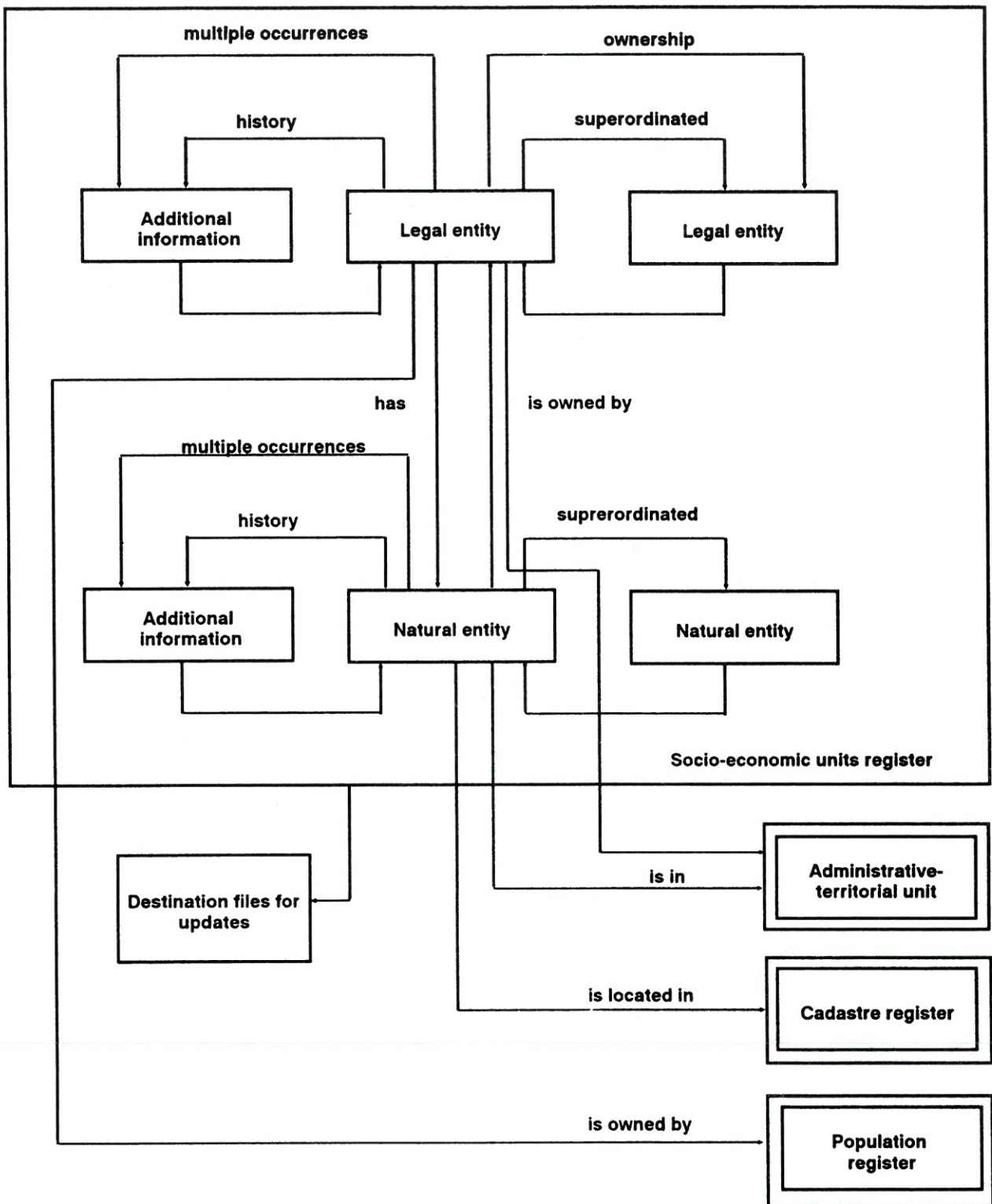Under INFOR two components are proposed for interfacing the sectorial IS:

Figure 7. Socio-economic Units Register Data Structure

Table 7. Social-economic Units Register Information

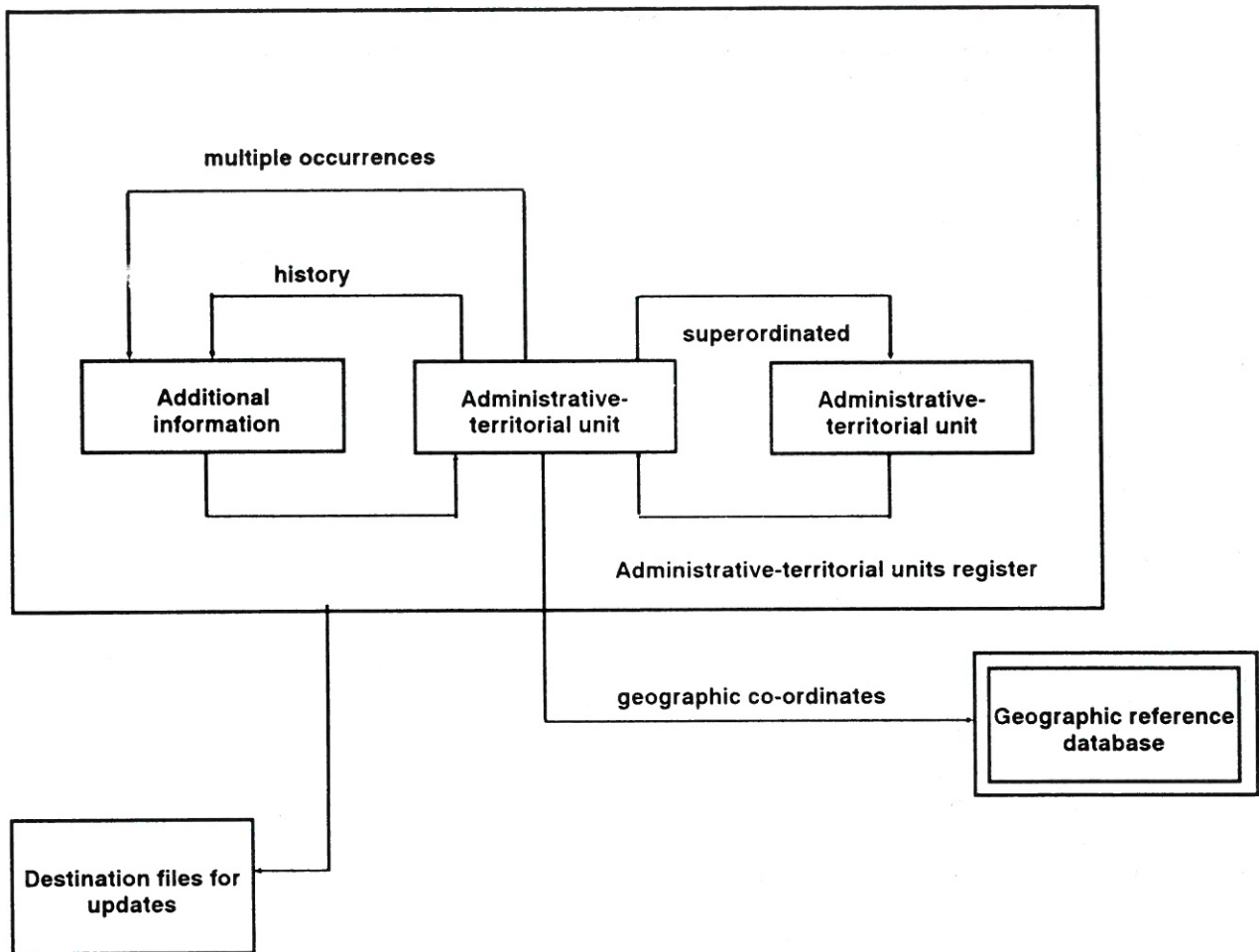| No.	Description	Possible history	Possible multiple occurrences	Comments
1	2	3	4	5
	Judicial Entity			
	A. Identification			
1	Identifier			
2	Description			
3	Commercial name			
4	Localisation address			Territorial-administrative unit code
5	Post address			
	B. Characteristics			
6	Foundation type code			
7	Foundation date			
8	Activity code	X	X	
9	Activity start date	X	X	
10	Activity stop date	X	X	
11	Personal number category code	X		
12	Business value category code	X		
13	Capital category	X		
14	Property type	X		
15	Legal status	X		
16	Administrator type			
17	Entity status code			
18	Owner entity type	X		
	C. Pointers			
19	Hierarchically superior judicial entity identifier	X	X	
20	Owned by judicial entity identifier	X	X	Socio-economic unit or person
21	Owned by natural entity identifier		X	
	Natural entity			
	A. Identification			
22	Identifier			
23	Description			
24	Commercial name			
25	Localisation address			Territorial-administrative code
	B. Characteristics			
26	Foundation date			
27	Activity start date			
28	Activity stop date			
29	Activity code	X	X	
30	Personal number category code	X		
31	Entity status code			
	C. Pointers			
32	Owned by judicial entity identifier			
33	Logically superior natural entity identifier			

Figure 8 . Administrative - territorial Units Register Data Structure

Table 9. Cadastre Register Information

No.	Description	Possible		Comments
		history	multiple occurrences	
1	2	3	4	5
	Parcel			
	A. Identification			
1	Parcel identifier			
2	Parcel localisation			Territorial-administrative unit identifier
3	Geographical location			Reference geographical database identifier
	B. Characteristics			
4	Technical characteristics	X	X	
5	Economic characteristics	X	X	
6	Legal characteristics	X	X	
	C. Pointers			
7	Hierarchically superior parcel identifier	X		
8	Construction identifier	X		
9	Owner identifier	X		Person or socio-economic unit
	Construction			
	A. Identification			
10	Construction identifier			
	B. Characteristics			
11	Technical characteristics	X	X	
12	Economic characteristics	X	X	
13	Legal characteristics	X	X	
	C. Pointers			
14	Hierarchically superior construction identifier	X		
15	Parcel identifier			
16	Owner identifier	X		idem

SB3-Administrative Data Communication and Archives.

This title heads a number of standardized procedures, software and IS components such as:

a) a Romanian character text processor (diacritics specific to the Romanian language and to the languages of the main nationalities living in Romania) accepting various fonts and office document architectures [ODA] for mixed text-graphics- image pages;

b) a general file transfer program including data security mechanisms certified for administrative use;

c) a reliable administrative electronic mail IS for Government - ministry; Government - prefects; ministry - ministry; Government- Government; Government - international organizations, such as the administrative network of France [TEDECO, 1990];

d) an administrative EDI IS;

e) a standardized WORM administrative document archives system, automatically generating and updating the corresponding archives register;

f) a standardized LAN based client-server integrated administrative office automation system.

SE1-The Interface between the Government IS and the Ministerial/Local Public Administration IS.

This component is meant as a set of standardized procedures.This interface will also be proposed for the Parliament IS and the Presidency IS and, perhaps, for press news databases or banks.

The link between various ISs represented in Figure 3 is schematically drawn in Figure 11.

(iv) Common general -purpose IS

Four transversal common IS at central and local public administration levels were identified:

- SA1-public administration accounting IS

- SA2-budget planning and follow-up IS
- SA3-human resources management IS
- SA4-material resources management IS

Nor will the elaboration of technical solutions be the main problem either , but their acceptance by various organizations of the central and local public administration. First of all, this implies I/O flexibility , in order to parametrically customize them as well as the parameterized user processing options and standardization, let us say, under UNIX. Another more specific requirement is flexibility with respect to sudden methodological changes, allowing that the mandatory classifications, data structures, validations and processings to be transmitted as files by the methodology generating authority.

That is the reason why a specific structure can be recommended for the program system (Figure 12).

(v) Other general- purpose IS and an IS initially not specified in INFOR

SB3-Science and Technology Data Bank

Interfacing specific EC data banks to this data bank, is an important R&D resource, with obvious direct and indirect general consequences.

M1-Population and Labour Dynamic Model

The population (demographic) model is the kernel of the socio- economic development model. Labour dynamics derives from population dynamics. Conversational decision support population dynamics models were developed in Romania too [Costake and Goreac, 1988].

M2-Input/Output Oriented Macroeconomic Model.

One of the recognized models is the Danish ADAM model [DAM, 1986].

4.4 Sectorial IS Priorities.

Though INFOR makes no such reference, the priorities given to the sectorial IS are not to be ignored.The analysis in Figure 13 permitted that
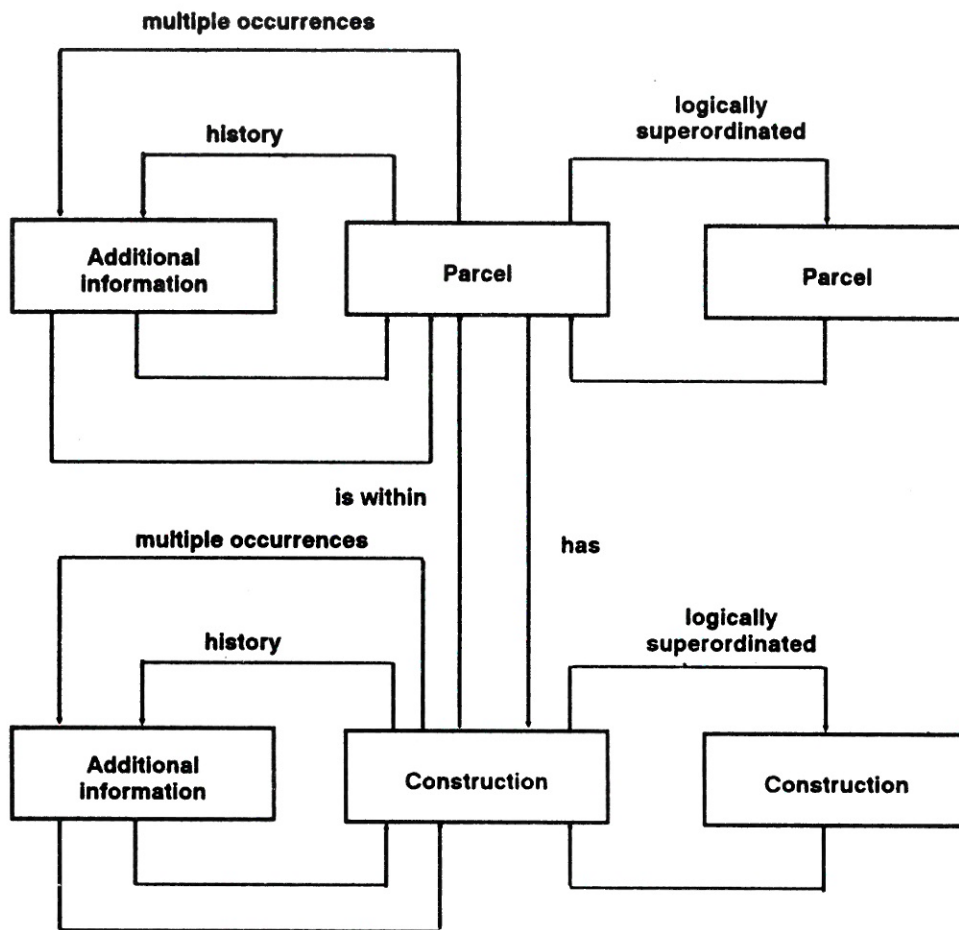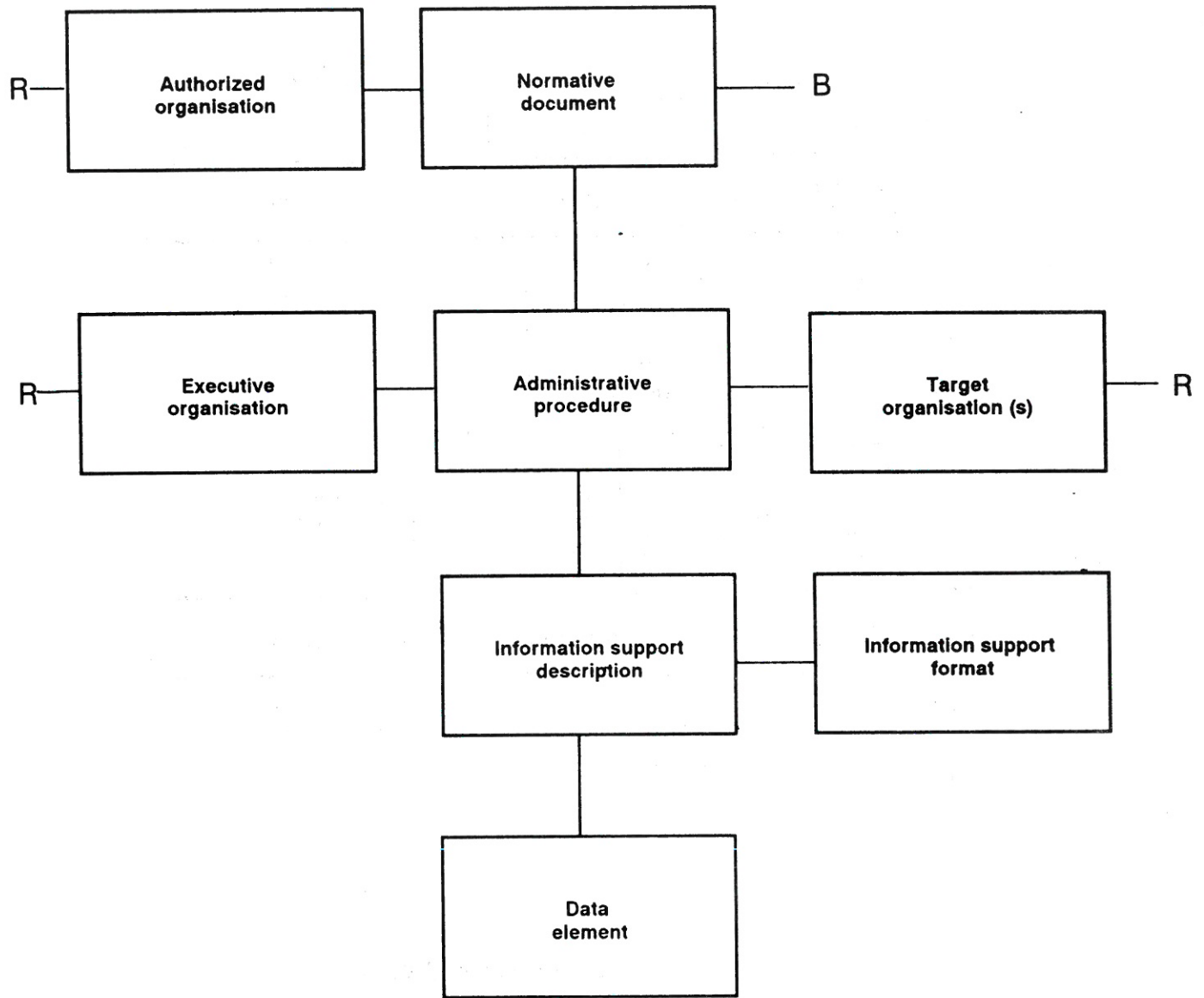
Figure 9. Cadastre Register Data Structure

Figure 10. Administrative Data Dictionary Data Structure

R - Socio-economic units permanent register (SG3)
B - legal   data   bank (SB1)

Legend

□ − SIPAL

▨ − Specific/local applications

− metainformation

− information

SE1 − Government/public administration IS interface

SG7 − Administrative data dictionary

SB3 − Administrative data communication and archiving

SG1 − Unitary nomenclatures server

Government's IS

SE1

SG7

SB3

Sectorial public administration IS

Common application IS SA1...SA4

SG1

Permanent registers   Data banks

SG2...SG6   SB1, SB2

SS1   Banking IS

INFORMATIZATION CONTEXT

(including public data transport network)

Figure 11. The Links Between INFOR's IS

the following sectorial IS priorities should be identified:

a) the financial IS,mainly taxation and customs taxes IS,as it controls one of the main cash flow inputs into the state budget;

b) the social security IS,as it controls one of the main cash flow outputs from the budget and also has a great social impact;

c) the statistical IS,as it is the main official information source for population, enterprises and other organizations in the state and for learning about trends in the socio-economic system as well as the main information source for the mezo and macroeconomic modelling as a basis of the state's decision-making process.As the Danish experience shows [e.g. lovmodel,1991], the integrated statistical IS can generate detailed samples required for forecasts on the likely socio- economic impacts of the proposed new laws and regulations,as a computer assisted instrument which the legislation generation process makes use of.

d) the banking IS,mainly electronic fund transfer and banking interchange,as:

 – readiness and security in banking have a major impact on profitability ;

 – the banking IS stimulates the cashless trade and payments and the generalization of the population's bank accounts.

The four is are INFOR-considered as the "societal informatization engine-type IS".

4.5 The Proposed Planning

The design team proposed time-resources-cost CPM diagrams and tables for each component of INFOR. After being discussed in the user groups,they have got consistence. Now they are prerequisites for drawing up a common officially adopted general programme for the INFOR objectives' implementation;this drawing up can be started on the ground of INFOR's official endorsement by the Romanian Government,based on the existing proposal.

A simplified version of the initial rooted planning is shown in Figure 14.

However,another point of view is that of developing a territorial pilot system, and then generalizing it .Such a planning is proposed in Figure 15.

The INFOR-proposed actions for protecting the proposed strategic planning from external disturbances are defined in Figure 16.

INFOR proposes two steps for the societal informatization:

a) **step one (4-5 years)** : outlining the informatization context, the priority coherence kernel IS, the common application IS , the public administration electronic data interchange and archives and the societal informatization engine IS.This first step asks for the public administration co-ordinated actions.

b) **step two (next years)** : a free but coherent development of all ISs within the framework set up at step one.

5.The Cost/Benefit Analysis Problem

Cost/benefit analysis problem difficulties in case of large- scale projects are apparent :

(i) costs can be evaluated,but, usually they are underevaluated;

(ii) qualitative benefits can be listed and assessed, but quantitative ones are difficult to evaluate.

A general diagram of the main components interesting INFOR is given in Figure 17.

On the other hand, governmental funding approval for new projects implies the knowledge of,at least,the order of magnitude of the possible benefits.

The following approach was used in INFOR:

(i) as the inflation rate in Romania is very high, costs and benefits were evaluated in equivalent $ US;

(ii) costs were evaluated using the CPM methodology as explained above; a multiplication coefficient of 2 for the total result was judged as satisfactory,i.e. the total costs resulting from the CPM evaluation were doubled.

The total cost for the first five years was at a level

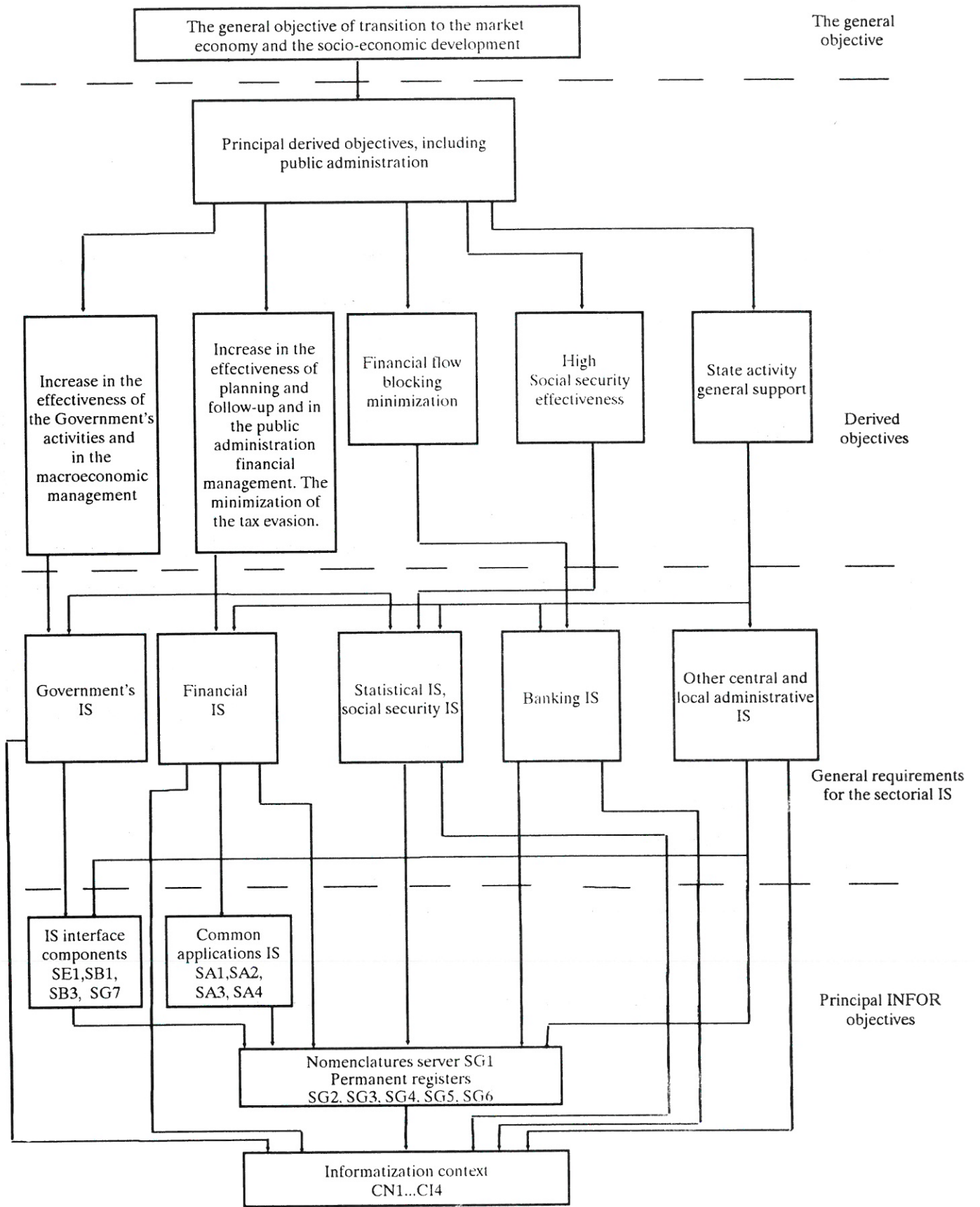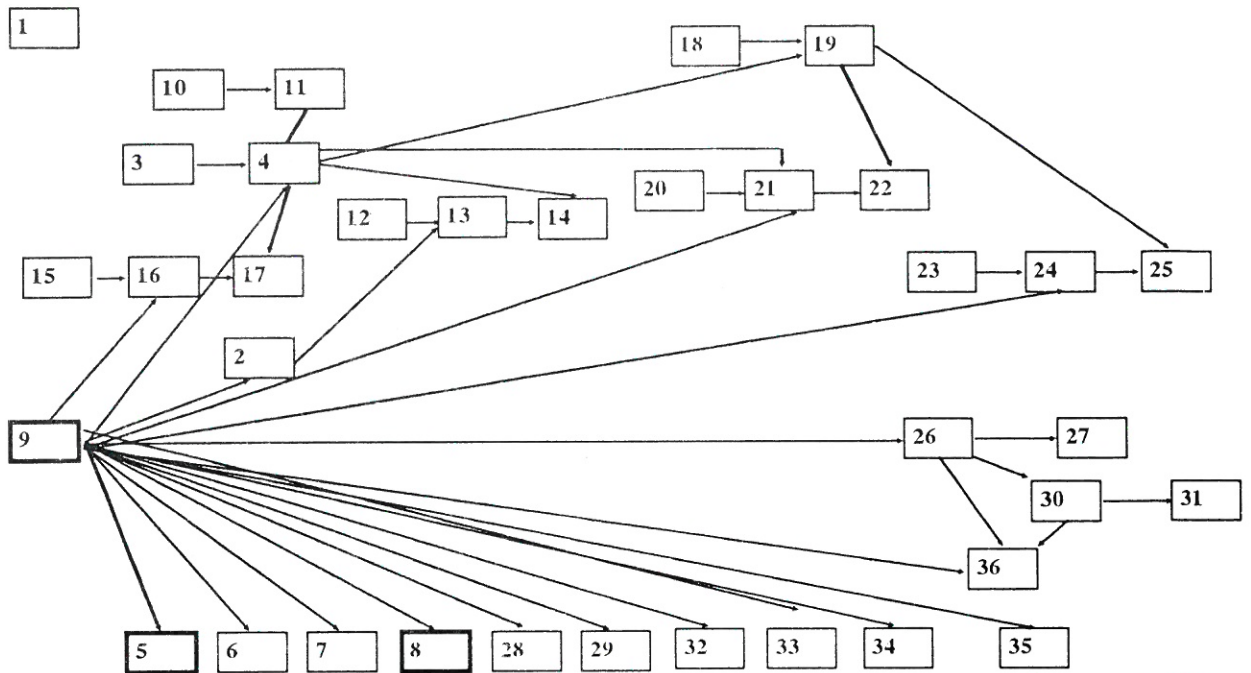| User declared parameterized I/P interface; ODA option	4GL interface
User declared options parameterized processing kernel (to files generated by the methodological co-ordinating body)	Nomenclatures server interface
	Parameterized metainformation interface
	Permanent registers interface
	Administrative data dictionary interface
User declared parameterized O/P interface	
	4GL interface

Figure 12. Common Application Proposed   IS Structure

The general objective of transition to the market economy and the socio-economic development

The general objective

Principal derived objectives, including public administration

Increase in the effectiveness of the Government's activities and in the macroeconomic management

Increase in the effectiveness of planning and follow-up and in the public administration financial management. The minimization of the tax evasion.

Financial flow blocking minimization

High Social security effectiveness

State activity general support

Derived objectives

Government's IS

Financial IS

Statistical IS, social security IS

Banking IS

Other central and local administrative IS

General requirements for the sectorial IS

IS interface components SE1,SB1, SB3, SG7

Common applications IS SA1,SA2, SA3, SA4

Nomenclatures server SG1 Permanent registers SG2. SG3. SG4. SG5. SG6

Principal INFOR objectives

Informatization context CN1...CI4

Figure 13 - The Priority Analysis

ID	Name	Duration	Critical	Free slack
1	The strategic planning of the informatization in Romania	261w	Yes	0w
2	CN1 – IT specific legislation	88w	No	132w
3	CN2A – General interest classifications and nomenclatures	16w	No	0w
4	CN2B – Nomenclatures	41	No	133w
5	CN3 – IT specific standardization	260w	Yes	0w
6	CI1 – Public sector procurement methods	85w	No	168w
7	CI2 – Technical and managerial training	250w	No	3w
8	CI3 – Research develop., intern. co-op. in the IT field	260w	Yes	0w
9	CI4 – Management of the IT activities in public administration	40w	Yes	0w
10	SG1A – Preparation for general nomenclatures	9w	No	15w
11	SG1B – Generation / updating of general nomenclatures	87w	No	150w
12	SG2A – Preparation for perm. register of population	20w	No	0w
13	SG2B – Pilot system for perm. register of population	102w	No	0w
14	SG2C – Generation / updating of perm. register of population	7w	No	132w
15	SG3A – Preparation for perm. reg. of socio-ec. units	8w	No	0w
16	SG3B – Pilot system for perm. reg. of socio-ec. units	32w	No	0w
17	SG3C – Generation / updating of perm. reg. of socio-ec. units	40w	No	181w
18	SG4A – Preparation for perm. register of territorial-adm. units	20w	No	4w
19	SG4B – Generation / updating of perm. reg. of territ.-adm. units	62w	No	133w
20	SG5A – Permanent cadaster register	16w	No	8w
21	SG5B – Pilot system for perm. cadastre register	28w	No	20w
22	SG5C – Generation / updating of perm. cadastre register	56w	No	133w
23	SG6A – Preparation for geographical reference data bank	12w	No	0w
24	SG6B – Pilot system for geographical reference data bank	84w	No	0w
25	SG6C – Generation / updating of geographical reference data bank	1w	No	164w
26	SG7A – Preparation for administrative data dictionary	106w	No	0w
27	SG7B – Generation / updating of adm. data dictionary	1w	No	146w
28	SB1 – Legal data bank	76w	No	184w
29	SB2 – Research-technology data bank	121w	No	139w
30	SB3A – Preparation for general information, dissemination and archives	34w	No	0w
31	SB3B – Generation / updating of general inf., dissemination and archives	26w	No	87w
32	SA1 – Public sector accounting	120w	No	133w
33	SA2 – Budget proposal / follow-up	120w	No	133w
34	SA3 – Personnel management and payroll	120w	No	133w
35	SA4 – Material resources management	120w	No	133w
36	SE1 – Government level Executive IS interface	105w	No	16w

Figure 14. The Strategic Planning of the Informatization in Romania

ID	Name	Duration	Critical	Free slack
	The Strategic Planning of the Informatization in Romania			
1	The strategic planning of the informatization in Romania	261w	Yes	0w
2	CN1 – IT specific legislation	88w	No	0w
3	CN2A – General interest classifications and nomenclatures	16w	No	0w
4	CN2B – Nomenclatures	41	No	0w
5	CN3 – IT specific standardization	260w	Yes	0w
6	CI1 – Public sector procurement methods	85w	No	168w
7	CI2 – Technical and managerial training	250w	No	3w
8	CI3 – Research & develop., intern. co-op. in the IT field	260w	Yes	0w
9	CI4 – Management of the IT activities in public administration	40w	Yes	0w
10	SG1A – Preparation for general nomenclatures	9w	No	15w
11	SG1B – Generation / updating of general nomenclatures	87w	No	150w
12	SG – Territorial pilot project	52w	No	0w
13	SG2C – Generation / updating of perm. register of population	7w	No	106w
14	SG3C – Generation / updating of perm. reg. of socio-ec. units	40w	No	73w
15	SG4B – Generation / updating of perm. reg. of territ.-adm. units	62w	No	9w
16	SG5C – Generation / updating of perm. cadastre register	56w	No	9w
17	SG6A – Preparation for geographical reference data bank	12w	No	0w
18	SG6B – Pilot system for geographical reference data bank	84w	No	100w
19	SG6C – Generation / updating of geographical reference data bank	1w	No	64w
20	SG7A – Preparation for administrative data dictionary	106w	No	0w
21	SG7B – Generation / updating of adm. data dictionary	1w	No	146w
22	SB1 – Legal data bank	76w	No	184w
23	SB2 – Research-technology data bank	121w	No	139w
24	SB3A – Preparation for general information, dissemination and archives	34w	No	0w
25	SB3B – Generation / updating of general inf., dissemination and archives	26w	No	87w
26	SA1 – Public sector accounting	120w	No	133w
27	SA2 – Budget proposal / follow-up	120w	No	133w
28	SA3 – Personnel management and payroll	120w	No	133w
29	SA4 – Material resources management	120w	No	133w
30	SE1 – Government level Executive IS interface	105w	No	16w

ID	Critical	Milestone	Subproject
	Noncritical	Summary	Marked
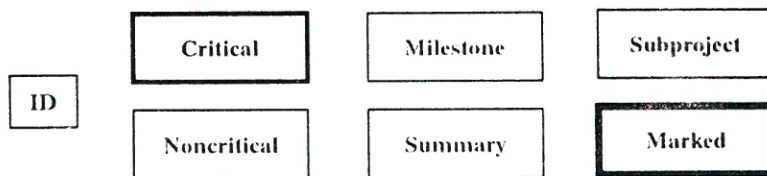
Figure 15 (second version). The Strategic Planning of the Informatization in Romania

of approx. the equivalent of $ 120 mil. ,of which:

- cca. 5 % for the informatization context;
- cca.30 % for the priority coherence kernel IS;
- cca.15 % for the common application IS;
- cca.50 % for the societal informatization engine IS excluding banking IS.

(iii) the potential benefits were evaluated based on the minimal limits of a number of expert evaluations.

The results are indicated in Table 10.

Some comments follow.

One of the main financial problems of the socio-economic transition period, in general, and of Romania, in particular, is that of tax evasion and hidden parallel economy.

An insufficient and non-integrated IS make it very difficult to evaluate these effects . However, their importance is of no doubt, even in the countries which are not going through an intense transition period.

It is obvious that coherent and integrated modern administrative ISs are the main weapons in this field.

The informatization of public administration can bring about new services for population and economic agents.

In general, they can fall under the following categories:

a) interrogation services e.g. economic and legal data banks;

b) identity check e.g.for bank customers;

c) use of automatically readable documents and automatic data acquisition;

d) performant and reliable communications e.g.EDI services;

e) (automatic) file updating e.g.for social security files

f) infocenter,consultancy and other similar knowledge-transfer services.

Probably, the effect of the improvement of the general management by IS is the largest source of revenues, very difficult to assess.The order of magnitude of the problem can in principle be evaluated based on the difference between the initial governmental forecasts and the final yearly results of the national economic activity.One example is the decrease rate of the economy under transition. Let us say that a forecast of 0 % may be followed by a real 3 % decrease.In case of Romania,such a difference is in the order of magnitude of 10 **$ 2 mil. per year.

Using the above figures for possible maximal costs and minimal benefits (Table 10), one can assume that the conventional pay- off time results form the relationship:

$$ct - eo < 2.5\, e \qquad (5)$$

in which:

ct - the total cost per 5 years

eo - one time total benefits

e - yearly benefit

The value of the conventional pay-off time will be of approx. 2 years.

A detailed net cash flow analysis will be made after the official approval of INFOR by the Government, i.e. after the first officially agreed consolidated planning graph.

6.The Present Situation

The informatics section of the national R&D Programme contains a number of objectives derived from INFOR. For example, a coherence kernel prototype will be studied at central and local levels and, at least partially, implemented.

Upon their request, French and English versions of the White Book were sent by UNESCO to the member countries. The Government Decision approving the proposed strategy , objectives and general schedule is under discussion.

However, the "Strategy for the reform programme" presented last Spring by the Government to the Parliament practically ignored INFOR, which was treated as a working document. As the problems raised by INFOR are objective problems and not simple cosmetic political proposals, INFOR strategy keeps its full importance.The belief is nourished that in a near future the real importance of the IS for the socio-economic reform will be largely accepted.

Table 10. A First List of Potential Benefits

No	Effect	Order of magnitude (minimal)
1	Minimization of tax evasion	10 % of the national state budget
2	New taxes on the IT services offered to population and economic agents	3 % of the national state budget
3	Minimization of the financial flow blocking	evaluation reserve
4	Improved public administration financial management	idem
5	Elimination of large census	idem
6	Improvement of macro & micro decision making	1 % of the GNP
7	Improved (and enlarged) foreign trade-exports	0.5 % of the GNP
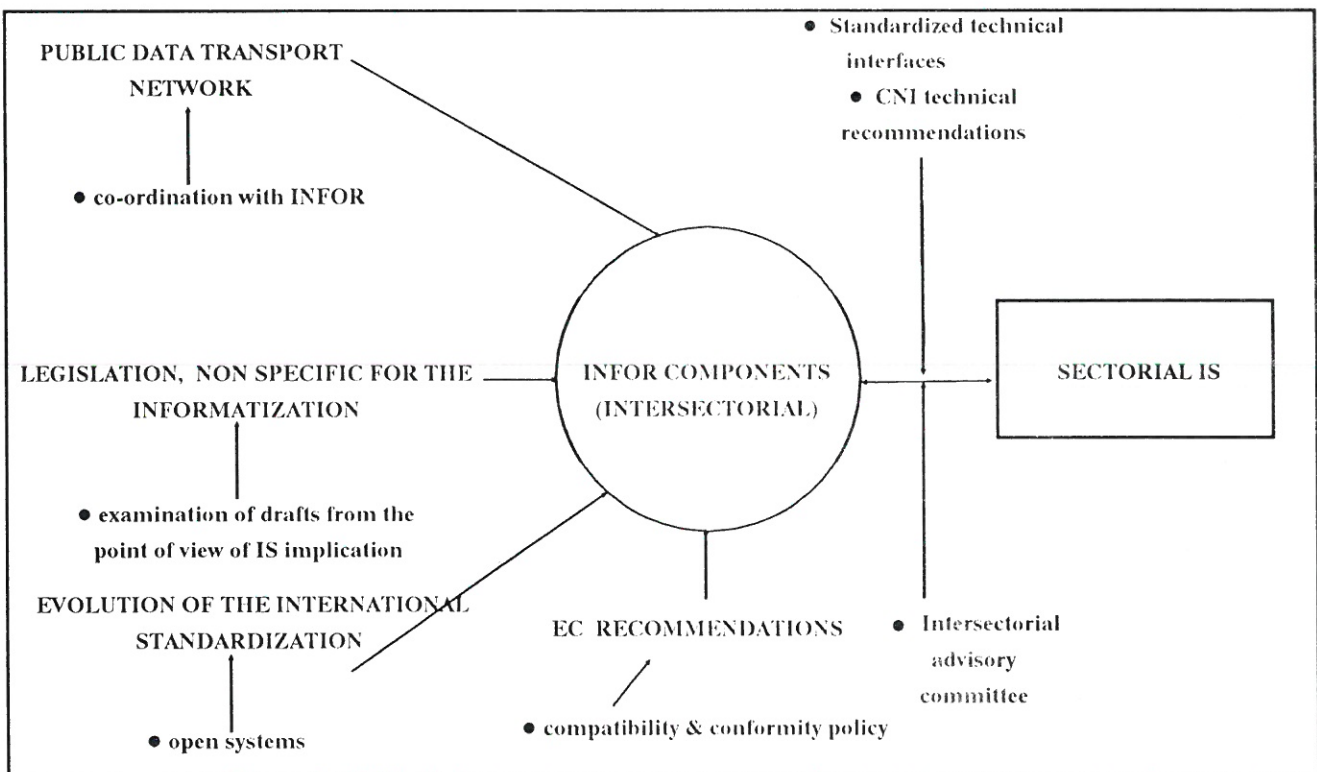
Figure 16. External Conditions for INFOR Components
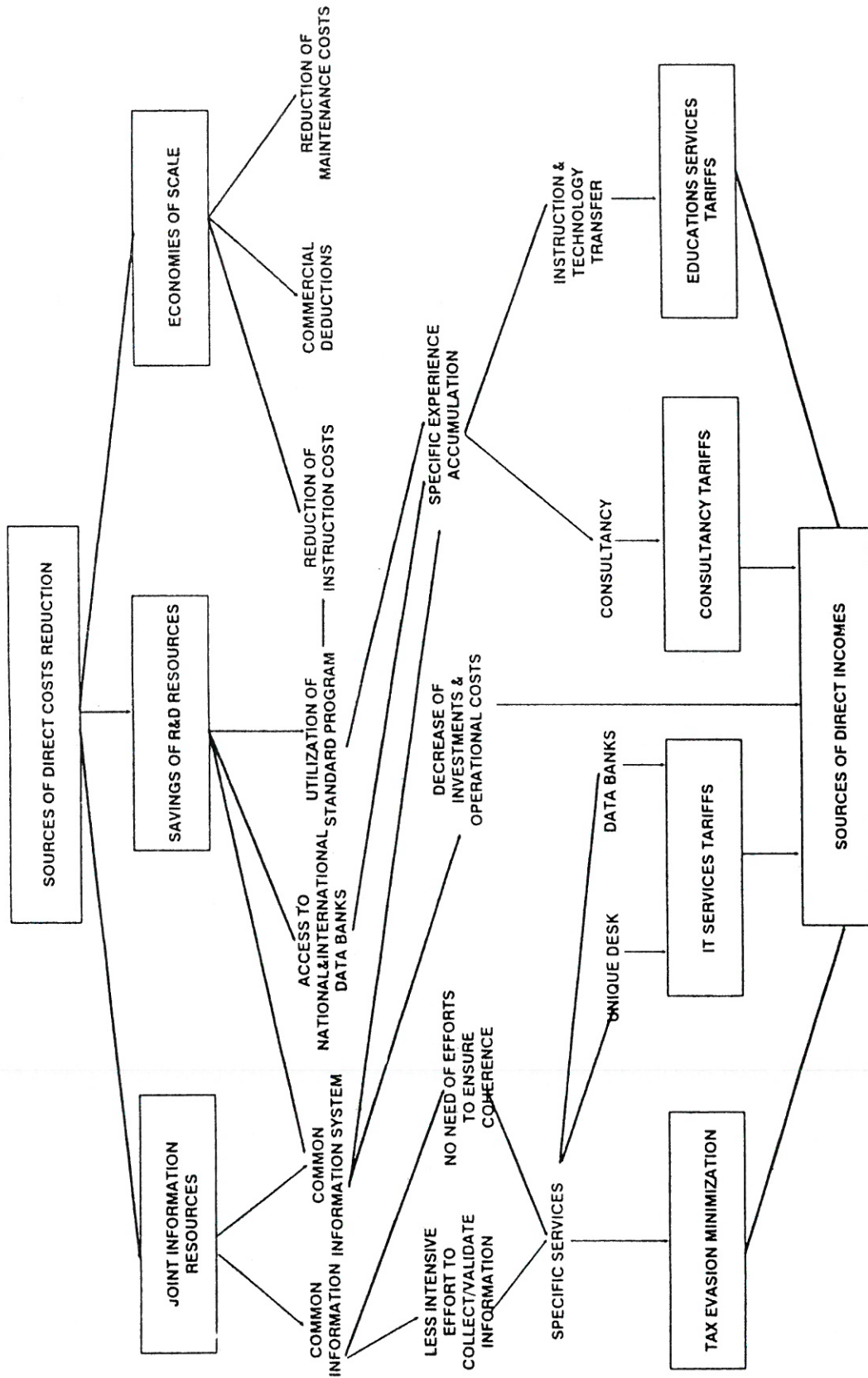
Figure 17. The General Costs/Benefit Diagram

7.Some General Remarks

INFOR has been an interesting managerial and technical experience at national level, and its proposals may have a general character,at least for developing countries.That is why, an international evaluation could be useful.

ACKNOWLEDGMENT

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RT CNI 1 – 1992 : 8 -bit coded Romanian characters

RT CNI 2 – 1992 : Romanian characters lay-out on PC / WS keyboards

RT CNI 3 – 1992 : Standards recommended by INFOR

RTCNI4 – 1992 : Compatibilities and interfaces recommended by INFOR

RT CNI 5 – 1992 : Configuration selection general principles

RT CNI 6 – 1993 : PC acquisition by non-professionals

RT CNI 7 – 1993 : IT resources / IS procurement procedures

RT CNI 8 – 1993 : IS security guidelines.