

# Community Network Tutorial Zine of Ribeirão Grande/Terra Seca

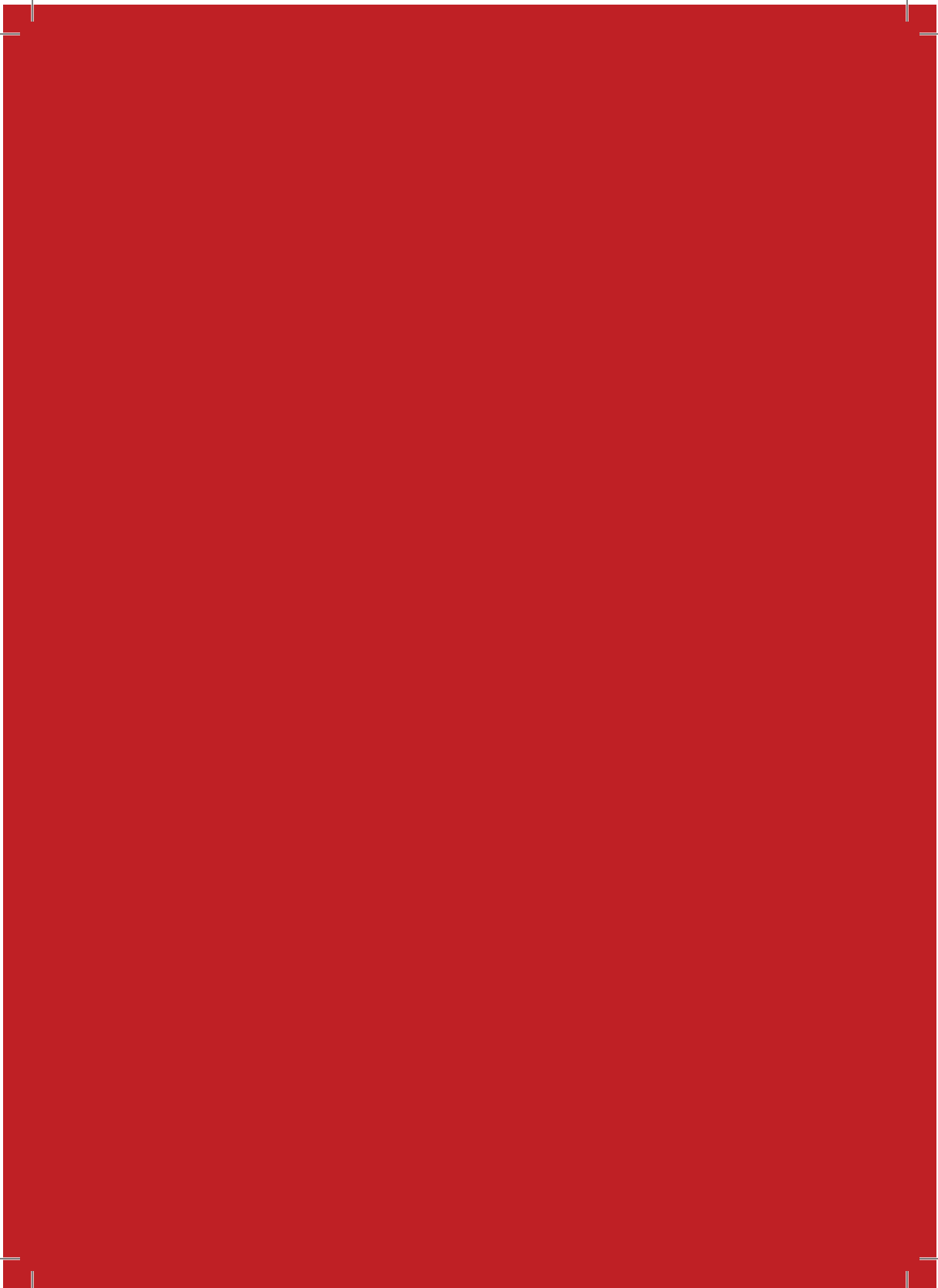


## A little bit of context

In Brazil's rural areas, the reality today is that half of the population has no Internet access at home. In urban areas, this percentage is slightly lower, at a quarter of the population. Even among the people who do have Internet at home, most use mobile connections, limited by the cellphone data package (3G and 4G). This happens mainly because Internet service providers have no commercial interest in providing service in sparsely populated regions with low purchasing power, and there is a lack of public policies for digital inclusion, considering the territorial extension of the country.

turn the page and  
check this idea!





With the Covid-19 pandemic, the problem of lack of connectivity, which was already bad, has worsened. Thousands of children are unable to study and their families have difficulty accessing information, public services, including health care, and even the covid emergency financial assistance and other government assistance programs. This is because Internet connection has become essential for the exercise of citizenship today. Given this scenario, community networks emerges as a connectivity alternative, which can support access and the exercise of social, economic, and political rights. Weaving not only digital networks, but also social.

## What are Community Networks?

Existing in various parts of the world and in different formats, they are basically local internet, mobile phone, or radio networks created and managed by the communities themselves, often unattended by the telecommunications market and public policies. They are digital networks that are self-organized by people, neighborhood associations and/or cooperatives, non-profit, and with the intention of solving the lack of connectivity in these regions. They use more accessible equipment and local labor. Thus, the community organizes itself to generate connectivity locally and, from there, connect to the Internet through some link that can be bought from a commercial provider, a small local provider, but can also be obtained from a public sector network (e.g.: a city hall, a library, Internet para Todos ("Internet for all", a brazilian government program) or Gesac project (short of Electronic Government Citizen Care Service, also a brazilian government program), etc).

So, what does it mean?



That community networks are networks that are thought out, designed, built, and implemented in particular places with the goal of improving the quality of life in those communities. They can be built by local groups, through collaborative processes with the participation of as many community members as possible. These networks expand access to technology through communication and information exchange, allowing, also, the reach of several tools for local empowerment such as community radios and Internet connection, among other services.

**Community networks are built from the point of view of the people concerned and the territory they occupy - centered on communities and their stories, taking into account the experiences and needs of their residents.**



**Did you know?** Not all WiFi or wireless network needs to be connected to the internet. There are WiFi networks that are only able to connect computers, cell phones, and other devices to each other in a certain territory, and may or may not connect to the internet. This means that some networks may be able to exchange information between some equipment and its users, but not necessarily connected to the Internet.

## The Community Network of Ribeirão Grande/ Terra Seca: a little bit of what this experience was

The Community Network built in the Quilombo[1] Ribeirão Grande/ Terra Seca was born from the initial interest in facilitating the marketing of agroecological products and communication between farmers. It uses WiFi technology to build its mesh network and currently has 3 nodes and an Internet connection. The project was made possible thanks to a partnership between the women's group from RAMA and women from SOF, with the support of the Feminist Internet Research Network (FIRN) and the Association for Progressive Communications (APC).

In order to build the community network, it was very important to understand the wishes and dreams of the community, and especially their expectations of the network. Six visits were made to the territory, in which facilitators and partners involved in the FIRN project were able to get closer to and learn about the reality of the quilombo residents through many conversations involving the historical rescue of the old forms of communication that have existed in the quilombo, the current communications and the new possibilities, while always remembering that technology is not only about digital and machines. Technology is about all forms and knowledge of doing, from the monjolo (a rustic water-powered mill for processing corn and husking coffee) to the daily food, from sewing to medicines, from agriculture to the wisdom that allows us to continue living in times of difficulty.

Resistance is an ancestral technology!

[1]According to Daine Araújo, the quilombos emerged as refuges for black people who escaped repression throughout the slavery period in Brazil, between the 16th and 19th centuries. The inhabitants of these communities are called quilombolas. After the abolition, most of them preferred to remain in the villages they had formed. With the 1988 Constitution, they won the right to own and use the lands where they settled. Today Brazil has more than fifteen thousand quilombola communities. (Available at: <https://www.genderit.org/feminist-talk/contribution-bell-hooks-and-paulo-fr-eire-construction-community-networks>)

There were also workshops addressing more technical topics, directly related to the construction of the network, such as knowledge about routers, antennas, software, hardware, and much more. Throughout this material we will recall a little bit about this technical knowledge covered in the meetings and bring you a step-by-step on how to expand the network from the infrastructure that has already been set up in the quilombo.



## Recovering some of the technical concepts

### What is the internet?

Have you ever wondered what the internet is? Where it comes from? How it reaches people's homes and why it is more difficult to access it in some places away from large urban centers?

In a very simplified way, the Internet is a network made up of several cables, computers, protocols (the language that computers use to communicate) and infrastructures that connect cities, countries and continents. The information is transmitted between the continents by submarine cables (that's right, wires under the oceans!!) and so we can access a website in Japan or anywhere else in the world, practically instantaneously. The network is distributed through several Internet Providers, owned by either private or public companies.

## **Cautions on Internet Use**

Throughout the internet it is possible to share knowledge, get informed, have fun, learn, trade, buy and sell, and access government services and benefits. The Internet is a communication tool with a lot of potential to support communities in achieving their goals! However, we must be alert, because on the same Internet where we find very rich and important content there is also violent content, unsuitable for children and young people, or content that attacks certain groups, such as women, black people, LGBTQIA+ people, and social and popular organizations. False, manipulated, lying and fraudulent news can also circulate there, as well as fraud schemes, scams and theft, which you have to be careful with!

Throughout the Internet it is also possible to have one's behavior tracked and watched by governments, companies and malicious people - if precautions are not taken. Thus, it is necessary to know how the internet works, its potentials and risks, and to make conscious choices about what you want to share on the web, when and with whom. Another important issue is the amount of time we spend online. It is necessary to take a good care so that the online connection does not negatively impact on other activities that enhance the cultural and historical identity of the community. In other words, it is necessary to make a responsible and healthy use. Be aware of the risks and interests behind the Internet and social networks, and do let connectivity become a tool of alienation and vulnerability.

## What is local area network (LAN)?

A local area network, also called an intranet, is a network of interconnected devices that operates specifically within a locality. A community network is a type of intranet, but not every intranet or LAN needs to be a community network. There may be, for example, local networks within a company or a government agency. Thus, a LAN provides a communication channel within a community, and is able to transfer files, pictures, and videos in the same location without the use of the Internet plan data traffic.

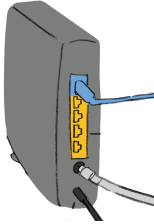


## Wireless Community Network infrastructure:

What we are calling the infrastructure is the part needed to make the network happen, i.e. the equipment, but as the equipment needs to be installed, taken care of, maintained, and updated, we also need human infrastructure, i.e. people who make sure everything works and are always on the lookout so that if a problem happens, they can solve it. The human infrastructure part of our network is the quilombo residents themselves, who must take care of the network and the equipment.



## Basic Equipment



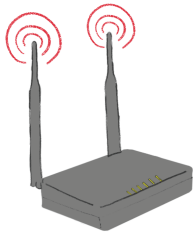
**Modem** - Responsible for encoding and decoding the signals from the Internet into digital form. It is what makes Internet connection possible.



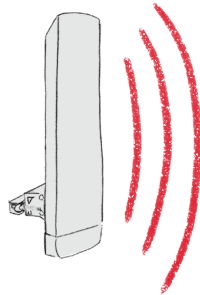
**Router** - Sends and receives data wirelessly via WiFi across the electromagnetic spectrum\*. It may be used either in a network connected to the Internet or in a local network.

Have you ever wondered how the Internet signal reaches mobile phones and computers without using a wire? The name of the technology used is known as Wi-Fi and it is possible due to the transmission of electromagnetic waves. Through these waves it is possible to transmit signals from the Internet, radio, TV, mobile telephony and other forms of telecommunications, each with its own specifications. Electromagnetic waves vary in power - like "strength" -, length and frequency. For example, when we say that a router operates at 2.4 or 5 Gigahertz, we are talking about frequency.

**Antennas:** All wireless equipment has an antenna, which may be hidden inside the device, as in the case of mobiles, or outside, as in the case of routers. An antenna can be omnidirectional (transmit in all directions - 360°), sectorial (transmit in a specific sector, for example 120° or 90°), or directional (transmit at a small angle, for example satellite dish). The smaller the angle of propagation, the further the signal will travel, i.e. omnidirectional has a short range, sectorial has a medium range, and directional has a longer range.



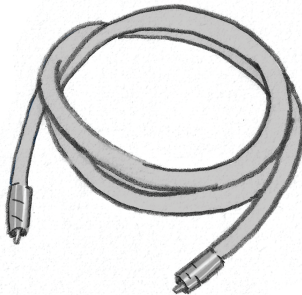
OMNIDIRECTIONAL



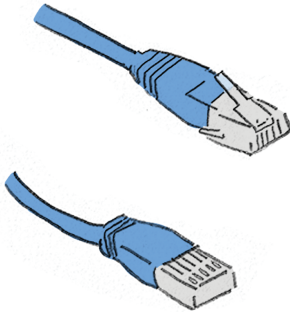
SECTORIAL



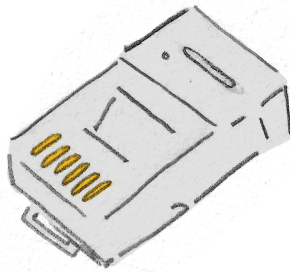
DIRECTIONAL



**Coaxial cable or fiber optic:** The cable that comes from the modem and connects to the router, it is the one that carries the Internet (and cable TV) signals over long distances (up to 500 meters / 546.807 yards), and can also be extended with the use of signal repeaters.

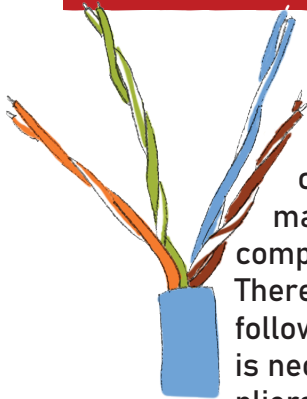


**Network cable (Twisted pair):** a type of cable made of 4 pairs of twisted copper wires (those colorful ones), responsible for transmitting Internet signals over short distances (up to 100 meters / 110 yards), generally used to distribute signals inside the house or to very close neighbors.



**Connectors:** every network cable uses a connector, the "cable end". This is what makes the ends of the cables fit onto other equipment. Coaxial cable uses a connector called BNC and twisted pair cables use RJ-45.

## How to crimp a network cable



That's right, the verb is to crimp, weird like that! It is the verb that gives the name to the act of placing the RJ45 connector on the twisted pair cable and making the end of it fit into computers, routers and antennas. There are a few rules and tricks to follow to make a good cable and it is necessary to have appropriate pliers:



It is first necessary to **strip** the handle – measure about 2,5 centimeters / 1 inch or two fingers, it is better to have a little left over to cut better than to have to strip more later.

After that, you need to **unwind** the braided pairs and put the cables in order – pay attention to the color convention used (the one shown above is the most common).

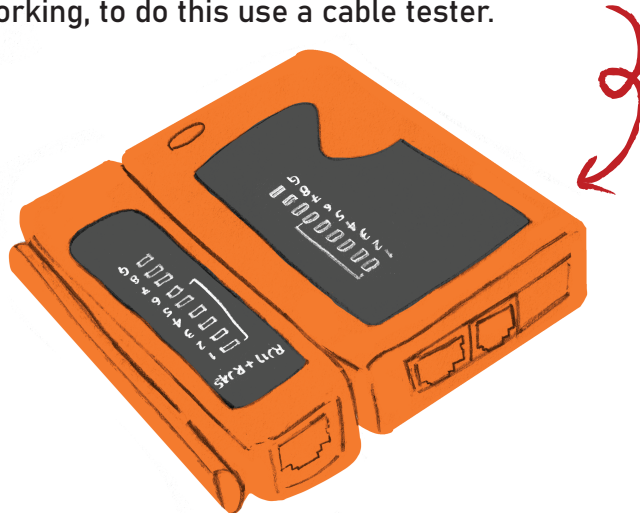
Then you need to **level** all the cables at the same height by cutting them straight (leave about 1.5 centimeters / half an inch, so that the plastic part of the cable also enters the connector, protecting it).

And **plug** it into the RJ 45 connector (always remember that the copper part must be facing you and all wires must go all the way into the socket).

TIP: check the colors again before crimping to avoid wasting connectors!)

Then it is necessary to **crimp**, putting the assembled cable into the opening of the crimping pliers (a special tool without which it is not possible to assemble the cable!) until the end and after hearing the little noise the cable is ready!

Before using the cable it is necessary to test and see if it is really working, to do this use a cable tester.



## **What is software and hardware? And firmware?**

Software means every program on a computer, mobile, or digital device that enables it to perform functions. Mobile apps are examples of software. So it is the operating system of your computer or cellphone (e.g. Linux, Windows, Android, or Apple), also Internet browsers (e.g. firefox or google), computer or cellphone games, text, image, and video editing programs, among others.

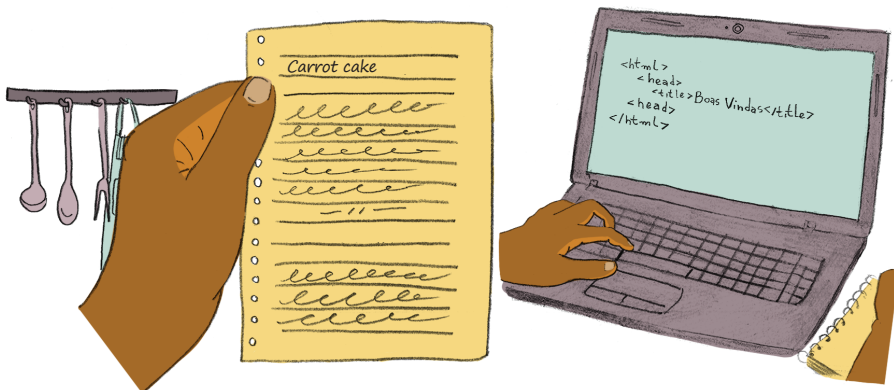
It is common to say that software is the rational part of electronic devices, the brain, the one that gives the orders to the body that obeys. Hardware is every physical component, internal or external to your computer or cellphone, that determines what the device is capable of doing and how you can use it. Examples of hardware: cellphone, laptop, and tablet. Following the analogy of the brain as being the software, the body would then be the hardware. Another term that is present in community networks but is less common is firmware, which is the name of the software present in embedded systems such as routers and sectorial and directional antennas; it is software made specifically for a device.

## **What does it mean for software to be free and open or proprietary?**

We have already said that software is every computer program or application and for it to work it needs a set of instructions and ways of doing things, which is called source code. The source code can be compared to a cake recipe, a step-by-step of what is possible to do and how to do it.

When we talk about free software we are talking about software that has its source code open and free for anyone to read, use, modify, distribute and improve. As if from a cake recipe you can change the frosting, the batter or the filling, in any way you like and then share the original or modified recipe as you like, citing the original recipe and allowing people to do the same with your recipe. They are created and improved by a community of people committed to sharing knowledge and are non-profit.

Proprietary software, on the other hand, is owned by a company and its source code (your recipe for the cake) is protected by intellectual property laws. Using the metaphor of a cake, this recipe is locked up and anyone who accesses the contents of the cake recipe, makes the cake without paying the owner of the recipe, modifies or distributes it, can be sued in court.



## Technical Characteristics of this Community Network

### LibreMesh


In this community network we use technology from the LibreMesh [2] project, created by a collective of developers from the Altermundi [3] organization, mainly from Latin America. LibreMesh is a free software program for routers that creates a mesh network. Once installed, this program improves the connection between routers and works on low-cost equipment.

### Satellite internet

The internet connection is made through a satellite dish that communicates to a satellite outside the earth, in the planet's orbit (WOW, right?), as a connection to another point connected to the Internet on earth. The signal of this internet travels long distances, so it can be characterized by latency, a small delay in communications, which can be milliseconds or even a few seconds.

## How to expand the Network

Demanded equipments



- CPE210 antenna** (those little white boxes that are on the towers we put up: the bamboo one, the wood one and the pole)
- TP Link home router**
- Network cable** to connect the equipment
- a tower** to raise the antenna
- electrical power** to connect the equipment.

[2] <https://libremesh.org/>

[3] <https://altermundi.net/>

First, it is good to remember that the new antenna will have to "look at" (have line of sight) at least one of the old antennas, so that it can be part of our network. The more CPE210 antennas it can "look at", the better its speed will be and the more robust the network will be. For this it should be higher than the houses, so as not to have signal loss and a good view. Remember to keep it safe to climb the poles! Wear safety equipment against falls and electric shocks.

The CPE 210 antennas left in the community are already installed with LibreMesh firmware, which automatically connects to the network. They need to be connected to a power source, via a network cable connected to the POE input on the CPE 210 Antenna. The LAN input can be used to connect to a TP Link home router, so that people close to the tower location can use it in their homes without overloading the network.

## Most common problems

If a certain WiFi signal stops appearing, it means that the router or antenna are not connected, the first way to try to re-establish connection is to unplug and wait 10s and plug in again.

The above tip also works in case the Internet connection drops, so the modem should be turned off, wait 10s and then turned back on.

Pay attention to energy oscillations and to the correct grounding of the energy in the house, and if there is a lot of lightning, unplug the equipment.



## Local server and content production

One of the coolest things about the Internet and the many forms of community communication, as in this case the local network (intranet), is that, unlike any other media such as television or radio, we can create and publish our own content, feeding websites and social networks with it, exchanging with people around us and with other experiences around the world. Therefore, as part of the development process of this community network, we also talked about possibilities for the quilombo residents to be not only consumers of information, but also producers. In this way, the members of this network will be able to inform other people, inside and outside the Quilombo, about their daily lives, as well as exchange experiences with other content producers in the form of Whatsapp audios and videos, on Youtube and TikTok, and who knows, maybe even have their own podcast, why not? The possibilities in the field of community communication are many, as well as the tools that can be mobilized, including free and proprietary software in the case of digital networks (you can find more about free and proprietary software on page 13). Each territory will find the form and content that makes the most sense in its context, evaluating the possibilities and disadvantages or risks of each alternative.

In order to explore some possibilities, in March 2020, in addition to meeting in workshops on bamboo management and following up with the installation of the network nodes, we also held a brief workshop on content production.



The idea was to find a way to inform quilombo residents in the region who were not directly involved with the installation of the community network about the steps being taken. We chose to make a short talk show based on the radio model. Thinking about what we would like to talk about, to whom and why, the group involved with the radio program started their meeting by doing a storytelling training exercise. In a circle, the participants, one at a time, had to tell a piece of a story, which was complemented by the next person in the circle, in order to build a collective story. After this exercise, we talked about how we could also collectively build a narrative for a radio program script. Thinking that the audience of the program would be the residents curious about how the network was developing, the participants first listed the information about the process of building the network that they considered essential to be shared, such as explaining what the intranet is, how the bamboo treatment was done, what was done in the workshops, and a schedule of upcoming activities.

Based on these axes, everyone took turns in the two roles of this dynamic: interviewer and interviewee. Through questions and answers asked to each other, and recorded by the recorders of the participants' mobiles, we produced a set of information in oral form that could be shared, even using the intranet audio message exchange applications, with no need for an internet connection, which at that moment was not yet available in the quilombo.

This collective exercise was a way to explore the many ways in which communities can strengthen their collective narratives, share their voice, use communication to strengthen their struggles, and share their knowledge, experiences, dreams, and ways of living.

Communities around the world have mobilized autonomy, creativity, participatory processes, and communication strategies as a central element in their community networks, showing that this is a diverse field with many possibilities.

Some experiences shared its methodologies and reflections through the guide “What if we rething communication technologies: methodological suggestions on planning and implementing projects of community communication.

Check on the link: <https://bit.ly/3yYjcCS>

And to close this subject, we share here an excerpt from the interviews made in our radio program workshop:

- > What do you expect from the future and from the network?
- > What I hope for the future of the network is for it to expand more and more throughout the communities.

## Know more

a great guide with technical content in a very didactic way and practical tips is the “Enredando Territórios de Cuidados: Guia para Aprendizado e Construção de Redes Comunitárias” (“Entangling Territories of Care: A Guide to Learning and Building Community Networks”) made by the MariaLab Organization.

The Guide, in brazilian portuguese, can be accessed through the link: [marialab.org/wp-content/uploads/2021/03/Cartilha-de-redes-comunitarias-FINAL.pdf](http://marialab.org/wp-content/uploads/2021/03/Cartilha-de-redes-comunitarias-FINAL.pdf)  
In English there is “The community network manual: how to build the Internet yourself”, that can be accessed through the link: [bibliotecadigital.fgv.br/dspace/handle/10438/25696](http://bibliotecadigital.fgv.br/dspace/handle/10438/25696)



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The project was coordinated by Bruna Zanolli and Débora Prado and had the collaboration of a working group also joined by Carla Jancz, Daiane Araujo dos Santos, Glaucia Marques and Natália Santos Lobo.

More information is available at  
[firn.genderit.org/research/action-research-feminist-autonomous-networks](http://firn.genderit.org/research/action-research-feminist-autonomous-networks)

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