



National and subnational digital hubs

Innovation tools in agrifood chains

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Introduction

The concept of a digital hub is a relatively recent one when applied to development of the agrifood industry and rural areas. Experience of establishing digital hubs is still being accumulated, meaning that the concept is expanding and becoming more diverse. The aim of this document is to outline and conceptualize the most recent processes implemented in countries of the region and around the world.

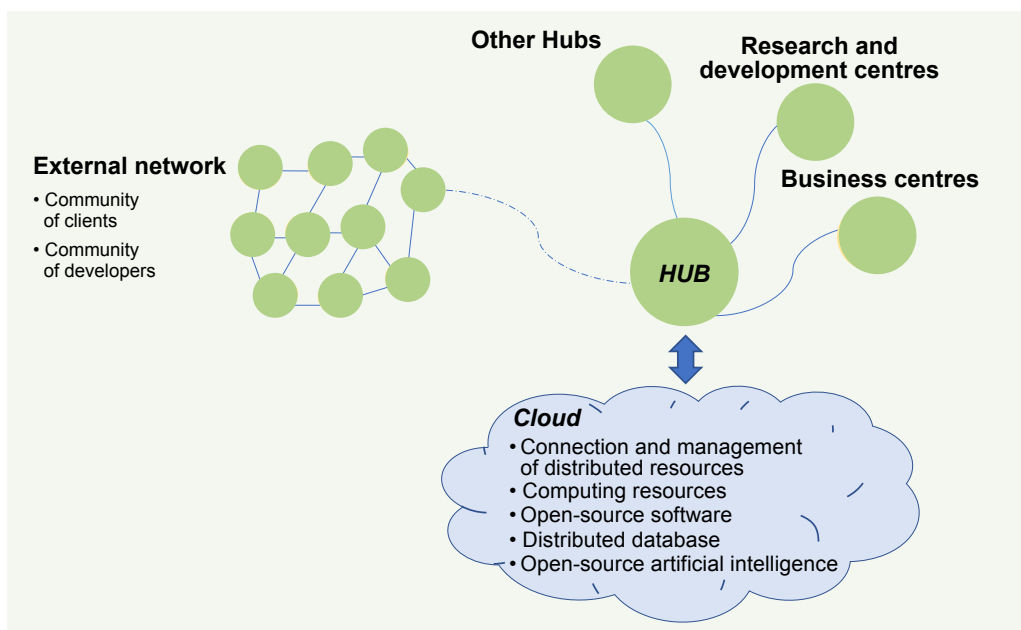
- In the field of computing, a hub often refers to a device used to connect and expand a network. In transport, a hub refers to an interchange or connection for transport of cargo or persons. It can therefore be said that a hub brings together materials, ideas or parties at a point, with a purpose of organizing or exchanging.
- When applied to company structures, a hub is similar to the concept of a cluster, as championed by the Economic Commission for Latin America and the Caribbean (ECLAC) and many other authors, which is understood to refer to a geographical concentration of interconnected companies, service providers, research centres and other related bodies.
- Based on this definition, a hub can be conceived as a physical concentration of parties at a given territorial level, developing networks for interaction in order to pursue a shared innovation and development goal. The adjective “digital”, meanwhile, may indicate one of two things: that digital technology is the area of interest and shared goal, which gives a hub purpose (for instance, an agricultural hub or mining hub specializing in digital solutions) or that a hub has another area of interest or purpose and digital technology is merely the tool that enables and drives the related development. Examples of the latter might be hubs for sharing or developing all sorts of mining, agricultural or other technology, with links formed using digital tools. In such cases, digital technology is only a tool that contributes to the internal communications of the cluster (Martínez, 2023).



A hub is similar to the cluster concept promoted by ECLAC

- Digital communication is a means of overcoming the prerequisite of physical proximity for a group to interact. Hubs are useful for observing and fostering this advantageous interaction between stakeholders in production that by their very nature are not physically concentrated, as they are in the cases of agriculture and tourism (Martínez, 2023).
- Busquets (2019) interprets a hub as a connector of networks (diagram 1). In his view, digital hubs are units –usually for innovation– that have an impact on competitiveness by creating technologies internally and combining those technologies with other external networks. They must also be connected to other existing units or hubs, such as research and development and sales centres.

Diagram 1
Schematic diagram of a digital hub



Source: Prepared by the author on the basis of J. Busquets, "Qué es un Hub Digital: repensando la innovación en la empresa", Blog Expansión, 2019 [online] <https://www.expansion.com/blogs/sociedad-empresa-digital/2019/04/04/que-es-un-hub-digital-repensando-la.html>.

As the rural world undergoes a new wave of restructuring, digital hubs are beginning to play an important role

- As the rural world undergoes a new wave of restructuring, digital hubs are starting to play a key role. But what does "digital hub" mean in the context of agricultural development and rural development? Digital hubs can be understood as digital centres or clusters that emerge in urban and rural areas and in agro-industrial chains, which centralize a complex web of conversations between the economic, social and institutional stakeholders in the local production structure, facilitating collaboration among them. This creates interconnected networks, a network of networks, a macro-phenomenon that has an internal organization that creates emerging properties, which adds value and improves the productivity of companies (Levy, 2013).
- The ultimate aim is to facilitate technological spillover and expand the entrepreneurship and innovation ecosystem in which the ultimate beneficiaries of economic and productive development policy operate (Martínez, 2023).
- Clustering makes it possible, among other things, to create subcategories of target groups to better direct a message and increase efficiency in various areas, such as political and social coordination, productive development, logistics or marketing. The idea is for public entities and companies to be able to cross-reference the data they obtain with the behaviour of citizens and consumers, to identify patterns and set out more precise strategies. At the centre of this system, one can imagine a node that connects the various conversation networks, fostering exchanges and collaboration. This is what we call a digital hub.



Diagram 2

Three levels of the process of digitalization of rural territories and agrifood chains

1

Level 1, “farm”, refers to the companies themselves, whether they are farms, agro-industrial companies or service companies operating in the food system. Both software (business management) and hardware (such as automation, including robotization) are included. Universities and national research institutes play a key role at this level. One example is the SmartField initiative of Chile’s Institute of Agricultural Research (INIA), comprising digitalized pilot farms that provide services to stakeholders in the collaborative ecosystem.

2

Level 2, “innovation systems”, extends beyond the limits of a company (or a farm) and refers mainly to innovation clusters and networks, agricultural extension systems, and marketing and value-adding strategies. This is the area of cooperatives, non-governmental organizations (NGOs) and public programmes for agricultural extension, innovation and productive development. It is also the sphere in which input supply companies operate, which have an increasing influence over the technical decisions of agricultural producers. One example in this area comes from what ECLAC has called mixed rural extension systems, whereby digital networks for extension (messaging groups) complement the face-to-face work performed by those working on extension through field work, technical visits and meetings.

3

Level 3, “management of production systems and value chains”, includes the digital hub as a coordination mechanism at a sectoral (chain) or geographical level. This area refers to governance of the development process, which includes face-to-face and digital mechanisms for social participation and decision-making. Hubs at different geographical levels are linked to digital networks that complement the work of those promoting extension, delivering additional information that improves the management skills of producers and businesses.

Some approaches use classifications similar to the one outlined in diagram 2 to analyse the agricultural digitalization process. This is the case of an exploratory literature review of more than 100 social science studies on digital agriculture, which identified five established thematic clusters (Klerkx, Jakku and Labarthe, 2019):

- (i) Adoption, uses and adaptation of digital technologies on farm
- (ii) Effects of digitalization on farmer identity, farmer skills, and farm work
- (iii) Power, ownership, privacy and ethics in digitalizing agricultural production systems and value chains
- (iv) Digitalization and agricultural knowledge and innovation systems (AKIS)
- (v) Economics and management of digitalized agricultural production systems and value chains

This classification shares the levels proposed in diagram 2 of “farm”, “innovation systems” and “management of production systems and value chains”. However, it also adds two new dimensions to be considered: “identity/skills” and “power/ownership/ethics”.



Types of digital hubs

- An analysis of recent experiences reveals that there are at least three lines of development or types of digital hubs (Barrera Ramírez and Sotomayor, 2023):

Table 1
Types of digital hubs

Type	Description
Type A	<p>These digital hubs seek to accelerate agricultural digitalization in the strict sense of the term, and are usually within a production chain or organized based on a cross-cutting thematic area, which is generally innovation. They are focused on providing digitalization services and therefore have a more technocratic approach. The target group is agricultural producers (and other related companies), connected to each other through the hub. The digital aspect is the technology shared among the stakeholders. These hubs generally report directly to line ministries for sectors such as agriculture or the economy, but may also report to regional governments.</p> <p>Experiences: Andalucía Agrotech Digital Innovation Hub, in Spain ([online] https://www.andaluciaagrotech.com/).</p>
Type B	<p>These are multi-sector hubs that complement face-to-face policy coordination work, aiming to improve dialogue and participation by local stakeholders. The ultimate aim is to increase productivity and sustainability in agrifood systems and rural areas, creating more jobs and income and enhancing well-being for households. In this case, the digital technology (the hub) is only a tool to facilitate coordination, dialogue and participation by the stakeholders. The main target group is producers (and other businesses linked to the agro-industry chain), but the scope can be broader, as other local stakeholders can also participate (such as consumers, retailers and wholesalers, NGOs, local organizations or political stakeholders). Digital technology is the tool that assists stakeholders in sharing other forms of technology.</p> <p>Experiences: Central Appalachian Network (CAN), in the United States ([online] https://www.cannetwork.org/). Similar initiatives are being developed in the Arica and Parinacota Region of Chile ([online] https://hubaricayparinacota.cl/) and in the Department of Risaralda in Colombia ([online] https://hubcrc.org/).</p>
Type C	<p>These digital hubs are linked to fast-growing industrial sectors, investments by large companies or large State projects, with a lever effect and spillover effect on other productive sectors, including small and medium-sized enterprises (SMEs) and other local stakeholders. They are not specific and in fact cover a wide range of themes.</p> <p>Experiences: Patagonia Hub of the Magallanes Region, Chile ([online] https://www.reuna.cl/2023/11/nuevo-nodo-de-la-red-patagonia-promete-convertir-a-magallanes-en-polo-de-la-investigacion-y-la-educacion/). In the case of this hub, the green hydrogen industry, the International Antarctic Centre in Punta Arenas, the port of Punta Arenas and other large projects are catalysts for an industrial cluster.</p>

Source: F. Barrera, E. Ramírez and O. Sotomayor (coord.), "Sistemas mixtos de extensión rural: intervenciones presenciales y digitales para ampliar la cobertura y mejorar la calidad de los consejos técnicos", *Project Documents* (LC/TS.2023/105), Santiago, Economic Commission for Latin America and the Caribbean (ECLAC).

Agro Hub Brasil is an online space providing information on the country's agricultural innovation ecosystem. It raises awareness and contributes to better coordination of ongoing innovation initiatives and measures

National and subnational digital hubs: experiences in Brazil, Chile and Colombia

Brazil: Agro Hub Brasil ([online] <https://www.gov.br/agricultura/pt-br/assuntos/inovacao/agrohub-brasil>)

- Agro Hub Brasil, launched in May 2022, is an online space providing information on the country's agricultural innovation ecosystem. The initiative is coordinated by the Secretariat for Innovation, Sustainable Development and Irrigation (SDI) and the Ministry of Agriculture, Livestock and Food Supply (MAPA) (Ministry of Agriculture, Livestock and Food Supply of Brazil, 2022).
- Agro Hub Brasil raises awareness and contributes to better coordination of ongoing innovation initiatives and measures. On the platform, users can access information in different sections (Ministry of Agriculture, Livestock and Food Supply of Brazil, 2023):

- Innovation spaces: information on different innovation spaces such as hubs, incubators, accelerators, smart-farm labs and technology parks.
- Start-ups: mapping and studies of start-ups in the country, such as Radar Agtech, Mapeamento Agtech, Report AgTech Garage 2021 and LIGA Insights Agtechs.
- Innovation ecosystems: information on the different innovation ecosystems that are working with the Ministry of Agriculture, Livestock and Food Supply to build an agenda focused on agricultural innovation.
- Innovation initiatives: the various agricultural innovation initiatives under way in the country, which are supported primarily by the Ministry of Agriculture, Livestock and Food Supply, the Brazilian Agricultural Research Corporation (Embrapa) and other institutions focused on agricultural innovation.
- Universities and Institutes of Science and Technology: list of Brazilian higher education institutions and science and technology institutes that work in the field of agriculture.
- Rural producers: information on the technologies that have emerged with the digital transformation in agribusiness (examples of applied technologies, products and services available, apps for rural producers, Internet in rural areas, weather information, tractor registration and rural property registration).
- Financing and development: public and private sector facilities to support and promote development of start-ups.
- Calendar: dates of events, courses and applications for initiatives related to technological innovations applied to the agricultural sector.
- News, videos and publications: up-to-date news, instructional videos and studies related to agrotechnology.

Table 2
Examples of agricultural hubs in Brazil

Hub	City	State	Website
Vertical Agtech (ACATE)	Florianópolis	Santa Catarina	https://agtech.acate.com.br/
AgriHub	Cuiabá	Mato Grosso	https://agrihub.com.br/
AgtechGarage	Piracicaba	São Paulo	https://www.agtechgarage.com/inicio/
AgFoodVentures AgFood Digital Hub	Varginha	Minas Gerais	https://agfood.ventures/
Avance Hub	Piracicaba	São Paulo	https://www.avancehub.com.br/
Bio Energy Hub	Sertãozinho	São Paulo	https://www.bioenergy.network/es
CampoLab	Goiânia	Goiás	https://sistemafaeg.com.br/campolab
Celeiro Agro Hub	Porto Alegre	Rio Grande do Sul	https://tecnopuc.pucrs.br/ecossistema-tecnopuc/hubs/
Centro de Inovação Fazu	Uberaba	Minas Gerais	https://fazu.br/centro-de-inovacao-fazu/
Cocriagro	Londrina	Paraná	https://cocriagro.com.br/
Conexa	Goiânia	Goiás	https://hubconexa.com/
Cubo Agro	São Paulo	São Paulo	https://cubo.network/hub/agro
FoodTech HUB Latam	Campinas	São Paulo	https://foodtechhub.com.br/
Hub de Inovação Tecnológica de Taubaté (HITT)	Taubaté	São Paulo	https://hitt.com.br/
Iguassu Valley	Cascavel	Paraná	https://www.iguassuvalley.com.br/
Inovacoop	Goiânia	Goiás	https://www.inovacoop.coop.br/
NovoAgro Ventures	Belo Horizonte	Minas Gerais	https://novoagro.ventures/
Pulse Hub	Piracicaba	São Paulo	https://www.pulsehub.com.br/
Startup Connection	São Paulo	São Paulo	https://www.startupconnectionusa.com/en
Tereré Hub	Dourados	Mato Grosso do Sul	https://www.dourados.ms.gov.br/index.php/dourados-lanca-hoje-o-tererere-hub-primeiro-centro-de-inovacao-do-municipio/
Telescope	Paranapanema	São Paulo	https://www.holambra.com.br/servicos/inovacao

Source: Ministry of Agriculture, Livestock and Food Supply of Brazil, "Agro Hub Brasil: Portal de informações sobre o Ecosistema de Inovação do Agro brasileiro", 2023 [online] <https://www.gov.br/agricultura/pt-br/assuntos/inovacao/agrohub-brasil>.



The Arica and Parinacota Regional Hub in Chile and the Risaralda Hub in Colombia, both of which are being established, promote technologies related to sectors that go beyond agriculture

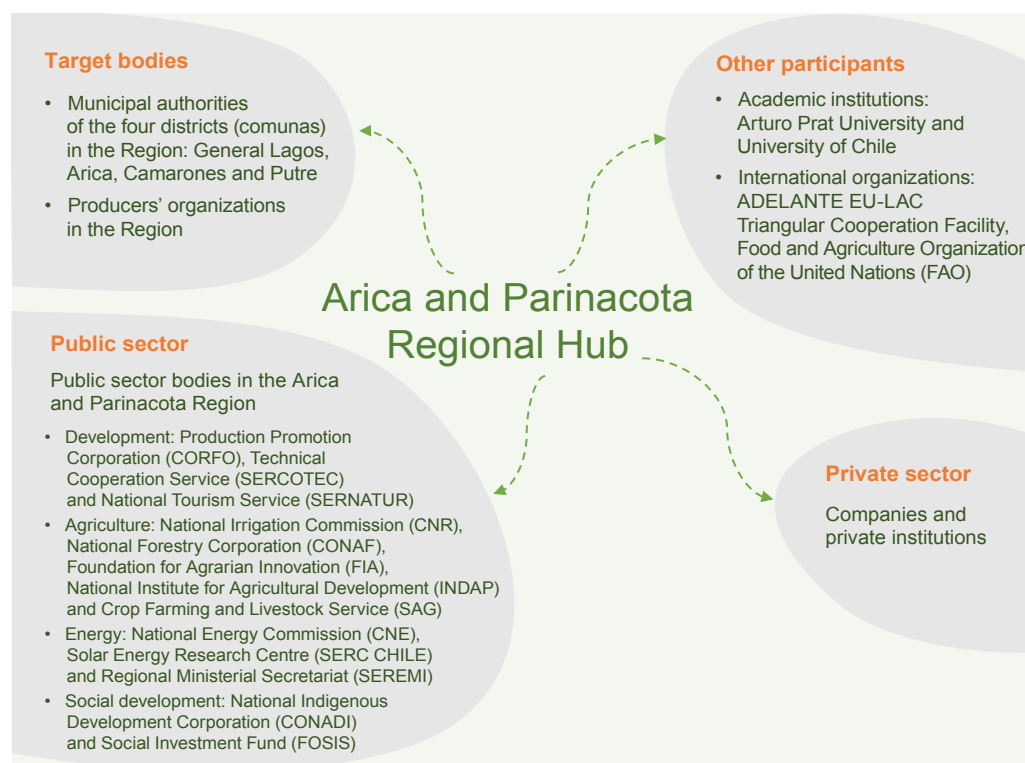
The Arica and Parinacota Regional Hub (Chile) and Risaralda Hub (Colombia)

The Arica and Parinacota Regional Hub in Chile and the Risaralda Hub in Colombia are currently being established. Both of the hubs promote technologies related to sectors beyond agriculture (such as tourism, energy and metalworking), including digital technologies also associated with these sectors. What they have in common is that their digital platforms are tools that contribute to linking, coordinating and increasing the number of stakeholders participating in the hub.

Arica and Parinacota Regional Hub

- In 2019, the University of Tarapacá in Chile and the Jorge Basadre Grohmann National University in Peru, together with Chile’s Intihuasi Regional Research Centre and Peru’s Tacna Agricultural Research Station, began work under the Tacna-Arica and Parinacota Cross-Border Production Ecosystem project. The project seeks to form synergies and partnerships to build on the integration of the Tacna-Arica and Parinacota macro-region (Aedo and others, 2023).
- In this regard, ECLAC and the Regional Government of Arica and Parinacota developed a digital platform called the Arica and Parinacota Regional Hub, which aims to accelerate innovation in the region. This tool is supported by the Regional Innovation Strategy for the Region of Arica and Parinacota 2022–2030 (ERI 2022–2030) public policy instrument of the Regional Government.
- The hub is a public-private network of stakeholders that interact in the region. Its aim is to build an innovation community, through coordinated action, to produce a regional knowledge base and foster initiatives for sustainable development of the region.
- The pilot of this hub is beginning to be operated by the Regional Government, through the Corporation for Territorial Development of the Arica and Parinacota Region.

Diagram 3
Map of Arica and Parinacota Regional Hub stakeholders



Source: Prepared by the author on the basis of M. Aedo and others, “Ecosistema productivo transfronterizo Tacna-Arica y Parinacota: caracterización del territorio, las instituciones y la plataforma integrada de proyectos de innovación agropecuaria”, *Project Documents*(LC/TS.2022/199), Santiago, Economic Commission for Latin America and the Caribbean (ECLAC), 2023.



Risaralda Hub ([online] <https://hubcrc.org/>)

- Risaralda Hub was proposed as part of the project entitled “Productive development and spatial heterogeneity in Latin America: institutions and capacity-building in regional productivity policy programming and implementation”, coordinated by ECLAC.
- Because the Risaralda Regional Competitiveness Commission had been working on coordinating its member stakeholders by formulating regional plans for sectors and cross-cutting pillars, and prioritizing initiatives for financing with national funds, it was proposed that the main aim of the digital hub would be to expand the entrepreneurship and innovation ecosystem to include ultimate beneficiaries of economic and productive development policy.
- The tool therefore seeks to enhance the work of the Regional Competitiveness Commission, facilitating interaction between stakeholders at all levels, such as those from government, trade associations, companies and academia, as well as entrepreneurs and citizens of the different areas and economic sectors of Risaralda.
- In addition, the tool seeks to create a broad innovation and entrepreneurship community, coordinated by the Regional Competitiveness Commission and in accordance with the Competitiveness Plan, connected through supply and demand of services for production and innovation, and commercial, technological and strategic information.
- In its initial stage, the hub is prioritizing the following areas of production (Risaralda Hub/ Comisión Regional de Competitividad, 2023):
 - **Metalworking: the sector has become the producer of the most sophisticated goods and services in the economy of the department of Risaralda. It encompasses areas such as manufacturing of motorcycles, transport equipment, buses and automotive parts. Additionally, the sector is entering innovative areas such as aerospace (aeronautics).**
 - **Agro-industry: agro-industry aims to add value to agricultural output in Risaralda and the surrounding region, such as the coffee-growing area. The good environmental supply and various altitudinal belts offer opportunities to develop new, more sophisticated products, based on science, technology and innovation.**
 - **Sustainable tourism: This sector is promoted through five complementary strategies: meeting tourism (business, corporate), nature, leisure, culture and health.**

Table 3
Extraregional
experiences

Central Appalachian Network (CAN), United States

CAN is a “network of networks” whose mission is to formulate and implement economic strategies to generate wealth in local communities, conserve natural and cultural resources, and empower marginalized communities (Central Appalachian Network, 2023). To this end, a Steering Committee comprising 7 non-profit institutions coordinates more than 50 local development agencies, seeking to strengthen partnerships between community groups, non-profit organizations, educational institutions, local governments and private companies.

Scope and area of action: CAN works in three sectors: agriculture and food, renewable energies and culture (creative placemaking). CAN works in more than 150 counties in the Central Appalachian states of Kentucky, Ohio, Tennessee, Virginia and West Virginia.

Organizational structure: CAN has an autonomous and formal structure with democratic governance. It is composed of a board of directors, committees, working groups, and representatives of local organizations and communities (Crosson, 2022).

More information: [online] <https://www.cannetwork.org/>.

Andalucía Agrotech Digital Innovation Hub, Spain

Andalucía Agrotech Digital Innovation Hub is a regional innovation ecosystem led and promoted by the Regional Ministry of Agriculture, Fisheries and Sustainable Development of the Regional Government of Andalusia. The ecosystem is backed by entities that wish to contribute to the digitalization of the agrifood value chain through adoption of digital technologies and creation of value from data (Andalucía Agrotech DIH, 2023).

Scope and area of action: Andalucía Agrotech Digital Innovation Hub is focused on the agrifood sector, covering all the provinces of Andalusia.

Cooperation work: Andalucía Agrotech Digital Innovation Hub has collaborated with initiatives in Málaga (Polo de Contenidos Digitales), Jaén (Digital Innovation Hub for Industry Technology Knowledge (DIH-ITK)) and Portugal (International Iberian Nanotechnology Laboratory (INL)). The Hub is currently contributing to the Interreg Spain-Portugal Cross-Border Cooperation project (POCTEP) Hub Iberia Agrotech (HIBA), to build a multiregional ecosystem for digitalizing agriculture. HIBA will link different digital innovation hubs in Spain and Portugal, thus strengthening the relationships between local agrifood innovation ecosystems (Andalucía Agrotech DIH, 2023; Rodríguez García, 2022).

More information: [online] <https://www.andaluciaagrotech.com>.

Source: Prepared by the author on the basis of Central Appalachian Network, "Working for a more just and sustainable Appalachia", 2023 [online] <https://www.cannetwork.org/>; Andalucía Agrotech DIH, "Entidades promotoras", 2023 [online] https://www.andaluciaagrotech.com/entidades_promotoras; A. Crosson, "La experiencia de la Central Appalachian Network en Estados Unidos. Una mirada territorial (agricultura, energías renovables, creative placemaking)"; and F.D.P. Rodríguez García, "La experiencia de Andalucía Agrotech en España. Digital Innovation Hub. Una mirada sectorial (agricultura)", papers presented at the International Seminar "Hubs digitales territoriales y coordinación económica y social de territorios rurales y cadenas agroindustriales", 27 September 2022 [online] <https://www.cepal.org/es/eventos/seminario-internacional-hubs-digitales-coordinacion-economica-social-territorios-rurales>.

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