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ORIGINAL ARTICLE

The Cybernetics of political communications and social transformation in Colombia: the case of the National Audit Office (1995–1998)

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Abstract
This contribution offers the author's personal experience with a project that took place 25 years ago in Latin America. This was about Second Order Auditing in Colombia during the second part of the 1990s. This project was carried out at the Country's National Auditing Office (CGR), and was an application of the *Viable System Model* (VSM) and the Viplan Methodology to a National Context. It was an innovative project at the CGR, focused on Second Order Auditing, to improve communications within the fabric of the Colombian government. Its emphasis was building responsible trust between public enterprises, ministries and political agencies. Its emphasis was building communications between ministries and public entities, with the aim of increasing their effectiveness. At its core were methodological and epistemological developments. Key questions it attempted to answer were how to model the complexity of the enterprises and how to transform the auditors' views of their relations with people in public entities, from one focused on requesting information, to one focused on communications. Structural changes were proposed for the National Audit Office and state enterprises, and hundreds of auditors were trained, through epistemological methodological workshops, in second order auditing and the reports of their auditing were debated extensively in government and beyond. This paper finishes with a short discussion of these transformations in the light of organisational cybernetics and in particular of the Viable System Model.

Keywords Viable system model · Colombia · Viplan methodology

1 Introduction

This article in organisational cybernetics in Latin America, adds to the author's work in Chile in the Cybersyn Project (Espejo 2014, 2018). It reports work in Colombia in *Second order Auditing* for the Country's National Audit Office (CGR), from 1995 to 1998. This was a project with hundreds of participants, which has had limited exposure in Latin America and beyond. Conceptually, it was guided by the *Viable System Model* VSM (Beer 1972, 1979, 1981).

Its focus was methodology; how to use the VSM in social organisations, including companies and social situations. It evolved from the Viplan Method developed in the 1980s (Espejo, 1989), towards the *Viplan* Methodology of the following decade (Espejo, 1983, 1998). Espejo's collaboration with Beer, as he was writing the methodological book Diagnosing the System for Organisations in 1985, was an important input to this work. Espejo's collaboration with students and colleagues, at Aston University and Syncho Ltd, a company he formed at the Aston Science Park in 1985, produced several diagnostic monographs of small organisations in the United Kingdom. In particular *PM Manufacturers* (Espejo 1983, 1989) was central to this methodological work. The detailed application of the VSM to this enterprise helped clarifying how to apply it. Espejo's interactions with Professor Peter Checkland (Checkland 1981) of Lancaster University had the relevance of clarifying organisational purposes to study an enterprise's structure. His idea of naming systems was the beginning of the VIPLAN method to study organisations, which was published in 1989 in the book "The Viable System Model: Interpretations and Applications of Stafford Beer's Model " (eds. Espejo and Harnden 1989). Espejo wrote several chapters in that book. In particular, the chapter *A Cybernetic Method to study organisations* introduced the VIPLAN Method.

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VIPLAN was proposed as a method to measure the complexity of an organisation's transformation (Ashby 1964) starting from naming the organisation as a system with inputs and outputs. The five steps of the method started with naming its transformation from inputs to outputs to clients/customers. The mnemonic *TASCOI* was introduced as a shorthand to relate actors (A) producing a transformation (T) beginning with suppliers (S) supplying its inputs, customers (C) receiving the outputs, owners (O) controlling the transformation and interveners (I) responsible for the transformation's context. This initial idea was used to develop in full the Viplan method and the related methodology. The method was further developed by Espejo's colleagues and students in hundreds of projects throughout the world. Further developments were made by Angela Espinosa and Alfonso Reyes, from Colombia. Espinosa was the initiator of the Colombian project about *second order auditing* in the *National Audit Office (CGR)* where VIPLAN was used in full as is explained next. Reyes was a major contributor in the Viplan's implementation and further development. Espejo and Reyes wrote the book *Organizational Systems: Managing Complexity with the Viable System Model* (Espejo and Reyes 2011), which in 2016 was published in Spanish by the Universities of Los Andes and Ibagué in Colombia.[1]

The Colombian Project 1995–1998. Organisational Change and Second Order Auditing at the Comptroller's Office: Towards transforming the accountability of public sector entities.

The project at the National Audit Office offered a framework to understand organisational systems from the perspectives of first and second order cybernetics (von Foerster 2003; Maturana 1988). Through this distinction organisations were seen as black boxes and as complex networks of interactions (Espejo and Reyes 2011). The former focused on external observers seeing organisations as transformations of inputs into outputs (first order cybernetics); the latter focused on observers in their reflexive relationships with other actors in the organisation and with environmental agents (second order cybernetics). This distinction was at the core of a *New Model of Control for the* CGR.[2] This distinction had important implications for the management of complexity as is explained below.

The most complete report of this project was done through papers about the "State of the State".[3] Published at the *Journal of Systems Practice and Action Research* (Espejo and Reyes 2001; Espejo et al. 2001; Reyes 2001; Zarama 2001). A more comprehensive report was published by the Deputy Comptroller of the CGR at the time of the project, German Bula in *Kybernetes Journal* in 2004 (Bula 2004). This was an important application of management and organisational cybernetics aimed at improving the Colombian state. The results at the end of the 4 years of its implementation were limited but understanding its development may help to carry out more work in this direction in the future.

For 4 years in the last millennium, the Comptroller's Office of the CGR, was engaged in a process aimed at improving the functioning of the Colombian State. To this end work was done to produce: new discourse of control, followed by the design of new auditing practices, the training of new auditors and the establishment of new forms of relationships between the Comptroller's Office and the country's public sector entities under its regulation. This process had its origin in a basic recognition; the purpose for auditing government agencies was improving their functioning, to make them more effective, more appropriate to their purposes and not to check the details of their operational procedures. It was apparent that no matter how well equipped an external auditing organisation was, it could not audit the details of hundreds of entities and furthermore, any attempt in that direction would be counterproductive; the cost of meddling in the activities of these entities would reduce their autonomy and make them less creative and flexible.

As the project's Scientific Director Espejo offers the following reflections. It starts with an introduction to its context. Second, it offers a diagnosis of the CGR´s organizational structure at the beginning of this work. Third, it offers the redesigning of the audit process and discusses its fundamental characteristics in the context of a 'new discourse of control'. Fourth, it offers an overview of the methodological and technical tools implemented to support the change process. Fifth, it discusses processes of individual change and transformation, particularly changes in the auditors' practices and the need to build responsible trust between them and the officials of the audited entities. Finally, it discusses the proposed structural changes in the CGR for its transformation into an effective institution to manage its resources. All this took place over the course of 4 years. Espejo's report to the CGR at the end of the project is the main reference source for this article (Espejo 1998).

[1] Raul Espejo y Alfonso Reyes, 2016. Sistemas Organizacionales: El Manejo de la Complejidad con el Modelo del Sistema Viable. Universidad de Los Andes, Universidad de Ibagué. https://uniandes.ipublishcentral.com/product/sistemas-organizacionales.

[2] CGR in Spanish is the Contraloria General de la Republica; National Comptroller's Office.

[3] State of the State was the encompassing name for the public enterprises regulated and managed by the Colombian Government through the CGR. It wanted to highlight the 'state' of these enterprises within the context of the CGR (Espejo and Reyes 2001).

1.1 Project context

The CGR had had a long history of changes and re-evaluations of its functions and this was a project for institutional strengthening. In September 1994, at the beginning of Ernesto Samper's Presidency of Colombia, the National Congress appointed David Turbay as the new Comptroller General, who appointed Miguel Gómez Martinez as Vice Comptroller and both undertook the task of revitalizing the Country's National Audit Office (CGR). They asked the support of Germán Búla, with a long trajectory in public services and who later, in 1997, became the CGR's new Vice Comptroller, and Angela Espinosa who had been attached to the Country's Presidency. They formed an internal team with people from different parts of the CGR and agreed on the relevance of a systemic vision for audit and control problems, which required external expert support. Espejo after a couple of conversations with Miguel Gómez accepted the scientific direction of the Project for Organizational Change at the CGR. A first formal visit to the CGR, including a meeting with the Comptroller General took place at the beginning of July 1995. Turbay was interested in short-term results, however it was clear that changes in the institutions' control and auditing practices required a long-term intervention. Eventually a 4 years horizont for the project.

Back in England, I drew up an action plan in July 1995, which identified necessary activities for the transformation of the CGR into a more functional entity in the Colombian context. This plan emphasized the need to diagnose structural and cultural aspects of the CGR, identified and diagnosed 'critical processes' relevant to its operations as an auditing entity, promoted structural and cultural adjustments, designed more effective ways to carry out these processes, proposed a prototype for the training of auditors in new auditing practices. Over time the meaning of these activities became richer as the project progressed from practice. Soon it was realised the CGR was there *to serve* the Colombian State and not its own interests. This realisation had structural implications. The Project for Organizational Change had as its first aim transforming the Comptroller's Office into an entity to support the effective development of the State's enterprises as well as of ministries and other governmental offices.

An event that catalysed agreements was the visit to London of the Comptroller and Germán Bula's, in September of that year. It was during this visit that a *new discourse of control* was agreed. More specifically it was agreed on the creation of more effective auditing practices, with the support of two prototypes—one of them supported by new information technology and the other with more traditional technology—and also it was agreed to establish a training program to generalize the use of practices related to the new discourse of control. The meaning of the project went beyond being an instrument to modernize the CGR, it took the meaning of transforming the organisation of the Colombian State.

2 The comptroller's office: structure and culture

According to the plan proposed in July 1995, the project was initially aimed at diagnosing the structure and culture of the CGR. The Viable System Model and the Viplan Method were proposed for these purposes. Model and method were going to have a great influence in the practice of the *new discourse of control* and the design of the new auditing processes, however at this early stage both were proposed to diagnose the structure of the Comptroller's Office. With the support of interviews and workshops, communications and information flows were modelled in the entity. Germán Búla and Angela Espinosa, supported by Soledad Gúzman, were the main actors in this task. Interviews made it possible to diagnose structural weaknesses of the CGR and also to observe the fundamental characteristics of the internal and external relations of the institution.

A key diagnostic point was what we called *reinforced centralization*. On the one hand, the relations between the Comptroller's Office and the audited entities, that is ministries, enterprises and so forth, were a manifestation of the State's over-centralization, on the other, the internal management practices within the CGR were also an illustration of an excessive centralization. The combined effects of both forms of centralization were an inadequate use of human resources, fragmented relationships, and in general inefficient audits. The CGR's role had to be reconceptualized; its role supporting the effective development of state entities had to be reinforced, going beyond ensuring the legality of institutional actions as an end in itself. More than a 'police' function, it had to be a facilitator of institutional learning.

In its role of auditing the adequate use of the State resources, the CGR had to be inserted in loops of evaluation, negotiation and allocation of public resources. Audits put the CGR in an excellent position to make well-founded judgments about the probity and effectiveness of those who operated and invested the resources of the State. Intrusion into their details had no place. At the local level, the CGR had no competence in the administration of the entities themselves. This was the situation detected in the interviews. The CGR was conducting local audits through its *regional offices* (the so called *sectionals*), producing results of doubtful utility. The purpose of an external audit, proper to the CGR, had to be the support of the effective use of the entities' resources and not the discovery of local instances of misuse; for these purposes internal audits were enough for as long as self-control was effective. Lack of clarity about this complementarity produced an undesirable functional centralization. It

was apparent that unless auditors reported to regional governments, which they were not, the fact of being located in regions did not imply decentralisation.

Something similar was happening with the CGR's functions themselves; the auditing teams, responsible for human, physical and financial resources in the external entities, were centralized. The allocation of resources for the sectorial (central) and sectional (regional) offices was done by an Administrative Secretary, concentrating an enormous power and a huge number of decisions, which in fact were beyond its functional capacity, producing either a delay in decision-making or arbitrary decisions. This administrative centralization was responsible for low budget execution.

This *reinforced centralization* affected the CGR's relations with the audited entities as well as within itself. In general, with the audited entities they had a relationship of fear and mistrust. On one hand, the audited entities were aware that the CGR did not have the capacity to carry out effective audits, but were also aware that the CGR's officers could harm them with legal and procedural details. Regulations could not be carried out; a culture of "control means inspect" generated a propensity for illicit acts.

Over-centralization within the CGR generated bureaucratic attitudes and cynicism. Implications of this centralization were fragmented and hierarchical relationships, which affected the way audits were done. The sectorial directorates in Headquarters were organized into *types of audits*, each with units to review in the external entities physical and management controls, financial and legal controls and environmental cost assessments. Integrating all these forms of auditing was necessary but in practice, structurally, these audits were fragmented. To a large extent, this fragmentation derived from the difficulty of seeing state entities as *organizational systems.* This was an issue that was clarified later in the project, which led to recognition of the need for a *good model of the State*. These models are discussed later on in the paper.

In summary, the CGR's diagnosis allowed us to detect that the auditing of state entities was fragmented functionally in *sectorial units* and geographically in what were centralised *sectional units*.

3 Re-design of the audit process: the second order audit

3.1 A new model of control for the CGR

Based on the previous diagnosis, it was necessary to redesign the audit processes. It was necessary to address aspects of the processes themselves as well as of the CGR's relationships with the audited entities. The proposal was a *second-order* audit*:* This was understood as an audit of the relevant control mechanisms of the audited entities rather than of their detailed activities. The principle underlying this audit was that effective control requires good quality self-control.

A black box description is often related to the idea of someone trying to control a situation from the outside; a form of unilateral control. A second order description is about ongoing interactions between actors that are striving for homeostatic stability in their relationships and with environmental agents. Control in this latter case has a very different connotation to the unilateral control exercised by a management viewpoint; it is all about mutual communications, influence, accommodation and stability in relationships. These two forms of description are not incompatible. Quite on the contrary, they are complementary as is shown below with reference to the auditing function of the CGR. Auditing reports can be improved when interactions between audited entities and their environments are made more reflective and this reflexivity helps improve the interactions between them and their management. Our aim was making the interactions between audited entities and the CGR's auditors, observing these entities, more reflexive. The complementarity of the epistemological perspective of external observers using traditional auditing practices, such as management accounting, with CGR's participant observers in the audited entities, observing control interactions from within, was at the core of the project *auditing of auditing* (Espejo and Reyes 2001); In the CGR project, we asked auditors to proceed with their traditional auditing practices (first order) at the same time of proceeding with auditing the entities' control mechanisms, that is, auditing the quality of the communication mechanisms underpinning the production of their traditional auditing reports (second order). We called this complementarity between first and second order auditing *integral auditing*. Auditors proceeded with their auditing practices as external observers and reported accordingly, however, additionally, their reports were produced as participants of teams in an auditing relationship with those producing reports within the entities, observing the quality of these auditing relationships with the Viable System Model (Beer 1979) and the Viplan Method (Espejo 2002). From a *second order perspective,* they were re-entering traditional auditing practices (see Fig. 1). The traditional external auditing, that entailed observing from the outside, was complemented by endo-auditing carried out by those observing the enterprise's relationships as they produced these first order reports. These latter auditors were trained in observing regulatory archetypes of problems in the entities, in particular of *control*

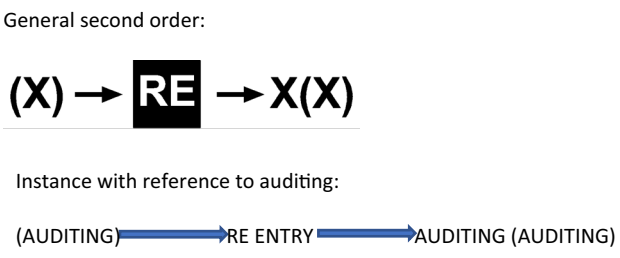


Fig. 1 Re-entry operations as generators of second-order topics. Adaptation From Karl Muller (2017). Own source

dilemmas (Espejo 2008), affecting the quality of interactions within the entities.

Actors within primary activities[4] experience these dilemmas when they suffer overcontrol in their relationships with their own management. In these circumstances, as they experience dysfunctional interactions, it is more likely that they will fail to report the true state of affairs in their interactions with other actors and environment agents. From their part, the more management feels that these actors are misreporting the true state of their affairs, the more they will impose additional audits, thus getting entangled in a *vicious circle*, which reduces the flexibility of the primary activities. Actors are influenced by increasing requirements of management and less by a true reflexive response to the demands of environmental agents, which is the basis of their performance. CGR auditors observed these behaviours within the audited entities, something that influenced their capabilities and environmental achievements. The second order auditing helped detect the shortcomings of hierarchical reporting and opened the space for the advantages of reflexive auditing (Espejo 2001). Reflexive auditing would allow re-entering audits and improving the communications underpinning traditional auditing practices thus making more apparent how to make relevant traditional auditing reports. The aim was improving reflexive interactions between management and internal actors in primary activities and between them and their environmental agents as a means of increasing the quality of relationships and therefore their performance. This was our design of second order auditing.

In the language of second order processes, auditing was recognised as the special domain X (i.e., auditing) that was re-entered: "X(X)" (i.e., auditing of auditing) of the managerial processes within the entities. This re-entry operation "**RE"**, as depicted in Fig. 1, constitutes a vast domain of second-order science (Muller 2017). Re-entry was originally suggested by George Spencer Brown in his book the Law of Forms (Spencer Brown 1969). The operation of re-entry occurs whenever elements or building blocks from first-order science, in this case traditional auditing practices are themselves audited. This is an example of re-entering that is similar to computation of computation, cybernetics of cybernetics, linguistics of linguistics, logic of logic and so forth. As proposed by Muller (2017), these re-entries into first-order disciplinary domains (e.g., auditing) lead to new and mostly unexplored second-order topics. For instance poor quality data, could be related, as part of the auditing, to actors' experiencing *control dilemmas*. Overcoming these dilemmas triggered the need for new data management systems. These were outcomes of second order auditing where the auditors recognised, for instance, the need for digital systems of digital systems. The expectation was that reports of this kind would emerge from second order auditing practices at the CGR. While multiple examples of control dilemmas emerged in our revision of practices, as is explained below, often the quality of these second order reports was not good.

The application of the Viable System Model to particular entities highlighted these dilemmas. Often through these auditing reports the second-order auditors visualised cohesion failures, that is, structural fragmentation within the organisation (Beer 1979; Espejo 2008), such as failures in *responsible trust:* poor coordination of actions and poor capacity for responsible negotiations; together all these structural aspects highlighted cohesion failures which were responsible for the poor quality of the traditional auditing reports. All these were second-order topics that required attention in areas such as personnel management, data management, financial reporting, purchasing and so forth.

CGR auditors produced tens of these reports during the four years of our work at the National Audit Office. In the context of the project, we produced procedures for second-order audits (Reyes 2001; Zarama 2001). These reports were discussed with people of the audited enterprises.

In summary, we argued that failing to produce organisational structure improvements could have the effect of control dilemmas within entities, failing to detect corruption (Espejo et al 2001),responsible for a misuse of resources and poor performance. The first order auditing practices were defective, producing weak results. Often these failures were the outcome of inadequate feedback loops; lacking the necessary information flows and operational practices to recognise and improve control dilemmas. The reviewed auditing practices lacked necessary feedback loops.

3.2 The practice of second order auditing

Naturally, if an entity has good control mechanisms, the chances of loss of control are less. This is not a trivial proposition. The problem is recognizing that control in an entity emerges from relationships—it is intrinsic to these

[4] In VSM term, primary activities (S1 in Beer's terms) are those producing the purposes of the entity under the regulatory control of its cohesion function (S3 in Beer's terms).

relationships—and not to the abundance of inspections. In other words, when control depends on arbitrary inspections carried out by people who are not part of the processes themselves, the chances of loss of control are larger. To put it graphically, external inspectors who are late, sick or on vacation, leave the processes out of control; no one is inspecting these processes. It is clear that effective control cannot depend on these contingencies. Recognizing the weakness of extrinsic controls, the 1991 Colombian Constitution had established the need to develop self-control mechanisms and the importance of internal control in institutions, but proposed no heterarchical mechanisms for these purposes. If internal control is understood as replacing the 'external auditors' (from the CGR) by the 'internal auditors' (from the entity's Internal Control office), but maintaining the emphasis on inspections of officials and not on improving weaknesses of relational self-control, the only thing that is achieved is transferring the problem of inefficient control from the external auditor to the internal instance. On the contrary, in the new perspective, the task of the auditor is to recognize whether the entity is creating and maintaining high quality relational circuits of self-control between those producing (actors) and those receiving products/services (customers). These multiple circuits constitute the entity's regulatory mechanisms; when they support the purposes of the entity they are virtuous. The second order audit seeks to establish relational circuits that are operating as virtuous circuits. As long as these relational circuits do not exist or are of low quality, the quality of process control in the entity will be poor and this will possibly result in corruption and loss of control. *Second-order* auditing diagnoses these circuits and offers ways to improve them.

3.3 A comptroller's office for the future

In June 1996, Espejo made a contribution to the project under the title "What is the Comptroller's Office that the Colombia of the future needs?", which elaborated second order-audit. This contribution was made in an international forum held in Cartagena de Indias with the participation of the President of the Republic, Stafford Beer and other national and international authorities.

The work in progress at the CGR was based on the agreements of the 1995 London meeting with the Comptroller and Germán Bula. Since February 1996, two second-order auditing prototypes had been progressing, one in the "Caja Agraria" (State's Agriculture Bank), supported by state of the art computer technology and the other in the "Registraduria" (National Registry), with the technology in use at the time. Two teams carried them out: the prototype at the "Caja Agraria" supported by Angela Espinosa, and the one at the Registry by Alfonso Reyes.

These were intense learning experiences, which occurred starting from the traditional practices of auditing. Traditional auditors were trained in the use of the VSM and the Viplan Method to compare the 'management circuits' in use with the 'virtuous circuits' necessary to implement effective primary activities. The prototypes sought to recognize the difficulties of doing a new job and therefore were completely open to learning. The lessons were important and many; they recognized difficulties in managing CGR's relationships with the audited entities and also within the teamwork of personnel in Bogotá, regions and from the audited entities themselves. Unfortunately, the prototype auditing reports were not received well by the CGR's sectorial managers. The audits not only reflected a naive use of the new tools, but were also, and unintentionally, the result of a process that had excluded relevant managers. These weaknesses had to be addressed. It was necessary to develop practices for the use of second-order audit methodological tools. Our project teams focused on problem areas of the two entities and made no attempt to carry out global VSM diagnoses. Auditing *Integration Committees* were set up with key managers of the Caja Agraria and Registraduria.

The auditing reports were discussed in *evaluation workshops* in October 1996. These workshops made more accessible to all the involved people the diagnosed problems emerging from the audits. The auditors' difficulties in thinking systemically became apparent, that is, thinking in relational terms rather than in terms of parts directly measurable. The need arose to produce archetypes, based on previous experience of systems thinking, to facilitate their diagnostic task (Espejo 2008). Rather than second order auditing we talked about *Organizational and Performance auditing*. This name emphasized the importance of making organizational performance criteria visible in the process of diagnosing its structure. Effective organization (that is, organization based on virtuous circuits of action) and performance criteria became closely linked. Auditors were unclear about the enterprises' purposes and therefore had difficulties evaluating the quality of relational mechanisms. 'Actors' and 'customers' had to evaluate the quality of services before making judgments. Workshops helped clarify them.

In spite of all the shortcomings, the two prototypes had a positive evaluation. It was clear that the new audits had much to offer and that the prototypes were producing important results. In a meeting with Germán Bula in Europe at the end of July of 1996, we confirmed the opinion already formed in Bogotá to undertake 30 organizational audits beginning in January 1997. However, doing them required amplification of the work in progress. One way or another, it was necessary to professionalize new auditing practices. This required a new organization of the project and making available tools for learning and generalizing the work. For these purposes, we made available the electronic guide

"VIPLAN Learning System" in Spanish, including the Viable System Model and the Viplan Method (Espejo and Bowling 1996). In particular, this guide had to include, as we saw in the evaluation workshops, a review of *archetypal communication and control problems* in organizations. These tools, together with an intensive training program, was the basis for professionalizing the new audit.

During the last quarter of 1996, the 30 audits in state enterprises were scheduled, which began in February of the following year. This was a titanic, high-risk job, directed by Roberto Zarama (2001). We were certainly no longer talking about a pilot project or prototypes. Thirty simultaneous audits could only be achieved by shaking up the structures of the Comptroller's Office, standardizing new processes and making use of important resources. We entered fully into the generalization of the project. Likewise, we had to anticipate a series of secondary effects derived from this massive effort. Structural changes were necessary.

The first months of 1997 were of intense activity. It was necessary to discuss the new approach with the managers of each of the 30 entities, including ministries and large corporations, to achieve commitment to the audits. Internally in the Comptroller's Office, the need to relate the new audit with the existing audits was now raised.

The *organizational and performance* audit was proposed as a global evaluation of the audited entity which started with the traditional 'first-order audit', that is, the financial, physical, legal and other audits. Likewise, we detected the need to have 'special audits' triggered by citizen's requirements and societal special problems. In May and August 1997 we could assess the progress of the 30 audits. At that point, the VIPLAN tutorial was already available, which was being used by the teams in their methodological training. At the same time they were progressing with interim audit reports. Reading these reports made it clear the need to promote important adjustments to the methodology. It was evident that the Viplan Method was being used naively and that its systemic vision was not yet integrated by the audit teams. In particular, it was evident that the auditors had failed to recognize VIPLAN as a method to diagnose *viable systems* and that, therefore, that it could not be applied to entities that were not supposed to be viable systems. This is a point discussed next.

Many of the state entities were not supposed to be autonomous entities; they were not viable systems by themselves, but contributors to the viability of either State institutions or of social systems, such as education, justice, transportation, industry or agriculture. For instance, considering the Ministry of Education as a viable system in itself would mean giving viability to the ministry's own interests at the cost of satisfying the interests of the national educational system, including among others education establishments, widespread educational services and even families. The ministry could not be reduced to pursuing its own viability, but the viability of the educational system. Also a CGR more concerned with its self-production rather than being an effective contributor to the State's viability was an anomalous and "non-functional" comptroller. A Planning Directorate more concerned with its plans and programs than with facilitating the effective creation of plans and action plans (Beer, 1969) by the Nation's social systems was an autistic Directorate. In summary, it became clear that auditors had to develop a capacity to 'see organisational systems' (Espejo and Reyes 2011, 2016) and it was only then that they would be in a position to diagnose relational weaknesses, that is, to diagnose problems about the quality of the virtuous circuits necessary for the effective functioning of the audited entities. This ability to observe organisational systems became the central challenge to the new audit. At the same time, this emphasis on systems meant starting to see sectors and in general social systems, beyond the entities, which, as we will see below, meant important changes in the design of the audit processes in the CGR. *Organisational and performance* auditing requires seeing entities as parts of organizational systems, accepting that there are entities that are expected to be viable in themselves. Effective auditing meant overcoming the fragmentation of entities, while efficiency audits meant focusing on the performance of the entities themselves. This recognition resulted in a series of proposals to change the structure and processes of the CGR.

An immediate adjustment was the need to create structural capacity to see systems, that is, social systems in general. For example, auditing problems often required the ability to audit problem areas that did not conform to just one sector. For that it was necessary to work with networks of sectors in *Sectorial Integration Committees*.

During August of that year, we saw an enormous progress in the preparation of audit reports. However, the difficulty for auditors to go from seeing only procedures in entities to seeing systems in the State could not be underestimated. This was a major paradigm shift and we accepted that it would take time to realize it. We had multiple meetings with audit teams in which the topic was to see systems and relationships rather than to see specific entities or events. Some of these meetings were filmed to document the progress made at them. In spite of the progress, the tendency of the auditing groups was to fit data and information onto the Viable System Model using the VIPLAN Method and not to use the model and method as tools to reflect upon situations. This is a learning process that still is in progress today, after more than two decades of this project (Espejo 2020).

3.4 Support tools

Two types of tools were used to support the new audit. The first related to structuring the audit process, the second to

building the necessary competencies to carry out an integral audit.

3.5 Technology for the audit process

Earlier in the process, the Comptroller had agreed to undertake two prototypes, one with new information technology and the other with the technology in use. To modernize the Comptroller's Office and solve some of its fragmentation problems, the proposal was to create *virtual work teams*, incorporating in the same audit team officials from regions, sectors of the central office in Bogotá, and from the entity to be audited. Traditionally, regional officials carried out auditing tasks at the request of sectorial managers in Bogotá, operating through their functional heads. As a consequence, communications were bureaucratic and slow. The proposal was to develop modern forms of collaborative work, integrating sectorial and regional officials into a team, thus breaking down hierarchical communication barriers. In London, the Comptroller had the opportunity to speak with Professor Clive Holtham of the City University Business School about the use of Lotus Notes, at that time this software was state-of-the-art technology, to support groups with participants working remotely and asynchronously. Unfortunately, the technology available at the Comptroller's Office was not adequate for a rapid implementation of this form of work. To appreciate this technology in the dynamics of an audit team, Angela Espinosa organized the final report for the Caja Agraria with this technological support, using external suppliers to the CGR. The experience was positive, but as is explained later, the fundamental problem for the integrated work of a virtual team was 'seeing systems' and not technology. The introduction of computer tools for auditing would have to wait until the second quarter of 98, a period in which a new effort was made to incorporate Lotus Notes into the auditing process.

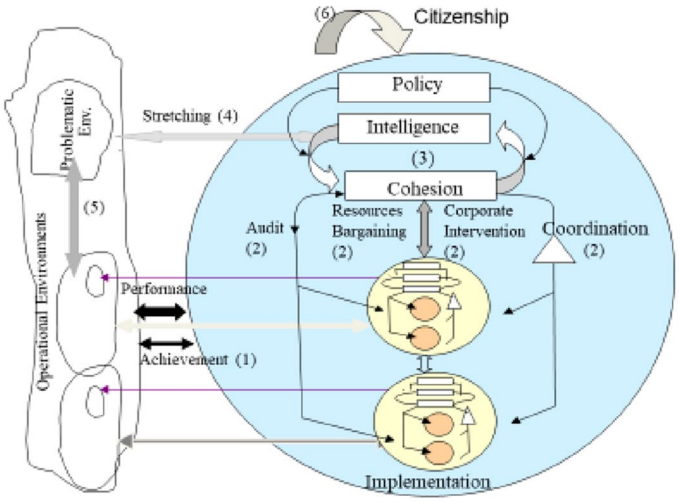
In the meantime, Pierre Jacob, at the time IT Director at the CGR, was working developing these new technologies for the institution. This work made it possible to recognize that the technological efforts of the Comptroller's Office had to aim at supporting the communication and information of its employees and not imposing on them a technology that was distant from their requirements.

3.6 Tools for the new audit: VIPLAN tutorial, guides and archetypes

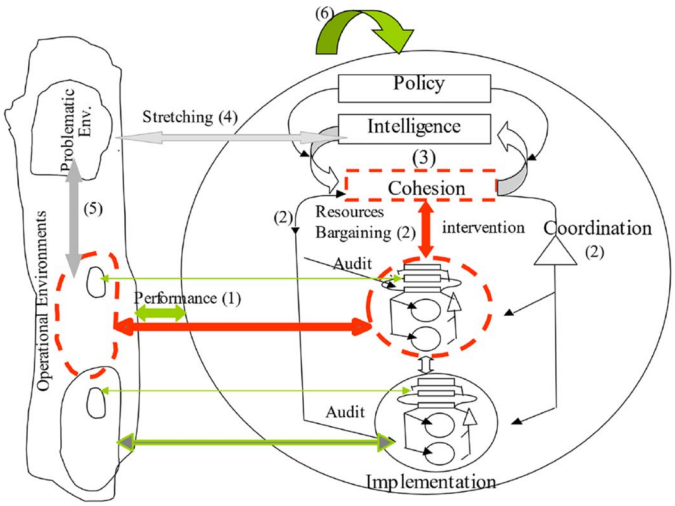
Since October 1996, at the time of the evaluation of the prototypes, the tools to professionalize the second-order audit were apparent. The VIPLAN tutorial in Spanish, the guides to support auditors' team work, and a new document with archetypes of organisational problems (Espejo 2008) were available. These tools were produced between December 96 and May 97. VIPLAN began to be used in April 1997 with the support of the Director of Informatics, who allocated resources for this purpose. The organisational archetypes were the basis of several workshops with auditors and officials of the audited entities. The guides only reached their full maturity in early 1998 when, once translated, the auditors began to discuss and use them in their day-to-day work. Both guides and archetypes were offered to auditors as learning tools and not as rigid guidelines to which they had to conform.

Identity, cohesion, performance and citizenship archetypes were proposed. In the use of the VSM it is common not to recognize the virtuous circuits necessary in an entity due to lack of clarity about its purposes. In practice, this lack of clarity had been a recurring theme of the audits; these are *identity archetypes*. It is common that the communication channels necessary for the coordinated and integrated work of an organization do not work or lack capacity; these are *cohesion archetypes*. This is the case particularly when there is functional and institutional fragmentation, as was the case of the State. The relationships between the CGR, Ministry of Finance, Planning Directorate and State entities allowed us to recognize various archetypes, among others the *archetype of naive trust*, where the allocation of resources was not based on a process of building trust, but on unsubstantiated evaluations of the competences of the entities. It was also common for executives to lack confidence in the officials working for them, or perhaps clarity about the complexity of social requirements. Whatever the case, they tended to develop relationships that inhibited the creativity and performance of the organization; these were *performance archetypes*. The *control dilemma* is an archetypical example of this problem. Finally, it was common to have entities with misaligned purposes and interests despite being part of the same system. This situation created problems of belonging or *citizenship archetypes*. The Police membership of the National Defence System was an example of inconsistent purposes and therefore of problematic membership. The use of archetypes has progressed over the years, beyond the CGR's time and they are still in use by VSM practitioners. Figure 2a shows the general structure of these archetypes and Fig. 2b shows the control dilemma, one of the most used archetypes.

It was only in the second quarter of 1998 that experimentation with information technology had begun. At this point, the CGR had a Lotus Notes network application, through which auditors could communicate by email, share files, work on shared documents, and access archetypes, guides, and VIPLAN whenever they needed methodological or conceptual support. However, at no time was the implementation of information technology a priority; it remained secondary to the individual and organizational learning processes.



.a. Reference Model for Viable System Model Archetypes. Own source



b. Control Dilemma Archetype. Own source

Fig. 2. **a** Reference model for viable system model archetypes. **b** Control dilemma archetype

3.7 Individual transformation: a new auditor

Often we hear that organizational transformation begins with individual transformation. A process of individual transformation required more than learning to do better what was already in progress, it required creating new possibilities and learning ways of doing something different. A great challenge for this project was producing this type of transformation in the auditors.

As already stated the CGR's auditors had been trained in traditional auditing practices, more concerned with detecting illegal and corrupt actions than with improving regulatory mechanisms. It is not surprising that the auditors' relationships with the officials of the audited entities had been distant and confrontational. These officials feared the auditors' authority, reluctantly accepting their intervention, which offered no apparent value added to them.

At the same time, relationships within the Comptroller's Office were hierarchical. Sectorial auditors operated through slow and restricted regular channels. Regional auditors were distant and inefficient. The new project proposed to break with all these forms of fragmented communication. The fundamental purpose of the new audit was the effective use of State resources. For this, it looked for collaborative relationships to end with the various forms of fragmentation. The audited entity was not evaluated in the dichotomy innocent – guilty, it was evaluated in the distinction effective—ineffective. Around this new polarity arose the need for auditors with the capacity to observe new distinctions and use new practices. This

transformation made necessary a training program for the new auditors.

Roberto Zarama (2001) and Alfonso Reyes (2001) designed and implemented an ambitious auditors' training program. On one hand, through weekly half a day methodological workshops for five months, auditors were exposed to approximately 200 VIPLAN distinctions to observe organizations as systems, seeking to improve the traditional fragmented observation of entities. These workshops were complemented by five workshops of 3 days each, whose purpose for auditors was to *incorporate* new practices related to the VIPLAN distinctions. For example, to incorporate the distinction of *variety* (Ashby 1964) requires recognizing the huge number of possible states of everyday activities, transcending their traditional association with the idea of the complicated. Group exercises allowed auditors to *incorporate* these distinctions. Likewise, incorporating the concept of *identity* required the practice of identity construction: identity was more than a definition of mission for the entity, it was appreciating actors' relationships and of these with external agents. Auditors required competencies to observe these relationships and as a result to observe the organisational system. For instance, hierarchical relationships produced what we have introduced as control dilemmas; auditors learned to observe how excessive information requirements by the authorities created relationships of mistrust, which translate into control dilemmas, that is, loss of control precisely when the intention was to gain effective regulation.

In the daily practice of organizational auditing, we experienced the difficulties of incorporating new distinctions. For example, virtual audit teams, with the participation of people from sectors, sections and entities were often understood as regional participants constituting the virtual, while those from Bogotá constituted the real. Of course, today this linguistic slip would be less likely to happen.

The *methodological and practical workshops* were used in each of the 30 audit teams from February 1997; auditors became more proficient running comprehensive systemic audits. More than 500 officers passed through them.

One of the most powerful amplifiers for external auditing was achieving trusting relationships between the audited entity and the CGR's auditors. Likewise, as I pointed out when discussing the second-order audit process (von Foerster 2003), its purpose was achieving responsible trust within the audited entities themselves. In this context, the auditing aim was replacing intrusiveness with open spaces for self-control, aligned with the interests of civil society. As already said intrusiveness created counterproductive control dilemmas. We were aware that effective second-order audits depend on building responsible trust in the audited entity and between the auditor and the auditee.

Building trust was a central transformational issue. We wrote documents to strengthen the auditors' appreciation of this concept. The document *Control and auditing as trust-building processes: A way out for the reconstruction of democratic countries in crisis*, later published as *Auditing as trust building* (Espejo 2001). However, building responsible trust takes time, which implies improving the cybernetics of the involved organisations. Regarding the audits carried out, we witnessed emerging collaborative relationships between second-order auditors and officials of the audited entities, which did not exist at the beginning of the project. However, we were unable to assess whether these were relationships of responsible trust. It was even more difficult to assess whether the internal relationships emerging within the audited entities were increasingly ones of responsible trust.

4 Organizational transformation: restructuring the comptroller's office and closure of the project

The work carried out in the Comptroller's Office for nearly four years gradually started to change the Office's identity and structure.

The auditors' work and the design and implementation of second order audits, especially as they became more widespread, required institutional adjustments. It would not have been possible to progress in parallel with 30 audits without facing structural adjustments. The need for these changes came from practices and reflection on these practices. Many of these adjustments were hinted at and discussed in the Comptroller's Office, some were implemented, others were not. These adjustments arise in the context of the diagnosis of the structure of the CGR.

Key missional activities of the CGR had been:

- Audits (financial, legal, physical, environmental costs, etc.)

- Investigations of special fiscal and policy problems in the Country.

- Economic and financial reports for the State and Government Sectors.

Of these three, our project focused on audits. However, as we progressed, new considerations emerged that made us propose structural adjustments relevant to the other two. To discharge its regulatory responsibilities of State resources, the Comptroller's Office had to be a *good model* of the State (Conant and Ashby 1970). Lack of resources implied areas of State activities beyond its regulatory capacity, possibly out of control. However, the structure of the regulator had to be a good *model* of a holistic situation, but because of fragmentation this was not the case.

In the context of a fragmented State in which *only what is inspected is controlled*, with the CGR lacking capacity to

audit some of the State entities, the chances that they would not conform to the interests of the State were large. Entities learned over time to 'play the system'. Also in a fragmented state it is less likely to find virtuous circles of self-control.

To improve the CGR's auditing capacity, it was necessary to design and implement virtuous regulatory circuits in the State, which included at least the ministries of Finance and Planning beyond the entities to be audited. This requirement made it necessary to take the project to the Presidential level. However much the internal functioning of the CGR was improved, if global structural problems were not addressed, it was unlikely that CGR's improvements would result in significant State improvement. This led the Comptroller and Vice Comptroller to talk with the President about the need to use the evolving project in the CGR at the Presidential level. Unfortunately presidential elections were in progress in 1998 and the chances for significant changes were slim.

However, progress to improve the CGR's 'model' of the State was in progress. In July 1996, Germán Bula had proposed to develop a model of the State as a requirement for second-order auditing. This model was necessary to improve the structure of the CGR. The model of the state became a sub-project of the second order auditing project; Angela Espinosa began it in August 1996, in collaboration with officers of the CGR planning department. The guiding idea was, following the VSM, to model *the recursive structure of the State*. Starting from recognizing its purposes and defining the goods and services that it offered to Society, such as education, health, infrastructure, security, justice and others, the primary activities producing these services and goods were modelled. For example, primary activities producing good education would include recursively primary, secondary and higher education under the umbrella of the Ministry of education. In turn, the primary activities producing higher education would be universities and technical colleges and so on. The purpose of this exercise was to recognize the operational relationships within the State, encompassing its public entities. Organizational auditing depended on the ability of auditors to audit how virtuous the State circuits were, for which they required *seeing organisational systems*. In particular, it was important to identify the State sectors and how well they corresponded to the five sectorial directorates of the CGR. This modelling, based on the purposes of the entities and the value added by them, allowed to recognize an enormous imbalance of coverage between the five CGR's sectorial directorates and the national State. One way or another, this had to be reflected at least in the coverage of their audits.

The generalization of second-order audits, and the need to see the systems relevant to the initial 30 audited entities, which by now were more, began to put pressure to recognize the State as a system and its 'sectors' and 'sub-sectors' as systems within it. Eighteen sectors were preliminarily identified, such as communications, education, social, and justice. Likewise, relationships between the audited entities within a sector began to be seen. For example, the audit of the Ministry of Agriculture could not be seen independently of the audits to the entities of the agricultural sector. These 30 or more audits were generating a very imperfect vision, but a vision in the end, of the *state of the State* (Espejo and Reyes 2001). This work proceeded in parallel with structural changes in the CGR. *Sectorial Integration Teams* were formed to discuss the learning achieved in the second-order audits. The need to integrate the different forms of auditing was recognized. From now on the entities would have, with exceptions, only one point of contact within the CGR. Auditors were appointed as leaders of the corresponding teams. These audits could in certain cases be reduced to accounting audits, while in others they could go as far as *organizational and performance* audits. What was fundamental was to create mechanisms for organizational learning in the CGR, emphasizing the permanence of the audit teams as teams of sectorial integration. The basis for the new structure was auditors with the ability to observe organizations, regardless of the tools used by them in specific audits. For about a year, they worked within Sectorial Integration teams. Starting in November 1997, up to the end of the project in the second half of 1998 these were auditors of holistic *auditing sectors*. Without the need for changes in the organization chart, new relationships were being enacted in the CGR which implied structural adjustments (Maturana 1988). The new design allowed overcoming, at least occasionally, fragmentations within the audited entities and also overcoming functional, regional and hierarchical fragmentations within the Comptroller's Office. The permanence of this design was in the balance at the end of the government's period in 1998.

These proposed changes could not fail to affect the other 'missional' activities of the CGR.

Investigations of fiscal and policy problems, beyond the sectorial directorates, created new forms of fragmentation. Many of these investigations had their origin in citizens' complaints. They were investigated without the participation of the affected sectorial managers. This lack of coordination not only meant duplication of efforts but also the non-use of local knowledge. *Units of excellence* were proposed for these special audits.

The third 'missional' activity of the CGR was preparing economic and financial reports. The Directorate of Economy and Finance prepared, among others, an annual report of the public accounts for the Congress. For these purposes, this Directorate required, independently, information from public entities. The macro-economic work of this Directorate gave them an integrated vision of the Colombian State. This role suggested that this directorate could be the most appropriate to audit the State as a whole, beyond the auditing of the sectors by the sectorial directorates. Without forgetting the legal

responsibilities of this Directorate, it was possible to visualize the need for an audit body of non-sectorial situations, whether they transcended sectors or were multi-sectorial. This allowed the project to see the Directorate of Economy and Finance as an instance related to the sectorial directorates. Aligning the statutory quarterly sectorial reports of the Directorate of Economy and Finance with the sectorial reports guided their auditing, offering the opportunity to unify the sources of information used by both instances. It would avoid the duplication of information requirements by State entities and would allow the coordinated preparation of audits within the Comptroller's Office, making better use of the sectorial knowledge of the experts in Economy and Finance. This proposal was widely discussed with officials from the Directorate of Economy and Finance during March of 1998. However, no progress was achieved.

The restructuring of the Comptroller's Office was part of a complex process that depended on legal, procedural, and also political aspects at the State level. Election of a new President for the Country brought new authorities to the CGR. Once the new Comptroller was appointed he was briefed about the progress made with the new *discourse of control* and the *auditing of auditing projects*. Unfortunately, the political changes in progress were not auspicious for its continuation. At this stage, several of the epistemological and methodological activities of the project started to migrate to the University of Los Andes, where a significant number of academics with systemic and cybernetic backgrounds had been operating for some time.

The VSM and complexity management

At the core of the Comptroller's Office project was the VSM and VIPLAN methodological developments. Both have continued to evolve over the past 50 years; it can be argued that their relevance to society is growing today. Indeed, their developments have made apparent a path to overcome some of the initial shortcomings with the implementation of Cybersyn. In today's digital society, they offer, as proposed in the paper "Cybersyn, Big Data, Variety Engineering and Governance" (Espejo 2021), in this special issue on Cybernetics in Latin America: Contexts Developments, Perceptions and Impacts a revolutionary paradigm to manage big data.

The digital society and the Viable System Model (VSM) share their focus on complexity as was understood in the CGR's project. The digital society, as we are witnessing it today, is grounding social activities in technologies with large capacity to create as well as to map all kinds of situational states. Algorithms, artificial intelligence, 3D printing, engineering services and so forth are making it possible for organisational systems to correct variety imbalances with their environments in real time. Rather than dealing with aggregations and averages, these systems can match individual needs through structural and algorithmic models. In other words, on the one hand their services can be tailored to people's specific needs and on the other they can help lift undesirable constraints and abuses of power, like for instance those described by Zuboff in *Surveillance Capitalism* (Zuboff 2019). People's distributed responses to large environmental challenges can be managed not only at aggregated levels but most significantly at local levels by local providers with the support of enabling technologies, adding flexibility and convenience (Espejo and Foss 2018). Computer networks today can increase relational performances beyond what was possible in the Comptroller's project, through the inclusion of other entities and by overcoming institutional fragmentation and isolation.

The VSM and the VIPLAN Methodology guide an organisational system to manage its environment's complexity through collaboration and coordination with others, rather than by attempting to go alone in a fragmented fashion. It is in this context that the VIPLAN Methodology plays its role. Beyond its use as a modelling tool for organisational systems, it is dealing with situations that require flexibility, creativity and adaptability.

The VSM's appreciation of structures, relationships and interactions opens the space for participation, democracy, and accountability. Today, beyond the CGR's project the current progress with digital technology is making possible new social relationships. That is what this article suggests needs to be developed further, beyond technological and methodological implementation. What we are missing today is cultural, ethical and political progress. As explored before, national opportunism and poor leadership are restricting unnecessarily important relationships. COVID-19 is making apparent that different local and global interactions are necessary to evolve during this pandemic period, and the opportunities for new organisational forms need to emerge (Espejo 2020).

We are increasingly recognising that current social forms need revision. Economists are connecting their language to the need for a transactional world, responsible for new organisational forms.

The Comptrollers' Office project offered a glimpse of possible methodological developments in the direction of holistic management. After a few decades, we need to reflect upon their meanings today, taking into account social, economic and technological developments in a world experiencing pandemics and climate change.

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