Conferencia Internacional LALICS 2013
"Sistemas Nacionales de Innovación y Políticas de CTI para un Desarrollo Inclusivo y Sustentable"
11 y 12 de Noviembre, 2013 - Rio de Janeiro, Brasil

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"Porque en realidad
nuestro norte es el Sur"
Joaquín Torres García

Legitimacy and effectiveness of the Uruguayan STI policy

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Abstract

Uruguayan government is undertaking a political STI reform, which conceives the STI activities as a strategic tool for economic and social development. It is based on a transversal institutional design, which should promote the pervasiveness of STI through the productive and social agenda.

It is largely recognized that transversality may be one of the pillars of STI policies, but it is also well known that it is usually blocked by several coordination problems. We consider co-coordination problems, but in this paper we focus on the analysis of the legitimacy challenges that the STI policy faces.

The new STI institutional design implemented in Uruguay could be suitable for developmental targets. Nevertheless, it failed to modify the supply-side rationale of the main policy tools. Indeed, current STI policy tools are mainly devoted to promote scientific research activities rather than innovation ones. **I**

We conclude that the supply-side bias could generate future political restrictions. It means that the current high legitimacy of the STI policies could be undermined if these policies were perceived as a matter of a specific community and not as an effective tool to pursue national goals.

Keywords: development, transversality, Innovation policy.

Cod. JEL: O21 O38 Z18

I. Introduction

A general reform of the STI policy has been executed in Uruguay since 2005. Arguably, it is the first explicit national STI policy in the history of the country. It is embedded in a broad developmental vision, which conceives STI activities as a strategic tool for economic development, and also as a new way to deal with the social inclusion problems deeply rooted in the Uruguayan society.

To address these wide objectives it was necessary to set a new organizational and institutional policy design, which allows: i) to support S&T activities in research institutions; ii) to promote innovation activities in public and private firms of several economic sectors; iii) to develop different actions and incentives oriented to inclusive innovation. The next section presents some long run patterns of the Uruguayan development path that help to understand the reorientation of STI policies.

The political and institutional option chosen in Uruguay was "transversality". This choice was based on the premise of "...the ubiquitous nature of innovation policy", that means that innovation and S&T, are useful tools to promote firms' competitiveness, to improve health services, and to obtain cheaper solutions for social and economic problems, such as energy, transport, etc. From the premise that "because innovation is everywhere, it is nowhere" derives the main obstacle to an effective policy (European Commission 2003: 9).

The interpretation of transversality in the Uruguayan STI policy design is that as innovation is everywhere, it is not the exclusive responsibility of any particular governmental organization. Therefore, STI objectives should be the responsibility of several public offices and they are not vertically assignable to any particular ministry (Bértola ~et~al. 2005) . T ransversality was conceived as an organizational and institutional instrument to promote the pervasiveness of the STI political agenda, which in turn is considered a prerequisite to follow a broad STI strategy for national development. In section III we develop the main features of recent STI policy reform, in order to analyze the extent to which the transversality proposal was actually implemented.

It is progressively recognized that transversality should be one of the pillars of STI policies, but it is also well know that there are several coordination problems that can block transversal policy initiatives (Dutrénit 2012. Brito 2014). This paper aims to analyze if the institutional and organizational design of the Uruguayan STI policy is suitable to drive the broad STI

national strategy. Even when we consider coordination problems, we focus on the analysis of the legitimacy challenges that STI policy face. Currently, STI activities, and particularly STI policies, were politically reappraised and legitimated because they were embedded in a broad framework that included several goals beyond scientific and technological progress (Bianchi et al. 2013). It is worth bearing in mind that in underdeveloped countries, STI policies often face big challenges of legitimacy (Arocena and Sutz 2005). The contribution of STI to national development is not clearly perceived either by political and social actors or public opinion. Besides, STI policies usually remain strongly associated with traditional science policies and are seen as a political arena unrelated to social and economic problems. Therefore, STI policies must overcome a double test: the legitimacy of the STI activities itself, and the efficiency and effectiveness of the policies to promote the diffusion of the STI outcomes beyond the scientific community.

In Section III we present the rationale of the current Uruguayan STI policies and their institutional design, while in section IV we discuss legitimacy challenges of STI policies. Finally, in section V we present a brief conclusion about how specific policy design problems can produce a progressive loss of STI policies' legitimacy, which in turn generates political constraints that hinder development.

II. STI policies and STI activities in Uruguay: some long run patterns.

Uruguay is a small country with 3.3 million inhabitants that is usually classified as a median income country. Since the beginning of the 20 Century it was characterized by a high percentage of urban population, low illiteracy rate and a relative high level of welfare. Nevertheless, long run research about the Uruguayan performance shows a

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deterioration of almost all the development indicators of the country . In order to understand current STI policies it is really important take into account the specific characteristics of the Uruguayan historical patterns. Specially, regarding the big

challenges related to the improvement of productive performance and to face the recent worsening of social integration.

The history of the STI activities in Uruguay can be characterized through some long run patterns that began in the second half of the 20 Century (Bértola et al. 2005. Bianchi and Snoeck 2009). Most of these patterns are shared characteristics with other underdeveloped

countries, mainly with Latin American countries, but some of them seem to be specific of the Uruguayan development path.

II. i Concentration on public sector

In Uruguay, STI investments as well as the institutional infrastructure have historically been concentrated in the public sector. It is a common pattern in underdeveloped countries, but, as we will remark the Uruguayan case shows some specifics features that have political consequences. Although the measures are not accurate, the available information shows that the public sector is responsible for around 60% of the national investment in STI activities. Also, several studies show the relative strength of the public STI institutions, while the private institutions devoted to STI activities are scarce and deeply dependent on public funds (Bértola et al. 2005. Bianchi and Snoeck 2009. DICYT-MEC 2012).

Besides the scarce development of STI activities in the private productive sector, the concentration on the public sector is related to the fact that the main institution devoted to STI activities is the public university: *Universidad de al República* (UdelaR). This is the unique public university in Uruguay, which is responsible for around the 70% of the whole national R&D activities (MEC 2012) . T his is clearly an anomaly within the international and the regional landscape . It is not easy to find other country which has only one public university, specially a country with the development indicators that Uruguay shows (average income, public health service, illiteracy rate,C connectivity, etc.) . Aside from several implications related to the national research system and the national model of development, this anomaly implies that the UdelaR has always been a central actor in Uruguayan STI policy. Actually, there are some research university policies or programs that account for more resources than other national programs. It also implies that the UdelaR has played a crucial role in national STI policies. In this regard, the long tradition of the UdelaR as a political actor as well as the high concentration of researchers in this organization is one of the key aspects in order to understand the building process of the academic collective actor. Also, it is a critical point for the legitimacy of research policies rather than innovation policies, as will be discussed in the section IV.

II. ii Weak knowledge demand

Another historical feature of STI activities in Uruguay is the chronic weakness of knowledge demand. Arocena and Sutz (2010) directly address this issue as one of the main

characteristics of the innovation system in underdeveloped countries. In addition, this problem has been stressed by several works related to the developmental challenges of Uruguay (Bértola et al. 2005. Bianchi and Snoeck 2009).

The weakness of knowledge demand is closely related to the overrepresentation of the public sector in STI activities. Innovation is an unusual activity in the private productive sector (Bianchi and Gras 2006). But, also, public organizations devoted to public services, such as health, security, transport, are basically administrators and do not work in hardly any knowledge based process. Then, the productive system -both public and private- does not boost knowledge demand intensively.

The lack of knowledge demand has been largely documented in empirical works for the manufacturer industry (Bianchi and Gras 2006. Bianchi 2007. Bianchi et al. 2011. Bittencourt 2012a Snoeck et al. 2012). These studies offer, at least, three basic results that are essential to understand the sources of the demand problems. First, in almost twenty five years (1985-2009) the proportion of innovative firms in the Uruguayan industry remained around 30% (Bianchi 2007. Bittencourt 2012a). Second, technological demand of the productive sector has been usually concentrated on acquisitions of machinery and equipments, rather than on R&D. Even considering several levels of technological complexity, technological demand is strongly concentrated in capital goods purchasing. This is reflected on the composition of the firms' investment strategy and on what the industrial entrepreneur understand by "technology" (Bittencourt 2012a Snoeck et al. 2012). Finally, these studies highlight that one of the main lacks of firms' innovation capabilities is the insufficient scientific or technological professional working in the industry. This is a chronic problem that affects the endogenous innovative capabilities of the firms. Also, the lack of qualified professional appears as one of the main barriers to develop innovative linkages between industrial firms and research centers (Bianchi et al. 2011).

These results summarize the main constraint for an intensive knowledge demand in the industrial sector. Although the empirical evidence regarding the service sector is less comprehensive, the available studies show than the knowledge demand is weak and highly heterogeneous, as in the case of the manufacturer industry (Bittencourt 2012b. Aboal et al. 2011).

Besides, the knowledge demand of the public sector is also weak. Previous studies highlighted several shortcomings related to technological demand in public health system, public administration, and other sectors dominated by public firms, such as logistic, energy or

telecommunication (Pittaluga et al. 2008. Ferreira-Coímbra and Labraga 2012). Nowadays, it is starting to work the first initiative oriented to build a government technological procurement system.

In contrast with the experience of industry and public services, the agriculture sector has a long tradition of technology transfer and the knowledge demand is pulled by the productive dynamic (Bértola et al. 2005. Bisang et al. 2000). Arguably, the creation of the National Institute for Agricultural Research (INIA by its Spanish acronym), as well as many other experiences of public-private collaboration are the best examples of the linkages between productive activities and specific knowledge demands (Pittaluga et al. 2013). Even though there are different assessments of the scope and the technological complexity of innovation in the Uruguayan agricultural sector, there is a shared consensus that in this sector innovation works in a systemic way.

II.iii The "institutional archip elago"

Another feature of Uruguayan STI institutional design that existed prior to the 2005 reform is that it is best characterized as an "institutional archipelago". This is a metaphor of the predominant disconnection among the institutions in charge of STI policies until 2005 (GMI 2006. Rubianes 2009). Uruguay never had a strong institutional infrastructure to support STI activities. Apart from the specific challenges faced by the promotion of private STI activities and knowledge demand, the previous descriptions illustrate the lack of linkages that - implicitly or explicitly- articulate STI activities in a systemic way. There was a clear relationship between the non systemic dynamic of STI activities with the STI institutional framework. *

In this regard, we state that until the current reform the Uruguayan STI policies were far from being part of a developmental project. We will describe the current institutional design of the Uruguayan STI policies in section IV and discuss the scope of the changes in relation to the previous institutional framework. But previously we want to briefly revise the rationale of the current policies and discuss why we argue that they are part of a developmental project.

III Current STI policies: Why we talk of a developmental project?

The first premise of the STI National Strategic Plan (PENCTI by its Spanish acronym) clearly states the political willingness to embed the STI policy into a major developmental project: *It starts rom a holistic conception o development in which equity and economic growth are part of the same strategy"* (Poder Ejecutivo 2010: 2. Own translation). In this

section we describe the historical and political background behind the two pillars of this developmental orientation: STI as a tool to boost economic growth based on a structural change process; and the STI as a tool to improve social equity.

There are at least two factors that help us to understand the orientation -at least the rhetorical orientation- of STI policies to social equity problems. First, there is a programmatic and ideological consensus related to a development concept that embraces these two dimensions. Actually, in the last years the theoretical and political linkages between equity and structural change have been highlighted (CEPAL 2012). Second, STI policies itself have incorporated a new dimension related with social inclusion. This is a complex debate that will not be tackled in this paper, we only want to stress two aspect that help us to understand why and how this dimension was incorporated into the Uruguayan STI policies.

On the one hand, current STI policies -its general objectives, strategic goals and organizational structure - were defined during 2004-2007, when the new leftist government defined the general governmental proposal. In that moment, Uruguay was recovering from one of the deepest crisis of the national history. One of the more traumatic consequences of that crisis was the high growth of poverty and indigence. The incidence of poverty grew at a rate around 40% in 2002 and 2003 (Amarante and Perazzo 2009). Moreover, during the first years of the 21th Century, Uruguay suffered an increase of income inequality. Arguably, apart from the classic indicator of income inequality, the worst consequence of the crisis was a deepening of the intergenerational poverty gap. The new government prioritizes working on the social consequence of the crisis and promoting the social development through a new pool of social policies (Antía and Midaglia 2007).

In this context, any developmental policy has to consider a pro poor dimension. But in fact, Uruguayan STI policies went beyond a strict pro poor policy. They were framed within a dual developmental general vision, which was oriented, at least as a project, to an integrated vision of social and economic development.

On the other side, the inclusive dimension was considered for endogenous reasons. After the social and economic crisis, some influential national thinkers began to stress the relevance of articulating social and STI policies (Arocena and Sutz 2005). At the same time that a left party arrived for first time to the government with a programmatic concern about poverty and inequality, the specific agenda of the national STI policy -in this moment especially receptive to academic ideas- began to consider the relevance of this dimension. During this period,

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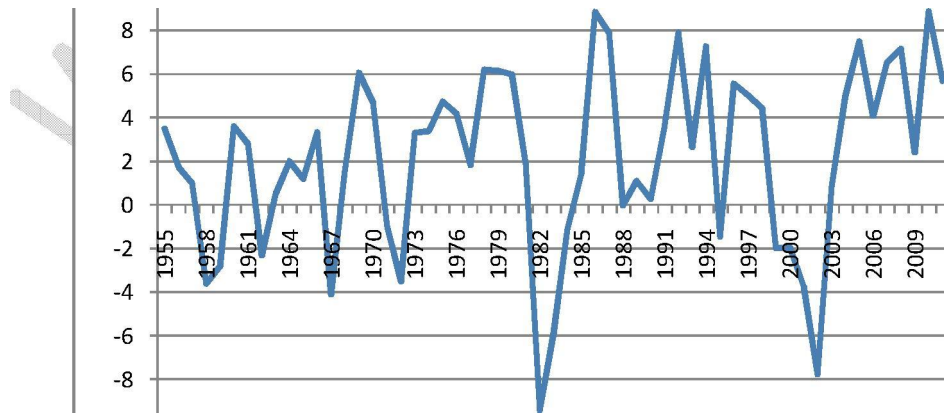11 e 12 de Novembro, 2013 – Rio de Janeiro, Brasil

along different and not exactly smooth discussions, these topics were introduced in the general objectives of the STI policy.

Regarding the economic growth problems, the Uruguayan historiography has largely highlighted the chronic problems of dynamism of the national economy (Bértola 2000. Bonino et al. 2012). As was pointed out by several inquiries in economic history, the average annual growth rate of the Uruguayan GDP since the end of the 19th Century remained around 1% (Bértola 2000). Nevertheless, as Bértola et al. (2005: 9) stress this growth path was not smooth. Actually, the economic performance of Uruguay in the long run shows a high volatility and an economic slowdown when the period before 1930 is compared with the period 1931-1960, and even more when compared with the period 1960-2000. This chronic economic deterioration process was related to productive strategies, scarce investment in building capabilities, and also in the high vulnerability of the agricultural commodities prices to exogenous shocks.

In this regard, current Uruguayan public policies conceive STI as one of the basis to build an economic strategy that overcome the dynamism and volatility problems showed by the Uruguayan economy in the long run.

It is worth considering that this general objective is based on a long run perspective but the macroeconomic performance has changed dramatically in the last years. Now, after one of the deepest crisis of the national history, that had its peak in 2002, the Uruguayan economy is undergoing a singular phase of growth. Chart 1 displays the growth rate of the GDP since the mid of the 20th Century. It shows the volatility of the growth rate during the period, as well as the depth of the crises experimented in 1982 and 2002. But it also shows that in the period 1955-2000 the average growth rate was 1.77%, while in the period 1955-2011 it was 2.17%, and when considering only the years since the start of the STI policy reform (2005-2012), the Uruguayan economy registered an average growth rate of 6.05%

Chart 1. Uruguay: GDP growth rate (%) 1955-2011

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Source: own elaboration based on: Bonino et al 2012

Considering this long and short run economic performance as well as the problems highlighted in section II, the current STI policies face singular challenges. On the one hand, these policies are embedded into a general framework that takes as premise the importance of innovation to economic growth. Also it is informed by the historical growth problems of the economic specialization based on natural resource, and in turn it is oriented to think STI as tool for an economic structural change. But, nowadays, these policies face the singular situation that Uruguay is undergoing one of the few historical moments of high economic growth rates, which is strongly based on the natural resource boom. In this regard, the current strategy tries to follow a dual focus, to promote the emergence of new activities that boost structural changes in the economy and, also, to promote an intensive knowledge incorporation on traditional activities (Bianchi and Snoeck 2009).

The STI policy challenges are really complex. In short, the current STI policy was conceived to contribute in the reversion of some of the more important problems of Uruguay in the long run -economic development- and in the short run -social inequality.
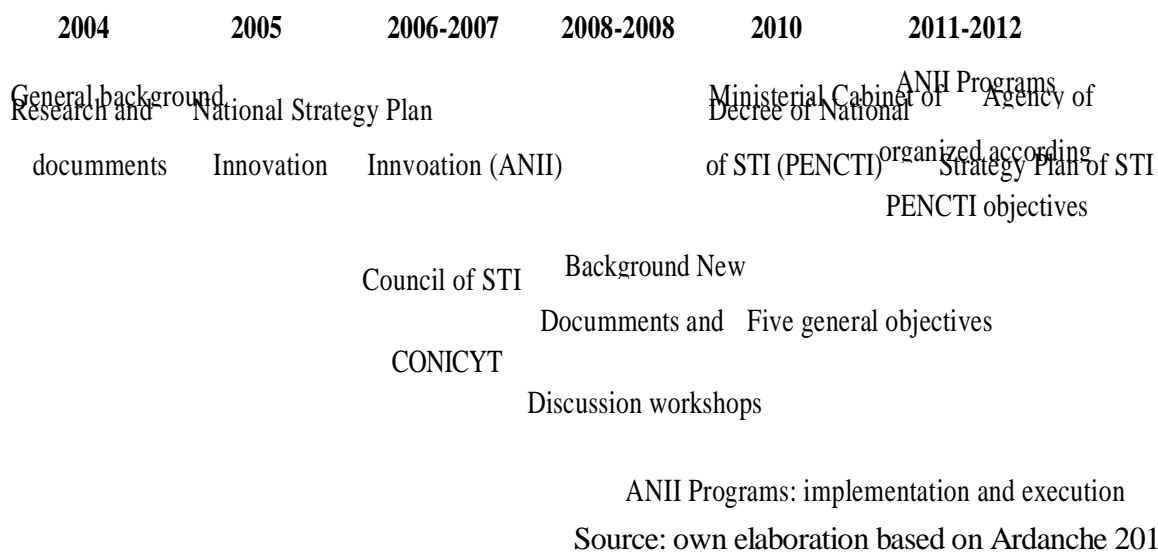
III.i. A political response for a major challenge

The National Strategic Plan of STI (PENCTI) mentioned above was passed on February 2010 by the President of the Republic and the Cabinet of Ministers. Nevertheless, current STI policy started in 2005 when the left party, *Frente Amplio,*

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arrived to the government. T his political party putted, for first time in the Uruguayan political history, innovation as a topic in its policy agenda as part of a general - maybe blurred - national developmental project. Figure 1 summarizes the organizational and institutional public efforts to face these challenges.

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Figure 1: Highlight events of the Uruguayan STI policy 2004-2012

2004	2005	2006-2007	2008-2008	2010	2011-2012

General background
Research and   National Strategy Plan   Ministerial Cabinet of   ANII Programs
                                                                Decree of National   Agency of
documments   Innovation   Innvoation (ANII)   of STI (PENCTI)   organized according
                                                                                          Strategy Plan of STI
                                                                                          PENCTI objectives

                              Council of STI   Background New

                                                    Documments and   Five general objectives
                              CONICYT

                                                    Discussion workshops

ANII Programs: implementation and execution

Source: own elaboration based on Ardanche 2012.

As was mentioned before, in order to deal with these challenges, the Uruguayan Government followed a political strategy based on the premise of the ubiquity of STI and on transversality as an institutional tool. In the next section we will discuss the theoretical meaning of these concepts. Here it is worth noting that the current STI policies are based on an institutional and organizational design that intended to build political spaces for articulation among different sectoral ministries. The concept of transversality was not clearly defined and nowadays there exist several different interpretations (Ardanche 2013). However, it is possible to find the linkage between this idea, the developmental vision and current organizational design. The basic principle that links these dimensions is the premise of innovation ubiquitousness, meaning that since innovation is a useful tool to contribute to solving diverse problems, it is not the exclusive competency of anyone.

This was the argument that supports the option of creating a Ministerial Cabinet of Innovation (GMI by its Spanish acronym) instead of creating a Ministry of STI, as the institution in charge of the strategic level of STI policies (figure 2). The GMI is composed by the Ministry of Education (MEC by its Spanish acronym), which coordinates it; the Ministry of Industry (MIEM by its Spanish acronym); the Ministry of Agriculture (MGAP by its Spanish acronym); the Ministry of Economy (MEF by its Spanish acronym) and the Office of Planning and Budget (OPP by its Spanish acronym). With this integration the Uruguayan Government pursues that the offices dealing with production, science, education and planning are in close contact with the STI strategic design.

The current organizational chart has a deliberative level, which is in charge of the National Council of Innovation, Science and Technology (CONICYT by its Spanish acronym). It has the casual name of "New CONICYT" in reference of the previous institution, which existed until the last reform and has the same acronym. The former Council has a different integration and a different role. Actually, there was a shift of the decision making centre displacing the CONICYT (Ardanche 2013: 18). The first National STI Council was created in Uruguay in 1961, within the wave of the STI policies in Latin America during the second half of the 20 Century. Before the current reform, the CONICYT was in charge of the strategic and deliberative level of the national STI policies in Uruguay. But these policies were few isolated experiences. Nowadays, it has only a deliberative role that includes functions as controller and regulator of the National Agency of Research and Innovation (ANII by its Spanish acronym), as well as adviser of the Parliament and the Government. CONICYT has not a role as preeminent as it used to have before 2005-2007. Nevertheless, it has the responsibility of assessing the strategic lines and to foresight the long run challenges. In order to fulfill this commitment, CONICYT has a plural integration of 21 members that try to represent the wide spectrum of actors dealing with scientific activities but also acting in productive and social fields where innovation could contribute to find solutions.

The main problems that the CONICYT has are related to the usual characteristics of those deliberative organizations that are integrated by many members. Nevertheless, that difficulty could be solved with an adequate manager team that organizes the agenda and prepares the inputs for discussions. But the CONICYT has not budget for management and secretary, and actually it counts with the support of one person. As we will discuss later on, management capabilities are concentrated on the implementation level, which has been consequence of the capacities of the organization in charge of the other levels.

Finally, the current reform created the National Agency of Research and Innovation (ANII), in charge of the design and implementation of the national STI programs. This Agency, shaped by the same Law that created the "New CONICYT" (Law N° 18.084) implements several programs oriented to promote different aspects of scientific research, technological development and innovation processes. To carry out its objectives, the ANII has a qualified technical and administrative team and has the support of several technical commissions composed by researchers and experts.

The ANII directorate is integrated by seven members, five of them appointed by the Government, as representatives of the Ministries that integrate the GMI; and two representative of the CONICYT. This composition was the result of the academic lobby,

mainly organized around the University representation in the "Old CONICYT". They succeeded in changing the first government proposal, in which the current ANII was called as Innovation Agency and its Directorate was only composed by five members appointed by the Government. During the Parliamentary discussions, the Academic actors obtained the change that is now in force (Ardanche et al. 2013). It is just a story of the real politics around the STI policy reform. But it is a good example of the implications of this reform. Actually, the changes that initiated in 2005 and deepened during 2006-2010, implied a reconfiguration of the STI policy arena. Previous to this reform, the Uruguayan STI policy was scarce and basically an S&T policy, with few exceptions focused on innovation problems, mainly supported by the T echnology Development Program (PDT by its Spanish acronym) .

The current reform intended to shape a new policy that include the classic S&T policy and the innovation policies, within an articulated framework oriented to the developmental goals already mentioned. The PENCTI tries to reflect this general vision in five general objectives: (i) To consolidate the S&T system and its linkages with the social and productive problems; (ii) To increase the competitiveness of the productive sectors in a globalized world; (iii) To develop new capabilities and opportunities to promote the social appropriation of knowledge and inclusive innovations; (iv) To train the required human resources to build a knowledge society; (v) To build a system for: Foresight, Technology Survey and Technology Evaluation, as a useful tool that contribute to achieve the previous objectives and to evaluate STI policies and programs (Poder Ejecutivo 2010).

Since the PENCTI was approved by a Governmental Decree (Poder Ejecutivo 2010), ANII began to organize its programs according to the general objectives of the PENCTI. Actually, when the ANII was created (2007) it continued to implement the already existent programs. The agency started in functions with the legacy received from others previous public offices, mainly the old Technological Development Program and some research oriented programs designed by the National Office of Innovation, Science and Technology (DICYT) located on the Ministry of Education. After 2010, with the PENCTI in force, there were few changes in the programs implemented, but the monitoring reports regularly published by ANII, began to be organized according the objectives of the PENCTI (ANII 2013).
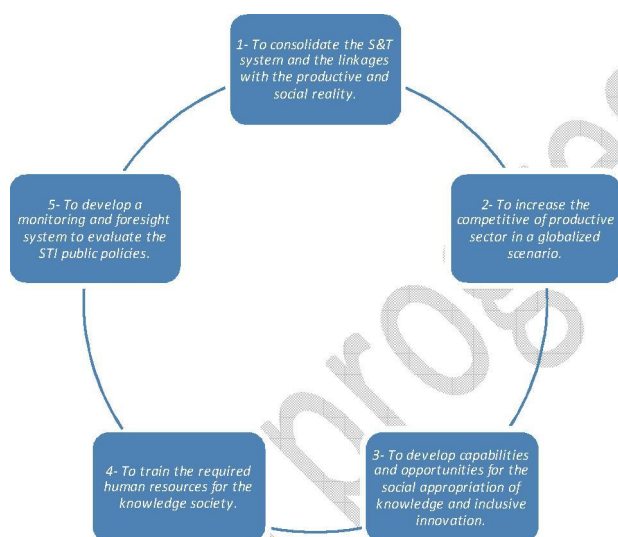
The institutional change was accompanied by a strong budgetary increase. According to official data, the period 2005-2009 presented an increase of more than three times the public expenditure destined towards STI activities, from almost 37 to more than 130 million dollars (DICYT-MEC 2012). Those values cover a wide range of activities directly related to the STI system (Bianchi et al. 2013).

This brief description allows us to show the organizational response of the Uruguayan Government to the big challenges that the new STI policies implies as part of a developmental project that meant a change on the configuration of the policy arena and of the institutional design. In this regard, in the next sections we will introduce the main theoretical categories that we use on the study of the Uruguayan STI policies and the conclusion about the political constraints to the national developmental project.

III.ii A snapshot of the programs and budget implementation - ANII 2008-2012

In figure 2 we display the five general objective stated in the PENCTI. They show the attempt to organize the major developmental goals in several objectives. In turn, different programs were associated to each of these objectives.

Figure 2. General objectives of the PENCTI

1- To consolidate the S&T system and the linkages with the productive and social reality.

2- To increase the competitive of productive sector in a globalized scenario.

3- To develop capabilities and opportunities for the social appropriation of knowledge and inclusive innovation.

4- To train the required human resources for the knowledge society.

5- To develop a monitoring and foresight system to evaluate the STI public policies.

Source: Presidencia de la Repúl

The annual reports of ANII show how these five objectives has been translated in several programs, each of which have implemented different rates of the previously assigned budget. During 2008 to 2012, ANII has executed around 103 million dollars in all the programs and in operative expenses (ANII 2009 to 2013).

These reports also show a rough division of the programs according to its general objectives. The main categories includes those programs oriented to R&D activities, basically academic R&D, and those oriented to innovation activities -mainly productive innovation activities because social inclusive innovation activities has hardly any assigned budget-. In broad strokes, innovation projects consist of activities oriented to the promotion of demand

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led innovation, while R&D projects are classic research projects conceived and executed within academic institutions.
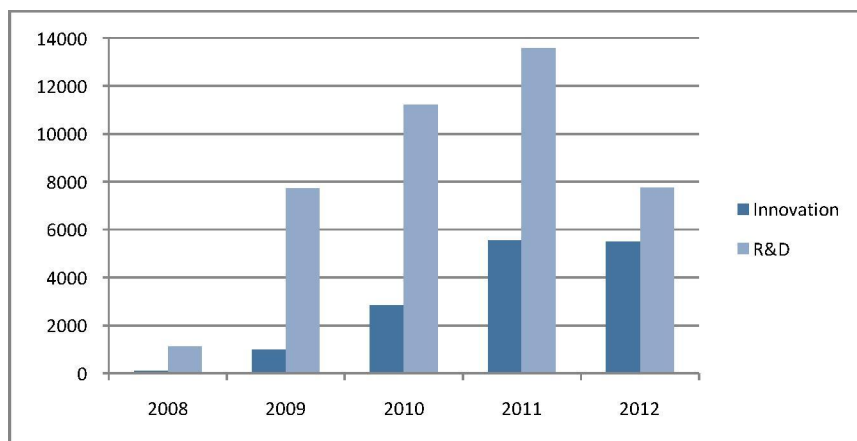
Graph 2. Implementation rates (%) of ANII's annual budgets according to type of project (2008-2012)
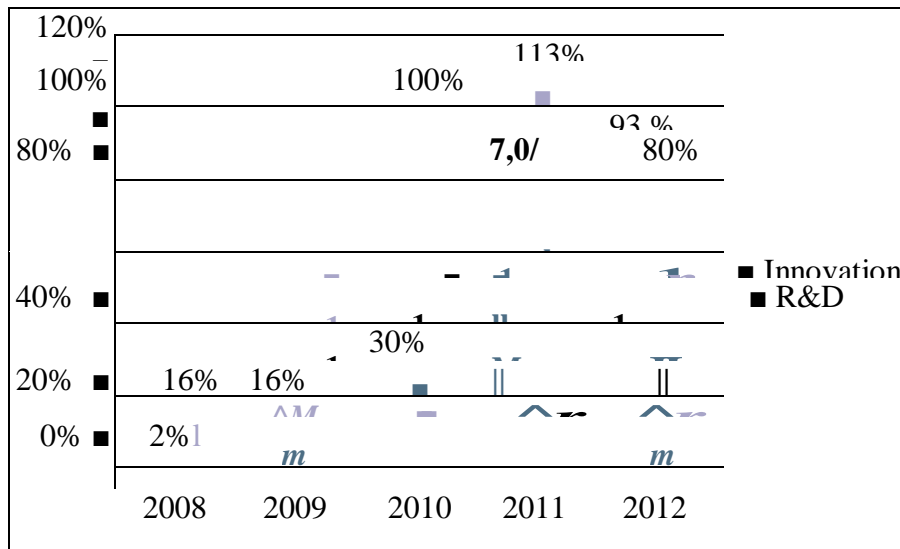
Source: Own elaboration, adapted from Bianchi et al. 2013, and based on ANII 2009 to 2013

Graph 2 and 3 show the strong supply-side bias on the destination of the ANII budget. It does not mean that there was a process of "capture" of new public budget by the academic actors. We think that this is an expected result in the Uruguayan context. As we highlighted in previous sections, the weakness of the knowledge demand from productive activities is a long run pattern in Uruguay. It does not make sense to expect that the availability of new funds will generate an immediate increase of demand for innovation project from the same productive sector which has never had an intensive knowledge demand. In contrast, even being small, academic community is an active community, trained in fund seeking and projects, which used to receive less financing than that able to execute in research activities. Then, the figures presented in graphs 2 and 3 are not surprising.

Graph 3. Annual budget according to type of project (1000 USD)

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Source: Own elaboration, adapted from Bianchi et al. (2013) and based on ANII 2009
to 2013.

Even if it could be expected a supply side bias in ANII's budget execution, these results
open a question regarding the national developmental project. Are policies effective in
pursing the objectives proposed by the developmental project? In case they were not, will this
situation affect their legitimacy?

IV. Building governance models: transversality, effectiveness and legitimacy.

Modern societies create particular organizational way of public administration in each
historical period. This means that in every time, there are particular ways to define a
representation and political organization, particular ways to define a governance model. In
turn, each governance model is related to a state capability system, which allows the public
organization to perform governmental goals effectively and efficiently (Grindle 2003, quoted
in Narbondo et al. 2008: 36). Therefore, governance can be considered as an instrument to
address public action, which requires instruments to identify social demands and to act in
consequences (Peters 2007: 3).

Hence, the institutional design becomes important (Przeworski 1996). It will operate as an
incentive matrix for the development of the required capabilities. Institutional design will
impact on effectiveness and efficiency regarding the government goals achievement, which in
turn will reinforce or undermine the legitimacy of the State role and public policies.

Political science literature about governance identified three general models of public
administration: i) hierarchical-bureaucratic; ii) market (based on new public management);
and iii) networks. Network structure is in between the market and the hierarchical models. It
is conceived as a more democratic and participative way of social organization than the others

models (Narbondo and Ramos 2001). Regarding the main characteristics of STI policy arena, transversality will require a governance model that, roughly, is based on the network model. This model may be composed by public organizations that, even "trained" on vertical working, are able to undertake horizontal relationships. Evans pointed out that national developmental projects need a synergistic integration of the three governance models, which results on a new model that he called "hybrid". The author also states that the effectiveness of public institutions will depend on reaching an equilibrium between the three governance models, even when integrating some contradictory features (Evans 2007: 80-82).

In order to boost a developmental project the Uruguayan Government faced, and still faces, the challenge of building a network government model. According with the selected institutional design for the STI policies, the Uruguayan Government have to conduct effective governance based on transversal institutions. Actually, the selected institutional design is a mix of different models of public administration that can be defined as a hybrid design.

IV. i Transversality

Transversality is a particular way to deal with the complexity that modern State faces. It aims to internalize the complexity and to create effective strategies for the State intervention, which implies coordinating different actors regarding shared goals.

In this regard, Serra (2005) defines transversality as a concept and as organizational tool, which improve the organization capability to deal with some problems for which the traditional vertical organization is not suitable. Both as concept and as organizational tool, transversality is useful to design organization, re-defining they scope and they management requisites. Therefore, transversal reforms pursue suitable organization solutions to deal with new visions, approaches and public goals that cannot be tackled through vertical organizational structures. Moreover, it aims to create new organization that share general objective and create a synergistic virtuous influence (Serra 2005: 3). Implementing a transversal institutional design requires a mix of formal and informal norms, which allow coordinated action of different public organizations. Echebarría (2001) stresses that informal norms have to include shared behavioral principles that guide the organizations' members to follow transversal objectives. These norms should be strengthened by training, management and planning actions within and between the public organizations.

It is well know that these informal norms are institutions deeply rooted on the organization, which are difficult to change, and they could determine the success or failure of a policy

initiative. Besides, transversality requires formal action, through the establishment of transversal projects and offices. But coordination capacity requires the existence of informal linkages. Indeed, formal coordination is more appropriate when it has a real informal base.

In Uruguay, transversality was an organizational tool within a developmental project that gives special importance for STI policies. This is particularly important because transversality results will affect the legitimacy of the whole project.

IV. ii Legitimacy and effectiveness

Political science literature has indicated a trade-off between legitimacy and efficiency-effectiveness. Both dimensions interact with each other: a legitimized "political arena" will probably have a quite straightforward path to obtain effective results. Otherwise, obtaining effective results will contribute to strengthen the legitimacy of the political arena. Linz pointed out that while efficiency and effectiveness are usually influenced by the legitimacy trade off, at least for a time, legitimacy works as a positive constant that multiplies each result obtained through policy efficiency and effectiveness. Furthermore, if a policy has low legitimacy, failures of efficiency and effectiveness will be multiplied (Linz 1987: 42-43). A virtuous circle may become vicious. If a government fails in its objectives, it could lose legitimacy, which in turn will constrain future policy implementations (Buquet 2007: 37-38).

Legitimacy problems have been analyzed regarding several political and institutional topics. One of the aspects that received more attention is the legitimacy related with centralized and decentralized institutional design in European Union (EU). McKay (2000) addresses this topic regarding the governance of the monetary community policy, while Borrás (2006b) deal with the legitimacy of the regulatory framework for genetically modified organism in the EU. Recently, relationships between effectiveness and legitimacy in STI institutional design and public policies have gained growing attention (Borrás 2006a and 2012. Paes and Areosa 2011). These works are part of a relative tiny but significant production that discusses legitimacy and efficiency problems in the general framework of democracy and new forms of governance (Borrás and Conzelmann 2007. Borrás et al. 2007. Kröger 2007. Büchs 2008). Moreover, several of these studies follow the legitimacy inputs and outputs approach, which has similar characteristics with the trade off approach mentioned above.

Büchs stresses that policies or institutions are output-legitimate when they produce outcomes useful to the interest of the political actors, what is another way of saying that policies are legitimate because they are effective. On the other hand, policies are input-

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legitimate when they reflect the will of the actors, that is usually provided through different procedural arrangement (in national democracies the main arrangement is the majority rule). This author, quoting Scharpf (1999), emphasized that input legitimacy requires that political actors share political identity and that they expect for shared policy outputs. However, output legitimacy does not require a shared political identity, since it meets the interest of political actors (Büchs 2008: 768).

Also according to Scharpf, Büchs pointed out that input and output legitimacy usually co-depend: *"effective...policies can be legitimate only when they are based upon input-legitimate policy processes whilst input-legitimate policies need to be effective to be fully legitimate..."* (Büchs 2008: 768). But the same author stresses that one of the more important perspectives about the governance of multilevel and multi-actor systems, like the European Union, must specially rely upon output-legitimacy. This approach emphasize that in a multi-actor system it is neither possible, nor necessary or desirable to create or to expect input-legitimacy. In contrast, Borrás et al. (2007) state that some highly specialized topics -like STI policies and mainly socially contested STI activities- need input legitimacy, trough participatory mechanisms. In this paper we focus on the output legitimacy problems of the current STI policies in Uruguay, but we will highlight some future research steps in order to assess input-legitimacy.

Here, following Borrás (2006a:598) we take as a point of departure that effectiveness and legitimacy are two inseparable issues for the success of a governance system. In this regard, we assume that *"The success of network governance can be defined as the ability to coordinate both effectively and legitimately the interactions among the organizations and individuals in a specific system so that they produce the common good around which the system was constituted"*.

IV. iii Legitimacy and effectiveness of the Uruguayan STI policy

As we mentioned before, policy output-legitimacy is related to their effectiveness. In this regard, we propose to analyze how effective is the implementation of ANII programs regarding the general premise and objectives posed by the PENCTI

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In figure 3 we attempt to illustrate that the best possible result of the tradeoff between legitimacy and effectiveness will be, obviously, to achieve the major objectives related to the promotion of STI activities that efficiently consolidate research capabilities as well as contribute to economic growth and social inclusion. Uruguayan STI policies will be fully effective if they achieve research and innovative objective; and, in turn, they will be highly legitimate. Also, we think that a negative effectiveness and legitimacy effect is not probable, it only will happen in a scenario of crisis, political or economic, which is not in the horizon.

However, the current implementation of the STI policies in Uruguay seems to move between a scenario characterized by poor effectiveness and temporary high legitimacy (2) and other with partially high effectiveness but potential loss of legitimacy (3).

Scenario 2 reflects to the current rhetoric of policies and the objectives of the transversal design: it refers to a STI policy embedded on a developmental project and an institutional framework designed with this broad objective. This scenario reflects the input-legitimacy that supports the political project of the last two governments but it also reflects the weak effectiveness of the current implementation. Finally, scenario 3 summarizes our main conclusion: the current supply side bias of STI policies is partially effective, since it answers to the expectative of research community and contribute to consolidating the S&T system. But it implies a potential loss of legitimacy, since it cannot deal with the broad developmental project, because it has not been able of strengthening productive and social actors demand knowledge.

One of the main features of the institutional design in the Uruguayan STI policies is the strong option for transversality. We adapt the approach built by Borrás (2006a) in order to analyze the formal and informal dimensions of the output legitimacy in the governance of the Uruguayan STI public policies. Through this analytic tool we want to discuss how legitimacy problems could affect the current institutional design.

Figure 4 shows that even when the formal dimension is as a suitable design, the informal requirements of transversality are not easily met. Moreover, new organizations like ANII, specifically created to act in a transversal way, seem to act as a traditional vertical organization devoted to manage STI programs efficiently but with scarce coordination capabilities. Clearly, an organization formal reform is not enough to change the classic behavior of the sectoral ministries and public offices (Ardanche 2013).

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V. Brief conclusions: political constraints of the Uruguayan STI policies

We conclude that the transversal design was an original organizational option in the Uruguayan experience, which can be suitable to pursue the developmental targets. Nevertheless, the transversal model, although reflected in formal institutional redesign, failed to pervade informal aspects of public organizations, which used to work in an isolated way, vertical and hierarchical. Besides, new organizations, like ANII, seem to adopt a similar pattern of traditional government organizations.

Besides, despite the strong programmatic effort oriented to comprehensive STI policies, recent changes in the institutional design failed to modify the supply-side rationale of the main policy tools. An analysis of the programs implemented by ANII reveals that most of them are classic supply-side programs for research support. Also, the operating budget of ANII shows a strong bias to financing research projects conducted by academic institutions rather than to innovation projects or activities performed by firms.

These results enable us to argue that the Uruguayan STI institutions and policies could face legitimacy problems in the next years. The concentration on supply-side programs could imply future political restrictions. It means that the relative high political legitimacy of the STI policies could be reduced if these policies are perceived as a matter of a specific community and not as an effective tool to pursue national goals. In short, the institutional design of the STI policy and its concrete implementation may create political constraints for the STI national project.

Moreover, the broad objective stated on the PENCTI implies that several actors could build different expectations about it. If PENCTI does not work as a shared and homogeneous reference, each actor would act and build expectations according to his group of references. It could implies that no expectation will be plenty satisfied, and if this happen, new legitimacy problems could emerge.

This is our first attempt to articulate several researches about STI activities and STI policies in Uruguay that we conducted in the last years. Therefore, this is a work in progress that we hope will allow us to discuss our approach and our results and continue improving it.

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