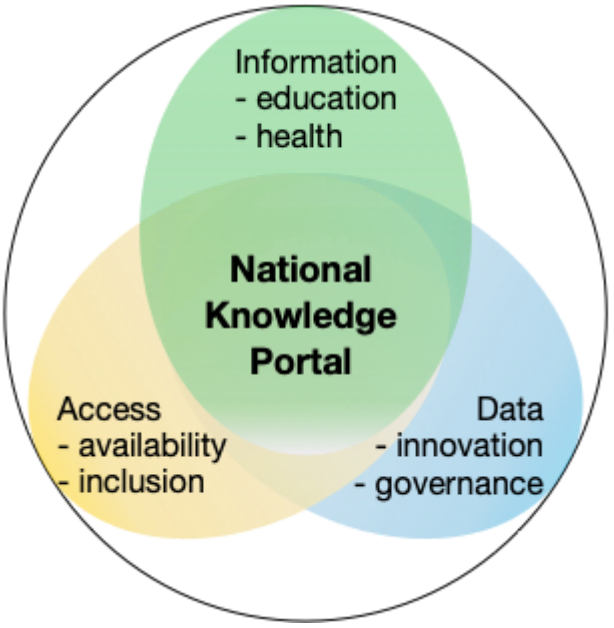
Yeboo Village platform development

Purpose

The purpose of this paper is to advocate for community empowerment, especially in rural areas, in the digital age. Studies from India show that about 80% of jobs that are lost, hit the rural areas. The main reason is that industrialisation and digitisation increases efficiency in production, and thus lower costs. While being obvious for industrial production, the cost advantage is also true for agricultural goods. Thus, rural societies are hampered in their competitiveness, and will fall (even more) behind if we don't encourage local value creation in the villages.

Suggested solution

Our suggestion is to create a local village platform to empower the local communities, enable access to digital knowledge, and create local centres for job creation and innovation in the villages. Regarding the main functionality of the village platform, the three elements to be considered are: *(i)* to create an architecture for knowledge spreading, *(ii)* provide everyone with free access to a national knowledge portal, and *(iii)* enable community engagement through a local village/school/community platform.



(i) The architecture for knowledge spreading focuses on a distributed platform, with a centralised part and local representations in the villages/communities. The centralised part is seen as becoming the National Knowledge Portal,
There are several reasons to go for a distributed platform, the main ones being the access to knowledge for everyone in the society, and secondly the edge capabilities introduced through the local representation. Such a local representation avoids both disturbances and costs[1] of the backbone network.

We suggest building the platform following the freemium model for access, as addressed through "Internet Lite", a lightweight Internet. The main background for the demand of a lightweight Internet are the demand for an affordable Internet, brought forward by the United Nations[2], Governments[3], the Internet Society and local communities. Given that bandwidth demanding applications like

[1] The delivery of bandwidth in rural Africa is quite expensive, typically in the range of 25-100 USD/month for a 1 Mbit/s line. The cost example of the DigI project had an offer of 4 Mbit/s for more than 600 USD/month.
[2] The United Nations' High-level Panel on Digital Cooperation listed in their final report the recommendation 1A as follows: "We recommend that by 2030, every adult should have affordable access to digital networks, as well as digitally-enabled financial and health services, as a means to make a substantial contribution to achieving the SDGs…"
[3] The Government of Norway has pointed out affordable access, together with skill, regulations and inclusion as the four drivers for Norwegian Policy. Source: "Digital Transformation and Development Policy", Norwegian Government, Message to the Parliament, Meld. St. 11 (2019-2020), Apr2020, https://www.regjeringen.no/no/dokumenter/meldst11_summary/id2699502/?ch=1

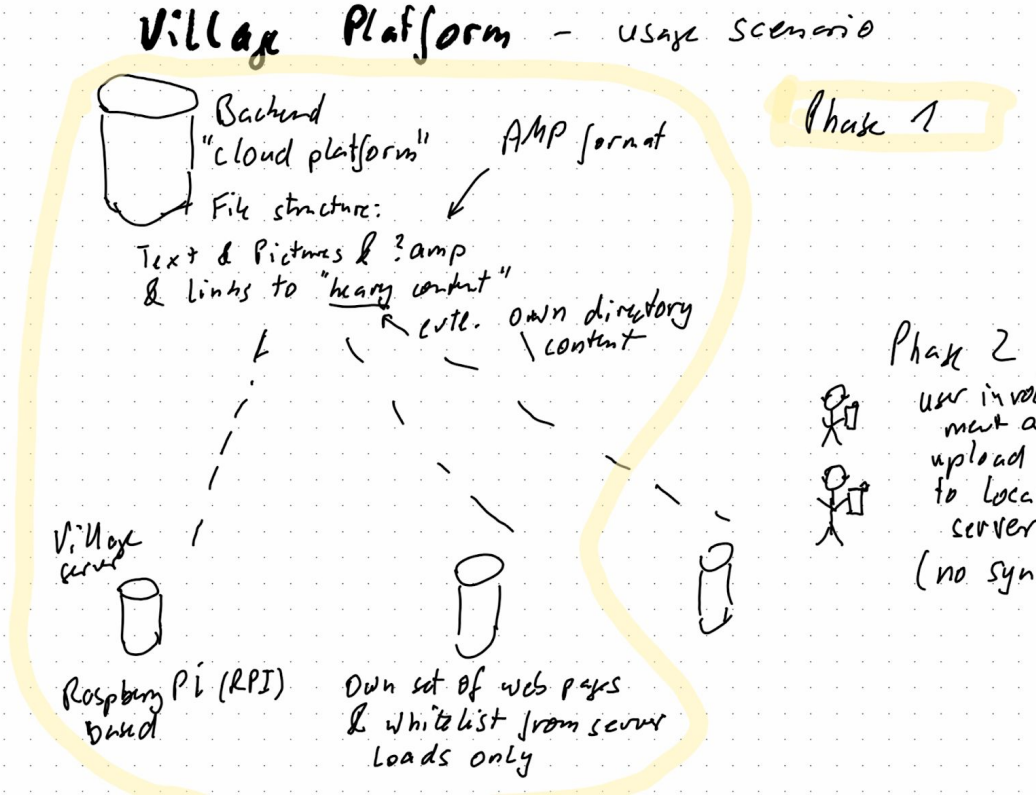
streaming are costly, e.g. a 10 GB data package allows about 10 h of video streaming at costs of typically 15-25 USD, there is an obvious need to reduce transmission of streaming material to an absolute minimum. Thus, instead of streaming, such bandwidth demanding content should be kept locally. In the beginning of the Internet, focus was on low-bandwidth services, but given the roll-out of fibre, the focus has turned into delivery of video and other streaming services. While societies with high economic power can roll-out fibre to the home, people in the bottom of the pyramid can't afford such connectivity. Furthermore, in rural areas there is no fibre infrastructure, and all access is performed over the mobile network.

Internet Lite and the freemium model for access are two ways of counteracting on the digital divide. Internet Lite claims a network architecture, where lightweight information like text, pictures floats on the Internet, while heavy content such as videos are kept locally. Thus, for a school, a video is only downloaded once, and then available locally in the school. The Freemium model for access adopts Internet Lite, by having a free access to lightweight content, and a premium access to broadband.

This paper creates the base for a platform development based on Internet Lite, having a centralised knowledge portal and local representations.

Goal

The goal of the platform development is to create the architecture and a prototypical implementation. For simplicity reasons, the goal is subdivided into two phases. Phase 1 will create the distributed architecture for the Knowledge Portal, with a backend located centrally, and a local representation for all the heavy content in a village platform. Phase 2 addresses user involvement, making the local village platform a center for empowerment of the society. This includes a.o. the opportunity for users to upload content, and to communities to place their own information on the site.



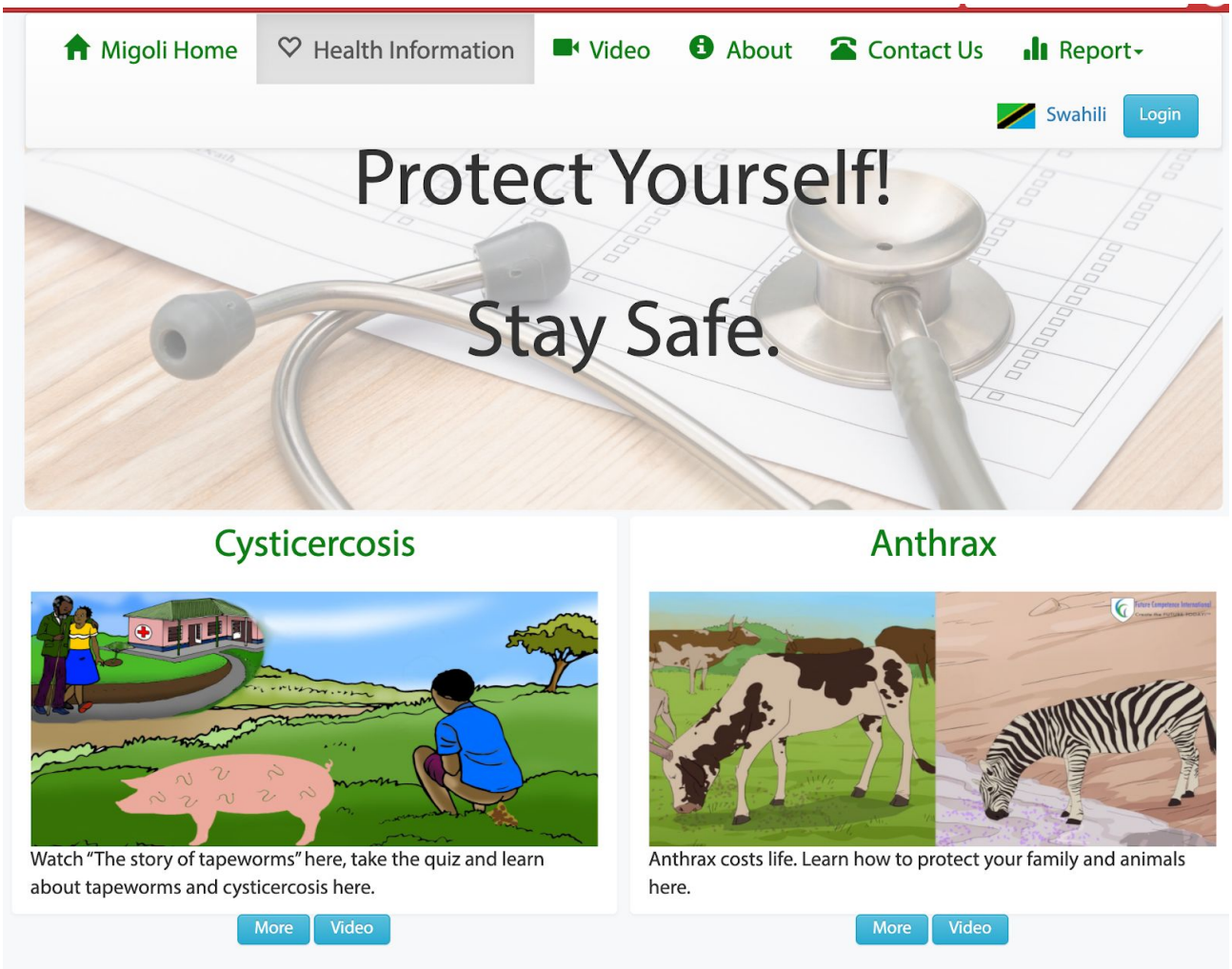
About the Knowledge Platform

The Knowledge Platform consists of two parts, the backend "cloud platform", and the local representation in the village, being typically a low-cost low-cost device, such as an embedded system as the Raspberry Pi.

The preferred solution is a backend cloud platform, providing a modular repository of Web sites and servers. These servers can either be centralised, or distributed. The content on the knowledge portal is provided separating the lightweight[4] components and the heavy content. In the local village/community server, there is a duplicate of the heavy content. Thus, when a user locally in the village accesses a web page from the Knowledge Portal, only the lightweight part is transmitted, the heave parts are streamed from the local Raspberry Pi. - *%see questions and answers at the end of this paper*

The **usage scenario** is as follows: A user in the village will have free access to the knowledge portal, and has a seamless experience in accessing the content on the portal. Our local hot-spots might also be a copy of the Colibri content spread through a P2P. Read more about the use case at: https://learningequality.org/kolibri/

A potential implementation might represent the heavy content through an URL instead of a local link. Then, given that URL is present locally, the video is taken from that URL. To be even more



specific, let's take the implementation of Yeboo.com for Digital Health content. This page has videos on Cysticercosis, Anthrax and other health videos, while the main web page is only text and pictures.
The server implementation might be structured as follows:

[4] In the long run, we'd like to establish the InfoInternet Standard, defining lightweight content types, e.g. text and pictures, and lightweight protocols, e.g. AMP. The regulatory framework can then address the free access to information as free access to all Web sites following the InfoInternet Standard.

Health package
/ .... basic information, set of java scripts, AMP format
/ ... figures
/ Yeboo.com/Cysti/Video#1 % containing the Cystinet video

When Yeboo.com/Cysti/Video#1 is present on the local Raspberry Pi, then the content is streamed locally.

Given the years of experiences with proxies, light-weight Web solutions, and others, there are certainly other ways of resolving the issue of distributed storage.

Phase 2 - User involvement

User involvement is planned for phase 2, and will hand the complete platform over to the local users. They can implement their own web server, upload their own content, and let the platform become a knowledge platform for their local society.

Reason for the distribution and the local community involvement is the need for digital empowerment, as well as user and society engagement.

Upload to the local server might be performed in different ways:

- Direct upload to the SD card (Web server establishment)
- Bluetooth upload (e.g. Bluetooth & OPP server installation[5] on RPI)
- Kolibri learning platform

...

Involvement:

- Joseph Bishi
- Hamed Arshad,
- Iñaki Garitano
- Maghsoud Morshedi
- Barack Otieno
- Antonio Javier Rodriguez Ceberio
- Ghislain Maurice Isabwe
- Josephine Miliza (will also confirm with folks from bosco, cyd and other CNs)
-
- .... (add names and invite)

Suggestion by Antton: static web sites, low-tech - https://solar.lowtechmagazine.com/about.html
Comments by Maghsoud:
From technical aspects, following questions come to my mind before implementation planning:
Q1: Will you **cache the whole knowledge portal** on the RPi or only videos? If the text and pictures will be downloaded from central server on the Internet for every request then what will be the amount of transferred bytes per user request and what is the estimated number of request per day or weekly?

[5] Bluetooth and OPP server installation on RPI: sudo apt-get install bluetooth bluez blueman

A1: focus is on syncing the “heavy parts”, not all the web pages. In fact, I would suggest that development of the web follows either static sites or AMP (or other) lightweight standards. Regarding the amount of transferred bytes per user request, it will be around 100-300 kB (AMP page size)

Q2: How the local server will be updated? (will be a Internet based online synchronization mechanism to synchronize knowledge portal on all the RPis with central server or any offline synchronization like visiting each site to update RPi). what is the estimated size of content changes and time intervals for knowledge portal as well as cost of the Internet and site visits for update?

A2: My expectation is that the local RPi selects from a list of sites which content should be pre-loaded, e.g. [x] education, [x] health, [x] governmental information, [ ] innovation
Sync can then be performed either by polling (not preferred) or by update on request, e.g. when content is update on the cloud/portal, then it will be downloaded once. Reason is that videos are normally “never” updated, but web pages are frequently updated.

Q3:- Does the user contribution to the portal will be synchronized with central server and other RPis?

- A3: Only on the local portal. Through having an “autonomous” local portal, we achieve that a) no sync needed, b) importance for local community, c) no responsibility (it’s the local community that decides)

Q4: how do you want to establish a repository of AMP pages/sites?

A4: Asking Google for help - I don’t know how the mechanisms work, see from Google crawl that they first reference to BasicInternet.org/?amp before requesting content for BasicInternet.org. - But as I said, I don’t have an idea what is best

Qx: ...?

Ax: ....

Qx: ...?

Ax: ....

Qx: ...?

Ax: ....