INFORMATIVE MODEL FOR NATIONAL DEVELOPMENT MANAGEMENT

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Abstract. Strategic planning experience shows the major problem of the national planning system – planning documents are faintly intercorrelative (including aspects "from long-term to short-term" and "from general to concrete"), as well non-linked with managing and implementing institutions (public sector functions and services) and budgetary appropriation. It creates huge barriers to carry out plans. Structurization of all system's objects in logical units and determination of strict interrelations between them is the proposed solution of the problem. Informative model of planning system have to be developed as depository of logical units and their interlinkage. It becomes possible to manage information flows and activities of public sector as well to check their consistency. The first steps of the practical realization have proved efficiency of the proposal.

Keywords: state management, strategic planning, sustainable development, modelling, ontology.

1. Introduction

Necessity and functionality of the national development planning system has been already shown several times (Bicevskis *et al.* 2009; Karnitis, Kucinskis 2009). Elaboration of national scale matrix of documents and institutions become possible by application of advanced modelling tools. Development of multidimensional informative model, uniting time, sectoral, regional and institutional aspects, gives possibility to create hierarchically structured integrated set of planning documents as well to determine responsible institutions. There was especially underlined importance of such system for overcoming current economic crisis.

Implementation of strategic and action plans is the following step in gradual introduction of development planning system. Naturally on basis of conceptual and strategic planning documents normative acts of all levels have to be elaborated and accepted – laws, regulations of Cabinet of Ministers and ministries, etc. (Fig. 1). Planning documents together with these normative acts (which should be mutually concerted and complementing) determine:

– all set of state functions which are necessary for management of the country and therefore have to be performed;

– the consequent public services that should be provided to citizens and/or business;

– institutions, which should perform any function and provide any service;

– budgetary appropriation for various activities of the public sector institutions.

Conclusions on the optimal list, hierarchy and structure of various ministries and other state/local administrative institutions could be made as a result, as well on acceptable structural reforms to perfect the management of the country.
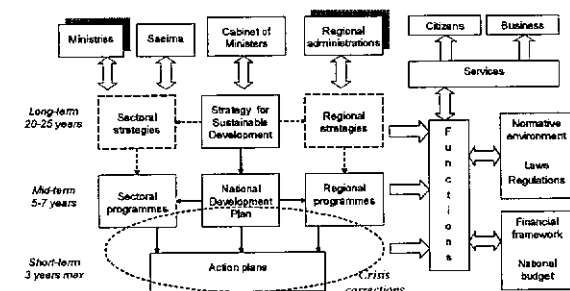

Fig. 1. National development planning system: elaboration and implementation

2. Weakness of current management: lack of consistency

There is lot of legally valid planning documents in Latvia; they consider various aspects of development. It was stated during revision of documents, that nowadays nearly 200 of them are *live* plans on national, sectoral or regional scale (State Chancellery 2009). In addition number of other normative documents are substantial for state functionality, development planning and achieving defined goals.

Functions performed by the public sector (e.g., consumer rights protection, culture policy, corruption prevention and combating, environment protection) are an important issue. The State Chancellery has batched information from all ministries on functions, which are performed by institutions in their frameworks (in total more than 1000 functions).

State/local administrations are considered as the providers of direct and general services to citi-

zens and business (e.g., granting and payment of pensions and social benefits, educational and healthcare services, protection from threats to life, health and property, etc.). Ministry of Regional Development has developed listing of accessible public services (more than 600 services).

Important there is a structure of state administration as well structure of each institution, because any function is performed and any service is provided by concrete structural units of concrete establishments.

And last but not least – budget. Exactly money determines plans which really will be implemented and activities which really will be realized; all involved public institutions are financed from state budget, you know. Much more, actual priorities and trends of the country have to define the national budget.

Unfortunately, the being experience discloses a serious weakness of existing structural system of the state (regional, sectoral) management: above-described logical relevances are noticed far not always.

All existing and valid documents remain weakly connected horizontally (the documents of various regions and sectors frequently are even contradictory) as well vertically (documents of a lower level not always are complementary to the documents of upper level). Existing references to another document often are too inconcrete for definition of exact connection.

There is lack of direct compliance of implementation activities with planning and normative documents in many cases. Activities of sectoral and regional bodies remain weekly consistent with national scale strategic planning documents; functional obligations of many institutions and responsibility sharing among them is not kept.

Very often it is impossible to determine mutual connection of state functions with public services, but costs for provision of concrete public services are not calculated. The national budget is still based mostly on the previous years' financing experience.

Lack of direct and strong consistency of activities, which are envisaged in strategic planning documents, with actions of concrete executive public institutions, with their functions and necessary budgetary appropriation can be evaluated as the basic objective reason of mentioned problems. But these problems result in weakness of management of the country and create unsustainable development threat.

To remove mentioned reason, the proposed informative model has to be complemented substantially (Fig. 2), integrating also all aspects re-

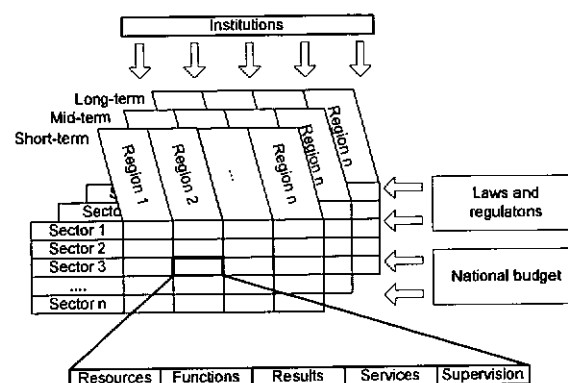lated to implementation of strategic and tactical documents.

Fig. 2. A complemented integrated informative model

3. An integrated model – ontology

There are lot of ideas on use of modelling principles and algorithms to deal with state management and development problems. But unlike the modelling of economic processes this aspect mainly is analysed theoretically (e. g., Cannon et al. 2005; Schleicher 1999). Only recent information shows few activities to implement modelling of state management in practice (e. g., Trnka 2008). Our proposal also in the first place is directed to practical improvement of current situation.

A complemented informative model of functioning and development of the country is the proposed solution of the problem.

The model has to represent huge and very complicated system, therefore ontological methodology was chosen as the most suitable method for this task (Gruber 1995).

To create the ontology, it is necessary to define the set of entities, their properties (functions) and relationships between them; in our case it includes:

– structurization of all system's objects (documents, institutions, functions, budget, etc.) in elementary logical units (entities);

– determination of strict connections between logical units;

– creation of united depository of logical units and their connections.

Functionality and growth of the country is prescribed by great number of various aspects – development goals, tasks and activities, state functions, public services, public institutions, budget, etc.

Decomposition of all objects in elementary units gives a possibility to determine strict mutual connections in the scale of single document/aspect (e. g., division of some activity in concrete actions in defined sequence) as well inter-aspect connec-

tions (e. g., performer of concrete action and budgetary appropriation for performance). One can identify existing gaps, e. g., lack of actions for achieving some goal or non-existence of such actions in the list of obligations of the corresponding institution.

Decomposition of complicated and sophisticated documents and actions in elementary logical units is well-known principle, which gives a possibility to concretize tasks, activities, performers, etc. of complex and integrated programmes, institutional and management structures, financing sources, etc. E.g., US Recovery Act spending is detailed in concrete projects and allows to view and to analyse related information from various perspectives (Recovery 2009). Our proposal is to apply this method to development and management of the country.

Each aspect has been determined by certain, normally text documents, which already are indirectly structured (according to the corresponding aspect), using chapters, sections, articles, clauses, etc.

However to perform a formalized analysis it is necessary to strengthen existing indirect structural indications: to create a strong treelike structure of document and for this purpose to decompose gradually the document till elementary logical units. Examples of such units would be strategic subgoals, separate tasks to achieve them, concrete activities that have to be performed, institution that is responsible for any activity, budgetary appropriation for the concrete activity, etc. As the result a few or even many trees will be obtained where each edge is some elementary logical unit. The next task is indication of logical connections between obtained elementary units.

There are two kinds of such connections: hierarchy and relations.

Hierarchy displays the arrangement and ranking of logical units in one document or affined (related to the same aspect) documents (Fig. 3.).

Some of documents naturally are hierarchically well-structured. Institutional structure of ministries (subordinated public establishments in the framework) as well organizational structures of public institutions is a typical example of such existing hierarchical structures.

A hierarchical structure of other documents has to be improved substantially. Far not always chapters are strongly decomposed in articles and clauses, tasks are not defined for each article, concrete activities and responsible institutions are not defined to achieve goals.

A hierarchy appears during gradual detalization of the document in logical units and then in

even smaller elementary logical units. E.g., the development programme is separated in action lines and actions, which in turn should be decomposed in separate activities, forming the treelike hierarchic structure.
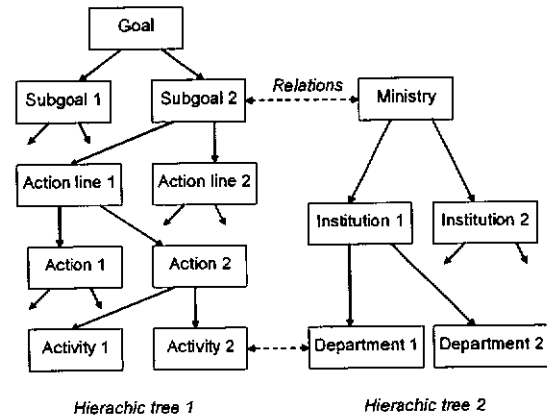

Fig. 3. State management: hierarchy and relations

Relations represent a certain logical connections between elementary units of documents of various aspects. They will be used to specify relation (influence, dependence) of the unit of one aspect with the unit of another aspect, hence ranging elementary units over more than one aspect. E.g., strategic actions and national budget are two separate aspects; relations indicate accordance of budgetary appropriations to specified actions.

Some of mutual relations normally are well-defined in documents, e.g., specific institutions are determined that are responsible for achieving each subgoal; to connect a subgoal with the responsible institution is a simple task in this case. Difficulties arise in cases when logical connections have to be, but they are not defined.

Actually the informative model includes not only management of development; it ensures directed and coordinated state functionality and governance.

In accordance to aforedescribed algorithm, an informative model is formed in a few steps.

First of all necessary documents are incorporated in single depository, that allows to structure and to analyse them unitedly. During entering information should be structured – decomposed in elementary logical units. This stage can be at least partly automatized in the cases when the planning document is formed using a spreadsheet format (e.g., Excel). A principal issue is a possibility of gradual detalization of logical units, possibility to add new edges to the existing tree.

The next step – to define relations between elementary units of the various aspects/trees and to interconnect these trees. It is possible to connect logical units of different levels of various trees.

The integrated graph of state functionality is obtained as a result; Fig. 4 shows some part of it. One can indicate several potential imperfections, which have to be specially studied:
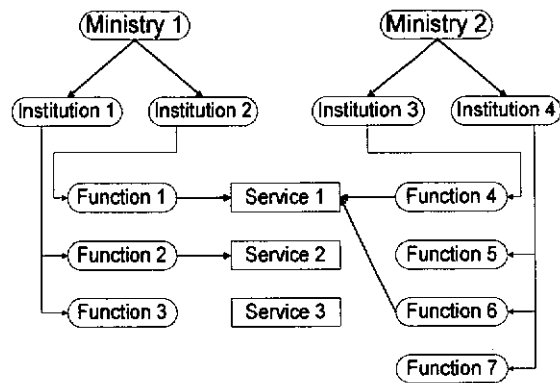

Fig. 4. State management: institutions, functions and services.

– What institution will provide service 3?

– Functions 3, 5 and 7 are not connected with some service; is it correct?

– Is enough strong division of competences between institutions 2, 3 and 4 (that are in frameworks of different ministries) for provision of service 1?

– Institutions 2 and 3 perform only one function each; can such scattered structure be optimized?

4. Use of the model and attained benefits

There are multiform applications of the created model, e. g.:

– on the basis of defined development goals, tasks and priorities one can determine state functions that have to be performed and public services that have to be provided as well necessary financing; the next step is creation of goal-based and task-based national budget;

– on the basis of necessary functions and services current institutional structure of administration can be evaluated and optimized; accordingly the national budget can be updated;

– by means of modelling one can evaluate changes of the budget, if some goal, task or priority is modified.

Decomposition of documents in elementary logical units and definition of strong logical connections between them gives a possibility to perform number of very practical tasks, e. g.:

– to manage a real implementation control of planning documents;

– to ensure consistency of all planning documents as well to identify inconsistencies between various documents;

– to identify scarcity of necessary activities as well needless activities;

– to control adequacy of budgetary and institutional resources with performed activities.

It becomes possible to analyse administrative and management information from various perspectives as well to create varied scoreboards, e.g.:

– activities that are performed by any institution in defined time period;

– functions that are performed and services that are provided by any institution;

– institutions that are involved in provision of any service;

– goals that will be achieved by means of any activity;

– the total cost of concrete service provision or activity performance;

– saving from non-fulfilment of concrete function;

– necessary budget appropriation to achieve concrete goal;

– concrete activities, which are performed at the proper time, and which are not performed;

– responsible institution/employee for achievement of concrete goal.

5. IT tools: support for development and use of the model

Strong support of advanced IT tools is an indispensable precondition to develop and to exploit aforedescribed model.

Creation and everyday use of integrated depository is impossible without instruments that provide lot of managing activities, including (but not only):

– entry of structurized documents in the depository;

– their decomposition in elementary logical units;

– relations of logical units of separate trees;

– navigation on trees, expanding or shortening processed information when necessary;

– navigation on various trees according to corresponding relations.

Even this short list of requirements shows that specific IT tools are needed:

– to take into consideration individualities of the model;

– to provide entry, maintenance and processing of information.

Researchers of the University of Latvia have developed and approved such model-oriented applications.

One of them consists of two components. The first functionality is destined for creation of documents' depository, for decomposition of various documents in elementary logical units, for determination of hierarchy and relations between these units. This component is designed for experts to develop the informative model.

Another functionality of this tool is bounded up with processing of information for its use (Arnicans, Karnitis 2006). It is intended for broad section of users, allowing on-line access to the information according to authorization level of users (including public access).

The tool allows information processing from various perspectives following the connected information how wide and deep it is necessary. Thus, the tool forms preliminary defined information outlooks that are available to concrete users or for concrete usage – one can easily determine necessary information from any tree as well format for its representation; e. g.:

– ministry/institution, its functions, corresponding performed activities, terms, responsibility for each activity;

– public service, necessary activities, corresponding responsible institutions, costs for service provision.

Wide checking possibilities of data consistency and quality in various aspects is another user's application, e. g.:

– full report on activities that have to be performed to achieve a concrete goal (performers, necessary resources, terms, results, etc.);

– budget of ministry/institution based on performed functions;

– full report on public services that are provided by concrete ministry/institution;

– performance of activities at concrete date, – accomplished/ unfulfilled activities;

– consistence of resources (human, material, financial) appropriated for separate activities with resources for achieving the goal as a whole;

– is full set of activities determined to achieve all goals?

– is the responsible performer defined for any activity?

Further development of the tool includes elaboration of graphical user-friendly interface that is understandable by intuition.

The basic principles already have been tested by specialists of Institute of Mathematics and Computer Science, University of Latvia and Da-

torikas instituts DIVI Ltd (Cerina-Berzina *et al.* 2009; Barzdins *et al.* 2007; Barzdins *et al.* 2009). They will ensure:

– graphical modelling processes and their connection with external hierarchically structured information;

– process modelling by means of unlimited gradual detailing methodology;

– easy configuration of the necessary information as well sources that are attracted to each step of the process.

6. Model development process: gradual enlargement of domains

It is clear that state management and development model have to be created gradually; only during the practical design of the model requirements and individualities could be specified, IT tools perfected and necessary corrections made. And we can take the advantage of ontological methodology – to form a model for small domain with few entities and relations and later step by step to increase the domain size.

In the first stage model algorithms were elaborated and tested forming the functional model of one extremely branched institution – State Social Insurance Agency. Domain specific language for modelling social insurance processes was developed. Processes were modelled by step-by-step detailing method until elementary units were gained. It was important to bond logical units of any process with performers, services, documents and legal acts that also were structurized in elementary logical units. Developed model corroborated advantages of proposed approach.

A primary analytical examination of interrelated national-scale documents has been made, including Latvian Plan of Strategic Development (a crisis updating of the National Development Plan), lists of state functions and public services, national budget for 2010, institutional structure of state administration.

The first results are very promising. Integrated procession of even small data file identifies various oddities, which are not so visible facts, while this information is collected in various information sources. Information processing, analysis and use become much easier, more rapid and more efficient.

The further steps are envisaged in several directions. Increasing the domain, the model will be created for some part of state management – for one city or separate sector. Another direction – improvement of IT tools, ta-king into account necessities and possibilities, which already are iden-

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tified, and which will appear when huge number of users will start to use the tools.

7. Conclusions

Week correlation of planning and normative documents as well lack of their connection with budget appropriation and public administration institutions, which are responsible for performance of state functions and provision of public services, have to be evaluated as very serious threats for sustainable development and even functionality of the country.

The proposed solution – strong structurization of all objects in elementary logical units, definition of connections between elementary units and incorporation of all information in united depository – allows managing information flows and activities of public sector as well to check their consistency.

Development of the integrated informative model allows specifying goals, tasks, activities, responsibility and financing thus eliminating mentioned objective defect. At the same time it significantly strengthens border spanning principle in the management of the country. It will become possible to perform actual structural reforms of the state administration.

The model cannot be created by IT specialists only. Definition of detalization level, hierarchy and relations, information entry and maintenance is a permanent task of experts of corresponding sectors. Therefore interest of upper level decision makers and all public servants, their willingness to improve management of the country become a primary precondition for success.

The first steps of the practical realization originate optimism in relation to efficiency of the proposed solution as well to its successful implementation.

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