



COMMUNITY

NETWORKS

MEET COMMUNITY

CURRENCIES

A guide to powering community currencies from local clouds

COMMUNITY NETWORKS MEET COMMUNITY CURRENCIES

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**Community Networks Meet Community Currencies:
A guide to powering community currencies from local clouds.**

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COMMUNITIES OF PRACTICE

This manual is the result of one of the projects undertaken by the communities of practice (CoPs) supported by the Local Networks (LocNet) initiative. LocNet is a collective effort headed by Rhizomatica and the Association for Progressive Communications (APC) that works with partners in Africa, Asia and Latin America and the Caribbean. Its goal is to support the development of bottom-up approaches for the construction of communications infrastructures known as community networks (CNs).¹ APC and Rhizomatica want to contribute to an ecosystem that permits the emergence and growth of such networks. To achieve its goals, LocNet adopts various strategies related to exchange among peers and institutional strengthening, training and tutoring, policy and promotion, technological innovation and sustainability, and gender and women's participation.

In recent years, LocNet has provided advice, financial resources and forums to support various CNs and other partners. The purpose of the CoPs is to increase collaboration among community networks worldwide through online collaborative spaces created in relation to different topics of interest for CN professionals.

The CoPs approach includes activities seeking to enhance support on key issues of interest for the CN community, bringing together the different lines of work in technology and innovation from previous years. In this sense, a CoP is a group of people who share a common concern, a set of problems or interest in an issue and who join forces to pursue both individual and collective goals. CoPs are often centred on exchanging best practices and creating new knowledge to drive advances in a given area, and one of their crucial components is constant interaction.

¹ These initiatives are best understood as a collective undertaking by local communities to connect in a meaningful way and construct relevant digital networks. Since 2017, the LocNet initiative has accompanied and supported their efforts.

WHY SUSTAINABILITY IS OF INTEREST FOR COMMUNITY NETWORKS

LocNet's CoPs approach brings together people and activities aimed at enhancing support for key issues of interest to community networks, which includes addressing not only the lack of connectivity and digital exclusion, but also other basic human rights of marginalised communities, having as a goal meaningful uses of the internet and digital technologies to meet specific needs such as empowerment against discrimination and oppression, and pursuing a better quality of life collectively and individually. In addition to technical aspects, funding sources and a good regulatory environment, the continuity of a community network depends on human relationships and the meaning that network will acquire in the daily lives of various communities. Looking at the different aspects that sustain community networks, therefore, is a fundamental part of the process.

Bearing in mind that human, social, environmental and technological practices should not be dissociated, LocNet's CoPs worked so that the knowledge produced and exchanged met this premise in a holistic way. In order to do that, the CoP on Sustainability has sought ways to give back to the local and circular economy by using community networks (through documentation and improvement of time bank methodologies and tools, social currencies and captive portals); encouraging the production and use of local content and platforms; and researching the main obstacles to the implementation and sustainability of community networks, considering them as common goods and not a telecommunications service.

The topics and methodologies for these learning exchanges and forms of interaction were defined collectively and not hierarchically, with the goal of the inclusion of gender, race/ethnicity, diverse abilities and different levels of knowledge, validating empirical knowledge and promoting an environment free of prejudice. Our goal is to use this approach to incentivise and share the dynamics of technology design and production, and sustainability practices that are community-centred and take into account the situatedness of tech practices from the start.

We hope you enjoy the following pages, give us feedback, share your comments and ideas, and join LocNet's CoP on Sustainability for new undertakings and co-creations: <https://t.me/+Gvy90-aem-l2MDJh>

Introduction

The human race builds connections, structures and patterns either organically (bottom-up or community built) or hierarchically (top-down or government built). For bottom-up built connections, neighbourhoods and communities can self-organise themselves into clusters using systems like community food markets, local currencies, micro grids, or self-built community mesh networks. For their part, governments create more formalised structures like power and water utilities and education facilities that serve national or wider localised interests.

A mix of centralised and decentralised infrastructures can co-exist; a government can ensure that common spaces are protected and created where more community-based or decentralised facilities or services can exist, such as common spaces where community markets can trade, or government-subsidised internet backhaul links which community networks can grow from. Governments can also create regulation that allows decentralised infrastructure and services to flourish, such as regulation that creates low-cost or zero-cost spectrum or network licences for community networks to be built, or regulation that allows community currencies to easily be created given a set of conditions that are there to protect citizens from fraud or abuse by scams or fraudsters.

There are some natural lower and upper bounds on decentralised systems that determine sizes that work. Several studies are helpful guides. Dunbar's number (proposed in the 1990s by British anthropologist Robin Dunbar) provides a suggested cognitive limit to the number of people with whom one can maintain stable social relationships. Dunbar proposed that humans can comfortably maintain 150 stable relationships.² As all decentralised systems are ultimately linked back to social relationships, these numbers provide guiding size limits. The "law of the few" by Malcolm Gladwell also provides insights into how clustering around an idea can grow. He states that 80% of the work will be done by 20% of the people and that success of any kind relies on involvement of three key people: (1) connectors who know large numbers of people and who are in the habit of making introductions, (2) mavens who connect people with new information, and (3) salespeople or persuaders who have powerful negotiation skills. These three key people will be in the group of 20% that move an idea to reality.³

² https://en.wikipedia.org/wiki/Dunbar%27s_number

³ https://en.wikipedia.org/wiki/The_Tipping_Point

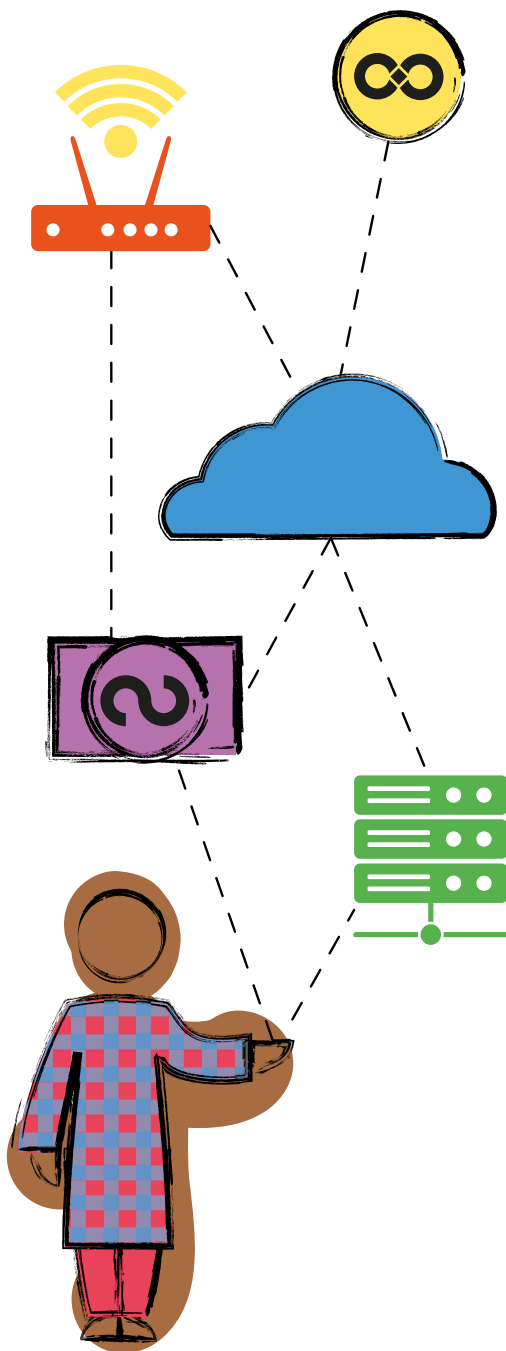
Given some of these parameters, one can see that clustering around a decentralised community currency, a community mesh network, or a cooperative neighbourhood food garden will likely not succeed with, for example, 50 people, and will also become unwieldy and too large with 500,000 people; a typical neighbourhood of 1,000 to 20,000 could contain sufficient critical mass to maintain an 80/20 principle, connectors, mavens and salespeople, and below the cognitive limit of stable social relationships to continue sustaining the service. There are also some natural resource limits that may define cluster sizes – they may be geographical (e.g. how much land is available to grow a community garden), capacity (e.g. how much internet capacity can be brought into a community), or market-based (e.g. size of the market for the specific goods and services). This manual is all about building bottom-up infrastructure, specifically an intervention to bootstrap:

- **A community inclusion currency (voucher) in your community to amplify local markets (this system is powered by the Grassroots Economics Community Inclusion Currency Platform).**
- **A local community network and a local content and services platform to move control and ownership of the network to actors in the community and amplify the creation, sharing and curation of locally relevant content and services (this system is powered by the iNethi platform).**

These two decentralised worlds (community inclusion currencies and locally owned networks, content and services) have been integrated and users are, for example, able to purchase internet vouchers and other digital services on the iNethi platform with a community inclusion currency (voucher).

1. Grassroots economics:

FROM VOUCHERS TO COMMUNITY INCLUSION CURRENCIES (CICS)



This section of the field guide consolidates practices for building and working with economic commons and developing vouchers with the goal of them becoming community inclusion currencies. You the reader are invited on a journey to question how we live together and find a shared purpose.

With this section of the field guide, you will become familiar with seeing through the lens of a grassroots economist and be able to identify and develop a flourishing economic commons and community inclusion currencies as a community member or programme organiser.

Much of the learning presented here derives from a long history of economic experiments worldwide and specifically from both ancient and contemporary cultures who have developed and refined these concepts. These learnings are landmarks along a path toward a collective future for the planet.

INTRODUCTION TO CICS

This section seeks to give an overall understanding of what CICS are through the use case studies.

Trapped abundance – a case study: Binguni and Mbele in Kenya

There is a community of 400 households in a drought-ridden area in rural Kenya that has a chronic lack of national currency, and few commercially valuable exports to the big cities. Sometimes people receive money from humanitarian organisations in the form of CVAs (cash and voucher assistance), or they send their family members to work in the cities so that they can send money back home. The community live at subsistence, unable to build or develop anything and with low cohesion in working together. The community members have excess capacity, they have skills and time and resources.

A community has a chronic lack of money, but human capacity and basic resources that are underutilised

One of the big needs that they have is to grow their own food and increase their local capacity, which takes a lot of labour. Luckily the supply (farm inputs) and the demand (for food) are local. The basic resources are there, but there is an inability to pool them. With effective coordination and utilisation of the local resources and excess capacity, there is potential for a resilient and abundant local market of goods and services.

One of the big hurdles the community faces in starting a farm is the severe erosion of the land from torrential rains and historically bad farming practices. They need to be able to coordinate their capacity to ready the land, collect water and control erosion, after which there are plenty more tasks to complete, such as seed harvesting, mulching, building fences – all requiring human power and labour.

Some community members are overworked, they are stretched for time, and need others to take on some of their load, but are short of national currency in order to pay for that labour.

Simply put, there is land that can be tilled, and people that can farm – there is potential for the production of local food that would be able to support that community from within rather than without.

Within the community there is a group that saves money together. They have a structured group/tontine/VSLA whereby they provide financial support to the internal members through a collective savings pool. They call themselves “Binguni”, and they want a better life for themselves, and their families.

Creating their own CIC

Members of the Binguni group have heard of community inclusion currencies (also called vouchers) that help empower marginalised communities to take charge of their own livelihoods and economic future. They connect with a core service provider (CSP) such as Grassroots Economics Foundation, who is prepared to help them through the process. The CSP begins to engage with the community, local government, community elders and leaders to ascertain whether the community has sufficient latent capacity and resources, paired with a demand for the realisation of the potential of both.

The community group engages with a core service provider to learn

A core service provider (CSP) works with Binguni to map the resources and capacity of the community, to gauge latent/potential abundance amongst them and the area. Once mapped, the CSP brings awareness to the community of the available resources and capacity.

The community group is now aware of their potential, but with the local deficit of national currency to create market liquidity. They lack the instrument with which to trade with each other in order to develop an economy around their available resources and capacity. A CSP trains the community group on the value of community inclusion currencies.

The community group decides to join a clearing union and issue their own community inclusion currency – a tradable voucher, redeemable for the collective goods and services within the group. The group gathers, and each member presents the quantity of goods or services they have to offer within a month (either as a month's value, or 12% of a year's value) and are willing to provide in exchange for the vouchers (CICs) that they will create. They denominate their offerings in national currency, and there is a collective verification of that value by elders, chiefs and others.

Now that they have joined the clearing union, and established themselves as a group, Binguni is now considered an association of clearing union members and anyone holding their Binguni vouchers is also considered a member through the terms of service.

In this case, the Binguni members decide to all commit to the same amount of goods and services they will redeem for vouchers, so that the voucher amount created is the same for each member. CSP auditing should verify that these vouchers are over-collateralised such that there is more production than vouchers, rather than too many vouchers without the resources to match.

- James, a local farmer, is able to provide 10 kg of seeds in a month to the value of 2,500 shillings, calculated as 12% of his yearly offering, and receives 2,500 Binguni vouchers.
- Pamela, a local cook, is able to provide daily cakes and potatoes to the value of 2,500 shillings over a month and receives 2,500 Vouchers.

All 20 internal members offer 2,500 shillings worth of their monthly goods and services, and agree to a combined commitment of 50,000 shillings worth of value. They present this in their agreement with Grassroots Economics, and 50,000 vouchers are issued/minted, connected to the distributed ledger. They name their vouchers “BIGs”.

Each member of Binguni is issued 2,500 BIGs, and each elect to put 200 of that back into the communal pot. Each member now has 2,300 BIGs, and the communal pot has 4,000. This pot could be used as a group savings or loan account, but the group agrees to use the savings for the project of the future farm – a group business that they will all benefit from in the long run.

They could have elected to issue vouchers directly to the project, based on the estimated future value of the farm – in which case 2,500 would have gone to the project as if it were a member, but the group decided to save communally, rather than risk minting vouchers with an uncertain future production value. Doing it this way has meant that all of the vouchers are more reliably redeemable for goods and services, as they were backed by auditable production of the members prior to issuance.

Using their CIC

Each member now has 2,300 BIGs, and they can begin to trade. Note that CICs are generally made available to use via digital wallets that can be accessed via phones (even without internet access), but CICs can also be printed on normal security printed paper vouchers.

James, the seed farmer, gives Pamela 20 BIGs for his breakfast cakes.

Pamela, who now has 2,320 BIGs, doesn't need seeds from James, but she uses 200 BIGs to pay her friend Joyce, another member, to cook with her for the day so that she has prepared enough fried potatoes for the community meeting that evening. Joyce spent 300 BIGs on water that morning, from John who walks to the spring each day to collect water.

By midday their accounts look like this:

- Pamela: 2,120 BIGIs
- Joyce: 2,200
- John: 2,600

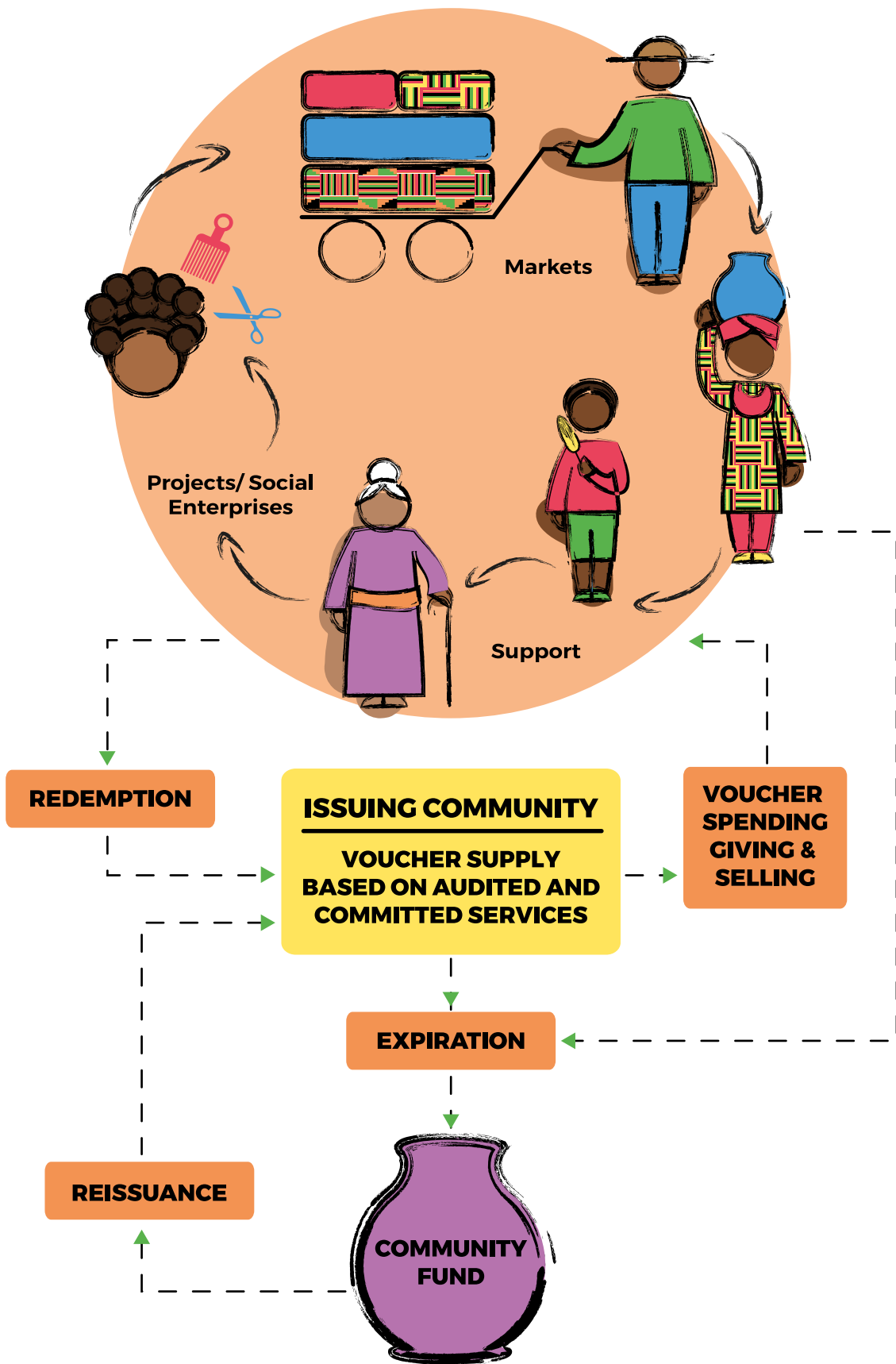
At the community meeting, members of Binguni are there, as well as others in the community. Pamela is selling her potatoes at 5 BIGIs each, and sells a total of 50 potatoes to Binguni members who have paid with BIGIs. She also sold another 50 in Kenyan shillings to community members who don't wish to take part. She leaves the community meeting with 250 BIGIs and 250 shillings.

Pamela now has 2,370 BIGIs in her digital wallet and can add the 250 shillings she earns to her savings and continue to trade with the BIGIs.

The Binguni group gathers to decide on what they need to do to start farming. Within the group they have labour, skills, seeds and access to water, but they lack a few resources. The main thing they lack is woman-power. A group of local farmers in Mbele have spare time to do land preparation – but the Binguni group are short of shillings to be able to pay them. Binguni members approach the Mbele group, and ask whether they would be willing to receive partial payment in BIGIs. Mbele women agree to accept BIGIs as partial payment, and can now redeem the vouchers for resources they need that members within Binguni have, namely seeds and water. They also come to the Binguni community meeting, where they taste Pamela's fried potatoes and love them, so they plan on using some of their BIGIs to buy from her at the next meeting as well.

Seeing the success of the Binguni community, the Mbele group decides to issue their own vouchers. In the same environment region, with slightly different skills and resources, they have different goods and services to offer in exchange for their vouchers. The Mbele group has members that are skilled in water management, which would be of value to the broader community if that capacity were shared. The Mbele vouchers are called an MBELEs.

A CSP also trains the Binguni and Mbele groups on the methods of syntropic agroforestry, to upskill them and develop more sustainable farming practices within the community. The training is intended to bring a more sustainable income-generating activity to the community, using the CICs as a financial instrument bridge between excess capacity and a thriving



Movements of these community currencies between its members.

local economy. Both groups have a communal savings pot that they have dedicated toward a group business. The groups are trained, and start to use their communal vouchers to pay for labour within their group. Because Mbele and Binguni have different but complementary goods and services, the groups decide to accept each other's vouchers.

A Binguni member is paid in MBELEs for his time spent tilling the land on the communal property of the Mbele group. A Mbele member is paid in BIGIs for her time teaching the Binguni group how to manage erosion on their land. Many more trades happen between the communities in service of developing their farms and farming practices.

John, the local farmer with the plough, is now valuable to both groups and decides to accept partial payments in BIGIs and MBELEs. He is now able to redeem those vouchers for goods and services from the two groups (seeds, water management labour, rich soil), and hopes to be able to redeem them in the future for the fresh produce that the new farms will provide.

The vouchers have provided a link between the latent capacity and a circular local trade of goods and services, for the benefit of the community. Through their circulation these vouchers form a community inclusion currency (CIC). The group members have started to save their Kenyan shillings and are able to use that money for investments into education, infrastructure, housing and resources that are available to them.

Through the implementation of capacity building like syntropic agroforestry, and more importantly, the linkage of community inclusion currencies, the communities have bypassed stagnated markets and moved toward a conscious decision and ability to coordinate.

GUIDE TO STARTING A CIC IN YOUR COMMUNITY

Why vouchers?

Community inclusion currency is a specific type of voucher or community currency. There are thousands of community currency projects worldwide with different purposes. Community currencies supplement government-issued money to help increase the economy of the community.

Vouchers are credit obligations which are backed by commitment to be used as payment for goods and services. This manual guides a community through determining how to use, create and allocate vouchers to people and projects.

Vouchers must be redeemable as payment for the goods and services of the issuers. This means that credit, in the form of vouchers, is infused into the community based on the commitments and liability from the issuers. Vouchers are a means to launch community projects, jump-start or bolster local economies, boost financial inclusion and to foster independence and sustainability of underserved communities.

Vouchers are designed not just for trade but also to fund community projects and support contributors. Using a voucher is a great way for funders to double or quadruple the amount of assistance they can provide and to encourage local economic resilience while integrating with other local, national and international economies.

You can think of a voucher as a funding mechanism that can jump-start resilient economies. Vouchers enable money that is used for projects to continue to circulate in the economy, rather than being used up as the project completes. The community itself can create mechanisms to renew the voucher supply, forgive debt and fund additional projects in the community.

What a voucher can (and can't) do

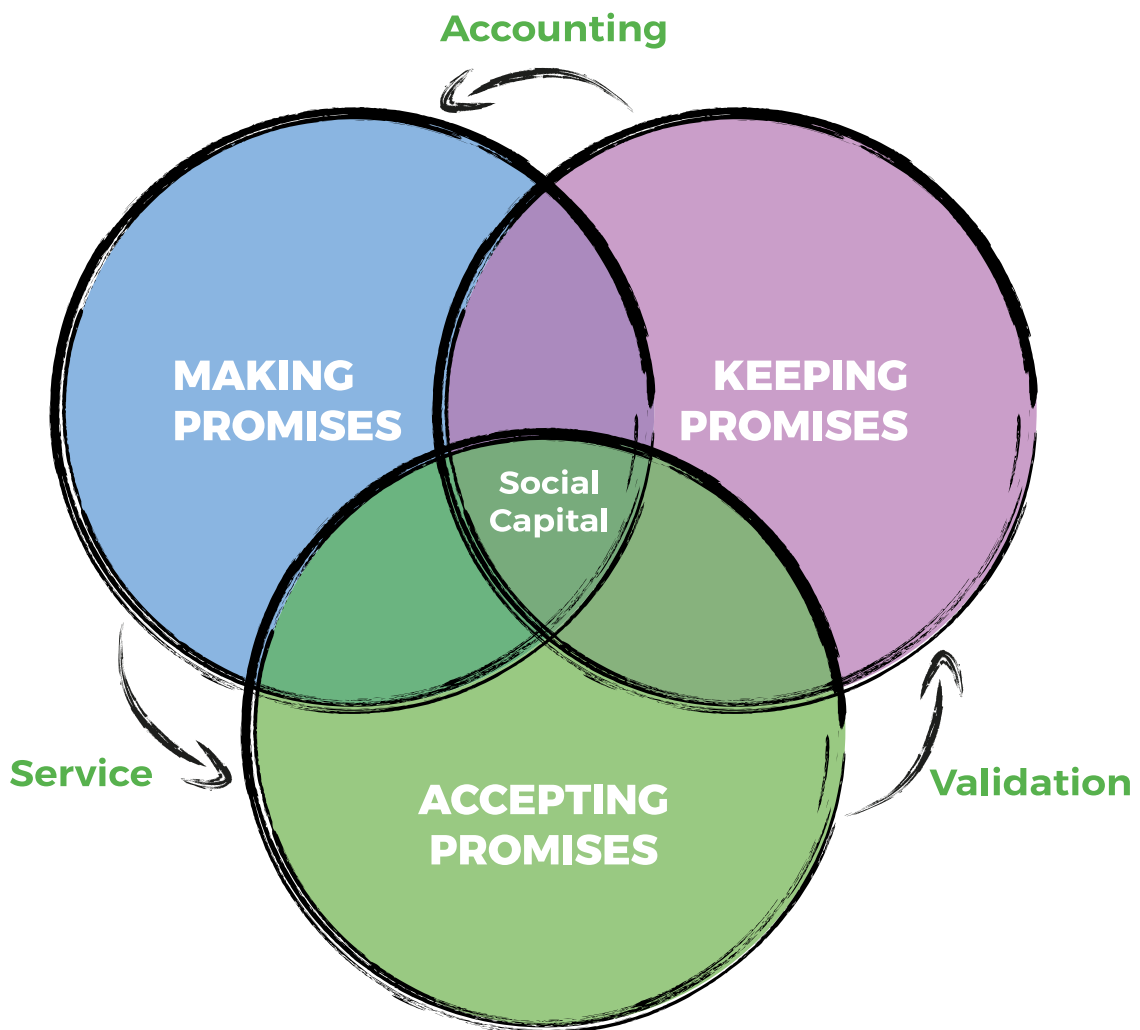
A voucher can:

- Change hands: the holder of a voucher can exchange that voucher with another person with the permission of the voucher issuer.
- Fund projects within a community.
- Expand the credit available to people in a community.
- Improve local economies and even jump-start economies that are cash-poor.
- Create local interest-free credit using proven financial fundamental calculations.
- Strengthen the agency of people to be proactive and take initiative.
- Strengthen the bonds of people within a community.
- Leverage a community's strengths and talents.
- Allow exchange with other tokens.
- Reduce dependence on interest-bearing loans.

- Reduce inequality.
- Reward non-economic behaviours (as defined today, such as planting a forest) only if the community provides ongoing backing for the project.
- Expire over time.

A voucher cannot:

- Run independently: the community (or an agency) must have administrators who care for and manage the voucher system.
- Operate without commitments (liability) of the issuing community to redeem the voucher for goods and services.



Elements of a voucher

Unit of account: How is the voucher's value measured? We may also ask, what are the vouchers denominated in? An airline can issue "miles" and a cell phone company can issue airtime credit. Whether issued as reward credits to incentivise loyalty or as an affordable form of compensation, redeemable as payment for talking on the phone. The unit of account, whether miles or airtime (the service of enabling communication on their network). There is no one correct unit of account but certain properties of these units can make the voucher more or less easy to divide, combine and transfer.

Energy provision – such as kilowatt hours – is a wonderful and fundamental unit of account that can be easily and objectively measured.

Similarly, the provision of a tomato is in many ways also energy provision and is specific to the promise of a particular voucher issuer.

Note that rather than having abstract units like time in general, we would specify the amount of energy or type of service delivered over that time period.

When working with a mutually issued credit, the association must choose an agreed upon unit of account. It is best if, whatever the unit (like apples), that some member of the association actually produces apples. Using a unit of account that is foreign to the community like US dollars or gold creates an external dependency that can be unhealthy.

Valuation: How many vouchers does it take to redeem as payment for how many units of account?

Example: One voucher is redeemable as payment for one apple, or one bus ticket is good for one ride on the bus. This basic valuation of the voucher is a legal peg to what it is redeemable as payment for.

National currency market rate: There can be many markets for vouchers but the chief among them is the market created by the trade of national currency. The market rate in national currency for the underlying service that the voucher is redeemable for may vary a lot. If one voucher is redeemable for one egg and the market price of an egg was 10 shillings and then doubles to 20 shillings, the one voucher is still redeemable for only one egg (as per the agreement).

The issuer or other may decide to sell or spend the voucher at discount or with a bonus as a way to let their clients in on economies of scale and build longer-lasting agreements. For instance, offering to a client that they can buy 1,100 vouchers for the market price of 1,000 giving, a 10% bonus, can help the issuer get the resources they need now, rather than selling one at a time.

Name: In a physical voucher there might be design and writing on it to distinguish it. In the digital realm the name or symbol of a voucher might be the main way people distinguish it. Each voucher has a name to distinguish it. It's important to think about the domain space in case there are duplicate names. There can be a seeds.bogota vs a seeds.kenya, each with the same name and different domains.

Issuer: The issuer of the vouchers is also obligated to redeem them as payment. This can be an association or an individual. Clearly identifying who the issuer is, their location and modes of delivery are important as the holder of the voucher needs to be able to redeem them as payment with the issuer. Note that the issuer is creating a legally binding contract.

Acceptor: Anyone can voluntarily accept vouchers as payment, but only the issuer is obligated to do so. The more people accepting the voucher as payment, the easier it is to transfer or trade that voucher giving it more *liquidity*. Note that while increased acceptance of a voucher as payment outside the issuers does increase its liquidity, it doesn't increase its value as a voucher. When a voucher starts to act as a medium of exchange due to broad acceptance we must remember that its value is still derived from the services of the issuer. It is dangerous to assume that just because people accept a voucher (or any token or "currency") that it is fundamentally valuable, as at any point a critical mass of people could stop accepting it. Fiat currencies issued by states or a lot of crypto currencies have no legal obligation for redemption in any way. While there is value in their circulation, they themselves are not fundamentally valuable as they hold no agreement toward redemption. Building an economy using fiat instruments - without trust and service at their core - is unstable and creates negative effects, where the economy is not bound by the world and people we live with.

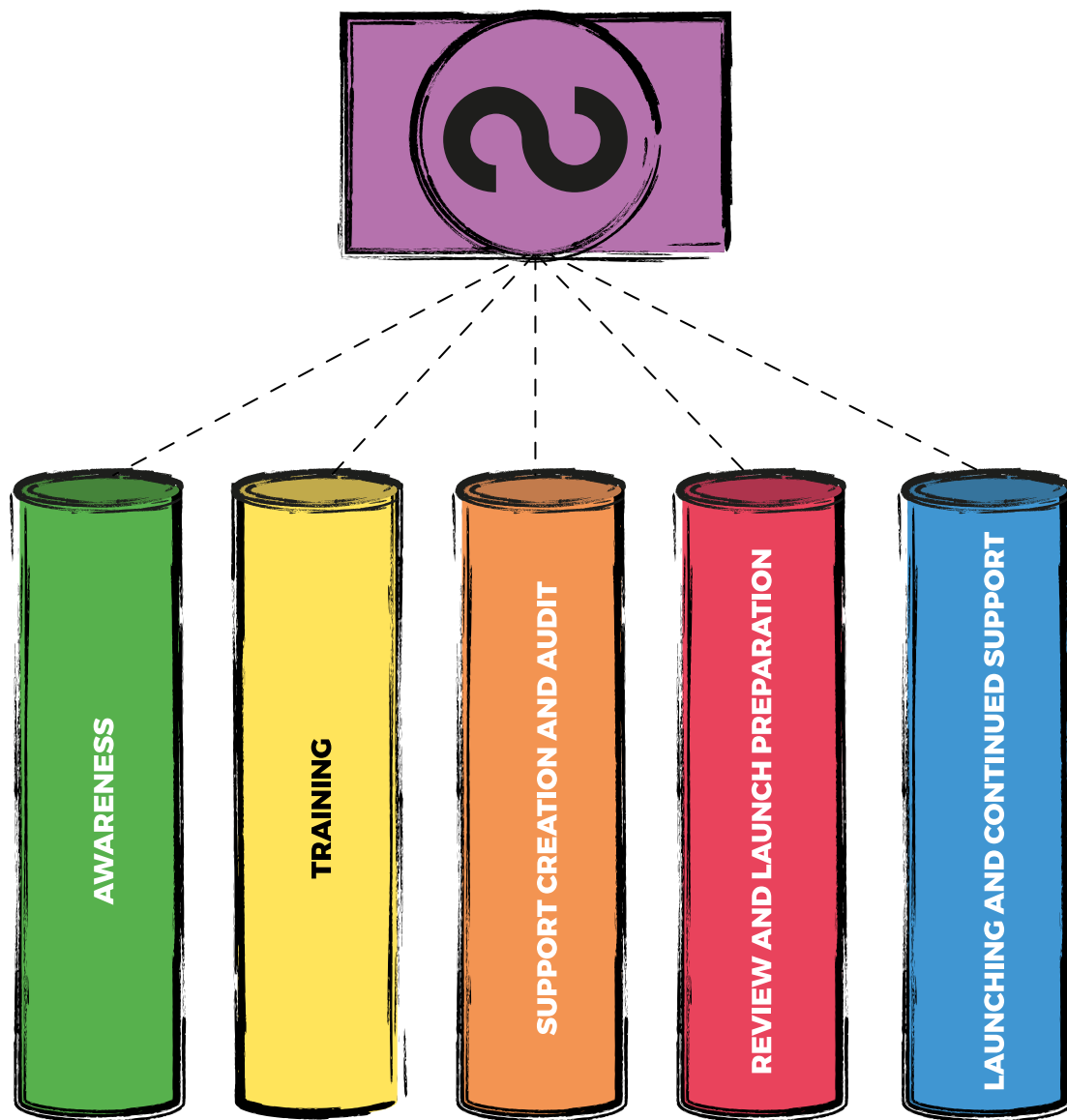
Expiration: Agreements end; they are living things in some way, as they are promises of living beings. Things that don't die tend to be unhealthy for the promotion of life. We want to acknowledge that trust and all living systems have some kind of natural decay and when we are creating promises - they too should acknowledge this externality. Fiat money that is not based on an agreement but is instead a collectible object is only useful as long as we agree to use them as a medium of exchange.

It is common for vouchers or tickets to have strict expiration dates. A transferable voucher with a strict expiration becomes less and less attractive the closer it is to expiration and becomes akin to tossing a hot potato.

Instead, a gradual expiration, often called demurrage, can be used. This can be done using a physical stamp script or a digital voucher.

Voucher creation process

Below is a summary of a group voucher creation process. A group of service providers (tomato sellers, school teachers, hairdressers and so on) come together to create a commons centred around their services.



Voucher creation pillars.

AWARENESS

1. Workshops

Meetings with regional and local stakeholders to explain the voucher concept and answer all questions. These workshops should be done yearly and when stakeholders change (such as a new administration or area chief comes in).

2. Gathering the participants

To have a voucher function in your community, you will need stakeholder businesses to issue and redeem the voucher as payment for goods and services. Therefore, it is important that a voucher is created by a group of initial participants that includes important community members such as leaders, business owners, pastors, farmers and producers. The more influential and trusted the issuers and other participants are, the faster the voucher will spread in the community.

3. Being willing to play

Participants in this training on vouchers will get an experience of how a voucher would work in their community. They may or may not be ready to implement the voucher at the end of the training. The exercises in this guide are designed prior to implementation so that enough community members can understand what they are getting into and make an intelligent decision as a community about next steps.

TRAINING

1. Intro

Group introductions, setting of intentions (prayers), historical overview and introducing the voucher concept.

2. Resource mapping

Working with your community to map out resources and needs. Often people don't realise how much they can offer and how much they can support each-other. The training guide goes through the majority of these steps. Also note that individuals and organisations like the Red Cross or core service providers can create their own vouchers redeemable for goods or services.

3. Learning through games

Ensure that everyone involved or expected to utilise a voucher is able to play through a demonstration with others. Work out all the kinks BEFORE you start. The bean game in our group training guide that you will find here, works well to demonstrate and help the community build their own voucher design. Ending with the thread game helps visualise the commons of service being formed.

4. Registration

Becoming a member of an economic commons and creating an account on the platform. Here we show people how to use the digital interface to create their account. They will automatically get some training tokens which they can use as a learning tool and later redeem in order to make their own vouchers. Also we go over password setting, social account recovery, editing profile information, and trading.

5. Voucher declaration

The group must fill out a legal form to create a voucher.

6. Member commitments

Coming up with agreements on what each member of the community can offer to the whole in exchange for the vouchers they are creating together.

7. Final demo game

We play through the bean game one more time – including the concept of a community fund that fills with expired vouchers.

8. Leaving forms

The voucher declaration forms are left with the group to complete. Note that our group training section gives a basic training for identifying local resources and sharing them together using a voucher.

SUPPORT CREATION AND AUDIT

1. Follow-ups

To help the group with any questions.

2. Audits, endorsements and conflict mitigation

Commitments should be internally audited by the community and as well with a designated auditor to ensure that the vouchers can be redeemed in a reasonable amount of time. A mediator should be assigned to deal with conflicts, like when a member spends but refuses to redeem vouchers they created.

3. Agreements signed in order to issue their own voucher

The group needs to enter into three agreements, in this order:

- **An Economic Commons Agreement:** This is an agreement every member must agree to before the creation of their voucher. It is effectively the terms and conditions of the full ecosystem.
- **A Voucher Declaration/Membership Agreement:** Note that community acceptance, usage and the value of a CIC starts with the issuer backing and vision. This commitment is audited and a document

as described below must be approved by mediators, the local chief and elders. CIC issuers that spend their CIC in the community must accept it back and are considered in debt until they do so. The following is an example of a statement of commitment and intention to develop a CIC.

In order to certify and support a community to create a CIC, Grassroots Economics' CIC creation criteria require groups creating a CIC to have:

1. Initial registration as a group at least one year ago.
2. Minimum 10 members with active membership.
3. Minimum commitments of 50,000 shillings of goods and services.
4. Demonstrable backing capacity for vouchers created (business audit).
5. The endorsement of a community official or village elder.
6. A leading member that has gone through this training.
7. A completed voucher application form⁴ between the members of the group, which ensures that:
 - They've identified a common unit of account and valuation (1 voucher = 10 Kenyan shillings of eggs).
 - They've identified and quantified their commitments/offerings to each other, using their chosen unit of account.
 - They've all been audited and verified on their commitments/offerings, by the service provider chiefs/elders/chairpersons/ local governance.
 - They've agreed on the total supply/quantity of vouchers to be issued, matched to their commitments, and have named their voucher.
 - They've agreed to accept the vouchers for their goods and services.
 - They've set limits to how many vouchers they can receive for their goods and services within a day/week/month/year, to ensure that they never receive more than they are able to spend (ensuring movement of vouchers).

⁴ <https://docs.grassecon.org/commons>

- They set a group issuance limit on the vouchers, to ensure that the amount of vouchers created matches the redeemable goods and services.
 - They've agreed to and elected a means of mediation/ arbitration in case there is a fault.
 - They've agreed on a gradual expiration of the vouchers to ensure that the voucher is not hoarded, but traded (demurrage). Because groups don't want their vouchers to be lost forever in the hands of collectors/hoarders, they ensure that they expire slowly over time at ~2% a month – and return to their group accounts. This means that anyone holding 100 vouchers will lose two of them from their account each month. These amounts in the community funds of the groups can be used for projects and supporting the needy.
 - They've agreed on any savings/voucher-pooling mechanisms within the group, and what that savings will be used for.
- **A Service Agreement:** This is an agreement with a core service provider such as Grassroots Economics Foundation around training, arbitration of disputes, instrument creation, data handling and technical platform access and maintenance (access to the core ledger, wallet, phone support, etc.).

4. Minting/voucher creation

This is generally handled by a core service provider like Grassroots Economics, who will validate the group's commitments, audits and endorsements and deploy a contract on a ledger that is visible to anyone. This contract (smart contract) will hold all the relevant information about the voucher and create the supply.

5. Initial voucher distribution

After minting, vouchers will then be distributed to the issuing community that has committed to redeeming them with full transparency. This will be done as per the instructions of the Voucher Declaration and can be facilitated by a community treasurer. It is recommended to have a voted on community fund/treasury which will also collect any levies (demurrage or expired vouchers).

REVIEW AND LAUNCH PREPARATION

1. Review

Refresher on how vouchers work and making sure everyone in the group is in alignment.

2. Group book

The voucher issuing group should have regular meetings where they record everyone's balances and seek to reach a balance of trade.

3. Marketing materials

Placards that tell people how to trade with their voucher are distributed to members.

4. Social fabric

Mapping out the members and their connections to each other on a fabric.

5. Launch preparation

Launch planning included, stakeholders, announcements, a schedule of the event, setting up a local market, theatre, offerings to local elders and leaders, speeches, displaying the unit of account. People not in the issuing group should be invited to accept the vouchers for their goods and services and to also be shown how to register on the network.

LAUNCHING AND CONTINUED SUPPORT

1. Greater community outreach

While the community of issuers may begin to assign and clear vouchers among each other, they will generally want to spread their usage to their greater community. They can choose to give new users a small amount out of their community fund, or to simply try to sell the vouchers or use them to buy goods or services. We call this process of bringing more and more users into the network “braiding”.

2. Long-term maintenance

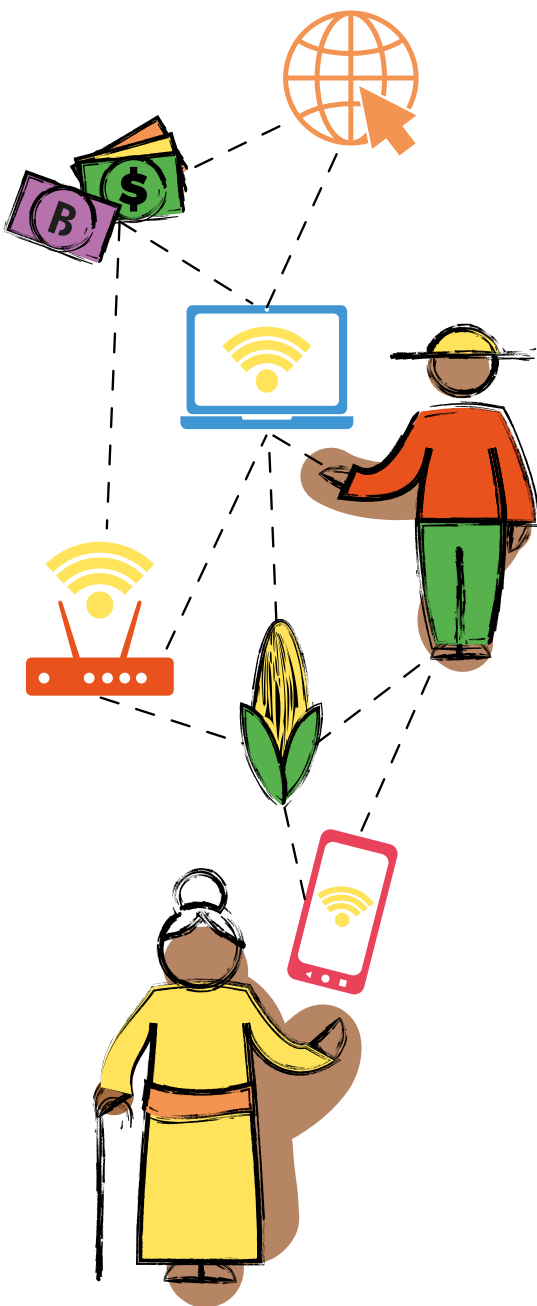
Imbalance/inequality is a common character of any credit system. Some people may end up with a lot and some people may end up with zero. Having regular meetings or market days and actively clearing imbalances are fundamental to healthy finance. A levy on accounts is a good way to ensure that people have no incentive to hold vouchers as a form of savings or investment and that they continue to circulate as a medium of exchange.

More information on creating a community inclusion currency including resource mapping, group training, issues around regulation, and monitoring and evaluation is available from the complete Grassroots Economics Field Guide.⁵

⁵ <https://docs.grassecon.org>

2. iNethi:

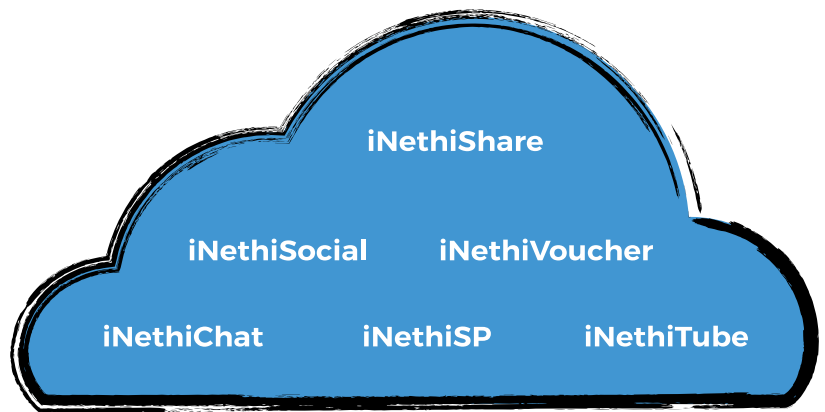
BUILDING DIGITAL COMMONS INFRASTRUCTURE IN YOUR COMMUNITY



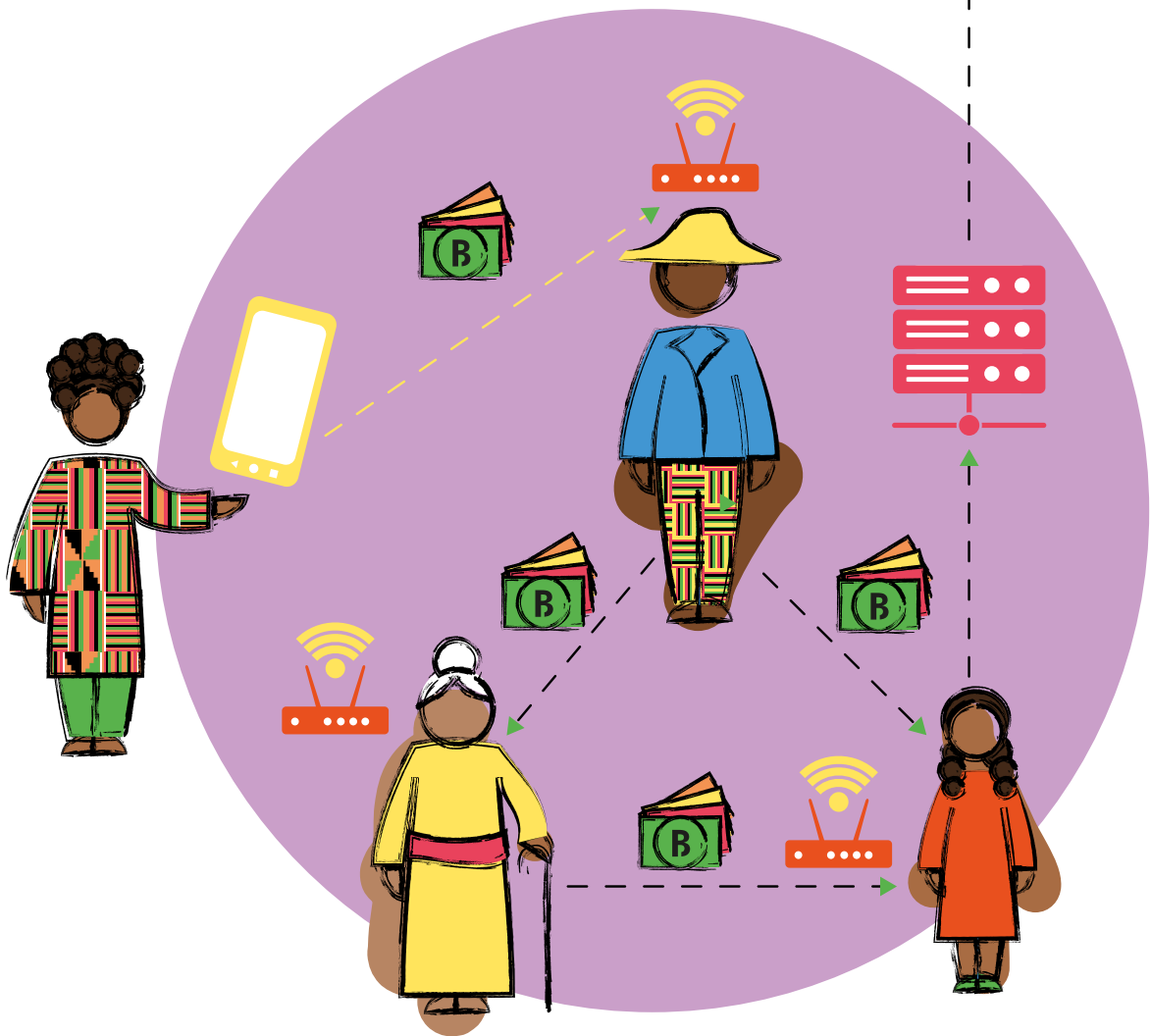
iNethi is an open source platform that allows communities to quickly bootstrap a community built internet service provider or ISP (with required components such as a firewall, network management and payment system), and an open innovation platform for localisation that allows communities to easily generate, share and interact with fast free or paid-for local content and services.

The system is federated and allows the local iNethi cloud platform to synchronise with other local iNethi cloud platforms and a global online cloud.

The vision is empowering community networks/small ISPs to connect to a hybrid of high-value locally relevant content (this can be a mix of content curated from the internet and locally created content) and affordable internet where community members are constrained by limited internet or lack of affordable internet.



iNethi CLOUDLET SERVER



iNethi services running on Cloudlet Server.

INTRODUCTION TO CREATING LOCAL NETWORKS, CONTENT AND SERVICES

This section seeks to give an overall understanding of what iNethi (a local community owned network and local cloud server) provides for a community through a case study in Ocean View, Cape Town.

Discovering untapped creativity – a case study: Ocean View, South Africa

Ocean View, Cape Town is a community of about 20,000 people where 48% of households have a monthly income of R3, 200 or less (slightly more than USD 200 per month); 84% of households live in formal dwellings (leaving a significant percentage of the population in informal buildings – shacks). Initial research results show that internet access is not affordable for most users, due to the high costs of cellular network data packages. The alternatives to access the web at affordable prices are limited, considering the reduced presence of public Wi-Fi and the non-availability of the services offered by the public schools at night and during the weekends.

This is also a community of immense talent. There are many talented artisans who create everything from mosaics to furniture and there are talented artists and musicians who have become well known across Cape Town and even South Africa. Formal employment is very low in this community, where approximately 60% of the adult population are not formally employed and have excess time and capacity.

A leader in the community reflected at a workshop on the economy of Ocean View and said that approximately 90% of the spending in the community is on products and services outside the community.

Young people in this community cannot affordably access education resources; this was particularly dire during the two-year COVID pandemic. Small business owners or employees that want to work from Ocean View that require internet connectivity (almost all businesses these days) don't have affordable connectivity options.

Ocean View needs to increase its ability to create its own connectivity, food, and various physical and digital goods and services. Low-cost internet and zero-cost local connectivity to local content and services (what iNethi provides) can act as a catalyst to seeding and growing a local economy and increase production and sharing of more local physical and digital goods and services.

To this end, a Wi-Fi network has been built in Ocean View by the community and run by the local community with about 20 hotspots. Locally relevant content and services run over this network using the iNethi platform. The content and services have been co-designed with Ocean View through a series of workshops. We will now outline how Ocean View got to this point and paint a picture of what the future could bring for this community-owned model for networks and digital content.

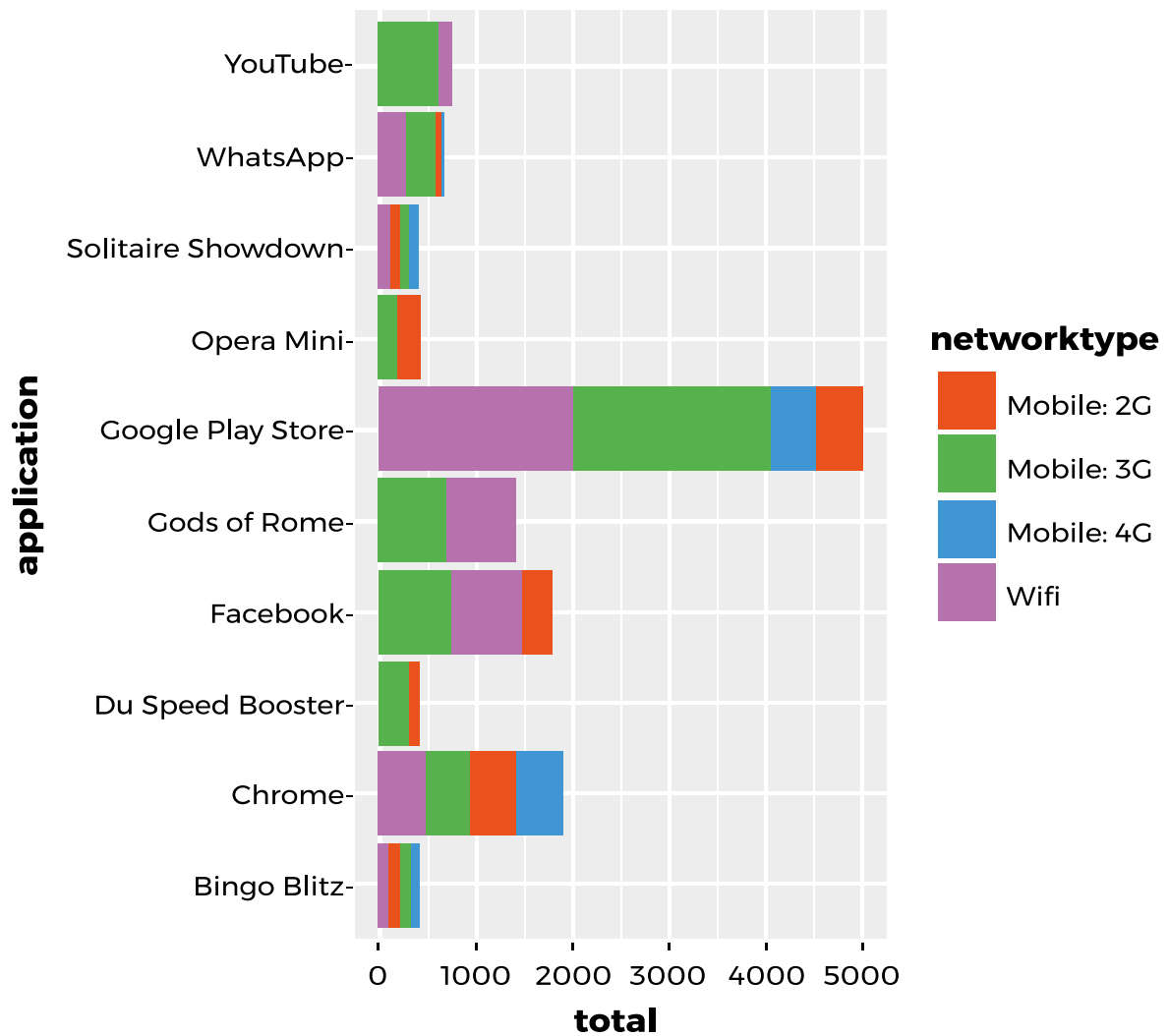
Step 1: Understanding the problem

The first step to building connectivity infrastructure and services that are going to be owned by the local community is understanding the current challenges the community faces. Using community meetings and individual interviews in Ocean View, the iNethi NPC together with University of Cape Town sought to understand how people were currently connecting to the internet, what type of content was important to them, and how content was shared amongst local community members. This was followed by meetings with a core team of community members who came forward and agreed to help form a cooperative to operate and run the network.

Most of the community connected to the internet through expensive mobile data pay-as-you-go data packages. This data was often bought at small intervals, resulting in higher costs/GB. The average monthly expenditure amongst users surveyed was between R100 and R200 (often for under 2GB of data). This is a high cost to pay for many users living on social grants of under R2,000 per month; internet access using mobile data packages is costing between 5% and 10% of total income for many of these users. The Alliance for Affordable Internet Access (A4AI) targets 2% of total income for 5GB.

The Ocean View Community was spending between 5% and 10% of their income for less than 2 GB of mobile data.

Using surveys and a measurement tool called MySpeedTest, we found that the Google Play store was the application using the most data by a factor of almost 10 compared to other traffic types on both Wi-Fi and mobile data applications. Unsurprisingly, Facebook, YouTube and WhatsApp were in the top five applications on users' phones. Many users complained about disappearing data, due to Google Play Store downloading updates without the users even knowing. From surveys, users reported sharing content like music using the Wi-Fi file transfer app and Bluetooth that allows direct user-to-user file sharing.



Top 10 applications and breakdown in network connection type and total usage in MB.

Further information available in paper: Phokeer, A., Densmore, M., Johnson, D., & Feamster, N. (2016, November). A first look at mobile internet use in township communities in South Africa. In Proceedings of the 7th Annual Symposium on Computing for Development (pp. 1-10).

Step 2: Workshops to build a locally built and relevant digital infrastructure and content and services

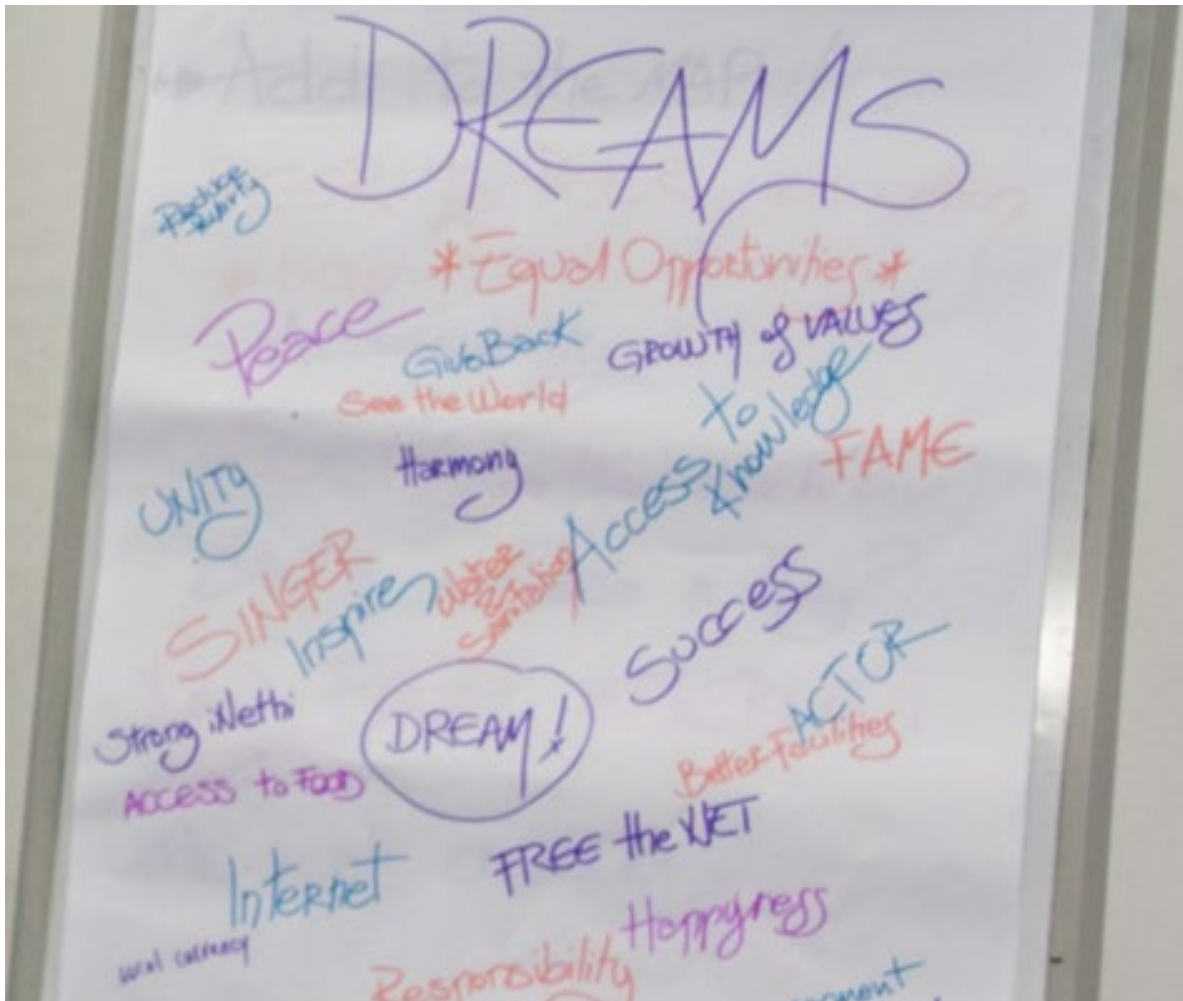
Building off the understanding of current internet use patterns and interviews in Step 1, we had workshops with the community in Ocean View to understand their vision of what a better future in Ocean View might look like and what types of digital infrastructure and services would support this. Educators shared their need for a platform to upload valuable content for learners that could enrich their curriculum and even provide a means for learners to share their learning with their peers. If learners engaged with digital content from their homes, they would make better use of the classroom environment to get clarity only on sections of the curricula they don't understand (a concept known as an inverted classroom).

Musicians told stories about how they use Bluetooth and Wi-Fi in taxis and other public areas to share their latest songs they have created or other music they wanted to share with local community members. They even upload their songs to YouTube, but community members had to spend their scarce and expensive mobile data to watch the latest music videos from local artists. They expressed the need for a local Wi-Fi network with a local file-sharing platform to share their latest music.

Businesses shared the need to advertise their local services in the community easily rather than use costly internet digital platforms. Ideally they could pay a small fee to the local community network to place adverts on the Wi-Fi splash page or on a classified page from the main landing website.

Educators, musicians and businesses all need a mechanism to distribute and share content and information with members of the community affordably.

The vision for the community drawn on a flipchart at the workshop was a place that was safe and peaceful, had equal opportunities for everyone, had access to affordable food, a place where people were giving back to the community, had flourishing local businesses, a place where children could access valuable education resources freely and where good values and principles were growing and where people's dreams could become reality.



Community vision exercise at workshop in Ocean View.

Step 3: Building the services on the iNethi platform and co-creating content

Following the workshops, the iNethi team first launched a set of generic messaging, chat and file-sharing services that could be used across a wide number of domains and meet some of the needs expressed in the workshop. We call the iNethi server a cloudlet server, to distinguish it from a large cloud server from one of the large technology companies like Amazon AWS or Microsoft Azure. The services that run on the iNethi platform we call cloudlet services.

The initial cloudlet services that were launched were (i) Diaspora: a decentralised social network (akin to Facebook); (ii) Nextcloud (was called Owncloud): a file-sharing application (akin to Dropbox); and (iii) RocketChat: an instant messaging service (akin to WhatsApp). An Internet-in-a-Box server was also launched to provide free high-value education content to students. Internet-in-a-Box had Wikipedia and TED Talks available for free.

iNethi cloud services are freely available over the local Wi-Fi network similar to services on the internet. Diaspora is akin to Facebook, Nextcloud is akin to Dropbox, and Rocketchat is akin to WhatsApp.

The content on the iNethi cloudlet server in Ocean View was also synchronised with a globally available cloudlet server at night to ensure that content was backed up and available outside the community. This also made it possible for a community member outside the community to share content with users inside the community by uploading the content to the global server. Following the upload to the global server, the content would be synchronised to the local iNethi and available for free download to anyone at the community accessing the content from one of the Wi-Fi hotspots.

As COVID-19 arrived, pupils had to stay home, and teachers were taught how to upload their lessons to the iNethi Nextcloud server from inside or outside the community. This enabled pupils in the school to access content created by their teachers from any of the free Wi-Fi hotspots. Community members also started creating their own content, including a TV station called OVTV with pupils sharing news about what was happening in Ocean View. We added a media streaming platform called Jellyfin to improve the user experience of users wanting to watch OVTV video streams. Local stories from inspirational community leaders in Ocean View were also recorded on OVTV. Local music from hip hop artists and other musicians was also placed on the Nextcloud server and streamed through Jellyfin.

As time went on, more services and content were added to iNethi based on feedback from the community in Ocean View. For example, at our workshops, we learned that the community had been trying to launch an FM community radio station but couldn't obtain a spectrum licence. We then explored adding a Wi-Fi-based radio station. Some University of Cape Town students worked on building a community radio station based on Azurecast and WordPress and we launched the radio station software in 2022.

We have also integrated all the Internet-in-a-Box services that ran on a separate Raspberry Pi into the iNethi platform. These now include: Wikipedia, TED Talks, Khan Academy, Phet maths and physics simulations, and Project Gutenberg (60,000 free books). We have also added Scratch, a Lego-like tool to teach kids to program, and Minetest, an open-source Minecraft-like sandbox game that allows users to extract virtual raw materials, craft tools and items, and co-build structures.



Connecting the dots for communities ...

Explore a world of free and iNethi club services that celebrate the creativity in your own community and dive into our large collection of education and entertainment resources.

Enter Coupon

I agree with the [Acceptance User Policy](#)

ACCESS INTERNET WITH COUPON

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Free local services

Because learning should always be free



WIKIPEDIA

The world's largest free community-built encyclopedia



TED TALKS

Explore interesting talks on science, technology, history, psychology and much more



KHAN ACADEMY

Learn about maths, art, computer programming, physics, and more



PHET SIMULATIONS

Interactive simulation for Science and Maths



SCRATCH

Learn to program and make your own games you can share with your friends



GUTENBERG

The world's largest collection of free books



iNethi club services

Entertainment, storage for your phone, games and much more



JELLYFIN

Your own community Youtube (user: guest, password: guest)



NEXTCLOUD

Share files with friends and backup all those photos on your phone



CHESS

Play chess against your friends or a chess computer



MINETEST

Play a minecraft-like game with friends without using any data



Landing splash page on iNethi server.

All these iNethi services are now available to anybody who sets up an iNethi server, and the process to set these up is explained in the next section.

Step 4: iNethi tools available to run a WISP

A community could just launch a local iNethi server with free services over Wi-Fi and that's okay if that is all they need. But many communities may also want to launch a wireless ISP (WISP) and also charge for internet access through Wi-Fi coupons/vouchers.

iNethi provides all the tools needed to operate a small WISP/ community-owned network.

In Ocean View, we held many workshops with the directors of the iNethi Cooperative to build the tools needed to run a community network that eventually evolved into a community-owned commercial ISP run by one of the community members. The tools needed were essentially: software to manage and monitor all the wireless radios, a firewall at the network gateway, and software to carry out user management and authentication and issue internet vouchers. We eventually converged on using a Ubiquiti hardware and the Ubiquiti controller (running on our iNethi platform) to monitor and manage the network, a pfSense firewall to act as a captive portal (show a splash screen when users connect to the Wi-Fi) and manage all the traffic, and RADIUSdesk, an open source voucher management and user authentication system that runs on the iNethi platform.

These are all available to anybody who sets up an iNethi server, and the process to set these up is explained in the next section.

CONCLUSION

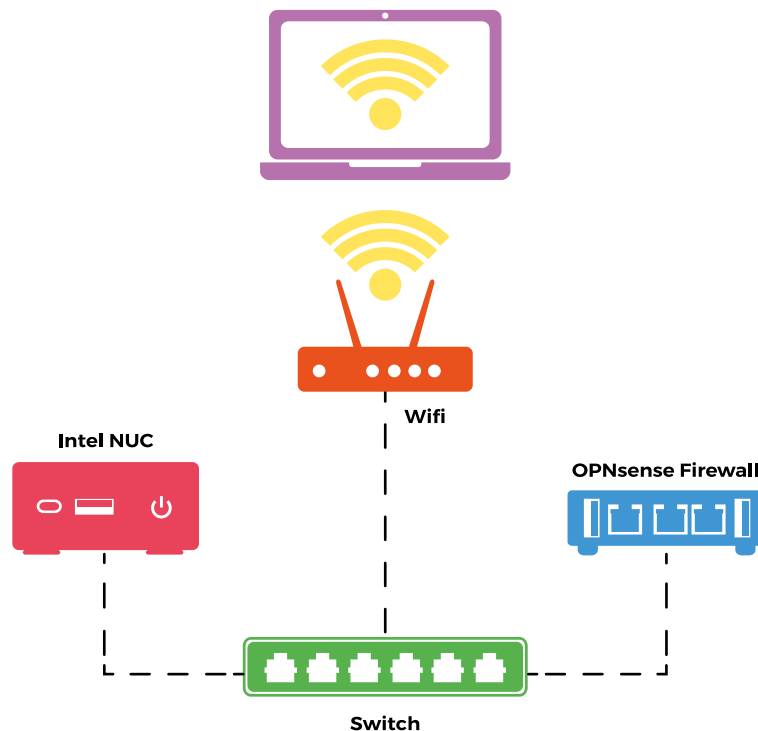
The iNethi tools provide a wide set of services for a community that needs to run a community network/small WISP and the tools to provide local services and host and share community-owned content. These services empower communities to take control of their own infrastructure and data and avoid high costs associated with internet access through mobile networks and the high costs involved in accessing content and services on large monolithic company servers like Google, Facebook and Amazon.

STEP-BY-STEP GUIDE TO BUILDING AN INETHI SERVER

In this section of the field guide, we take you through the step-by-step process to create a local community-run WISP and local community iNethi server. If you have run workshops with the community and launched a community currency, the iNethi system allows you to pay for services like internet vouchers using the community currency. To make use of this feature, be sure to install the payment and user management module when running through the installation options..

1. Device setup and prerequisites

An iNethi system can run on a variety of hardware. We suggest using an Intel NUC with at least an i5 processor, 16 GB of RAM, and a 1TB SSD drive (for a medium system supporting up to 50-100 users) or a small Intel Atom-based minicomputer with at least 8 GB of RAM, and a 250GB SSD drive (for a small system supporting up to 10 users). The current suggested operating system is Ubuntu 21.04. Once you have a system with Ubuntu 21.04 you can proceed to the next steps. Make sure you write down you username and password to login to the Ubuntu machine as you will need this in some later steps. We also suggest using an OPNsense firewall. A list of suggested hardware for OPNsense is available here: <https://hometechhacker.com/11-great-choices-for-pfsense-hardware>. The hardware setup for installing iNethi and testing with a small network is shown in the figure below.



Hardware setup for installing iNethi and testing with a small network.

To setup OPNSense to work with iNethi we suggest the following steps (full documentation is available at <https://docs.opnsense.org/>):

Installation:

- Download the latest version of OPNSense from the official website (<https://opnsense.org/download/>) and create a bootable USB drive with the ISO image.
- Boot the target machine with the USB drive and select the option to install OPNSense.
- Follow the installation wizard and choose the desired options, such as disk partitioning, network settings.

Wizard:

- Once the installation is complete, plug your host machine into the LAN port of the OPNSense firewall and login to the OPNSense web interface on <http://192.168.1.1> using the default credentials: Username: "root" Password: "opnsense".
- From the web interface, run the system Wizard and choose a Hostname like iNethiFirewall, leave the other default options, and click the "Next" button.
- Leave the Time zone server hostname, change Time zone to the time zone of your country, and click the "Next" button.
- Leave the "Configure WAN interface" settings as default and click the "Next" button.
- Change the LAN IP Address to 10.2.0.1 and subnet mask to 16 and click the "Next" button.
- Setup a root password and confirm the root password and click the "Next" button.
- Click the "Reload" button and allow the system to reboot.
- After 2 minutes remove and reinsert the Ethernet cable on your computer to obtain a new DHCP lease.

DHCP Settings:

- Connect to the OPNSense Web interface on <https://10.2.0.1>
- Click on the Services menu and select DHCPv4.
- Scroll down to Range and set “from” to 10.2.0.50 and set “to” to 10.2.255.254. Scroll down to the bottom of the page and click “Save”.

DNS Settings:

- Click on the Services menu and select General.
- Scroll down to DNS servers and change the DNS Server to 10.2.0.10 (this is the DNS server running on the Intel NUC).
- Uncheck “Allow DNS server list to be overridden by DHCP/PPP on WAN”.
- Scroll down and click on “Save”.
- Click on the Services menu and select “Unbound DNS” and select “Query Forwarding”.
- Check the box next to “Use System Nameservers”.
- Scroll down and click on “Apply”.
- Click on System menu and select “Settings” and select “Administration”.
- Scroll down to DNS Rebind Check and check the box next to “Disable DNS Rebinding Checks”.
- Scroll down and click “Save”.

Radius Settings:

- Click on the Services menu and select “Access” and select “Servers”.
- Click on the “+” Add button.
- Enter a descriptive name: radiusdesk.
- Select type: Radius.
- Enter a hostname or IP Address: 10.2.0.10
- Enter Shared Secret: inethi4u.
- Select services offered: Authentication and Accounting.
- Leave all other default values and click on “Save”.

Captive Portal Settings:

- Download the iNethi captive portal template from <https://inethi.org.za/software/captiveportal.zip>
- Click on the “Services” menu and select “Captive Portal” and select “Administration”.
- Click on the Templates tab.
- Click on “+” and enter the template name: “inethi” and click on “Choose File”. Select the file downloaded in the 1st step and click on “Upload”.
- Click on the “Zones” tab.
- Click on “+” to enter a new zone.
- For Authenticate using: check “radiusdesk”.
- Enter Allowed addresses: 10.2.0.10
- Select Custom template: inethi.
- Enter Description: iNethi captive portal.
- Click on “Save” to save the captive portal settings.
- Click on “Apply” to activate the captive portal. This may take a few minutes, wait for the spinning wheel on the Apply button to stop spinning.

This field guide does not provide information on building a community network, but we suggest looking at these resources:

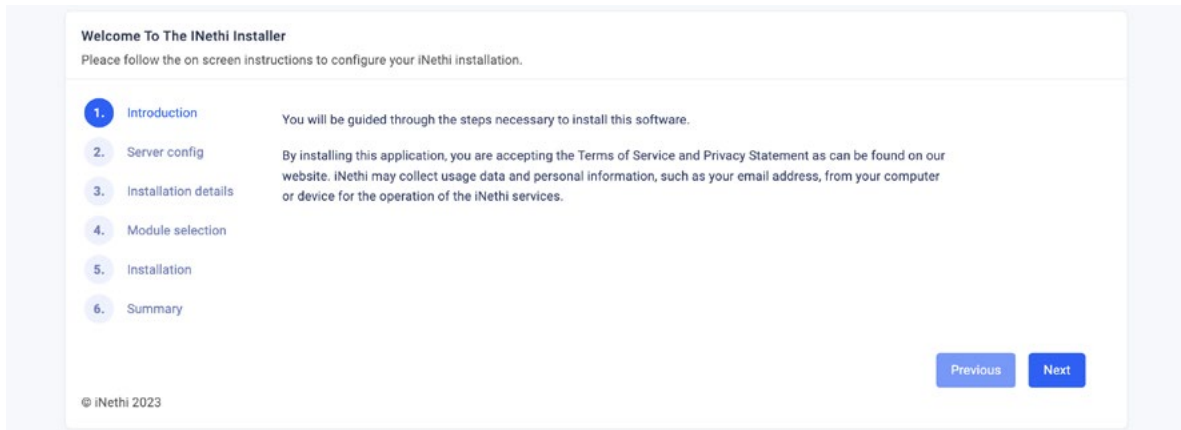
- Libremesh: <http://libremesh.org/>
- Meshdesk: <https://www.radiusdesk.com/>

2. Installation

Make sure your computer is connected to the same network that your Intel NUC and OPNSense firewall is connected to either through WiFi or a LAN port.

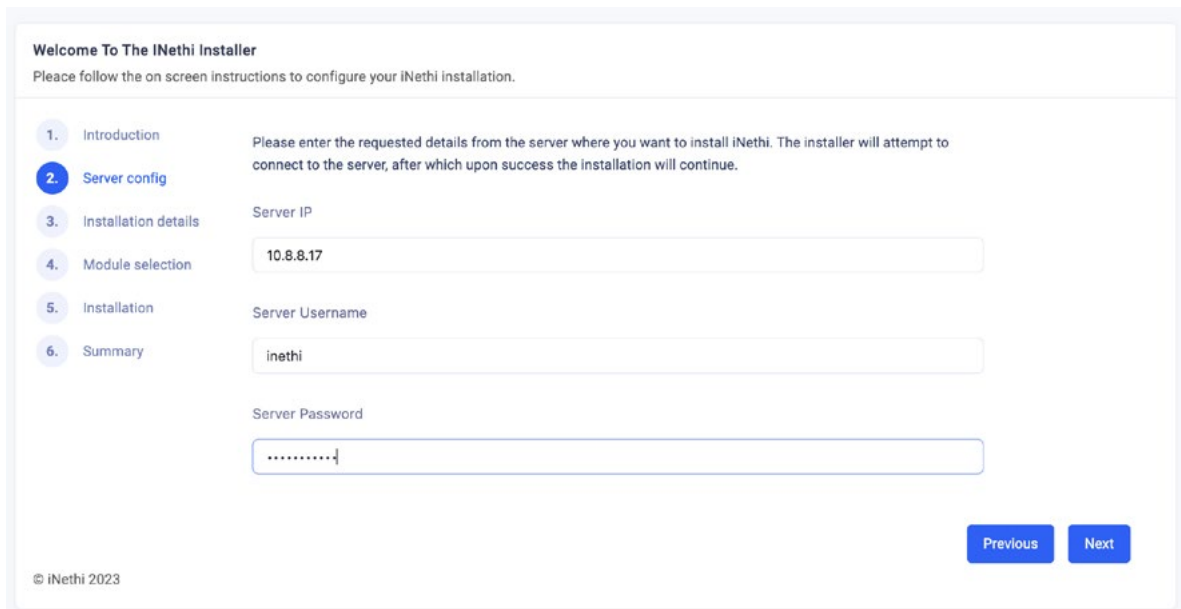
Visit <https://iNethi.org.za/software> to download the installer on your host operating system. Note, this runs on your host machine not on your server.

After running the installer, you should see the following screen.



Step 1. iNethi Builder: Introduction

After accepting the Terms of Service and the Privacy Statement. You will provide information on reaching your NUC server (the IP address and password were configured in the installation phase).



Step 2. iNethi Builder: Server config

Once you have provided the installation details, click Next to provide the Installation Details (shown below). Here you can provide a custom storage location for all the iNethi services and content as well as a custom Domain Name. We suggest leaving these as default at first when you are getting to know the system. Once you are comfortable with iNethi and want to deploy it in a production system, you may want to customize these (this can be done later from the maintenance software). You will also need to set a Master Password which will be used across many of the iNethi services.

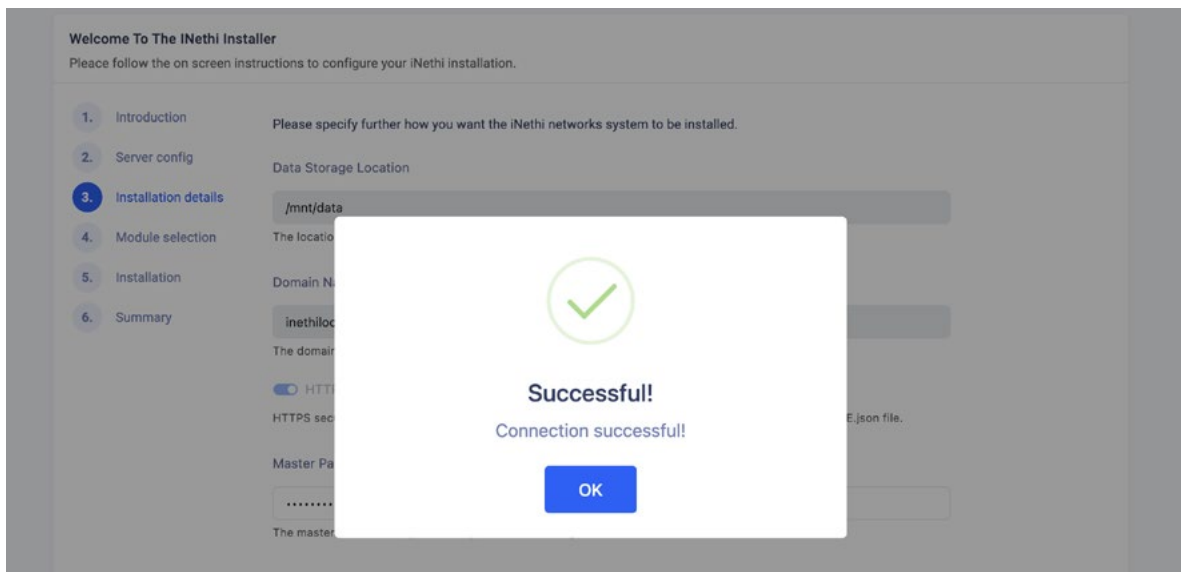
The screenshot shows the 'Installation details' step of the iNethi installer. The interface includes a progress bar on the left with six steps: 1. Introduction, 2. Server config, 3. Installation details (highlighted), 4. Module selection, 5. Installation, and 6. Summary. The main content area contains the following fields and options:

- Data Storage Location:** A text input field containing `/mnt/data`. Below it, a note states: "The location where services that require data storage will store their data. Default is `/mnt/code`."
- Domain Name:** A text input field containing `inethilocal.net`. Below it, a note states: "The domain name through which the iNethi platform can be accessed. Default is `inethilocal.net`."
- HTTPS:** A toggle switch that is currently turned on.
- Master Password:** A password input field with masked characters (dots).

At the bottom right of the form, there are two buttons: "Previous" and "Next".

Step 3. iNethi Builder: Installation details

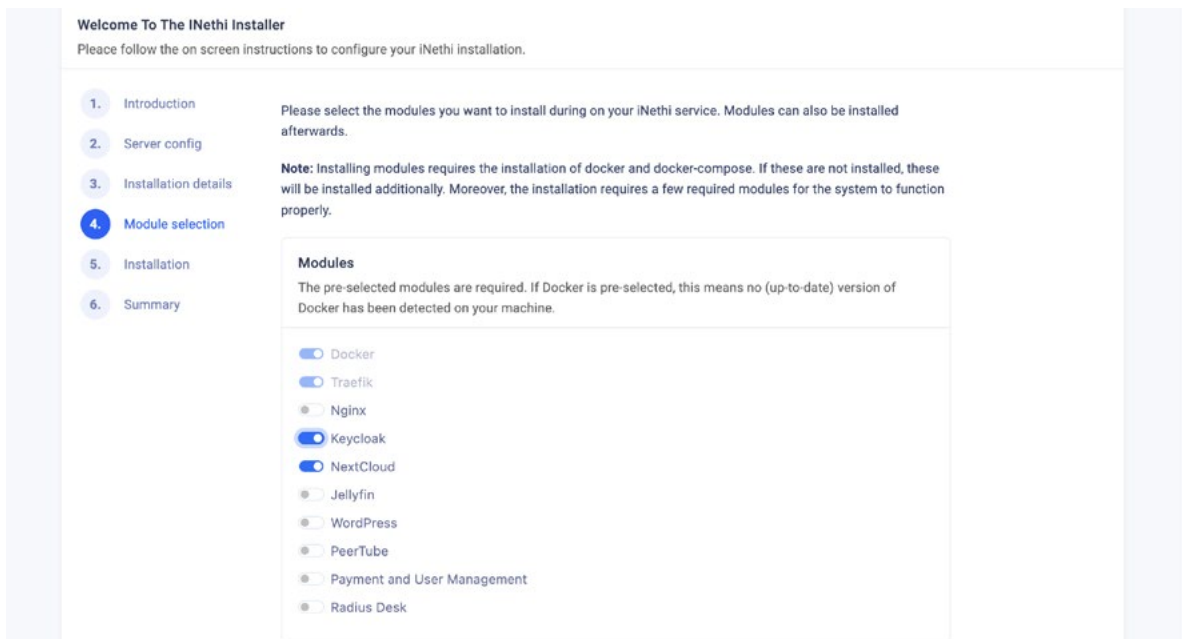
After Clicking Next, the builder will attempt to connect to the server and if successful will show a message shown below.



Step 3. iNethi Builder: Installation details – Connection successful

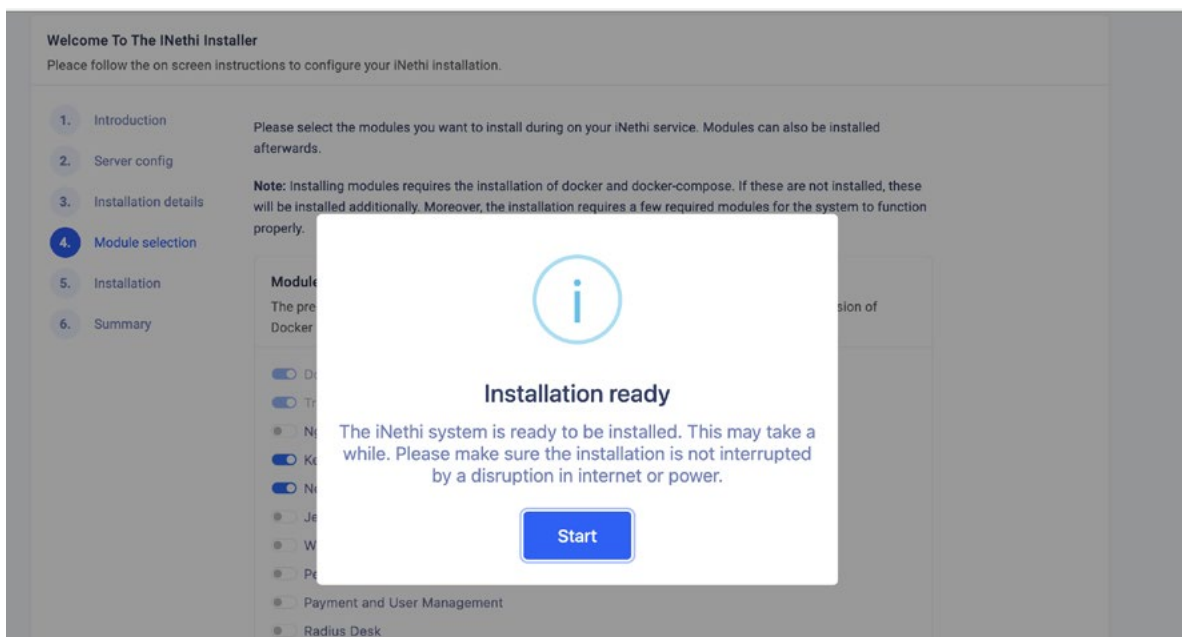
The next step is selecting modules, we've preselected some core modules that are part of iNethi, although there are others that you will be able to select with the iNethi maintenance tool. Docker and Traefik cannot be removed as these are key to the functioning of the system.

- Nginx: This is a web server that displays a splash page for users to select an iNethi service to use.
- Keycloak: This provides single sign-on capability to many of the iNethi services with identity and access management.
- Nextcloud: This provides a local Dropbox-like environment for storing, creating and using cloud-based file hosting.
- Jellyfin: This provides a media server for videos and music and suite of multimedia applications designed to organize, manage, and share digital media files for users with accounts.
- PeerTube: This media service is a federated video platform powered by WebTorrent, that provides a way to disseminate video content and allows users to comment on videos. It is well suited to public video content that don't require an account to view the content.
- WordPress: This service provides a content management system that allows users to easily build web pages that can be viewed on the local network.
- Payment and User Management: This is an iNethi custom built service to provide a payment system to pay for any services on the iNethi platform using a community currency or local payment systems like OneVoucher in South Africa. It also provides a mechanism for users to check services they have paid for, and a mechanism for administrators to manage users. User identification can be a user's phone number or a keycloak ID.
- RADIUSDesk: This is a Web-based Wireless Hotspot Manager that can be used to manager network Users, Vouchers, Devices and Mesh-Setups from one central Dashboard. The RADIUSDesk system is closely tied to the Payment and User Management system to allow a community currency to be used to purchase an Internet voucher.



Step 4. iNethi Builder: Module Selection

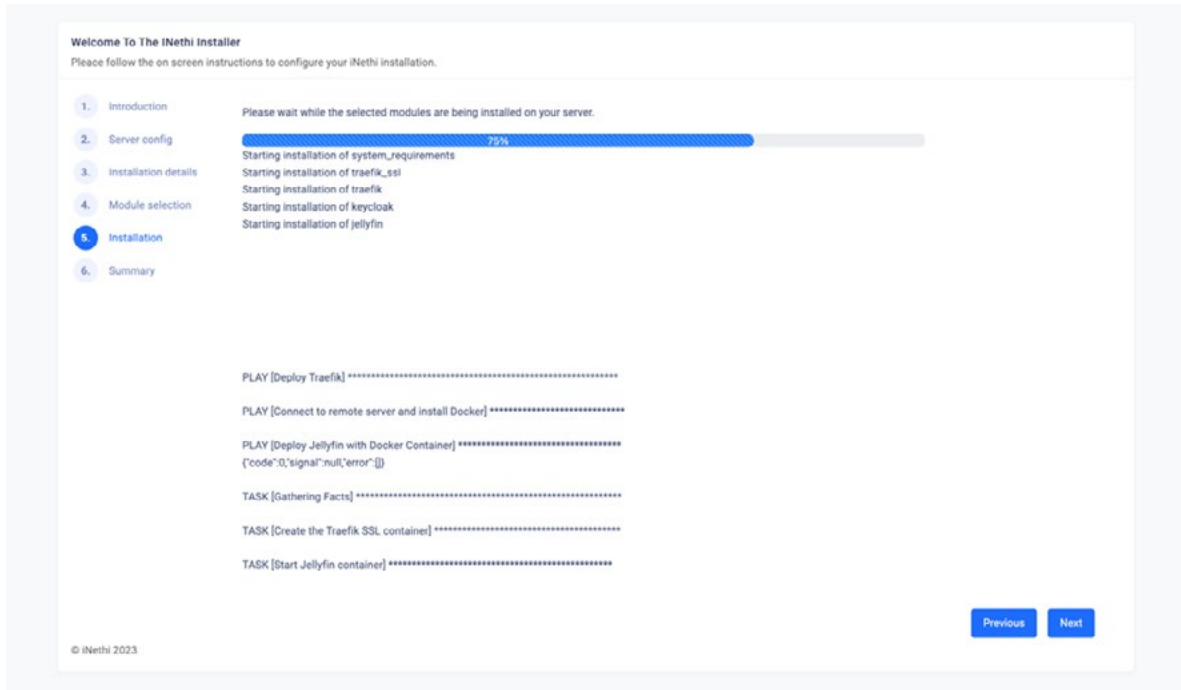
Once you have chosen the modules you want click Next and you should see an “Installation ready” message shown below. When you are sure you have a stable internet connection and stable power to your host computer and the iNethi server, click Start.



Step 4. iNethi Builder: Module Selection – Installation ready

You will then receive a message saying that the config was saved successfully. This sets up all the backend systems with the parameters you’ve chosen and instructs the server to start installing all the iNethi components. Click OK start the installation on the iNethi server.

The installation can take quite a while and you will see a progress bar as shown below with details on which components are being installed. Once this is complete your iNethi system is installed and you can proceed to the Post-Installation steps.



Step 5: iNethi Builder: Installation – Installation progress

POST-INSTALLATION STEPS

1. WordPress

To set up, visit <https://wordpress.<domain name>> on your web browser, e.g. if your domain name is inethilocal.net, then visit <https://wordpress.inethilocal.net>

2. Nextcloud

To set up, visit <https://nextcloud.<domain name>> on your web browser, e.g. if your domain name is inethilocal.net, then visit <https://nextcloud.inethilocal.net>

Choose a master username and password and storage location

- user: inethiadmin (suggestion)
- password: (pick a secure password)
- storage location: (leave as default)

Configure database

Select MySQL/MariaDB (under configure the database)

- Database user: inethi
- password: *password you set in the installation section*
- database name: inethi_nextcloud
- database: inethi-mysql

Nextcloud will now launch and ask for a username and password. Log in using the administrator username and password you set.

- Select Apps from top right icon
- Select Disabled Apps
- Enable External storage support

Add a public group

- Select Users option when clicking on Administrator user icon
- Select Add Group - Enter Public

Add external storages

- Select Administrator user and select Settings
- Bottom left – select External storages

Add the following suggested folders in order to share folders between iNethi users and also to synchronise your local iNethi with a global iNethi instance:

- Folder name: Rshare, External storage: Local, Configuration /mnt/Rshare, Available for Public, Options: Enable Sharing, Read only
- Folder name: Rvideo, External storage: Local, Configuration /mnt/Rvideo, Available for Public, Options: Enable Sharing, Read only
- Folder name: Rmusic, External storage: Local, Configuration /mnt/Rmusic, Available for Public, Options: Enable Sharing, Read only
- Folder name: Rphoto, External storage: Local, Configuration /mnt/Rphoto, Available for Public, Options: Enable Sharing, Read only
- Folder name: RWshare , External storage: Local, Configuration /mnt/Rshare, Available for admin, Options: Enable Sharing
- Folder name: RWvideo, External storage: Local, Configuration /mnt/Rvideo, Available for admin, Options: Enable Sharing
- Folder name: RWmusic, External storage: Local, Configuration /mnt/Rmusic, Available for admin, Options: Enable Sharing
- Folder name: RWphoto, External storage: Local, Configuration /mnt/Rphoto, Available for admin, Options: Enable Sharing

3. Jellyfin

To set up, visit <https://jellyfin.<domain name>> on your web browser, e.g. if your domain name is inethilocal.net, then visit <https://jellyfin.inethilocal.net>

Complete Tell us about yourself section.

- Username: inethiadmin (suggestion)
- Password: select a strong password

Add video library.

- Select Add Media library
- Content type: Movies
- Display name: Videos
- Select Folders (+)
- Folder: /mnt/Rvideo
- Select OK

Add music library.

- Select Add Media library
- Content type: Music
- Display name: Music
- Seelect Folders (+)
- Folder: /mnt/Rmusic
- Select OK

Add content.

To add music and video content that can be viewed on Jellyfin. Open Nextcloud, log in as administrator or a user with administrator privileges and drag videos to the RWVideo folder or drag music to the RWMusic folder. The content will automatically appear in Jellyfin.

4. Adding synchronisation to global server

You can contact iNethi to get some space on the global iNethi cloud – a folder allocated for your organisation will synchronise with your local iNethi instance. Contact iNethi at info@inethi.org.za for a pricing arrangement to meet your storage requirements.

You will receive a login to the global iNethi storage folders on Nextcloud and a Webdav link. Run the iNethi maintenance application which you will find at <https://maintain.inethilocal.net> and select synchronization from the menu and enter this link in the Webdav link.

5. Single sign-on

In order to run a single sign-on (SSO) environment, you need to have keycloak running (if it wasn't chosen from the initial installation, you can select it with the iNethi maintenance application). The following applications have been tested with SSO:

- Nextcloud
- React Payment Portal

6. Payment and user management system

The payment and user management system consists of two components: (a) the RADIUSdesk Voucher system and (b) the iNethi User Management system.





The RADIUSdesk Voucher System creates a radius server for authenticating users who wish to connect to the internet and provides a mechanism for creating radius usernames and passwords or radius vouchers for Wi-Fi hotspot access.

The iNethi User Management system provides a mechanism for creating mobile phone number and/or keycloak iNethi users that can authenticate across multiple services on iNethi and provides an API for various payment

interactions on iNeth, including paying for an iNethi voucher. Payments can take the form of community currency, One4You vouchers, or cash and the iNethi management system is capable of being extended to new payment mechanisms.

7. Configuring RADIUSdesk

Prior to allowing users to pay for internet radius vouchers, you will need to configure a set of data and/or time-based voucher types and batches of vouchers based on the voucher types. Follow these steps to build the vouchers

1. Go to the web page <https://radiusdesk.<domain name>> on your web browser e.g. if your domain name is inethilocal.net, then visit <https://radiusdesk.inethilocal.net>
2. Login with user: root, password: admin
3. Select  "Admin" from menu on the left
4. Select the  Realms (Groups) tab
5. Click the "+" icon to add a realm
6. Select "Logged in user" and click "Next"
7. Choose a name e.g. "iNethi" and [x] make available to sub-providers and click "Next"
8. Select the  Admins tab
9. Highlight the "demo1" admin and click the edit (pencil) icon
10. Select the "Realms" tab
11. Give iNethi "Create", "Read", "Update", "Delete" rights
12. Select  Profiles from the menu on the left (For this example we will set up a 1G data-capped profile and a 1-day time-capped profile)
13. Click the "+" icon to add a profile

14. For the 1G data-capped profile, Pick Owner “Logged in User”, enter the Name: “DATA1G”, select [x] Available to Sub-Providers, DATA LIMIT switch to Enabled, Reset set to “Never”, Amount set to 1, Units set to GB, Type set to Hard, Speed Limit not Enabled

15. Click “Save”

16. For the 1 Day time-capped profile, Pick Owner “Logged in User”, enter the Name: “TIME1D”, select [x] Available to Sub-Providers, TIME LIMIT switch to Enabled, Reset set to “Never”, Amount set to 1, Units set to Days, Type set to Hard, Speed Limit not Enabled

17. Click “Save”

18. Select  “Users” from the menu on the left

19. Select the   Vouchers tab

20. Click the “+” icon to add a new set of data-capped vouchers
Select “Logged in user”

21. Realm: Select iNethi, Profile: DATA1G, How many? 100 (you can choose more or less if you wish), Batch name: digital_batch1 (if you provide a different name it is critical that you leave the prefix “digital” as this is searched for by other code in the iNethi management system)

22. Click “Next”. You should now see all the data-capped vouchers being created.

23. Click the “+” icon now to add the time-capped vouchers

24. Select “Logged in user”

25. Realm: Select iNethi, Profile: DATA1D, How many? 100 (you can choose more or less if you wish), Batch name: digital_batch1 (if you provide a different name it is critical that you leave the prefix “digital” as this is searched for by other code in the iNethi management system)
Click “Next”. You should now see all the vouchers being created.

You now have vouchers ready to be issued by the iNethi system.

To ensure that the firewall works with RADIUSDesk you will also need to do the following:

RADIUSDesk

1. Connect to the OPNSense Web interface on <https://10.2.0.1>
2. Click on the Services menu and select “Access” and select “Tester”
3. Enter Username: test, Password: test and click “Test”. You should see a fail message. This is simply to force the firewall to contact RADIUSDesk.
4. Connect to the RADIUSDesk Web interface on <https://radiusdesk.inethilocal.net>
5. Click on the RADIUS menu.
6. Select the “Unknown clients” tab.
7. There should be a single entry with a randomly assigned NAS-identifier. Select this and click on the paperclip icon to attach the new NAS.
8. Select “Logged in User” and click “Next”.
9. Provide a Name like “OPNSense Firewall” and click “Next”.
10. Select “Make available to any realm” and click “Next”, the NAS should now be authenticated.

8. Other services available

iNethi has many other services available that are not displayed on the build menu. These include:

- Fdroid : To run your own app store
- Kiwix : For displaying Kiwix content such as Wikipedia, TED Talks, and Project Gutenberg
- Kolibri : For displaying educational content such as Phet and Khan Academy
- Minetest_server: An open source Minecraft-like server with a free Android and PC client
- Moodle: A content management system
- Scratch: A block-like programming language
- UISP (Ubiquity): A Ubiquity network controller for managing backhaul links
- Unificontroller (Ubiquity): A Ubiquity network controller for managing access points.

To install these simply run the iNethi maintenance application available at <https://maintain.inethilocal.net>.

WHAT'S NEXT NOW THAT iNethi IS INSTALLED?

With everything installed it's time to start collecting local content and putting it on the server. This can be done by dragging content to the Read/Write folders on Nextcloud. In addition, you may want to customise the splash page by running the iNethi maintenance software available at <https://maintain.inethilocal.net> and selecting splash page from the menu options.

If you are selling internet coupons, you need to create data or time packages. Go to the RADIUSdesk system and add packages using the same steps shown in the Post-installation steps Section 8.

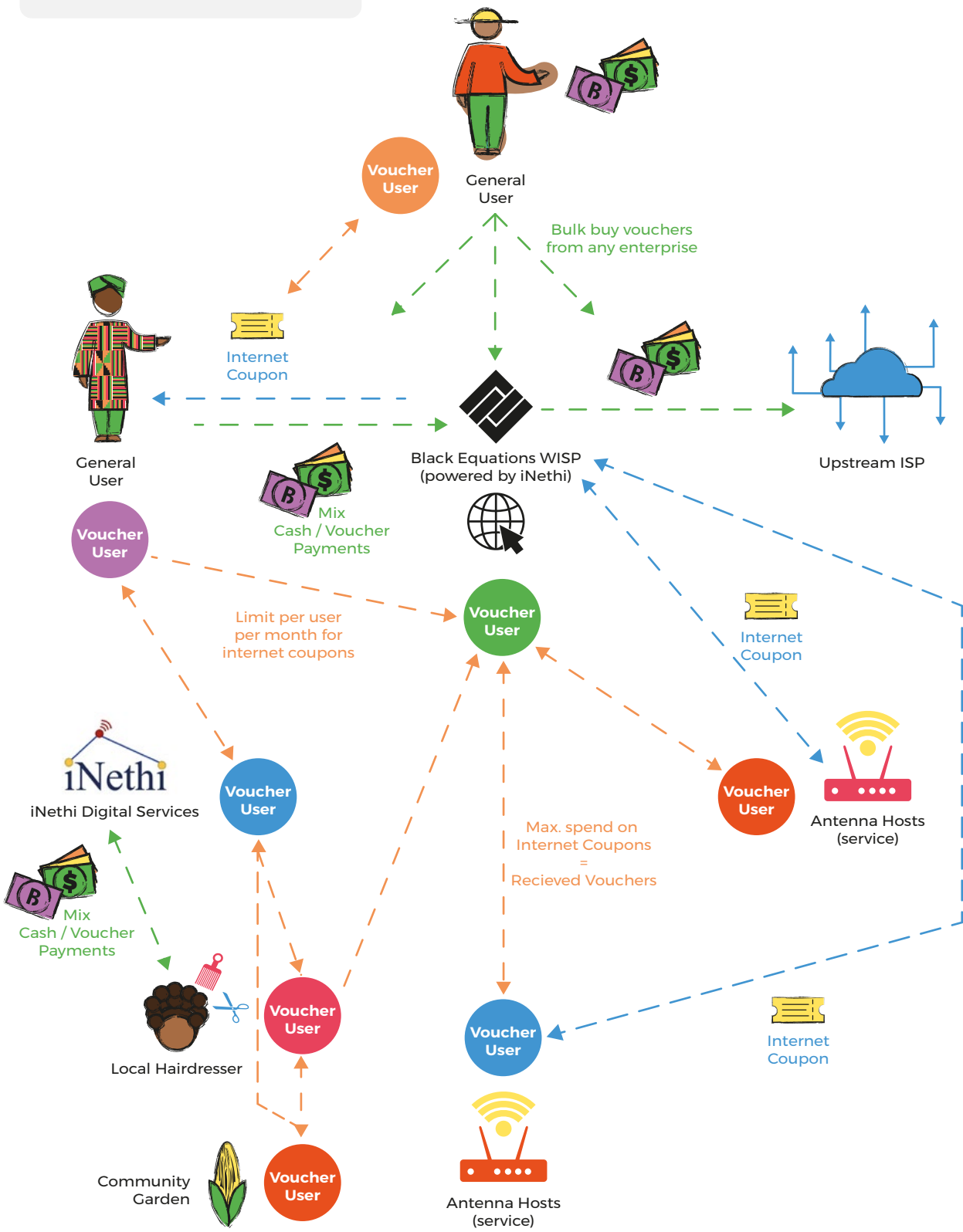
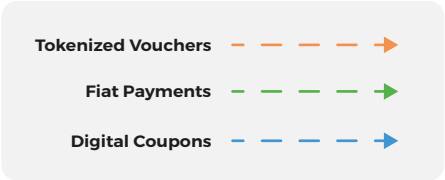
You will also need to decide what prices to charge in both local currency and the community inclusion currency you have created for your community. Once you have created additional internet coupons, you can modify the price mappings by running the iNethi Maintenance application available at <https://maintain.inethilocal.net> and selecting service prices from the menu options.

Conclusion

We hope this field guide helps you in your journey to build commons infrastructure and economic services for your communities. Your journey may begin with first working with the economic commons in your community and developing vouchers with the goal of them becoming community inclusion currencies and at a later point building a community network. Or you may begin your journey with building network commons infrastructure, even just a single first Wi-Fi hotspot running off an iNethi server, and growing your network from there and at a later point integrating a community inclusion currency.

We believe that having both an economic commons as well as a network commons complement one another to ensure there is both growth in the local economy in a community and growth of widely available affordable internet and locally relevant content and services.

We also believe that a mutual credit-based community voucher integrated with a community-owned network will incentivise users to become better custodians of commons infrastructure, create more locally generated digital content, and expand the use and stability of a community voucher to support wider local markets that embrace local digital and physical goods and services.



Combination of iNethi network and community currency.

Appendix

DEFINITIONS

Economics was traditionally the practice of managing a household. It can be seen as a set of agreements that bring us toward healthy outcomes.

Finance was traditionally coming to settlement or finality. It can be seen as coming back into balance.

Economic commons is defined here as an open association of people and organisations, where mutually defined instruments are utilised by general members who jointly oversee service providers, i.e. active stewards, subject to passive custodians, i.e. guardians, with protective governance rights.

Included in the definition of an economic commons is the platform under which are specified technical, social and legal requirements. Grassroots Economics Foundation, for example, works to empower local economies through developing economic commons with instruments like vouchers via a platform called Sarafu Network. Via this network, Grassroots Economics is partnering with organisations, groups and individuals to provide support for economic commons.

Network commons refers to shared network infrastructure that is collectively owned and managed by a community or group of individuals. This can include physical assets such as networks (cables, wireless links) or telecommunications infrastructure (masts, antennas, etc.). The goal of a network commons is to provide access and benefits to all members of the community, rather than being controlled by a centralised authority or for-profit organisation.

Digital commons refers to a shared digital resource that is collectively owned and managed by a community or group of individuals, in a digital context. This can include things like open-source software, online platforms, data sets, and other digital resources that are freely available for use, reuse, and sharing by the public. The goal of a digital commons is to provide access to and promote the sharing of digital resources for the benefit of all members of the community, rather than being controlled by a centralised authority or for-profit organisation.

CORE ECONOMIC LENS

When we look at how a healthy household is managed, three core functions are at work:

Service: The social lens of value being given primarily to collectible things, goods or commodities can be seductively pervasive. Yet as we hold an apple we should acknowledge the services that brought it into our hand: the farmer, the market, the soil, the tree. The services provided that brought this apple contain in them agreements.

Trust: In order to assess value, accept a service and collaborate we must be able to rely on each other.

Memory: Memory provides storage of information that enables accountability.

AGREEMENTS

Unilateral agreement: Certificate: we can claim something or endorse something or someone. Universities give certificates that indicate a student has completed a course of study. Certificates will relate to how we develop trust in each other and other agreements like vouchers.

Bilateral agreements: The promise itself is a communicated intention. The issuer of the promise creates an ethical obligation to honour it. As a bilateral agreement, a promise can be accepted and in the form of a voucher and can also be transferred to others.

Multilateral agreements: Several parties can come together and create collective promises.

From a promise to a voucher: When an individual or group creates a voucher, they are making a promise, which is recorded in a physical or digital medium such as a ledger (memory). The medium records who is obligated to redeem the voucher as payment for services (service) and also who holds the voucher as well as the history of to whom the voucher was transferred. The ledger can also hold other endorsements and certifications that build confidence (trust).

Untransferable promises of service to individuals, like invoices, create a pattern where the issuer and acceptor are locked into an agreement with each other. With a voucher, if the acceptor doesn't need the service at

this moment and would rather transfer it to someone else, then they are more free and the voucher can be redeemed by that other person or again transferred. Note that a relationship and agreement exists between the issuer and the holder, but the holder may choose to transfer their holding to someone else.

For example: If you give me 10 dollars or a pair of shoes and I promise to give you 100 apples next month, then I have an obligation to give you apples. If that agreement is transferable (in the form of a voucher), then you can assign it to someone else and I would have an obligation to give the apples to them.

Reassignable/tradable agreements can flow among a community unlocking the potential for people to develop projects, infrastructure, regenerative agriculture and other complex human interactions. They are not “money” or “currency” in the traditional sense of the words, they are flowing agreements. A voucher can also be called a credit obligation, where the issuer is being given a credit by the acceptor and has an obligation to redeem it as payment.

Individually-issued credit: An individual person or business might issue a voucher redeemable for specific services they offer. In this case it is clear exactly who is obligated to redeem the voucher.

Mutual-issued credit: Vouchers can be issued collectively. An association of people under a common agreement as found in an economic commons can collectively issue a voucher.

Networks of vouchers: Regardless of how they are issued, vouchers can be tradable for each other and people can issue and hold many vouchers. Such networks like Sarafu Network in Kenya enable users to access a market of vouchers and develop projects where promises against many services will be needed. Groups of vouchers co-existing in an area provide a collective medium of exchange.

Connecting vouchers: When someone accepts a voucher for a good or service or another voucher or fiat money, they are acting as a conduit or connector. They are saying this voucher (redeemable as payment for apples) is valuable and I will accept it in return for something else that is valuable to me, like an hour of my time.

This connecting function between vouchers and other services is how a voucher can start to act like a medium of exchange. Generally this is limited based on the capacity of the issuer and supply of vouchers and the trust

of people around them. A voucher like a telecom airtime credit can be accepted by many people because they all value its utility.

While holding two or more vouchers someone can offer to be a conduit between those vouchers. This is generally called an exchange. You might be familiar with money changers standing on the street with pesos in one pocket and dollars in the other. When you give them dollars they give you back pesos and keep a small fee. This can also happen between two vouchers where a fee is charged for the exchange service. This fee can counteract demurrage or gradual expiration and act as a form of savings. You save by making something useful.

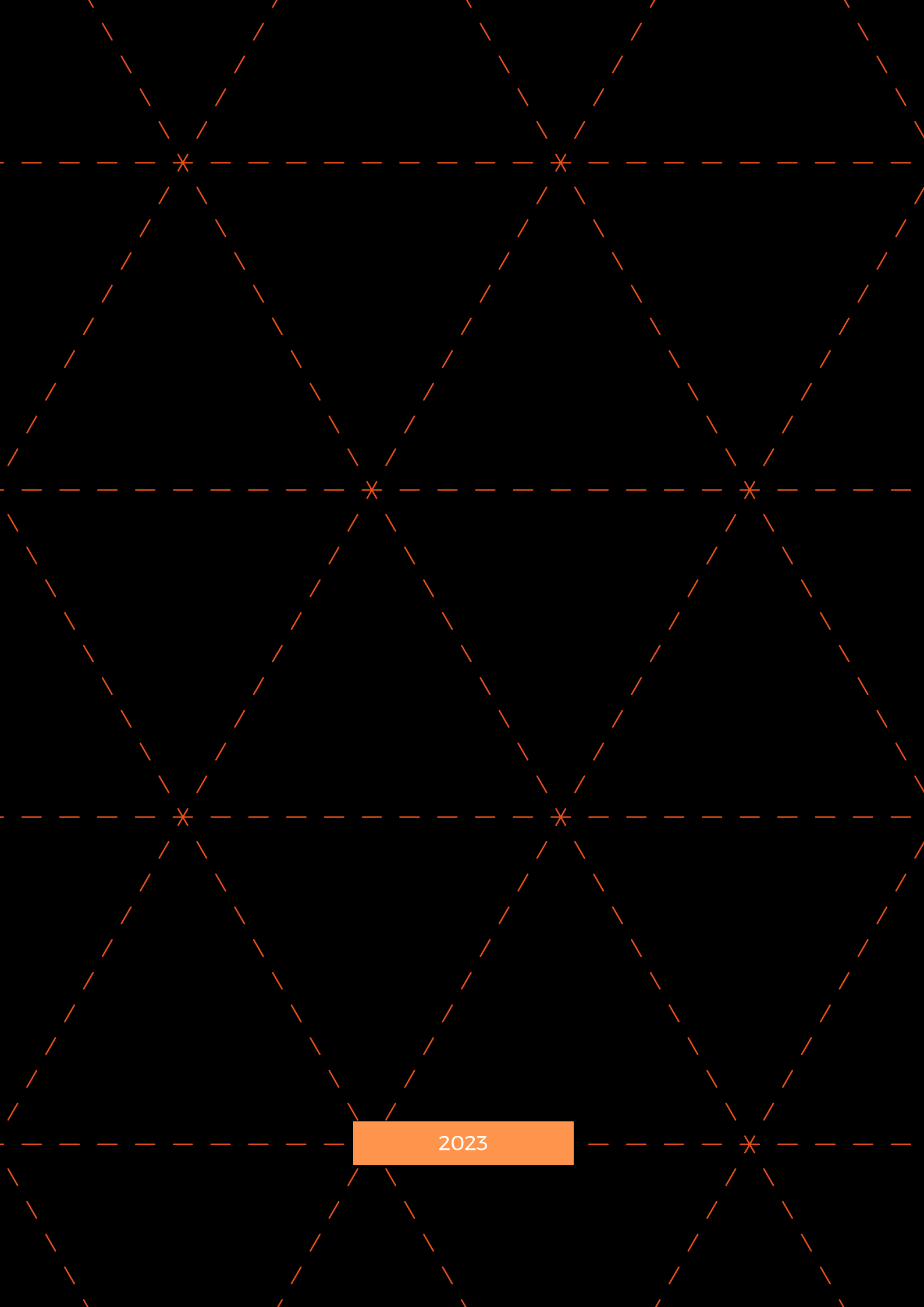
NETWORK AND DIGITAL SERVICES

Cloud server: A cloud server is a virtual or physical server that is hosted and maintained by a third-party cloud provider such as Amazon and Microsoft. These servers are accessed over the internet and can be used to host websites, applications and data storage. Cloud servers offer a number of benefits over traditional on-premises servers, including scalability, flexibility and cost-efficiency.

Cloudlet server: A cloudlet server is a small-scale, low-power server that is designed to be deployed in close proximity to the end users it serves. These servers are typically used to provide cloud services to users in remote or resource-constrained environments, such as in rural areas or on mobile devices. Cloudlet servers can be used to offload computation and data storage from mobile devices, improving performance and reducing power consumption. They can also be used to provide local access to cloud services, such as storage, computation and networking, reducing the need for long-distance network connections.

RADIUS: RADIUS (Remote Authentication Dial-In User Service) is a networking protocol that provides centralised authentication, authorisation and accounting for wireless and wired network access. It is commonly used by service providers and enterprises to manage access to network resources, such as wireless networks and virtual private networks (VPNs).

DNS: DNS (Domain Name System) is a hierarchical, distributed system that translates human-friendly domain names (such as www.example.com) into IP addresses that computers use to identify each other on the internet. It is an essential component of the internet infrastructure, as it allows users to connect to websites, email servers and other resources using easy-to-remember names rather than long strings of numbers.



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