

# Technology Options for Sustainable Rural e-kiosks using India as an example

ashok jhunjunwala  
ashok@tenet.res.in

The views expressed in this paper are the views of the author and do not necessarily reflect the views or policies of the Asian Development Bank Institute (ADBI), the Asian Development Bank (ADB), or its Board of Directors, or the governments they represent. ADBI does not guarantee the accuracy of the data included in this paper and **accepts no responsibility for any consequences of their use**. Terminology used may not necessarily be consistent with ADB official terms.

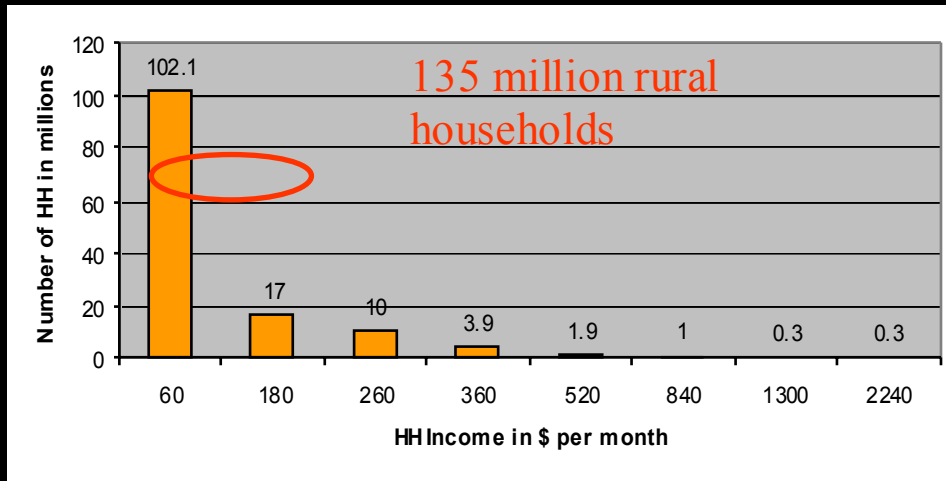
- How can they stand up and be counted?
- How will they get access to resources, health and education?
- How will they be able to compete?
- How will they bridge the distance with their urban counterparts or those in the developed world?

# Rural India has 700 million people

- in 600,000+ villages

(about 1000 people per village with per-capita income of 40 cents per day)

- per capita GDP of \$200 per year



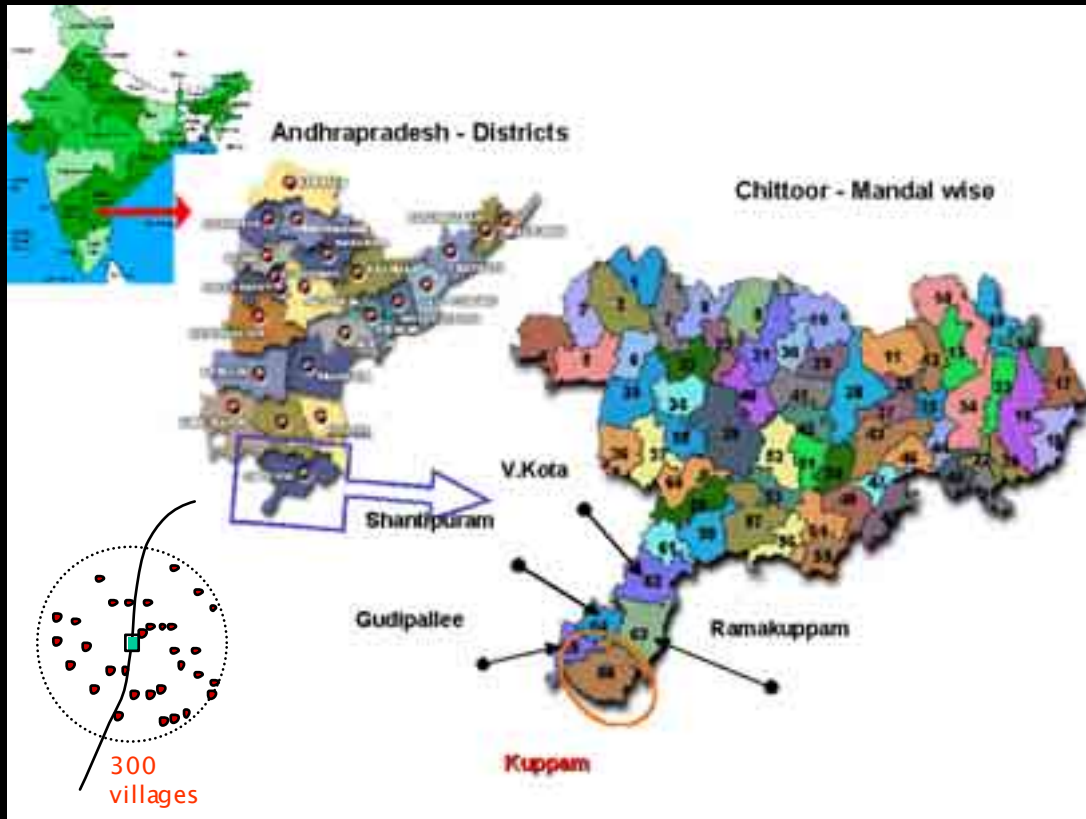
- Can technologies make a significant difference in lives of such people?

- Can it bring to them health & Education
- Can it significantly enhance their incomes?

# Can the Efforts Scale?

- Creating 100 or 1K or 10K kiosks make no impact to Indian Rural Areas
- To Scale one requires
  - Technology
  - Sustainable business model and
  - an Organization which thinks and acts Rural

# Technology

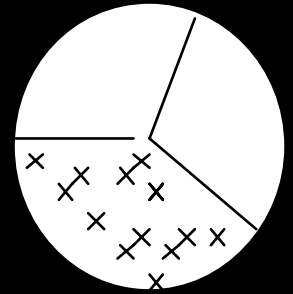


Wireless systems can connect most of these villages

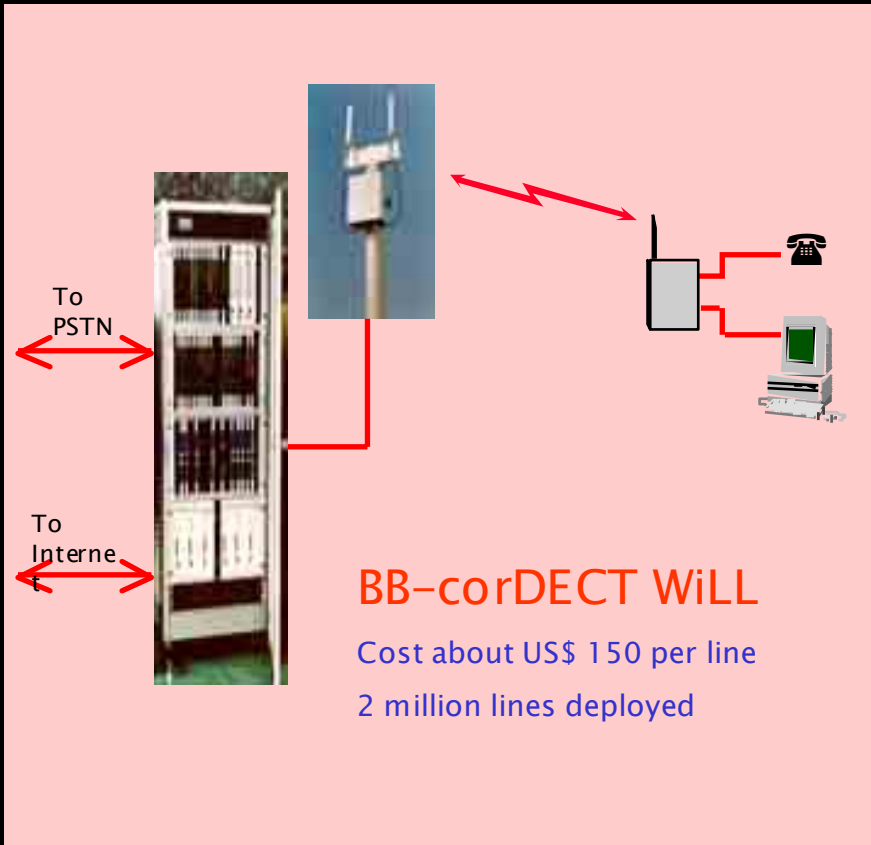
- Technologies are continually evolving
- Costs keep going down
- Bit rates keep increasing
- In India, fibre connectivity to most county towns (*talukas*) provided by State-owned incumbent
  - Fibre has capability for infinite bandwidth
- 85% of villages lie within 20 Km radius of *talukas*
  - Typically 300 villages in 30 Km radius

# Will today's wireless technology suffice?

- Mobile GSM and IS-95
  - Bit rates of 9.6 kbps : too low
- 2.5G Mobiles: GPRS / 3G-1X
  - 100 kbps shared connectivity in a sector
    - 100 villages in a sector share this
      - A few kbps per kiosks
- 3G mobile may give 500 kbps per sector
  - Still not enough
- Mobiles are great for handheld, not for kiosks



# Technology



- Jointly developed by the IIT Madras and Midas Communications
- Provides simultaneous voice & dedicated Internet connectivity of up to 100/200 Kbps for each user
- Always-ON Internet
- Enables a wide range of services suited for rural needs even at bandwidths of 64 Kbps

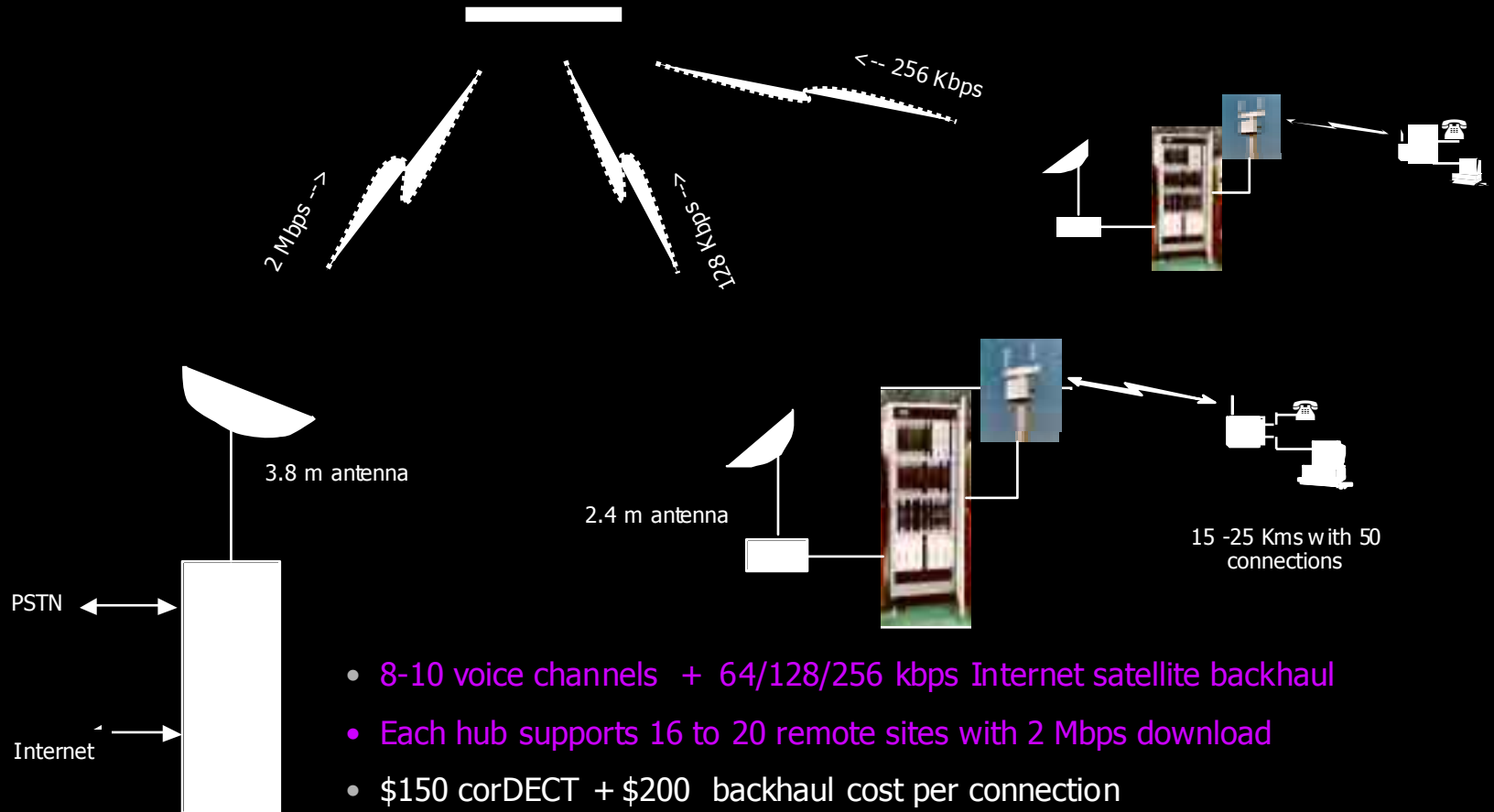
- Exchange and tower in town
  - up to 35 Km radius coverage
  - works at even 55°C
  - low power requirement (1 KW)
  - extremely low start-up costs

# Future Connectivity

- Connectivity requirement in each village
  - up to 1 Mbps dedicated connection to each village can be served by terrestrial wireless
    - OFDMA ... WiMax
      - Early WiMaX not cost-effective and not sufficient bit-rate
  - as need goes higher than 5 Mbps, fibre or point to point wireless (microwave) may be required
    - 7 to 10 years hence
- 15% Sparse Area villages will require special attention
  - double hop (satellite and terrestrial wireless) may serve most of these villages (99%)
  - direct satellite connection required in about 1% of villages

# Sparse Area Communications

where there is no fibre backbone



# Business Model:

## Use Local Entrepreneurs to drive ICT

- Entrepreneur-driven operator assisted telephone booths (STD PCOs) introduced in India in 1987
  - Today in urban areas:
    - 950,000 such PCOs covering every street of smallest town
    - generate 25 % of total telecom income
    - 300 million people use these PCOs
- Lesson for Rural:
  - To serve Rural people with incomes less than \$ 1 /day, aggregate demand and let Entrepreneurs drive it

Aid/ Grant does not scale

Successful Enterprises can scale to all villages

Aid / Charity does not scale

# Business Model

- n-Logue Communications: a Rural Service Provider
  - Gets an entrepreneur in every village to set up a kiosk
  - Enables setting up of the kiosk infrastructure
    - including multimedia PC with web camera, printer, power back-up, software, training, 6 months unlimited Internet at a cost of just US\$ 1000
  - Partners with the Government, NGOs, private enterprises, schools, hospitals to offer various services through the kiosk

# Local entrepreneur

- grade 10 graduate: need not have seen a computer
- effectively communicate and network in the community
- Provides telephony, Internet access and various services to the local community
- Channels information needs of community to application and content providers
- Needs to earn US\$ 75 pm providing
  - computer education, photography, DTP, typing, email, voice/video mail, e-Governance and other services

Application & Solution Providers

Internet Backbone

- Provides Training and Technical Support
- Handles Licensing and Policy issues
- Provides Internet Backbone Connectivity
- Enables Kiosk Services through Alliance Partners
- Creates Awareness



- Markets Connections
- Provides Onsite Support and Training
- Manages Local Web & Email Services
- Manages Local Content Pages

- School /PHC
- Private Business
- Government Office
- Rural NGO

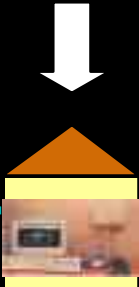
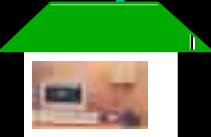


ACCESS CENTRE

Local Service Partner

Scope:  
 3000 sq km  
 400-600 connections  
 (1 in each village)

- Provides Internet Access to Local Community
- Provides Awareness and Training
- Channels Information needs of Community through LSP to AP



Internet Kiosk Operator

Financing



*Rural women taking language courses online*



*A District Collector conversing with people in several villages*



*Online consultation with experts at the City Agricultural College  
Cost of information - \$1  
Savings to farmer - \$5500*



*Veterinary care from a doctor in a far-away city*



*Basic medical advice in remote villages*

**Services offered at kiosks through multiparty video conferencing distance education, e-Governance, telemedicine, veterinary care, agricultural support etc.**

# Kiosk: Bouquet of Services (besides telephony)



- Learning typing, Computer education & E-learning
- Photography, entertainment and movies on CD
- DTP work, Email/voice & video mail
- e-Government
- Tele-medicine & Vet Care
- E-Agriculture
- Crafts
- IT based Services

Difficult to make kiosk economically viable with single service

e-Health through kiosks

# It Started with emails

- A potential epidemic of Chicken Pox in a remote village was halted by a simple email to the right people
- Instant response from the Government Doctors



# Eye Care

## The Problem

- India has more blind (9 million) than any other country
  - 80% blindness due to cataract: curable
- Screening Eye camp most common method of outreach

## Limitations

- held at best twice a year in the same place

## Objective

- To replace the Screening Eye Camp as a method of identifying Preventable Eye Diseases



Till recently Eye Ailments that could only be detected this way...

An Eye Camp conducted in a TN Village

# Remote Eye Care using Video-conferencing

- Allowing the patient and counsellor to interact





# Online Application in Local language

Address: <http://bluehill.infi.chi.ssg.com/Quest/admin/viewhistory.php?code=TNTH0007> Go Link

அரசினித்த கண் மருத்துவமனை வினாத்தாள்

Questionnaire Dates sent by Patients

[Personal Details](#)

[2004-04-26](#)

Personal Details:

பெயர்	S.Madhubala	வயது	32
இனம்	பெண்	கிராமம்	Karakudi

Questionnaire Sent Date : 2004-04-26  TOP

கண்களில் உள்ள குறை பற்றிய கிளக்கம்	unable to view Long Distance
எவ்வளவு நாட்களாக இந்த குறை உள்ளது?	10 years
எந்த கண்களில் வலி உள்ளது?	இரண்டு கண்களிலும்
உங்களுக்கு சர்க்கரை நோய் உள்ளதா?	இல்லை
உங்களுக்கு இரத்தக் கொதிப்பு உள்ளதா?	

# General Medicine followed

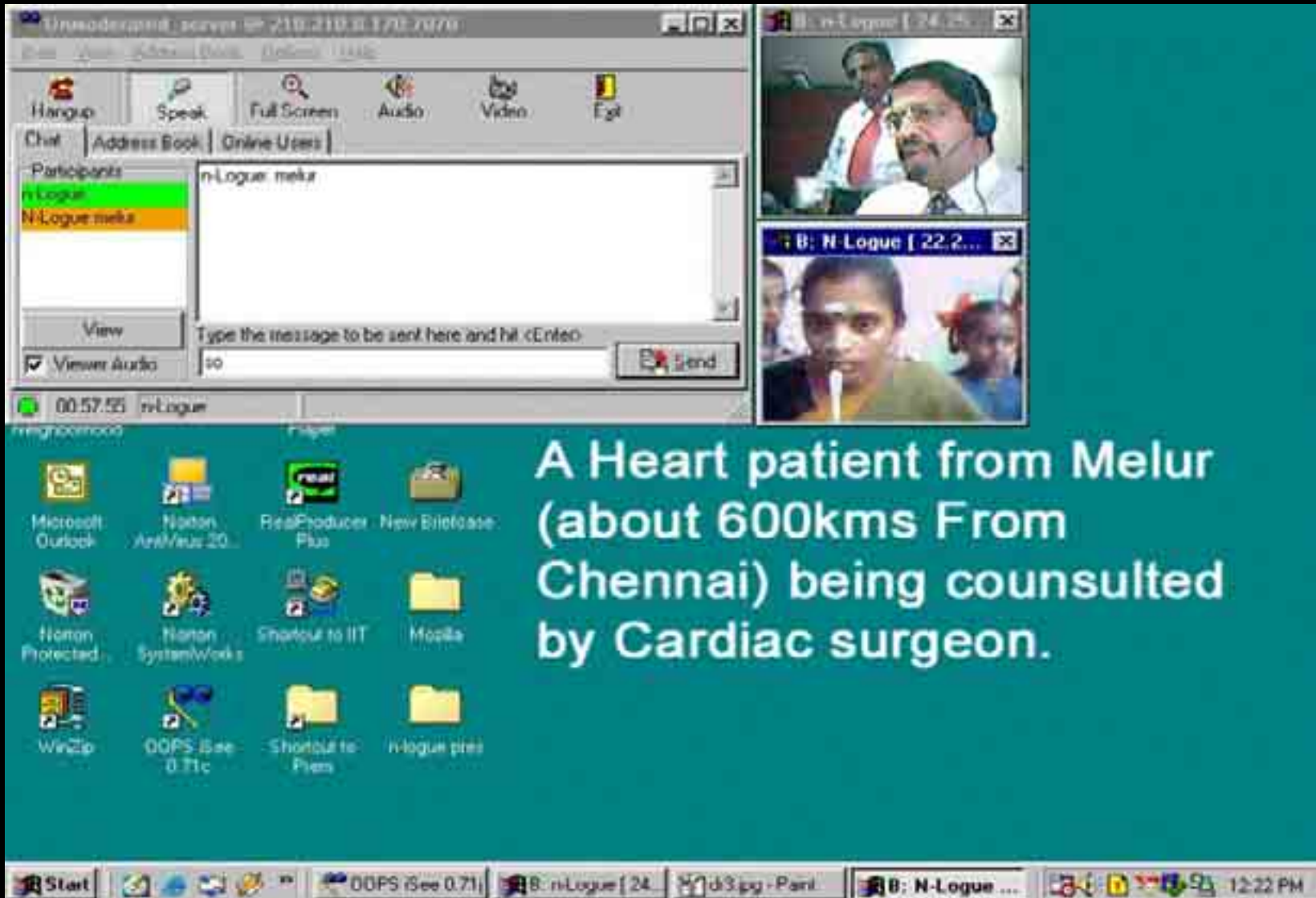
- Online consulting with local doctors
  - General Practitioners, Paediatricians and Gynaecologists)



# An Online Clinic – General Physician

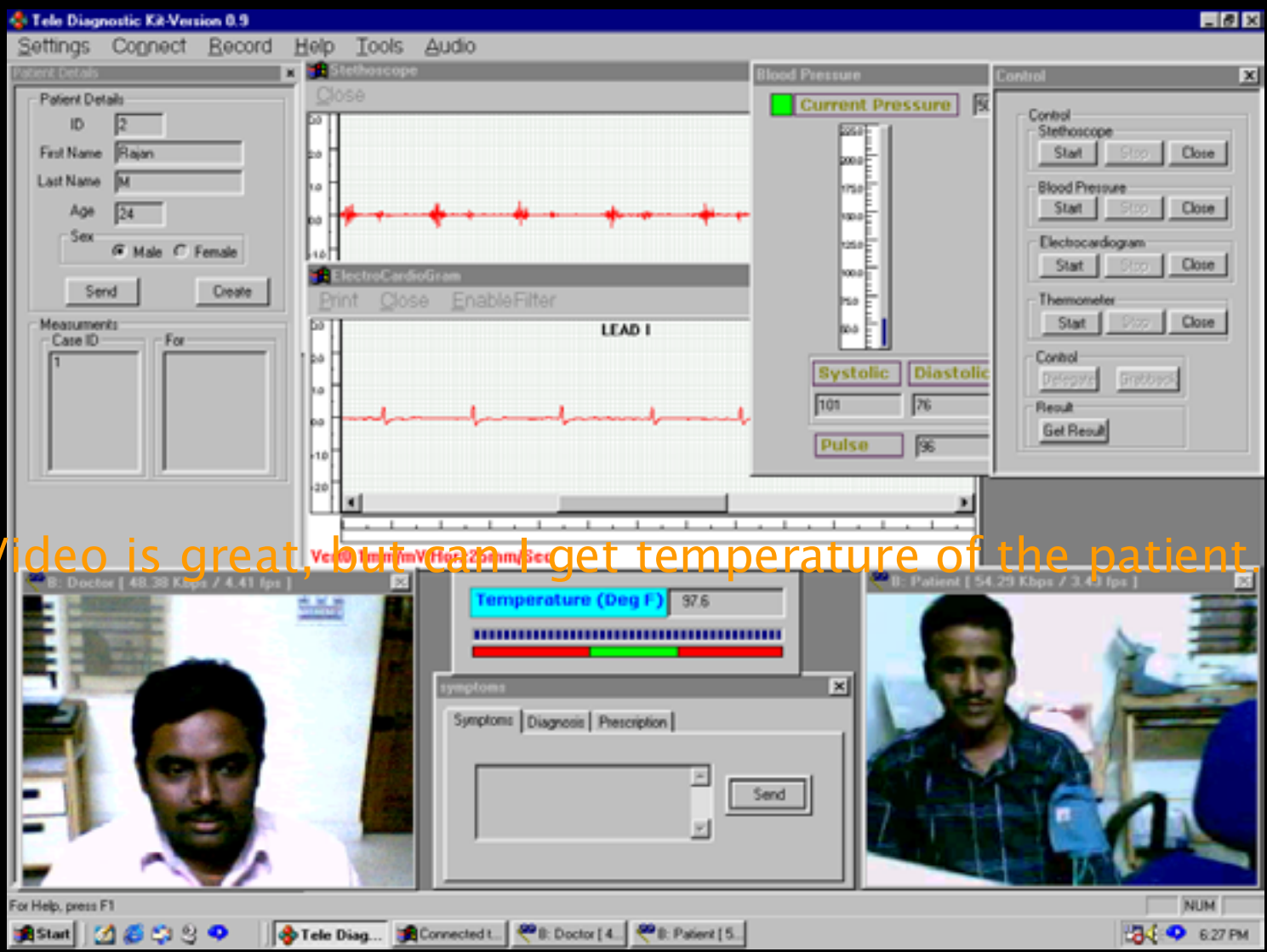


# Remote Cardiac care



The image displays a remote consultation interface. On the left, a window titled "Unreadersoft: server IP: 210.210.0.170:7070" shows a control panel with buttons for Hangup, Speak, Full Screen, Audio, Video, and Exit. Below this is a chat window with tabs for Chat, Address Book, and Online Users. The chat window lists participants: "n-Logue: melur" and "N-Logue: melur". A "View" button is visible. At the bottom of the chat window, there is a text input field with the text "so" and a "Send" button. The top right corner shows two video call windows. The top window is titled "B: n-Logue [ 24.25..." and shows a man wearing a headset. The bottom window is titled "B: N-Logue [ 22.2..." and shows a woman. The background is a Windows desktop with a teal background. The desktop has several icons: Microsoft Outlook, Norton AntiVirus 20..., RealProducer Plus, New Bitloase, Norton Protected, Norton SystemWorks, Shortcut to IIT, Mozilla, WinZip, OOFS (See 0.71c), Shortcut to Files, and n-Logue pres. The taskbar at the bottom shows the Start button, several open applications, and the system tray with the time 12:22 PM.

A Heart patient from Melur (about 600kms From Chennai) being counsulted by Cardiac surgeon.



Video is great, but can I get temperature of the patient...

Remote Medical diagnostic kit (ReMeDi) consisting of BP, temperature, ECG measurement & stethoscope at just US\$ 200

Education

# Customised ICT Courses for Various Age Groups – in Local Language



# Remote Teaching: Tutorials

## SECTION

Short Question  
Synonyms  
Antonyms  
Prefix & Suffix  
Passage  
Questions  
Phrases &  
Idioms  
Quotes from  
Memory  
Poetry I  
Poetry II  
Composition  
Rewrite  
Passage  
Dialogue

And as my fingers pressed it, still  
It moved and yielded to my will.

This is from the poem "The Sculptor"

1. What does 'it' refer to ?

'It' refers to the plastic **clay**

2. Was the clay flexible ?

Yes, The clay was **flexible**

ers pressed it, still  
elded to my will.

poem "The Sculptor"

Quotes from  
Memory  
Poetry I  
Poetry II  
Composition  
Rewrite  
Passage  
Dialogue

1. What does 'it' refer to ?

'It' refers to the plastic **களிமண்**

2. Was the clay flexible ?

Yes, The clay was **flexible**

TeNeT Online Science Question Bank

**Correct**

Diagram: PART-I Choose Filter PART-II Start Question PART-III Long Questions Logout

Chlorine gas

Water Chloride solution

Laboratory Preparation of Chlorine

$$\text{MnO}_2 + 4\text{HCl} \rightarrow \text{MnCl}_2 + 2\text{H}_2\text{O} + \text{Cl}_2$$

Equation:  $\text{MnO}_2 + 4\text{HCl} \rightarrow$

Red color text indicates the Incorrect answer  
Green color text indicates the correct answer  
Important Points

- Diluted hydrochloric
- M
- Co
- U
- H

# Science – Long Question B

# Math – Long Question

TeNeT Online Mathematics Question Bank

**Correct**

PART-I Choose Filter Start Question PART-III Long Questions Part-VI Logout

1 Find the 15<sup>th</sup> term in an A.P, whose 10<sup>th</sup> is 35 and 25<sup>th</sup> term is 80

**Answer**

In an A.P,  $t_{10} = 35$   
 $t_{20} = 80$   
 $t_{15} = ?$

$$a + 80d = 24$$

$$a + 9d = 35$$

$$15d = 45$$

$\therefore d =$

$a + 9 \cdot 3 =$

$15d = 45$

TeNeT Online

Wipro

Social Science Question Bank


Level - 10 Chapter 5: Map Work Unit - 10 Social Questions Unit - 10 Long Questions

A →

B →

C →





D →



# Social – Map Question

Wordsplit Unit-II


## My Family

Fa + ther		Father
Sis + ter		Sister
Bro + ther		Brother
Un + cle		Uncle

# Spoken English – Word Split

Select Slide Show:  
 earth << < > >>

- Solar System
- Force of Gravitation.
- Formation of Earth
- Formation of Moon.
- Effect of Cooling.
- **How oceans and rivers were formed.**




Moderated\_server @ 144.16.244.2-7072

File View Address Book Options Help

Chat | Address Book | Online Users

Participants  
 Anitha  
 Moderator

Moderator: Good Morning Students  
 Moderator: Today we are going to see about long questions  
 Anitha: Ma'm I have a question

Type the message to be sent here and hit <Enter>

Send

Photography

# Digital Studio – Low cost Photography



**ID cards**



**Passport  
Photographs**

E-government

# E-government services at a Village



**VILLAGE KIOSK**

Net Banking

- Payment of
  - Municipal taxes
  - Electricity Bills
  - Bus Tickets
  - Purchase of Seeds / Fertilisers
  - Entrance and Exam Fees

From Central Website

- Distribution of Application Forms
- Information from Online Databases like
  - BPL lists
  - Electoral Lists, etc

Physical Dispersal

- Dispersal of
  - PDS coupons
  - Application forms for exams, etc

Information Dissemination

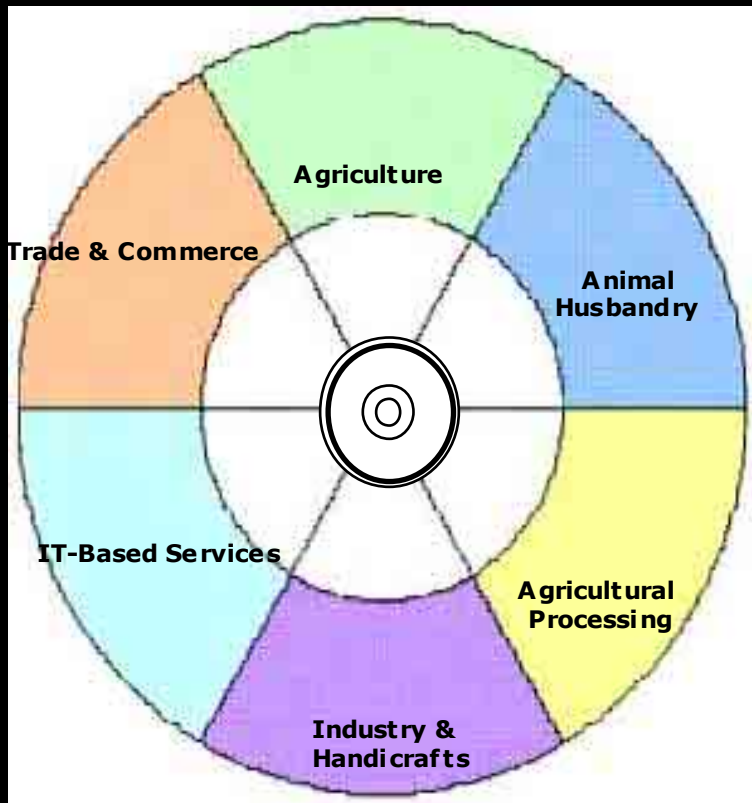
- Text, Audio, Video formats of various Government / Public service Announcements
- Video-conferencing between Collector and villagers
- Physical Notice Board outside Kiosk on which Govt. Notices can be pasted

# Web-Durbar: DM talks to multiple villages on video-conferencing



Livelihood

# Rural Micro-Enterprises are the Wealth Creators



- Micro-enterprises need
  - Finance
  - Knowledge, Training & Support
    - Quality control, packaging
  - Buying, Selling & Logistics
  - Risk Sharing
- Can Communications Enable these ?



# Crafts can be a big revenue earner

- Produce made using Local Material
  - Provided quality is maintained
    - and packaging is the key
- Packaging Material Rural Industry

Item Code: J75/001



# Eco-cycle of production, distribution and Sales, coupled with Quality Control and packaging

- Purchase orders
- Market intelligence
- Training
- Cash

**Entrepreneur/ Purchaser Officer/  
Export Agent**

**Village Community**

**LSP/Kiosk Operator  
/n-Logue**

- Raw Material
- Production
- Maintain production records
- Quality control
- Packaging
- Transport to collection centre

## Value Proposition to buyer:

- Authentic production source
- Compile and monitor production
- Provide info flow
- Maintain databases
- Design support
- Aggregation of supply

## Value Proposition to village

- Identify new markets
- Create, establish and maintain market relationships
- Provide info flow
- Maintain databases
- Aggregation of demand

# The Available Rural Skills – Can be directed to providing Urban Goods and Services



**Bag Weaving**



**2 Wheeler Repair**



**Nursing**



**Photography**



**Basket Making**



**Masonry**



**Sewing Machine Repair**



**Papad Making**



**Garland Weaving**

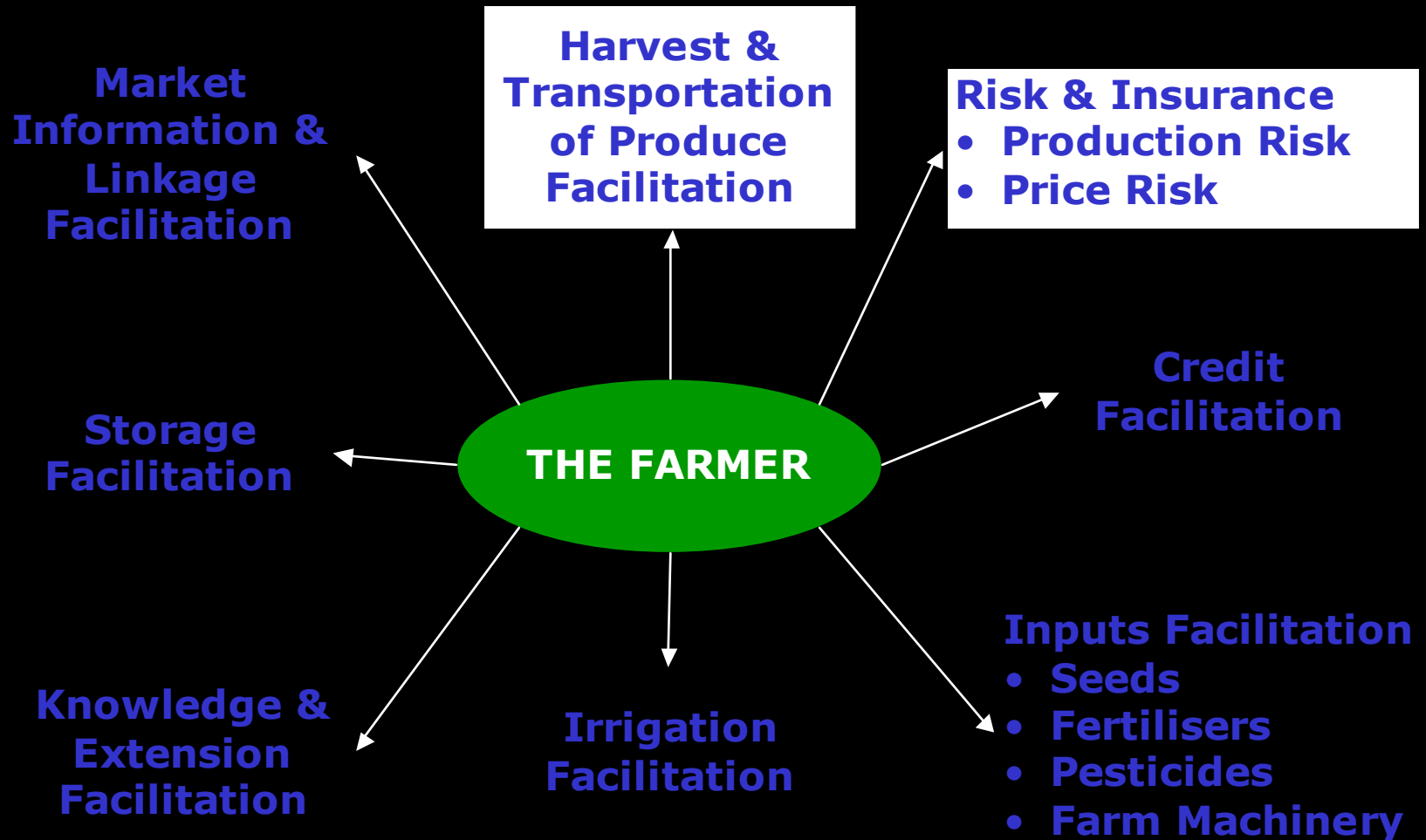
# And the skills can be enhanced

- Enabling Elements
  - Training & Development
  - Create new Skills and increase Knowledge
- Education and Training Centres
  - Impart distance education, with some contact programmes
- Knowledge Centres and Clearing Houses for all types of problems and questions
  - Offer expertise on a variety of subjects
- Information Dissemination Centres for
  - Best Practices
  - FAQs
  - Research and Development
  - Innovations

# Agriculture and Animal Husbandry

# Agriculture

## What Does The Farmer Need



# Saving Crops and Agri-consultancy

Department of Rural Extension, Madurai Agricultural College and Research Centre  
"Mosaic disease"



"Mosaic disease"

in Madurai, the Lady's Fing  
was turning white

Saving to farmer – \$3000



# Spot Prices from NCDEX



**NCDEX** Chiraag Commodity Prices in partnership with NCDEX

Spot Prices

Last Update : 05-Oct-2004 02:52:00 PM

விளைபொருள்	இடம்	விலை	அடிப்படை அளவு அலகு
கடுகு	ஜெய்ப்பூர்	393.7	20 கிலோ
தங்கம்	சாவதேசம்	6228	10 கிராம்
வெள்ளி	சாவதேசம்	10507	1 கிலோ
சோயா எண்ணெய்	இன்டோர்	433.6	10 கிலோ
கோதுமை	ஷஜகான்பூர்	749.85	100 கிலோ

Commodity Market Price Unit

Prices are automatically refreshed 4 times a day on all our Local Servers  
Similarly for Futures

# Agriculture Initiatives through kiosks

- **Agricultural Insurance**
  - With ICICI Lombard – Weather Insurance being tested
- **Irrigation**
  - Exploring partnerships with expertise in Micro-irrigation systems and Drip Irrigation systems
    - Kiosks help in after-sales services
    - Online Consultancy with experts from the National Agro Foundation on water conservancy
- **Seeds**
  - Online ordering for seeds
- **Soil Testing**
  - National Agro Foundation tests soil samples

# Family Data to Enable Loans

Family Head Name	A.P.Veeranan			
Address	6/ 4,,T.Ulagupitchanpatti,Thiruvathavoor,Melur,Madurai			
Total Land	None Acres			
Water Source(Agri)	None			
Water Source(Drink)	Water Tank			
<b>Residence Details</b>				
Residence type	Own Kaccha			
Bought by Loan	No			
Total Houses Own other than residence	House Type	Number Bought with Loan?		
	-	-		
Crops Grown	-			
Items Own	Item Name	Bought with Loan?		
	-	-		
Total Animals Own	Animal	Number	Vaccinated	Health Problem
	Cows	2	No	None
	Hens/ Chickens	4	No	Vella Erukku
	Sheep	above 12	No	None
Number of Relatives abroad	0			
Relationship				

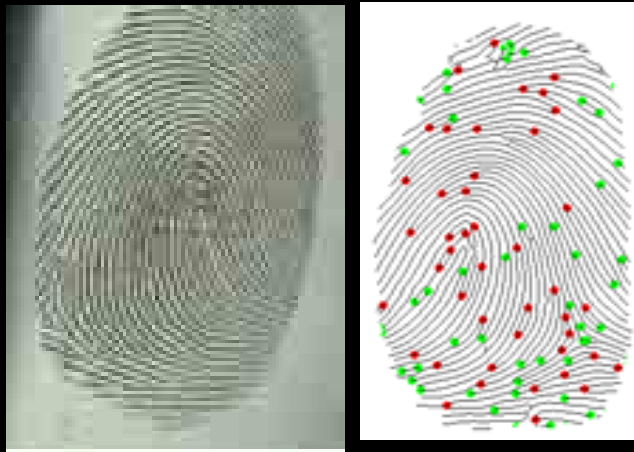


## Family Members

[A.P.Veeranan-Head](#)  
[V.Kanuppayi-Wife](#)  
[V.Thirumathi-Daughter](#)  
[V.Ranjith Kumar-Son](#)  
[V.Muthupandi-Son](#)

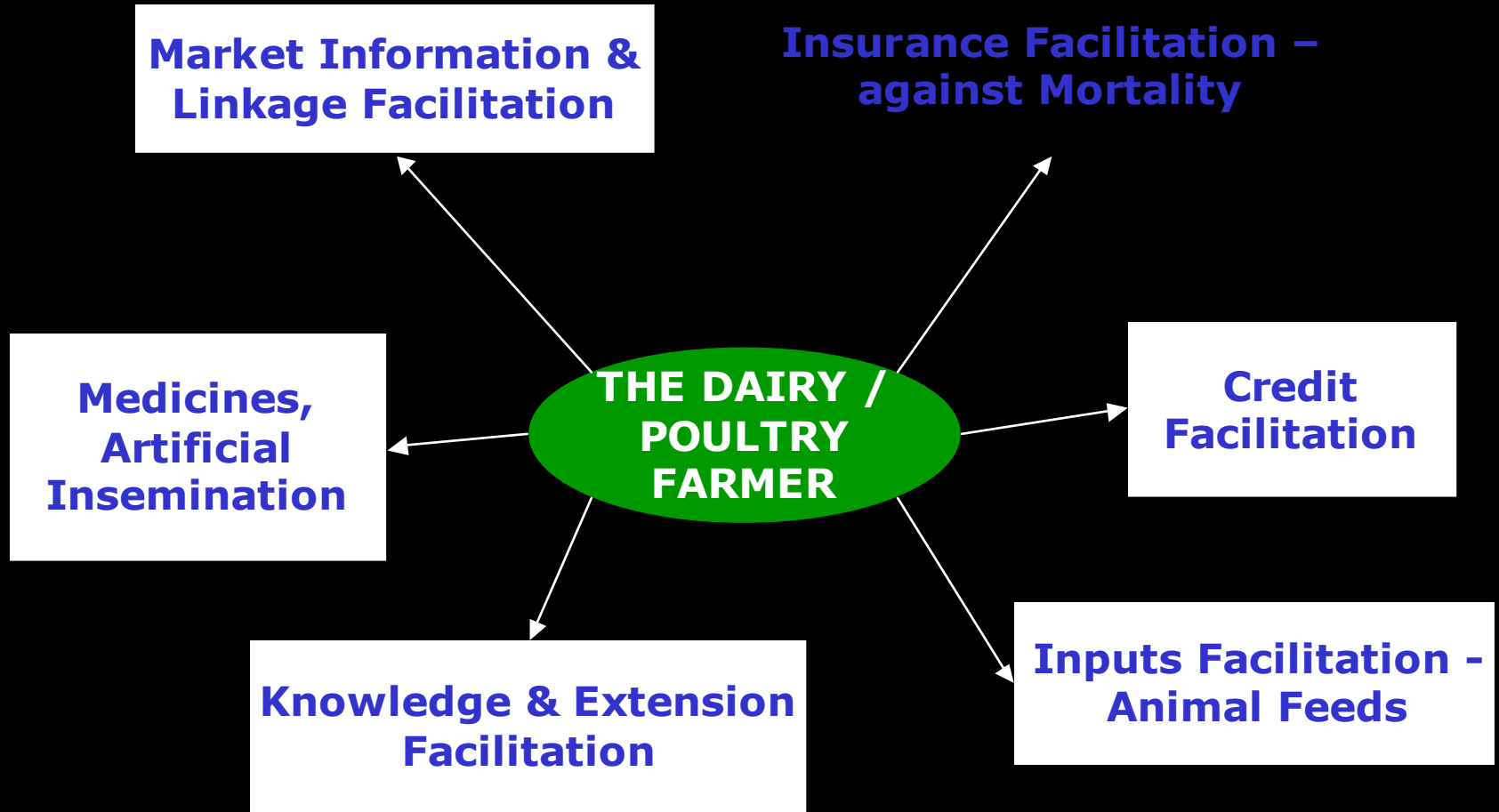
# Financial Services with ICICI Bank

- Rural low cost ATMs at kiosks
  - Works with PC and connectivity at kiosks
  - Uses finger print authentication
  - Works with soiled notes
  - Remote Electronic Safety lock
  - Breakthrough pricing at \$ 1000



# Animal Husbandry

## What Does The Farmer Need



# The Vet is on the Net ...



- This goat had a wound near its mouth and could not eat for a week
- The advice from the doctor cured its problem in 2 days

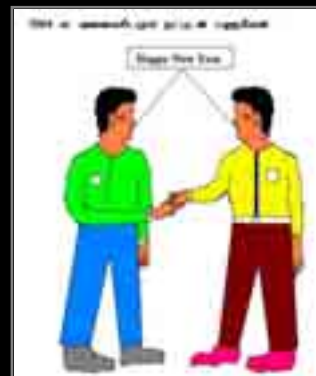
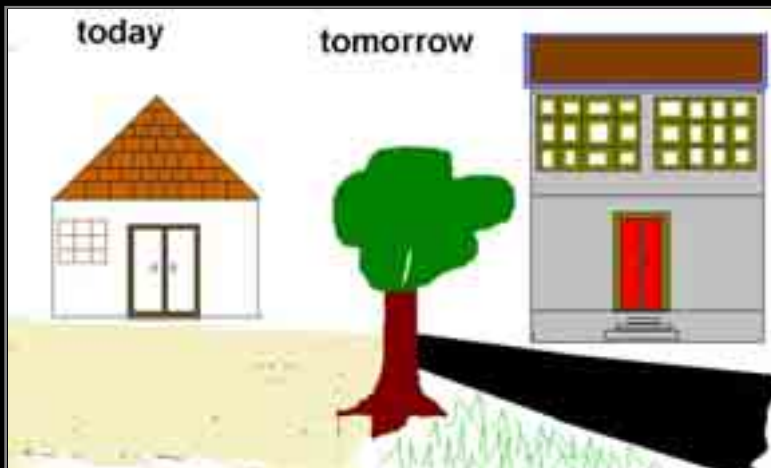


# IT Based Services

# IT Based Services for Urban Areas

- India has excelled in providing IT based services to the West
  - required computer, connectivity and skilled personnel
  - has earned money and respect for India
- With Computer, Connectivity and hard working persons who can be trained
  - Can Rural enterprises provide Services to Urban Areas?

# Rural Children create computer drawings for greeting cards



**All drawn on a PC**

# Others have picked up

- CAD / CAM skills
- Presentation / Power point skills
- Web Design skills
- Graphic Design skills

Can they be harnessed for IT based services?

# Dare to Dream

Current Rural GDP in India = \$ 150 Billion  
For a Population = 700 million people  
GDP / Person = \$ 200 per year



**DOUBLING per-capita Rural GDP**



**\$ 400 per person per year**

# Rural Areas can also be a large market

- With 700 million people, it can be a large internal market for goods and services
  - but Current incomes largely go for sustenance
    - Food, housing and education
  - Additional Income will be spent on goods & Services
    - India can create a extra \$ 150 Billion Market
      - A potential market for Indian as well as multinational products
  - Kiosks are already distributing
    - Indian Oil: 5 kg LPG cylinders, lubricants
    - TVS Motors: new / second hand motorcycles
    - Tafe: tractors and spare parts
    - Godavari fertilizers
    - HLL consumer products

TeNeT Group  
and 1200 engineers in 14 companies  
incubated by TeNeT behind these efforts

corDECT WiLL, ATM, ReMeDi, CK-Office, iSee, iKoN RAS,  
Minnow ISP, Bluebill, CygNet NMS



# To Sum Up

- Internet can empower Rural India
  - Education, Health Care
  - Livelihood
    - Agriculture, micro-enterprises
- Technology can impact lives provided there is a big enough vision behind it
  - Dreams of Doubling per-capita Rural GDP
- Large number of innovative technologies and applications need to be developed catering specifically to Rural areas