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# ICT4D and RCS for Digital Platform Development: The Case of Onda Rural

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Abstract

The field of information communication technologies for development is presently geared towards digital development. The implementation of tools like digital platforms aid in the integration of underdeveloped regions into an increasingly digitized world. The present research analysed one such platform operating through an initiative named Onda Rural, promoting family agriculture practices in the region of Latin America and the Caribbean. The research was done in collaboration with the Food and Agriculture Organization of the United Nations. Therefore, the goals of the research were threefold: to identify factors influencing the organizational effectiveness of Onda Rural, how the ICT platform contributes to this effectiveness, and areas of improvement for the initiative. A modified version of Midrange Socio-Technical Systems theory was utilized to include factors relevant to digital platforms and organizational effectiveness. Through a deductive analysis which utilized this theoretical framework, seven factors were identified as most influential. These include: the alignment of organization values and cohesive vision which contributed to collaboration and network creation; the standards and routines allowing consistent and quality creation of content; streamlined communication and dynamic information contributed to the effectiveness of daily operations; and the modularity and reliability of the digital platform allowing for the greatest avenues for continuous improvement. Six recommendations were also detailed concerning future steps that Onda Rural can implement for the increase effectiveness of the initiative in achieving its goals of supporting the communication, capabilities, and participation of family farmers in the Latin American and Caribbean region.

Keywords: *communication for development, information communication technology for development, rural communication services, digital platforms, socio-technical systems, Onda Rural.*

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# Introduction

## Background

The field of communication for development has become greatly integrated in the use of information communication technologies (ICTs) throughout the years. This has resulted in the field of ICTs for Development (ICT4D) which aid in addressing the growing digital divide occurring between developed and developing countries that encompasses economic, social, and political matters (Ragnedda, 2018). The ICT4D landscape is presently geared towards digital development, characterized by the inclusion of digital roles, digital products, and digital business models with the goal to enable participation in and benefit from the digital economy, to reduce poverty and inequality (Heeks, 2020). A dominant tool used to achieve this are digital platforms which encompass a wide variety of socio-technical factors, particularly when operating within developmental contexts (Bonina et al., 2021). Therefore, the understanding of these platforms and their effectiveness in bridging the digital divide are critical to their success. The present research takes the case of Onda Rural, an initiative focused on regional integration on family farming issues and inclusive communication services that articulates the experiences and practices of different actors in Latin America and the Caribbean with the aid of a digital platform.

## Motivation

The present research is done in collaboration with the Food and Agriculture Organization (FAO) who have provided access to the internal operations of Onda Rural. This has provided the opportunity to study a regional initiative through prominent organizations within the field of agriculture and ICT4D. The relevance of integrating ICTs in the agricultural sector has been identified by major organizations including the United Nations, through the FAO, and the European Union, through the European Commission (World Bank, 2017). The present research is most importantly focused on the betterment of ICT platforms in Latin America and the Caribe. This is relevant as it is a region currently on the outset of the digital divide concerning the integration of ICT into their agricultural practices, especially pertinent as they are a key producer of food on the global scale (United Nations, 2018). In this vein, Onda Rural is actively attempting to improve the local families'

access to various communication and educational resources, provide connectivity, and agricultural innovation in the region.

**Objective**

As this research is done in a collaborative effort with the FAO, one of the objectives of this research is to make recommendations of improvement for the future development of the Onda Rural platform. This practical goal, while uncommon in academia, will aid FAO and contribute towards the literary body by serving as a case study. To achieve these recommendations for improvement, the research aims to identify factors of influence contributing to the effectiveness of Onda Rural. Additionally, to contribute towards the field of ICT4D an emphasis is placed on the contributions of the ICT platform on the effectiveness of Onda Rural. Thus, the factors include aspects of organizational design, digital platform environments, and stakeholder relationships.

**Research Question**

- What are the factors influencing the organizational effectiveness of Onda Rural?
- How does the ICT platform contribute to the effectiveness of Onda Rural?
- Which are the areas of improvement for Onda Rural?

**Scope and Delimitation**

The scope of the research is limited to the participation of member organizations of Onda Rural. These include the leading organization and three partner organizations, each operating in different countries of the region and contributing to Onda Rural. Therefore, there is no inclusion of the end-user perspective. Furthermore, the initiative is analysed through an overarching theoretical framework which gives insight into various aspects but does not provide too much depth with which each factor can be explored.

## State-of-the-Art

The following section provides context for the topics in which the research is contextualized. The case study operates in the field of communication for development (ComDev) through the application of information communication technologies (ICTs). As the developmental landscape continually changes, often in response to external forces, an understanding of the paradigm's growth is necessary. This provides insight into its current state and gives relevant information that is utilized in the empirical aspects of this paper.

### Communication for Development

Communication for Development (ComDev) is a social process based on dialogue using a broad range of tools and methods. It is about seeking change at different levels including listening, establishing trust, sharing knowledge and skills, building policies, debating, and learning for sustained and meaningful change (World Bank, 2014). The process goes beyond information dissemination to facilitate active participation and stakeholder dialogue. It highlights the importance of raising awareness, the cultural dimensions of development, local knowledge, experiential learning, information sharing and the active participation of rural people and other stakeholders in decision making (World Bank, 2014). ComDev has shifted in prominence as organizations have fought for its inclusion and relevance. Initially called Development Support Communication (DSC), the model was based on transferring western, industrialized technology to developing countries as support for communication (Balit & Acunzo, 2020). This was mostly focused on technical knowledge, with the hopes of utilizing mass media as a source of wide range integration. However, few governments in developing countries established a dialogue with rural people to allow de-centralized decisions to take place. Technologies that were targeted for implementation included participatory use of radio and video, creating unilateral communication. In Mexico one initiative sought to train farmers to produce and use communication materials to aid in the identification of needs (Fraser & Restrepo-Estrada, 1996). In Africa, radio services were brought to villages and programs were produced in local languages considering local customs and values (Ilboudo, 2003).

Due to the technical and hard science focus, communication was misunderstood and became hard to implement in rural areas of developing countries where illiteracy was prevalent. Therefore, the various DSC programs aimed to make communication recognized as a social process to improve lives of rural people and increase participation (Balit & Acunzo, 2020). To provide a more strategic approach to communication in a consultation of experts was organized in 1987 with academics as well as communication specialists from all regions (FAO, 1987). Important take-aways were the emphasis of knowledge sharing and participation to have an exchange of communication, as to dissipate the trickle-down approach of western technologies previously applied. This would also influence the role of technology as a tool, and not the soul solution.

In 2006 FAO held a global forum including a multitude of country representatives to emphasize the role of communication in a push to integrate ComDev into the creation of policies and legislative practices. However, soon after, FAO downgraded the discipline during a reforming process, so did UNESCO. This was due to globalization and the privatization of public services, free markets, and international trade agreements which caused serious effects on governments, local communicates and vulnerable group (Balit & Acunzo, 2020). The private sector emphasized results-based management and logical framework, leaving little room to participatory approaches. Bundled together with the rise of newer ICTs, lead to rural communities being absent in decision-making processes.

Efforts to remediate the lost interests included several international events such as IX UN Roundtable in 2009 and the FAO Expert Consultation in 2011 with the goal of mainstreaming ComDev within organizations (Balit & Acunzo, 2020). This has led to the development of ComDev specific teams in international organizations such as FAO and UNESCO which focus on assistance to strategic objectives and programs, capacity building partnership, and networking, and creation of evidence, advocacy, and policy dialogue (World Bank, 2014). To achieve these goals, the contemporary focus has been in the development of Rural Communication Services (RCS). These are projects that are meant to be sustainable, inclusive, and efficient communication opportunities with a wide range of processes, activities, media applications, and institutional arrangements (Torres et al., 2017). RCS are aimed to create participative

inclusion of the rural population and underrepresented communities. They provide a framework to promote policy dialogue, social inclusion, participatory decision-making, appropriation of the ICTs by rural people, stronger links between rural institutions, and communities. Therefore, the application of RCS requires research as they herald the continued work of ComDev and the progress that it brings to underdeveloped rural regions.

**ICTs for Development**

The importance of information communication technologies (ICTs) has been present for many years. From the dawn of ICTs, the potential of digital computation and information technologies as a tool for economic growth has been at the forefront of multinational firms. Consequently, a digital divide was created almost in parallel as many developing countries have failed to keep up with the technological developments (Ragnedda, 2018). This divide is only growing as economic, social, and political aspects of life are becoming increasingly digital. In response, the field of ICTs for international development (ICT4D) began to flourish. Heeks (2008) provides three main arguments showcasing the relevance of prioritizing ICTs for this purpose. The first is a moral argument. Where the world's poor live at the forefront of the planet's biggest problems, including climate change, disease, and resource depletion. The poor in developing countries suffer the most, and hence have a higher ethical importance than profiting wealthy corporations. The second argument is the enlightened self-interest in a globalized world. Where the problems of the poor today, can become problematic for those on the top through migration, terrorism, and disease epidemics. Conversely, as the poor become wealthier, they can consume the goods and services provided by the industrialized countries. The final argument tis through personal self-interest. Where the development of systems for developing countries is more interesting, satisfying, and richer than for fully developed ones. Together, these arguments have given root to the ICT4D movement and only continue to be more prevalent as the digital divide grows.

The history of ICTs for international development can be categorized into three main phases, each describing how developing countries have responded to the rapidly growing landscape of information technologies. Heeks (2009) segments these phases in periods which are distinguished by specific technologies, key goals, and issues,

amongst other aspects that were prevalent in the characterization of the paradigm at the time. A summary of ICT4D phases can be found in Table 1 detailing what technology was prominent, who ICT4D was targeting, and what the aim was. The precursor to the initial phase, or ICT4D 0.0, was inaugurated with the rise of the internet which prompted the creation of several political movements, most notably, the International Development Goals in 1996 which formalized the Millennium Development Goals (MDGs). Each of the following phases was hence shaped by the MDGs and provided valuable lessons with their technology's implementation. The first phase, ICT4D 1.0, was focused on the use of telecentres, a space designed to deliver information, encourage communication, and provide services to poor communities with support of ICT partner companies (Heeks, 2008). It was a model inspired by its previous use in North America and Europe years before, essentially creating a supply-driven model where the poor attempted to catch up through communal spaces. The second phase, ICT4D 2.0, saw the mass use of mobile phones as an avenue for a demand-driven model. Here the innovation was created from the bottom-up, taking into account the poor's specific resources, capacities, and demands (Heeks, 2009). The particpation of actors was driven by many more sectors as they had direct access to individuals.

| **Issue / Phase** | **ICT4D 0.0** **(1960s – mid 1990s)** | **ICT4D 1.0** **(mid-1990 s– mid-/late-2000s)** | **ICT4D 2.0** **(mid- /late-2000s onwards)** |
|---|---|---|---|
| Iconic Technology | PC Database | Telecentre | Mobile Phone |
| Key Application | Data Processing | Content (& Interaction) | Services & Production |
| The Poor | Who? | Consumers | Innovators & Producers |
| Key Goal | Organisational Efficiency | MDGs | Growth & Development? |
| Key Actor | Government | Donors & NGOs | All Sectors |
| Key Issue | Technology's Potential | Readiness & Availability | Uptake & Impact |
| Attitude | Ignore → Isolate | Idolise → Integrate | Integrate → Innovate |
| Innovation Model | Northern | Pro-Poor → Para-poor | Para-Poor → Per-Poor |
| Dominant Discipline | Information Systems | Informatics / Development Studies | Tribrid of CS, IS and DS |
| Development Paradigm | Modernisation | Human Development | Development 2.0 |

Table 1. Summary of ICT4D Phases from Heeks (2020)

These initial phases showcase the relationship ICT has had with the developing world, a continuous reassessment of strategies and evolving models. Consequently, policy has had to adapt. This is seen with the advent of the Sustainable Development Goals (SDGs), settled by the United Nations (2015) covering the period of 2015 to 2030 as a new set of objectives after the period of the MDGs expired. The SDGs are comprised of seventeen specific goals to aid the development of people and the planet towards prosperity and peace (United Nations, 2015). Regarding ICT4D, the SDGs prioritize the inclusion of all for equal opportunities, sustainability in all ICT solutions as to not compromise future generation's needs, as well as transformation of an incremental development approach as to keep up with changes in the ICT landscape (Heeks, 2020; United Nations, 2015).

The changes mentioned have been significant, with general trends pointing to a new phase of ICT4D, 3.0. These trends revolve around the dissemination of digital technologies in the developing world. Where previously on the outset, digitization has impacted the low-income communities both urban and rural, been implemented in a wide variety of sectors, and has provided depth to ICTs (Avgerou, 2017; Heeks,

2020). This trend can be seen in Figure 1 and 2, highlighting ICT indicators for developing countries and the increased affordability. The phase conceptualizes the higher level of connectivity through a paradigm of digital-for-development. The paradigm is characterized by several blocks of development, including digital roles, digital products, and digital business models with the goal to enable participation in and benefit from the digital economy, to reduce poverty and inequality (Heeks, 2020). However, there are risks with this level of integration. Ezeomah and Duncombe (2019) see this trend as a potential disruption to value chains in developing countries, making a pro-active approach for these regions essential. Otherwise, it is possible for the digital economies to continue to be dominated by external forces. Hence the importance of research within the field of ICT4D rises to emphasize development, delivery, and communication (Heffernan et al., 2016).

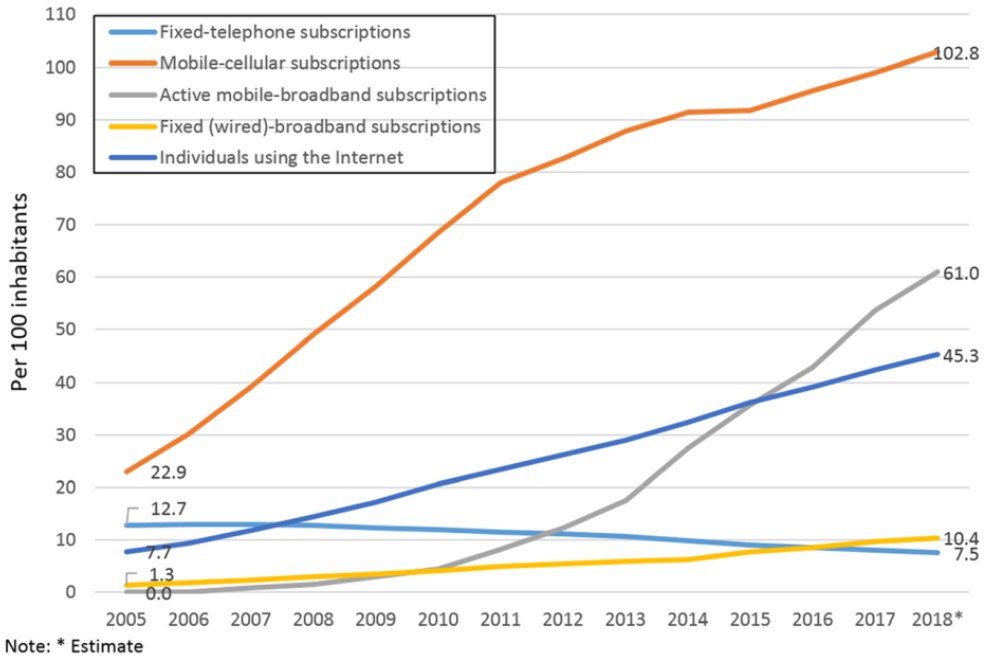


Figure 1: Digital ICT Indicators for Developing Countries (*ITU*, 2018)

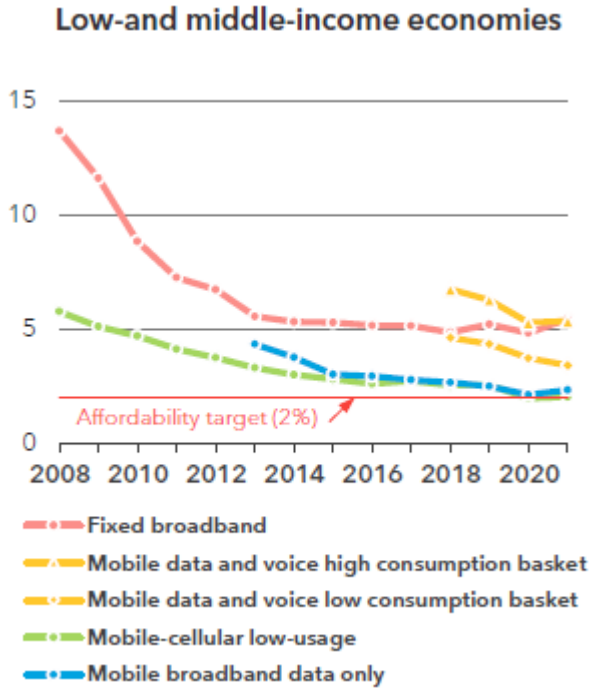


Figure 2: Affordability of ICT Indicators for Developing Countries (*ITU-D ICT Statistics*, 2020)

**Onda Rural**

Onda Rural is an initiative focused on regional integration on family farming issues and inclusive communication services that articulates the experiences and practices of different actors in Latin America and the Caribbean (*Onda Rural*, 2004). The initiative has its beginning in 2004, with participation of representatives of community radio stations, developing agencies, indigenous and peasant organizations, among others. Onda Rural became formally inaugurated in 2006, during the World Congress on Communication for Development by the FAO and AMARC LAC, where it introduced communication into rural development policies and programs (*Onda Rural*, 2004). The initial aim was to formulate strategies, projects, research, and collaboration mechanisms between development entities, communicators, and radio networks. In 2016, the FAO and the International Centre for Higher Communication Studies for Latin America (CIESPAL), who would later on become the leading body of Onda Rural, pushed for the strengthening of the network and promote public policies and programs that contribute to the promotion of family farming and rural development (*Onda Rural*, 2004). Hence, it began to

have its focus on the individual users and utilizing the reach of the various organizational entities to access the families and provide its various rural communication services.

Currently, Onda Rural is comprised of eleven core organizations that are part of a partner committee overseeing, managing, and creating the numerous projects and activities within the initiative. These partner organizations are from various sectors including radio broadcasting, agriculture, education, agencies for development, advocacy groups for marginalized people, local policy parties, among others. The initiative has recently begun a new phase of development with a focus on three core objectives. First is to facilitate and support participatory communication about on-going activities, policies, and programs relating to family farming and rural development. The second objective is to strengthen and develop the communication capabilities of actors operating at regional, national, and local levels. Finally, Onda Rural looks to diffuse and document experiences on policies and programs in the region around family farming and rural development through rural communication services. These goals and their components are detailed through the Plan of Participative Communication 2022, which highlights the strategic actions, expected results and future actions that Onda Rural plan to undertake. This documentation is present in Appendix A.

The embodiment of the products and services that Onda Rural creates for reaching these objectives takes place within a digital platform. This platform contains educational material, forums to share experiences, news of current events, as well as promotion for the other projects performed by the partner organizations, such as informative radio broadcasts. The As the digital platform plays such a central role in hosting the multitude of services provided by Onda Rural, its functioning and place within the overarching organization require careful understanding. This is particularly true due to the involvement of such numerous and varied partner organizations, each operating in their own field and region. Alignment between stakeholders is necessary to ensure that the objectives set by Onda Rural can be met and the initiative continues to improve.

## Literature Review

### Digital Platforms

Research in digital platforms is present in various fields of study. These are largely focused on economics, industrial innovation, and management research (de Reuver et al., 2018). This is due to the large role that platforms play in technologically focused corporations, including the big five of Microsoft, Alphabet, Apple, Amazon, and Metaverse (Witt, 2022). While relevant, the western industry perspective dominates the space, leaving gaps concerning the creation and implementation of digital platforms within the developmental context (Bonina et al., 2021; Gomez-Morantes et al., 2022; Koskinen et al., 2019). Current research involving developing countries and digital platforms mostly revolves around the impact of western platforms, such as connectivity, creation of employment opportunities, innovation, and income (Bucci et al., 2019; Fu et al., 2021; Koskinen et al., 2019). Thus, the present research focuses on the implementation and operation of the Onda Rural platform. A digital platform that has been developed and managed by FAO and CIESPAL, alongside regional organizations for local use. And in doing so, providing the perspective of a platform created by and for rural sectors within developing countries.

When discussing digital platforms, the terminology differs based on the field of study. But there are key characteristics that help define digital platforms. These include, being technologically mediated, providing interaction between user groups and digital resources, being products or services, and created for the benefit of user groups (Cusumano et al., 2019; de Reuver et al., 2018). The platforms in themselves are only tools and require entire ecosystems of various actors and interdependent components. The extent of these ecosystems can also differ, but they do require consideration not only for the technical properties, but also their functioning within a societal context (Fu et al., 2021; Gomez-Morantes et al., 2022; Kapoor et al., 2021). This is particularly true in a developmental context because as the ICT4D movement begins to grow within the developing world, so do their ramifications. Questions of access, inclusivity, technological characteristics, and individual capabilities in terms of skills and resources become much more relevant and require a wider lens when considering the environment in which these digital platforms operate (Bonina et al., 2021; Gomez-Morantes et al., 2022). Therefore, the present research has a socio-

technical view to its terminology. In this context, the concept of digital platforms concerns the technical elements, including software and hardware, and associated organizational elements, such as processes and standards (de Reuver et al., 2018). In the case of Onda Rural the digital platform includes the main website alongside all social media extensions and extra modules that provide spaces for the rural communication services that they offer. These services include radio programs, news repositories, and digital community hubs, all of which are managed from the servers located in CIESPAL. Platform ecosystems refers to the platform's network as an assemblage of its actors interacting with a contribution to the complementary components (Cusumano et al., 2019; Kapoor et al., 2021). For Onda Rural this relates to the various actors that help in the functioning of the initiative including the committee of partner organizations who create and help diffuse RCS, as well as the end users that consume, interact, and participate in the ecosystem.

Literature of digital platforms in a developmental context often showcase the socio-technical consideration necessary so that the platforms have the desired effect. If proper contextualized design is not considered, it is possible to exacerbate the inequalities and barriers that the technology is attempting to reduce (Ragnedda, 2018). The research agenda by Bonina and her colleagues (2021) exhibits several examples where the digital platforms where confronted with barriers and limitations unique to developmental contexts. One such research involved a peer-to-peer social lending platform, where the aim was to provide access to fairer and bigger financial opportunities through crowd-sourced information (Riggins & Weber, 2017). However, the lack of supporting infrastructures and institutions made it so that upstream lenders did not have adequate information about local businesses and loan decisions, so they ended up making decisions based on identification biases. In another instance, a digital education strategy was conceived in South Africa to address the number of issues with a previous initiative (Walls et al., 2015). The paper proposes that for the plan to succeed in a sustainable manner it requires offline platforms, a mobile technology focus, and sideloading cultures rather than downloading; all to raise digital skills and information access. The last example that will be highlighted is of a platform aiming to facilitate access to information for Tanzanian women entrepreneurs (Kapinga et al., 2019). The analysis of the platform

showcased the importance of contextualizing the platform through codesign and cocreation development. Each of the various research showcased work in a different sector and the platforms have distinct goals. However, the importance of socio-technical considerations is evidenced throughout.

Another aspect that is relevant to all digital platforms and has consequences for those in developmental regions, are the societal implications of being too digitally integrated. These concerns include the surveillance of citizens leading to a loss of freedoms and discrimination, the concentration of power and imposition of practices and standards, and the negative impact of platforms on the labour force as seen by the informal 'gig' economy (Bonina et al., 2021; Cusumano et al., 2019; Rangaswamy, 2019; Zuboff, 2015). The extent and ramifications of these concerns are important and while too broad to have a single answer, they should be mentioned in each case as they are explored in the discussion section.

**Factors of Digital Platforms**

As previously mentioned, the present research will follow a socio-technical approach, extrapolating from those papers which follow this type of application in their analysis of digital platforms as full ecosystems. This is the case with the systematic review by Kapoor and colleagues (2021), which consisted of seventy curated journal publications within the field and also revealed an overall lack of consideration for societal factors. This type of oversight risks misunderstanding the complex actor interdependencies present in the ecosystem, creating misalignments around organisational goals (Baxter & Sommerville, 2011). The researchers of the systematic review thus provide a socio-technical approach to evaluate the literature through four dimensions containing relevant factors found throughout. It is important to note that the variety of the digital platforms present in the literature are designed as for-profit organizations. This is addressed in the operationalization of the theoretical framework for the empirical research conducted.

The first dimension focuses on technical aspects including two factors. The first is platform modularity, the possibility for complementary add-on subsystems which enhances functionality and flexibility (Benlian et al., 2015; Ghazawneh & Henfridsson, 2015). The second is the degree at which the core architecture interacts with modular complements, creating complexities in the platform ecosystem

affecting efficiency and performance (Cennamo et al., 2018). The second dimension, tasks, focuses on the factors of governance, network orchestration, and incentives. Platform governance speaks to the leadership and management of relationships between actors including collaboration, competition, and conflicts of interests (Cusumano et al., 2019). Network orchestration regards the development of platform value through standard and routine set of practices, such as access and resource openness (Perks et al., 2017). The final factor in this dimension concerns the incentives that complementors, or third-party developers, have in aligning their interests with those of the platform leader and the environment (Wareham et al., 2014).

The third dimension involves actors, as in key stakeholders, such as the platform leaders, complementors, and the end users, which each act as factors in themselves. The platform leader influences the trajectory of innovation, acting as an architect accountable for various aspects including design, management, and continuous change of the evolving network (Helfat & Raubitschek, 2018). Complementors are tasked with developing supplementary contributions with the goal to expand the platform's market and achieve its objectives (Cusumano et al., 2019). The end users are the consumers of the content and/or services provided by complementors, sometimes also considered complementors in co-developing environments (Sussan & Acs, 2017). Together, these individual actors also have the potential to create both direct and indirect network effects that are considered as another relevant factor within this dimension as they influence the platform's value and competitiveness (de Reuver et al., 2018).

The fourth and final dimension within the socio-technical approach to platform ecosystems is that of the structural aspects. This dimension is relevant to the issues of decision-making and competition. The factors of importance in this dimension depend on the platform's classification, be it an internal institution-specific platform, an external industry-wide based one, or focused on the supply chain. Each class has a different focus of factors, such as product innovation and scope of production (de Reuver et al., 2018; Facin et al., 2016). Regardless of its function, however, the platform is likely to face competition at the supply or demand side, sometimes even at both (Tanriverdi & Lee, 2008). This can significantly alter the development path

of the platform where there are various strategies that can be implemented, including multi-homing, platform tipping, forking, and envelopment (Kapoor et al., 2021; Tanriverdi & Lee, 2008).

Each of these dimensions play an intricate role within any platform ecosystem and affect its functionality and sustainability. The relation of these dimensions is understood to be interlinked, each connected to one another at the system level (Lyytinen & Newman, 2008). These interconnections may also contain relevant overlaps that can potentially influence the integrity of the ecosystem and are platform dependent. This is visualized in Figure 3.

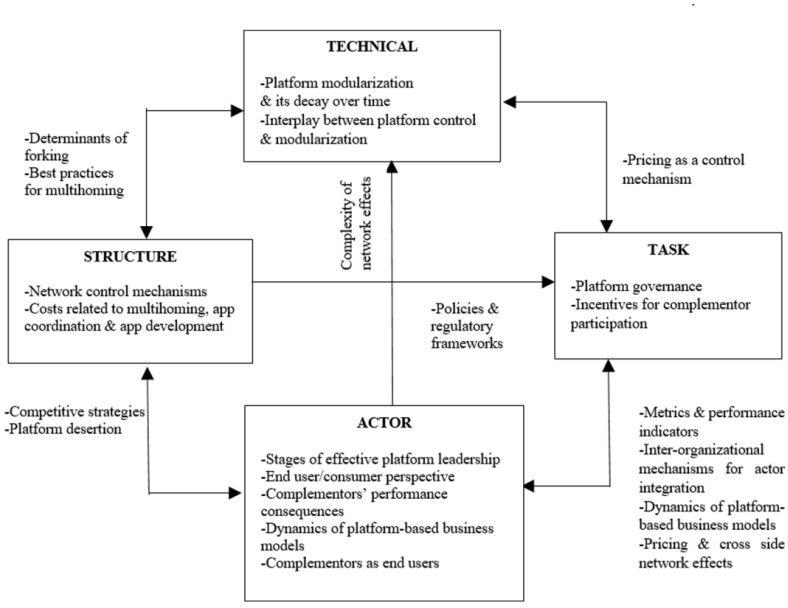


Figure 3: Socio-Technical Research Agenda Model (Kapoor et al., 2021)

The dimensions highlighted are essential for any platform environment. However, the context of having a platform evolve and function within a developmental context requires careful attention. Gomez-Morantes and colleagues (2022) identified three typical ways in which features of developing countries affect platforms. The first concerns resource constraints. The specifics might differ per case but typically include the absence of individual capabilities that prevent someone from using the platform (Chrysantina et al., 2019), or telecommunication infrastructure constraints that make it difficult for the platform to scale (Yadav et al., 2015). The second way regards the absence or implementation shortcomings of formal institutions such as

laws, regulations, and market-forming roles, where informal institutions fill in the void. This can lead to implementation and growth constraints of the platform (Renner-Micah et al., 2020). Finally, there may be power inequalities between actors in developing countries, potentially leading to constraints on marginalised groups from becoming platform users (Malhotra et al., 2019). The inclusion of these factors in the study of platform ecosystems helps account for specificities that occur in developing countries.

**Socio-Technical Systems**

Socio-technical paradigms are most often studied through the field of information systems. Amongst the most widely utilized theories are activity theory, cognitive behavioural theory, diffusion of innovation, actor network theory, structuration theory, contingency theory, and the technology acceptance model (Sekgweleo et al., 2017). Each of these has their own purpose and application. As highlighted by the literature review and state-of-the-art, a social-technical approach is necessary to encapsulate the multiple factors influencing platform environments. Therefore, the Socio-Technical Systems (STS) Theory will be utilized for this research as it advocates consideration of both technical and social factors within organizational environments for continual improvement (Emery & Trist, 1960). The theory places an emphasis on organizational design, an area that was not explicitly detailed in the literature concerning digital platforms. Organizational design expands much further than the relationships between actors and the tools utilized to create goods and services. STS Theory considers that the design and performance of an organisation can be understood as complex systems comprised of many interdependent factors (Cherns, 1976). This underlying philosophy has laid the groundwork for various developments, most widely seen in the integration of specific principles and its various applications. The theory was initially focused on heavy industry and through these principles has evolved into broadened inquiry including advanced manufacturing technologies, as well as office-based work and services (Clegg, 2000; Davis et al., 2014). The addition of principles has been made in response to contemporary ICTs which require a greater level of detail as they become more widely integrated in organizations. A list of nine of the core principles can be found in Appendix B.

There have been criticisms related to STS theory, more commonly regarding its applicability for empirical research. This is highlighted by Majchrzak and Borys (2001) who discuss three main concerns about the principles that sustain the theory. The first concern is that the principles are misunderstood or even ignored, where often a heuristic problem-reduction approach is chosen (Felten, 1993). The second concern is that the principles in themselves are abstract, which doesn't allow for evaluation. The principles need to be operationalized to be tested for internal and external validity. The third and final concern raised is that STS researchers and organizational scientists often overlook each other's research, leaving out various factors of relevance found for both parties. Due to these criticisms, Majchrzak and Borys (2001) developed Midrange STS Theory as a testable approach to the wider STS philosophy.

***Midrange STS***

The theoretical framework of midrange theory is utilized in this research as it bridges the abstractions of STS theory and the particulars of STS practice with the goal to allow for empirical testing (Majchrzak & Borys, 2001). The theory takes into account the original principles settled by Cherns (1976, 1987) through operationalization that created three main elements. The first consists of a distinction of business strategies that allows for a better definition and measurement of what is contextually considered as organizational effectiveness. The business strategies are continuous improvement, process variance, and control strategies, with each contributing to effective organizational design at various degrees. The second element is a set of distinct topics with factors that capture the major design choices available and their influences on organizational effectiveness. These set of factors include work roles, technological characteristics, customer involvement, reporting structure, socio-technical capabilities, performance standards, and motivation. These factors are theorized to be in an ideal state, which is used as a systematic way to account for the impact of deviations and find areas of improvement. The third and final element pertains to the interdependencies between factors. These may be present and can compensate for other factors when they are individually not contributing at an ideal level towards the organization's success.

These elements differentiate Midrange theory from the existing STS. The treatment of variances also differs, by considering them as opportunities for strategic decision-making rather than immediately aiming to reduce them. Finally, there is a focus on operationalizing the elements and factors to specific contexts and strategies as to avoid generalization and vagueness. This is what allows for empirical application. The operationalization is done in the following section with consideration to the factors highlighted in the literature review and in the context of the case study, Onda Rural.

## Operationalization of Theoretical Framework

The various factors identified by midrange STS are meant to be matched to a given business element. These factors have specifications that depend upon the organizational design in which they are implemented. The full list of these specifications can be found in Appendix C. The following subsections will contextualize how each factor pertains to the organization of Onda Rural, as well as include the factors dealing with digital platforms identified in the literature review. An overview of the individual factors can be seen in Figure 4 below.

### Organizational Effectiveness

Onda Rural is an initiative that is a non-profit organization, its overall goals revolve around facilitating participative communication, the creation and diffusion of experiences through various rural communication services (RCS) and strengthening communication capabilities of its users and participants for development. Therefore, organizational success is difficult to measure, making the distinct business strategies identified through midrange STS useful. The first strategy, continuous improvement, is described as the expectations about improvement trajectories in the performance areas that affect success in the market (Majchrzak & Borys, 2001). For Onda Rural continuous improvement would be expectations of improvement trajectories in terms of its ability to provide the service and environments to encourage participative communication, as well as incentivise their use and access. The second business strategy, process variance control, talks about expectations on how variation in the business process are managed (Majchrzak & Borys, 2001). Here, the business processes described would mainly revolve around the creation and delivery of various projects within the initiative and how deviations in their plans are addressed. Due to the integration of distinct organization this variance control is important in keeping sustainable standard. The third and final strategy is organizational values, which are the normative statements about how organizational members should contribute to the business process (Majchrzak & Borys, 2001). These values are of particular importance as Onda Rural is non-profit and requires a common understanding and alignment of interests between its members to achieve its goals. The three key goals of the Onda Rural are built on the values that they hold which

include gender equality, inclusivity, representation, and agricultural sovereignty through communication for development.

**Work Roles**

The work roles are dependent on the aspects of the actors and the tasks they fulfil within the organization. Onda Rural has a structure of eleven key partner organizations that work together as a committee. Within this committee resides the chair association, CIESPAL, whose member representatives are the leaders of Onda Rural. The other members act as complementors to the Onda Rural platform environment as each partner organization has a distinct background and provides different expertise for the development of services. Among them include the fields of radio, education, and various activists involved in accessibility to information and technology, gender equality and indigenous representation. The end users within Onda Rural are family farmers and more local groups that participate in the initiative and utilize the RCS.

Each of these main actors have distinct aspects and tasks to perform within the platform environment (Kapoor et al., 2021). In this case CIESPAL leaders are meant to handle designing and managing the complex inter-organisational network to ensure collaboration and execution of essential activities. Therefore, the main tasks that are performed for these duties include governance and network orchestration of these organisations. Specifically, with the goal to promote collaboration, handle conflicting interests, and creating standard and routine practices (Cusumano et al., 2019).

In Onda Rural, the complementors are other partner organizations that collaborate in the development of services and activities. Thus, it is important for them to have the necessary resources to implement the projects into the platform (Majchrzak & Borys, 2001). These organizations have their distinct field of operation independent of Onda rural and often function at various levels within the region. Therefore, the level of overlap between the partner organizations' networks and that of Onda rural necessitates inquiry as to account for potential network effects (Kapoor et al., 2021). The end users in Onda Rural are those utilizing the RCS, hence increasing capabilities for access and awareness of these services is important to create the participative network desired. This necessitates organizational-wide factors,

including the use of dynamic information for the day to day process that must take place within Onda Rural, as well as a cohesive vision and understanding between the various members to ensure purposeful development of RCS (Majchrzak & Borys, 2001).

**Technological Characteristics**

The digital platform acts as the core technology in the Onda Rural initiative, being the place housing the various RCS and spaces for participative communication in the form of the website, forums, radio broadcasts, educational report, and workshops. Thus, its sustainability requires special attention so that it's functioning is in line with the various strategies implemented. This includes ensuring that its functioning is also reliable through continuous maintenance (Majchrzak & Borys, 2001). The digital platform is meant to be continuously updated for the implementation of new RCS to increase functionality. Hence, the core architecture must be modular enough to allow for flexibility in making changes (Ghazawneh & Henfridsson, 2015). The amount of additional sub-systems and modules can increase the complexity of the digital platform which influences its efficiency and the users' experience. Therefore, it is important to reach a balance of performance and simplicity (Cennamo et al., 2018; Majchrzak & Borys, 2001). Throughout these changes the usability factor should also be accounted for both the users and developers. Due to the digital platform having a developmental focus, it is subject to be limited by resource constraints. These can limit the implementation of RCS through monetary factors, and also its usability through questions of access and local infrastructure (Gomez-Morantes et al., 2022).

**Customer Involvement**

Customer involvement has become a wider trend in both the fields of ICT4D and communication for development (Heeks, 2020). The involvement of end users ensures that resources are allocated efficiently, and improvements are made with contextual awareness. Therefore, it is important to receive feedback from users and utilize the feedback to implement changes (Majchrzak & Borys, 2001). Additionally, customer feedback becomes a greater necessity due to the possibility of power inequalities being present. Marginalized groups can be limited in their participation and use of services and should thus be considered when gathering customer feedback

(Gomez-Morantes et al., 2022; Malhotra et al., 2019). Another strong approach for increasing customer involvement is co—development. Through the participation of users in the creation of services and activities, Onda Rural can increase the value they present to end users from the initial stages of development.

**Reporting Structure**

An organization's effectiveness depends greatly on its design and reporting structure. Onda Rural is organized as a variant of the supply chain platform system, where various suppliers, in this case the partner organizations, provide resources and expertise for the assembly of products and services (de Reuver et al., 2018). As the complementors often also act as core suppliers in Onda Rural, the reporting structure is likely streamlined. Yet, proper communication in prioritizing projects among various working areas should still be ensured (Majchrzak & Borys, 2001).

**Socio-Technical Capabilities**

Onda Rural operates in a platform ecosystem environment within a developmental context, as such the socio-technical capabilities are of great relevance. Both users and developers should have access to the skills and resources necessary to utilize and evolve the platform (Majchrzak & Borys, 2001). Onda Rural and its partners have great stake in the capabilities of its ecosystem and as such should work towards their development.

**Performance Standards**

Performance standards allow an organization to operate at a consistent level and deliver products and services with reliable quality. As such, the standards must be congruent with the business strategies of importance to the organization. They should be challenging, yet achievable, and clearly communicated. They're evaluation is as important as their existence and should therefore be tracked on a regular basis, visibly and accurately to ensure applicability and compliance (Majchrzak & Borys, 2001). These standards are typically upheld so an organisation can compete in the market. However, there aren't any direct alternatives for users that intend to provide the RCS or the space for participatory communication that Onda Rural strives towards. Onda Rural is instead competing for the attention of users and their time to interact with their platform. Therefore, how Onda Rural addresses competition is in

terms of their incentives for users to be motivated in being a part of their platform ecosystem.

**Motivation**

Motivation to be part of a platform ecosystem can differ amongst stakeholders. Hence, the alignment of interests is important, especially that of the partner organizations that comprise the committee as many operate in different fields and provide a complementary service to Onda Rural. Often, rewards are utilized to encourage performance standards of individuals (Majchrzak & Borys, 2001). However, this can be difficult when managing non-profit based organizations. Onda Rural also aims to create a space for participative communication. This would require an understanding of the motivation end users have in becoming part of their platform ecosystem to ensure engagement. Whether motivated by functional necessity, social interaction, or personal interest, Onda Rural should still have mechanisms to incentivize the continuous use of their network and platform.

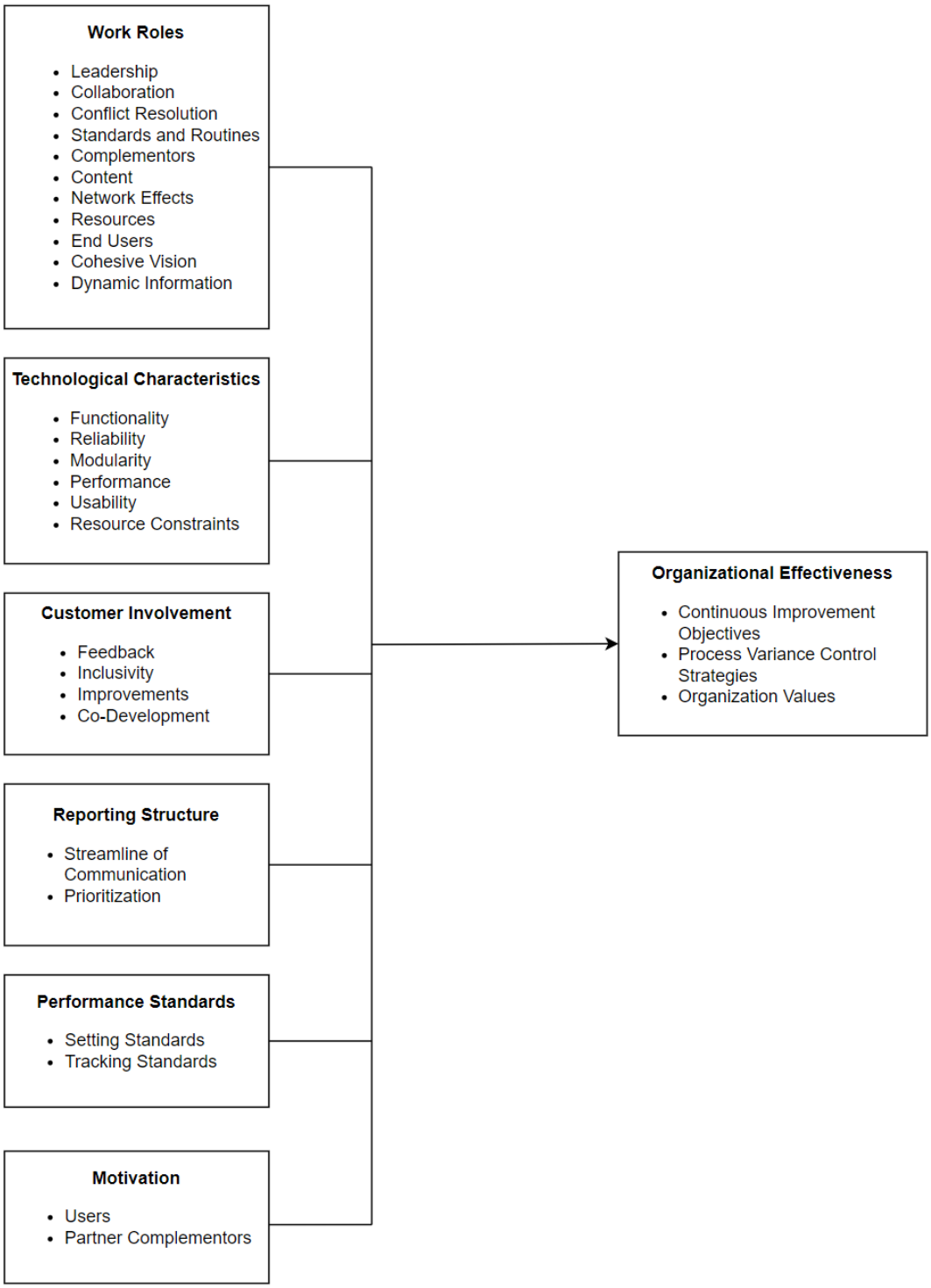


Figure 4: Modified Midrange STS Factors of Relevance for Organizational Effectiveness

## Methodology

The present research is being performed as part of the master thesis with the University of Aalborg, Paris Lordon University of Salzburg and in collaboration with the FAO. Hence, literary material used for the development of the state-of-the-art, literature review, and theoretical framework was found using the search engines and digital libraries of both universities, FAO, and Google Scholar. These libraries provided access to numerous journals and publications including Elsevier, Wiley, the Journal of Information Technology, Journal of Business Research, and the European Journal of Developmental Research, amongst others. Literature concerning the state-of-the-art utilized the key words of "communication for development," "rural communication services," "ICT for development," and "Onda Rural." An emphasis was placed on covering the historical development of these fields as they are continuously evolving, often in a reactionary manner. This helps contextualize the digital platform studied and provide insight into its potential future based on its current development status.

The literature review contained a wider range of keywords that were often combined with one another. These included "digital platforms," "digital platforms for development," "socio-technical digital platforms," "digital platform ecosystems," "socio-technical systems," "socio-technical systems theory," and "midrange theory." Through the reviewing process it became evident that digital platforms are most often studied in for-profit, western based organizations with a technical focus. Therefore, the concepts of socio-technical systems (STS) and the relevance of operating with a developmental capacity were used to complement the more commonly considered factors identified in the success of digital platforms.

STS theory was utilized for its framework and focus on organizational-wide elements in which the combination of factors identified through the literature review could be reconciled together. Other theories that were considered were actor network theory and structuration theory as they are also prevalent socio-technical theories typically used in information system studies. However, in the case of actor network theory, the focus on actors with equal level of contributions to the establishment and operation of the network was not translatable to the Onda Rural initiative. This is due to the three main levels of the organization with CIESPAL acting as chair, partner

organizations complementing the initiative each with different levels of influence, and end users having a more limited impact on the platform acting more as consumers. Additionally, actor network theory has a greater emphasis on the how and why the networks are formed, and the current research is focused on the initiative's current and future developments (Callon, 1999; Sekgweleo et al., 2017). This aspect also became relevant when investigating the viability of structuration theory. Where structuration theory has an emphasis on how events and social systems are produced and reproduced over a period and space while accounting for various entities (Jones & Karsten, 2008; Sekgweleo et al., 2017). The paradigm posed by the STS theoretical framework has a focus on continual improvement and optimization with its various design principles. Therefore, STS theory proved to be better aligned with the goals of this research and the current state of Onda Rural's development. However, STS theory does have its critics, mainly with its inability to apply its principles in a testable manner, often considered too abstract. Midrange STS theory then provided the empirical approach necessary to test in an organized and succinct manner. By operationalizing the elements of Midrange STS theory, it was possible to include the relevant socio-technical factors found in the literature review.

The participants interviewed include members of the chair organization, CIESPAL, and Onda Rural's partner organizations. This sample of participants was chosen due to the goals of the research having a focus on the operational effectiveness of Onda Rural and organizational-wide factors. Therefore, priority was given to those actors who are directly involved in the development of the initiative. Additionally, the collaboration with FAO in this research provided an opportunity to get in contact with partner organizations that would otherwise be difficult to reach. The users of the digital platform and agricultural farmers were not included as potential participants. This is due to the consumer perspective being considered as outside of the scope for the present research. The focus on the development of Onda Rural as an organization, as well as the logistical limitations of gathering a sufficient sample size for the entire region of Latin American and the region, made the incorporation of end user unviable.

The empirical data gathered for this research consists of mainly semi-structured interviews as well as documentation presented by Onda Rural. Documentation regarding the development of Onda Rural through the years was available through their digital platform. Its current and future endeavours are detailed through the Plan of Participative Communication of 2022 visible in Appendix A. As described in the state-of-the-art section, this plan comprises details on the strategies, expected results and future actions that Onda Rural will undertake in relation to its current goals and objectives. This documentation provided insight and context into the past and current state of the initiative and aided in operationalizing the theoretical framework.

**Interview Design**

The interviews were designed to be performed in a semi-structured format to allow for greater detail in the areas where interviewees were most knowledgeable. Therefore, many follow-up questions could be done in a dynamic manner independently of the initial format. The methodology was selected because it allowed for the flexibility necessary to adapt to the various types of stakeholders present in the Onda Rural initiative. This is relevant as participation was not guaranteed and therefore the exact role of the interviewees was unknown. Other methodologies such as quantitative surveys and focus groups could not be utilized due to the socio-technical nature of the research and its focus on the digital platform's ecosystems. The scope which the factors of study cover is also quite large and together with location and time constraints, videoconference semi-structured interviews are the best methodological approach.

The interview questions were designed with the elements of Midrange STS theory as the main topics that constitute various factors which are also supplemented by the literature review. Table 2 below showcases the initial development process where the topics are broken down into relevant factors with each having its own question. After ensuring that each factor had a relevant question, with the possibility of expanding follow-ups, two versions of the interview were created. One version was tailored to the core leadership within CIESPAL and the other to the partner organizations in the committee that act as complementors to the Onda Rural initiative. This was mainly done because of the factors relevant to work roles, as the responsibilities would differ greatly between the two groups. However, most other questions remained consistent

between the two versions. To finalize the interviews, the questions were re-organized into four main groups. These are work role, digital platform, users, and organization. This was done to ensure that the questions flowed logically into one another and because of the length of the interview. There were twenty-five final questions in both versions. By dividing the interviews in larger segments, it was possible to keep the interviewees focused on each topic and allow for breaks if necessary. As the interviewees were from Latin America, the interviews were translated into Spanish by the author who is fluent. Both versions of the interviews and their translations can be found in Appendix D.

| | **Questions** |
|---|---|
| **Organizational Effectiveness** | |
| Continuous Improvement Objectives | What mechanisms does Onda Rural have in place to ensure the continuous creation of RCS? |
| Process Variance Control Strategies | How are deviations in service delivery plans addressed? |
| Organizational Values | How do the Onda Rural values of (insert normative statement) align with the values of (insert organization)? |
| **Work Roles** | |
| Leadership | How do the Onda Rural values of (insert normative statement) align with the values of (insert organization)? |
| Collaboration | How does Onda Rural ensure collaboration between its various partner organizations? |
| Conflict Resolution | How does CIESPAL address conflicts that arise between partner organizations? |
| Standards and Routines | What processes have been introduced to provide a standardized creation method of RCS? |
| Complementors | What are the main operations of (insert organization) and how do they relate to Onda Rural? |
| Content | What services does (insert organization) provide for the Onda Rural initiative? |
| Network Effects | How does (insert organization)'s network and that of Onda Rural overlap? |
| Resources | What resources does (insert organization) require from Onda Rural to deliver its RCSs? |
| End Users | How are the RCS of Onda Rural promoted to the end users? |
| Cohesive Vision | How do the RCS contribute to (insert organization)'s vision for Onda Rural? |
| Dynamic Information | How is information about the RCS communicated in Onda |

| | |
|---|---|
| | Rural? |
| **Technological Characteristics** | |
| Functionality | What are the core functionalities of the digital platform? |
| Reliability | What is the maintenance procedure to ensure proper and reliable functioning of the digital platform? |
| Modularity | How flexible is the digital platform when integrating new changes and RCS? |
| Performance | How do the addition of RCS and other subsystems impact the digital platform's performance? |
| Usability | What feedback do you receive on the complexity of the digital platform? |
| Resource Constraints | What are the resource constraints that can limit the implementation of RCS? |
| **Customer Involvement** | |
| Feedback | How is the feedback from end users gathered by Onda Rural? |
| Inclusivity | How is the participation of marginalized groups (women and indigenous people) encouraged? |
| Improvements | How is the feedback from end users utilized for the improvement of RCS? |
| Co-Development | To what extent are the end users involved in the development of the RCS? |
| **Reporting Structure** | |
| Streamlined Communication | What are the reporting levels within Onda Rural? |
| Prioritization | How are the various projects prioritized? |
| **Socio-Technical Capabilities** | |
| ST Capabilities of Complementors | What programs, if any, does (insert organization) have to grow socio-technical capabilities of workers? |
| ST Capabilities of End Users | How does Onda Rural encourage the development of the users' socio-technical capabilities? |
| **Performance Standards** | |
| Setting Standards | What are the base performance standards of Onda Rural? |
| Tracking Standards | How are standards tracked? |
| **Motivation** | |
| Users | What motivates (insert organization) to work as a committee member that helps create the RCS for the Onda Rural initiative? |
| Partner Complementors | How are users incentivized to participate in Onda Rural and use its RCS? |

Table 2: Interview Questions by Factors

**Thematic Analysis**

The data was studied using the thematic analysis methodology. Thematic analysis is a structured, iterative process where data patterns are coded based on a deductive or inductive approach and organized in themes used to create a narrative that interprets the data (Clarke & Braun, 2021). A deductive thematic analysis approach is utilized in this research because the questionnaire was constructed using a theoretical framework comprised of individual factors identified through literary review. Therefore, these factors act as the coding patterns with which the data is analysed to identify the relevance of each factor and their respective theme. To perform this analysis the software of NVivo was utilized to help organize and compare the coding of all interviews. There are a total of thirty-two total factors coded in the interviews. As mentioned, the interviews were divided into two versions, one for the leadership of CIESPAL and one for the partner organizations with twenty-eight and twenty-six codes each, respectively. The divisions were made based on work-role relevant factors and the interviews shared a total of twenty-one codes, which allowed for many avenues of comparison to determine the reliability and viability of each factor. The organization and spread of these factors are visualized in Appendix E.

## Results and Analysis

The final sample size gathered consisted of seven interviews, of which three were from the leadership organization of the International Centre for Higher Communication Studies for Latin America (CIESPAL) and consisted of, the organization's director, the project manager for Onda Rural, and the web developer of the digital platform. The four remaining participants were an amalgamation of different partner organizations within the committee, each contributing to the initiative in their own manner. These include the Latin America Association for Education and Popular Communication (ALER), Comunica, the Rural Regional Dialogue Program (PDRR), and the World Association for the Christian Communication (WACC ALC). The length of each interview ranged between half an hour to two hours and were recorded and transcribed through Microsoft Teams software. While some factors were divided between the two interviews sets, the final coding results showcase interdependencies among certain factors, which will be elaborated upon further in the discussion.

The breakdown of the final coding relevance can be seen in Table 4, where the total coding references for each topic are given. The table showcases how applicable the factors were to the interviewees, with some being relevant to all participants, and others requiring expert knowledge. This distinction stems from the role and level of involvement that the participants have with the Onda Rural initiative. Therefore, certain aspects such as user interaction or in-depth knowledge of the digital platform were not always applicable. The unique perspectives that each interviewee provided are summarized within their designated section below. The factors that were most consistently mentioned and discussed included the organizational values, a factor relevant to the organization's effectiveness. The role of complementors and the content they produced were highly discussed within the work roles section. In terms of the technological characteristics, the functionality and resource constraints that the digital platform faced were greatly significant. Finally, all factors dealing with customer involvement were well documented, with feedback and inclusivity being the most prominent.

| Factor | Interviews Referenced | Words Coded | Coding References |
|---|---|---|---|
| **Organizational Effectiveness** | | | **57** |
| Continuous Improvement Objectives | 3 | 1,207 | 17 |
| Process Variance Control Strategies | 3 | 766 | 8 |
| Organizational Values | 6 | 2,744 | 32 |
| **Work Roles** | | | **74** |
| Leadership | 3 | 349 | 8 |
| Collaboration | 4 | 1,322 | 23 |
| Conflict Resolution | 2 | 701 | 2 |
| Standards and Routines | 3 | 1,308 | 13 |
| Complementors | 7 | 3,575 | 28 |
| Content | 6 | 2,305 | 24 |
| Network Effects | 5 | 1,745 | 25 |
| Resources | 1 | 501 | 4 |
| End Users | 5 | 2,072 | 22 |
| Cohesive Vision | 5 | 2,020 | 14 |
| Dynamic Information | 7 | 1,693 | 14 |
| **Technological Characteristics** | | | **60** |
| Functionality | 7 | 2,812 | 19 |
| Reliability | 1 | 503 | 3 |
| Modularity | 4 | 749 | 8 |
| Performance | 2 | 2 | 250 |
| Usability | 4 | 363 | 5 |
| Resource Constraints | 6 | 3,023 | 23 |
| **Customer Involvement** | | | **68** |
| Feedback | 6 | 2,469 | 18 |
| Inclusivity | 5 | 2,810 | 24 |

| | | | |
|---|---|---|---|
| Improvements | 6 | 1,817 | 17 |
| Co-Development | 4 | 1,212 | 9 |
| **Reporting Structure** | | | **16** |
| Streamlined Communication | 2 | 607 | 3 |
| Prioritization | 5 | 1,730 | 13 |
| **Socio-Technical Capabilities** | | | |
| ST Capabilities of Complementors | 3 | 785 | 3 |
| ST Capabilities of End Users | 5 | 1,421 | 14 |
| **Performance Standards** | | | **22** |
| Setting Standards | 6 | 1.765 | 13 |
| Tracking Standards | 4 | 1,227 | 9 |
| **Motivation** | | | **17** |
| Users | 5 | 1.737 | 11 |
| Partner Complementors | 3 | 776 | 6 |

Table 4: Coding Results by Factors

**CIESPAL – Director**

The director of CIESPAL was appointed lead coordinator of Onda Rural as of 2018. Her role includes managing communications and collaboration across the multiple organizations in Latin America, including the FAO. As lead coordinator, the director has a wide overview on the multiple facets of the initiative. This is evidenced by her coding for twenty-five factors, tied for the second highest with CIESPAL's communication assistant. However, her expertise lies with her insight into the daily procedures and partnerships, providing details that other participants could not.

Starting with the internal operations of the organization, Onda Rural's structure is in place to produce and distribute its content at a certain standard. Mechanisms behind this include how, "[Onda Rural] operates on a plan, what topics are of importance this year, who is working on them … every project has a team and contact with the five-core people who are always aware of the happenings in Onda Rural" (CIESPAL Director, 2022). Much of this is possible due to the collaboration with organizations, such as FAO and Comunica, who have strict protocols and process under which content must be evaluated to be affiliated with them.

These type of collaborations with the partner committee aid in the orchestration and communication of projects that work towards Onda Rural's larger objectives. However, the coordination of the various partners requires careful planning, as the director describes, "the participation [of committee partners] is not always equal, there is always a need for coordination. So, what we seek is to have periodic meetings that motivate and inform about the initiatives to help in the integration of the whole process" (CIESPAL Director, 2022). These meetings bring structure, as the other organizations do have their own agendas and projects that are also diffused in the Onda Rural network. Hence, there is a large reunion in the beginning of the year to attempt to align the organizations and achieve a common understanding of individual and collective priorities for Onda Rural. Future meetings are then project dependent and occur at regular intervals, monthly or even weekly, to try and address issues as they arise. Communication is constant, where tools such as WhatsApp streamline the process. This has also aided in addressing potential conflicts when interests arise in sensitive topics, such as those with political ramifications, that are not in line with Onda Rural's themes. The director states that "when there is

something very national, very local, then we always talk with our counterparts and seek to have to have a dialogue before taking a specific stance. So, we haven't had real conflicts" (CIESPAL Direct, 2022).

On the technical side, the digital platform hosts the content developed by Onda Rural, acting as a hub linking to the various rural communication services. The director highlights its importance saying, "the platform allows articulation, where we have the communicational tools that are free to access, spaces for groups, participative communities that allow for topic discussions" (CIESPAL Director, 2022). This community of practice has been the larger focus for Onda Rural in the last two years, as the initiative has begun to shift to a more user-centric approach. Examples that showcase this include the creation of a participative, weekly radio magazine and communal spaces for discussion through Facebook and Rocket Chat. The director supports these initiatives in saying, "what we are prioritizing now, well the [Covid-19] pandemic has put us behind, is closeness to the people. They require collective work, it is not like in cities that everyone has internet and easy access" (CIESPAL Director, 2022).

In the past Onda Rural has been able to host in-person workshops in Bolivia and Ecuador. However, in recent times the possibilities have diminished with the tightening on resources constraints. The director explains "in economic terms, having a meeting with about a hundred communication producers who also work with family farmers or are [themselves] farmers, or community leaders, is not easy to concentrate" (CIESPAL Director, 2022). Other logistical challenges including food, housing, and transportation in a variety of countries make physical presence challenging. To help mediate this problem, the accessibility of users has been considered in the design of the digital platform by using images of lower resolution, as well as using SMS and radio for broadcasting more frequently.

Nevertheless, the importance of physical outreach does not escape the director. She alludes to many potential benefits from a closer network in teaching and increasing the value of Onda Rural's platform. An example includes how "there are countries that are more advanced, others less, and so there can be an exchange where synergies can form to support each other and better the recourses and local proposals" (CIESPAL Director, 2022). The director considers how this outcome could be

achieved through face-to-face meetings at a more local level, instead of at a regional level, which ends up being convoluted. In a statement depicting Onda Rural's commitment to their values and goals for improvement, she says the following:

> "I think that there is a lot of work to be done so that users begin to know and feel that they can use the platform, that they can use these spaces, where they will be the protagonists. That part I think we need to improve and work on. But I think there is an opening. We are going to change, and we are going to strengthen the entire platform as they tell us." (CIESPAL Director, 2022)

**CIESPAL – Communication Assistant**

The communication assistant interviewed from CIESPAL has a pivotal position in her work at Onda Rural, where she plays the role of producer of the radio program, manager of the website and social media accounts, and coordinator for communication with external organizations. From this high level of exposure to the various operations of Onda Rural, the assistant was able to provide insight into several key aspects of the initiative, and the dialogue coded for twenty-five factors. With her multiple roles and her inclusion in the leadership of the organization, she plays an important role in managing daily processes. Therefore, she was able to reinforce many of the CIESPAL director's comments related to operations, such as the use of standards and protocols, the prioritization of meeting structure and collaborations, and accounts about the ongoing efforts to create a participative community.

Through the assistant's work with the radio program and social media outlets, she has the greatest amount of direct access to users as compared to the other interview participants. According to her, the first point of contact with users is the initial impression that they have when accessing the various digital platform. Therefore, the aesthetic representation of the initiative play an important role, which include the logo, typography, colours, and photos. The assistant comments on the importance of these by saying, "since we work with specific content or with other organizations, the alignment of both content themes and visual identity help create a visual identity" (CIESPAL Assistant, 2022). This type of mechanism allows for a level of variance control when disseminating the content as part of Onda Rural's key objectives. This

process is accounted for through the standards and protocols enforced by FAO and Comunica.

The assistant was also able to give examples of how users interact with various rural communication services. She comments that access and inclusivity were key concepts that were incorporated in their latest platform overhaul. The platform is free to access, but efforts were made to encourage user participation. The assistant provides the following example, "there's a series called Talking with Josefina. It is a dialogue between two people, where they present information about the importance of family farming. For example, the importance of incorporating women and of facilitating access to resources" (CIESPAL Assistant, 2022). Projects such as this were designed to incentivize use and retain participants. Another initiative to gain user interaction is organizing a variety of virtual workshops. She mentions that these were done in a participatory manner to encourage a tailored experience of topics of interest. She states, "For example, one group spoke about a need for capacities with communication services, another with the production of content. So, these general topics were established, and a workshop was developed around them" (CIESPAL Assistant, 2022). This type of co-creation creates relevant services for the users.

In terms of the engagement with the digital platform, the feedback from users has been sparse. Most of the gathered feedback currently comes through the workshops and social media, particularly Facebook. She gives an example of this feedback in "we had someone message us and say they were having trouble finding the course on communication. This inspired the change to moving the course in a main space within the website" (CIESPAL Assistant, 2022). The importance of gathering feedback from organizations as well as from users directly is a strong value within Onda Rural, to the extent where the latest redesign of the website included an analysis on user necessities with CIESPAL and FAO. The assistant alludes to this when talking about their goals in developing the participatory communities, "I consider that these spaces facilitate people to inform themselves or local organizations community leaders, to know what is happening, how to participate and make a decision where the policies can account for their necessities" (CIESPAL Assistant, 2022).

The assistant considers that the initiative and its platform are still developing the capacities to achieve their desired goals. The participatory community is a relatively new venture that has limitations that need to be addressed as, "On the subject of resources, human and monetary, we need them to be closer … I believe that we are missing the implementation of the first-hand experience to know who the farmer is, how all participates and how much time it takes" (CIESPAL Assistant, 2022). According to her, these experiences are valuable because they can shed light on specific problems within a region, such as providing access to those without an internet connection or other technological limitations.

**CIESPAL – Web Developer**

The web developer worked for CIESPAL in implementing the latest version of the Onda Rural digital platform, by redesigning the website and integrating various modules. These modules include the forums, repositories, and the participative community space present through the opensource platform of Rocket Chat. In total, the web developer coded for twelve distinct factors, with his particular focus being on the technical capabilities and development process of the digital platform. He is not part of the daily operations of Onda Rural and therefore could not answer many questions regarding these processes, as evidenced by his relatively low coding of twelve factors. However, his limited exposure to operations had been generally positive, reporting efficient and comprehensive communication.

When discussing the digital platform, the web developer described its functionality as a place to communicate the activities and rural communication services available to the agricultural community. Its strength lies in its ability to share workshops and relevant information, as well as providing a space for constant communication for the farmers. The developer also considers the platform to be extremely flexible, stating "I would evaluate it in a range from one to ten as an eight in terms of flexibility, at this time" (CIESPAL Web Developer, 2023). This is due to modularity being a core concept within its design, where an administrator is only needed to perform structural changes, but updates in terms of content management can be done freely by other partner organizations.

Reliability of the platform was also an important facet of its design philosophy. The platform was developed through Drupal, a free and opensource content management

system framework written in PHP, and MongoDB, a free and opensource database management program (*Drupal - Open Source CMS*, 2018; *MongoDB*, n.d.). This allows for architectural management to be done easily. However, reliability requires careful maintenance. Sharing his knowledge of the back-end technology, the developer says, “maintenance of consistent versions is very important, it has caused a problem in the past with the development of the Rocket Chat module. You must consider the versions and the coherence of the versions across modules and the database, or there can be a crash” (CIESPAL Web Developer, 2023). Another facet of this maintenance is the infrastructure, including the servers and circuit breakers. But these aspects require more intermittent attention, and the developer reports that these are working without any kind of problem. When asked on whether he conducts the maintenance he says it is guaranteed by the system administrator of CIESPAL, while his own role is strictly in a developmental capacity.

Users were discussed in terms of their integration into the digital platform. The developer mentioned that the platform was designed to also be accessible through a phone to increase usability in rural areas. However, there are severe resource constraints that they will face, such as “access to an internet connection, it will always be necessary. Eventually, the quality of the device will also be a concern, older versions of a mobile could have greater complications accessing Rocket Chat” (CIESPAL Web Developer, 2023). Successful integration of more users also presents its hurdles in terms of scalability. With the current load of users, the developer reports that the platform runs without any problems. However, he does foresee potential problems as the userbase increases and functionality expands, including questions on cybersecurity as well as limitations of the server. He states “it worries me, because the systems eventually grow, and the dependencies aren’t all necessarily accompanied by new [technical] developments. Eventually, some development made can impact a lot of dependencies and can affect the overall performance and security” (CIESPAL Web Developer, 2023).

Finally, although the developer could comment on user integration, there is limited information on the platform's usability from a user's perspective. The developer shares that "at this moment there is no feedback system for users, it’s one of the functionalities that weren’t considered for the current version” (CIESPAL Web

Developer, 2023). Other pending topics included the newsletter management and a more participative upload system for content, each that were outside the scope of the current version and the developer considers areas of improvement.

**ALER**

The Latin America Association for Education and Popular Communication (ALER) coordinates various national companies, including five hundred broadcasting stations in the region, that work on the communication of topics such as human rights, environmental issues, gender equality, intercultural topics, migration, and education, amongst others. ALER has been a partner of Onda Rural since its inception and has collaborated on the dissemination of content and communication with other organizations, as well as user outreach through broadcast radio. The ALER representative interviewed aided in coordinating Onda Rural with different partners across the region, including Costa Rica, Panama, and Peru. Through these collaborations, the goal has been to expand the network of Onda Rural as well as introduce topics, such as family agriculture into ALER's sphere.

The representative describes the collaboration as mutually beneficial and states, "its complementary … [ALER] are an agent that multiplies, a type of promotor that amplifies the resonance of activities that is intended to interest our audiences" (ALER Representative, 2023). The shared values on various topics, including education and representation, allow for a cohesive vision between the two organizations. This alignment of values has also translated to a collaborative environment. ALER works most closely with CIESPAL and not so much with the other partners, allowing for a streamlined and flexible dialogue with the latter. At the same time, when attending the larger meetings with all partners, the representative calls the communication to be very smooth with no need to add bureaucracy.

The representative did not have much personal experience with the digital platform as ALER receives content directly from Onda Rural to disseminate, but he does call the website a valuable repository of knowledge that provides access to resources and programs, not only for farmers to use but also for ALER to inform their activities.

ALER has partnerships with twenty-two stations that focus on broadcasting to smaller towns and indigenous groups. The representative provides an example, "One such organization is, Indigenous American, which picks up the problems, aspirations,

fights, and proposals of the towns and distinct communities in Latin America. It's important to visualize, because if they lose their identity they can cease to exist" (ALER Representative, 2023). These types of marginalized communities are the core audience of both ALER and Onda Rural, encouraging the use of targeted broadcasting efforts. However, when further discussing the potential needs of users to interact with Onda Rural, the representative talks of a disconnect for both ALER and Onda Rural. He states that there is minimal feedback and acknowledges the importance of changing this when saying "Concrete experiences of distinct cultural families in various locations could be interesting to consider. That would help us a lot because it would give us feedback on how the message is being received in contrast to our expectations" (ALER Representative, 2023). He relates limitations in gathering these experiences as economic constraints of the initiative. Later, he once again highlights the importance of closing this distance when considering the impact that de complementor's perspective can have in providing information, "Us communicators and technicians have a heavy technical mindset, and it can be a communicational barrier … We need to delve deeper on what the culture, identity, methods, and ways to communicate are for our audiences" (ALER Representative, 2022). The representative sees a need to address these diverging socio-technical perspectives to further improve communication with the targeted audience.

**Comunica**

Comunica is an organization dedicated to supporting the use of new information and communication technologies in rural areas. Comunica's network supports a variety of activities that contribute to communication rights and the policies within the sector. Due to this alignment of values, Comunica has had a close relationship with Onda Rural for several years and is currently in the process of becoming a partner within the committee. This has provided the representative with significant experience, evidenced through his coding of twenty-four factors. Being outside of the committee has also provided the representative with a more critical outlook and a vision for Onda Rural's future.

Currently, Comunica supports Onda Rural through a variety of activities; for instance, the representative talks of advising in projects, aiding in translation, and distributing content. Comunica has also helped create and enforce the standards and

protocols for the products and services of Onda Rural through a nine-step process. These steps include qualitative and quantitative verification to ensure their quality and alignment with the goals and values of Onda Rural. In the future, Comunica aims to participate in Onda Rural's daily activities more closely by being involved in their plan of participative communication, helping to guide topics and themes for future communication services. The representative emphasises this point with the hope of aiding the redirection of the plan for participation, as he notices a disconnect and a lack of participation among committee members. In his words, "there are large producer organizations that do not share the information that they have … On the other hand, others send information that is not possible to promote through Onda Rural because of our other partners like FAO" (Comunica Representative, 2022). The representative regards this to have been instigated by the shift of focus in Onda Rural from organizational collaboration to more local, individual experiences.

In terms of the digital platform, the interviewee reports that it works well as a repository of information for other organizations but believes that there is much functionality to be added for farmers. He shares, "There isn't much information on public politics or how to benefit from current policy or of practical matters like market prices for farmers. I think it could be much more practical and dynamic in how it shows information" (Comunica Representative, 2022). These types of added functionalities aim to increase the value proposition for users. He cites resource restraints in integrating these types of improvements as maintenance, operation costs, and human resources are already at capacity. At the same time, the representative does praise the technical team in CIESPAL. He assesses that the maintenance of the platform has been well managed and responsive to requests for changes.

The topic of resource constraints was also brought up when speaking of greater user integration. Currently, the representative mentions Onda Rural's inability to address factors related to access limitations of their digital platform. He says, "there is a misalignment in terminology, where some think of communication services as infrastructure and mechanical. Onda Rural does not give, and cannot, maybe can lobby for them, but they are outside our current scope" (Comunica Representative, 2022). This makes in-person presence of Onda Rural that much vital. While this is

not yet possible due to the same resource constraints mentioned earlier, a greater importance is placed on the services that Onda Rural can provide.

The representative mentions how the lack of a feedback system on the website impedes their effectiveness in addressing users' needs. He states that "the traffic numbers aren't reliable and the extent 'to which the content reaches the audience is vague. We need an analysis of our reach and a system to have this continual interaction" (CIESPAL Representative, 2022). Greater user interaction, he concludes, is needed aside from the forums and digital workshops, to motivate users and create the impact that Onda Rural strives for.

**PDRR**

The Rural Regional Dialogue Program (PDRR) is an organization working in the field of family agriculture, with various groups in the region of Central America and the Dominican Republic. The representative interviewed had ceased to be part of the main collaborative team since 2019, so he wasn't able to provide full insights into the current operations. However, through his continued work in PDRR he Alsin depth knowledge on the relationship and overall strategy employed by Onda Rural.

The partnership began with the common goal of increasing visibility of and supporting the work done by various organizations and family farmers. Onda Rural specializes in the communication angle, bringing in their expertise with ICTs, while PDRR provides access to various users within the field of family agriculture. PDRR additionally helps organize various workshops and virtual meetings hosted by Onda Rural, where "the aim is to exchange experiences, the different problems and challenges that the farmers face" (PDRR Representative, 2022). The change from physical workshops to virtual meetings was mainly due to the Covid-19 pandemic and its impact on the collaboration has been significant. Furthermore, PDRR works closely with the agricultural groups of their region and is therefore very conscious of the changes that occur in those communities. The PDRR representative describes the challenges that the end users have with the digital mediums, saying, "the digital campaigns are good but have no consistency in captivating audiences" (PDRR Representative, 2022). According to him, this occurs because there is insufficient outreach for the material i.e., while he knows which content is present, the users are not informed on what is available, thereby making the content inaccessible.

The question of outreach encompasses both monetary and human resource constraints, a fact that the representative acknowledged and expanded upon by saying, "we have to account for resources, but only when we have an effective communication strategy to apply those resources to" (PDRR Representative, 2022). The emphasis placed on a communication strategy is due to the representative insisting that physical workshops need to take priority since social media and other forms of digital outreach are insufficient. The representative envisions this change through country-specific workshops to capture greater interest and inform the users. The importance of this is given when he states how "the main objective of [the digital platform] is to share experiences, right? So there needs to be a mechanism that fills this space, it has a greater level of efficiency" (PDRR Representative, 2022).

However, to achieve this type of mechanism, the representative speaks about how the collaboration between PDRR and Onda Rural requires a higher level of commitment and contractual obligations. The following statement reflects the representative's perspective on the current state of the partnership:

> I believe it should be institutionalized more, currently I'd say that the communication at the level of PDRR isn't right, I can see the content of Onda Rural, but I can't see PDRR …. I feel that for now Onda Rural is working to visualize the experience of South America more. I haven't seen Onda Rural retake the Central American perspective. (PDRR Representative, 2022)

As the representative interviewed is not directly in contact with Onda Rural, he mentions it is possible that information requests have been made and PDRR has yet to respond. He accepts that there is much to learn from the experiences and agricultural methods of South American countries, and that the inclusion of all experiences can be augmented through a proper communication strategy.

**WACC ALC**

The Latin American branch of the World Association for Christian Communication (WACC) is primarily a broadcasting group that promotes and supports various organizations. The representative interviewed is part of a small team that works alongside Onda Rural. Their experience with the partnership is positive overall, supported by a strong alignment of interests. As the representative describes, "WACC and Onda Rural share the same values, the same principles, not necessarily

Christianism, but form a quality of life and respect to human rights" (WACC Representative, 2022). He goes on to describe how the partnership is mutually beneficial: on one hand, Onda Rural opens the dialogue of family agriculture with the expertise on food sovereignty from the FAO, while on the other hand, WACC provides access to their network to diffuse the content that would otherwise not be available to many listeners. The partnership also revolves around the inclusion of WACC in other aspects of the initiative. The WACC representative described their role as "What WACC does is provide logistical support, firstly with the search and raising of funding, and also with the strategy and forming of communication strategies" (WACC Representative, 2022).

WACC has worked closely with Onda Rural for many years and the representative has been a part of their meetings on multiple occasions. as According to him, "There are no doubts after a meeting, the transparency with which [Onda Rural] inform and the quality of the communicational work they do is truly excellent" (WACC Representative, 2022). At the same time, he mentions that these meetings can take between two and three hours as there are many partners that need to be heard. Organizing these meetings is also difficult due to the logistics of working with partners from multiple countries. When inquired about the content and structure of these meetings, the representative had this to say, "There's a time for presentations, which are prioritized chronologically by time in which they've appeared … [CIESPAL] build the agenda, then we can propose some change, and we are happy to participate" (WACC Representative, 2022). Due to this structure, he hesitates to call the meetings dynamic, but does consider CIESPAL's ability to influence them as flexible.

The participation of WACC involving the digital platform and contact with its users is limited, since their efforts are focused on dissemination through broadcasting. Nevertheless, the representative is positive about the digital platform, commenting, "[the platform] is a good reflection of our proposals that have come about from these years of work … it can be improved and that is the advantage of the digital side. The committee of partners can keep collaborating to improve" (WACC Representative, 2022). WACC is quick to consider all developments of Onda Rural as a collaborative

endeavour. In consideration to the users, he asserts that the growth of the participative community is an achievable goal with the right strategy.

## Discussion

The interviews provided context to the various topics of discussion by giving insight into the operations and priorities currently in place at Onda Rural. The coding results shown in Table 4 highlight how applicable the topics were to the interviewees, with some being relevant to all participants, while others requiring expert knowledge. While it is a significant predictor, the importance of the factors cannot be determined by frequency alone. Additionally, several factors also had interdependencies. This is not unexpected, as the Midrange STS framework considers them as predictors for effectiveness by allowing them to compensate for when certain areas are not in an ideal state (Majchrzak & Borys, 2001). Therefore, it is important to consider the factors independently, highlight those that present interdependency amongst others, and account for their recurrence, particularly when there are inconsistencies between participants. Doing so will provide a more comprehensive understanding of those factors influencing the organizational effectiveness of Onda Rural, the role of the digital platform, and what improvements can be considered.

The following subsections are organized in the same order as in the theoretical framework to address each factor within their respective theme. However, as interdependencies showed a strong mix between a variety of factors, certain themes are enclosed within larger ones. Nevertheless, all factors are discussed, and dependencies explained.

### Work Roles

The factors dealing with work roles of leadership, complementors, and users were mostly consistent with the responsibilities expected from the theoretical framework. The leadership gave a great level of detail concerning their role in the initiative, the collaboration with partners, and standards and routines in place. The roles of CIESPAL participants were well defined and had clear boundaries, with the director having an overview of operations, the web developer functioning through a technical capacity, and the assistant overseeing daily operations. Although, the assistant does also have responsibilities of content production for the radio, alongside the website, social media duties, and partner coordination. This is most likely due to the frequently referenced lack of human and monetary resources present in the resource constraints factor, causing heavy workloads to be attributed to certain people. A

common issue raised in this and by other studies in ComDev and ICT4D where projects are often not given sufficient resources as the full extent of necessities is not fully accounted for (Bonina et al., 2021; Gomez-Morantes et al., 2022). This is the result of a lack of contextual understanding that is necessary for this field, where misconceptions of developing countries as generally being more affordable projects lead to an oversight on the specific requirements and issues present.

Often when describing collaboration, interdependencies arose involving the responsibilities and benefits of having partner organizations. The CIESPAL leadership worked closely with the partners with which they have active projects, with streamlined communication mainly with broadcasting associations such as ALER and WACC. The network outreach that these partners provided was a strong motivator for Onda Rural to keep the collaboration close. Additionally, the partners did share a cohesive vision and values to the organization, so they were also incentivized to continue working together and increase value to their own networks. These mutually beneficial arrangements were acknowledged by both CIESPAL leadership and the partners. However, this level of collaboration was not reported by other partners. In the case of PDRR, the collaboration had been declining even when organizational values and cohesive vision aligned, with Comunica also attesting to this disconnect being the case with other committee partners as well. While the PDRR representative no longer working with Onda Rural since 2019, the contact for PDRR was provided by CIESPAL leadership, showcasing a separation between the organizations. This limits the amount of network orchestration possible and signifies a lack of institutionalized arrangements that keeps all parties accountable. These are factors that are necessary for the success of rural communication services and their digital platform environments, and should therefore be addressed (Kapoor et al., 2021; Torres et al., 2017).

One factor that was not highly discussed was conflict resolution. This was due to the absence of conflicts and the leadership strategy of acting as moderators and only interfering if escalation ever occurred. Most of the arguments that were documented concerned the type of content which partners wished to include. However, these were quickly resolved by having a strict set of standards and organizational values which included the themes that Onda Rural supports. Hence, interdependencies played a

role in supporting the harmony amongst partners and leadership. The standards and routines were set by partners, mainly FAO and Comunica. Showcasing how collaboration augments Onda Rural's effectiveness.

From the partners' viewpoint, their roles and responsibilities as network amplifiers were strongly aligned to the expected ideal. This is due to their strong alignment with Onda Rural's values, creating a cohesive vision and motivating the partners in disseminating information. The resources necessary for the complementors to fulfil their role were also not a great issue of relevance as many partners work as disseminators and can handle the current load. The resource constraints alluded to are often in terms of projects with closer integration of users and scalability of Onda Rural, a common problem in ICT4D often also relating to infrastructure problems in the region (Yadav et al., 2015). The network effects also extended to introducing Onda Rural to other companies outside of the committee that had more local access, rather than the regional perspective that most partners operated in. However, the degree at which this is leveraged outside of outreach opportunities is limited by current state of the digitally mediated participation. PDRR detailed potential avenues to contact users, as the community of practice begins to flourish, they can be a strong partner in increasing the network's value.

In terms, of content provided, most partners provided services through access to other companies outside the main committee, as well as serve in an advisory capacity contributing to the daily processes of Onda Rural. Content creation work is streamlined due to protocols and standards, as well as the participation of partners providing various amount of support depending on the project, which are important aspects for the continual operation of digital platforms (Cusumano et al., 2019). One project that received a lot of attention form most participants is the radio newsletter that is broadcasted on a weekly basis. The program works on addressing topics that are chosen with input from users and many partners work on its creation and dissemination. This technology serves well as a medium of accessibility for rural areas that lack the infrastructure and resources to utilize the internet-based platform. However, in terms of achieving the goal of creating a participatory community, the effectiveness of the radio program is limited. From a ComDev and ICT4D perspective, this almost unilateral approach is outdated (Balit & Acunzo, 2020;

Heeks, 2020). Since the radio has a limited source of input by users it mostly acts as a trickle-down form of disseminated information. Coupled with a limited tracking and analysis on the outreach achieved, the radio program's resources could be better allocated towards the furthering of physical interaction with the end users or developing new services to increase functionality.

The role of users was a factor discussed in terms of consumption and network effects. Increased integration of users creates direct network effects that can elevate the value of the platform and create the participative community Onda Rural strives for (de Reuver et al., 2018). However, the initial value proposition of the digital platform must be large enough to motivate integration. This is where added functionalities, such as those proposed by the Comunica representative with market price integration, can have a larger impact. These added functions would contribute through indirect network effects, where there would be greater interdependency between users and complementary service providers contributing to the platform's value (Helfat & Raubitschek, 2018). This would have the added benefit of efficiently ensuring collaboration as interest alignments would be more impactful than broad-stroked organizational values.

**Technological Characteristics**

The purpose of the digital platform and its vision for communal communication is a vision shared by all participants interviewed. The technical infrastructure within CIESPAL is well managed and was developed with modularity and flexibility design philosophies, important aspects that contribute to a platform's effectiveness (Benlian et al., 2015; Cennamo et al., 2018). In the latest version, users provided co-development mainly in the user interface and content information. This made it so the usability of the performance was overall well received. The same co-development practice can be applied in future integration of services that leverage the dynamic and interactive capabilities of the digital platform.

As Onda Rural expands, the importance of a feedback system will also rise. Its inclusion can provide a stronger avenue for communication and co-development opportunities, outside of specific workshops and social media. It can also provide a better perception on the tracking of standards that can aid in evaluating the success of different services, along with gaging their applicability to users. Standards tracking is

normally considered in terms of compliance within an organization, but the information can prove valuable in asserting that the resources are being efficiently utilized for relevant services (Majchrzak & Borys, 2001).

Additionally, the maintenance of the platform can become a collective effort which will be important as the expansion of the platform can present more problems. These problems of scalability are seen in various ways when discussion digital platforms typically in for-profit cases where they are unable to compete with larger corporations (Kapoor et al., 2021). Even when not as critical to the survival of Onda Rural's platform, scalability is an aspect that the web developer foresees where the growth of the network and added functionalities can strain the platform and affect the performance. These eventualities should be considered in the resource management to future-proof the digital platform.

The digital platform has the greatest opportunity to provide Onda Rural with continuous improvement opportunities in the short term, particularly in creating more pragmatic services and nurturing the community of practice. While physical interaction with users is planned, they require a higher level of coordination, planning, and resources. The evidenced modularity and reliability of the platform provide a great avenue to increase the overall organization's effectiveness in achieving Onda Rural's goals.

**Customer Involvement**

The importance of co-development and feedback have been discussed in the previous segments, and they are all done in the name of greater inclusivity. Access to the platform is a strong value within the organisation and participation of users benefits the network. Chanels with which to onboard users point towards a conjunction of more physical workshops and more interactive services. This balance in the level of dependency on ICTs has been a struggle within ICT4D for many years, as different conditions in each region can limit their effectiveness (Bonina et al., 2021; Gomez-Morantes et al., 2022). It is specially challenging for Onda Rural, as it operates at such a broad regional level including all Latin America and the Caribe. The current resource constraints do not make it possible for Onda Rural to give the same level of attention to all the various communities in the region. Therefore, a consensus on which areas to prioritized should be made to make efficient and impactful projects.

The partner's capabilities and connections should be considered in assessing the organizations which would be the most responsive and have the proper context for the area.

**Socio-Technical Capabilities**

Training of socio-technical capabilities of users has been an effort from Onda Rural with various successful workshops, including the program Talking with Josefina which addressed specific user-suggested topics. This is a very strong aspect of the initiative since typically there is an absence of individual capabilities that prevent people from using digital platforms (Chrysantina et al., 2019). While the user capabilities are well addressed, more considerations should be taken regarding those of the complementors. This can become more relevant as contact with the users from various countries increases and begin to interact more regularly with one another as well as cultural and political differences lead to conflict (Bonina et al., 2021). Currently, Onda Rural is very efficient at handling conflict resolution amongst collaborating organizations, and it should also be able to do the same for user interactions.

**Organizational Effectiveness**

The organizational effectiveness of Onda Rural is very strong when considering the factors relating to its daily operations. The structure, variance control processes, and network of partners developed is robust. Having a multitude of organizations that align in a cohesive vision and share organizational values are significant signs towards effectiveness of Onda Rural. It's openness of the collaborators in signifying and proposing solutions to the areas requiring continuous improvement also signify the open communication and dynamic structure necessary to address them. The transition of Onda Rural's focus from being organization-centric to user-centric has been a challenging process. However, it has built an infrastructure that with proper strategizing, resources, and accountability, could achieve its goals supporting the communication, capabilities, and participation of farmers in the Latin American and Caribbean region.

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**Recommendations**

From the analysis performed of Onda Rural in this research, there are six main recommendations that can increase the effectiveness of the initiative. The first involves assessing the effectiveness of their current rural communication services. Having a thorough analysis on the reachability and effectiveness of each of the projects they are working on can help in reassessing the allocation of resources. In this same line, the second recommendation is to make this assessment and tracking more systematic through the integration of a feedback mechanism. Its integration can be beneficial to both users and partners to help restructure their approach when necessary. Thirdly, the digital platform should be given a wider range of functionality as to provide more dynamic and recurring interactions with users. By focusing on the possible indirect network effects that service provides can supply, the motivation for participation can increase from both parties. Expanding on motivation, the fourth recommendation lies in the institutionalization of contractual agreements among collaborating organizations. The plan of participative communication which Onda Rural operates with provides specific goals, but the assignment of these is ambiguous from the documentation available to the researcher. While the flexibility can be appealing to participate in non-profit organizations, the participation of complementing partners needs to be much more proactive and reliable.

The fifth recommendation is to better leverage the possibilities that each network of partner organizations has to offer. These are often already operating at a local level with frequent interaction with their target audience, therefore they can aid in co-developing services and provide vital socio-technical context. This leads to the final recommendation of re-establishing the physical workshops and contact with the communities across the region. The digital platform serves as a great tool and host for various services, but the limitations of developing countries concerning infrastructure and affordability of ICT4Ds will continue to limit access in rural areas for the foreseeable future. Therefore, in-person outreach programs throughout the region should be a goal that Onda Rural strives towards.

**Future Research**

The field of ICT4D and ComDev are constantly evolving and currently lie in a state where platform technologies drive economic and social influence. The present research utilized a modified version of midrange STS theory to include factors relevant to digital platforms to measure the organizational effectiveness of the Onda Rural initiative. The framework allowed for discussion in a variety of aspects which gave an encompassing view of the organization. In doing so, it provided insight into various interdependencies that highlighted areas for improvement and was able to formulate specific recommendations. This was possible because of the factor-based approach which isolated the various topics and allowed for independent discussion to take place at two levels of the organization, the leadership of CIESPAL and collaborators. A limitation in this approach is that its constraints the depth with which each factor can be explored. There are a total of thirty factors used to assess the organization's effectiveness and therefore only a limited number of questions and follow-ups were possible. However, the ability to contextualize the framework into a variety of sectors and organizations operating in the field of ICT4D does warrant further investigation in assessing the full capabilities of the framework. As ComDev will continue to necessitate a socio-technical lens, the present theoretical framework can allow for an analysis that encompasses various relevant aspects.

Limitations relating to the present research include the sample size of partner organizations being relatively small as the entire committee is comprised of eleven organizations. Additionally, there is no representation of family farmers within the participants, as the end-users of Onda Rural. While their inclusion is deemed to be outside of the scope of this research and logistically unfeasible, the insights they can provide would be highly beneficial in the analysis of the organization. Furthermore, the inclusion of only having direct members of Onda Rural is prone to bias due to the not having an external, objective perspective in the operations and direction for the initiative. This could have enrichened and given more weight to the critics given by collaborators, as even then they are still very invested in the success Onda Rural.

A continuance of this work should focus on addressing these limitations as well as incorporate more sector relevant factors to analyse. Presently the theoretical framework's contextualization is focused on the organizational effectiveness and the

use of digital platforms. However, agricultural specific factors would become more relevant with the inclusion of family farmers as end-users to have more specific context when approaching them.

## Conclusion

The present research identified factors relevant to the organizational effectiveness of Onda Rural and was able to provide six specific recommendations for improvement based on these. The formulation of factors was provided by the operationalization of a modified version of midrange STS theory. The modifications added context of digital platforms as they are an important tool for Onda Rural to achieve its goals. The factors identified to be the most influential to the effectiveness of Onda Rural include: the alignment of organizational values and cohesive vision, which fomented the creation of a partner committee with a vast network; the standards and routines set in place and enforced by partner organizations which allow for a consistent creation and quality of content as well as direction within the themes explored by the initiative; the reporting and daily operations factors fomenting a dynamic flow of information and communication within the daily of daily operations; and the modularity and reliability of the digital platform, which when coupled with the unanimous desire for continuous improvement in collaboration and user interaction, showcase the greatest strengths for the future of Onda Rural. This being the case by the dynamic possibilities of the ICT platform that can increase user participation and encourage responsive collaboration through greater service integration.

The areas of improvement were addressed in six recommendations, these include: an analysis and tracking on the effectiveness of current services; the integration of a systematic feedback mechanism; implementation of wider functionality for the ICT platform through practical user-cantered services; the institutionalizing of contractual agreements among amongst collaborating partners; leveraging of partner's network to achieve local access to userbase; and re-establishing the physical workshops with the communities across the region to raise inclusiveness to areas without ICT capabilities. These recommendations can aid in improving the effectiveness of Onda Rural in achieving its goals supporting the communication, capabilities, and participation of family farmers in the Latin American and Caribbean region.

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**Appendix A – Plan of Participative Communication 2022**

| INFORMACIÓN INCLUSIVA | | | |
|---|---|---|---|
| **Componente PCP** | **Línea de acción estratégica** | **Resultados esperados** | **Tareas específicas** |
| | | | |
| **1. Comunicación participativa: concienciación, fomento, incidencia y difusión.** | **1.1** Actualización de la plataforma Onda Rural. Plataforma operativa con funcionalidades necesarias. | **1.1.1.** Portal web de Onda Rural actualizado: navegabilidad y arquitectura y medios sociales. | • **Página web Onda Rural**. El diseño se revisará oportunamente para mejorar la facilidad de percepción del contenido, de acuerdo a las observaciones de los visitantes.<br><br>• Instalación de software que añada una funcionalidad adicional o una nueva característica, de ser necesario.<br><br>• **Comunidad de Practica.** Facilitada a través de Rocket Chat[1], instalado en la web y abierto para generar participación de grupos de trabajo. en https://comunidad.ondarural.org/home. |
| | **1.2** Elaboración y adaptación de contenidos, de socios estratégicos, incluidas las representaciones de | **1.2.1.** Segmentos de audiencia informados sobre el Decenio de la Agricultura Familiar. | • **Canales de difusión:** Medios digitales de OR. Entrega de material a las instituciones del Comité Impulsor y a todos los medios de comunicación de la región y que constan en la base de datos de CIESPAL y OR. |

[1] Con esta herramienta es posible: enviar mensajes de texto o de voz; compartir documentos; generar debates o intercambio de propuestas o experiencias.

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| | FAO en la región. | | |
| | **1.3** Socialización de la información generada por medio de la plataforma y las redes sociales de Onda Rural; actualizados y compartidos a través de canales relevantes. | **1.3.1.** Materiales de comunicación recopilados en alianza con organizaciones, instituciones y redes y entidades de comunicación. | • **Seguimiento de difusión**, envío de comunicaciones a las redes y medios que reciben el material. Mecanismos para recoger información de los medios. Por ser voluntaria y gratuita la difusión, no se reciben muchas respuestas de la forma y periodicidad de difusión. |
| | **1.4** Mantener la campaña de información y comunicación sobre el DAF, el Plan de Acción Global, y los Planes Nacional de Agricultura Familiar de los países de la región. | **1.4.1. Campaña de comunicación** organizada e implementada. | • **Campaña sobre el Decenio de la AF**, producción y difusión de mensajes sobre el Decenio. Recopilación y difusión del material producido por FAO y sus programas. Estos productos se incluyen en la producción semanal de la Radio Revista OR.<br><br>• **Campaña de información diseñada** y canalizada a través de Onda Rural y sus aliados. |

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| | **1.5** Fortalecer grupos de trabajo en las áreas de trabajo del PCP. | **1.5.1. Grupos de trabajo fortalecidos** y en plena actividad, principalmente en temas relacionados con servicios de comunicación rural.<br><br>**1.5.2. Grupos de trabajo creados**, los necesarios en temas relacionados con proyectos en curso, iniciativas o componentes de comunicación participativa. | • **Convocar regularmente a los grupos de trabajo.** Establecer, para cada área o tema, una frecuencia de reunión. |
| **FORTALECIMIENTO DE CAPACIDADES** | | | |
| **Componente PCP** | **Línea de acción estratégica** | **Resultados esperados** | **Tareas específicas** |
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| **2. Fortalecimiento y desarrollo de capacidades en** | **2.1** Fortalecer o desarrollar capacidades en Comunicación para el Desarrollo y temas | **2.1.1.** Seminarios virtuales (2) facilitados sobre la apropiación local de TIC por parte de las organizaciones | • **Seminarios virtuales** (dos) sobre nuevas tecnologías y AF. Según resultados de encuestas y solicitudes directas. En tecnologías y su utilidad para la AF<br><br>• **Realización de un taller** |

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| **comunicación para el desarrollo** | específicos. Se orienta a personal de organizaciones de productores, instituciones del sector y medios comunitarios a través de asistencia técnica, formación y capacitación en servicio. | e instituciones de la AF y la sistematización de los resultados.<br><br>**2.1.2.** Taller virtual regional (o semipresencial) en CpD para organizaciones de productores, proyectos y otros actores relevantes, y del UNDFF.<br><br>**2.1.3.** Asistencia técnica y participación en otros talleres (o reuniones y seminarios web) que puedan organizarse en la región América Latina. | **virtual regional (o semipresencial) en CpD.** Se planificará, convocará y realizará un taller con la presencia de OP, proyectos y redes de comunicación, para discutir los aspectos más relevantes de la comunicación en el trabajo diario. Al final del taller se contará con trabajos, que pueden ser difundidos en la plataforma de OR.<br><br>• **Sistematización de los seminarios. I**nforme detallado de exponentes y participantes y conclusiones con propuestas.<br><br>• **Sistematización de los talleres.** Se realizará a manera de resumen de los resultados alcanzados, las conclusiones de los procesos y la evaluación de los participantes. |
| | **2.2** Generar comunidades de práctica según especialidad e interés de las personas | **2.2.1. Comunidad de Práctica** operativa en Onda Rural para facilitar asistencia técnica, | • **Implementación de la Comunidad de Práctica.** Metodología de intercambio de conocimientos y aprendizaje. Temas de comunicación para la AF. |

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| | interesadas y de aquellas que formen parte de los grupos de capacitación. | capacitación y colaboración en la implementación de estrategias y planes de acción de CpD. | • **Sistematización de principales propuestas de la Comunidad de Práctica**. Los responsables de cada grupo de trabajo y con el apoyo y participación del Comité Impulsor, se sistematizarán los temas de mayor trascendencia. |
| | **2.3** Producir un conjunto de materiales (documentos, guías técnicas, presentaciones, videos, etc.) que contribuyan a los procesos de fortalecimiento de capacidades. | **2.3.1. Un módulo introductorio de capacitación en TIC** para el desarrollo de capacidades en organizaciones e instituciones vinculadas a la agricultura familiar.<br><br>**2.3.2.** Una **Guía sobre producción y uso del video participativo** para organizaciones de productores en la modalidad de agricultor a agricultor u otras fundamentalmente participativas. | • **Módulo introductorio de capacitación** en TIC, orientado a organizaciones e instituciones vinculadas con la AF, temáticas relevantes y prácticas aplicadas a su labor y el módulo se elabora con criterios pedagógicos.<br><br>• **Guía de producción y uso del video participativo** en modalidad predominante “de agricultor a agricultor”. |

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| | | **2.3.3.** Mecanismo de **divulgación de la guía de producción y uso del video** participativo; así como de los materiales comunicacionales producidos. | |
| **SERVICIOS DE COMUNICACIÓN RURAL (SCR)** | | | |
| **Componente PCP** | **Línea de acción estratégica** | **Resultados esperados** | **Tareas específicas** |
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| **3. Servicios de Comunicación Rural** | **3.1** Promover **Servicios de Comunicación Rural (SCR)** mediante investigaciones aplicadas, consultas virtuales y capacitación.<br><br>**3.2** Brindar **asistencia técnica** a organizaciones de | **3.1.1** Un **documento de revisión de experiencias**, marcos regulatorios y Universal Access Funds y recomendaciones para promover servicios de comunicación rural en América Latina.<br><br>**3.1.2** Una **propuesta sobre la promoción de servicios de comunicación rural** para decisores y | • **Un documento**: Situación y recomendaciones del acceso a la tecnología en Latinoamérica, con énfasis en sectores rurales", este documento se trabajará con el apoyo de APC y del Comité Impulsor. Siempre y cuando, contemos con la participación activa y comprometida de APC. *Se puede trabajar el documento sobre ley de comunicación o servicios de comunicación rural en la región*<br><br>• **Documentos y material dirigidos a parlamentarios y decisores** a través de foros de análisis y discusión con participación de los sectores involucrados y difundido por redes sociales, con mensajes que los sensibilicen y motiven a incluir en sus agendas los temas |

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| | productores e instituciones en la elaboración e implementación de estrategias y planes de CpD para la AF. | parlamentarios, como parte de la política pública de agricultura familiar.<br><br>**3.2.1 Asesoría técnica provista** a organizaciones de productores, instituciones y programas-proyectos FAO.<br><br>Por ejemplo, Plan Nacional de Agricultura Familiar (Redcaf) y UPA Nacional Costa Rica, Proyecto Conciencia agropecuaria Uruguay, Programa de la FAO Mecanismo para Bosques y Fincas (FFF), RECLIMA El Salvador, entre | relacionados con la AF.<br><br>• **Reuniones técnicas** de asesoría y experiencias a organizaciones involucradas en proyectos de AF, a fin de que cada una pueda desarrollar acciones concretas en comunicación.<br><br>• **Seguimiento a la implementación** de Planes Locales de Innovación y Comunicación en los países. |

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| | | otros de nivel nacional, regional o global. | |
| | **3.3** Establecimiento de una red de comunicadores pertenecientes a organizaciones e instituciones relacionadas a agricultura familiar y área rural en general. | **3.3.1** Construir una base de datos para identificar especialistas y entidades que trabajen en CpD, vinculados a la AF. | • **Identificar especialistas y entidades vinculadas con la CpD y AF**, levantando información con el apoyo de Comité Impulsor y FAO. Enviarles información en CpD para motivar su acercamiento y vinculación con las organizaciones de AF y la iniciativa de OR. |
| | **3.4** Creación, fortalecimiento o rediseño de grupos de trabajo por componente del Plan de Comunicación Participativa. | **3.4.1** Ampliado y fortalecido al menos el grupo de trabajo "comunicación participativa", en especial robusteciendo la relación con nuevos aliados y la sinergia con la página del UNDFF en RLC. | • **Búsqueda de nuevos mecanismos ganar-ganar** para la conformación sólida de grupos de trabajo comprometidos con la comunicación participativa en la agricultura familiar. |
| **PROMOCIÓN DE LA COMUNICACIÓN PARA EL DESARROLLO RURAL** | | | |

| Componente PCP | Línea de acción estratégica | Resultados esperados | Tareas específicas |
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| | | | |
| **4. Fortalecimiento y promoción de la iniciativa regional** | **4.1** Implementación de la estrategia de promoción CpD en los diferentes segmentos de audiencias identificadas. | **4.1.1** Un listado de responsables y especialistas en comunicación de las organizaciones de productores.<br>**4.1.2** Informes de uso y evaluación de formatos y productos de Onda Rural difundidos en redes sociales y en medios de comunicación que voluntariamente decidan participar. | • **Identificar responsables y especialistas de comunicación en organizaciones de productores,** para motivar su participación activa en la iniciativa OR y procurar actividades conjuntas que puedan derivar en la confirmación de una posible red.<br>• **Producir materiales de comunicación** sobre CpD y los elementos constituyentes que desarrolla. |
| | **4.2** Promoción de la iniciativa Onda Rural en el marco del Decenio de las Naciones Unidas de la Agricultura Familiar (DAF). | **4.2.1** Plan de promoción de Onda Rural implementado incluyendo: un boletín mensual y un DB-click quincenal; producción de materiales multi-mediales; difusión de los materiales de acuerdo a las | • **Diseño de un plan de promoción de Onda Rural** tanto al exterior como al interior de la organización. Y las posibilidades de intercambio de materiales de Onda Rural: Radio revista semanal; Reseñas de AF, Facebook, Twitter; reportajes a personalidades; resultados de la comunidad de práctica, entre otros.<br>• **Producción de boletín informativo mensual,** que |

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| | | audiencias. | destaque acciones desarrolladas en OR y otras relacionadas al DAF, dirigido a las organizaciones de productores, funcionarios gubernamentales y de la cooperación internacional, vinculados a la AF.<br><br>• **DB-Click quincenal**, listado de noticias con links de acceso y que se envían por mail masivo. |
| | **4.3** Generación de datos y evidencia de los resultados alcan<br>**4.4** zados. | **4.3.1** Informes de cantidad de personas certificadas en seminarios y cursos realizados. Proporcionar información de audiencias alcanzadas, productos elaborados y actividad de la página web y medios sociales. | • **Informe de participación en los cursos y seminarios.** Da cuenta de la cantidad de participantes, cargas horarias y detalle de contenido que permitan evidenciar el impacto de las actividades de capacitación.<br><br>• **Informe de resultados y recomendaciones de productos OR.** La información se recogerá a través de dos grupos focales y el envío de una encuesta. Los resultados servirán para ajustar los productos y su pertinencia. |

## Appendix B – Principles of STS Design (Cherns, 1976, 1987)

1. Compatibility: The process of design must be compatible with its objectives.
2. Minimal critical specifications: Only the minimal critical allocation of tasks to jobs, jobs to roles, and objectives and methods that is absolutely essential should be specified.
3. The socio-technical criterion: Variances, if they cannot be eliminated, must be controlled as near to their point of origin as possible.
4. The multi functionality principle: Each element in an organism (such as people in a team) should possess more than one function, and the same function should be able to be performed in different ways by using different combinations of elements.
5. Boundary location: Locate responsibility for coordination without outside groups clearly and firmly with those whose efforts require coordination.
6. Information flow: Information systems should be designed to provide information in the first place to the point where action on the basis of it will be needed.
7. Support congruence: Systems of social support should be designed so as to reinforce the behaviours that the organization structure is designed to elicit.
8. Design and human values: An objective of organizational design should be to provide a high quality of work.
9. Incompletion: Design is a reiterative process; as soon as design is implemented, its consequences indicate the need for redesign.

**Appendix C – Generic Critical Specifications (Majchrzak & Borys, 2001)**

1. Specifications for ideal work roles

- Workers have basic literacy skills (reading, writing, math, computer operation), basic manufacturing operations skills (operating and basic maintenance of relevant equipment; problem-solving), and product knowledge (understanding how design parts meet equipment specs, how parts function together).
- Workers are provided the dynamically changing information on scheduling (e.g. routing slips), part and process specifications (e.g. quality, cost, equipment capabilities, part drawings), customer feedback, and supplier capabilities.
- Employees are empowered to make decisions over how their work is designed, the sequence in which tasks are performed, contacting customers when needed, and improvements to the way work is done.
- Workers are given authority to access the resources (tools, equipment) they need to perform their work.
- Tasks are allocated to workers to allow them to engage in the preparation, doing, adjustment, evaluation and improvement cycle (Hacker, 1986) of work.

2. Specifications for ideal technology characteristics

- Reliable.
- Availability of breakdown alternatives.
- Simple (i.e. technology that is mature, does not mix different vendors, uses as few input/output devices as possible, needs only one software program to run it, is comprised of as few mechanical and electronic components as possible, has error detectability, components are modularized for easy replacement, and has a self-diagnostic capability).
- Performs routine work leaving humans to perform non-routine tasks (i.e. of synthesis, interpretation and non-routine judgment).
- Designed with human–machine interfaces that avoid human information overload (i.e. by presenting processing information over time, automatically comparing processing information against specifications, and allowing humans to manipulate information).
- Designed to allow for human override.

- Production processes that minimize variation across products (i.e. by separating out different products into different production, standardization and identifiable of products and parts, and organizing parts into similar part families).
- Safe working conditions.

3. Specifications for ideal customer involvement

- Customers involved in evaluating the unit.
- Customers identifying manufacturing process improvements.
- Customers helping to redesign parts.
- Customers helping to develop new products.

4. Specifications for ideal reporting structures

- Norms that encourage learning.
- Few reporting levels within a production area (ideally two or less levels for an organization of less than 200).
- Sharing of priorities among the different jobs or units in the organization.

5. Specifications for socio-technical capabilities ideally available from other units

- When needed skills, task authority, and resource authority are not formally allocated to the unit, but are allocated to some other unit, the unit should have the authority to request the skills, tasks, and resources, and the other unit should be required to quickly provide them.

6. Specifications for ideally motivating performance standards

- Standards are congruent with the business strategies of importance to the organization.
- Standards are challenging but achievable.
- Standards are clearly communicated.
- Standards are set by individuals (not by management without worker input).
- Standards are tracked on a regular basis.
- Tracking is done visibly and accurately.

7. Specifications for ideally motivating rewards

- Rewards are tied to performing on the tracked performance standards.
- Rewards are based on a mixture of individual, unit (or team), and larger-unit performance.

- Employees value a continuous change and improvement perspective on the way they do their work.
- Employees value a learning perspective such that they are willing to evaluate past mistakes and learn new tasks.

## Appendix D – Interview Questions

**ENGLISH**

Good morning, thank you for meeting with me. I am Saulo Arias Hernandez. As I've detailed in our correspondence, I'll be asking a series of questions about your experience working in Onda Rural. While some of these questions will be relating to the development of the digital online platform, the website including the Rural Communication Services (RCS) and extensions to Rocket Chat. I'll also ask about the overall organization of the initiative and its functioning. This will be a semi-structured interview, so while I do have some specific topics to discuss, it's even better to get specific details on those aspects you deem most relevant.

**Leadership - CIESPAL**

*Role*

1. What are your core responsibilities as director / manager / ICT manager of Onda Rural?
2. How does Onda Rural ensure collaboration between its various partner organizations?

*Digital Platform*

3. What are the core functionalities of the digital platform?
    a. What are additional functions that could increase the value of the platform?
4. How flexible is the digital platform when integrating new changes and RCS?
    a. Can other partner organizations make changes and additions?
5. When working with partner institutions in developing the RCS, what processes have been introduced to provide a standardized creation method?
    a. What routines would you consider necessary?
6. How do the addition of RCS and other subsystems impact the digital platform's performance?
7. How are deviations in service delivery plans addressed?
    a. What kind of control strategies are in place to ensure service delivery?
8. What mechanisms does Onda Rural have in place to ensure the continuous creation of RCS?

a. Once created, how are the existing services improved and managed?

**9.** What is the maintenance procedure to ensure proper and reliable functioning of the digital platform?

**10.** What are the resource constraints that can limit the implementation of RCS?

*Users*

**11.** How are the RCS of Onda Rural promoted to the end users?

a. How is access to Onda Rural and its RCS by end users ensured?

**12.** How is the participation of marginalized groups (women and indigenous people) encouraged?

**13.** What are common resource constraints that potential users may experience?

a. How can these be addressed by Onda Rural?

**14.** How does Onda Rural encourage the development of the users' socio-technical capabilities?

**15.** How is the feedback from end users gathered by Onda Rural?

**16.** How is the feedback from end users utilized for the improvement of RCS?

**17.** What feedback do you receive on the complexity of the digital platform?

**18.** To what extent are the end users involved in the development of the RCS?

a. How can their involvement be increased?

**19.** How are users incentivized to participate in Onda Rural and use it RCS?

*Organization*

**20.** How is information about the RCS communicated in Onda Rural?

a. Would you consider the information on customer feedback and project updates dynamic? Why or why not?

**21.** What are the reporting levels within Onda Rural?

a. How could it be streamlined?

**22.** How are the various projects prioritized?

a. How are these levels of priorities communicated among the partner organizations?

**23.** How does CIESPAL address conflicts that arise between partner organizations?

a. Can you provide me with an example?

**24.** What are the base performance standards of Onda Rural?

a. How are these standards chosen and communicated?

**25.** How are these standards tracked?

a. How is the tracking done in a visible and accurate manner?

**Partner Organizations – Complementors**

*Role*

**1.** What are the main operations of (insert organization) and how do they relate to Onda Rural?

**2.** What services does (insert organization) provide for the Onda Rural initiative?

**3.** (Insert Organization) has its own network of users and other stakeholders. How does your network and that of Onda Rural overlap?

a. Does (insert organization) have any interest in a merger? Why or why not?

*Digital Platform*

**4.** What are the core functionalities of the digital platform?

a. What are additional functions you consider could increase the attractiveness of the platform?

**5.** How flexible is the digital platform when integrating new changes and RCS?

a. Can you as partner organizations make changes and additions?

**6.** What resources does (insert organization) require from Onda Rural to deliver its RCS?

**7.** What are the resource constraints that can limit the implementation of RCS?

*Users*

**8.** How are the RCS of Onda Rural promoted to the end users?

a. How is access to the RCS by end users ensured?

**9.** How is the participation of marginalized groups (women and indigenous people) encouraged?

**10.** What are common resource constraints that potential users may experience?

a. How can these be addressed by Onda Rural?

**11.** How does Onda Rural encourage the development of the users' socio-technical capabilities?

**12.** How is the feedback from end users gathered by Onda Rural?

**13.** How is the feedback from end users utilized for the improvement of RCS?

**14.** What feedback do you receive on the complexity of the digital platform?

**15.** To what extent are the end users involved in the development of the RCS?

a. How can their involvement be increased?

**16.** How are users incentivized to use Onda Rural?

*Organization*

**17.** How is information about the RCS communicated in Onda Rural?

a. Would you consider the information on customer feedback and project updates dynamic?

**18.** What are the reporting levels within Onda Rural?

a. How could it be streamlined?

**19.** How are the various projects prioritized?

a. How are these levels of priorities communicated amongst the partner organizations?

**20.** What are the base performance standards of Onda Rural?

a. How are these standards chosen and communicated?

**21.** How are these standards tracked?

a. How is the tracking done in a visible and accurate manner?

**22.** What programs, if any, does (insert organization) have to grow socio-technical capabilities of workers?

**23.** How do the Onda Rural values of (insert normative statement) align with the values of (insert organization)?

**24.** How do the RCS contribute to (insert organization)'s vision for Onda Rural?

**25.** What motivates (insert organization) to work as a committee member that helps develop the RCS for the Onda Rural initiative?

**SPANISH**

Buenos días, gracias por atender la llamada. Soy Saulo Arias Hernández. Como le he comentado con anterioridad, le realizare una serie de preguntas sobre su experiencia trabajando en Onda Rural. Algunas de las preguntas estarán relacionadas con el desarrollo de la plataforma digital, el sitio web, los Servicios de Comunicación Rural (SCR) y las extensiones de Rocket Chat. También preguntaré sobre la organización general de la iniciativa Onda Rural y su funcionamiento. Esta será una entrevista semiestructurada, por lo que tendré algunos temas en específicos para discutir, pero también me gustaría conseguir más detalles sobre los aspectos que considere más relevantes.

**Liderazgo - CIESPAL**

*Rol*

1. Como supervisora de Onda Rural, ¿cuáles son sus responsabilidades principales como directora de Onda Rural?
2. ¿Cómo asegura la colaboración entre las distintas organizaciones colaborando con Onda Rural?

*Plataforma Digital*

3. ¿Cuáles son las funciones principales de la plataforma digital?
    a. ¿Qué funciones adicionales podrían aumentar el valor de la plataforma?
4. ¿Qué tan flexible es la plataforma digital al integrar nuevos cambios y SCR?
    a. ¿Miembros del comité pueden hacer cambios y adiciones?
5. Al trabajar con instituciones asociadas en el desarrollo de SCR, ¿qué procesos se han introducido para estandarizar el método de creación de los SCR?
    a. ¿Qué rutinas consideraría necesarias?
6. ¿Cómo impacta la adición de SCR y otros subsistemas el funcionamiento de la plataforma digital?
7. ¿Cómo se manejan las desviaciones en planes para entregar SCR?
    a. ¿Qué tipo de estrategias de control existen para garantizar la entrega de servicios?

8. ¿Qué mecanismos tiene Onda Rural para asegurar la creación continua de SCR?
    a. Una vez creados, ¿cómo se gestionan y mejoran los servicios existentes?
9. ¿Cuál es el procedimiento de mantenimiento para garantizar el correcto y confiable funcionamiento de la plataforma digital?
10. ¿Cuáles son las restricciones de recursos que pueden limitar la implementación de SCR?

*Usuarios*

11. ¿Cómo se promocionan los SCR de Onda Rural a los usuarios finales?
    a. ¿Cómo se asegura que los usuarios tengan acceso a Onda Rural y sus SCR?
12. ¿Cómo se fomenta la participación de grupos marginados (mujeres e indígenas)?
13. ¿Cuáles son las limitaciones de recursos que pueden sufrir los usuarios potenciales?
    a. ¿Cómo puede abordarlos Onda Rural?
14. ¿Cómo fomenta Onda Rural el desarrollo de las capacidades socio técnicas de los usuarios?
15. ¿Cómo reúne Onda Rural el feedback de los usuarios?
16. ¿Cómo se utilizan los comentarios de los usuarios finales para mejorar los SCR?
17. ¿En qué medida están involucrados los usuarios en el desarrollo de los SCR?
    a. ¿Cómo se puede aumentar su participación?
18. ¿Qué comentarios recibe sobre la complejidad de la plataforma digital?
19. ¿Cómo se incentivan a los usuarios a participar en Onda Rural y usar sus SCR?

*Organización*

20. ¿Cómo se comunica la información sobre los SCR dentro de Onda Rural?
    a. ¿Consideraría que la información sobre los comentarios de los clientes y las actualizaciones del proyecto es dinámica? ¿Por qué si o por qué no?

**21.** ¿Cuáles son los niveles de reporte dentro de Onda Rural?
   a. ¿Cómo se podría simplificar?

**22.** ¿Cómo se priorizan los distintos proyectos?
   a. ¿Cómo se comunican estos niveles de prioridades entre las organizaciones del comité?

**23.** ¿Cuáles son los estándares básicos de desempeño de Onda Rural?
   a. ¿Cómo se eligen y comunican estos estándares?

**24.** ¿Cómo se rastrean estos estándares?
   a. ¿Cómo se realiza el rastreo de manera visible y precisa?

**25.** ¿Cómo maneja los conflictos que surgen entre las organizaciones socias?
   a. ¿Podrías darme un ejemplo?

**Organizaciones Asociadas – Complementarios**

*Rol*

**1.** ¿Cuáles son las operaciones principales de (insertar organización) y cómo se relacionan con Onda Rural?

**2.** ¿Qué servicios brinda (insertar organización) para la iniciativa Onda Rural?

**3.** (Insertar Organización) tiene su propia red de usuarios y otros actores ¿Cómo se superponen su red y la de Onda Rural?
   a. ¿(Insertar organización) tiene algún interés en una fusión? ¿Por qué si o por qué no?

*Plataforma Digital*

**4.** ¿Cuáles son las funciones principales de la plataforma digital?
   a. ¿Qué funciones adicionales podrían aumentar el valor de la plataforma?

**5.** ¿Qué tan flexible es la plataforma digital al integrar nuevos cambios y SCR?
   a. ¿Usted puede hacer cambios y adiciones, como parte del comité?

**6.** ¿Qué recursos requiere (insertar organización) de Onda Rural para entregar sus SCR?

**7.** ¿Cuáles son las restricciones de recursos que pueden limitar la implementación de SCR?

*Usuarios*

8. ¿Cómo se promocionan los SCR de Onda Rural a los usuarios finales?
    a. ¿Cómo se asegura que los usuarios tengan acceso a Onda Rural y sus SCR?
9. ¿Cómo se fomenta la participación de grupos marginados (mujeres e indígenas)?
10. ¿Cuáles son las limitaciones de recursos que pueden sufrir los usuarios potenciales?
    a. ¿Cómo puede abordarlos Onda Rural?
11. ¿Cómo fomenta Onda Rural el desarrollo de las capacidades socio técnicas de los usuarios?
12. ¿Cómo reúne Onda Rural el feedback de los usuarios?
13. ¿Cómo se utilizan los comentarios de los usuarios finales para mejorar los SCR?
14. ¿Qué comentarios recibe sobre la complejidad de la plataforma digital?
15. ¿En qué medida están involucrados los usuarios en el desarrollo de los SCR?
    a. ¿Cómo se puede aumentar su participación?
16. ¿Cómo se incentivan a los usuarios a participar en Onda Rural y usar sus SCR?

*Organización*

17. ¿Cómo se comunica la información sobre los SCR dentro de Onda Rural?
    a. ¿Consideraría que la información sobre los comentarios de los clientes y las actualizaciones del proyecto es dinámica? ¿Por qué si o por qué no?
18. ¿Cuáles son los niveles de reporte dentro de Onda Rural?
    a. ¿Cómo se podría simplificar?
19. ¿Cómo se priorizan los distintos proyectos?
    a. ¿Cómo se comunican estos niveles de prioridades entre las organizaciones del comité?
20. ¿Cuáles son los estándares básicos de desempeño de Onda Rural?
    a. ¿Cómo se eligen y comunican estos estándares?
21. ¿Cómo se rastrean estos estándares?
    a. ¿Cómo se realiza el rastreo de manera visible y precisa?

**22.** ¿Qué programas, si los hay, tiene (insertar organización) para aumentar las capacidades socio técnicas de los trabajadores?

**23.** ¿Cómo se alinean los valores de Onda Rural con los valores de (insertar organización)?

**24.** ¿Cómo contribuyen los SCR a la visión que tiene (insertar organización) para Onda Rural?

**25.** ¿Qué motiva a (insertar organización) a trabajar como miembro del comité que ayuda a desarrollar los SCR para la iniciativa Onda Rural?

## Appendix E – Division of Factors between Interview Sets

| | CIESPAL Leadership | Partner Organization |
|---|---|---|
| **Organizational Effectiveness** | **3** | **3** |
| Continuous Improvement Objectives | 1 | 1 |
| Process Variance Control Strategies | 1 | 1 |
| Organizational Values | 1 | 1 |
| **Work Roles** | **7** | **7** |
| Leadership | 1 | |
| Collaboration | 1 | |
| Conflict Resolution | 1 | |
| Standards and Routines | 1 | |
| Complementors | | 1 |
| Content | | 1 |
| Network Effects | | 1 |
| Resources | | 1 |
| End Users | 1 | 1 |
| Cohesive Vision | 1 | 1 |
| Dynamic Information | 1 | 1 |
| **Technological Characteristics** | **6** | **4** |
| Functionality | 1 | 1 |
| Reliability | 1 | |
| Modularity | 1 | |
| Performance | 1 | 1 |
| Usability | 1 | 1 |
| Resource Constraints | 1 | 1 |
| **Customer Involvement** | **4** | **4** |
| Feedback | 1 | 1 |
| Inclusivity | 1 | 1 |
| Improvements | 1 | 1 |
| Co-Development | 1 | 1 |
| **Reporting Structure** | **2** | **2** |
| Streamlined Communication | 1 | 1 |
| Prioritization | 1 | 1 |
| **Socio-Technical Capabilities** | **1** | **2** |

| | | |
|---|---|---|
| ST Capabilities of Complementors | | 1 |
| ST Capabilities of End Users | 1 | 1 |
| **Performance Standards** | **2** | **2** |
| Setting Standards | 1 | 1 |
| Tracking Standards | 1 | 1 |
| **Motivation** | **2** | **2** |
| Users | 1 | 1 |
| Partner Complementors | 1 | 1 |
| **Total** | **27** | **26** |