Reflections on ICT projects in rural areas from the Meraka Institute – South Africa

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Problem space of Africa

Target: 450M rural unconnected Africans

Fixed line teledensity: concentrated in main cities

- Excluding North & South Africa:
  - Teledensity < 13%
  - Most lines in main city
- Dramatic decline in fixed lines
- Worst world connectivity
- NCPAD efforts to improve situation
- Better infra & inter-connectivity could help
- Challenges:
  - How to distribute to rural/sparse population?
  - Wireless cell towers are hope!

Very high poverty: living on < $2/day (PPP)

Very high adult illiteracy! Thus, broadband.
Community-built philosophy

• Self-help Community Networks
  – Balance De-skilling technology and up-skilling local entrepreneurs (still want local innovation)
  – Local installation, operation, maintenance and support
  – Local innovation, e.g. local “manufacturing” of a can antenna

• Freedom of the airwaves
  – Using un-licensed frequencies
  – Policy in many countries prevents self-provision of infrastructure or charges very high license fees
Community-built philosophy

- Wireless mesh network technology
  - Auto-configuring and self-healing networks
  - Infrastructure with lower capital investment barriers
  - Lower power consumption and possibility to run technology off renewable energy sources

- (New) business models
  - Models where the revenues are contained within a village, or new revenue flows into the village - local village telco
Peebles valley mesh network – South Africa
Peebles valley mesh

• 15 km from nearest town
• Funded by IDRC to explore rural mesh
• 9 nodes deployed over an area of 15 square kilometres
• Internet - 2GB capped VSAT link – used spare capacity
• VoIP between clinic and hospice to save $400 per month
• Very limited ICT skill base in the area
• All initial skills to build network came from outside
Peebles valley mesh connectivity
Peebles valley mesh-observations

- Instant messaging vital link between skilled and unskilled
- Connectivity helped people to find jobs
- Installing Linux reduced maintenance burden – no viruses
- Users unplug mesh nodes when not used
- VoIP for doctors not used because phone not private
- Connected school computer lab failed
  - lab locked after school hours
  - no local champion.
- Very susceptible to email hoaxes and spam
Peebles valley mesh - challenges

- Network built and planned by outside skilled specialists
  - hand over to local champion has been challenging

- When locals are skilled they usually move to cities
  - Well-paid jobs
  - Prefer modern lifestyle

- Operating this kind of network can be illegal
  - Often a grey area – policy needs interpretation
  - Businesses are scared of breaking law

- Internet supplied by VSAT is too expensive
  - Rural networks have to be bridged back to cities where Internet is cheaper

- Limited available free bandwidth difficult to manage
Macha Linknet - Zambia
Macha Linknet

- 75km from nearest town and 350km from Capital city
- Linknet has provided Internet to Macha since 2004
- Cellular Operators saw no market in the area and didn’t install a mast until last year – Linknet created market.
- A mesh network was explored as an extension to network after seeing the Peebles mesh project
- Some good ICT skills base has been built but networking skills are limited
- Strong champion exists who is pushing the boundaries of what’s achievable in rural areas
Macha Linknet network
Macha Linknet – observations

- Internet has been pre-requisite for development
- Connectivity helped local farmer have cash crop
  - researching sunflower farming on the Internet
- Brought extra employment opportunities
  - Employed by capturing data from 700,000 documents for a USA-based company
- Improved HIV care
  - deployment of online health management systems
- Local champion very active in growing and improving the local ICT services
- Distance learning possible at some Universities
  - Locals can stay in a rural area but still be educated through good distance learning Universities
Macha Linknet – challenges

• The environment is very harsh on electronic equipment
  – Power supplies fail due to voltage spikes
  – High temperatures and dust shorten the life of sensitive electronics

• Internet bill for Macha is $1700 per month

• Email spam entering mail server in Macha wastes precious bandwidth

• Managing bandwidth of users difficult
  – there have been some download abuses – problem is solved by confronting people
Future ideas

- WISP in a box
  - Lower the skill entry level for a local entrepreneur to set up an Internet Cafe or be a gateway provider
Conclusions for rural connectivity

- Need to find the balance point between de-skilling technology and up-skilling local entrepreneurs.
- A local champion is paramount – getting involved in these sort of projects is going to take caring and dedication.
- Social networking is a great tool for assisting users in rural networks – adopt an African ICT entrepreneur!
- Everything needs to be done to minimize expensive bandwidth usage – install local content like Wikipedia, strip mail overseas, make use of proxies.
- Keep lobbying policy makers to allow free infrastructure provisioning especially in areas where operators are scared to tread.
**Questions – rural wireless**

- What is the spark of local innovation
  - Inward out or Outward in
  - Which has a higher chance of success

- What degree of freedom is necessary for innovation (Lawrence Lessig)?

- Can the economic activity from community built infrastructure in poor/rural areas outgrow that of infrastructure built by large corporations or government
  - Will this persist or will it always be monopolized
  - How do you continue to keep economic activity local

- What are the key catalysts to move a society to a knowledge based economy?

- Is the mechanical turk principle beneficial in the long term for connected rural areas?
Questions – Digital doorway

- Will the success of non-invasive education be universal
  - Across which age group?
- How do children peer learn?
- Why the male dominance?
- Guided learning vs unguided learning
  - When is this good/bad?
Questions – Digital doorway

- Surprising results in most popular application - how much is peer influence how much is personal choice ... why do users like worm games?
  - 4479 gnibbles (worms)
  - 3919 xawtv webcam (see themself on webcam)
  - 3471 gmplayer Fun/Movies/Alien_Song.mpeg (movie)
  - 2855 tuxmath (maths shooter game)
  - 2345 ktron (worms)
  - 2290 tuxpaint (paint program)
  - 1868 gcompris (education suite)
  - 1843 ktuberling (potato man)
  - 1463 Mindset (school curiculum)
Web sites with more info

- http://wirelessafrica.meraka.org.za
- http://www.fmfi.org.za
- http://linknet.zm
- http://www.digitaldoorway.org.za