

Biotechnology Development Support Program
in MERCOSUR - BIOTECH
FINANCING ARRANGEMENT ALA/2005/017 – 350 – EUROPEAN UNION – MERCOSUR

Contract
**Methods to Approach Consulting on the Establishment of Information Flows and Strategic
Planning in the Biotechnology Sector in MERCOSUR**

BIOTECH-ALA-2005-017-350C3 A

Fifth Report:
Identifying Strategic Guidelines for the BiotechSur Platform

Activity A15.2
Comparing Information Flows in MERCOSUR and the EU

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I. INTRODUCTION

This document compares the main structural features of the different forms of information flow between the European Union and MERCOSUR in the field of biotechnology development: groups, relations among R&D groups, business platforms, conferences, and technology fairs.

The document is based on information flow descriptions carried out in all the countries comprising MERCOSUR, within the framework of the Biotechnology Development Support Program in MERCOSUR-BIOTECH.¹

This work is a qualitative summary that validates the complexity of relations between R&D groups and cluster companies, business platforms, scientific exchanges, conferences, and fairs in the EU and MERCOSUR. Relations are validated according to their ability to make knowledge flow between the different poles where it is created – the technology production centers reaching the markets.

The content of this document is prescriptive, but not in a sense that it indicates which final policy procedures must be applied in order to develop biotechnology. Rather, it points out important issues regarding the new development phase of the BiotechSur Platform. It is intended to orient actions that might integrate existing abilities and competencies during the first phase of the program.

Knowing the structure, demands and vectors necessary to trigger biotechnology innovation abilities is essential for MERCOSUR. This is especially true in order to improve internal collaboration among the countries in the area, as well as to establish new cooperation ties with the European Union.

The document is arranged in three parts: First it presents an outlook on information flow in the EU and the countries of MERCOSUR. Then it discusses relevant information that comes from comparing both regions. Finally it presents comparative tables which offer a synthetic comparison.

This document seeks to support the next development phases of the BiotechSur Platform. It focuses on the capabilities of institutions, companies, industrial innovation public policies, governments, knowledge creation communities, etc. The aim is to qualitatively create the knowledge flows necessary to generate biotechnological innovation.

II. Outlook on Information Flow

II.1. Description of Information Flow in the EU

¹ Documents: “Caracterización de los Flujos de Información en la Argentina, Brasil, Paraguay y Uruguay” and “Caracterización de los Flujos de Información de la Unión Europea”.

Information flow in the EU is highly conditioned by geography, and thus, by the corresponding political authorities (municipal, regional, interstate, etc.). However, the range of activities transmitted face to face, especially fairs and conferences, goes way beyond geopolitical boundaries. It extends to regions, nations, and the European continent as a whole, attaining worldwide outreach.

There is a high degree of diversity in communication means, and a considerable amount of information flow, showing certain neuronal redundancy (characteristic of the EU) with strong governmental presence performing coordination tasks.

Regarding economic issues and sectors, business platforms, even in regional activities, behave like global companies, or allow incubated companies to behave as such.

This might be due to the fact that their actions cover a wide range of activities essential to develop biotechnology. Many perform their tasks (which go from providing basic services to the certification of technological equipment) through technological capabilities and human resources, thus attaining a biotechnological business profile. After reading the documents, one feels that information is valued in economic terms (beyond academic appreciation).

Information flow among R&D groups and businesses, encouraged by regional governments and funded through mixed systems, seems to be an essential component of the circulation capacity dynamics in the EU.

Knowledge Transfer Networks (KTN) can be considered an innovation in the organization of biotechnology networks. They allow selected information delivery in certain areas of industrial interest, adding value to private activities. The financing system and financing opportunities are organized in ways that make it easier to obtain resources for those who are interested in obtaining them. In a broad sense, this can be seen as a factor that guarantees the effectiveness of the system's dynamics in the EU.

Public mechanisms working on developing policy strategies (which allow the aforementioned articulation) are presented as "scientific exchanges", scholarships, programs and actions designed to increase the exchange of academic researchers with the world of business technology. This has a positive impact on industrial interests and businesses seeking to provide technological services. States constantly encourage personnel and information circulation, supply resources for such matters, and support bridge-organizations and events that provide knowledge and information flow regularly, based on a certain strategy and pre-established time charts.

Cross-border personnel circulation (both in academic and/or business circles), information systems, and institutional learning are identified as factors that make information flow efficient in the EU. This may be due to measures taken to provide political and economic strength to the bloc, as part of a conceived harmonious consolidation of the States

conforming the European Union. Such circulation does not only take place among public agencies, some cases include the private sector.

The report does not signal the causes for unequal biotechnology development, which may be related to development differences among some countries that are now members of the EU (not only concerning biotechnology creation capabilities). One can only assume that these imbalances are due to matters of historical development in certain activities and/or capabilities. However, no detailed information on the origins of such development is provided. We should also consider that the limitations of this study, such as the exclusion of French organization flows, like the INRA, may be skewing the direction of private flows.

Non-governmental organizations (NGOs) are also responsible for information exchange activities and for the coordination, financing, and organization of interest groups. This may prove they are essential elements for the success of the European system's biotechnological development.

It was not possible to identify the role of the main R&D financing programs, such as 7PF (EU's Seventh Framework Program for Science and Technology), nor the role of clusters, R&D and business groups, and innovation networks in general.

Likewise, the European Union's Characterization Document used to make this comparison does not take into account concession of technology licenses, patents, and research collaboration agreements among institutions, fairs, conferences, etc.

These indicators could reveal reasons for the cohesion among biotechnology networks in the EU, thus allowing to compare governmental issues of the system with those of MERCOSUR with greater precision.

However, we can assume from the document that structural complexity and density of the EU networks is quite significant. This is due to institutional diversity and formal technology development initiatives. Also, the amount of economic and human resources clearly contrasts with those allotted by our countries.

It seems that these networks have an equal capacity regarding intellectual property asset exchange, essential business information transmission, and the establishment of alliances among the Science, Technology and Market poles.

The multiple shapes and amounts of resources available to promote information and knowledge flow, and the learning implied in technological progress, are probably responsible for the innovation-related virtuous circles in the EU.

We can also assume that frameworks for relations and biotechnology agreements in the EU are favored by the actions of supranational agencies articulating economic policies, such as the OECD. This represents a way to coordinate multiple capabilities in order to make

information exchange and institutional collective learning more efficient. It also represents a means to generate new technologies.

Flow structures and the *modus operandi* of relations between EU actors allow raising the hypothesis that the ability to generate technology depends on a dynamic and dense network (covering a wide variety of subjects). It also backs the point of view that biotechnology (typical knowledge-based economic area) is governed by an innovative dynamics that relies on information flow and institutional and business capabilities. These capabilities are based on regional, national, and international public policies, both in the European bloc and in international markets.

Information exchange in the EU through business and market information exchange is highly significant because it proves the system is guided by activities seeking industrial development.

The private sector finances both R&D and all information flow maintenance. For such purposes it has different systems that range from self-funding to mixed financing along with the public sector and supranational agencies. This predisposition of EU businesses to share information creation and use is striking when compared to what happens in the (few) related Latin American companies. We can assume this is due to the economic value they find while operating such networks.

Therefore, we may conclude, still in a preliminary fashion, that the establishment of biotechnological platforms requires an adequate environment to generate businesses based on scientific and entrepreneurial knowledge and to make target industries adopt this knowledge.

Information flow in the EU seems to be able to integrate (by different means) community actors and entities interested in biotechnology. The analysis of the capability to generate innovation, however, does not come from the EU's report in this stage of the work.

II. General Description of Information Flow in MERCOSUR

Two main considerations guide the general framework.

First, considering the complex information flow among countries in the area, MERCOSUR has the institutional and informational conditions to considerably improve in this subject, strengthening biotechnology as an activity.

Existing businesses, research institutions, governmental actions, and information flow have technical and scientific support –an essential factor in using biotechnology to develop technological chains that generate products, processes, and services.

However, we find:

- a) The public sector is the leading actor in the system generating scientific knowledge, including information flow maintenance and knowledge processing.
- b) There is an asymmetry between countries (and regions) concerning the critical mass of the scientific areas of Biology. This is especially the case for Cellular and Molecular Biology, essential to develop biotechnology. The critical mass is concentrated in Argentina and Brazil, and it is not consistent in all the countries. However, the critical mass can be used regionally, through personnel circulation and inter-institutional cooperation initiatives.
- c) A general weakness in articulating joint activities among scientists, technologists, and innovators, despite the R&D critical mass is relatively consolidated, as we mentioned before.
- d) Despite its growth in Argentina and Brazil, the number of technology-based businesses is not large enough to attain a true business dynamics, even when considering that, globally, this activity shows a reduced business density (in comparison with other technology dynamics, such as IT). Still, there is a small business mass that will undoubtedly constitute a starting point for a more consistent development.
- e) There is a starting level business culture regarding biotechnology. However, it is relatively important in some countries, reaching an increasing social visibility thanks to some specific developments. There are scientific interest groups with a powerful influence over the definition of policy challenges. The recently launched National Science and Technology Institutes prove that a concern for technology and the marketing of biotechnological products are not the main priority of the country's scientific community.
- f) Governmental actions are emerging and growing (especially in Argentina and Brazil) in order to create agencies and institutions dedicated to R&D and to promote technology (FONCYT and FONTAR in Argentina, CGEE and ABDI, and certain actions carried out by FINEP in Brazil, for example). This means the subject is under consideration for public policies.

In countries that promote and finance relations between universities and research institutes on one hand, and private businesses on the other, the actions have been articulated by governments. Businesses have been relatively involved with the measures, especially from the technology sector.

In countries where funds are allocated to this purpose, the public sector is the main source of R&D financing. Information flow maintenance as part of the innovation system has the same funding level.

Second, biotechnology markets in MERCOSUR have two sides, one global, the other regional. This also implies a double character in its information flow and its contents:

- a) The common global demand for innovation in global health issues, such as problems with diabetes, cancer, hypertension; and, in farming areas, the development of biotechnological innovation-based production systems, such as genetically modified, drought-resistant plant varieties, greater productivity and disease/plague resistance, etc.
- b) Regional particularities, including elements from a wide range of geographical factors (specific climates and soils), which go from tropical to temperate; a wide variety of specific farming environments and human and veterinary diseases with an incidence directly related to these particularities. In all these cases there are existing biological developments of certain relevance (vegetable phyto-improvement, animal genetics, etc.)

A difference with EU flows is the importance of the organizations dedicated to the flow of genetic materials, that is, for germplasm exchange. This is particularly important in Brazil, although it is also significant for other MERCOSUR countries with great biodiversity, such as Paraguay. There is a need to develop common registers that lower the costs involved in the exchange of materials among MERCOSUR and Latin American countries, or with EU research centers.

III. MERCOSUR – European Union Comparison

The outlook on the initiatives that support or maintain information flows in the EU and MERCOSUR shows that biotechnology seems to tend towards the formation of networks as the organizational form that best adapts to this type of activity.

Thus, in both cases, information exchange initiatives show great complexity in terms of types and institutions, means of maintaining interactions and governmental actions supporting them, and personal and technological information exchange efforts that make technical, scientific, and business knowledge and information available.

Within this context, university-business-government relations are essential in order for information exchange dynamics to become more or less virtuous. In this sense, in the EU they reach better biotechnology placement platforms in the markets.

Scientific and technological production indicators in areas related to biotechnology generation, while not explicit in the studies on which this work is based upon, are

significant. They show that nowadays the EU is the third largest knowledge producer in the world. This fact makes information exchange relations more efficient.

Another very important general factor –which deserves further research– is private and mixed R&D investment (much more frequent in the EU), and its relationship with MERCOSUR (where public sector investment is more frequent).

Cluster amount and efficiency are in fact greater than in the EU, since every country, in addition to national policies, has bloc development promotion initiatives.

Clusters represent the articulation between technological poles: industrial complexes with certain geographic locations, oriented to developing technology-based businesses.

These agreements may be seen as networks (with an emphasis on geographic location), and in the case of Europe they are now highly consolidated. Information flows are central components of the poles. They keep poles open enough in order for interdependent technological activity demands to have the necessary amount of relations (between people, implicit and formal knowledge, information and data exchange, political action support, etc.) to establish a positive system dynamics seeking to improve the network's components.

The multidisciplinary character of these networks becomes evident in the case of EU flows: information flows allow the exchange of multiple types of knowledge, covering scientific, technological, and market poles. Innovation promotion policies support these arrangements, producing benefits at national and regional levels.

On a smaller scale, the same seems to be starting in MERCOSUR: a range of initiatives with different scopes (from non-existence to the real installation of technology parks) tending to mobilize a network of institutional and business capabilities. These are supported by more or less widespread policies involving university-business relations, as well as their financing and regulation.

Obviously, there are clear differences between the EU and MERCOSUR in terms of network structure and information flow, and of economic, cultural, and political results. The wide range of efforts carried out in every MERCOSUR country may be in fact a factor hampering flow efficiency. However, we must also consider that when information exists, there are obvious problems when trying to transform it into actual technology.

Fairs, conferences, consulting agencies, among others, whether oral or graphic, are more frequent and efficient in the EU. They also represent very important flows in some MERCOSUR countries, like Brazil. However, as in this case, the amount of flows may not be large enough to offer relevant results in comparison with EU results.

Generally speaking, companies' involvement in obtaining scientific and technological knowledge in MERCOSUR countries is rather low. Thus, this is a factor the BiotechSur

Platform will have to address, since R&D private entrepreneurship is essential to articulate actors in innovation networks.

A proof of this is that EU companies proactively coordinate fairs and conferences, and maintain information flows capable of creating an innovation dynamics. Personnel flow, both from the science and technology poles, is often fostered through government actions, supported by innovation-based industrial indicators.

In this sense, the nature of data and information exchanged in the EU is essential to carry out business and lead technologies towards more important markets. This proves the system is oriented towards activities related to industrial development.

Information is an implicit asset for businesses which depends on personnel interaction. Taking this into account, the volume of information and people's involvement in conferences, fairs, and personnel interaction media is something to address when seeking to install equally efficient systems in other geographic regions. This is the case of the BiotechSur Platform.

The aim of this work has not been to search for a minimum amount of business activity necessary to reach certain levels of efficiency in biotechnology creation. The role of the information flow dynamics in the EU may be related to certain "change of course", in which a minimum amount of business activities are necessary. That is: without a minimum amount of businesses, flows may exist, but they will not be active or efficient; no flow means no business creation.

This non-tautological idea shows the need for a future revision of business conditions that can make flows active and efficient and sustain a certain amount of businesses. This must be achieved in a way that the entire biotechnology creation network reaches an important dynamics from a business and industrial development perspective.

IV. Comparative Tables for MERCOSUR and the EUROPEAN UNION

European Union	MERCOSUR
Information Flows:	
<p><u>Characterization:</u></p> <p>The established relations in the European Union are basically bi-directional. New information technologies and communication prevail as the means of information flow between the different players.</p> <p><u>Conditions:</u></p> <p>The Business platforms have a focus in market information, Business Networks, and contact with government bodies. The main portions of these originate from state initiatives.</p> <p>The information Exchange manages to be centered in the diffusion of information about the opportunities of obtaining capital (risk capital, Financing with preferential rates, subsidy programs, etc.) that allow setting in motion new enterprises or the growth of existing ones. The institutions support the mutual interchange of information about the responsible politicians and the actors in the field of modern bioscience represented by the companies and research institutes (lobby).</p> <p>At the R&D platforms the flow centers on the data surrounding biotechnology. Promoted by these structures, it sustains itself in the need for transfer technology from the research centers and universities to the for-profit corporate sector. The government and the related actors in Europe in the biotechnology sector have recognized its importance.</p> <p>The formation of the clusters and the support on behalf of the EU is novel to the European technology platforms. The clusters, made up of primarily companies in addition to academic institutions are a perfect tool to guarantee the adequate information flow from academia to corporations, as well as between the corporations themselves. The state supports the authorization of networks and clusters by private initiative, for which reason the great majority of the capital is mixed.</p>	<p><u>Characterization:</u></p> <p>The degree of articulation between public research institutions and the private sector widely varies. Unidirectional relations prevail (from universities to companies). Even though in countries like Brazil, strong bi-directional ties exist between the R&D and corporate sectors, in general the links are with one or two specific institutions.</p> <p><u>Conditions</u></p> <p>These relationships depend in great measure on the size of the private companies (while the small ones lean strongly on the public sector for their routine R&D, the larger ones connect predominantly for large projects. In a complimentary way multinational corporation subsidiaries connect almost exclusively through their headquarters.</p> <p>In the majority of countries except Brazil, there are not major private initiatives to collaborate in the development of business associations. Instead, labor associations exist. Public initiatives have been recent and originate from the science and technology areas. For that reason the MERCOSUR platforms are budding, fragmented territorially, or are simply absent.</p> <p>The R&D platforms are a recent development and are in the primary stages, with the exception of Brazil where a more efficient utilization of resources and financing is sought in addition to the scientific-technological development results being more effective.</p> <p>The majority of existing capital is State capital with progress in business sectors and companies with mixed financing.</p> <p>The creation of clusters in MERCOSUR in general terms is incipient, with an intense scientific interchange and an almost exclusive predominance by the State en in the technology ventures. In Brazil the clusters stand out in the region of San Pablo predominantly from the state universities.</p>

European Unión	MERCOSUR
COMMUNION MEDIA USED FOR INFORMATION EXCHANGE	
<p>Personal contact has not lost importance, as is demonstrated in the frequency of simultaneously held meetings, congresses, and seminars, and the flow of information from a graphical point of view. However, in Europe the creation of informational data bases relevant to their players (new technologies, experts, activities of creation and distribution of scientific knowledge), is utilized through publications and, principally, by internet content.</p> <p>From the oral information point of view, the sponsorship and organization of congresses, seminars, and meetings, in some cases limited to their members, but in others also open to players not belonging to the platform.</p> <p>There is a web platform, sponsored by the European Union that makes available to interested organizations information from the projects carried out by the EU in the areas of life sciences. The Knowledge Transfer Networks, an English R&D platform, promotes, with the assistance of the internet, the virtual meetings between the players (e-conferencing).</p> <p>The R&D platform actively collaborates, as in the case of the Spanish agency Biobasque and of KTN, in the development of policies to follow for the stimulus and development of biotechnology.</p> <p>With respect to geographic scope the structures possess a primarily national or European focus.</p> <p>In the business platforms the oral information channels prevail, and are seen used as two types:</p> <ul style="list-style-type: none"> • Meetings, seminars, workshops and conferences, through which establishing direct contact between biotechnology executives, financing and venture capital groups, and government entities is sought. • Consulting and accompaniment, through which first-hand information about the national and global biotechnology market situation is offered. <p>In the event of distribution, the introduction of new products and developments prevails, besides being joined with extensive presentations and scientific and business conferences. The objective of these activities is to encourage network building.</p>	<p>Various lines of information distribution have been identified. An intense distribution of knowledge exists through the Internet, financing sources, and training procedures.</p> <p>Through implemented state policies, the exchange has been promoted through the public portals, databases, and web platforms, etc.</p> <p>Scientific publication, broadcast techniques (TV, radio, pamphlets, magazines), patents, specific seminars; conferences, special courses for companies; chats by corporate specialists to the academic sector, Project workshops, amongst others, are utilized as modes of information exchange.</p> <p>Personal contact has not lost importance. There exist regional public research centers that through the decades have built basic capacities to generate flows of information and knowledge. Various professionals trained in such centers continue associated with them (through teaching, internships, assistants, etc.) y they use them as a source for capturing young trained professionals. In general, such relationships are as effective as they are informal and only take on a contractual nature when it involves substantial developments (that in general have patent opportunities).</p> <p>In some cases, these public institutions operate as incubators of corporate development and as such keep a strong corporate-university dependency. There are- for the smallest companies- frequent cases of relations based in the use of public infrastructure, process development, etc.</p> <p>For the companies there are essentially two sources of information and knowledge supply: the weak link of the academic sector and the system of corporate relations. In the latter there are cases of importers that affiliate with one another via that method in a flow of knowledge that will be later their base of productive developments. In other cases they operate commercially with manufacturers of analysis machines that permit acquiring knowledge about reactants that later are developed locally. It is worth adding the relations of the local companies to the major multinational firms.</p> <p>In general terms the systems of communications are based in oral Communications, the distribution of technical and scientific publications are limited especially in Uruguay and Paraguay. The massive attendance at the events like seminars, congresses, and sector meetings shows the effectiveness of the strategy, that function along the same lines as proposed by the EU.</p>

European Union	MERCOSUR
FINANCING	
<p>The European structures present a type of mixed financing. The state lends support to this type of measure, fulfills the role of promoter and appoints other entities to carry out their plans.</p> <p style="text-align: center;">]</p> <p>The R&D platforms do not have an exclusively private financing. All of them either are financed directly by state institutions or by non-profit institutions.</p> <p>Congresses and tradeshow are those with the greatest number of ventures with private funding given the economic benefits generated, even though in the most important events the Government participates through sponsorship.</p> <p>The state support for the clusters is fundamentally important at the time of their founding, despite how some rely exclusively on contributions from their Partners.</p>	<p>The financing in MERCOSUR is predominantly public, with very scarce participation from the private sector.</p> <p>The structural funds of MERCOSUR contribute to infrastructure development and recently to biotechnology development in the region.</p> <p>The financing of the R&D platforms is from public sources.</p> <p>The scientific exchanges and networks are sustained by mixed financing, basically stemming in part from national contributions and from international organizations.</p> <p>The rare congresses and tradeshow connected with biotechnology basically have private financing.</p>
SCIENTIFIC EXCHANGE	
<p>There are programs that financially spur the exchange between students, especially between doctoral students.</p> <p>The international and inter sector mobility is seen as a key component, and the strong corporate participation, particularly by small and medium-sized companies, is considered an important added value.</p> <p>The improvement of cooperation between industry and university is encouraged for the purpose of research, professional development, and knowledge exchange.</p> <p>Besides, the financial assistance for the organization of scientific meetings is promoted, for which travel subsidies are offered to encourage them.</p>	<p>State institutions exist to offer backing for the formation of human resources that economically support the institutions (CONICET, CONICYT, CONACYT, ANII, CNPq, FONCyT, FONTAR, EMBRAPA, REDBIO, CAB-BIO, IICA).</p> <p>The majority of countries manifest a need for human resources training for the creation of technology platforms and the exchange between companies, R&D centers and institutions.</p> <p>Less developed countries in MERCOSUR such as Paraguay do not possess postgraduate education and their development in modern technology is incipient.</p>

The Information Flows				
Europe	Argentina	Brazil	Paraguay	Uruguay
Characterization of Flow (unidirectional o bi-directional)				
<p>The flow of information between R&D organizations, companies, and those public institutions is bi-directional.</p>	<p>The flow is fundamentally unidirectional. It flows from universities and research institutions towards companies or institutes with industrial production capability and takes the form of consultations, research exchanges, and use of library materials and/or infrastructure.</p>	<p>It is bi-directional.</p> <p>Although it is considered a bi-directional flow, that flow is influenced by the universities that lead the process of companies and research centers. They are structured as networks: a) of research: research centers with intellectual property organizations, governments and private organizations; b) of experimentation: including clinical research-principally carried out by hospitals- and the experimental fields within agriculture. That permits building and completing the requisites for the documentation of products and processes.</p>	<p>The information flow is unidirectional and with scarce exteriorization of the local information. Basically this flow prevails in the public sector.</p> <p>R&D in the private sector is practically non-existence. There are recent initiatives in non-governmental and private research centers that involve the health and agricultural sectors.</p>	<p>Flows are principally uni-directional. The prevailing information flows are those for academia and industry dedicated to problem solving.</p> <p>There is a pronounced disassociation between the productive and academic sectors. There is reduced internalization of the academic sector in the practical problems that are generated in this environment.</p> <p>The creation and setting in motion of the ANII is shortening the distance between the public and private sectors. It has the purpose of creating a favorable environment for business and a true link between academia and the private sector.</p>
Conditions of the information in each of the transfer structures				
<p>The R&D platforms and scientific exchanges concentrate on information about biotechnology.</p> <p>The business platforms have a focus in market information, creation of business networks, and contact with government bodies.</p>	<p>Substantive R&D platforms do not exist, other than a few limited cases based in public-private joint ventures for specific projects.</p> <p>There are not major private initiatives for the development of platforms for businesses. On the other hand there is greater weight from the unions in the private associations. The public initiatives are only recent and originate from the science and technology sector.</p>	<p>The prevalence of scientific exchanges is remarkable.</p> <p>The business platforms concentrate in the distribution of commercial products. The exchange network shows a tendency for state universities and regional poles.</p> <p>The flow in the platforms of R&D looks for a more efficient utilization of resources and financing.</p>	<p>There are institutions like the Institute of Health Science Research that lead the biotechnology field and that find it better positioned nationally and internationally.</p> <p>Research and service lending centers of the public universities are those that have the greatest exchange of information and service lending.</p>	<p>Even though the private universities participate, the biotechnology sector is monopolized by the UedelaR.</p> <p>A few biotechnology companies exist, private ventures with R&D needs in which there is occurring the recent phenomenon of approaching the academic sector.</p>

<p>The clusters, tradeshows, and congresses manage mixed information. In these organizations and events information, both business and scientific, is exchanged.</p>	<p>Conferences/thematic and/or institutional seminars. Additionally, there are conferences from foreign experts (at random periods)</p> <p>Rare development of temporarily outlined events.</p> <p>There are no national congresses that convene the scientific and technological community periodically. The cluster is not seen as a source of information. Improving the density of connections is still lacking in the initiatives now in play.</p> <p>Many different types exist and with very minimal development.</p>	<p>The networks produce information through media such as the Internet, industry congresses and pamphlets.</p> <p>The scientific exchanges occur in the wealth of events, congresses, tradeshows, industry meetings and seminars.</p> <p>The clusters stand out in the San Pablo region with strong prevalence by the state universities.</p>	<p>There are no biotechnology platforms. Favored initiatives exist for REDIEX and ONPEX that support the development of "clusters" (companies that work on the web, in specific geographic areas, related to the industry, product, or market).</p>	<p>A biotechnology platform exists in the Pasteur Institute that aspires to link with the national and/or regional producing sectors.</p> <p>This exchange permits updating technology, as well as the development and application of new technologies and scientific methods.</p> <p>The clusters are incipient. The National Chamber of Seeds and the Life Cluster are notable examples, oriented towards the disclosure and assistance to market activities. We highlight the participation of the Life Cluster in the creation of intellectual and industrial property.</p>
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Scope of the Information Flows

<p>The platforms generally have a regional scope. The clusters generally limit their actions to specified regions and, in some cases, countries.</p>	<p>Strong public support, almost exclusively national (with little state or province support).</p> <p>Low density networks. The relationship is directly established between the institutions. In addition, there are private networks of individuals (in some cases of high density based on their academic experience.)</p>	<p>There is a certain regionalization of networks being perceived.</p>	<p>Detailed information, databases and similar information sources are restricted to a few research centers and public sector institutes.</p> <p>There are commercial exchange chambers. But they are primarily targeted to the member partners and have limited diffusion at a societal level.</p>	<p>Strong prevalence of the public sector with privileged access for the research centers.</p> <p>In the case of the Timbó program the scope is limited to properly accredited centers.</p>
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COMMUNICATION METHODS USED IN THE EXCHANGE OF INFORMATION (GRAPHIC AND ORAL)

Europe	Argentina	Brazil	Paraguay	Uruguay
<p>Graphically speaking, the creation of databases with relevant information for their actors (new technologies, experts, educational activities and scientific knowledge diffusion) are used via publications and, primarily, via web content.</p> <p>From the point of view of oral information, there is the sponsorship and organization of congresses, seminars, and meetings, in some cases restricted to their members, but in others with open attendance.</p> <p>There is a web platform, sponsored by the European Union that to interested organizations makes available information about the projects carried out by the EU in the life science field.</p> <p>KTN (British Knowledge Transfer Networks), with the aid of the Internet, promotes virtual meetings between the players (e-conferencing).</p> <p>The R&D platform actively collaborates, as in the case of the Spanish agency Biobasque and of KTN, in the development of policies to follow for the stimulus and development of biotechnology.</p>	<p>The transfer mechanisms occur essentially through the institutional coordination of R&D groups and companies. Although other methods are recognized and can be utilized, the majority are implemented through this type of mechanism.</p> <p>The utilized methods can be enumerated as: personal contact, scientific publications, communication techniques, patents, specific seminars, special courses, for companies and talks by company specialists to the academic sector</p> <p>The INTA and the INTI rely on a policy of technological link targeted at facilitating the market acceptance of technologies.</p> <p>Few advances in the formation of R&D platforms and a disseminated collection of scientific exchange initiatives.</p>	<p>Intense communication via the Internet through knowledge portals (virtual libraries, document centers, industry information), financing source, and training courses.</p> <p>Government support for information dissemination through the congresses, seminars (presence of the key institutions is essential to achieve support, even internationally).</p> <p>The existing web platform is administered by universities and state research centers.</p> <p>The Brazilian web demonstrates the key role of the state universities in San Pablo and of other federal universities as from institutions key to biotechnology (FIOCRUZ and EMBRAPA). In Brazil there are research and/or experimenting “network groupings” that enable the building and completion of the requisites to register products and processes.</p>	<p>The information exchange instruments are effective while being low intensity due to the incipient biotechnology development and the scarce quantity of researchers.</p> <p>The exchanges are carried out basically in seminars, congresses, both national and international.</p> <p>Prevalence of oral flows over written flows. In general they are: Internet, farm days, exo-tradeshows, TV, radio, commercial and science magazines, pamphlets, and international forums.</p> <p>Scarce existence of national discussion networks or forums for a continual exchange.</p> <p>Researchers maintain institutional or personal ties with those in the region through the web o through knowledge creation.</p> <p>The public university is part of the Latin American university network with exchange both from students and teachers.</p>	<p>Seminars and congresses are used for the oral and written diffusion of scientific information</p> <p>Nevertheless, the true biotechnology professionals are practically nonexistent at a national level. The participation of the biotechnology field stands out as an integral part of the scientific-biological activity.</p> <p>The Timbó Portal allows the communication of virtual libraries, human resources, and biotechnology project information.</p> <p>There is a National System of Researchers that acts as the database available to the country.</p>

EXCHANGE STRUCTURE				
EUROPE	ARGENTINA	BRAZIL	PARAGUAY	URUGUAY
BUSINESS AND R&D PLATFORMS				
<p>Business Platforms:</p> <p><u>Conditions:</u></p> <p>Technologies are transferred from the research centers and universities to the productive business sector. The goal is the creation of new companies. The information exchange regarding the possibilities of obtaining capital that enables launching new companies or the growth of the existing ones is important</p> <p>They support the information exchange between the responsible politicians and players in the bioscience field represented by the companies and the research institutes.</p> <p><u>Integration:</u></p> <p>It includes different types of networks, associations, and forums.</p> <p>Primarily they are regional entities although there is an environment of national and supranational application.</p> <p><u>Methods:</u></p> <p>Amongst the channels, the oral ones prevail</p> <ul style="list-style-type: none"> - Meetings, seminars, workshops and conferences between companies, agents, financiers, and government entities. - Consulting and accompaniment, information is offered about national and international sector markets. <p>The channels of written information concentrate principally in information from entities or from industry</p>	<p>Business Platforms:</p> <p>There is an acceptable flow of information between the public and private spheres, but there remain only tenuous links between the specific private established companies. This is compatible with the scarce density existing in the private agreements where, in exchange, it is customary to have developments in exclusive fields and with little subcontracting.</p> <p>In the public sphere there are no wide-reaching, strategic, and long-term public policy initiatives based on a limited number of projects that target establishing environments for massive exchange of technology information.</p>	<p>Business Platforms:</p> <p><u>Conditions:</u></p> <p>There is a strong state initiative to promote business. Although considered a bi-directional flow, it is influence by universities that lead the process of companies and research centers.</p> <p><u>Integration:</u></p> <p>There are organizations whose objective is to integrate Biominas, FAP's and Finep (Ministry of Science and Technology) in foundations that fulfill this role from actions of securing financing and that supply market information.</p> <p><u>Methods:</u></p> <p>Channels of oral information, seminars, tradeshow, common interest groups</p> <p>Written information channels: the FINEP and BIOMINAS sites</p> <p><u>Financing:</u></p> <p>The majority comes from state</p>	<p>Business Platforms:</p> <p>They do not exist.</p> <p>The government, through the Minister of Industry and Commerce, put in place the National Plan of Exporting, whose actions will be focused on: i) joint development between the public sector, private sector, and universities; ii) communicate the decisions, advances, barriers, and results; and iii) coordinate programs that stimulate exports.</p> <p>The investment and export network seeks to create spaces for "strategic dialogue" through the Internet and written publications.</p>	<p>Business Platforms:</p> <p>They are practically non-existent.</p> <p>Presently the ANII is implementing associating mechanisms between academia and the private sector.</p> <p>Recently biobusiness initiatives are being implemented with various cluster participation:</p> <ul style="list-style-type: none"> - the Life Sciences Cluster together with the participation of private players. - the OCTANTIS Group, - the group OCTANTIS, business strengthener from the Alfonso Ibáñez University, together with the ORT, Emprender, PacPymes and the Life Sciences Cluster. <p>R&D Platforms</p> <p>Recent development and in the early stages.</p> <p>Infrastructure and the execution of some projects is shared.</p>

<p>studies, both general and specific of a certain subsector. Another written method is that of databases from the participating players.</p> <p><u>Financing:</u></p> <p>The large majority come from state initiatives.</p> <p><i>The demand and increase in player participation as well as the importance of technology transfer are clear signals of their success and need for their creation.</i></p> <p>R&D Platforms:</p> <p><u>Conditions:</u></p> <p>The information flow is relevant to the scientific and applied science research. It is a knowledge diffusion tool targeted not only at the scientific world but also to the public and private bodies interested in its commercialization as well as in the development of policies for the furthering and development of information flow.</p> <p><u>Integration:</u></p> <p>They take different structures of action such as networks, forums, furtherance foundations, governmental agencies, associations or simply tools (online databases).</p> <p>The geographic scope is generally national or European. Except for some that are financed with the member contributions the majority rely on the support of governmental institutions.</p> <p><u>Methods:</u></p> <p>The information channels are similar to the business platforms. It is important to point out the virtual meetings between the players that promote the KTN.</p> <p><u>Financing:</u></p> <p>In general these platforms have been initiated by some government body at a country or regional level.</p>		<p>funds.</p> <p>The importance of FINEP and FAPESP stands out and they are developing networks of initiatives similar to the FAP's.</p> <p>BNDES has a technology fund that has increasing importance and resource backing.</p> <p>R&D Platforms:</p> <p><u>Conditions:</u></p> <p>There are robust platforms with an emphasis on sciences. Scarce development of inventive activities and innovation.</p> <p><u>Integration:</u></p> <p>Companies rely on the initiatives of "industry technology associations" that also act like platforms (ANPEI, PROTEC) that promote the integration of industrial information and interests.</p> <p><u>Methods:</u></p> <p>Information media is in course, including courses in technology project development and in information about financing of research and development.</p> <p><u>Financing:</u></p> <p>The financing is realized with resources of the participating companies. Other types of state financing are unknown.</p>		<p>They are of public origin (UdelaR, IBCE, INIA) and with less participation from the mixed sector (LATU, Pasteur Institute).</p> <p>The financing comes from public and mixed capital, with less participation from the latter.</p>
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EXCHANGE STRUCTURE

EUROPE	ARGENTINA	BRAZIL	PARAGUAY	URUGUAY
CONGRESSES, SEMINARS AND TRADE SHOWS				
<p><u>Conditions:</u> Introduction of new product and development combined with introductions of scientific conferences and businesses.</p> <p>The objective is to spur network formation between companies, research institutes, associations, political decision-makers and investors, thereby promoting a mutual synergy.</p> <p>At these events, employment bureaus are organized that enable attendees to contact with the company representatives. The databases specially implemented for these events play an important role.</p> <p><u>Financing:</u></p> <p>The organization is composed of large companies, national and supranational players, institutions and associations for their diffusion and securing of financing means.</p> <p>There are strictly private events intended to identify and set in motion associations between companies. Generally the participation is conditional on membership dues. In general the events are held annually.</p> <p><i>The opportunities for exchange of relevant technical information are proven by the increased number of visitors, lecturers and participants to these events.</i></p>	<p><u>Conditions:</u> Introduction of the structure and functionality of the initiatives that sustain the "supply" scheme of the scientific, technological, and economic information upon which the local biotechnology operates.</p> <p><u>Financing:</u></p> <p>Seminars and conferences are carried out but without revolving about one series of periodic substantive events as might occur in other disciplines.</p> <p>At a public level, there is a strong presence by the approaches of CTI and slight participation from the production and financial industries. At the private level the initiatives still have a strong union tone and less focus towards affiliations under the logic of generating/distributing/developing "Club goods" (also known as collective goods)</p> <p><i>As in other countries the communication through events is considered effective.</i></p>	<p><u>Conditions:</u> The creation of networks with varying intensity connection is fostered by promotional events in congresses and seminars. Similar to the EU, the nature of the information exchanged focuses essentially on business and market information, as well as information about new products and technologies (R&D).</p> <p><u>Financing:</u></p> <p>Biotechnology events are generated by governmental institutions. FIOCRUZ leads in the biomedical sector and EMBRAPA in the agricultural sector.</p> <p><i>The massive attendance to different sectors' events shows the effectiveness of the strategy that works in the same line proposed by the EU.</i></p>	<p><u>Conditions:</u> Disclosure of project results. The introduction of products is incipient as regards R&D. Instead it is more a consumer of biotechnology events.</p> <p>The benefits and offerings of biotechnology products are introduced in tradeshows and fairs. Ex, "Farm Days" plant breeders show in situ the characteristics of materials; "polytechnic tradeshows" for biotechnology products, etc.</p> <p><u>Financing:</u></p> <p>The private sector leads biotechnology events promotion with limited participation of the public sector. However there have been recent government initiatives.</p> <p><i>These events are being held periodically with high impact results. They keep growing in importance and in quantity of attendees.</i></p>	<p>The performance of scientific events is almost non-existent with respect to biotechnology specifically.</p> <p><u>Conditions:</u> The content of these is of academic nature without the intervention of companies, employment bureaus, Consulting firms, private companies, entrepreneurs or bio-businesses for technology transfer.</p> <p>Written material is discussed with high predominance of oral exchange.</p> <p>There are indicators of changes since the completion of the FIA forum in 2008, which addresses topics related to policy and bio-businesses.</p> <p>Nevertheless, the emphasis depends on the program that is carried out in each conference, since it is not specific to each biotechnology field.</p>

EXCHANGE STRUCTURE

EUROPE	ARGENTINA	BRAZIL	PARAGUAY	URUGUAY
CLUSTERS				
<p><u>Conditions:</u> They function as network promotion sources among their participants.</p> <p>It is in these networks internal to the clusters where the active exchange of information occurs, as much scientific as business related (market analysis, economic reports, databases for teams and laboratories).</p> <p>These are made up primarily by companies and academic institutions.</p> <p><u>Methods:</u> They behave like depositories and distributors of information gathered and analyzed by their members through graphic media (publications, databases, Internet) or oral events (congresses, seminars, meetings, etc.).</p> <p><u>Financing:</u> Diverse funding sources. The government support is important even though some rely only on the exclusive contributions of their members.</p> <p>In general state intervention is important in the beginning even though there are cases stemming from exclusively private initiatives.</p>	<p><u>Conditions:</u> There are a few (though forcing the definition) limited to recently spurred developments (the case of Polo Biotechnology of Rosario; closely associated with the UNL; the original developments in Córdoba and others).</p> <p>Few are made up by companies and by public and private institutions,</p> <p><u>Methods:</u> Personal contact between the personnel of the groups, Exchange of scientific publications, diffusion techniques, patents, and special documents.</p> <p>Exchange in specific seminars, conferences, special courses for companies, talks to the academic sector by specialists from companies.</p> <p><u>Financing:</u> Basically the start-ups are supported by the state.</p>	<p><u>Conditions:</u> There is an intense scientific exchange at the center of the universities.</p> <p><u>Methods:</u> All the institutions include Internet diffusion as a mass media.</p> <p>There is a clear tendency towards the creation of mixed companies propelled by the state.</p> <p><u>Financing:</u> The professional associations rely on financing from their own members for the diffusion of their event, regardless of the fact that that the state supports all types of start-up ventures.</p> <p>As in the EU state support prevails and the nature of the information is knowledge.</p>	<p><u>Conditions:</u> There are commercial exchange chambers that are national clusters promoting the business of their members.</p> <p>The information flow between the commercial Chambers and the R&D centers is limited.</p> <p>To better focus efforts, the creation of six sector committees were considered to improve export competitiveness.</p> <p>Every committee is presided over by a private sector representative and is composed of public and private institutions and the universities that are directly related to the industry.</p> <p>There are projects co financed by the PNE directed towards the intelligence and market surveys, tradeshow participation, product adaptation, and other matters related to the exporting effort of companies.</p> <p><u>Financing:</u> There is a prevalence of state financing in the cluster ventures, which are very limited.</p>	<p><u>Conditions:</u> Incipient development</p> <p>Of note:</p> <ul style="list-style-type: none"> -Life Sciences cluster as site for the policy and organizational discussion. - Audebio as association of the companies tied to biotechnology <p>In the agriculture industry, the Uruguayan Chamber of Seeds, wine producers, and rural farming committees stand out for being tied primarily to business, political, and country branding strategies.</p> <p>Although these associations have a great tradition in the country, the specific activity tied to biotechnology within the industry is very limited.</p> <p><u>Financing:</u> The clusters have a practically private financing through the ventures of small- and medium-sized companies.</p>

EXCHANGE STRUCTURE				
EUROPE	ARGENTINA	BRAZIL	PARAGUAY	URUGUAY
SCIENTIFIC EXCHANGE				
<p><u>Conditions:</u> They promote the exchange of knowledge and information based on scientific experience oriented towards R&D. The transnational and inter-industry mobility is seen as a key element with a strong participation from companies, in particular the small- and medium-sized companies.</p> <p><u>Methods:</u> The methods utilized are graphical (Publications, Internet, press releases) or oral (conferences, events, direct contacts, etc.).</p> <p><u>Financing:</u></p> <p>There are different programs in the European Union or countries that:</p> <ul style="list-style-type: none"> -support financially the exchange of students, in particular doctoral candidates. -contribute financial aid for the organization of scientific encounters such as through travel subsidies. -encourage the improvement of cooperation between industries and universities for the research, professional development, and exchange of knowledge. 	<p><u>Conditions:</u> There are institutions of economic support (CONICET, etc.) for the professional training of human resources.</p> <p>The interaction and collaboration have grown between the knowledge creators, their adaptors, and marketers.</p> <p>The relations with the International setting refer to the contacts in academic situations of the professional that operates in such institutes and/or companies.</p> <p>The limited nucleus of multinational enzyme supplier companies import products supplying local users with information.</p> <p><u>Financing:</u></p> <p>Almost all the studied companies and/or institutes have a long-standing link with the public instruments dependent of the current MINCYT through the FONTAR and FONCYT.</p> <p>Such programs sustain some "leaps" in infrastructure at the same time that they are essential for the development of certain projects. Something similar is occurring with the CONICET programs.</p>	<p><u>Conditions:</u> There is a training network at a national level composed of institutions devoted to the research and organizations created to support professional development.</p> <p>There is a clear advance in the university-company relations, supported by the education of human resources.</p> <p><u>Methods:</u></p> <p>Scientific information Networks (CNPq, BIREME).</p> <p><u>Financing:</u></p> <p>The state and the mixed financing promote the disclosure of results and the human resources training. There is participation in international projects supported by the EU.</p>	<p><u>Conditions:</u> Fluid exchange by professors and students, generated by almost all the academic departments of the public and private universities.</p> <p>We can mention: Grupo Montevideo, Red de Universidades Públicas, CABBIO, AMSUD, CYTED, RELAB and others in the region.</p> <p>There are thematic networks with participation from researchers in the EU framework programs. Institutions with R&D capability and laboratories recently have linked with companies and only for specific projects. .</p> <p><u>Financing:</u></p> <p>CONACYT will grant short-term scholarships specifically to doctoral candidates. The scientific meeting initiatives are carried out and financed by scientific associations. The state institutions support by paying the tuition of their employees.</p>	<p><u>Conditions:</u> Execution of programs that finance doctoral candidates and short term internships with countries in the EU and USA.</p> <p>There is an exchange of professors and support for the countries in the region for human resources training.</p> <p>It participates in EU projects and with other MERCOSUR countries, despite still being in too early a stage be able to measure the impact.</p> <p>The public training systems function like incubators where young professionals are captured that can be inserted into the private sector.</p> <p>They operate like incubators of venture developments and as such keep a strong company-university dependency.</p> <p><u>Financing:</u></p> <p>The financing comes from international cooperation.</p>

FINANCING

EUROPA	ARGENTINA	BRASIL	PARAGUAY	URUGUAY
<p>The European structures have a mixed financing. The government lends support to this type of measures, plays a promotional role, and entrust the execution of such measures to other institutions.</p> <p>The European R&D platforms described herein do not have exclusively private financing. All of them are either financed directly by state institutions or by non-profit institutions.</p> <p>Congresses and tradeshows are the areas that have the greatest quantity of initiatives with private financing given the economic benefits generated; though the most important ones receive government sponsorship.</p> <p>The state support to the clusters is vitally important at the moment of its establishment, although some rely only on members' contributions.</p>	<p>Financing constitutes one of the principal limits to the development of R&D activities. In the Science and Technology Fund, FONCYT that finances the academic research, biotechnology projects represent more than 17%. In the Argentine Technology Fund, FONTAR, that funds innovating start-ups at a corporate level, a precise estimation cannot be made since a classification that includes the biotechnology field as such is not made. But the percentage of resources that go to this type of activity for the fields of agriculture and livestock, foods, and beverages, and chemical substances is of considerable importance. There is state financing (in the case of Argentine in the MINCYT); there is private sector cooperation. The public sector prevails while private sector participation is lacking.</p>	<p>The relations between institutions enable establishing the type of financing that exists in the networks, as in the genome projects.</p> <p>A strong push in biotechnology can be observed from the public sector. The financing is mixed, in spite of prevalence by the public sector. There is support from Brazil for the countries in the region for training in different knowledge fields. Scholarships and exchanges, as well as financing the participation by regional researchers in forums, congresses, and seminars. Since 1999 the financing system is strengthening. FINEP: Industry funds, Project INOVAR, Program Juro-Zero, Sibratec, PROGEX Prime, economic programs subsidizing innovation, BNDES: FUNTEC, FAP's, Innovation programs at small companies, technology innovation programs in companies, etc.</p>	<p>Research centers and scientific institutions are financed by the state and are within the universities.</p> <p>There are two exceptions in the private sector; one for agriculture and the other for research in biology sciences.</p> <p>Through the CONACYT the state finances projects with strong application and innovation components with local compensation.</p> <p>The congresses, seminars and updating conferences take place principally with private funding, although the academic centers contribute with the entry fees of their officials.</p>	<p>There is a pronounced state prevalence observed with mixed financing in select cases.</p> <p>Cooperation via programs such as the PDT and the FOCEM fund presently centralized through the ANII.</p> <p>For the business platforms that are practically non-existent there are financial agents, in great part from public capital.</p> <p>The financing sources for the R&D platforms are of public origin.</p> <p>The scientific exchanges and networks are sustained by mixed financing, basically by a contribution national and another part by international organizations.</p> <p>The rare congresses and tradeshows related to biotechnology count on financing that is basically private.</p> <p>The clusters have practically private financing through the ventures of small- and medium-sized companies.</p>