

& Innovation partnership

# White book for EU-LAC

## **Research and Innovation**

## cooperation in ICT

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### 1 Introduction

The **LEADERSHIP project** supports the evolving dialogues on European and Latin American research and innovation (R&I) cooperation in ICT by providing input to bilateral and bi-regional dialogues on Science, Technology and Innovation, thus ensuring continuity and enhancing collaborative ICT R&I in Horizon 2020 and other programs. To support dialogues and partnership building for ICT cooperation, LEADERSHIP focuses on action-oriented dialogues and well-targeted capacity-building events that stimulate innovation and engagement, as well as on providing input on key aspects that contribute to enhance EU-LAC cooperation in ICT. To this purpose, the project has elaborated the following documents:

- **Report on ICT R&I Priorities in LAC**: identifying ICT R&I priorities in LAC, assesses their alignment with the ICT priorities of the EU R&I programme Horizon 2020 and thus explore common areas for future EU-LAC cooperation in ICT R&I;
- **Input Papers on Digital Agendas**: presenting an analysis of the Digital Agendas in Latin America vis-à-vis the Digital Agenda for Europe;
- **Input Paper on Funding Mechanisms**: mapping of Latin American Programs and Financing Mechanisms that support International Cooperation in ICT R&I describing access to funding programs and recommendations; and
- **Input Paper on ICT Regulations**: identifying indicators, tools and methodologies to measure the gaps and distance to an efficient Regulatory and Institutional Framework in LAC.

All these documents feed the LEADERSHIP **"White book for EU-LAC Research and Innovation cooperation in ICT".** The white book provides analytical input supporting policy dialogues on EU-LAC cooperation in ICT. It **synthetizes the knowledge and results** produced in the elaboration of the above documents and **highlights main findings and recommendations** to enhance collaborative ICT R&I between Europe and Latin America, based on common interest and mutual benefit.

The content included hereby has been produced by the LEADERSHIP consortium (see <u>www.leadershipproject.eu</u>) along with the support of the LAC-ICT Expert Group and relevant ICT stakeholders and decision makers that were consulted. Findings and recommendations provided throughout this document are an initial step to build an integrated overview of the complex and fragmented LAC ICT landscape which should be further updated by respective country policy makers and experts.



## 2 Landscape to EU-LAC R&I cooperation in ICT

To support dialogues and partnership building for EU-LAC research and innovation cooperation in ICT, it is firstly necessary to understand the complex and fragmented ICT landscape of the LAC region. To this purpose, the LEADERSHIP project has approached this challenge by firstly identifying LAC ICT R&I priorities and assess their alignment with the ICT priorities of Horizon 2020. In parallel, the LEADERSHIP consortium analysed the Digital Agendas of Argentina, Brazil, Chile, Colombia and Mexico, identifying connections with the Digital Agenda for Europe that could lead to potential synergies between both regions. As a result of these tasks, top 10 ICT R&I priority areas were identified and an overview of Digital Agendas, National Digital Strategies or Development plans of the LAC region was provided, identifying common key factor for success and challenges faced by LAC governments in the implementation of ICT policies.

As a next step, LAC ICT regulations were analysed to comprehend how ICT priority setting is framed and how the regulatory frameworks work. To this purpose, the LEADERSHIP consortium identified indicators, tools and methodologies to measure the gaps and distance to an efficient Regulatory and Institutional Framework in LAC. As a result of this task, a set of ICT regulatory areas of strategic interest were identified under three different perspectives: a) Sectorial Regulations, b) S&T Regulations, and c) Industrial Regulations.

Finally, after having an understanding of LAC's Digital Agendas and ICT regulatory framework and policies, the LEADERSHIP consortium performed a mapping of Latin American Programs and Financing Mechanisms that support International Cooperation in ICT R&I describing access to funding programs. As a result, a total of 122 programs were identified as relevant for the scope of the LEADERSHIP partnership, from the total, 54 are explicitly open to Europeans amounting US\$ 6.8 billion.

In the sections below, you will be able to find main findings and results of each of the above mentioned steps to comprehend the LAC ICT Landscape.

#### 2.1 ICT R&I priorities

In order to explore potential areas for future cooperation in ICT R&I between Latin America and Europe, the LEADERSHIP project identified ICT R&I priorities in Latin America and assessed their alignment with the ICT priorities of the EU Research and Innovation programme Horizon 2020. For this purpose, an online survey was conducted from 16 June to 15 July 2014. The questionnaire was answered by a total of 523 relevant stakeholders across Latin America, covering Argentina, Brazil, Chile, Colombia and Mexico, and additionally other countries of the region such as Uruguay and Costa Rica. Respondents of the survey belonged to Universities and research centres (56%), followed by the industry (23%) and government institutions (13%). They represent both large and small and medium size organisations, including SME, with a clear research profile. The great majority of respondents (82%) were currently involved in R&I activities, mainly in the areas of future internet; content



technologies, including ICT platforms for learning and inclusion; health and components and systems. Overall, the majority of respondents belonged to R&I performing organisations, dedicating more than 10% of their budgets and full-time employees to R&I activities.

Findings from the survey showed that international cooperation is becoming a crucial element for the implementation of R&I policies in Latin America. More than half of the survey respondents have participated in R&I international cooperation initiatives, including projects funded by European programmes like FP7, and the experience of Latin Americans in participating in previous EU-funded projects has been assessed as positive. Furthermore, half of respondents, in particular in Colombia, Argentina and Mexico, were planning to participate in R&I projects under Horizon 2020 programme.

It is clear that Horizon 2020 represents a great opportunity for EU-LAC cooperation in R&I since it is open to participation from across the world. Although cooperation is open to any topic through Horizon 2020 work programmes, identifying priority topics of common interest and mutual benefit is crucial to stimulate ICT R&I cooperation between Latin America and Europe.

The results of the survey underline the relevance of ICT for societal challenges in Latin America, such as ICT for inclusion, efficient energy and health. The data also indicates that other ICT priorities are topics related to Future Internet, content technologies and cybersecurity. In summary, the **top 10 ICT priorities** to enhance research and innovation cooperation between Latin America and Europe are the following:

- **ICT-enabled open government:** smart and mobile public services, open data and services, Pro-active and personalised citizen-centric public service applications, data mining.
- **ICT platform for Learning and Inclusion:** education and training, e-Inclusion and e-Accessibility.
- **Technologies for better human learning and teaching:** adaptive solutions, learning analytics, augmented reality, mobile learning.
- Advanced ICT systems and services for Integrated Care.
- Digital representation of health data to improve disease diagnosis and treatment.
- Smart Cities and Communities solutions integrating energy, transport, ICT sectors: nearly zero or low energy districts, integrated infrastructures, sustainable urban mobility.
- **Big data:** novel data structures, algorithms, methodology, software architectures, optimisation methodologies, data analytics, data quality.
- **New ICT-based solutions for energy efficiency:** smart meters, smart plugs, social media, micro-generation.
- Cybersecurity, Trustworthy ICT.



• Advanced Cloud Infrastructures and Services: high performance heterogeneous cloud infrastructures, federated cloud networking, dynamic configuration, automated provisioning and orchestration of cloud resources, automated discovery and composition of services, cloud security, innovation platforms for trusted cloud systems.

Based on the findings of the survey it is evident that priorities of common interest exist in Latin America for ICT research and innovation which are further detailed throughout section 2.2. Digital Agendas and section 2.3 ICT Regulations.

The priorities identified in the LEADERSHIP survey are aligned with the European R&I priorities defined in Horizon 2020 Work Programmes 2014-2015, specifically under Leadership in enabling and industrial technologies – ICT and Societal challenges pillars. This creates solid bases for future cooperation between EU and LAC in ICT R&I.

#### 2.2 Digital Agendas

The work carried out on the Input Paper on Digital Agendas builds on top of results obtained in the LEADERSHIP survey to identify ICT R&I priorities, by performing an analysis of Latin American Digital Agendas vis-à-vis the Digital Agenda for Europe in order to identify potential synergies between both regions and continuing the EU-LAC policy dialogue on ICT.

In the context of international cooperation between Europe and Latin America, a number of projects have been supporting this on-going policy dialogue. Projects such as <u>PRO-IDEAL</u>, <u>PRO-IDEAL</u> <u>PLUS</u>, <u>FORESTA</u>, <u>FIRST</u>, <u>AMERICAS</u>, and currently <u>LEADERSHIP</u> and <u>CONECTA2020</u> have contributed significantly to the development of an EU-LAC research community in ICT and e-Infrastructures, as well as to the coordination of national and international funding mechanisms, agencies and stakeholders. Other – more general – projects also support the biregional political dialogue in ICT, such as <u>ALCUE NET</u>, the four bilateral projects with Argentina, Brazil, Chile and Mexico, as well as the <u>ERANet-LAC</u> project. As a result, the connections between both regions at all levels have increased significantly.

Although there is not an explicit chapter for the international aspects inside the LAC Digital Agendas, the governments, universities, large companies and SMEs, as well as start-ups are currently fostering international cooperation activities on ICT in different sectors and industries.

According to the analysis performed, for most countries, international cooperation is important for the country global positioning, which is also reflected in the Digital Agendas. For example, from a global point of view, the orientation of Chile's Digital Agenda or Mexico's National Digital Strategy is considered a world international positioner for the country. Similarly, the vision of Colombia is to position the country as a world leader in the use and development of applications and digital content with social impact and to work with international projects. Also in Uruguay there is a strategic plan about international insertion.



Latin American governments have employed important efforts in the past years to increase resources and establish ICT strategies and Digital Agendas. Building proper mechanisms to follow up the implementation of the agendas, is currently a challenge for all countries given the fact that preparing a one and only document containing the ICT Policies, action plans and goals could have differences on each change of government. There is a discussion upon how to avoid losing all efforts and follow up the implementation activities despite the changes in the government administrations and officials.

Finally, another point suggested by consulted experts, highlights the importance of including the citizens, industry and universities in the elaboration and implementation of Digital Agendas and digital policies.

#### 2.3 ICT Regulations

The study of LAC ICT Regulations allowed to define a prospective and convergent ICT frame of reference to identify ICT trends, ICT indicators and ICT indexes globally and across the EU and LAC measuring the gaps and distance in the development of the ICT sector between the two regions.

According to the analysis performed, the long-term evolution of technologies, technological progress and the phenomenon of convergence in the provision of telecommunications services are factors that marked both the dynamics of the ICT sector and the schemes of State intervention to ensure efficient delivery of ICT public services to end users in the LAC region.

Having built up a framework of analysis, a benchmarking of the LAC ICT R&D Regulations was conducted. As a result, a set of ICT regulatory areas of strategic interest were identified, both to orient and promote ICT R&I, and to create appropriate conditions for strengthening international cooperation. The results were shared and validated with the Regulations Working Group experts and transformed in an online questionnaire in order to have insights and prioritizations from key stakeholders and additional experts from LAC.

Building on a convergent and prospective vision of ICT, and consolidating the expert opinions, a set of priorities were detected from Latin America perspective to **orient and promote research and innovation in ICT**: Related to **Sectorial Regulations**; Access and Interconnection, Consumer protection & empowerment and Cyber security are priority ICT regulatory areas. Currently, these areas are also frontline issues in the ICT regulatory agenda in Europe. Additionally, from **S&T regulations perspective**, Data protection, Software & IT sector incentives as well as Intellectual property are priority ICT regulatory areas. Finally, from the **Industrial regulations point of view**; Knowledge & technology transfer, Industrial strategic vision and Internet mass use are priority ICT regulatory areas.



#### Figure 1: Prioritization of LAC ICT regulatory areas of strategic interest

REGULATORY FRAMEWORK OF ICT IN LATIN AMERICA					
Prioritization of areas of strategic interest that would:					
	orient and promote research and innovation in ICT	create appropriate conditions for strengthening international cooperation			
SECTORIAL REGULATIONS	<ol> <li>Access and Interconnection</li> <li>Consumer protection</li> <li>Cybersecurity</li> </ol>	<ol> <li>Access and Interconnection best practices</li> <li>Market regulation best practices</li> <li>Consumer empowerment</li> </ol>			
S&T REGULATIONS	<ol> <li>Data Protection Regulation</li> <li>Software and IT sector regulatory incentives</li> <li>Intellectual Property Regulation</li> </ol>	<ol> <li>IT research promotion</li> <li>IT education incentives</li> <li>Security and privacy</li> </ol>			
INDUSTRIAL REGULATIONS	<ol> <li>Knowledge and technology transfer</li> <li>Prioritization and industrial strategic vision</li> <li>ICT and Internet mass use</li> </ol>	<ol> <li>ICT in education (e-education)</li> <li>ICT in health (e-health)</li> <li>ICT to promote Small &amp; Medium Enterprises</li> </ol>			

Source: CINTEL, based on the responses of ICT regulation experts to the LEADERSHIP online questionnaire.

On the other hand, in order to **create appropriate conditions for strengthening international cooperation**, priorities on **sectorial regulations** are: access and interconnection best practices; Market regulation; and consumer empowerment. **Respecting to S&T**, topics that would strengthen cooperation are oriented to: IT research promotion; education incentives; and security and privacy. Finally, on **industrial perspective**, ICT in education, ICT in health and ICT to promote SME, are the three priorities to reinforce international cooperation.

#### 2.4 Funding Mechanisms

The study on LAC Funding Mechanisms provided a mapping of the main programs and financing funds supporting international cooperation in ICT R&I in Argentina, Brazil, Chile, Mexico, Colombia, Costa Rica and Peru. It also identified complementary funding mechanisms for cooperation with Europe in ICT R&I and reviewed access for European researchers of LAC programs and funding mechanisms, in terms of their eligibility and reciprocity.

As a result, a total of 122 programs were identified as relevant for the scope of the LEADERSHIP partnership, 54 are explicitly open to Europeans (44%), while 32 do not specify whether they are open to foreign nationals (26%), and 36 (30%) are restricted to local country nationals.

When studying funding amounts, total funds budgeted for ICT research in the countries under study approximate US\$20.5 billion per year. Of this amount, US\$ 6.8 billion (or 33%) comprise funds that explicitly indicate European researchers' eligibility. On the other hand, US\$ 10.0 billion (or 49%) comprise research funds that do not clearly state the national eligibility of applicants, while US\$ 3.0 billion (or 15%) pertain to research funds targeted only to researchers that are local country nationals. While it is understood that this information might not be



complete, the breakdown of categories by country provides some indication of the comparative emphasis set by each Latin American country in putting forward cooperative funding mechanisms with Europe.

Country	Total Funds	Funds with European eligibility		Funds not specifying national eligibility		Funds targeted to local country nationals	
		Total	Percent	Total	Percent	Total	Percent
Argentina	\$ 165.16	\$ 33.94	21%	\$ 34.07	21 %	\$ 97.14	59 %
Brazil	\$ 16,283.37	\$ 4,923.65	30 %	\$ 9,817.60	60 %	\$	9 %
						1,524.12	
Chile	\$ 173.13	\$ 171.56	99 %	\$ 1.57	1 %	\$ 0.00	0 %
Colombia	\$ 1,126.92	\$ 1,091.85	97 %	\$ 5.86	1 %	\$ 29.21	3 %
Costa Rica	\$ 78.71	\$ 0.00	0 %	\$ 42.27	54 %	\$ 36.45	46 %
Mexico	\$ 2,597.87	\$ 626.72	24 %	\$ 29.79	1 %	\$	75 %
						1,323.11	
Peru	\$ 31.13	\$ 0.00	0 %	\$ 29.79	96 %	\$ 1.34	4 %
Total	\$ 20,456.29	\$ 6,847.706	33 %	\$	49 %	\$	15 %
				10,023.00		3,029.37	

Figure 2: Latin America Total Funds by Geographic Eligibility (in US\$ million)

Source: Telecom Advisory Services analysis

As data indicates, some specific patterns of collaboration with Europe across Latin American countries emerge. Chile, and Colombia appear to have a large portion of program funds eligible to European researchers. On the other hand, the reverse is the case for Argentina, Mexico, Peru and Costa Rica, where a high percentage of program funds are only eligible for local country nationals. Brazil is a special case. Despite the fact that only 30% of surveyed program funds are eligible for European researchers, the total size of ICT funding makes the amount available to promote European collaboration to be fairly sizable (US\$ 4.9 billion) among the countries studied.

Overall, the main funding areas for European researchers are basic and applied research, technology modernization, ICT assimilation by the productive sector, regional economic development through promotion of clusters, entrepreneurship and start-up funding.

Beyond the national programs, there are three types of complementary funding mechanisms promoting cooperation between Latin America and Europe regarding ICT research and innovation:

- International funding mechanisms: funding programs sponsored by multilateral institutions aimed at promoting cooperation between Europe and Latin America;
- Bilateral agreements: funding agreements signed between specific European and Latin American countries aimed at promoting cooperation in ICT research; and
- Latin American funding programs open to European researchers: funding programs sponsored by Latin American institutions (public and private) open to European researchers.



## 3 Recommendations for EU-LAC R&I cooperation in ICT

In addition to the main findings and results described in the above sections, the analysis performed by the LEADERSHIP consortium on ICT R&I priorities, Digital Agendas, ICT Regulations, and Funding Mechanisms in the LAC region, aimed to provide recommendations to strengthen and enhance R&I cooperation in ICT between Latin America and Europe. To this purpose, a number of recommendations are proposed for the ICT Working Group (WG) of the EU-CELAC<sup>1</sup> Senior Officials Meeting (SOM) and the European Commission in order to contribute to the policy dialogue on Science, Technology and Innovation at a bi-regional level; as well as to LAC governments, agencies and regulatory bodies committed in creating the proper conditions to enhance EU-LAC cooperation in ICT R&I.

#### 3.1 ICT R&I priorities

The recommendations from the LEADERSHIP survey on ICT R&I were provided by respondents of the questionnaire with the overall objective to enhance EU-LAC cooperation in ICT R&I.

The results of the survey conducted by the LEADERSHIP project showed that Europe and the Horizon 2020 programme are perceived in Latin America as a great opportunity for future cooperation between both regions in the field of ICT. However there are still important barriers for Latin American participation in Horizon 2020 such as lack of access to information about EU programmes, difficult access to funding for LAC participants, and lack of experience in participating in EU projects. The lack of calls targeting Latin America was also considered as an obstacle to participate in ICT R&I cooperation projects between Europe and Latin America.

Some recommendations provided by respondents to enhance EU-LAC cooperation in ICT R&I are framed within current actions undertaken by LEADERSHIP project as to facilitating access to key information about H2020 work programme and calls, networking activities to find partners, and fostering engagement of LAC countries to fund R&I cooperation with Europe. In addition, there is a general agreement on the need of enhancing the ICT policy dialogue and selecting ICT priorities for R&I cooperation between Latin America and Europe.

#### 3.2 Digital Agendas

The recommendations of the Input Paper on Digital Agendas are intended to provide a contribution to strengthen and improve the coordination of the Latin American Digital Agendas, thus enhancing ICT cooperation between Latin America and Europe.

<sup>&</sup>lt;sup>1</sup> CELAC - Comunidad de Estados Latinoamericanos y Caribeños



The first set of recommendations addressed to the **EU-CELAC SOM ICT Working Group** is to take advantage of the discussions on digital agendas and ICT strategies in Latin America carried out by the LAC-ICT Expert Group set up by the LEADERSHIP project, and to share the SOM ICT WG's views on digital agendas in Latin America to explore their roles in the context of the evolving EU-LAC policy dialogue; to follow up the evolution of Latin America Digital Agendas, deepening the comparative analysis of the digital agendas of Argentina, Brazil, Chile, Colombia, Mexico, Costa Rica, Peru and Uruguay in order to align Latin American national strategies in ICT; as well as to promote areas of common interest for EU-LAC cooperation in ICT R&I (i.e. those priority areas and topics identified by the LEADERSHIP project and validated by the LAC-ICT Expert Group).

In addition, it is recommended to explore the possibilities of the SOM Energy and Health thematic working groups to jointly or transversally develop proposals for pilot activities together with the ICT WG. The relevance of energy and health to tackle Societal Challenges in Latin America has been underlined by the LEADERSHIP survey and also topics related to energy efficiency are partially addressed by Digital Agendas of Brazil, Colombia and Mexico.

Recommendations addressed to **Latin American Governments/ICT Agencies** suggest updating priority areas for ICT in the content of the Digital Agendas or National Digital Strategies, on the basis of recent surveys and insights from relevant stakeholders involved in the development and implementation of Digital Agendas; as well as explicitly including innovation in the structure of the Digital Agendas.

In addition, LAC Government/ ICT agencies should establish an administrative office for "ICT affairs", so each country can follow up the implementation of the National Digital Agenda despite changes in the government administration; as well as to establish coordination mechanisms through Digital Agendas in Latin American countries. Possible mechanisms should be discussed and promoted in international events or spaces for discussion and interaction between the ministries, agencies and stakeholders involved in the development and implementation of the ICT policies in Latin American countries.

Finally, recommendations to the **European Commission** suggest including the need of coordination of Digital Agendas in the political agenda of EU-LAC dialogues. Topics for discussing in the EU-CELAC SOM should cover areas of common interest addressed by the Digital Agendas in Latin America and the Digital Agenda for Europe; as well as international aspects that specifically affect EU-LAC cooperation, such as internet governance, market access and regulatory aspects.

#### 3.3 ICT Regulations

The recommendations from the Input Paper ICT Regulations are intended to improve the LAC ICT R&D Institutional and Regulatory Frameworks that would orient and promote ICT R&I and to create appropriate conditions for strengthening international cooperation with Europe.



Overall, Latin American countries are suggested to harmonise a legal and institutional framework that would ensure a coordinated approach to overall development of ICT; encourage a continued work of LAC ICT regional groups and fora setting foundations for ICT public policy and ICT regulation; set-up efficient communication channels with counterpart groups in Europe; and establish effective organisational and governance frameworks to coordinate the implementation of S&T strategies, ICT public policies, broadband plans and regulatory agendas within and across levels of governments in the LAC region, identifying clear responsibilities to ensure overall coordination of their implementation in all sectors of the economy.

Furthermore, in order to improve the LAC ICT Regulatory Framework, LAC governments should ensure true independence of their national regulatory authorities (no direct participation of the government should be allowed on their boards, so that decisions can be taken independently); increase the efficiency of LAC ICT and S&T regulation to achieve policy objectives by merging separate regulatory bodies; and harmonize regulations across different sectors.

All this together would support efficiency, fairness and clarity for service providers and the general public as well as to encourage, facilitate and promote self-regulation and competitiveness of the LAC ICT industry.

#### 3.4 Funding Mechanisms

The recommendations of the Input Paper on Funding Mechanisms are intended to incrementally improve the efficiency in financial resource allocation since fragmentation across ICT research funding mechanisms, programs, and agencies in Latin America continues to be pervasive. If private sources are also considered, the fragmentation increases exponentially. This state of affairs hampers the efficient allocation of funds as well as the alignment of funds with ICT development objectives. Certainly, this fragmentation cannot be fully addressed over the short run but the following initiatives may help to improve resource allocation efficiency in the long run.

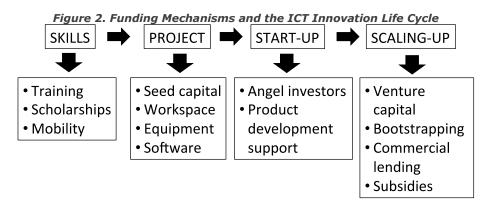
The first recommendation points to the need to develop a country-bycountry comprehensive institutional framework that enhances the alignment between the various funding sources and programs and national ICT development objectives. Additionally, this framework would facilitate the potential coordination of programs in order to avoid redundancies. Considering that each country comprises many funding programs beyond those handled by institutions such as the one mentioned above, the need to deploy a country-wide comprehensive institutional framework for defining basic principles guiding funding of ICT research and innovation is apparent. Developed and managed by each country entities such as the Ministry of Science and Technology or Ministry of ICT, these institutions are expected to act as a link translating the objectives of a country's ICT national strategy into guidelines for the allocation of funds to be followed by the different programs offered by public (national and sub-national) and private sector institutions.

The second recommendation focuses on the development of country specific maps of funding mechanisms with again, the purpose of



rationalizing the sources of funding. In addition, these maps could serve as a basis for providing researchers with a tool that enhances their visibility of potential funding programs. This matching platform could enhance efficiency in resource allocation.

Since funding sources originate from multiple programs, the need to understand how these are deployed in support of ICT research and innovation is a critical task. A conventional view of funding mechanisms along the ICT innovation life cycle remains a useful framework to identify potential gaps and redundancies (see figure 2).



Along these lines, it would be useful to conduct a detailed mapping effort to understand the availability of funding programs or lack thereof in support of ICT research at the country level. Such a map for each country would also be useful to identify the potential relative scarcity of funding programs for specific stages of the ICT project life cycle.



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