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ORGANIZATIONAL CONTROL THEORY:  
A FORMAL APPROACH

Juan A. Pérez López \*

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\* Professor of Accounting and Control, IESE

IESE Business School - Universidad de Navarra

Avda. Pearson, 21 - 08034 Barcelona. Tel.: (+34) 93 253 42 00 Fax: (+34) 93 253 43 43

Camino del Cerro del Águila, 3 (Ctra. de Castilla, km. 5,180) - 28023 Madrid. Tel.: (+34) 91 357 08 09 Fax: (+34) 91 357 29 13

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## **ORGANIZATIONAL CONTROL THEORY: A FORMAL APPROACH**

### **Introduction**

The subject matter of this study is an inquiry into the formal characteristics of control and, consequently, into the formal nature of organization. By “formal” I mean that no hypothesis is made about the particular nature of the entities being controlled and no hypothesis is made about what usually is known as “organizational purposes” either.

It may be thought that a study at such a high level of abstraction can scarcely be useful. The main arguments against its usefulness would seem to be the ones based on the fact that a framework that does not make any hypothesis about the nature of controlled entities would have to be applicable to human beings and machines alike. It could therefore be argued that the results of a study applicable to both cases of control can hardly be useful for dealing with human beings. Men and machines have some common properties, but the differences between them are far more important than any superficial likenesses.

In fact, that line of reasoning is not an argument against the usefulness of this particular study; if anything, it is a good starting point to gain a glimpse of its potential usefulness. The study attempts to show that the differences between men, animals and machines are so basic that they appear even at a formal level when approached from a control viewpoint. It attempts to show that those differences may be considered an open question at the level of argument, but not so at the level of action. The study does not need to consider the differences between men and machines in its postulates (via hypotheses about the nature of controlled entities) because the control of machines appears to be a very particular case of control within the general case that is considered throughout the study. In fact, the meaning of control for a machine can be obtained when a very restrictive set of assumptions is applied to the variables that constitute the model developed in order to analyze the meaning of control. Conversely, approaches to control of human beings as if they were machines may be interpreted in our model in terms of which variables are neglected by the controlling unit. Consequences of that fact may also be anticipated within the model.

The level of abstraction used throughout the theoretical part of the study is a logical requirement. The differences mentioned above do not appear as formal properties at a lesser level of abstraction. Any study based on concepts more superficial than the ones we are about to introduce would have to handle those differences via hypotheses about the nature of the entities that constitute the existential support of the concepts that are used.

## CHAPTER I

### The logical framework

#### *Purpose of the chapter*

We are going to investigate in this chapter the logical properties of statements about control. A “control statement” is a statement asserting that “if certain actions are applied by a controller unit to a particular controlled unit, certain observable results will follow”. “Control statements” differ from formal logical statements of the type “if A then B” in that logical statements abstract two very important things from reality. One of them is the fact that both the actions to be applied and the results to be observed are referred to some “observer”. The other fact that is abstracted refers to the entity which connects actions and results. A “control statement” recognizes that any logical relationship in any of its existential applications implies a structural relationship between two units: the controlled unit and the controller unit. The most general form of a “control statement” could be conceived in terms of pure observation, that is, the “controller” would not apply any actions other than those related to “simple observation”. That general form could be described as “given observer”  $O_1$  and “observed”  $O_2$ , if  $O_1$  observes A, then its observation of B follows. Abstraction of  $O_1$  and  $O_2$  may be safely made in some circumstances, mainly related to cases where only the most common “powers of observation” are required (and can be taken for granted in any “observer”) and the “observed unit” represents nature itself (whose laws are assumed to be unchangeable by the fact of observation). The point explains why classical physics and formal logic are so closely related to each other.

As we are interested in control theory, we will leave aside the analysis of the most general form of what we have called “control statements” and focus our research on the actions-results sequence, where actions are applied by a certain controller and results are relevant for the same controller.

Our analysis of “control statements” will show that there are three properties inherent in any such statement. In the way those three properties present themselves to our unaided intuition they do not lend themselves to theoretical analysis. Careful steps must be taken to find the “pure form” of those properties, without leaving any one of them outside of our framework in the process of abstraction. At the end of the chapter we will arrive at what we could define as a “pure control problem”, that is, a problem in which nothing is relevant except control itself. We will have the opportunity to compare our achievement with reality, because we have “living” entities that constitute the existential counterpart of that theoretical problem: namely those that we usually call “organizations”.

### The essential properties of control statements

A control statement, as it has been defined, has the following elements:

- I. It specifies a controller unit.
- II. It specifies a controlled unit.
- III. It specifies a “set of actions” to be performed by the controller unit.
- IV. It specifies a “set of results” that those actions will bring about.

We are going to tackle the problem of establishing criteria by which to judge a particular control statement. To do that we will focus our attention on a “reduced control statement” which has all the elements of a complete control statement except the specification of the controller unit. We will assume the role of the controller unit, and the “reduced control statement” will be judged from that point of view.

It is clear that if a particular controller applies a “reduced control statement”, he does so because, in his opinion, the statement is a “useful” one. What is meant by usefulness in this context?

First of all, we can note that if we interpret the categories true-false as expressing whether or not “the specified results follow from the application of the specified actions”, those categories do not suffice to judge usefulness. More specifically, the truth of a reduced control statement appears to be a necessary condition for its usefulness, but it is not a sufficient condition. A controller may reject many truthful statements as being irrelevant.

Therefore, we must keep the first property of a useful control statement, namely that of being a truthful statement, and continue our search for the remaining properties that make it useful. That first property we will call the “validity” of the control statement. A control statement is *valid* if the relation that it expresses between actions and results is true.

The second property that appears to be related to the usefulness of a control statement is the possibility of its being applied by the controller. We are dealing here with a quality of the “set of actions” expressed by the control statement. Many control statements that a given controller may consider to be valid would at the same time be useless to him because he would not know how to, or could not, carry out the actions that the control statement specifies. We will call this second property the “operationality” of the control statement.

It might be thought that given both “validity” and “operationality”, the usefulness of a control statement would be guaranteed. It is very easy to prove that that is not the case. Let us take, for instance, a control statement which specifies certain operational rules that have been defined in order to change the position of bodies. The validity of those rules will depend on certain physical properties of the bodies. There is no doubt that their validity would be unaffected by whether those physical properties belong to a piece of machinery, an animal or a human being. That would be because machinery, animals and human beings all have certain properties in common, and many ways of changing position under the action of external forces may very probably be explained with only the help of those common properties. In spite of that fact, no “reasonable” controller would make arrangements for transportation without considering whether the set of physical properties being transported belongs to a machine, an animal or a person.

It seems, then, that a third element must be taken into consideration if the “usefulness” of a control statement is to be explained. We will call that third element the “adequacy” of the statement. As is clear from our analysis, “adequacy” is a residual concept. By that we mean that we have yet to make clear what the meaning of the concept is. So far we have merely identified its existence as an element which must be taken into consideration in order to explain why some control statements that are both “operational” and “valid” are not useful.

In other words, “adequacy” would explain why in some circumstances a controller would apply a particular operational and valid control statement, while at other times he would not apply it, in spite of its being operational and valid.

As a matter of fact, “adequacy” is the most important property for ensuring “usefulness”. A valid control statement that is not operational may be considered to be meaningless for the controller. But a control statement that is valid and operational but that is not adequate is worse than meaningless: it would be, at least, a temptation to do the right thing in the wrong way.

The whole study we are undertaking here is simply a study of the “adequacy” of control statements. Most of this chapter will be devoted to the process of abstraction needed in order to arrive at the “pure form” of the concept of “adequacy”. That “pure form” will have no meaning other than that which it must have in order to maintain both the operationality and the validity of the control statement. In other words, we will arrive at the “formal concept of adequacy”, the one which does not depend on “circumstances” other than those implicitly accepted in order to judge the operationality and validity of the control statement. At that level the most fitting names for what we have called “adequacy” turn out to be “consistency” and “efficiency”. It also becomes clear that these qualities are logical requirements for control statements. They are the properties of a control statement that tend to increase both its validity and its operationality when it is applied. The rest of this study serves simply to develop a model which unfolds the consequences of that logical requirement in control processes.

### **On a formal meaning of adequacy**

It seems from our previous example on transportation that the adequacy of a control statement has something to do with the “nature” of the entities that support the properties on which the validity of the statement is based. Accordingly, we can see the controlled unit as a “nature” which has certain “properties”. Those properties, when certain actions are applied to them, produce certain observable results. They relate actions to observable results, and that relation is independent of the fact that the properties are supported by one particular nature or another. It is also a fact that we can find many different natures that have common properties, which, so to speak, can be controlled units in the application of control statements that have the same operationality and the same validity. In order to identify the concept of adequacy we make an appeal to the fact that in some cases our common sense appreciates that the application of a control statement cannot be envisaged without considering the “natures” that are the statement’s “controlled units”. That appeal may be made to identify the concept, but it will not be much help in understanding its meaning.

In order to continue our analysis we must think for a while about the meaning of “nature” as it has been defined above. The way we introduced the concept makes it a residual one. We have talked about “properties” held in common by different “natures”, those “properties” being the ones needed to relate actions and results of the control statement. By “natures” we meant “the remaining properties of the controlled unit”. The specific actions of the control statement, when applied, may also produce results other than those specified in the control statement because of the impact of those actions on the other properties included in the concept of “nature”. That is not to say that those results would necessarily *affect* the results specified in the control statement (that would affect the validity of the statement, and we accept validity when it is applied here and now). What it means is that those results are on a *different level* than the ones defined by results *within* the control statement. In other words, they could be *unobservable results* from the point of view of the control statement. We will call them “results internal to the controlled unit” or “internal results”.

We can use our previous example to illustrate the point. The application of a particular set of actions in order to transport bodies, apart from the fact of changing their

position in space, could have other consequences, ranging from “smashing a machine” to “hurting people’s feelings”. These consequences depend on those remaining properties referred to by the word “nature”.

What we have called “adequacy” seems to include, at least, an evaluation of those internal results from the controller’s viewpoint. In order to see what is meant by that, a little effort of abstraction is required, because evaluating “internal results” from the point of view of the controller of a control statement does not mean evaluating those results from the point of view of a person who happens to assume the controller’s role when applying a particular “reduced control statement”.

It could be argued that if we abstract the particular evaluations of the person who happens to be the controller, no meaning is left for adequacy. However, we will immediately see that that is not so.

Let us recall the form of a reduced control statement:

“Given certain actions on a given entity, certain results follow”. The control statement asserts a particular relation between actions and results. What would we think of a control statement that, when applied, achieves the predicted results (that is to say, is a valid one) but at the same time destroys the entity which supports the relation between actions and results? We are not evaluating that fact from any particular controller’s viewpoint. He may happen to be interested in the validity of the control statement for only one application. We are evaluating that fact from the point of view of the control statement itself. We would say that the control statement is inconsistent because it asserts the validity of a relation which the statement itself destroys. Consistency in control statements has a meaning equivalent to that of formal consistency in logical statements. Consistency reflects some existential non-contradiction principle in the same way that formal consistency reflects a non-contradiction principle in logic. So, we can find, at least, two sets of properties in the controlled unit that are relevant from the point of view of the control statement. One of them is relevant to support the validity of the statement. The other is relevant because the internal results of actions on those properties affect the properties that support the validity of the statement. A statement is inconsistent if the internal results make the statement invalid. If a controller judges an inconsistent control statement to be adequate, one of two things must be the case: either he is interested in only one application of the statement, or his judgment is wrong.

We have found a meaning of adequacy that is based only on the meaning of the elements which constitute the control statement. From another point of view it is easy to see that a control statement which is operational, valid and consistent will not always be useful for the controller unit. We can say that if a statement is inconsistent, it will be useful only once, because if applied, it will lose its validity.

On the other hand, a statement’s usefulness for the controller will also depend on whether the actions specified by the control statement have some impact on the controller himself that could affect the properties of the controller that are relevant for defining the operationality of the statement. Here we could conduct an analysis very similar to the one we have carried out for the controlled unit. That fact must be taken into consideration when defining the usefulness of a control statement. A control statement that prescribes actions which, when performed by the controller unit, affect the properties that support the operationality of the statement would become a “meaningless statement”.

So, a “complete control statement” has the following properties:

- The statement is *valid* if from the specified actions follow the specified results.
- The statement is *operational* if the specified actions can be performed by the controller.
- The statement is *consistent* if the specified actions do not destroy the statement's validity.
- The statement is *efficient* if the specified actions do not destroy the statement's operationality.
- The formal concept of adequacy we have arrived at includes both *consistency* and *efficiency*, as defined above.

It is clear that a control statement which is inefficient carries within itself the seeds of meaninglessness. If it is inconsistent it carries within itself the seeds of invalidity.

Let us now interpret the meaning of these properties of formal control statements in existential terms. It is clear that these are the relevant properties in cases where the only relevant things are the very existence and continuity of control itself. In order to visualize what is meant, we could think of two units that stand in the following relationship to one another:

Actions from unit A constitute results for unit B.

Actions from unit B constitute results for unit A.

The “pure control problem” is therefore interpreted as follows:

“Actions from A motivate actions from B, which in turn motivate further actions from A, and the process goes on *ad infinitum*”.

Such a case shows clearly why both “consistency” and “efficiency” are relevant if the process is going to continue. As a matter of fact, “consistency” from the point of view of B is simply “efficiency” from the point of view of A, and vice versa. “Operationality” from the point of view of B is simply “validity” from the point of view of A, and vice versa.

In this case nothing is relevant but control itself. Namely, A controls B and B controls A, and the efficiency of their actions guarantees that the process will continue.

It is not difficult to see that what we have called the “pure control problem”, which is merely the existential counterpart of the “control statement” in logic, has a very definite name in our common experiences. It constitutes what we call “organizations”. In any organization the only thing that matters is that “transactions” among its members be satisfactory for all of them. The very existence of any particular organization depends on that mutual satisfaction and its continuity through time.

## **Conclusion**

We have endeavored to show that the logical analysis of what we called “control statements” is nothing other than the logical analysis of organization itself. We have discovered the logical properties of such statements. It is crucial now to interpret them,

because that interpretation will constitute a clarification of organizations themselves. The interpretations we have given them so far have been purely descriptive. They have helped to identify the properties by isolating them from one another, but they do not constitute a scientific analysis of the properties themselves. Scientific analysis was followed to arrive at them but not to interpret them. We learned a very important thing in the process, namely that we must go into the unit's structures if we want to give further meaning to those properties. That is the task we undertake in our next chapter, devoted to the building of a model of what we will call a "decision-making center" (DMC), which is the most complex kind of unit that we can approach. Any other unit may be understood as a particular case of a DMC.

## CHAPTER II

### A model for decision-making centers

#### *Purpose of the chapter*

In order to be able to analyze further the properties of control statements, we must give them some meaning in terms of properties of controller and controlled units. This chapter attempts to develop a model that is applicable to such units. The model has to be rich enough to fulfill the following requirements:

- a) It must have a variable whose values can express the existence of the properties that make a control statement valid. That variable will be called the "effectiveness" of an action.
- b) It must have a variable that can be affected by actions and whose values can modify the "effectiveness" of actions. That variable will be called "internal structure".
- c) It must have a variable that can be affected from "outside" and whose values can also modify the "effectiveness" of actions. That variable will be called "external structure".

In other words, we are going to analyze a "unit" which has the properties of:

- a) Achieving goals through its actions.
- b) Performing actions that may also have an effect on its future ability to achieve goals.
- c) Aiming for goals that can be more or less easily achieved depending on "external conditions".

The whole chapter is simply a development of the model, assigning words to the variables and their relationships. The meaning of the model, how it can be interpreted, will constitute the final paragraph of the chapter.

#### **Description of a decision-making center (DMC)**

The most elementary idea of a DMC is that of an entity that selects the "inputs" of a "system" in order to obtain some particular "output" which the DMC happens to want. The

particular “output” obtained will depend on the particular input applied, and also on the particular “state of the system” at the time when the input is applied.

In the rest of this paper we are going to call the inputs “actions”, the outputs “results”, and the state of the system that relates “actions” and “results” the “structural state”.

The first point to be noted is that the concept of “results” is not to be confused with what we might call “the consequences of actions”. “Results” is meant to apply to the specific consequences obtained by application of an “action” to some “given particular system”. The same action, when applied, could have consequences other than those specific ones. These “other consequences” are not included within the meaning of “results”.

The DMC must have the capability of evaluating, at least, the “results” of its “actions”. Otherwise it would not choose the action, it would not be a DMC. However, we will not be concerned with what makes one result more valuable than another from the DMC’s point of view. Our only assumption is that such “preferences” exist, but we shall make no hypothesis about their “content”.

Assuming those preferences, we will define the “effectiveness” of an action as the “evaluation of the results of the action in terms of the DMC’s preferences”. Clearly, the effectiveness of an action will depend on the “structural state” that relates actions to results.

In fact, we have three different possibilities regarding the consequences of an action other than those included within the concept of “results”:

- A) The DMC’s actions cannot change the structural state.
- B) The DMC’s actions can change the whole structural state.
- C) The DMC’s actions can change one part of the structural state but they cannot change another part of it.

In the first case we will say that the DMC has an “external structure”. In the second, we will say that the DMC has an “internal structure”. And in the third, that it has both an “internal structure” and an “external structure”.

If the DMC has an internal structure, it will not be able to evaluate its actions by looking only at their effectiveness. Structural changes brought about by actions may have an impact on the future effectiveness of those actions. Unless the DMC is conceived as making a single decision throughout its whole existence, it is clear that those structural changes must have a “value” from its point of view. The “value” of those changes in terms of the preferences which evaluate effectiveness can easily be obtained. It is the difference between the “ex ante effectiveness” of an action and its “ex post effectiveness”. In other words, it is the change in the effectiveness of an action due to application of that same action. We will call that difference the “efficiency” of the action. Efficiency is the value of an action in terms of the same preferences that evaluate its effectiveness, due to the capability the action has to improve or jeopardize its effectiveness for “the next time” it may be applied. The operational counterpart of that value is the structural change brought about by the action.

So, a DMC with internal structure must also have an internal capability for evaluating two sets of consequences of the same action, namely what we have called the “effectiveness” of the action and its “efficiency”. However, it must be noted that both sets of

consequences are evaluated from the point of view of the same preferences, those preferences whose existence within the DMC is assumed.

We must establish a further distinction in order to arrive at the model that represents those DMCs that have both internal and external structures. In those DMCs part of the effectiveness of their actions is due to the particular state of their internal structure. We shall call that part of the total effectiveness the “internal effectiveness”. Another part of the effectiveness of an action, the part that must be attributed to the state of the external structure, will be called “external effectiveness”. Total effectiveness of an action, then, is seen as the aggregate of internal effectiveness and external effectiveness.

### **Variables of a model for decision-making centers**

We shall now formalize the variables that have appeared in our previous description of a DMC. No meanings will be assumed for the variables other than those expressed by the following definitions.

*Decision-making center (DMC):* An entity that performs “actions” and may choose a particular “action” among those it can perform.

*Preferences of a DMC:* That which evaluates the “results” of actions from the DMC’s point of view. “Preferences” are assumed by the model and no change of preferences is contemplated in the model.

*State of the structure:* That which relates “actions” and “results”. Given a particular “action” and a particular “state of the structure”, a particular “result” follows.

*Structure:* That entity which supports the various possible “states of the structure” as defined above. “Actions” performed by the DMC may or may not have an impact on the “structure” itself, changing its “state”. The model takes into consideration the possibility of such changes.

*Internal structure:* That part of the “structure” that is affected by “actions” of the DMC and whose “state” may change due to those “actions”.

*External structure:* That part of the “structure” whose “state” is not changed by “actions” of the DMC.

*Action:* That activity taking place within a DMC which, when applied to a “structure” in a particular “state”, brings about a “result”. If the “structure” is an “internal structure”, the “action” will make some change to that particular “state” too.

*Result:* That which is brought about by an “action” applied in the presence of a “structure” in a particular “state”. The “result” itself does not depend on the “structure” but only on the particular “state” of that “structure”. Many different “structures” may be the support of “states” that are completely identical from the point of view of the relation between “actions” and “results”.

It is important to keep in mind that the variable “results” does not include the consequences of an action that depend on the “structure” itself and that affect the future “state” of the structure.

*Internal result:* That part of the “result” due to the application of an “action” on the “state” of the “internal structure”.

*External result:* That part of the “result” due to the application of an “action” on the “state” of the “external structure”.

The definitions that we are now going to introduce are definitions of “variables” that express relations among the “variables” defined above. They will be formal variables and they are the ones we will use in our reasoning from now on. Their meanings cannot be directly interpreted. They depend on whatever interpretation is given to the variables we have defined so far. They will have a role within the theory that could be assimilated to the role that variables such as “velocity” and “acceleration” have in pure mechanics.

### **Formal variables**

*Effectiveness* (of an action): evaluation of its “result” in terms of the “preferences” of the DMC.

*Internal effectiveness:* evaluation of “internal results” in terms of the “preferences” of the DMC.

*External effectiveness:* evaluation of “external result” in terms of the “preferences” of the DMC.

*Efficiency* (of an action): Changes in the “internal effectiveness” of an action due to the changes the action has brought about in the “state” of the “internal structure”.

“Effectiveness” is the aggregate of “internal effectiveness” and “external effectiveness”.

Clearly, for some DMCs some of the variables we have defined will have no significance. Those DMCs may be seen as particular cases of the general case, that is, the one which assumes a DMC that has both internal and external structure. That is the case we will focus our attention on. Our reasoning will be developed on the basis that *the effectiveness of an action does not ensure its efficiency*.

### **Interpretation of the model**

An elementary description of organisms could conceive of them as being endowed with the following properties:

- A.1. An organism has “perceptions”, and those perceptions are more or less attractive for the organism.
- A.2. Perceptions depend on two elements: an “action” that the organism performs, and some “conditions” in which the action is performed.
- A.3. The organism may choose a particular “action” in order to obtain a particular “perception” that it finds attractive.

The behavior of organisms is very commonly analyzed on the basis of descriptions which, more or less, fall into one of the two following groups:

- B. An organism is an entity that has the power to apply some “action” on a certain “environment” in order to change that “environment” into a new one that better fits the organism’s wants.
- C. An organism is an entity that has the power to apply some “action” in order to adapt itself to environmental changes, with a view to restoring some “state of equilibrium” that has been disturbed by those changes.

Our model includes a description of an organism according to the description given in A above. There is a great conceptual difference between that description and the ones given in B and C. Clarifying those differences may help us to understand the kind of properties we are bound to discover through our model. Consequently, we are going to devote a few words to the subject.

Description A represents a higher degree of differentiation of elements present in our experience than either Description B or C. Thus, if we translate Description B in terms of Description A, we find that the concept of “environment” in B includes both what is meant by “perception” and what is meant by “conditions” in Description A. If we make the same translation of Description C, we can see that the equivalence in this case is established by the translation of what is meant by “actions” in C into both what is meant by “action” and what is meant by “conditions” in Description A.

It is not surprising that that should be the case, as the triad action-conditions-perception constitutes a framework for explaining our experiences. It is the same framework as is used in systems theory, where the names are inputs-state-outputs. But, as a matter of fact, it is possible to attempt an explanation of experiences based on a simpler framework than the “triadic” one. The one that is immediately apparent to our intuition is the dual one that classifies reality in terms of causes-effects. It attempts to explain a particular experience by including under a single concept (that of “causes”) everything that contributes to the existence of the “experience”. Different levels of causality cannot be dealt with within this framework; they belong in some meta-framework that is not made explicit. Beyond the dual framework no explanation is possible: “Experiences” themselves would appear as “givens”. The general criticism of such frameworks and the level of explanation that each can achieve belongs to epistemology. We are not going to deal with the subject at length, but only with a very specific characteristic that can be very easily interpreted and whose relevance is clear in our particular case.

It would be harmless to simplify the triadic description action-conditions-perceptions into a dual one, actions-perceptions, unless *it happened that the very same “actions” that gave rise to definite “perceptions” in certain “conditions” also changed those “conditions” for future applications.* In other words, a dual framework is “blind” to interactions at the “causal level”. It can only analyze the cause-effect relationship under the very specific hypothesis that *whatever entities are meant* by “causes” are unrelated to one another.

The basic hypothesis underlying the building of our model is that some organisms have the power to, at least partially, change the “conditions” that relate their “actions” to their “perceptions”. The behavior of organisms of that kind cannot be understood without the use of a framework that can take such changes into consideration. Our model constitutes the

“minimum” expression of such a framework because *it merely assumes the possibility of such changes*; but it does not make any assumption about the changes themselves. With the help of this framework we will be able to explore the consequences that must consistently appear for an organism with the above-mentioned characteristics. We have seen that those consequences call for a new set of concepts to represent realities that are left out of the dual framework. We will also see that the properties discovered in the control statement belong to that new set of concepts. Their entire meaning can be established with the sole help of the concepts introduced in the DMC model.

## CHAPTER III

### Control theory

#### *Purpose of the chapter*

We are going to analyze in this chapter the meaning of control for DMCs that are described by the characteristics that we have formalized in our model.

That will be a first step towards an interpretation of the properties found in control statements in terms of properties of DMCs.

We will see that our model permits a fairly good description of control processes for complex organisms. The simpler forms of control processes, namely those which describe control for the case of very simple units, can be seen as particular cases within the general one, which we will focus our attention on.

#### **The meaning of “control”**

Even the most unsophisticated idea of “control” includes the fact that controlling means obtaining a particular behavior from a controlled unit. By particular behavior is meant some action by the controlled unit which the controller unit finds desirable. In order to bring about that particular action the controller unit is supposed to apply some other action to the controlled unit. The impact of the “control action” on the controlled unit is what gives rise to the action by the controlled unit which the controller wanted to obtain.

It is very common to use the systems framework to understand control processes. The description of the process in systems language is more or less as follows: A controller applies inputs to a real system in order to obtain the desired outputs. Successful control depends on the real system’s having certain properties that relate inputs and outputs according to the rules specified by some formal system known to the controller.

It is widely accepted that the systems description is a very limited framework for understanding control processes in goal-seeking DMCs. In fact, in a DMC whose actions are undertaken in order to achieve some purpose that is relevant to the DMC itself, we can conceive of two different approaches for bringing about a particular action by that DMC.

1. The controller’s actions change the DMC’s purposes in such a way that the DMC, in seeking to achieve its own purpose, performs the action desired by the controller.

2. The controller's actions change the relation between the DMC's actions and the DMC's purposes in such a way that the action that achieves the DMC's purposes is precisely the action that the controller, too, finds desirable.

We can give a more formal description of approaches 1 and 2 in terms of the variables of our model. What we have called the DMC's purposes may be represented by what we defined as "effectiveness of actions". Those purposes express the fact that the DMC is motivated to perform actions that will achieve some "level of effectiveness", while it will not perform actions that are expected to achieve a degree of effectiveness below that level. However, the effectiveness of an action depends on two elements: namely, the DMC's "preferences" and the "state of the structure". Approach 1 above points towards changing the DMC's "preferences". Approach 2 points towards changing the "state of the structure".

Here we will understand by control what is meant by approach 2. It reflects our common intuitions about control, intuitions based on the fact that a DMC's preferences cannot be changed unless the DMC itself is changed. "Preferences", which are the subjective evaluation of "results" of actions, constitute the innermost attribute of a DMC. They are manifested by that "feeling" of like or dislike which the DMC has together with experiences themselves. Controlling a DMC means changing the *DMC's evaluation of actions*, which is quite different from changing the *DMC's evaluation of the "results" of actions*. Control, then, is the activity that tends to make the action desired by the controller also desirable for a DMC. The controller may achieve such congruence by changing the "results" of actions. The process does not touch the DMC's "preferences". In fact, those preferences are the very support of control. The controller finds a way to control the DMC through its ability to change what we defined as the "state of the structure", that is, the other element apart from "preferences" that influences the effectiveness of actions.

In order to simplify our reasoning we may assume that the controller's actions constitute what we have defined above as the "external structure". That implies that the controller has a perfect command of what we called the "external effectiveness" of a DMC's actions. On the other hand, the meaning of "internal effectiveness" appears to be that of preferences associated with the "results of actions" by the DMC, which depends on a "structural state" that may be changed by the DMC's actions but which is beyond the reach of the controller's actions. We are not concerned here with the question of whether what in this case we consider to be "internal structure" may be considered "external structure" *for the same DMC and a different controller*.

Thus, the common idea of control, when translated into the language of our model, can be expressed as follows: A particular action may be obtained from a DMC by changing the external effectiveness of the DMC's actions in such way that the action desired by the controller becomes the most effective from the DMC's viewpoint. As a matter of fact, this concept of control is simply the formal expression of the basic intuition that DMCs can be controlled by attaching "rewards" to their actions.

We have said that the action may be obtained, not that the action *will always be* obtained. That fact is consistent with our experience, and the model contains two elements which explain it. One is the internal effectiveness of the required action. It may be that the rewards attached to the action do not compensate for the internal effectiveness that the DMC would lose by choosing the prescribed action instead of another one. In that case control may be achieved by increasing the rewards attached to the prescribed action.

The other element which explains control failures is the efficiency of actions. It may be that a DMC cannot be motivated to choose inefficient actions no matter how effective they may be. That fact is related to the quality of some DMCs which we call “freedom”.

We shall now analyze the consequences that flow from the fact that “controlling a DMC means changing the effectiveness of its actions”.

### **Dynamics of control**

We must now make an important distinction. Either the control activity is intended to bring about an action by a DMC only once, or else control is meant as a continuous process whereby some particular action is required from a DMC on a repetitive basis. Clearly, in analyzing organizations the second case is the only relevant one.

When control is meant as a continuous process, what we defined as “efficiency of actions” becomes an important element. That is so because the total effectiveness of an action from the DMC’s viewpoint depends on both internal effectiveness and external effectiveness. External effectiveness depends on the control action, but not so internal effectiveness. However, the actions that are “rewarded” in terms of control may, at the same time, bring about changes in the internal structure that decrease the DMC’s future internal effectiveness. So, given the same “reward”, the DMC will be less motivated to perform the action again because what motivates the DMC is total effectiveness, and that has decreased.

But the efficiency of actions is also an important element from another point of view. We have seen that the action of the controller is what establishes the level of external effectiveness of the action for the controlled DMC. But the action of the controller may have a negative efficiency for the controller. In that case, control would also become impossible as the controller would no longer be motivated to “reward” controlled actions.

The complete effects of control action and controlled action may thus be classified as follows:

- A) Impact of controlled action from the point of view of the controller’s external effectiveness.
- B) Impact of control action from the point of view of the controlled DMC’s external effectiveness.
- C) Impact of control action from the point of view of the controller’s internal effectiveness.
- D) Impact of controlled action from the point of view of the controlled DMC’s internal effectiveness.
- E) Impact of control action in terms of the controller’s efficiency.
- F) Impact of controlled action in terms of the controlled DMC’s efficiency.

Control is meant to achieve the effects specified in A by changing effects in B. Effects in C, D, E and F correspond to the impacts of both the control action and the

controlled action on their respective internal structures. They may be seen as effects that are not explicitly intended when control takes place, although they are relevant from the point of view of both the existence of control and its long-term continuance. Conditions for the existence of control fall into categories C and D; conditions for its long-term continuance fall into categories E and F.

### **Control theory**

We can now interpret both control statements themselves and their properties in terms of the properties of DMCs. That will constitute our control theory.

If we look at the complete effects of a control action and controlled action we can see that:

- I. A “control statement” expresses the external effectiveness for the controller of a control action applied to a controlled DMC. That control action represents an external effectiveness for the controlled DMC which is expressed by the control statement too. A “control statement” is therefore a relation between the external effectiveness of the controlled unit and the external effectiveness of the controller unit.
- II. The validity of the statement depends on the internal effectiveness of the controlled action.
- III. The operability of the statement depends on the internal effectiveness of the control action.
- IV. The efficiency of the statement depends on the efficiency of the control action.
- V. The consistency of the statement depends on the efficiency of the controlled action.

We can conclude that a control statement in which the controller unit and the controlled units are specified as DMCs having the properties that describe our model of a DMC can be interpreted as follows:

- I. The statement represents a relation between the external effectiveness of those DMCs.
- II. Its validity, operability, efficiency and consistency can be interpreted as follows:

*Validity:* Depends on the existence of certain properties in the controlled unit. Those properties are identified by the existence of some required level of internal effectiveness if the controlled action is performed.

*Operability:* Depends on the existence of certain properties in the controller unit. Those properties are identified by the existence of some required level of internal effectiveness if the control action is performed.

*Efficiency:* Depends on changes in the properties that define operability. Those changes are identified by the efficiency of the control action.

*Consistency*: Depends on changes into the properties which define validity. Those changes are identified by the efficiency of the controlled action.

## **Conclusion**

We have found in this chapter the meaning of a control statement and the meaning of the criteria to be applied in order to judge it in cases where both controller and controlled units are DMCs.

Those meanings have been established in terms of properties of DMCs. We have seen that:

1. The statement itself expresses a relation between the external effectiveness of DMCs.
2. Four criteria must be applied in order to ensure:
  - a) That the statement, if applied, will achieve the results it expresses: *Criterion of validity*.
  - b) That the statement can be applied: *Criterion of operationality*.
  - c) That application of the statement will not destroy its operationality: *Criterion of efficiency*.
  - d) That application of the statement will not destroy its validity: *Criterion of consistency*.
3. The four criteria have the following meanings:

*Criterion of validity*: Requirements of internal effectiveness for the controlled action.

*Criterion of operationality*: Requirements of internal effectiveness for the control action.

*Criterion of efficiency*: Non-negative efficiency of the control action.

*Criterion of consistency*: Non-negative efficiency of the controlled action.

## **CHAPTER IV**

### **Organizational Control theory**

#### *Purpose of the chapter*

We have found the properties of control, namely, the properties that control must have in order to accomplish that which for which it is intended, without destroying itself. All those properties have a clear meaning in terms of properties of DMCs.

Organizations are made up of DMCs that are related in such a way that all of them contribute to satisfying the each other's needs while also satisfying their own. Organizations contribute to better satisfaction of DMCs' needs by formalizing those relationships. Organizations establish the requirements to be met by actions taken by any DMC in order to ensure that those actions are effective for the other DMCs and vice versa. Organizations perform that task through their control system.

In this chapter we are going to establish what properties a control system must have if the control processes that take place due to the fact that the control system is used are to have the properties of control. That will constitute our "organizational control theory".

### **The elements of a control system**

A control system may be described by the following elements:

- a) A set of *motivational rules* that specify the "rewards" that a DMC will obtain if it belongs to the organization.
- b) A set of *operational rules* that specify the requirements that an action by any DMC must fulfill if it is to belong to the organization.

The control system is meant to accomplish the following:

- I. Provide satisfaction of external effectiveness requirements for its DMCs. That task is performed through the motivational rules of the control system.
- II. Provide what the organization requires in order to be able to "reward" its members according to the motivational rules. That task is performed through the operational rules of the control system.

The *operational rules* of the control system may fulfill to different degrees the purpose they are meant to fulfill, namely provide the resources the organization needs in order to be able to apply its motivational rules. To account for that fact we must introduce the following concept:

*Internal effectiveness of a control system:* It measures how well operational rules obtain the resources needed in order to be able to apply motivational rules.

The *internal effectiveness* of the control system is a quality of the system that does not depend on anything other than the elements that make up the system itself.

The *motivational rules* are meant to fulfill the purpose of satisfying the external effectiveness requirements of DMCs belonging to the organization. They may fulfill that purpose to different degrees. In order to be able to express that fact we must therefore introduce the following concept:

*External effectiveness of a control system:* It measures how well motivational rules satisfy the external effectiveness requirements of DMCs in the organization.

The *external effectiveness* of a control system is a quality of the motivational rules of that system. It depends on the DMCs in the organization, that is to say, it depends on those DMCs' external effectiveness requirements.

A third relation must be considered, too. It is the one established between the control system's operational rules and the internal effectiveness achieved by DMCs when their actions accomplish operational rules. That relation will be expressed by the following concept.

*Attractiveness of a control system:* It measures how well the actions required in order to accomplish operational rules serve to attain some degree of internal effectiveness for the DMC performing the action. The attractiveness of the control system is a quality of the system's operational rules. It depends on the internal effectiveness requirements of the DMCs in the organization.

Clearly, the *internal effectiveness* of a control system may be judged by looking at the system itself; no other consideration is needed. To judge both *external effectiveness* and *attractiveness*, the DMCs which the control system is supposed to control must be taken into account. Two characteristics of those DMCs appear to be relevant in this connection: their external effectiveness and their internal effectiveness.

And yet, the above attributes of a control system are seen from a "static" point of view. If the control system is intended to be applied continuously, we must look at the quality of the control it applies from a dynamic viewpoint. To do that all we need to do is apply the framework we developed in the previous chapter. The application will be based on the fact that the control system, when applied to a DMC, is a control statement in which the "controller" is the organization, the controller's external effectiveness is expressed by "accomplishment of operational rules by that DMC", and the control action is "motivational rules applied by the control system".

### **Dynamics of control through control systems**

We approach the analysis from the point of view of the organization as a controller of DMCs. We can immediately see that:

- a) DMCs' achievement of external effectiveness under the control system is expressed by what we have called the *external effectiveness* of the control system.
- b) The organization's achievements as a controller are expressed by the accomplishment of "operational rules" by DMCs.
- c) The control action is the application of motivational rules to the DMC.
- d) The controlled action is the one that accomplishes operational rules.

We must therefore analyze the meaning of *validity*, *operationality*, *efficiency* and *consistency* for a control statement which is described by a), b), c) and d) above.

- a) *Validity of a control system.* Validity expresses the requirements of internal effectiveness for the controlled action. In our case it has to be interpreted by the

level of internal effectiveness achieved by the DMC when accomplishing operational rules of the control system. It is, therefore, supported by what we called the attractiveness of the control system.

- b) *Operationality of a control system.* Operationality expresses the requirements of internal effectiveness for the controller's action. In our case the controller's action is the application of "motivational rules". The application of motivational rules means that some resources obtained through operational rules are "given away". However, we can look at the question from a different point of view: the application of a particular motivational rule means that those resources must be obtained through operational rules. In either case what matters is the relation between operational rules and motivational rules.

If the control system has a common measure to evaluate what it receives through operational rules and what it gives away through motivational rules, the meaning of operationality is the difference between value received through operational rules accomplished by a DMC and value given away through the rules motivating that DMC.

However, we do not need to assume a common measure in order to apply the concept. *Operationality* is the impact of motivational rules on what we have called the *internal effectiveness* of the control system, *given the operational rules* of the system.

A control system will be more or less operational depending on its internal effectiveness and the extent to which it is affected by the motivational rules required in order to motivate DMCs.

- c) *Efficiency of a control system.* Efficiency expresses the changes that the controller's action may bring about in the level of internal effectiveness that the action has for the controller. In our case we must think of the impact that repeated application of particular motivational rules may have on the operationality of the control system.

It is measured by the cumulative differences between resources obtained by operational rules and resources given away through motivational rules. If the internal effectiveness of a control system is "positive", that is, if the system receives more resources than are needed to apply motivational rules, the efficiency of the control system will be measured by the amount of resources it accumulates.

- d) *Consistency of a control system.* Consistency expresses the changes that the controlled action may bring about in the level of internal effectiveness that the action has for the controlled unit.

In our case we can see that consistency expresses changes in the *attractiveness* of a control system due to the repetition of actions demanded by its operational rules.

### **Organizational control theory**

We can now summarize the attributes of a control system, that is to say, the properties that must be considered an expression of its quality to accomplish control and ensure its continuity. They are:

*Effectiveness of a control system:* The degree to which it satisfies DMCs' external effectiveness requirements in order to motivate them to accomplish the system's operational rules.

*Validity of a control system:* The degree to which its operational rules are attractive for DMCs. That is to say, the degree to which its operational rules ensure that those DMCs will achieve some degree of internal effectiveness when accomplishing them.

*Operationality of a control system:* The degree to which its motivational rules can be satisfied by the resources provided by the operational rules.

*Efficiency of a control system:* The degree to which it ensures its operationality by accumulating the resources that are needed in order to satisfy the motivational rules.

*Consistency of a control system:* The degree to which it ensures its validity through growth in the attractiveness of its operational rules when they are applied repeatedly.

## CHAPTER V

### Teleology of control systems

#### *Purpose of the chapter*

In this chapter we are going to investigate the end state towards which a control system works.

That "end of control" will differ, depending on whether the control system is consistent or not and depending on whether it is efficient or not. We have four different possibilities:

- a) Control system is both efficient and consistent
- b) Control system is efficient but not consistent
- c) Control system is not efficient but it is consistent
- d) Control system is neither efficient nor consistent

We do not need to investigate control systems that are invalid or non-operational because they cannot exist. The mere existence of a control system means that to some extent it is *valid* and *operational here and now*. An *invalid* control system has no members to control: its rewards do not motivate anybody. A *non-operational* control system may offer rewards that would motivate somebody to perform its operational rules, but it cannot make those rewards effective. In the first case the control system is *unattractive*, and in the second, *utopian*. In practical terms they appear as "theoretical lucubrations", in the first case of "naive practitioners" and in the second of "naive theoreticians".

The four categories of control systems that we are going to analyze do in fact exist. They can also be approached as the different forms of factual organizational rulership. The names we could give them are as follows:

- a) Efficient and consistent control systems express the characteristics of authority based on “love”, whose aim is to improve others. They characterize the “unselfish leader” whose aim is the “relinquishing of power”.
- b) Control systems that are efficient but not consistent express the characteristics of authority based on power whose aim is to gain more “power”. They characterize the “demonic leader” whose aim is to replace the preferences of DMCs by “organizational preferences”. This type of control systems is formally identical to the type of control system applied to animals: that is because for animals consistency has no meaning.
- c) Control systems that are not efficient but that are consistent express the characteristics of well-meaning but unwise authority. They characterize the “weak leader” who relinquishes “power”, but too soon.
- d) Control systems that are neither efficient nor consistent express the characteristics of irresponsible and unwise authority. They characterize the “irresponsible and erratic ruler”.

In the rest of the chapter we will attempt a more accurate description of the processes generated within the organization by these kinds of systems and the “end state” implicit in the characteristics of each system.

### **Inefficient and inconsistent systems**

The main formal characteristic of the process generated by these systems is that of destroying both their *operationality* and their *validity*. The end state implicit in the system is the disappearance of the organization. The process leading to that “end state” is very easy to visualize:

1. Decreasing validity will require more effectiveness from the control system in order to maintain DMCs’ motivation.
2. The required effectiveness will have to be achieved through increasing rewards.
3. Decreasing operationality does not allow for increased rewards.

Accumulated efficiency may give the organization a “grace period” until it finally disappears. The “end state” could be represented by an organization that “demands a lot” and “gives nothing”. We could say that inefficient and inconsistent systems tend to lead to an organization’s disappearance “by explosion”.

### **Inefficient and consistent systems**

The main formal characteristic of the process generated by these systems is that of destroying their operationality but improving their validity.

The end state implicit in the system depends on the outcome of two forces that have

opposite effects. In other words, the organization may continue to the extent that its members “freely” sacrifice external effectiveness requirements. The end state could be represented by an “organization” that “demands nothing” and “gives nothing” to its members. In fact, they could be called “irrelevant organizations”. We could say that inefficient and consistent systems tend to lead to the disappearance of an organization “by consumption”; they tend to reduce the organization to an “empty point”.

### **Efficient and inconsistent systems**

The main formal characteristic of the process generated by these systems is that of *improving their operationality while destroying their validity*.

The end state implicit in the system depends on the outcome of two forces that have opposite effects. The organization may continue to the extent that its members exchange internal effectiveness requirements for rewards obtained through external effectiveness. The end state is represented by an organization that we shall call “unity by power”, which has the following characteristics:

- a) It demands complete subordination of its members in order to maintain organizational efficiency.
- b) It relies exclusively on the effectiveness of the control system to motivate its members.

The process generated by control runs as follows:

1. Decreasing validity requires more effectiveness from the control system in order to maintain the DMCs’ motivation.
2. Required effectiveness has to be achieved by increasing rewards.
3. Increasing rewards tend to decrease the operationality of the system.

How can we explain that operationality grows when the internal dynamics of control tend to make the system less operational? In fact, an organization ruled by an efficient and inconsistent system appears to be an *impossible organization* in terms of pure control theory. It can, however, be explained in terms of meta-theory. To do that we need a little digression into the field of ethics.

### **A note on freedom and independence**

An implicit hypothesis that has underlain our reasoning is that of “voluntary participation” as the basis for organization. We have been assuming in our analysis that if a DMC is not motivated to belong to an organization, it will simply stop belonging to it. That is the case in many organizations, and because of that one of the main features of organizational success is membership itself. On the basis of that postulate of “free participation”, it is impossible to explain the existence of organizations ruled by an efficient and inconsistent control system. Once that postulate is dropped, the real nature of such organizations appears

very clearly. Analysis of these organizations is more important from the point of view of sociology and politics than from the point of view of control itself.

The analysis of the process followed by “control” in such organizations can be perfectly developed on the basis of our theory, It must only be kept in mind that DMCs *cannot leave the organization*. The way to include that element in our reasoning is in fact very simple: *It is enough to accept that DMCs need, in fact, some degree of external effectiveness, which can only be provided by an organization, and so they have no alternative for satisfying that need but to belong to the organization*. This postulate may seem to go directly against the fact of “freedom” in DMCs. That is not the case. The subject belongs in the field of ethics, but it is worth devoting a few words to it here. It is probably the most fitting subject to check the consistency of our model in anthropological terms. The key distinction implicitly made by our model, one which is very often forgotten in sociological and political discussion, is the distinction between “freedom” and “independence”. The confusion is most unfortunate because it blinds the observer to the dynamic process that relates the two, and that process constitutes the very essence of human existence. *Freedom* refers to the bare fact of the possibility of choice, and its actuality is achieved through independence.

*Independence* refers to the possibility of achieving goals, of satisfying needs, *solely by means of the DMC's own actions*. A DMC is *free* to the extent that the goal which motivates its action can be independently achieved. Men have the possibility of being *free*. The degree of *actual freedom* achieved by any human being is measured by the *degree of independence* that he has achieved. Our model explains the dynamics of the process: men achieve freedom to the extent that they improve their “internal structures”. A man whose actions were motivated exclusively by *internal effectiveness* would be supremely free. In fact, he could not be “controlled” by an organization. We can see that the degree of independence is expressed by the extent to which internal effectiveness is the source of motivation for action. If we were to develop our analysis within the field of ethics, we would need to explain a little further our previous postulate about the “external effectiveness that DMCs need and that can only be provided by an organization”. For our analysis here it will be enough to consider that postulate within practical limits as asserting that “leaving the organization would entail almost unbearable hardship for DMCs”.

We can now go back to our subject. The point to be explained is the notion of “increasing operationality with decreasing validity”.

If that is the case, we can see that the effectiveness of the control system must be maintained *without increasing rewards*, simply because rewards cannot be increased if operationality is to grow. In fact, if the rewards are so vital for the DMC that it cannot stop belonging to the organization, the organization does not need to increase rewards to ensure motivation. By the same token, however, an organization may increase its operationality by rewarding at the minimum level required in order *not to satisfy DMCs but merely to keep them in existence*. Organization becomes *an end in itself*; it owes its existence exclusively to the effectiveness of the control system. That effectiveness is ensured to the extent that its rewards are more appreciated by DMCs because those rewards are the only source of motivation for them. The system will therefore tend to become more and more inconsistent in order to destroy any possibility of internal effectiveness in the organization's members. The final characteristics of such an organization are:

- a) It constitutes a “mechanical unit”. The organization is the only “free DMC”.
- b) Organizational members are no longer “free”. They depend completely on organizational rewards.
- c) To ensure its own stability, the organization must eliminate any other source of rewards for DMC’s other than organizational rewards.
- d) Organizational efficiency is best ensured if the level of rewards is kept at a minimum.
- e) The preferences of DMCs are totally ignored.

The “end state” will be achieved to the extent that the organization effectively destroys the DMCs’ internal structure, that is, their ability to be independent to some extent, however small.

The “end state” implicit in the rule of an efficient but inconsistent system justifies the name we have given it when applied to human beings, namely that of “demonic leadership”. We can see that, *in fact, its efficiency* is measured by its ability to destroy freedom in DMCs. That is the important fact, not whether it starts the process by attracting DMCs through high rewards. That kind of leadership, usually called “paternalism”, may be associated with an inconsistent control system. If that happens and it succeeds in being efficient, it will degenerate into the kind of leadership we have just analyzed. “Paternalism” may be the appropriate name at the beginning of the process, but it will degenerate as rewards are cut back to ensure efficiency.

Another feature of the system is its tendency to “discriminate” among DMCs. In order to maintain efficiency it will start by cutting back the rewards of the “weakest DMCs” in the organization. The “weakest DMCs” are the ones whose internal effectiveness is very low and who therefore rely on external effectiveness to satisfy most of their needs.

### **Efficient and consistent systems**

Let us suppose that we have a control system that satisfies all the requirements expressed by our control theory.

We will have the following process:

1. *Consistency* tends to make the system’s operational rules more and more attractive for DMCs. In the “end state”, DMC’s fulfill those rules simply because they are internally effective, regardless of any rewards obtained through motivational rules.
2. At that stage, “*efficiency*” will also be at its highest point because, in fact, motivational rules do not need to be satisfied. Everything obtained through operational rules could be “freely” disposed of by the organization.
3. At that stage, “*operationality*” will also be at its maximum, and the same with “*validity*”.

4. Effectiveness will have a meaning in this case. DMCs will not need to be motivated to apply the operational rules. They will apply them independently of the external effectiveness of those rules. That does not mean, however, that those DMCs will be *indifferent about external effectiveness*. It means that they can move themselves because of the internal effectiveness of their actions and that they do not depend on “rewards” attached to those actions. Those “rewards” may still be “rewarding” and the subject of preferences, however.

*Thus, in the “ideal case” we find that DMCs are moved to act because of the internal effectiveness that they achieve when satisfying the preferences of other DMCs. The control system merely translates those preferences into operational rules for other DMCs.*

A control system tends by its very nature to achieve that supreme *unity* among controlled DMCs. It is important to note, however, that *unity is achieved through freedom*. That is to say, the control system tends to create *unity*, but through a process which, by improving the DMCs’ internal structures, makes them “more free” and at *the same time more interested in satisfying the preferences of other DMCs*. It is important to note this characteristic of “unity in freedom” because we have just seen the caricature of “unity” attempted by an inconsistent control system, which could be called “mechanical unity” achieved through exercise of sheer power.

Another characteristic of that “unity in freedom” is “growth”. In fact, the organization itself may “freely” use the resources that are no longer needed to motivate DMCs within the organization to attract new DMCs, whose internal structures may be improved by the control system. The DMCs initially attracted by motivational rules may later on become members of the “unity” itself. The level of “efficiency” that “unity” ensures allows the organization to apply “motivational rules” for DMCs that reward their actions much more than the contribution which the accomplishment of operational rules by those DMCs means for the “unity”. The only limit to that “reward” is set by the consistency of the control system. The control system will not reward those actions which, if performed by the new DMC, will destroy its internal structure.

In fact, we can see that the “control system” that tends to achieve “unity” is merely the expression of what we may call “authority exercised by love of those who are ruled”. The important point here is that the attributes of the control system *specify the conditions to be met by authority if it is to be described as above*. That is:

1. Authority is meant to improve the internal structure of the subject under authority.
2. Rewards are attached to actions *which are efficient for the subject*. That may be noticed through the fact that as the action is repeated, the rewards will be needed less and less to motivate the action.
3. In the end, “authority” itself is no longer needed in the sense of rewarding desired actions: “Love” is mutual. □

## Appendix 1

ORGANIZATIONAL CONTROL THEORY:  
A FORMAL APPROACH**The meaning of organizational goals**

We can approach an organization as an input-output system. Adopting that approach, we can identify inputs as “what the organization receives from its members”. Outputs are “what the organization gives to its members”. The system itself is the “control system”. In fact, the control system is what specifies inputs (through “operational rules”) and outputs (through “motivational rules”).

We have seen before that the “attractiveness” of a control system is the “evaluation of inputs from the point of view of organizational DMCs”. We have also seen that the “external effectiveness” of a control system is the “evaluation of outputs from the point of view of organizational DMCs”. Finally, we have also found that the “internal effectiveness” of a control system is the “evaluation of inputs from the point of view of outputs”, that is, the “gains” in organization itself when operational rules and motivational rules are applied.

It is not difficult to see that all those aspects are relevant from the organizational viewpoint. A particular organization may define its purposes in relation to some “desired state” of any one of those variables. The fact is that the remaining variables will appear as “constraints” to be accomplished, too.

We have also seen that two more “constraints” must be added if an organization is not only to exist but continue to exist in the long run. They are expressed by what we called the “efficiency” and “consistency” of the control system. Efficiency has to do with improving the organization itself as a source of “rewards” for its members. Consistency has to do with improving DMCs as the source of organizational inputs. Efficiency tends to improve an organization’s “output capacity”. Consistency tends to improve the “input requirements”. Both efficiency and consistency appear to be “structural constraints”.

Bringing to light the whole set of evaluations and the whole set of relations that connect them makes the inadequacy of concepts such as “organizational goals” all-to-apparent. It is not surprising that the meaning attached to such concepts differs widely from one situation to another. Take “profit”, for instance, as an expression of “organizational goals”. It is obvious that “profit” indicates the organizational gains that follow from a particular application of its control system. That is, “profit” is the difference, *evaluated from the organization’s point of view*, between what a DMC “gives” to the organization when it accomplishes “operational rules” and what the DMC “receives” from the organization through “motivational rules”. It is true that “profit” is an *organizational goal* because an organization is *independent* of its members to the extent that it “makes a profit”. That is so because “profit shows that the organization generates more resources than are required to motivate membership”.

In the same way, we find that the satisfaction of the needs of organizational members (via motivational rules) is likewise an organizational goal. That is a very easy point to see, and sometimes it is emphasized by those who tend to define “organizational goals” in terms of “social usefulness”.

The analysis is a little more difficult in the case of “attractiveness”. That is because we have a deeply rooted custom of approaching any analysis of motivation *as if*

organizational members *were motivated only* by organizational rewards. The fact is that one needs only look at organizational reality to see that *in most organizations, and in most members of organizations*, exactly the opposite is the case. Any non-profit organization must rely on the internal effectiveness of many of its members as the motivating condition for them to belong. In fact, they have no motivational rule for some of their members.

There is an even deeper explanation than that provided by the mere existence of internal effectiveness. We are not going to deal with it at length because it belongs in the field of the organizational and anthropological theories built on the basis of our approach. All the same, we can at least give a glimpse of what the explanation consists of.

We can conceive of a DMC as an entity that attempts to achieve *two goals at the same time*. One of the goals is satisfied by what we call *external effectiveness*. The other is satisfied by *internal effectiveness* and so we shall call it the *internal goal*. *It is quite possible that the organization's operational rules will teach the DMC better ways of achieving his internal goal*. It is not at all unusual. Indeed, educational organizations have that explicit purpose. In fact, we cannot deny that in many organizations (be they profit or non-profit, or however else they may be categorized) people belong because they like what they are supposed to do in the organization. We cannot deny that in many cases what they do there improves them. It is also a very sad fact that often what they do there destroys them.

In fact, what we have called “attractiveness” is an organization’s “motivational reserve”. It is a better insurance against failure than any kind of “earned surplus”. Many administrators have found that out the hard way, as soon as they started to change the “operational rules” looking for hypothetical improvements.

“Attractiveness” is thus an organizational goal, too. As a matter of fact, those who confuse democracy *as a way of evaluating outcomes of decisions* with democracy *as a way of making decisions* implicitly claim that it is the only goal. If an organization demands *no operational rules*, “attractiveness” may be guaranteed, but unless the organization has achieved what we called “perfect unity”, it is hard to see how this procedure will guarantee “external effectiveness”. Democracy is the best way to measure a control system’s *external effectiveness*. To the extent that an organization does not evaluate its decisions by democratic procedures, it will tend to be “demonic”. That is because it will tend to replace effective satisfaction of its members’ preferences by some other “standard” which supposedly “represents” that satisfaction. The standard will go “untested” unless democratic procedures are followed. However, to the extent that an organization uses democratic procedures to define operational rules beyond the point set by the actual “degree of unity” it has achieved, it will tend to be, at the very least, “irrelevant”. Democracy as a way of making decisions is an organizational goal. To the extent that it is achieved, “attractiveness” is guaranteed. But we have the same constraint as in the case of the other organizational goals: neither can be maximized at the cost of the other.

Turning to the “structural constraints”, represented by efficiency and consistency, we also find that sometimes one of them is said to be organizations’ only goal. For example, organizational goals have often been set in terms of organizational “growth”. If “growth” is understood in the sense of “extension”, that is, in the sense of “increasing membership by attracting new members”, then *efficiency* would appear to be the relevant element. If “growth” is understood in the sense of “intensity”, that is, in the sense of “increasing unity among existing members”, then *consistency* would appear to be the element implied.

However, we can immediately see that those two goals cannot be set independently of the other three goals. If they were set independently, they would become the goals of

organizations that did not exist, due either to lack of attractiveness and external effectiveness (unattractive organization) or lack of operationality (utopian organizations).

We may now summarize our analysis of organizational goals as follows:

1. An organization has goals at both the *operative* and the *structural* level:

Goals at the operative level establish the conditions that ensure the actual existence of an organization and its usefulness.

Goals at the structural level ensure the continuity of an organization and the improvement of its usefulness.

2. Goals at the operative level are:

*Organizational attractiveness*: The extent to which the organization helps its members to satisfy internal effectiveness requirements.

*Organizational effectiveness*: The extent to which the organization provides external effectiveness for its members.

*Organizational operationality*: The extent to which the organization can achieve both attractiveness and effectiveness at the same time. It is measured by the surplus of resources achieved while remaining attractive and effective.

3. Goals at the structural level are:

*Organizational consistency*: The extent to which organizational attractiveness grows with operations.

*Organizational efficiency*: The extent to which operationality grows with operations.