



# Innovating communication in the age of digital agriculture

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## Introduction

New media revolutionized human communication, producing new social habits. With easy access to information, society has become more aware of its rights and much more demanding regarding their needs and expectations. In addition, this new and modern consumer profile and user of products and services encourages companies to be more concerned about accountability to the public, the transparency of their actions and social responsibility.

In a highly competitive environment, knowledge has been the driver of economic and social development. In this context, communication plays a fundamental role in the complex environment of public research, development and innovation companies. They are faced with the challenges to more efficiently contribute to the dissemination of the scientific knowledge produced, and also bringing to society, in an innovative way, the results of research and technologies.

The 21<sup>st</sup> century is marked by digital communication; society is increasingly eager for fast information, in real time. Furthermore, it is an agent that helps to build the contents that constitute collective knowledge, in other words, it is no longer limited to receiving information, in one-way communication. This society wants to participate, speak, listen and be heard.

As a result, communication tends to be increasingly horizontal in a participatory system, at all levels, highlighting the two-way symmetrical communication model, characterized by the balance between the interests of organizations and their audiences. Thus, it plays the role of enabling organizational change processes, as it goes beyond borders, provides greater access to information and facilitates dialogue, establishing strategies to deal with environmental changes.

The overwhelming global transformations caused by the pandemic of the new coronavirus imposed on companies and science and technology institutions the pressing need to adapt to the new scenario, and this reconfiguration is based on efficient communication with society and its strategic audiences. Thus, we witnessed a rapid increase in the participation of these entities in interactive portals, virtual communities and social networks, among other channels that enable greater interaction with individuals and consumers.

Communication is also considered a strategic instrument to awaken public motivation for science, to promote interaction and encourage the exchange of knowledge, contributing to socioeconomic development, democratization and social inclusion. These contributions are inherent to the mission of public institutions involved in research, development and innovation (RD&I), such as the Brazilian Agricultural Research Corporation (Embrapa), linked to the Ministry of Agriculture, Livestock and Supply (MAPA).

How to talk to this new audience profile; what language to use; what channels can be built; how to meet interaction needs; how can sounds, images and content be added to arouse interest and facilitate communication, given the many options and offers available on the web and social networks? How to make a difference and stand out? These are just some of the issues that communication professionals from RD&I institutions have been addressing in order to innovate communication and the relationship with society in the current context.

At Embrapa Digital Agriculture, an Embrapa Unit that is a research reference in the area of information technology, professionals from the Organizational Communication Nucleus (NCO) also face these challenges, in order to develop differentiated communication actions that bring innovative experiences in the relationship with the different audiences that the Unit interacts with.

Numerous solutions generated by agricultural research are made available on a daily basis in different formats to broadly disseminate the knowledge produced. The objective is that the actions contribute not only to more effectively bringing the research results, technologies, products and services offered to society, but also to facilitate interaction with the public and capture their demands.

This chapter presents some of the results obtained by the Unit. They are the outcomes derived from integrated communication based on adequate and consistent planning, which includes institutional, market and internal communication actions. Initiatives to support the innovation process and strategic management of Embrapa Digital Agriculture are also addressed, as well as participation in projects supported by an educommunicative vision, based on the subjects' autonomy and critical view.

## New technologies and science communication at Embrapa

Companies and institutions began to be more intensely concerned with organizational communication in Brazil from the second half of the 1980s onwards. Political changes and, later, the phenomenon of globalization imposed the need for greater transparency in the relations of organizations with governments, non-governmental organizations, workers, unions, suppliers, the press and communities (Oliveira, 2013).

Since its creation, in 1973, Embrapa has been concerned about disclosing its administrative actions to society. For this reason, that same year, then-president José Irineu Cabral hired the first journalist to work

at the Company (Duarte; Barros, 2003). In 1996, Embrapa implemented a Communication Policy, which helped to reorganize all its operation areas. Revised and updated in 2002, the policy defines that strategic and integrated communication<sup>1</sup> is a business intelligence system whose fundamental responsibility is to manage actions aimed at promoting the institution's relationship with the internal and external environments (Embrapa, 2002).

This policy created precepts to support the development of actions and programs to manage the dissemination of information to strategic audiences and to strengthen the institution's image. In addition to supporting actions aimed at popularizing scientific knowledge, at Embrapa communication is engaged with the transfer of research, development and innovation results, in order to improve the scientific literacy of the Brazilian population.

In a research institution, acknowledging Business Communication as strategic implies including this competence in all instances of the organization, whether for prospecting demands or building scenarios, or when interacting with stakeholders involved in projects and solutions forwarded by company, or in search of the necessary interface with society (Embrapa, 2002, p. 15).

Communication actions, in addition to benefiting the Company and government, essentially play a role on behalf of society, as they facilitate disseminating research results generated at Embrapa and access to its products, services and technologies. The Company is committed to “make viable research, development and innovation solutions for the sustainability of agriculture, for the benefit of Brazilian society” (Embrapa, 2015, p. 8).

The arrival of new information and communication technologies (ICT) created a challenging scenario for companies and institutions to promote the dissemination of their actions, technologies, products and services to their strategic audiences, with an innovative approach. In this context, knowledge tends to be increasingly built using a collective, democratic and shared approach, so that everyone can benefit from the obtained results and therefore make their own decisions.

The evolving scenario of both information technology and communication resulted – at least for organizations more attentive to new competitive requirements – in a converging scenario. A vital transformation in organizational communication seems to be underway, considering the expressive investments in integration and relationship solutions, which enable the intense participation of the entire chain of business agents in the dialogue and shared actions (Cardoso, 2020, p. 31).

In the 21<sup>st</sup> century, it is no longer possible for the scientific dissemination process to be a “one-way” model, built under a unidirectional vision and without the participation of all interested agents. The web tools provide interactivity with the public, which is no longer a mere consumer of information, but can become a co-author and participant in the process, playing the role of an active agent that acts and transforms its reality.

The impact of changes can be seen in all human activities, leading institutions to rethink their policies and create strategies to remain competitive, in addition to being socially responsible. New technologies also promote changes in the agricultural production process with the introduction of methods and tools that modernize agriculture.

In the case of Embrapa, there is a permanent focus on monitoring the demands of the external environment in order to align its performance. Embrapa's VI Master Plan (PDE) is a directive document

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<sup>1</sup> Strategic and integrated communication is understood as that which is part of the organization's philosophy, guiding and integrating all communication actions generated in the company, seeking equilibrium between the organizational interests and those of its audiences (Kunschik, 1997).

that establishes the main guidelines for the activities to be developed at Embrapa, from 2014 to 2034, in line with the changes in the global scenario.

During the preparation of the VI PDE, the Company identified the need to expand its efforts to foresee the challenges in order to ensure the sustainability of Brazilian agriculture, which is greatly affected by technological intensification. The progress of ICT also offers enormous potential to revolutionize the agricultural sector, as new tools and technological solutions emerge for automating agricultural processes and impact business models.

Amid these profound transformations, research, development and innovation (RD&I) activities in the agricultural sector have a central role. Technological transformations occur quickly, with the introduction of new products and processes, in which the control of genes and atoms becomes the center of change. There is a clear tendency to increase the complexity of this market with the expansion of various technologies, such as precision agriculture, biotechnology, nanotechnology, biological nitrogen fixation, biopesticides, biorefineries and intelligent packaging, etc. The concept of innovation no longer refers only to products and processes, but also to innovation in business models, logistics, services associated with products, distribution and marketing, management and organization (Fonseca Júnior et al., 2009, p. 87).

One of the current challenges of Agricultural research also includes making agriculture ever more connected (Rodrigues et al., 2020). Digital technologies represent significant commitments for the transformation of Brazilian agriculture, based on digital content, cutting-edge technology and connectivity, which characterize the digital age and Agriculture 4.0.

The focus of activities of Embrapa Digital Agriculture and Embrapa, “the so-called Agriculture 4.0 was already one of the priorities in the Company’s Research, Development and Innovation (RD&I) programming, but with the pandemic, it will certainly grow even more to meet the demands of the productive sector” (Diniz, 2020).

The technological convergence, allied to the intense generation of data and information, have provided disruptive technologies an immense potential for applications in all activities, including planting, handling, harvesting and post-harvest. Furthermore, communication must also pay attention to all these innovations to help disseminate and appropriate these technological solutions.

It is important to highlight that communication planning must be strategic, foreseeing scenarios, enabling the participation of company members, paying attention to expectations of the public and expressing the results desired by the company, in the short, medium and long term (Galerani, 2006, p. 51).

## Digital revolution and network communication

The origin of communication as “convergence”, ensuing from the understanding of the communicative process as a result of social interactions, replaces the diffusionist logic guided by the communication of “many for few” and now constitutes a new model, centered on the idea of “all for everyone” (Lévy, 1999). The new digital technologies make it possible to break the barriers of time and space, bringing together and stimulating the exchange of knowledge, cooperation and collective creation in the network.

In the virtual space interactions can be enhanced, and subjects are active, with the right to express themselves and interact, bringing proposals that benefit thousands of people who are interconnected, while also sharing solutions with those who do not have access to the network. Therefore, it is necessary to innovate in the sense of no longer treating the subject as a passive being, who receives a ready-made technology and needs to adapt to use it.

The digital revolution has brought, as well as to several other areas, a new horizon for organizational communication. The restriction of space and time is no longer an obstacle, and digital communication began to permeate spaces that were previously unnoticed or ignored. Universal digitization forced rethinking, not only for formal communication vehicles, but also for society, which discovered new ways to send news, receive information, seek updates and also be present. “Cyberspace presupposes a mixture of subject and object, unthinkable in the process of interpersonal and mass communication” (Santos, 2016, p. 4).

With new media, people can exchange information and share global solutions, contributing to the development of “knowledge networks”. This model centered on a “everyone for everyone” type of communication (Lévy, 1999) assumes that anyone is able to be, at the same time, a consumer and a producer of information.

The dissemination actions are supported by internet resources – a form of “many-for-many” communication that, with the possibility of interaction, revolutionized human communication and designed a new paradigm for the socialization of information (Pereira et al., 2010, p. 4).

In this context, communication must also reinvent itself, operating in a network, as seen in research production based on the participation of researchers in collaborative virtual networks, which expand the possibilities of exchanging information and generating knowledge. A new dynamic is formed in these networks, stimulating collaboration in order to obtain the best results for their members.

In these networks, scientists need to have a communication structure that facilitates, interactively, the exchange of information, knowledge, skills, competences, experiences, knowledge and abilities that allow them to simultaneously integrate them using an interdisciplinary and transversal approach, favoring the construction of new knowledge and solutions that add value to society (Torres et al., 2012, p. 3).

Technological convergence and multimedia resources offer potentials that allow researchers and scholars to organize in these networks, where participation and collaboration are encouraged both locally and internationally. This is a model that promotes collaborative creation, with the use of free and open technological resources that are available to multiple institutions, which benefit from ideas and collective improvements. As an example, we can mention the several collaborative initiatives currently underway in universities and research institutes for the production of a vaccine against covid-19 caused by the new coronavirus.

Characteristic of the information age and knowledge-based society, digital communication presents a new and complex scenario, in which the speed of obtaining information, the increased volume of content, not always from secure sources, and the overexposure of people and brands encourage thinking about how to position institutions, companies and actions in a relevant, clear, appropriate and attractive manner.

However, what is this digital communication and what makes it so different from traditional communication? It can be considered that digital communication is based on the communication strategy and actions carried out on the web, social networks and mobile devices, including the digital ecosystem and the digitization of information media. Supported by four pillars – presence, content, relationship and engagement – digital communication involves the relationships between connected human beings and the influence on corporate dynamics.

A segment of social communication, enhanced by technological advances, digital communication is a set of practices and forms of dissemination, interaction, reception and dialogue between sender and receiver on online platforms – accessible through devices such as computers, notebook, tablet, cell phone etc.

As it is comprehensive, it can be applied to diverse audiences, having started within corporations and expanded to the social world, in which legal and physical persons began to integrate and interact in a maze of information. With diversity increasingly present, the plurality of voices only tends to enrich relationships, professional or not. For companies and institutions, digital communication has brought valuable opportunities. Among them are the different forms of language, access, greater proximity and audience.

Today it is clearer that companies that are able to control their own digital communication can not only lead thoughts, but also shape behaviors, generating competitive advantages in a world where speed of delivery conquers not only consumers and business partners, but also followers. However, it is important to emphasize that communication must be intrinsically allied to corporate governance, for an effective contribution in this extremely competitive scenario, "seeking a more flexible, creative, collaborative environment and which, consequently, will bring more competitiveness and sustainability to organizations" (Sabbatini, 2010, p. 155).

Only after establishing dialogical relationships integrated to a collaborative and transparent communication proposal, which considers the citizen as an active subject in this process, will organizations be able to stand out and remain sustainable.

Moreover, communicative actions need to be guided by a philosophy and an integrated communication policy that consider the demands, interests and demands of strategic audiences and society. This means there must be full integration between internal, institutional and business communication in the pursuit of organizational effectiveness, efficiency and efficacy for the benefit of the public and society as a whole, and not just solely the company. Studying, understanding and practicing organizational communication, therefore, is much more complex than one might imagine (Kunsch, 2009, p. 80).

## Communication for innovation

The changes brought about by the 21<sup>st</sup> century, which impact both organizations and human beings, producing new social demands, also influence organizational communication within a complex context of relationships that require more interactive and collaborative systems.

Cajazeira and Cardoso (2009, p. 1) highlight the central role played by communication in the innovation process. However, they emphasize that the "complexity of the internal and external relations of organizations, and of individuals among themselves, combined with the growing competitive demand for innovation, poses unprecedented challenges on the way of thinking and acting in organizational communication."

Communication plays a fundamental role in the innovation process, as well as adequate information management. Strategies that encourage innovation attitudes have social interaction processes as one of their strongest allies, as communication, a reciprocal action, provides a favorable exchange environment for information to circulate and knowledge to be discussed, validated and possibly, adopted by the target audience.

For Wolton (2010, p. 121), "communicating is less and less transmitting, rarely competing, mostly negotiating and, finally, living together." Structured dialogue and the transmission of ideas can leverage the creative process, a precursor to innovation.

Therefore, communication and the creative process interact in complex but complementary ways, enabling the growth of the innovative potential in organizations. Having information is one of the first components for stimulating creativity and strategic thinking.

In this context, and to deliver more value to society through its products and services, Embrapa began implementing, in 2018, a new Innovation Policy. Among the six main guidelines, two are directly based on communication: promoting the culture, practices and internal environment for innovation; and expand the Company's participation and protagonism in the innovation market (Embrapa, 2018a).

Following this same philosophy of promoting innovations in its processes, the Company's communication strategies have already undergone reformulation, with the creation and use of differentiated communication tools to serve different audiences, with content and language suitable for each one. The main purpose has always been to improve how to communicate to society what Embrapa does and to talk more effectively with the innovation ecosystem, promoting dialogical and collaborative relationships.

The culture of organizations plays a preeminent role in stimulating, developing and disseminating innovations. It is essential for the internal environment of a RD&I institution to support the generation and sharing of ideas, which will be reflected in the research design, in the development of solutions and in the achievement of results to meet the demands of its strategic audiences.

To overcome the limits of traditional business communication and the instrumental focuses of organizational communication, it is necessary to understand communication as a strategic process for action in a plural, dynamic and complex reality, which aims to elicit innovative, creative and dynamic behavior from a strategic point of view and which works, in a democratic way, as a disseminator of objectives and cultural values of the company for internal and external audiences. [...] These are economic changes with significant transformations for the markets and for the relationships between human beings inside and outside the company (Cardoso, 2006, p. 1.127).

To support this innovation process, it is essential that organizational communication is supported by a proposal for collaborative communication, which encourages dialogue and reciprocity. Communication for innovation plays a strategic role in the interpretation of the internal and external environments, identifying internal strengths and weaknesses, in addition to the characteristics and trends of the macro-environment.

Therefore, it comprises a multidisciplinary area, as it includes all forms of communication used by the organization to relate and interact with its audiences. It is important to highlight the work of public relations professionals in building the corporate innovation agenda, since "it is through public relations that the organization's philosophy contributes to strengthening and consolidating a solid and favorable corporate image and identity before the public of interest" (Kunsch, 2003, p. 164-165).

Thus, both communication and innovation need to be aligned so as to produce impactful results for companies and institutions, since the complexity of human relations makes this innovation process extremely challenging, which breaks the vertical structures of power and relationships. It is healthy for organizations to adopt more flexible and open styles of management that are reflected in their relationships with employees and stakeholders – including all the publics with which they relate.

The internal communication model must also be supported by participatory management, focused on collaborative work, which encourages autonomy and integration among teams. The Oslo Manual, published by the Organization for Economic Co-operation and Development (OECD), defines that among the factors that strongly influence the learning capacity of companies, vital for innovation, is knowledge management, including "policies and strategies, leadership, knowledge acquisition, training and communications" (Manual..., 2005, p. 32). "Corporate governance (legal, planning and public relations)" is also referenced among the administration and management actions for innovation (Oslo, 2018, p. 73).

In addition to all the disruptions caused by ICTs, the social changes that have taken place in the 21<sup>st</sup> century determine new relationship configurations that are based on pluralism and interdependence, “which require a new way of thinking about communication” (Cajazeira; Cardoso, 2009, p. 8). The challenges of this new context demand that strategic organizational communication, allied to corporate governance, advance within a relational perspective.

The dialogic interaction is a new paradigm in this area, which breaks the mechanical model of information and adopts the posture of dialogue as the best way to resolve conflicts, make agreements, and, seek consensus in relation to a practice, thus understanding communication beyond technical rationality (Marchiori, 2011, p. 29).

In this scenario, it is essential to have an environment that will stimulate creativity and sharing ideas, with communication supporting the decision-making process of institutions and corporate governance. Seeing that innovation is an intrinsic process to organizational skills, it is essential to develop policies, programs and actions that favor cooperation, dialogical relations and the pluralism of opinions.

Thus, internal communication is also a vital characteristic in the decision-making process and in the construction of a participatory organizational environment, facilitating the integration and exchange of information. This will benefit enhancing the institutional image and strengthening the company’s culture, producing positive results in a competitive and innovative business environment.

Therefore, it is important that leaders also develop skills in interpersonal relationships, face-to-face communication and management of information flows, establishing channels open to dialogue that are capable of supporting the construction of collaborative relationships, supported by ethics and the respect for the internal public.

Internal communication cannot be isolated from the combination of integrated communication and from the other activities of the organization. Its effectiveness will depend on teamwork between the communication and human resources areas, the board of directors and all the employees involved. It will basically depend on adequate and consistent planning, and then it has to find support in the information obtained from the strategic planning, so that the programs to be developed correspond to the demands of the environment (Kunsch, 1997, p. 129).

## Communication results and challenges in the digital age

Embrapa seeks to “be a world reference in the generation and offer of information, knowledge and technologies, contributing to innovation and sustainability in agriculture and food security” (Embrapa, 2015, p. 8). Among the 12 strategic objectives defined in its VI Master Plan 2014–2034, the development, adaptation and dissemination of “knowledge and technologies in automation, precision agriculture and information and communication technologies to enhance sustainability of production systems and add value to agricultural products and processes” are highlighted (Embrapa, 2015, p. 12).

For Embrapa Digital Agriculture, it is a priority to disseminate these innovations in Brazilian agriculture. Since the mid-1990s, the Unit has had a communication area dedicated to supporting the dissemination of research and technology transfer actions, in addition to managing the communication channels and flows with its stakeholders.

Communication is also among the strategic objectives of Embrapa's VI Master Plan. It is the responsibility of the Company to “develop and disseminate information products and communication strategies that will promote agricultural research and expand society's support for Brazilian agriculture.” (Embrapa, 2015, p. 13).

The Organizational Communication Nucleus (NCO) is a sector directly linked to the head of the research center, and its performance is included in the strategic planning of the Unit.

Based on this perspective, communication has the potential to become an instrument and also an intelligence process, a source of value generation and competitive advantage. After all, as it permeates all organizational dimensions – human, economic, marketing, cultural and social – communication is inextricably linked, whether acknowledged or not, to corporate performance as a whole (Mello, 2010, p. 200).

Communication actions are built at the Unit in a planned manner and then integrated with Embrapa's communication plan, which outlines strategies with corporate reach, aimed at the institution's various stakeholders.

When preparing a communication plan, professionals must take care that their objectives and goals are not merely related to their productions – preparing publications, holding events, preparing reviews, and other productions. These can actually be means to reach nobler ends, such as effects on the relationships between the organization and its audiences (Galerani, 2006, p. 54).

The research center has been improving its performance in the communication area, investing in the composition and training of its team of professionals, so they can quickly respond to the new challenges imposed by the digital transformation. One of the main results of these investments is the consolidation of Embrapa Agricultural Informatics as a reference center in the field of digital agriculture, recognized by society and opinion makers.

The Unit has had a strong presence in the press in ICT reports, Agriculture 4.0, internet of things and development of technological solutions for the field. In 2019, the repercussion of news citing Embrapa Digital Agriculture increased by 123% compared to the previous year, with more than 1,450 news retrieved, which were published in local, regional, national and international media. Figure 1 shows some examples of inclusion in the media.



Figure 1. Covers of the magazines Pesquisa Fapesp, Dinheiro Rural and Globo Rural, which cited Embrapa Digital Agriculture.

In addition to producing podcasts for the radio program *Prosa Rural* by Embrapa<sup>2</sup> and video reports for the television program *Dia de Campo on TV*<sup>3</sup> about the technologies developed, the Unit is present on social networks on Embrapa's channels on Facebook<sup>4</sup>, Instagram<sup>5</sup>, Flickr<sup>6</sup>, Twitter<sup>7</sup> and Youtube<sup>8</sup>. Figure 2 shows the dissemination of posts and tweets on social networks about research and developed technologies.

The Internet Portal<sup>9</sup> is one of the channels that Embrapa Digital Agriculture uses to publicize research and its results, in addition to presenting technological solutions, institutional and technical-scientific publications, available products and services. Aware of the external demands of its audience, the Unit is concerned with the permanent updating and revision of content to facilitate access for the population. Furthermore, the intense participation in agricultural events and exhibitions is to disseminate technologies, products and services, always seeking to approach and strengthen relationships with rural and urban audiences.

The challenge is to continue creating innovative strategies in the relationship with this society, which has a more participative and dynamic new profile. It's not just the tools that evolve, but also the organizational culture. It is important to have a receptive and open attitude to dialogue, which contributes to this closer proximity and interaction with the institution's stakeholders.

We can add that in a complex environment, communication can only fulfill its role as a strategic management tool when the company creates the true channels for communication to fulfill its basic social principle, that is, its democratic character so as to enable all



Figure 2. Posts on artificial intelligence research and technological solution.

<sup>2</sup> Available at: [www.embrapa.br/prosa-rural](http://www.embrapa.br/prosa-rural)

<sup>3</sup> Available at: [www.embrapa.br/dia-de-campo-na-tv](http://www.embrapa.br/dia-de-campo-na-tv)

<sup>4</sup> Available at: [fb.com/embrapa](https://fb.com/embrapa)

<sup>5</sup> Available at: [instagram.com/embrapa](https://instagram.com/embrapa)

<sup>6</sup> Available at: [flickr.com/embrapa](https://flickr.com/embrapa)

<sup>7</sup> Available at: [twitter.com/embrapa](https://twitter.com/embrapa)

<sup>8</sup> Available at: [youtube.com.br/embrapa](https://youtube.com.br/embrapa)

<sup>9</sup> Available at: [www.embrapa.br/agricultura-digital](http://www.embrapa.br/agricultura-digital)

individuals to share ideas, behaviors, attitudes and, above all, the organizational culture. This democratic character is expressed through dialogue and the production of meanings (Cardoso, 2006, p. 1.135).

Therefore, the Organizational Communication Nucleus of Embrapa Digital Agriculture is also guided by an action aligned with Embrapa's innovation process. Hence, it develops strategies to promote connections with the Unit's various stakeholders, including institutions, companies and partners, in order to strengthen relationships, in addition to reinforcing the image of an innovative company in the agricultural sector.

Support is highlighted in the pioneering spirit, especially from 2018 onwards, with the organization of events such as Embrapa's first hackathon – programming marathon – with the theme of automatic diagnosis of diseases in agricultural crops, and conducting meetings related to the theme of data science and digital agriculture. Among these events, SBIAgro Conect@ stands out, focused on promoting qualified networking between institutions, companies, accelerators, investors, developers and users of ICT.

Communication professionals also supported the construction of the methodology for the first acceleration program for startups that work with agricultural technologies (agtechs), the TechStart Agro Digital. The relationship and interaction with the program's startups were facilitated precisely by the work of these professionals, from the program's conception up to the selection and interview phases, in addition to mentoring specialized in communication techniques, with the use of digital media and the creation of exclusive relationship channels between members of startups and communicators.

The communication area also plays an important role for supporting various events aimed at innovation and for conducting mentoring. Among the programs carried out with the participation of communicators are Sebrae Startup SP, Samsung Creative Startups, InovaPork, carried out by Embrapa Swine and Poultry, and the Bridges for Innovation, organized by Embrapa's Department of Innovation and Business (SIN).

Digital media was one of the strategies adopted, which has greater reach and faster and more qualitative delivery. It is noteworthy that traditional communication vehicles, which have a limited reach and are usually aimed at the technical-scientific audience of these events, were not replaced, but digital and interpersonal communication, guided by a closer relationship, gained focus.

As shown, the communication actions are created by the NCO with a planned and integrated approach, permeating all institutional processes and the different areas of activity of the Unit, in order to effectively achieve the institution's objectives. Also noteworthy are the relationship strategies with the internal public, for which the NCO develops targeted communication actions and supports events, in line with the personnel management area.

We understand integrated communication as a philosophy that directs the convergence of different areas, enabling a synergistic action. It presupposes a combination of institutional communication, marketing communication, internal communication and administrative communication, which form the mix, the combination of organizational communication (Kunsch, 2003, p. 150).

## Educommunication to support collective creation

With technological progress, the convergence and integration of new media, the production and distribution of information are marked by significant changes. Although throughout its history man has used instruments to communicate, the universalization of the means and resources of the contemporary

world is now especially unique, pressing the communication means and ICTs to configure a new model of Man and Society (Gómez; Aguaded, 2011, p. 4).

Society organized in “virtual networks” is configured based on new spaces that can favor the process of sharing and creating content, with a collaborative and more participative approach. From the connectivity, mobility and portability resources of the web, any citizen can become a producer and consumer of information (Pereira, 2013, p. 1).

In the information society, this new paradigm of collective construction guided by the convergence of media, which enables organizing in networks, makes subjects to no longer be mere consumers-receivers, making them individuals-consumers. This new approach, based on constructivist learning, takes into account the numerous resources provided by ICT as possibilities for active appropriation, based on the individual’s autonomy and cooperation, including creation, authorship, human development and innovation.

Technology offers enormous potential for interactivity, but there is considerable complexity in these mutual interactions mediated by technological resources, which include “reciprocal action, cooperation and collective creation” (Primo, 2008, p. 148) which cannot be ignored. In this regard, the exchange of knowledge in a digital world can be enriched by a pedagogical proposal designed to support the collective construction of knowledge and encourage the subject’s critical view and autonomy.

The communication/education interrelationship constitutes a field of social intervention, called educommunication, characterized by a political action for the contribution of an ethical conscience and a pragmatic approach aimed at transforming society. This action is based on the formation of critical, participative citizens who are part of the social environment and the implementation of social utopias of quality education and participatory and democratic communication (Schaun, 2002).

Education is a science concerned with the formation and constitution of the human being as a subject, in other words, a being who thinks about his reality, reflects and acts on it, transforming the environment in which he lives. The proximity of the fields of education, communication and technology favors multiple views on the human condition and development, enabling the shared construction of information, knowledge and experiences in a context of exchanges and social interactions that can encourage the exercise of citizenship (Pereira, 2013, p. 2).

According to the Communication and Education Center (NCE) of the University of São Paulo (USP)<sup>10</sup>, studies carried out on the interrelationship between communication and education point to the emergence of a social intervention field characterized by offering theoretical-methodological support that allows social agents to understand the importance of communication actions for human coexistence, the production of knowledge and the elaboration and implementation of collaborative projects for social change.

The concept of educommunication actually proposes the construction of open, dialogical and creative communicative ecosystems in educational spaces, breaking the hierarchy of knowledge distribution, precisely because of the recognition that all people involved in the flow of information are producers of culture [...]. Therefore, the goal of educommunication is to construct citizenship, based on the basic assumption of everyone exercising the right to expression and communication (Núcleo de Comunicação e Educação, 2012).

From the point of view of interactions, it can be said that communication is a social process focused on expanding the capacity of individuals to interrelate as active agents in the environment in which

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<sup>10</sup>NCE – USP. Available at: <http://www.usp.br/nce/onucleo>

they live, promoting changes in their reality based on these interactions. Educommunication emerges from this conception, which is based on the communication/education interrelation. It is about adopting a perspective of educational communication that is designed as a dialogical relationship of educative action, defined as a “field of dialogue, space for critical and creative knowledge, for citizenship and solidarity” (Soares, 2000, p 12).

For subjects to effectively take ownership of productive processes, it is important for learning environments to be characterized by the constructivist approach and that they favor intellectual exchanges, the development of thought, cooperation, leading to reflection on actions, and the awareness that determines their moral and intellectual autonomy (Piaget, 1998). Therefore, technological resources must be incorporated into a transformative critical-reflective pedagogical proposal, which promotes articulations between the educator’s knowledge and their practice, favoring learning based on interaction, collaboration and cooperation between students and educators.

Thus, the communicators at Embrapa Digital Agriculture have also supported technology transfer projects that are guided by a vision supported by the concepts of educommunication, considering the autonomy and critical perception of the subjects involved.

## Dialogical communication to support sustainable development and popularization of science

The United Nations (United Nations, 2015) established, in the 2030 Agenda, the 17 Sustainable Development Goals (SDGs) to support the construction and implementation of public policies worldwide. Embrapa understands that agricultural research plays an important role in achieving the 169 goals of the Agenda aimed at human development, as “food production in line with the generation of sustainable innovation in the field contributes to improving the quality of people’s lives, to reduce the price of basic food and to export Brazilian products” (Embrapa, 2020a).

To align its work with the international commitment, Embrapa carried out a comprehensive evaluation of its agricultural research and innovation program, mapping how the Impact Axes and the 12 Strategic Objectives described in its VI Master Plan are related to the 17 SDGs. The Company understands that this is a way of being accountable to society and showing alternatives for an increasingly sustainable agriculture, serving as a model for other countries.

Also with the objective of contributing to the SDGs and subsidizing strategic actions in science, technology and innovation, Embrapa established the Strategic Intelligence System, Agropensa, responsible for widespread monitoring of the external environment focused on capturing signals and trends to elaborate scenarios and future visions for Brazilian agriculture (Embrapa, 2018b). The leading role of consumers is one of the megatrends indicated in the document Vision 2030: the future of Brazilian agriculture:

The exponential growth of Information and Communication Technologies (ICT) applications means that individuals have much more power to influence food production chains, and their food consumption decisions are based on continuous interactions with production agents, which, together with the expanding market niches, consubstantiate this megatrend. In this context, the convergence of accelerated global movements intensify the use of digital platforms in consumer relations, the co-creation of products and services and the growing access to information by digital means. Safe, traceable, healthy and produced through sustainable processes will be increasingly valued (Embrapa, 2018b, p. 12).

At Embrapa, numerous solutions generated by agricultural research are made available on a daily basis in different formats, so as to broadly disseminate the knowledge produced. Moreover, the Company's communication is inserted in this context. Embrapa is concerned not only with production, but with sustainable consumption that provides a better quality of life for the population:

Brazilian agricultural research faces many challenges regarding sustainable development, including systematizing all the knowledge generated, standardizing and integrating methods, translating knowledge into solutions to be directly appropriated by society, sufficient financial resources, proximity of scientists and decision makers, and other challenges. The mission of the Brazilian Agricultural Research Corporation (Embrapa), based on the results of its research, is to contribute to the sustainable development of agriculture (Palhares et al., 2018, p. 7).

The Company is also aware of the technological revolution of the last decades, which is marked by an accelerated computerization and digitalization process of analog procedures and by the development of new information and communication technologies (Antunes et al., 2018, p. 77). As a promoter for generating technical-scientific knowledge, Embrapa needs to make it accessible to the different segments of its stakeholders, from rural producers to consumers.

Several lines of study theorize about communication forms that are more compatible with the appropriation of knowledge and learning processes. Both are essential to translate scientific advancement and influence the life of rural producers, especially for those who belong to the uncomfortable statistics verified by the Brazilian Institute of Geography and Statistics (IBGE) on education in the countryside: approximately 80%, that is, the vast majority of rural producers in Brazil have primary education or have never attended school<sup>11</sup>.

Considering that 77% of agricultural establishments<sup>12</sup> are in the category of family farming<sup>12</sup>, one of the challenges seen is understanding how communication can support the process of translating knowledge into solutions to be appropriated by the beneficiaries. And, educommunication is exactly one of the lines that seeks to bring together education, communication and technology for the shared construction of knowledge.

Based on the concept of a dialogical and transforming education, focused on solidary construction and knowledge sharing, it breaks with the vertical model of disseminating and transferring content to a liberating education, grounded on a process of analysis and reflection, in which subjects learn to think and, thinking, they are capable of promoting changes in their reality (Freire, 1982).

At Embrapa, some experiences and perceptions for ensuring the appropriation of knowledge are identified, even if they are incipient, given the wide range of actions provided by organizational communication. One of the examples related to collective production resulted in the publication of *Colegio Povos e Comunidade Tradicionais*, launched in 2017, which brings together reports on works carried out with rural communities and their traditional knowledge (Antunes et al., 2018, p. 77).

Another initiative also took place within the scope of the Pedagogical Production Methodology of Multimedia Materials with an Agroecological Focus on Family Farming (Pedagroeco<sup>13</sup>). Coordinated by Embrapa, with the participation of four Decentralized Units (Semi-arid, Coastal Tablelands, Middle-North

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<sup>11</sup> According to data from the 2017 Agricultural Census, the rural producer has higher education in only 5.58% of agricultural establishments in Brazil. In high school, adding the numbers of the scientific article, EJA, and high school technician, they represent 14.95% (IBGE, 2017).

<sup>12</sup> In the IBGE classification for the Agricultural Census, family farming has different dynamics and characteristics from non-family farming. In it, property management is shared by the family and agriculture is the main source of income (IBGE, 2017).

<sup>13</sup> To learn about the project, go to (Embrapa, 2020b).

and Cotton), the project was carried out in partnership with civil society organizations. The objective was to develop a methodology to encourage young rural students to use ICT, in the context of family farming and agroecology.

The Organizational Communication Nucleus of Embrapa Digital Agriculture coordinated actions to train multipliers in the state of Piauí. In all, more than 200 young people were trained in five states in the Brazilian semiarid region. Organized as workshops, as shown in Figure 3, the training included the Griô Pedagogy as a policy-methodological reference (Pacheco, 2014), which conducted the actions throughout the entire process of training young people.



Fotos: Magda Cruciol e Rosival Dias



Figure 3. Young students participate in multimedia production workshops.

The methodological approach<sup>14</sup> ensured participatory processes anchored in the transformative and autonomy perspective advocated by Freire (2011), and the material produced resulted in 18 videos. The experience and interactions among Pedagroeco participants showed how communication and the use of ICT, anchored in the Griô Pedagogy action model, played an expressive role in the knowledge appropriation processes and in the affirmation of identity of the young people involved in the project.

This perspective of network communication, with its characteristics that break with traditional notions of time and space, allows the reconfiguration of public powers, since “only looking at the technological bias in educational processes can be related to emptying the cultural dimension in question, as well as a fragmented thought of knowledge” (Ferreira, 2019, p. 10).

<sup>14</sup>The Griô Pedagogy is the pedagogy of experiencing affective and cultural rituals that facilitate dialogue between ages, groups and communities, through an enchanting, experiential, dialogic and shared method for the development of knowledge (Pacheco, 2006). Discover the history of the Griô Pedagogy. Available at: [www.graosdeluzegrio.org.br](http://www.graosdeluzegrio.org.br).

## Final considerations

The progress of information and communication technologies (ICT), especially from the 20<sup>th</sup> century onward, transformed human communication, democratizing access to the new media. As regard communication and the process of scientific dissemination, new media are accessible instruments that enhance the generation of knowledge in a collaborative way and facilitate the popularization of science.

Currently, a unidirectional communication process is no longer accepted, as citizens increasingly want to hear and be heard. In this context, the individual is at the center of decisions, and at the same time is a producer and consumer of information and knowledge, since democratizing the means of communication allows anyone to be a source of information.

This reality impacts the way in which companies and research institutions relate to society and their strategic audiences, in a disruptive way, since the technological resources of connection and interactivity expand social interaction and collective construction in the so-called cyberspace. Thus, there is growing concern with a more interactive digital communication for a more effective sharing of information and scientific dissemination.

With the new media, content production has grown exponentially. However, the process of scientific dissemination and technology transfer requires ensuring the quality of information, as they strongly impact the lives of citizens. Therefore, it is up to research institutions to find innovative ways to interact with society and its strategic audiences, implementing new mechanisms for scientific dissemination that include interactivity and collective participation, with social responsibility.

The progress of the means of communication, driven by technological development, has produced changes in habits and behavior. This requires a more educated and thoughtful attitude with the media based on inclusion, ethics and citizenship, supported by a pedagogical approach with the media. The mediation of the fields of education and communication, known as educommunication, seeks to encourage integration, reflection and the production of ethical contents that promote social transformations for the subjects involved in communicative processes.

Public research, development and innovation institutions are committed to promoting the dissemination of the knowledge produced as well as transferring the technologies generated, to promote the development and scientific literacy of society. Aware of its external recognition as reference in tropical agriculture research and of the excellent results in communication with society, Embrapa encourages innovation in its communication practices and communication channels focused on new media and technological resources.

Therefore communication must contribute to the dissemination of science and its results through innovative actions that consider a new way of talking to society, interacting through the exchange of knowledge, taking advantage of the potential of new technologies, which are increasingly within reach for the greatest number of people.

Thus, several actions have been developed to share information and promote a better relationship with the rural and urban public. Information and communication technologies can be used to help restructure channels that manage information and communication flows, in order to enhance the development of new social media for scientific dissemination.

Among the actions carried out, the most effective use of new technologies stands out, which add interactivity resources and benefit network performance, allowing the public not only to know but to

interact and contribute to the production of knowledge, reflecting on their role as interactive user under a new perspective of participation and collective construction.

This can help to better understand strategic audiences, through the dissemination of research results, technologies, products and services, in an accessible and interactive approach. Embrapa already has several strategies to bring science to the population through events, radio and television programs and internet portals. However, it is also necessary to study new methods to adapt the language and facilitate people's access to scientific knowledge, promoting interactivity, in addition to capturing their demands, in a dialogical relationship.

Embrapa Digital Agriculture develops several initiatives to bring the results of research and technologies, products and services to the public knowledge, contributing to the dissemination of ICT, especially in the rural sector. With the production of publications, radio and television programs, events and participation in agricultural fairs and exhibitions, the research center stands out as a reference in the matter of digital agriculture, including a strong presence in the media.

In the research area, the Unit has been expanding its collaborative operations with the private sector, through joint projects to develop technological solutions. Regarding technology transfer, partnerships were also expanded, especially with companies and startups in the digital ecosystem. It is up to the communication area to find new ways to build and strengthen more open and integrated relationships with the institution's audiences, supporting actions for a more connected and digital agriculture.

The challenge for communication professionals is to discover innovative ways to disseminate the science produced to a society that increasingly demands for real-time information. It is expected that public research institutions will be able to promote innovations in their communication processes, which will help to improve the relationship with society and contribute to expanding the knowledge and participation of their audiences in relation to the development of research and its results.

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