

A METHOD TO STUDY THE ORGANIZATIONAL  
DIMENSION OF REGIONAL PROGRAMS

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1. Introduction

Our current research activities at IIASA provide the opportunity to study five cases on the organization of regional development. These cases are TVA, Bratsk-Ilimsk Territorial Production Complex, Scotland, Vistula-Lublin and Guayana in Venezuela. The aim of this paper is to present a research method for this purpose independent of the particular characteristics that each case might have. This method is supported<sup>1</sup> by a model of the organizational structure of any viable system<sup>1</sup>. In this case the 'regional system' is postulated to be a viable system. If the program is going to be successful it should be viable. This suggests the need to define the 'regional system' with precision. The elucidation of the components of this system is seen as a fundamental research step in this method. A second step focuses on the organizational functions that these parts fulfil, and on the linkages among them. A third step relates to the consistency of the regional organization and its effectiveness. The second step seeks to provide the basic structure to support the search for information. A set of questions, supported by this structure, will be presented for explanatory purposes. This 'questionnaire' is by no means comprehensive and it is hoped that improvements will be made on it along this research process.

2. The Model of the Organizational Structure of any Viable System

A very short summary of the organizational model of any viable system is presented in what follows. I have presented in a previous paper the scientific support to this model<sup>2</sup>. The aim now is to provide the reader with the conceptual tools used in the applied sections of the paper.

If a system is to be viable it needs to develop five basic functions, namely

- Policy function
- Development function of the system, e.g. planning and research
- Operational management of the system's operations
- Coordination of the operations, and
- Operations (subsystems).

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<sup>1</sup>Stafford Beer: Brain of the Firm, Allen Lane 1972

<sup>2</sup>Raul Espejo: "A Cybernetic Paradigm for Organizational Assessment"  
LOP Working Paper 1975

The operations represent the 'implementing' capacity of the system, and they themselves need to be viable in order to be successful in the very complex environment around them. In other words, the function of 'doing' needs to be autonomous, just because we cannot expect that the management above is going to control every single action of these operations. This means, that the 'operations' themselves have the five mentioned functions i.e. policy, development, operational management, coordination and operations at a lower level. This is the concept of 'recursion' (Fig. 1). This means that the whole is encapsulated in the parts. Of course, the first system under our attention is also encapsulated at a higher level viable organization i.e. the metasystem.

The linkages (communication channels and information transfer) among these functions are the basic elements that support the system's effective operation (e.g. a case in which the development function has little influence on the policy process is clearly affecting the long term survival of the system). Figure 2 presents the organizational model of any viable system and we can see on it the type of linkages we postulate are necessary for an effective interaction of the functions.

Of course the model has nothing to do with an organizational chart. It is quite feasible to have many institutional parts, institutions or existing mechanisms fulfilling the same function. If we want to apply this model to the regional system it is important to understand this point. In this context it is equally relevant to have good integrating mechanisms of the different institutional parts fulfilling the same function as to have well structured relationships among different functions.

The basic structural linkages are:

- Command linkages (the central lines of Fig. 2), they connect the different functions on a hierarchical basis. The policy function is above all others. The development function is on the line of command, though not necessarily above the operational management (that is the meaning of the dotted lines). The operational management is above the operations. (Of course there are no hierarchical lines among the operations though they might be more or less interconnected on their operations, this is represented by the quivered lines.)
- Linkages with the environment; the 'development functions' at the different recursion levels are providing the interaction with the relevant environment and therefore supporting the system's adaptivity to changes.
- Coordinative linkages (the right side lines below the Operational management); these are the main structural mechanisms to reduce oscillations in the simultaneous activity of the operations. At the same time they are filtering information for the operational management (management by exception). No doubt, within the different

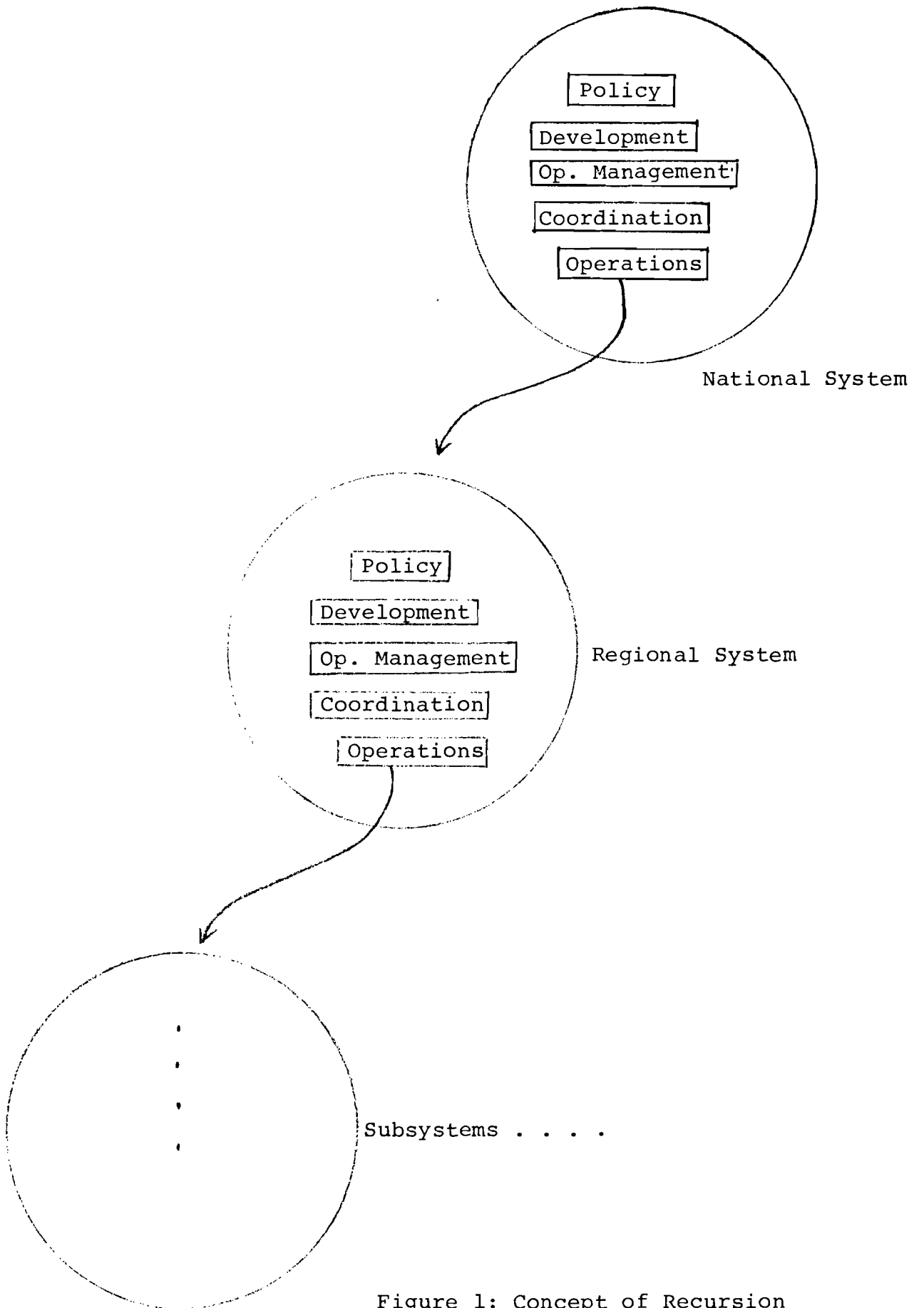


Figure 1: Concept of Recursion

System

Environment

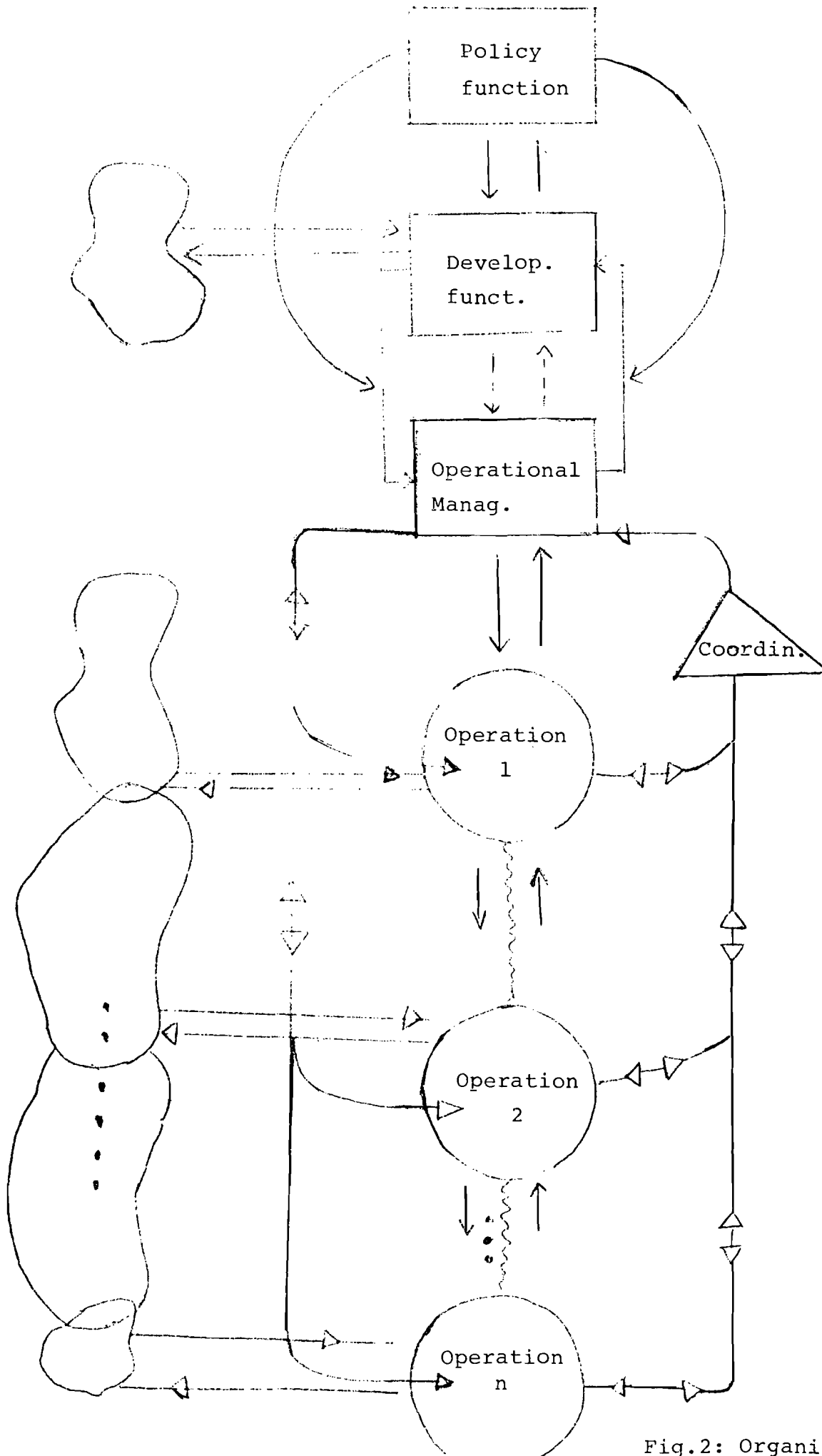


Fig.2: Organizational model

functions there are many coordinative problems, but they do not have the same systemic implication as the one that is pointed out here.

- Auditing linkages (the left hand lines below the Operational management); they represent the management prerogative to get information on the 'operations' by-passing their corporate management functions i.e. the top three functions of this lower recursion level.
- Linkages supporting the top decision process (the non-command linkages among the top three functions). They represent a continuous transmission of information between the Development and Operational Management functions, which are monitored by the policy function. Development is concerned with the long term viability of the system. Operational management with its present viability. They are competing for the allocation of limited resources in their own sphere of action, and eventually they are in conflict. One of the main functions of 'policy' is to allocate the scarce resources among these two functions.

Summing up, the concept of recursion as developed above and its implication in terms of the organizational functions and linkages, should help us to define what we mean by 'regional system.'

### 3. The Regional System

For the purpose of the case studies we have used a definition of regional development which is consistent with the aims of the organizational analysis. Basically, we are considering regional programs where there is an explicit political decision to develop a region, i.e. there are explicit goals, and these decisions imply changes in the regional activities and organizations. The whole system is tuned to make the programs implied by these goals viable.

One of the characteristics of this system is that it embraces a set of organizations. The inter-organizational dimension has to be understood in order to understand the 'organization' of the regional program. The normal situation is that a set of institutions are relevant to explain the regional development and not just one. Even many of them will not be regional organizations, although in this respect we can find a large range of possibilities. The basic point is that the 'regional system' does not necessarily map the geographical boundaries of the region. On the contrary, we can expect that it will often include trans-regional institutions. But of course, this is something that changes from country to country, and is in itself a basic issue of research. The model which has already been presented provides us with a useful paradigm for these purposes.

A first step is to postulate the 'regional system' as a viable system. This has two immediate consequences:

1. That a Regional System has the five mentioned functions;

policy, development, operational management, coordination and operations.

2. That it is embedded in the national system and of course it is embedding subsystems (the operations) that are viable too.

In order to find out the relevant institutions and mechanisms supporting the regional development, we trace the 'goals' up to the level where the unfolding of goals into subgoals still represents only a trade-off internal to the region. Above this level is the national system. Once we have delimited the regional system, our task is to study the institutions supporting the regional program, in particular their managerial and structural characteristics. Of course in cases where multi-organizations are supporting each function of the regional system, their level of integration is of significant importance to understand the consistency and effectiveness of the whole program. The 'questionnaire' presented later in this paper will take into account these conceptual points.

In addition to the 'regional system' we are interested in its links with its relevant national system. If the regional program is a national policy probably its embedding is going to be different from if it were the result of a regional policy. The intelligence capacity and the operational mechanisms available at the national level are related to the precision and elaboration of the set of goals that the regional institutions are going to receive. The control mechanisms more or less define the regional discretion in unfolding goals.

As for the subsystems of the regional system, i.e. the operations, in general we will not consider them in detail. We are mainly interested in the multi-organizations and this implies a constraint in developing in-depth organizational studies. But this might change according to the characteristics of the different national settings and the concrete research approaches. The Tennessee Valley and Guayana settings suggest in-depth studies of TVA and Guayana Corporation. The field trip to Bratsk permits an in-depth study of Bratskgesstroi, one of the many organizations influencing the regional program. The Soviet, as well as the British and Polish settings, are clear cases in which the regional development cannot be explained unless we develop a methodology to study the multi-organizational dimension.

The previously mentioned concepts of 'viable system' and 'recursion' provide us with the tools to develop a common methodology to study within the 'Regional System' any particular organization. It just depends on the level of resolution we want to achieve.

#### 4. Consistency Analysis

The concept of consistency is one of the basic elaborations we can develop from the definition of a 'regional system'. This represents a second area for our research activities.



Consistency analysis is aimed at elucidating the organizational mechanisms created to support the regional program and at examining whether these mechanisms can be used effectively by the 'regional operations' (subsystems), considering their linkages with their metasystems (the policy, development, and operational management functions of the regional system). Therefore we are talking about the influence of the behaviour of the Regional System on the behaviour of its subsystems. We are postulating that if the organizational mechanisms created to implement an integrated regional program are going to be effective, they should be supported behaviorally by the other organizational functions i.e. policy, planning, operational management. For example, if Corporate Management of the regional program is the newly created organizational mechanism and at the same time the metasystem keeps a departmentalized behaviour, it will not be possible to make the corporate approach effective. Thus we are interested in understanding the consistency of organizational mechanisms used at two different levels of recursion. If the metasystem does not support with its behaviour the level of integration that it wants or that the systems think is necessary, the result is that the behaviour of systems, de facto, is going to be that which is induced by the metasystem, even if this is inconsistent with the created mechanisms.

This problem of consistency is particularly interesting when we are studying multi-organizations as opposed to the situation of different divisions in the same institution. In the first case this problem is less obvious. From the multi-organizational dimension this consistency analysis implies a basic understanding of the integrating mechanisms in use internal to the different systemic functions, i.e. the internal integration of the five functions.

#### 5. The Problem of Organizational Effectiveness

This step aims at the elucidation of the actual behaviour of the 'Regional System'. This aspect is related to the nature of the linkages among the structural parts that define the system. This analysis adds to the previous one the dynamic assessment of the regional function. Mapping the actual inter-organizational relationships on the organizational model of a viable system should provide criteria for finding out the strengths and weaknesses of the 'Regional System'.

Although we are interested in the assessment of the 'Regional System' effectiveness, our priorities at this stage, are concerned with defining the system and studying its consistency. I consider this latter step, i.e. consistency, the most general test of effectiveness, but of course it does not cover an in-depth study of the structural effectiveness.

#### 6. The Use of the Model

Up to this stage, we have:

- a definition of Integrated Regional Development;
- a conceptual model to study organizations;

- a definition of 'Regional System';
- a definition of organizational consistency, and
- a tool to study organizational effectiveness.

Now, we want to operationalize these concepts and definitions. In practice we want to suggest a thread that can support our data collection efforts. Basically, any organization is the result of the explicit or implicit efforts to cope with the complexity of its environment. For that purpose, it develops mechanisms to reduce the environmental complexity and to increase the management complexity. The elucidation of the organizational mechanisms and management practices that support these filtering and amplifying processes is the main thread for our own data collection efforts.

We can think of structural, planning and operational mechanisms to reduce the environmental complexity. On the other hand, among others there are structural, augmentation and informational mechanisms to amplify the management complexity (see Fig. 3). This is a common problem to all cases we are studying and it seems important to find out the practical solution to it in the different regional settings. In practice our data collection efforts are structured around this problem. An outcome of our studies on this data collection stage should be a table for each case with the amplifiers and filters of complexity in use in each setting. To help this activity we shall present the structure of a 'questionnaire'. No doubt the questions themselves are context-bound and therefore any extended list would be just an instance, for explanatory purposes. The structure of the 'questionnaire' suggests the 'boxes' that need to be sorted out, normally in a non-sequential process, until we are satisfied with our understanding of them. A second characteristic of this structure is that it is recursive. If we want to develop in-depth analysis of particular organizations, e.g. Bratskgesstroi, we can apply the same structure, now at this lower level of recursion. This recursiveness is supported by the nature of our organizational model. In fact the structure of the 'questionnaire' is a mapping of that model in the particular space of the mechanisms that support the organizational behaviour i.e. filters and amplifiers.

## 7. The Structure of the Questionnaire

We conceive the questionnaire as a basic tool to elucidate:

1. The Organization of the Regional System,
2. The structure and fundamental characteristics of the regional metasystem, and
3. The internal consistency of the Regional System.

There is no way to have a linear development of these three aspects. Basically, our interactions with different operations should lead us in a heuristic process, of which the questionnaire is just a tool, to a reasonable understanding of the overall organizational aspects of the Regional System.

The Use of the Model

The Higher Management

Some organizational reducers of world variety		... Requisite Variety	
Class Name	Meaning	Danger	
divisionalization	by factories or products	loss of corporate synergy?	
specialization	by market segments	loss of market synergy?	
functionalization	by profession or service	loss of collaborators' surplus?	
massive delegation	top man free to think	withdrawal symptoms?	
utter involvement	immediate problem-solving	loss of wider opportunities?	
short-term horizon	ignore distant future	lack of continuity/investment?	
long-term horizon	let immediate problems solve themselves	'in the long run we are all dead'	
settling priorities	sequential attention	destroy systemic interaction?	
very detailed planning	well-oiled machinery	obsession with trivia?	
management by objectives	decide where we are going	loss of adaptability?	
management by exception	ignore routine chance results	using wrong model?	
close administration	cut down argument and curbs freedom to react?		
averaging/aggregating	taking one year with another, etc.	unassailable optimism?	
sacking innovators	prevent rocking the boat	creeping paralysis?	
management auditing	keep a continuous check	stifling initiative?	

Trade-Off → Some organizational amplifiers of management variety			
Class Name	Meaning	Danger	
integrated teamwork	share knowledge and experience	loss of accountability?	
work through henchmen	amplifiers of the boss	transmit his faults?	
diversification acquisition	generate acquire } new areas of business	overstretch managerial ability? reverse takeovers?	
reorganization	broadening everyone's experience	hopeless confusion?	
recruit managers	add to } existing managerial capability	face does not fit?	
recruit experts	enhance } capability	wrong advice? political involvement?	
consultants to advise	gain from best practice	slanted? irresponsible?	
consultants to implement	increase power to hatchet	hatchet wrong people?	
consultants to absorb variety itself	inhibit action while <i>sub judice</i>	illusion that problems solved?	
conferences	encourage participation	open flood-gates of criticism?	
improve management information systems	enrich specific knowledge	inundation by data?	
training	enrich general knowledge	unrequited ambitions?	
management development by T-Groups	enrich self-knowledge	disintegrate personality?	
open door arrangement	employees come first	collapse of authority?	

Figure 3. Ref. Stafford Beer: Brain of the Firm

The structure that we propose is focused on the aim of defining the Regional System. Although we might not know in advance the nature of the regional system, we will hypothesize that it is a viable system and therefore we want to inquire about the following functions:

a) The Policy Function (of the Regional System)

1. Goals that define the operation of the policy units.
2. Internal structure of the Policy function; Integration of the policy units. The multi-organizational dimension. Decision mechanisms.
3. Nature of the linkages with the national system (This latter is defined by the set of organizations concerned with the particular IRDF for which this program is just one among other alternative decisions).
4. Nature of the linkages with the development and operational functions of the Regional System. Monitoring of these institutions.

b) The Development Function

1. Internal structure of the function. Analysis of the different relevant units and their level of integration, e.g. multi-organization or single organization.
2. Tools to filter the environmental complexity e.g. planning methods, longterm, shortterm plans, use of mathematical and other models.
3. Influence of the development function on the policy function. Elucidation of linkages, e.g. advisory role, on the line of command ....

c) Operational Management of the Regional System

1. Internal structure of the function and mechanisms of integration, e.g. if there are many organizations feeding the regional operations with commands, do they have coordinating mechanisms?
2. Linkages with the development function. Mechanisms to receive and transmit information to the development units.
3. Linkages with the regional operations. Are there many channels feeding the regional operations or just one? What sort of mechanisms do they use to transmit commands? Level of delegation. Mechanisms reducing the complexity of the information generated by the operations.
4. Mechanisms supporting the operational management, e.g. legal units, financial operations, auditing units, special units.

d) Coordinative Function

1. Structural characteristics of coordinative mechanisms. Set of regional operations covered by different coordinative mechanisms.
2. Nature of the coordinative mechanisms, e.g. information systems, coordinative bodies.
3. Role of the coordinative function in supporting the reduction of the operations complexity and therefore in helping the operational management.

e) Regional Operations

1. Goals and subgoals of the Regional Operations. Level of autonomy in structuring these goals.
2. Structure of the Regional Operation 'doing' the IRDP. structural linkages.
3. Management practices; the policy, development and operational management characteristics. (If the aim is an in-depth study of the Regional operations, the above four points should be developed in detail for each case). Basically this point seeks an overall assessment of the mechanisms they use to reduce environmental complexity and to amplify their management capacity.
4. Linkages with the operational management. Perceptions of the regional operations on their linkages with the regional operational management.

8. One Example of Unfolding the 'Questionnaire Structure'

With the aim of relating the above structure with the sort of information we can normally gather on a field trip, we present one example of the type of 'questionnaire' that can be generated.

a) The Policy Function

1. Goals that define the operation of the policy units.
  - What are the goals of the Regional Program? (At present).
  - Which are the programs and projects related to the goals?
  - Which are the main decisions under consideration that are related to the above defined goals for the regional development?
2. Internal structure of the Policy Function
  - Which are the organizations relevant to the policy process?
  - If many organizations are related to the development program, what is the level of integration of the policy units? Are these policy units operating at different

structural levels in the overall administrative system? What is the influence of the political system?

- Are there Regional Management Boards/Councils?
- Are there different structural mechanisms to support the policy process of the many policy units?
- Which are the mechanisms supporting the policy process? Think Tanks?
- Which are the norms of operation of the different policy units? Are there big differences in time scales?

### 3. Nature of the Linkages with the National System

- Which are the relevant institutions defining regional policy? Where are the above mentioned policy units embedded? Is there any particular instance related to 'regional policy' at the national level? Is the particular IRDP under development the result of national or regional goals?
- Which are the mechanisms used in the national system to decide on regional development? Which are the mechanisms used for this particular IRDP? Do they use think tanks? Do they use 'Ad hoc' Commissions? Are there 'permanent' Commissions? What is the influence of regional bodies in this process? What is the relevance of planning and research organizations?
- Which are the mechanisms to transmit goals and sub-goals to the regional system? Are they extensively developed at the center? Are they transmitted to the region in broad terms? What is the level of autonomy of the regional system?
- Which are the permanent mechanisms at the center to monitor the policy development? How do they allocate resources? What sort of controls do they have over the IRDP? In which time scale do they operate? Relevant to the IRDP, is there a similar level of integration at the national and regional policy processes?

### 4. Nature of the Linkages with the Development and Operational Management Functions of the Regional System.

- What is the influence of research and planning in the policy process of the different units? Are research and planning functions structurally independent of policy making? Do they have an advisory role? What are the interfaces between research and planning and the policy functions?
- Is the policy process mainly related to operational issues? Does it have a more strategic function? What is the nature of the interactions of policy makers and operational managers?
- Is there a clear mapping between the issues decided by the policy function and the issues which are natural to the regional operations? What about innovations in that case?

b) The Development Function

1. Internal Structure of the Function.

- Which are the planning and research organizations supporting the regional policy process? What is their internal structure? What are the available mechanisms to integrate their activities? Can we recognize a synergistic operation of them, or of any subset of them? In which institutional setting are they embedded.

2. Influence of the Development Function on the Policy Function.

- Do the planning and research units have direct influence over the policy function? Do they operate by influencing the metasystemic relationships of the regional system? What is the nature of their relationship with the planning and research institutions at the metasystemic level? Is planning indicative or compulsory?

3. Influence of the Development Function over the Operational Management.

- Is there any structural linkage between development units and operational management? Are they under their control? Are the development units tuned to the operational problems or are they defining new ventures? Is there a permanent transfer of information between these two types of units?

4. Tools to Filter Environmental Complexity.

- What type of specialization does research have on the region? What sort of models do they use? Is planning short-, medium- or long-term oriented? Which are the criteria for delegation of development problems? What are the planning instruments? Is planning very detailed?

c) Operational Management of the Regional System

1. Internal Structure of the Function.

- Which are the organizations in charge of transmitting instructions and commands to the regional operations? Are all of them at similar hierarchical levels? Are there mechanisms to integrate the different units related to operational management? Which are these - management boards, information links, conferences...?

2. Linkages with the Development Function.

- Which are the informational mechanisms linking these two organizational functions? Are they designed to operate on a permanent basis or are they ad hoc? Do the operational management bodies have internal resources to operationalize the results transmitted by the development function?

3. Linkages with the 'Regional Operations'

- Are there many channels feeding the regional operations with instructions or commands? If so, is one dominant? What sort of mechanisms do they use for these purposes? Budget mechanisms? Detailed instructions? Operational indices? Are there broad definitions of goals that need to be amplified in the region? What level of specificity has the setting of targets?
- Which are the control mechanisms? Are there well structured information systems? Is there a well developed monitoring system? What are the practical expressions of the auditing activity? Are there enough control mechanisms as compared to the level of detail in instructions? Management by exception? Are there well developed communication channels to reach the operational management?

4. Mechanisms Supporting the Operational Management

- How do the operational managers amplify their management capacity? Do they use consultants, experts? What is the criterion used to develop the control capacity? By function? By type of operation?

d) Coordinative Function

1. Structural characteristics of coordination

- How extensive are the communication networks? Are there many different communication networks? What is their institutional coverage? What is the structure of these networks? Are they supporting more vertical interactions than horizontal interactions? What are the capabilities of the communication network? To what extent are these communication networks supported by the cultural characteristics of the regional setting? e.g. Meetings. What are the main differences between intra-organizational coordination and inter-organizational coordination?

2. Nature of the coordinative mechanisms.

- What sort of information do the networks convey? Are there well structured information systems? Are they particularly related to a specific function?



Are they mainly related to strategic operations?  
What sort of mechanisms are used to filter data?  
What are the normal time lags in transmitting data?  
What sort of criteria are used to aggregate data?  
If coordination is supported by meetings, what sort  
of information is normally exchanged there?

3. Role of the Coordinative Function in Supporting the  
Operational Management

- Are the mechanisms for coordination feeding the  
Operational Management with well structured information?  
Do they represent an effective reduction of the opera-  
tions complexity? Are the interfaces information-  
managers well designed? To what extent have decision  
rules been made automatic? What are the support  
mechanisms if the automated system fails?

e) Regional Operations

1. Goals and subgoals of Regional Operations

- In what level of detail do goals arrive at the regional  
operations? Do they structure programs and projects  
from scratch? What are the goals and subgoals of the  
different Regional Operations? What are the practical  
expressions of these goals? Which are the institutions  
involved in the implementation of the programs and  
projects?

2. Structure of the Regional Operations

- Which are the regional operations? Are all of them  
at the same hierarchical level? What are the linkages  
among them? Are these linkages well structured? Which  
type of institutions are involved - private companies,  
state agencies, local authorities, nationalized industries..

3. Management Practices<sup>1</sup>

- What are the policy mechanisms of the Regional Operations?  
What can we say about the interactions of the operations  
with the regional environment? What are the mechanisms  
they use to reduce the environmental complexity? Which  
are the mechanisms they used to increase the management  
capacity? What sort of models and planning techniques  
do they use? Do they use direct or indirect operational  
mechanisms? What are the internal coordinative mechanisms?

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<sup>1</sup>If the intention is to develop an in-depth analysis of any  
particular 'operation' then the whole questionnaire as developed  
above should be used.

#### 4. Linkages with the Regional Operational Management

- What is the perception of the operations as regards their relationships with the Operational Management? Is the information they transmit to the upper level useful to them? Are the communications mainly on the command, coordinative or auditing lines? Is there any way to assess their effective level of autonomy? What are the types of regulations and controls affecting the operations of these institutions? Do they perceive conflicting objectives?