Innovation system, dialogue processes and STI policymaking: Stylising Evidence on Latin America and the Caribbean

Dutrénit, Gabriela* (gabrieladutrenit@gmail.com)
Natera, José Miguel ** (josemiguelnatera@gmail.com)
Puchet Anyul, Martín*** (anyul@unam.mx)
Torres Vargas; Arturo* (atvargas@hotmail.com)
Vera-Cruz, Alexandre O. * (veracruz@correo.xoc.uam.mx)

* Universidad Autónoma Metropolitana, Mexico
**Cátedras CONACYT-Universidad Autónoma Metropolitana, Mexico
*** Universidad Nacional Autónoma de México, Mexico

Abstract

This paper aims at discussing the dimensions, attributes, and challenges to the dialogue processes in order to contribute to public STI policy-making within innovation systems in Latin America and the Caribbean. The evidence is based on 15 cases from this region. An analytical framework is proposed to analyse these dialogue processes, based on three dimensions: object, space, and temporality; each dimension is made up of various attributes. We outline three major policy recommendations: (i) it is crucial to understand the object of the dialogue and who are the communities and actors participating in it; (ii) it is important to clearly identify the three dimensions of the dialogue process and the specific attributes of each one; and (iii) it is advisable to identify differences in capabilities between the participating communities and any asymmetries of power, in order to take corrective action and encourage the generation of agreements.

Keywords: dialogue processes, stakeholders, STI policies, innovation system

1 Introduction

Innovation systems have become increasingly complex, with a wide variety of agents and actors in various spaces and levels. This has required the construction of governance structures facilitating the coordination of public, private, and hybrid agents. A STI policy is needed to stimulate these systems, where new public and private actors are emerging. On this basis, the justification for public intervention has acquired analytical dimensions other than the more orthodox theoretical perspective, which are focused on the need to find solutions to systemic failures associated with the way networks, institutions, and the regulatory framework operate (Chaminade and Edquist, 2006).

Formulation of STI policy has gradually shifted from being a governmental or state concept to one of public policy. This has led to public participation and stakeholder involvement being discussed. From an operational perspective, an innovation system is an entity made up of four sectors (academic, business, government, and civil society). Each sector is comprised of organisations (businesses, universities, research centres, etc.), and, in turn, within these organisations are individuals (scientists, technologists, business owners, etc.) who carry out an activity as agents of the innovation process. Stakeholders, communities, or specific actors, make

up this scenario, among whom willingness emerges to participate or hold a dialogue on a type of STI policy.

The concepts of public participation / citizen participation / citizen involvement / stakeholder involvement centre around the need for dialogue for the decision making process (Jensen, 2005; Griessler, Biegelbauer and Hansen, 2011; Griessler et al., 2012).[1] This dialogue may refer to matters of interest such as human rights, health, the environment, water, and incentives, among others. The nature of dialogue processes between stakeholders and policymakers has become increasingly relevant, first in Nordic countries and the US, and later worldwide. Various studies have identified mechanisms that may facilitate dialogue processes (Jensen, 2005; Mejlgaard, 2009; Rowe, 2005). The focus of democratic (Cuentas and Linares, 2013) and public-private dialogues has recently gained strength in the sphere of interaction between the state and the business sector (OECD, 2007). Whereas policies designed by governments may be governmental, state, public, or a mix of all three, dialogues for designing policies are primarily associated with public policy.

Interaction of agents in these systems tends to be more limited, presenting hindrances to interaction, obstacles to communication among agents, or behaviours which make it difficult to connect. In other words, they reinforce systemic failures (Chaminade et al., 2009).

Latin American and Caribbean countries have made progress in building innovation systems, but these are still at an immature stage (Dutrénit and Sutz, 2014). STI policies in the region have followed the analytical framework promoted by international organisations; more recently, they have adopted a systemic approach (Crespi and Dutrénit, 2014). Formulation of STI policies has also advanced towards building public policy (Ordoñez-Matamoros et al, 2013), characterised by the participation of interested parties (stakeholders)[2]. This has led to discussing the involvement of communities as well as a host of public and private actors in the decision-making process.

Dialogue processes between communities and actors play a foundational role in public policy. Such processes are recent, and knowledge about them therefore limited; particularly in the area of STI. This paper contributes to this discussion, and its aim is to discuss the dimensions, attributes, and challenges to the dialogue processes in order to contribute to public STI policy-making within the context of innovation systems in Latin America and the Caribbean.

This reflection on dialogue processes is based on existing international literature, and on empirical evidence from Latin America and the Caribbean. The papers reviewed come from different types of literature: the analysis of innovation systems, the systemic-evolutionary perspective of STI policies, and the institutional approach of public policy. The empirical evidence was collected through the thematic network entitled "Red temática para mejorar el diálogo entre las comunidades involucradas en las políticas de CTI (COM-LALICS)" [*Thematic Network to Improve Dialogue among Communities Involved in STI Policies*], financed by CYTED (the *Ibero-American Program of Science and Technology for Development*).

[1] Different concepts are used in the literature on public participation, such as citizens, stakeholders, and constituencies, among others (Crane, Matten and Moon, 2004).
[2] People who may be affected by decisions the government makes.

After this introduction, Section 2 describes the evolution of STI policy towards the construction of public policy in Latin America and the Caribbean; Section 3 links public policy and public participation; Section 4 discusses the communities and actors of the innovation system and the need for dialogue; Section 5 proposes an analytical framework to assess the processes of dialogue in STI, including dimensions of analysis and transversal elements; Section 6 presents empirical evidence; and Section 7 contains final reflections.

2 The Construction of Public Policy in STI and Governance

STI policy-making in Latin America and the Caribbean has moved through phases, which successively comprise governmental, state, and public policies. In the first phase, policy-making responsibility lay entirely with the government—specifically, with the country's executive power. The latter took on a hierarchical and imperative style, and it also had power over the coordination of governmental plans, programmes, and instruments. The spread of these governmental policies did not overtake the scope of the organisations (or organisms) that depended on the various ministries; in particular, those in education, industry, or STI. Consulting expert advice could also be included in the STI policy-making, however, the idea that governments should promote scientific research, technological development, high-level training of human resources, and transfer of results towards innovation activities prevailed. The whole process of innovation was thought as a lineal model: a transfer from scientific and technological results towards generating innovations. The relevant policies consisted of instruments and measures designed and implemented by the government, with the purpose of improving each stage of the creation of knowledge, techniques, and innovations, and the transfer of results among them. (Crespi and Dutrénit, 2014; Dutrénit and Puchet, 2017)

Coordination of the government policies — where the system's governance was based — were included in the administration's role, and their efficiency depended on the extent to which the executive power was able to ensure governance. These policies were restricted in their conceptual, spatial, and temporal scope; they were limited to the national executive power throughout the period of an administration.

In the largest countries in the region, state STI policies incorporated executive and also legislative and judicial power, as well as other subordinate or autonomous bodies such as those linked to promoting and developing STI, and to universities, institutions, and centres for scientific research or higher education. These policies began being designed in the early noughties, and their aim was to build agreements or conventions with business associations and professionals linked to various scientific or academic industries. They also covered lower levels of government. They introduced periods that lasted longer than one administration, in order to encourage long-term objectives and strategies that involved rules and funding sustained throughout various administrations. (Puchet and Ruíz, 2003; Vera-Cruz et al., 2011; Kreimer et al., 2014)

At this stage it was not yet possible for coordination between state policymakers to be hierarchical and imperative, to the extent that it integrated people or organisations from different constitutional powers, governments of different territories under non-centralised political regimes, state bodies subject to autonomous statutes, and associations that joined people who

carried out private, corporate, or civil activities. Differing methods of cooperation or agreement were introduced, which could not be based on the vertical logic of the executive power. This led to changes in the way the system was governed. In this phase, instruments and measures were required that would act directly on stakeholders; not only this, but institutions also needed to be created that would indirectly establish conditions and frameworks for action that would in turn induce behaviours suitable for the policy objectives, or would regulate exchanges suiting several forms of interaction and communication.

As such, the transfer from governmental to state policies meant a change in ways of leading and managing innovation systems. Vertical orientation and management directed by one centralised body gave way to more horizontal forms of management for STI activities. Interaction and communication methods between people and organisations started to emerge that were more self-directed and self-driven in nature around STI activities, implying governance of incipient national innovation systems.

The appearance of the public policy phase was, essentially, marked by participation of interested parties in policy-making (Aguilar, 1992, 2006; Valenti, 2008; Ordoñez-Matamoros et al., 2013). In other words, by people who may be affected by decisions the government makes, or someone involved in or affected by, knowledgeable of, or having relevant expertise or experience in the issue at stake (Cuppen, 2012). Policies therefore acquired the dimension of public participation in their creation and implementation. This implies that when governments are formed and institutions established, mechanisms begin to appear, regulating the involvement of a variety of actors, together with a growing institutionalisation of public participation (Nupia and Martínez, 2015).

The incorporation of public participation transforms governance into a process that, on the one hand, integrates the configuration of rules of conduct and modes of action for actors who must agree in orienting activities towards a common goal, and which on the other requires the emergence of self-orientation, self-management, and self-control methods for innovation systems (Türke, 2008). Both perspectives of governance — the one stemming from the actors' behaviour and the one coming from constitutive systems' interaction and communication — require dialogue processes in various parts of the systems, in different territories, and in various temporalities. At the same time, the linkage and compatibility of these processes are part of the national innovation systems' capability to govern at the current stage.

3 Public Participation, Communities, and Public Policy in STI

Building public policy puts public participation at the centre of the decision-making process (Jensen, 2005; Griessler, Biegelbauer and Hansen, 2011). Public participation experiences in STI policy have gained significant interest in recent decades. A heterogeneous set of public and private communities and actors participate in this arena, which do interact, but also have different motivations, priorities, logic, resources, and capabilities.

This paper focuses on what we call STI communities. Communities are defined from individuals — they are the result of the interaction of two conflicting processes: (i) the socialisation of

individuals, insofar as this expresses a common origin and shared values that accentuate people's determinants of economic, social, and cultural mindset, and (ii) the formation of networks, assuming belonging but also generating relationships among individuals that influence and condition people's behaviours and ways of acting (Barboza, 2016; Dutrénit, Natera and Suárez, 2014). In STI activities, the formation of communities results as much from the activities themselves as it does from the policy-making and implementation.

The four main communities identified within the sphere of STI are academic, business, public sector (comprised of governmental and state bodies), and other civil society agents (Dutrénit, Natera, and Suárez, 2014). Groups or sets of people, or associated bodies emerge within these communities, and become actors in policy-making. Some of these communities are stakeholders. Such is the case with the academic, business, or other civil society actor communities, inasmuch as the public sector community manages policy-making. These four communities respond to different rationalities, an analysis of which can be seen in Section 4.

One set of specific actors in the communities participates in dialogue processes to build public policy. These dialogue processes play an important part in public policy. Theoretical and methodological efforts have been orientated towards identifying means to contribute to a greater public participation in decision-making processes (Chilvers, 2008; Jensen, 2005; Griessler, Biegelbauer and Hansen, 2011).

Public policy-making moves through a cycle of different stages: definition of agenda, design, decision-making, implementation, monitoring, and evaluation. Public participation opens spaces for dialogue among communities, with stakeholders on one side and the public sector on the other. In other words, interested communities participate and interact with the public sector community differently, and with differing intensity, at each stage of the policy cycle. The evidence shows a closer involvement during the agenda definition and design stages (Jensen, 2005; Rowe, 2005; Mejlgaard, 2009; Lázaro et al., 2013).

According to some authors, participation of interested parties in the policy cycle shows a set of both positive and negative aspects. The positive aspects include more orientation of policies towards the users, greater transparency in the rules of the game, de-politicisation of some controversial decisions, a reduction in conflicts between a country's regions, and greater assistance to create networks between different interested parties. Among the negative aspects are a longer decision-making process, an increase in the transaction costs of policy-making, and a greater risk of interested parties' behaviour being skewed in favour of certain groups or positions (Boekholt and den Hertog, 2004).

4 Communities and Actors of the Innovation System and the Need for Dialogue

Analysis of dialogues and the public participation of different clusters of individuals in STI policy-making processes demands a reconsideration of both the concept of an innovation system and the vision for its function (Álvarez et al., 2016). At the same time, the need has arisen to adopt a concept of community in STI that is compatible with a conception of innovation systems

where public policy is generated (Goñi, Bianco and Puchet, 2015). The analytical construct of innovation systems needs to be related to the relevant STI communities in order to establish the types of dialogue that make the creation of public STI policies possible.

A key characteristic of innovation systems is the interaction among system actors (Freeman, 1987; Lundvall, 1992; Nelson, 1993). In general, it is assumed *a priori* that actors are part of the academic, business, governmental, and civil society sectors. The system performance is based on the idea that relationships among actors reach a certain threshold of interaction and communication. This threshold ensures that the actions and messages exchanged among the actors make it possible to set out the innovation processes, identify the components of supply and demand, and generate the desired results. In order for this to happen, suitable institutional frameworks must emerge that ensure systemic coordination, and each actor must play its role and meet its objectives. The actors' individual behaviour, as well as the interaction and communication between them, are vital determinants of the system's governance.

System evaluations that note shortcomings or immaturity point to the absence, fault, or inadequacy of these links. In particular, they note on the one hand that there are hindrances to interaction or blocks to communication among actors. On the other, they note behaviours that hinder linkage or avoid commitments stemming from the exchange, due to behaviours outside of the rules. They also indicate inconsistencies in the institutional framework or incomplete rules being established in one of its aspects. Governance becomes unworkable in these circumstances. The system is therefore ineffective and the actors perceive it as inefficient or unfair in terms of the benefits it brings. These are recorded as systemic failures (Chaminade et al., 2009).

The four sectors articulated in innovation systems are based on agents and organisations. Agents are commonly considered to be those who carry out STI activities in different organisations, and the organisations are, in turn, grouped into their respective sectors. For example, universities as a type of organisation are situated in the academic sector. Different agents participate within them, such as scientists, technologists, scholars, and university officials.

But who are the communities and actors in the system, and how are they related to organisations in the system's sectors? Communities are built through pertinent links generated by shared origins and values, as well as activities in common. There is always a conflict between both elements (Ostrom, 2005; Bowles, 2004). At the same time, the placing of community members in the organisations and their hierarchies guides the possibility that the communities themselves influence the organisations' objectives. Connections established between communities and organisations are key determinants in the emergence of actors. For this to happen, the communities configure values and interests as well as interpersonal relations. Organisations define and shape institutions internally, and in turn produce power relationships that condition the agents through a set of rules (Basu, 2011; Caballero Miguez, 2011).

Individual and collective actors stem from this mutual conditioning between communities and organisations. In order to become actors, they must affirm intra-community networks and identity and, at the same time, internalise the intra- and inter-organisational institutions and learn to act in them. The actors face some problems. For example, an excessive concentration of intra-community connections makes it difficult to build agreements with other communities within the organisations. Furthermore, excessive emphasis on the operation through organisational rules,

and on performance subject to conditions of power, hinders the representative role played by actors in the community, and dilutes the values and interests that make community cohesion and authority possible. The primary relationship between communities and organisations is that communities, particularly the actors that emerge from them, participate in the organisations' activities and actions. Dialogue processes are simply a manifestation of these actions of participation.

From the perspective of innovation systems and their governance, it is important to highlight the role of participation and dialogue. Innovation systems are developed when agents interact and communicate at a certain level, organisations form their internal institutions and interact between them, communities emerge and make up their actors, and intra- and inter-organisational institutions are formed with their respective institutional frameworks. These processes tend to take place in all sectors of the innovation system. Coherence of institutional frameworks in the different sectors, and achievement of suitable levels of interaction and communication among agents are all required for governance (Fung, 2006). The development of governance requires the participation of communities and actors, as well as breadth and depth of dialogue processes that are carried out. Without participation and dialogue, coordination and harmony at an adequate level of governance are impossible (Newman et al., 2004; Fung, 2006).

If the evolutionary pattern of Chaminade et al. is followed (2009: 365–366, Fig. 13.1), participation and dialogue are the basis for transforming emerging innovation systems into mature ones. But some specificity has to be taken into account. The initial conditions of the innovation systems in developing countries, particularly in Latin America and the Caribbean, are different to those observed in central economies. On the one hand, there is greater diversity of organisations, communities and actors (Cimoli, 2000; Cassiolato, Lastres and Maciel, 2003; López, 2007; Dutrénit et al., 2010; Llisterri and Pietrobelli, 2011; Dutrénit and Sutz, 2014). On the other, there is an institutional variety that comes from both the processes of founding organisations and communities — that are developed through a collision of cultures and the subordination of one to another — and the cultural diversity of their societies (Ostrom, 2005). These facts and the constitutive processes of societies mean that the process of adaptation to surroundings, which is at the origin of innovation systems, imposes qualities different to those observed in many developed countries in processes of dialogue and conditions of participation.

The transition of governmental STI policies, confined to the sphere of governments' executive bodies, towards state and, later, public policies, described in Section 2, requires the participation of STI communities and their actors. Concrete participation is impossible without progressive opening of different spaces for exchange of experiences and policies, and gradual improvement of the quality of dialogue between communities and their actors. As such, participation and dialogue are fundamental components in developing innovation systems, their governance, and management of public policies.

5 Analytical Framework for the Processes of Dialogue: Definition, Dimensions of Analysis, and Transversal Elements

The definition of dialogue in terms of creating public STI policies, within the framework of innovation systems, requires a certain precision. It is necessary to define what exactly a process of dialogue is, and characterise its dimensions. In the case of STI, it is necessary to bear in mind a map of the innovation system from the point of view of those participating in the processes. This map could be seen as a means to navigate the ocean of dialogue processes.

As discussed in Section 4, the four sectors of the innovation system (academic, business, governmental, and civil society) are made up of organisations, which are in turn comprised of various communities. The participants in dialogues are the actors who emerge from these communities.

While there are different definitions of dialogue, given that the present paper is based on STI policy-making, we draw on the definition of democratic dialogue proposed by Cuentas and Linares Méndez (2013)[3]. However, following Goñi, Bianco and Puchet (2015), it is important to make three specifications in order for this definition to be adapted to processes relative to STI policies.

The first specification is that the participants are collective people or subjects comprised of human beings who have the character of actors emerging from their respective communities. This specification makes it possible to introduce two additional and complementary tensions in the conflict underlying all dialogue. The following two specifications refer to these tensions.

The second acknowledges that interests and values play out themselves in the dialogue, which brings the participants into conflict. From this angle, dialogues measure conflicts and can possibly resolve them. But it should be specified that the actors maintain a representational relationship with the communities to which they belong. Therefore, when actors participate in a dialogue, there is always a tension between their interests and values and those of their communities of origin. Although representation may have a formal aspect, the key point is that the social processes that make the emergence and evolution of the actors possible are always set out by the level at which the actors and communities establish that representational relationship.

The third specification refers to the structure of communities that participate in different organisations. This fact makes the communities transversal entities in terms of the organisations, and also in terms of the sectors of the innovation system. The key aspect of this transversal belonging is that it provides actors with different types and degrees of power that comes from insertion into different organisations. A community of scientists who are associated with various national universities where they hold hierarchical roles may have actors with academic power to agree or strike up agreements in a dialogue. A community made up of scientists who work in

[3] "Dialogue is a process of genuine interaction through which human beings listen to one another with such depth and respect that they change through what they learn. Each of the participants in a dialogue strives to incorporate the concerns of others into their own perspective, even when there is disagreement. None of the participants relinquishes their own identity, but each one recognises the validity of others' claims, and consequently acts differently towards them." (Cuentas and Linares Méndez, 2013).

research centres, whose management positions are held by administrators linked to industry, may in turn have actors with power in technology, but these would probably have little force taking part in a dialogue with consequences in establishing scientific policies.

Taking these specifications into account, the definition of dialogue processes stemming from a reviewed perspective, which is used here as an operative definition is as follows: "Dialogue processes related to public STI policies are authentic exercises in interaction and conflict, just like those in democratic dialogue. There, each of the participants learns and internalises others' arguments while maintaining their own identity and — from a communication perspective — they are placed in a position resulting from the power or abilities they have. Participants are actors who emerge from the various communities of agents of STI activities. As such, they have a representational relationship with their community, and at the same time, they belong to academic, businesses, governmental, or civil society organisations which provide them with different levels of power and capabilities." (Goñi, Bianco and Puchet, 2015)

Based on the above, it is possible to set out the theme of dimensions of dialogue processes. This must, on the one hand, make possible an analysis of how the actors interact and communicate in order to define a collective action for those exchanges, and on the other, it must be useful to identify failures, hindrances, and obstacles presented by the dialogue processes in order to arrive at a result. Just as those who hold dialogue are actors, it is also important to identify what exactly they hold dialogue on (the objects of the dispute), where the process takes place (spaces where they are carried out), and how long it lasts (temporality in which they develop). As such, these three dimensions are object, space, and temporality of the dialogue.

Object. The object of dialogue processes is the type of STI policy to be made. These types are characterised by at least three attributes: (i) scientific, technological or innovation activity, or one of their components, where dialogue is held, (ii) the territory where these activities take place: a country, region or locality, and (iii) the specific public problem that the actors define, set out, and try to approach, and the parts comprising it.

The key feature of the dialogue is the problem to be tackled. It is not set out in advance, but rather it is explored, set out and formulated during the process itself. However, in order to do this, it must be considered whether dialogue is held on aspects relative to supply, demand, or the connection between the two, in the specific framework of the activities and territories to which the dialogue refers.

The connection between problem, territory, and STI activity captures the primary features and profiles that the policy emerging from the dialogue will have. In other words, public policies that stem from a process of dialogue focus on a problem with a territorial connotation in terms of a specific STI activity.

Space. The space where actors hold dialogue is a result of the origin of the initiative, the actors' relative powers, their intentions upon arrival, and the position they take in regard to the object of dialogue itself. Four attributes can therefore be identified: (i) origin, (ii) intentions, (iii) positions, and (iv) power.

One key question to understand the space for the dialogue process is: what are the initiative's origins in terms of the communities it stems from? The initiative has either been brought about by one of the stakeholder communities in relation to STI policies (a bottom-up mechanism), or conversely, it may be brought about by governmental communities (a top-down mechanism) (Dutrénit et al., 2016).

Actors' intentions when coming up to the dialogue are, in principle, set out by the call to join in the process. Nevertheless, it is relevant to detect whether each actor considers the dialogue to be consultative, orientated towards drawing up general policy guidelines or designing a particular policy, or towards assessing a pre-existing policy (Dutrénit et al., 2016).

Positions in respect of the object of dialogue define the course of the process. There will be actors who are reactive, others who will have taken a position and, possibly, a previous analysis, and others who are more favourable to exploring the object in conjunction with the other actors starting from some initial ideas. The positions are sustained in the knowledge on the dialogue object and also in the actors' abilities and experience of participating in previous dialogues on the same or similar objects.

The actors' power depends on the relationships between them and the community they represent, the communities' placement in the organisations they belong to, and the transversality of the communities between the system's sectors or organisations. Underlying power relations in the processes must be understood beyond their clear expressions. Given that these are linked with initiating dialogues, it is worth asking what actor has the initiative to hold a dialogue. There are various options: an official responsible for a public administration on its own behalf, or for a coalition of them established by law; a leader of a business association; leaders of a social movement, etc. The possibility of having different actors in the four communities leads to a framework of power relationships in which different symmetries (or asymmetries) make up and/or emerge from the process of dialogue.

The relative powers, intentions, and positions of those holding dialogue shift the space for dialogue and tend to place it in terms of confrontation, unworkable imbalance, restricted collaboration, or active agreements. These situations may give rise to results with distinct possibilities for implementation.

Temporality. Finally, the temporality for the processes can be defined as: a one-off, a pre-defined period or a period generated by the dynamics of the dialogue, or on a permanent basis. The formal terms of the call and of the rules of the dialogue limit the temporality. However, temporality is an attribute of the process itself. (Alvarez et al., 2016)

Table 1 summarises these dimensions and attributes. It also includes a list of the different levels the attributes may have.

Table 1. Dimensions and Attributes of Dialogue Processes in STI

Dialogue Dimension	Dimension's Attributes	Attributes' Levels
Object	STI Activity	General STI Activities
		Specific STI Activity: science, technology or innovation
	Territory	Specific location or region

		Country
	Problem	Demand side
		Supply side
		Demand-supply interaction
Space	Origin	Bottom-up
		Top-down
		Open position
	Intentions	Consult or outline general policy guidelines
		Evaluate (criticising or opposing) policies
		Propose a new policy
	Positions	Reactive position
		Pre-established position
	Power	Symmetrical power relations
		Asymmetrical power relations
Temporality	One-off event	
	Limited period	
	Permanent	

Source: own elaboration.

Finally, dialogue processes are determined by two transversal elements: (i) context and institutional framework, and (ii) the communities' capabilities. A sense of the effect these elements have on the cycle of STI policies can be gleaned from discussions in the previous sections. These elements will now be examined in detail and included within the framework of analysis of dialogue processes.

Context refers to a series of circumstances that physically (e.g., time, place) or symbolically surround an event (such as the social or economic climate). Context must be understood broadly; that is, not simply referring to the immediate context of a community, but also to the wider one in which dialogue processes are developed, given that there are multiple actors with diverse interests. Institutional framework refers to the assembly of informal rules (codes and best practice for actors, habits, uses, and customs relative to interaction and communication among agents, organisations, and actors) and formal rules (intra-organisational rules, legal rules, regulations, and laws on various scales) (North, 1990; Ostrom, 2005). Communities participating in dialogues have different values, knowledge and background, and therefore it is important to have institutionalised rules and practices to regulate participants' behaviour.

Processes of dialogue for STI can be understood as processes of interaction among actors (and their communities). Connectivity between them depends to a great extent on their capabilities. Capabilities represent actors' and communities' specific knowledge, which is acquired through individual or collective experience and learning and accumulated over time. Dialogue is essentially a process based on knowledge, communication, coordination, and leadership skills, that leads the communities to conflict exploration, problem-solving, and decision-making. Communities, by their very nature, have different capabilities, including different skills for establishing dialogue. Among communities' capabilities that are particularly relevant for a dialogue process are: cognitive abilities, orientated towards identifying and resolving problems, linking in networks and generating confidence, as well as those for sharing knowledge, joint learning, leadership and coordination, among others (Alvarez et al., 2016).

The dimensions and attributes proposed are a framework of analysis to understand complex dialogue processes, such as those in STI. It is a proposal that does not seek to establish a normalising standard; on the contrary, it seeks to highlight various characteristics that coexist in the interactions occurring within a dialogue.

6 Dimensions and Attributes of Dialogue Processes: an Approach to Evidence

This section is based on collected and systematised evidence from 15 case studies on dialogue processes for STI policy-making in Latin America and the Caribbean. It presents quantitative evidence of the dimensions and attributes described in Table 1. It also uses anecdotal evidence to illustrate some of the transversal attributes and elements defined in Section 5.

6.1 Quantifying the Evidence

Table 2 classifies the 15 case studies according to the dimensions and attributes of dialogue processes defined in Table 1. It can be seen that the set of cases can be classified according to the various levels of attributes. For example, in the Object dimension, the case of Mexico-Entrepreneurs is classified as a Specific STI Activity (innovation), its territory is the whole of the country, and it is a problem that tackles demand-supply interactions.

Table 2. Classification of the Dialogue Process in Latin America and the Caribbean

Dialogue Dimension	Dimension's Attributes	Attributes' Levels	Number of Cases	List of Identified Dialogue Processes*
Object	STI Activity	General STI Activities	11	Argentina-FONARSEC, Brazil-Carnaval, Colombia-Social, CostaRica-Indicators, Cuba-Institutions, Mexico-Gender, Peru-Agenda, DominicanR-Policy, Uruguay-Wind, Uruguay-Citizens, Venezuela-Energy
		Specific STI Activity:	4	Argentina-FONSOFT, Chile-Science, Colombia-ResearchGroups, Mexico-Entrepreneurs
	Territory	Specific location or region	1	Colombia-Social
		Country	14	Argentina-FONSOFT, Argentina-FONARSEC, Brazil-Carnaval, Chile-Science, Colombia-ResearchGroups, CostaRica-Indicators, Cuba-Institutions, Mexico-Gender, Mexico-Entrepreneurs, Peru-Agenda, DominicanR-Policy, Uruguay-Wind, Uruguay-Citizens, Venezuela-Energy

Dialogue Dimension	Dimension's Attributes	Attributes' Levels	Number of Cases	List of Identified Dialogue Processes*
	Problem	Demand side	3	Brazil-Carnaval, Uruguay-Wind, Uruguay-Citizens
		Supply side	8	Argentina-FONSOFT, Argentina-FONARSEC, Colombia-ResearchGroups, Cuba-Institutions, Mexico-Gender, Peru-Agenda, DominicanR-Policy, Venezuela-Energy
		Demand-supply interaction	4	Chile-Science, Colombia-Social, CostaRica-Indicators, Mexico-Entrepreneurs
Space	Origin	Bottom-up	7	Brazil-Carnaval, Chile-Science, Mexico-Gender, Mexico-Entrepreneurs, Uruguay-Wind, Uruguay-Citizens, Venezuela-Energy
		Top-down	8	Argentina-FONSOFT, Argentina-FONARSEC, Colombia-Social, Colombia-ResearchGroups, CostaRica-Indicators, Cuba-Institutions, Peru-Agenda, DominicanR-Policy
	Intentions	Consult or outline general policy guidelines	2	Uruguay-Wind, Uruguay-Citizens
		Evaluate (criticising or opposing) policies	4	Colombia-ResearchGroups, CostaRica-Indicators, Mexico-Gender, Mexico-Entrepreneurs
		Propose a new policy	9	Argentina-FONSOFT, Argentina-FONARSEC, Brazil-Carnaval, Chile-Science, Colombia-Social, Cuba-Institutions, Peru-Agenda, DominicanR-Policy, Venezuela-Energy
	Positions	Reactive position	4	Chile-Science, Colombia-ResearchGroups, Mexico-Gender, Mexico-Entrepreneurs
		Pre-established position	5	Argentina-FONSOFT, Argentina-FONARSEC, Peru-Agenda, DominicanR-Policy, Venezuela-Energy
		Open position	6	Brazil-Carnaval, Colombia-Social, CostaRica-Indicators, Cuba-Institutions, Uruguay-Wind, Uruguay-Citizens
	Power	Symmetrical power relations	2	Colombia-ResearchGroups, Mexico-Gender

Dialogue Dimension	Dimension's Attributes	Attributes' Levels	Number of Cases	List of Identified Dialogue Processes*
		Asymmetrical power relations	13	Argentina-FONSOFT, Argentina-FONARSEC, Brazil-Carnaval, Chile-Science, Colombia-Social, CostaRica-Indicators, Cuba-Institutions, Mexico-Entrepreneurs, Peru-Agenda, DominicanR-Policy, Uruguay-Wind, Uruguay-Citizens, Venezuela-Energy
Temporality	One-off event		1	Chile-Science
	Limited period		11	Argentina-FONSOFT, Argentina-FONARSEC, Brazil-Carnaval, Colombia-Social, Cuba-Institutions, Mexico-Gender, Mexico-Entrepreneurs, Peru-Agenda, DominicanR-Policy, Uruguay-Citizens, Venezuela-Energy
	Permanent		3	Colombia-ResearchGroups, CostaRica-Indicators, Uruguay-Wind

Source: Own elaboration
Note: * Annexe 1 lists the dialogue processes.

There is a clear pattern in the Object dimension from Table 2. The majority of the dialogue processes are orientated towards general STI Activities, at a country level and for supply side problems. This is not surprising, since the constructions of national innovation systems in Latin America have been orientated to generating the required scientific and technological infrastructure to increase country's ability to participate in innovation processes (Crespi & Dutrénit, 2014). On the other hand, from the temporal point of view, most of the dialogue processes tend to take place in a limited period.

The Space dimension is more heterogeneous: (i) Table 2 shows that Positions vary across the different attributes' levels; (ii) the origin is closer to top-down approaches, but there is a high possibility of finding bottom-up processes; and (iii) it is clear that most of the dialogue processes deal with new STI policies. However, there is one attribute that stands out from the others: power relationships in dialogue processes are characterised by a marked asymmetry. Section 6.2 describes evidence of this attribute.

Finally, there are two transversal elements of dialogue processes that are not included in the table: context and institutional framework, and the actors' and communities' capabilities. The following sections present anecdotal evidence on asymmetries of power, context and institutional framework, and capabilities.

6.2 Power Asymmetries between the Communities

Actors participating in STI dialogues come from different communities that possess characteristics (e.g., motivations, priorities, and logic), knowledge, capabilities, and varied resources. These differences can be used as mechanisms to control the dialogue, generating

asymmetries of power that can emerge in the process of interaction (Goñi, Bianco and Puchet, 2015).

Asymmetries are situations in which one of the communities participating in the dialogue process, or one of the actors of a community, has a capability, resource, or characteristic that the other participants do not possess. When these characteristics, resources, or capabilities allow those who have them to build hegemony in the dialogue process where their will, interests, or values prevail, this leads to a situation of power asymmetry. Dialogue processes can face conflicts resulting from asymmetrical power relationships between those participating in the dialogue. It is important to take note of these situations in order to encourage spaces for genuine interaction and not simply legitimise courses of action already established in another sphere (Goñi, Bianco and Puchet, 2015). The cases described below illustrate situations of power asymmetry in dialogue processes.

The case of Mexico-Entrepreneurs shows a facet of possible power asymmetries, not between or within communities, but rather in relation to the role played by certain actors in the dialogue process. In effect, this situation is seen in relation to facilitators and mentors. Participation of translators or mediators was found to be necessary in order to establish a dialogue between young entrepreneurs and public officials. They were sought to help facilitate the flow of communication between the participants, and avoid obstacles created by differences in codes of communication and distances in the technical language used by the participants.

This role of translation and mediation was given to a facilitator and three mentors who were very experienced entrepreneurs. Because of their experience, they had already developed their own agenda to encourage the development of knowledge-based ventures. While carrying out their roles as translators, they interpreted the young entrepreneurs' opinions in terms of a priori ideas they had, and, in the session reports, they expressed their filtered interpretation of what the young entrepreneurs had said. They could do this because they were in an asymmetrical power relationship with respect to the other actors present for the dialogue. They had a knowledge or capability that the others did not: the ability to master the language of both groups and dominate their position of intermediation, which caused an asymmetry of knowledge or ability. As a consequence, some of the entrepreneurs advised that they did not see a clear relationship between the initial challenges they had identified and the policy proposals resulting from the dialogue, leading to appropriate adjustments in the proposals.

The Argentina-FONSOFT case was focused on the creation of a Software Industry Promotion Fund, orientated towards the design of innovation policies and promotion of new businesses, products, and services in this industry. In this dialogue, the coordinators acted as moderators and translators in managing power asymmetries. Their merit lay in using their power as moderators to impede the development of asymmetries between participants who brought differing agendas, and thereby maintaining a balanced and plural nature in the dialogue.

This dialogue process was called by the public sector, and from the beginning, it involved multiple institutions and broad participation from all interested sectors (academic, business, and other sectors of civil society). Communities participated with high abilities but different agendas. In particular, there was significant disparity between the agendas of small, medium, and large businesses in the sector. While small and medium national businesses were interested in

promoting the integration of a national software sector, the strategy of most of the multinational companies had primarily been centred on importing standard solutions. In this context, to maintain the dialogue process it was important to support the small and medium national businesses without arousing opposition from the large multinational companies. The facilitators' work, and their position of power, helped to balance the groups' power and translate heterogeneous agendas and objectives into concrete policy recommendations. As in the Mexican case, this was possible because the facilitators had a great deal of experience in the public sector, academia, and the business world, which allowed them to understand the different communities. A balanced and plural character was maintained in the dialogue and a network grew with low-level asymmetry between communities in terms of power distribution.

The Colombia-Research Groups case analyses a dialogue process between the government and the scientific community associated with the development of the Colombian Model of Measuring Production of Research Groups. The aim was to have an instrument to develop a public policy for driving research groups' performance through a system that measured scientific productivity. This dialogue illustrates two situations of power asymmetry associated with forming "committees of experts". Colciencias, who lead this project, did not explicitly design any mechanism for dialogue with the scientific community; it used its position of power, based on being the governmental agency responsible for STI promotion in Colombia, to appoint a community of scientific experts. Coliencias assumed that the conformation of this expert committee was a mechanism for consultation and legitimisation to encourage research and assess its quality. In this sense, it can be said that through the expert committee, Colciencias established a hierarchical dialogue with the scientific community to legitimise the measurement procedures for research quality in the country.

This first power asymmetry led to (and legitimised) a second asymmetry between fields of knowledge. To the extent that the expert committee was essentially made up of scientists belonging to areas of basic and applied sciences, the criteria established for measuring research quality adhered to the way of doing things in these scientific fields, and the norms and dynamics of research in social sciences and humanities were ignored. This situation left the social sciences and humanities researchers at a disadvantage, and led to them expressing their dissatisfaction with the quality measurement system in 2001. These complaints were not supported by the community of basic and applied science. In 2014, new expert committees were created to meet the requirements of the social sciences and humanities communities, but groups of researchers in these fields decided not to participate that year. This demonstrates that confidence within Colciencias and a significant proportion of the scientific community was deeply affected by poor management of power asymmetries.

6.3 The Context and Institutional Framework

Dialogue establishes institutional arrangements that are renegotiated from time to time, in such a way that they may alter their form and function. The new institutionalism approach facilitates the understanding of dialogues as an institution; a dialogue is established to solve problems framed by its participants and to transform relationships among actors (Nupia and Martínez, 2015).

In the case of incorporating wind energy into the Uruguayan energy matrix (Uruguay-Wind), this required not only huge transformation in the processes, practices, and knowledge of energy sources, but also amendments in the regulations related to its production and use. Amendments include new norms for grid connection, construction and operation of wind parks, environmental regulations, financial incentives, and tax-related aspects. These undertakings gave way to the emergence of new actors as well as new roles assigned to existing ones.

A change in institutional framework is not just the product of external events and disruptions, but also of incremental changes generated during the process itself. The latter is illustrated by the Colombia-ResearchGroups case. Over the past 15 years, this dialogue process has experienced gradual changes that have influenced its progress. These are the result of feedback from the scientific community and official institutions, and are reflected in changes to established rules. Some of these rule amendments consisted of eliminating general financial incentives for research groups, and establishing quality as the prime driver for these activities. Groups were also reclassified into areas according to the nature of their projects (basic or social sciences, etc.), and finally, STI policy was re-orientated (based on the regulations of 2009), whereby innovation appears as a primary driver of productivity for academic groups.

Amendments of context and of formal and informal rules can be key in the development of dialogue processes for STI. In the case of Brazil-Carnaval, a policy plan and proposals for action were prepared for the Local Innovation and Production System of the Carnival as a product of dialogue, but it was halted by changes in the STI ministry. The new ministry and directors assigned limited relevance to the policy for promoting Local Innovation and Production Systems. They chose to redirect policy priorities towards traditional targets of large industrial sectors, high-tech fields, industry-university relations, and technological parks and spin-offs, where uncertainty is much lower than to Local Innovation and Production System. There was a need to engage in new rounds of discussion, trying to find new ways to combine the policy proposal with the institution's usual scope. Eventually, political turbulence at the federal government level led to a complete paralysis with a context of uncertainty marked by the restructuring of power relations, and of the institutional setting up.

6.4 Capabilities of Communities and Actors

Capabilities orientated towards identifying and resolving problems, linking into networks, and sharing knowledge, as well as those generating trust, joint learning, leadership, and coordination can play a central role in building proposals for dialogue processes. The dialogue experience of Brazil-Carnaval shows several capabilities that were crucial for the success of the dialogue. One of the main aspects affecting the intensity and speed within which dialogues turn into effective initiatives relates to the capacity of different actors to translate their understanding of specificities of the activities involved into policy-making language. The ability of demanding groups, as in the case of the samba schools, to organise themselves, communicate their needs, and exert pressure on high levels of government is crucial for the dialogue to work. The capacity of the samba schools' associations to mobilise different actors and drive the process forward explains the extension and potential impact of the dialogue process. In this case, the integration of a mixed research group was essential, which was made up of academics, samba school professionals, and members of civil organisations directly connected with routines and activities linked to cultural

processes and management in samba schools. This group was led by the assessment of challenges and opportunities for the schools in the dialogue process to build the Local Innovation and Production System for Carnival. The mixed knowledge and capabilities of this group, and the learning by interaction developed amongst the actors allowed the group not only to conduct field research but also translate the results into proposals fitting with the scope and possibilities of the beneficiary communities.

Capacities for leadership and organisation were also an important element to progress in the various stages that made up the dialogue process. The main samba school association in Rio de Janeiro (LIESA) provided leadership in each of the three stages of dialogue: mobilisation of actors, building a bottom-up policy, and management of a complicated context of political and institutional change. During the first stage, its capacity for convocation and representation helped to involve samba schools from other cities in the process. It was able to present the community's demands in a structured and representative way, contributing to joining visions with other samba schools in the country. During the second stage, given the perception that samba communities were not being truly heard, it promoted a new round of dialogue with governmental bodies. This was made feasible due to its capacity to push proposals in contexts that were usually bureaucratic. During the third stage, when facing political changes, it sought legitimacy with the new conditions, even when the context was very uncertain.

The heterogeneity of the actors and the existence of gaps large or small can make processes of dialogue difficult; different levels of intra- and inter-community capacities demand additional efforts in order to be carried out. In the case of Argentina-FONSOFT, the promotion of the software industry, a process that is essentially bottom-up, was the product of a long process of strategic discussion that required strong interaction between the academic sector and the business and public sectors. The proposal of the Software Industry Promotion Fund required participation from leading actors with a high level of capability in each one of these communities. In order to aid the process, it was crucial to reduce the cognitive distances between the actors, leading to conditions of learning by interaction. Conversely, in the case of the Argentinean sectoral fund (Argentina-FONARSEC), an emerging vertical programme with a top-down process, public sector skills and experience were essential to coordinate actors in identifying regional and sectoral needs and priorities. Other critical skills accumulated by the public sector actors were implementation and follow-up of policies, as well as those related to translating the actors' interests and political will into financing instruments.

These experiences indicate that dialogue is a dynamic process. Hindrances and limitations that can occur along the way derive not only from the characteristics of a single actor, but also from the dynamics of the interaction between the actors (Goñi, Bianco and Puchet, 2015). In terms of various capacities accumulated, the actors' initial characters or gifts that affect the dialogue can be developed and transformed, removing barriers in the process. Any gaps that exist can be narrowed by improving the actors' capabilities as a result of learning and experience acquired during the process itself, and also from practicing, building, and interacting with other actors.

7 Final Reflections

This document recognises the importance of public participation in public STI policy-making. The evidence, based on 15 cases from Latin America and the Caribbean, illustrates the complexity of these dialogue processes developed in emerging innovation systems.

Starting from existing literature and drawn on empirical evidence, an analytical framework has been proposed to analyse these dialogue processes, based on their dimensions and attributes. Three dimensions are proposed: object, space, and temporality of dialogue; that is, what is being discussed, where the discussion takes place, and how long it lasts. This "dimensioning" allows an analysis of how the actors of communities interact and communicate in order to define a collective action and identify any failures, hindrances, and obstacles in dialogue processes towards arriving at a result. Each dimension is made up of various attributes. The dimensions and attributes proposed are a framework of analysis to understand a complex process of dialogue, such as those in STI policymaking. It is a proposal that does not seek to establish a normalising standard; on the contrary, it seeks to highlight various characteristics that coexist in the interactions occurring within dialogues.

This document contributes to various bodies of literature. First, with regards to the arguments by Chaminde et al. (2009), in terms of the differences between innovation systems in developed and developing countries and the nature of their failures, this paper enables various points to be argued. Without a doubt, a lower quantity and less variety of components in the innovation system is associated with fewer and less intense links between the components. However, a system transforming into maturity will not only encounter a certain set of systemic failures as obstacles when compared to the prototype of a mature system. It will also have shortcomings in developing its parts, in the co-evolution that should prevail between them, and in the constitutional interaction of the whole system. There will therefore be critical thresholds in the number and variety of components, and in the types and intensity of links that are important and specific to each emerging system, and which will characterise their development. There will be capability and network problems to be framed and resolved according to the conditions of each system and set of surroundings.

From this perspective, processes of participation and dialogue with communities and actors tend to tackle their respective specific developmental obstacles and evolve according to their specific path-dependencies. Dialogue processes in the framework of innovation systems also require problems to be set out with communities' and actors' capabilities and with building networks at different levels - within communities, between actors, and the communication between them. The present analysis reinforces the evolutionary perspective of developing innovation systems and strengthening their governance, incorporating the dimension of collective action and the will of the communities and actors that operate reflexively on the gestation and maturation of the systems.

Secondly, based on the evidence collected in the project, an adaptation of the definition of democratic dialogue has been adopted that is more suitable for processes relative to the design of STI policies (Goñi, Bianco and Puchet, 2015). Unlike that proposed by Cuentas and Linares Méndez (2013), the definition takes into account that: (i) participants are people or collective subjects comprised of human beings who have the character of emerging actors in their respective communities, (ii) interests and values manifest themselves in the dialogue that place the participants into conflict, but the actors maintain a representational relationship with the

communities they belong to, and (iii) there are communities that participate in different organisations; that is, they are transversal entities in terms of the organisations, and also in terms of the sectors of the innovation system.

Thirdly, with respect to the literature on public participation for the policymaking process (Jensen, 2005; Griessler, Biegelbauer and Hansen, 2011; Griessler et al., 2012), this paper provides a classification of dimensions and attributes of dialogue processes that are relevant when these focus on STI policymaking. The evidence presented illustrates the characterisation of dialogue processes in Latin America and the Caribbean according to these dimensions and their attributes.

Analysis of the empirical evidence illustrates that the dialogues take place in various contexts; each of the cases analysed represents a set of particular circumstances. Deriving standardised processes to improve and promote dialogue is complicated; however, in the cases described it is possible to identify certain regularities and illustrations that can provide specific learning points for STI policy designers and other actors participating in the dialogue processes. First, it is crucial to understand the object of the dialogue and who are the communities and actors participating in it. Second, it is important to clearly identify the three dimensions of the dialogue process and the specific attributes of each one, in order to understand its nature and make appropriate decisions. Third, it is advisable to identify differences in capabilities between the participating communities and any asymmetries of power, in order to take corrective action and encourage the generation of agreements.

Public STI policy needs to be orientated relative to participation and dialogue between the communities and their actors. In this sense, those who have constituted and emerged as participating communities and actors in each innovation system should be known. Even if there is a set of information systems to capture data on sectors, organisations and agents in innovation, procedures, mechanisms and information systems should also be implemented to allow maps and surveys to be made on communities and actors involved in dialogues. Dialogue processes require agreements to be established between participants in order to record systematic evidence about the same. Systems should emerge from these agreements which, based on information and communication technology, provide a follow-up to the dialogues and the configuration of expert groups that study their emergence, development and results. Follow-up and analysis of the dialogues and their participants make it possible to detect points of linkage between sectors in innovation systems, or parts where their organisations and agents can interact and communicate, where communities and actors to participate and hold dialogue have not yet emerged. Detecting this allows for any tensions existing in the governance of the system itself to be identified.

Moreover, public STI policy requires bodies to be constituted that come about autonomously and as a result of the communities and actors, or which are established more formally, whose function is to put the participation and dialogue itself into practice. Important advances have been made along these lines in various Latin American and Caribbean countries, where advisory and consulting bodies have been created to support the processes of designing, implementing, and assessing STI policies. One of their functions is simply to be consulting bodies for different communities and actors (Dutrénit, 2014). In the case of Mexico, the Scientific and Technological Consulting Forum that joins communities' participation functions already assessed and proposed early how to deepen the processes of inter-relation and dialogue at an early stage (Puchet, 2010).

Information systems and autonomous bodies related to participation and dialogue allow actors' and communities' capabilities to be revealed, as well as levels of conflict and possibilities for agreements. Without emergence of these complementary institutions, it is difficult to make public policy and generate governance of innovation systems. As one looks in the mirror, how much STI public policies have been developed can be seen in how evident, for society, is its orientation to the participation and dialogue of communities and actors.

Finally, we would like to share some reflections and lines of future work. One key aspect relates to the way dialogue processes are charted. Given the dimensions set out for studying the 15 dialogue processes in Latin America and the Caribbean, it is clear that the geometry in which this takes place is not simply two-dimensional. For this reason, our first intention was to arrange the dimensions of the dialogue into a three-dimensional space, where we could take a heuristic approach to assign specificities of the three dimensions (object, space, and temporality) to each of the dialogue processes. The three dimensions began to take on a cubic shape, resulting in a very convenient representation, given that it clearly arranges the location of the dialogue processes in the region. This in turn serves to map out the relationships between attributes. One relatively small set of attributes that distinguish one process from another makes it possible to place and describe them through certain relevant elements. However, a deeper analysis of the dialogue processes revealed an interesting and decisive characteristic: the attributes of the dimensions set out to study the dialogue processes are not necessarily exclusive. As well as interconnecting them, we must admit that during the process itself, some overlap with others, giving rise to a distinctive attribute that accounts for the level of complexity reached by dialogues.

For each of the dimensions, evidence of a non-exclusive nature could be found for the attributes of the process dimensions. If we take temporality — which is perhaps the dimension that can be thought of as the most exclusive, it is difficult to understand how a dialogue process can be both punctual and for a specific period. However, when dialogues are permanent (or very long-lasting), it is possible to consider that sometimes the dialogue has traits similar to punctual ones, and at other times it can seem similar to processes that take place in a definite timeframe. The case of changing the Uruguayan energy matrix to wind power (Uruguay-wind) is a clear example of this. For this reason, even if the cube shape represented a progress in the way we focus dialogue processes, it was not enough to cover the dynamics' level of complexity in this analysis. One line of future work is to explore how the dimensions of dialogue processes work in complex spaces, seeking a representation that is useful to better understand the connections between different dimensions and attributes of dialogue and their interaction with the public policy cycle.

Other future lines of work include introducing a more flexible definition of "community," which is not just associated with the sector, but that also allows an illustration of hybrid communities cutting through cross-sections of STI. Exploring this view is appropriate, especially when focusing on capability building in innovation systems. The idea is to explore how some of the interactions set out by dialogue processes can end up strengthening the links between actors in emerging innovation systems. Many systemic failures are linked to the actors' inability to find coordination mechanisms that allow for stable and durable flows of knowledge over time. It would therefore be interesting to understand the extent whereby dialogue processes to formulate STI policies can have an effect on improving these mechanisms, achieving the development of more effective STI activities in Latin America and the Caribbean.

References

Aguilar, L. (1992, ed.), *La hechura de las políticas públicas*, México: Miguel Ángel Porrúa, Grupo Editorial.

Aguilar, L. (2006), *Gobernanza y gestión pública*. México: FCE.

Álvarez, I., Barletta, F., Suarez D. and Yoguel G. (2016), "Marco analítico para la tipificación de diálogos para las políticas de CTI", *Documento de trabajo* núm. 4, Red CYTED COM – LALICS.

Barboza, L. (2016), "Algunas consideraciones en torno al concepto de *comunidad*", *Documento de trabajo*, Red CYTED COM – LALICS.

Basu, K. (2011), *Beyond the Invisible Hand. Groundwork for a New Economics*, Princeton, NJ: Princeton University Press.

Boekholt, P. and den Hertog, P. (2004), "Governance of the Netherlands' Innovation Policy System", *National Synthesis Report*, Dialogic- Technopolis.

Bowles, S. (2004), *Microeconomics. Behavior, Institutions and Evolution*, Princeton, NJ and Oxford: Princeton University Press.

Caballero Miguez, G. (2011), 'Economía de las instituciones: de Coase y North a Williamson y Ostrom', *Ekonomiaz,* **77** *(*2), pp. 14-51.

Cassiolato, J., Lastres, H. and Maciel, M. L. (eds.) (2003), *Systems of Innovation and Development Evidence from Brazil*, Cheltenham, UK: Edward Elgar

Chaminade, C., Lundvall, B.-Å., Vang, J. and Joseph, K.J. (2009), "Designing innovation policies for development: towards a systemic experimentation-based approach" in Lundvall, B.-Å., Joseph, K. J., Chaminade, C., and Vang, J. (eds) *Handbook of Innovation Systems and Developing Countries: Building Domestic Capabilities in a Global Setting*. Edward Elgar Publishing.

Chaminade, C. and Edquist C., (2006), "Rationales for public policy intervention from a systems of innovation approach: the case of VINNOVA", *Working Papers series, CIRCLE*, Paper no. 2006/04.

Chilvers, J. (2008), "Deliberating Competence: Theoretical and Practitioner Perspectives on Effective Participatory Appraisal Practice", *Science, Technology & Human Values*, *33*(3), 421–451.

Cimoli, M. (ed) (2000), *Developing Innovation Systems, Mexico in the Global Context*, London: Pinter Publishers.

Crane, A., Matten, D., and Moon, J. (2004), "Stakeholders as Citizens? Rethinking Rights, Participation, and Democracy", *Journal of Business Ethics*, *53*(1/2), 107–122.

Crespi, G. and Dutrénit, G. (eds) (2014), *Science, Technology and Innovation Policies for Development: The Latin American Experience*, London: Springer.

Cuentas, M. Á. and Linares, A. (2013), *Guía práctica de diálogo democrático*, Organización de Estados Americanos - Programa de las Naciones Unidas para el Desarrollo.

Cuppen, E. (2012), "A quasi-experimental evaluation of learning in a stakeholder dialogue on bio-energy", *Research Policy*, *41*(3), 624–637.

Dutrénit, G. (2014), Experiencias de Organismos Latinoamericanos de asesoría y consulta para construir políticas de Ciencia, Tecnología e Innovación, documento de trabajo, México: FCCyT.

Dutrénit, G. and Puchet, M. (2017), "Tensions of STI policy in Mexico: analytical models, institutional evolution, national capabilities and governance", in S. Kuhlmann and G. Ordóñez-Matamoros (eds.), *International Research Handbook on Science, Technology and Innovation Policy in Developing Countries: Rationales and Relevance*, Edward Elgar.

Dutrénit, G. y Sutz, J. (eds) (2014), *National Innovation Systems, Social Inclusion and Development: The Latin American Experience*, Cheltenham: Edward Elgar.

Dutrénit, G., Capdeville, M., Corona, J., Puchet, M., Santiago, F., and Vera-Cruz, A. (2010), *El Sistema Nacional de Innovación Mexicano: Instituciones, Políticas, Desempeño y Desafíos*, México: UAM-X/ Textual.

Dutrénit, G., Natera, J. M. and Suárez, M. (2014), "Lineamientos para la caracterización de las Comunidades y sus Procesos de Diálogo", *Documento de trabajo* núm. 1, Red CYTED COM – LALICS.

Freeman, C. (1987), *Technology, policy and economic performance: lessons from Japan*, London: Pinter Publishers.

Fung, A. (2006), "Varieties of Participation in Complex Governance", *Public Administration Review* (66), 66-75.

Goñi, M., Bianco, M. and Puchet, M. (2015), "Elementos para caracterizar los procesos de diálogo en políticas de CTI", *Documento de trabajo* núm. 1, Red CYTED COM – LALICS.

Griessler, E., Biegelbauer, P. and Hansen, J. (2011), "Citizen's Impact on knowledge intensive policy: introduction to a special issue", *Science and Public Policy*, 38(8), 583-588

Griessler, E., Biegelbauer, P., Hansen, J. and Loeber, A. (2012), "Citizen participation in decision-making on complex and sensitive issues? experiences with xenotransplantation: Synthesis report", *Technical Report, Brussels: European Commission*.

Jensen, C. B. (2005), "Citizen Projects and Consensus-Building at the Danish Board of Technology: On Experiments in Democracy", *Acta Sociologica*, *48*(3), 221–235. http://doi.org/10.1177/000169930505656

Kreimer, P., Vessuri, H., Velho, V. and Arellano, A. (eds.) (2014), *Perspectivas latinoamericanas en el estudio social de la ciencia, la tecnología y el conocimiento*, México: CYTED, FCCyT, ESOCITE y Siglo XXI Editores.

Lázaro, M., Trimble, M., Umpiérrez, A., Vásquez, A., and Pereira, G. (2013), Juicios Ciudadanos en Uruguay. Dos experiencias de participación pública deliberativa en ciencia y tecnología, Montevideo: PNUD/Universidad de la República.

Llisterri, J.J. and Pietrobelli, C. (eds) (2011), *Los Sistemas Regionales de Innovación en América Latina*, Washington: BID.

López, A. (2007), *Desarrollo Económico y Sistema Nacional de Innovación en la Argentina*, Buenos Aires, Consejo Profesional de Ciencias Económicas de la Ciudad Autónoma de Buenos Aires: Buenos Aires.

Lundvall, B.-Å. (1992), *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning*, Pinter: London.

Mejlgaard, N. (2009), "The trajectory of scientific citizenship in Denmark: changing balances between public competence and public participation", *Science and Public Policy*, *36*(6), 483–496.

Nelson, R. R. (ed.) (1993), *National Innovation Systems: A Comparative Analysis*, New York: Oxford University Press.

Newman, J., Barnes, M., Sullivan, H. and Knops, A. (2004), "Public Participation and Collaborative Governance", *Journal of Social Policy*, 33(2) pp. 203–223.

North, D. (1990), *Institutions, Institutional Change and Economic Performance*, Cambridge: Cambridge University Press.

Nupia, C. and Martínez A. (2015), "Revisión de metodologías de procesos de diálogo", *Documento de trabajo* núm. 4, Red CYTED COM – LALICS.

OECD (2007), *Public-Private Dialogue in Developing Countries Opportunities and Risks*, Paris: OECD Development Centre.

Ordónez-Matamoros, G., Tadlaoui, S., Porras, S., Duarte, J., López, L., Martínez, L. and Calderón, G. (2013) *Manual de Análisis y Diseño de Políticas Públicas*, Bogotá: Editorial Universidad Externado de Colombia.

Ostrom, E. (2005), *Understanding institutional diversity*, Princeton University Press.

Puchet Anyul, M. and Ruiz, P. (2003), *Nuevas leyes de ciencia y tecnología y orgánica del CONACYT. Buenos propósitos, cambios institucionales y concentración presidencial de las decisiones*, México: Editorial Porrúa y Facultad de Derecho – UNAM,

Puchet Anyul, M. (2010), *Evaluación del desempeño del Foro Consultivo Científico y Tecnológico (2002 – 2009)* México: FCCyT.

Rowe, G. (2005), "A Typology of Public Engagement Mechanisms", *Science, Technology & Human Values*, 30(2), 251–290.

Türke, R. (2008), *Governance. Systemic Foundation and Framework.* Heidelberg: Physica-Verlag.

Valenti, G. (coord.) (2008), *Ciencia, tecnología e innovación. Hacia una agenda de política pública*, México: FLACSO.

Vera-Cruz, A., Dutrénit, G., Ekboir, J., Martínez, G., and Torres, A. (2011), "El financiamiento de la Investigación y la Innovación Mediante Fondos Competidos: Balance del caso de la Agricultura Mexicana", en Aboites, J. y Corona, J.M. (coord.), *Economía de la Innovación y Desarrollo*, México: Siglo XXI, pp.192-215.

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Annex 1. Table of Dialogue Processes Identified

Code	Referencia
Argentina-FONSOFT	Barletta, F; Suárez, D; Yoguel, G. (2016). Matriz de Información para el mapeo de procesos de diálogo de CTI: Promoción de la innovación en la industria del software y los servicios de TI - El caso de FONSOFT. Documento de Trabajo Red CYTED COM_LALICS. Available at: http://lalics.org/index.php?option=com_content&view=category&layout=blog&id=63&Itemid=321&lang=es
Argentina-FONARSEC	Suárez, D; Barletta, F; Yoguel, G. (2016). Matriz de Información para el mapeo de procesos de diálogo de CTI: Promoción de la innovación a nivel sectorial - El caso FONARSEC. Documento de Trabajo Red CYTED COM_LALICS. Available at: http://lalics.org/index.php?option=com_content&view=category&layout=blog&id=63&Itemid=321&lang=es
Brazil-Carnaval	Pessoa de Matos, M; Cassiolato, J.E.; Lastres; H. (2016). Matriz de Información para el mapeo de procesos de diálogo de CTI: Construcción de políticas STI: diálogo de políticas públicas en los Sistemas Locales de Innovación y Producción del Carnaval en Brasil.. Documento de Trabajo Red CYTED COM_LALICS. Available at: http://lalics.org/index.php?option=com_content&view=category&layout=blog&id=63&Itemid=321&lang=es
Chile-Science	Cortes, R. (2016). Matriz de Información para el mapeo de procesos de diálogo de CTI: Creación de instituciones públicas para el desarrollo de la ciencia en Chile. Documento de Trabajo Red CYTED COM_LALICS. Available at: http://lalics.org/index.php?option=com_content&view=category&layout=blog&id=63&Itemid=321&lang=es
Colombia-Social	Nupia, C, Martinez, A. (2016). Matriz de Información para el mapeo de procesos de diálogo de CTI: El desarrollo participativo de la innovación en políticas sociales en Colombia. Documento de Trabajo Red CYTED COM_LALICS. Available at: http://lalics.org/index.php?option=com_content&view=category&layout=blog&id=63&Itemid=321&lang=es
Colombia-ResearchGroups	Nupia, C, Martinez, A. (2016). Matriz de Información para el mapeo de procesos de diálogo de CTI: Medición y reconocimiento de grupos de investigación en Colombia. Documento de Trabajo Red CYTED COM_LALICS. Available at: http://lalics.org/index.php?option=com_content&view=category&layout=blog&id=63&Itemid=321&lang=es
CostaRica-STIIndicators	Orozco, J; Barboza-Ariaz, L. (2016). Matriz de Información para el mapeo de procesos de diálogo de CTI: Sistema de Indicadores Nacionales de Ciencia, Tecnología e Innovación (Costa Rica). Documento de Trabajo Red CYTED COM_LALICS. Available at: http://lalics.org/index.php?option=com_content&view=category&layout=blog&id=63&Itemid=321&lang=es
Cuba-Institutions	Torres Pérez, R; Díaz Fernández, Ileana; Fernández Estrada, Oscar (2016). Matriz de Información para el mapeo de procesos de diálogo de CTI: Arreglos institucionales e incentivos para la innovación en Cuba. Documento de Trabajo Red CYTED COM_LALICS. Available at: http://lalics.org/index.php?option=com_content&view=category&layout=blog&id=63&Itemid=321&lang=es
Mexico-Gender	Dutrénit, G, Suárez, M. (2016). Matriz de Información para el mapeo de procesos de diálogo de CTI: Propuestas para adoptar una perspectiva de género en las políticas de CTI, México. Documento de Trabajo Red CYTED COM_LALICS. Available at: http://lalics.org/index.php?option=com_content&view=category&layout=blog&id=63&Itemid=321&lang=es
Mexico-Entrepeneurs	Dutrénit, G, Suárez, M. (2016). Matriz de Información para el mapeo de procesos de diálogo de CTI: Desafíos empresariales basados en el conocimiento en México. Documento de Trabajo Red CYTED COM_LALICS. Available at: http://lalics.org/index.php?option=com_content&view=category&layout=blog&id=63&Itemid=321&lang=es
Peru-Agenda	Bazán, M; Prada, F; Romero, F. (2016). Matriz de Información para el mapeo de procesos de diálogo de CTI: Diálogos para el desarrollo de la Agenda de Competitividad 2014-2018 en el Eje Estratégico de Ciencia, Tecnología e Innovación (CTI). Documento de Trabajo Red CYTED COM_LALICS. Available at: http://lalics.org/index.php?option=com_content&view=category&layout=blog&id=63&Itemid=321&lang=es
DominicanR-Policy	Gómez-Valenzuela, V; Zapata, L. (2016). Matriz de Información para el mapeo de procesos de diálogo de CTI: Diálogo nacional sobre políticas de innovación: fomento de la innovación, la creatividad y la creación de nuevos negocios. Documento de Trabajo Red CYTED COM_LALICS. Available at:

	http://lalics.org/index.php?option=com_content&view=category&layout=blog&id=63&Itemid=321&lang=es
Uruguay-Wind	Ardanche, M; Bianco, M; Cohanoff, C; Conteras, S; Goñi, M; Simón, L; Sutz, J (2016). Matriz de Información para el mapeo de procesos de diálogo de CTI: Cambio en la matriz energética uruguaya con especial énfasis en el desarrollo de la energía eólica - Uruguay. Documento de Trabajo Red CYTED COM_LALICS. Available at: http://lalics.org/index.php?option=com_content&view=category&layout=blog&id=63&Itemid=321&lang=es
Uruguay-Citizens	Ardanche, M; Bianco, M; Cohanoff, C; Conteras, S; Goñi, M; Simón, L; Sutz, J (2016). Matriz de Información para el mapeo de procesos de diálogo de CTI: Jueces Ciudadanos en Uruguay. Una experiencia de participación pública deliberativa en Ciencia y Tecnología. Documento de Trabajo Red CYTED COM_LALICS. Available at: http://lalics.org/index.php?option=com_content&view=category&layout=blog&id=63&Itemid=321&lang=es
Venezuela-Energy	De la Vega, I; Ruiz, N; Cervilla, M.A. (2016). Matriz de Información para el mapeo de procesos de diálogo de CTI: STI desde la gestión del conocimiento. El caso de la política pública en el área de energía en Venezuela. Documento de Trabajo Red CYTED COM_LALICS. Available at: http://lalics.org/index.php?option=com_content&view=category&layout=blog&id=63&Itemid=321&lang=es