

Case study :

# **RWANDA**



## **PRACTICAL IMPLEMENTATION OF GROUP COMMUNICATION SYSTEM FOR LOCAL AND WIDE AREA NETWORK**

The case of :

Electronic Delivery of Agricultural Information to Rural  
Communities in Rwanda

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# 1. Introduction

*research project proposal*

*Today, most work activities can no longer be realized by an individual alone but they are handled in teams,*

*With www success, there is a need of using CSCW (Computer supported cooperative work).*

*Thus let's say, we can already find a great number of supporting applications used for cooperative work.*



# 1. Introduction

*Analyze and characterize :*

- 1. Communication behavior*
- 2. Amount of information that need to be exchanged*
- 3. Non availability of tools capable to handle the information*

*Agriculture  
sector*



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graph TD; A["Agriculture sector"] --> B["1. Communication behavior<br/>2. Amount of information that need to be exchanged<br/>3. Non availability of tools capable to handle the information"]; style B stroke-width:0px
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*Solution*

*Web integrated software for the support of  
GCS..... : E-RURAL COMMUNITY.*



## 2.Objectives, Scope, interest of the study

**Purpose :** To coordinate and manage information of different groups of peoples involved in agriculture sector in Rwanda.

### **Data :**

- Products
- Stock prices
- Weather report
- Early warning of pest disease
- Market information
- New technologies
- Agriculture policies
- Source of credits
- .....

E-Rural  
communities

### **Functions :**

- Authorization & administration
- User friendliness
- Explicit group structure
- Information exchanges
- Document management
- Two way e-mail discussion.
- Forum and Chat.....

# Objectives

- To analyze the requirements
- modelling the system so as to provide software specifications.
- Design a database and create interactive interfaces
- To implement client server architecture
- Provide a network technology base on wireless
- Load sample data and test the system.
- To implement the system ( farmers, local government, technical advisor, ministries, banks, Non government institutions.

# Scope of the study

- The delivery of agriculture information for the following type of data:
  - Agriculture products that fit to different lands in different regions.
  - Stock prices and product availability.
  - Weather report and early warning of pest diseases.



# Interests of the study

The software will enhance the efficiency of the day to day work.

The software will link farmers, customers, policy makers, and technical advisors for the facilities to access agriculture information using online web application.

# 3. Current situation of ICT in Rwanda

## Country info.



Pop: 8,128,553 (08/2002)

< 14 years old: 49%

< 20 years old: 60%

+/- 400,000 are orphans; +/- 20% of head their household

Male: 46%

Female: 54% (estimated 42% are widowed)

35% of all households are headed by women

# Country info.

- **Land Area** : 26,338 square kilometers
- **Location** : Between 1 & 3 deg. latitude south and 29 & 31deg. longitude east 75 miles from the Equator; 880 miles from the Indian Ocean; 1250 miles from the Atlantic Ocean
- **Altitude**: Most of the country lies above 1000 m, with half of it 1500 - 2000 m above sea level
- **Terrain**: Mostly grassy uplands and hills; relief is mountainous with altitude declining from west to east
- **Land use**: 47% cropland, 22% forest, 18% pasture, 13% other



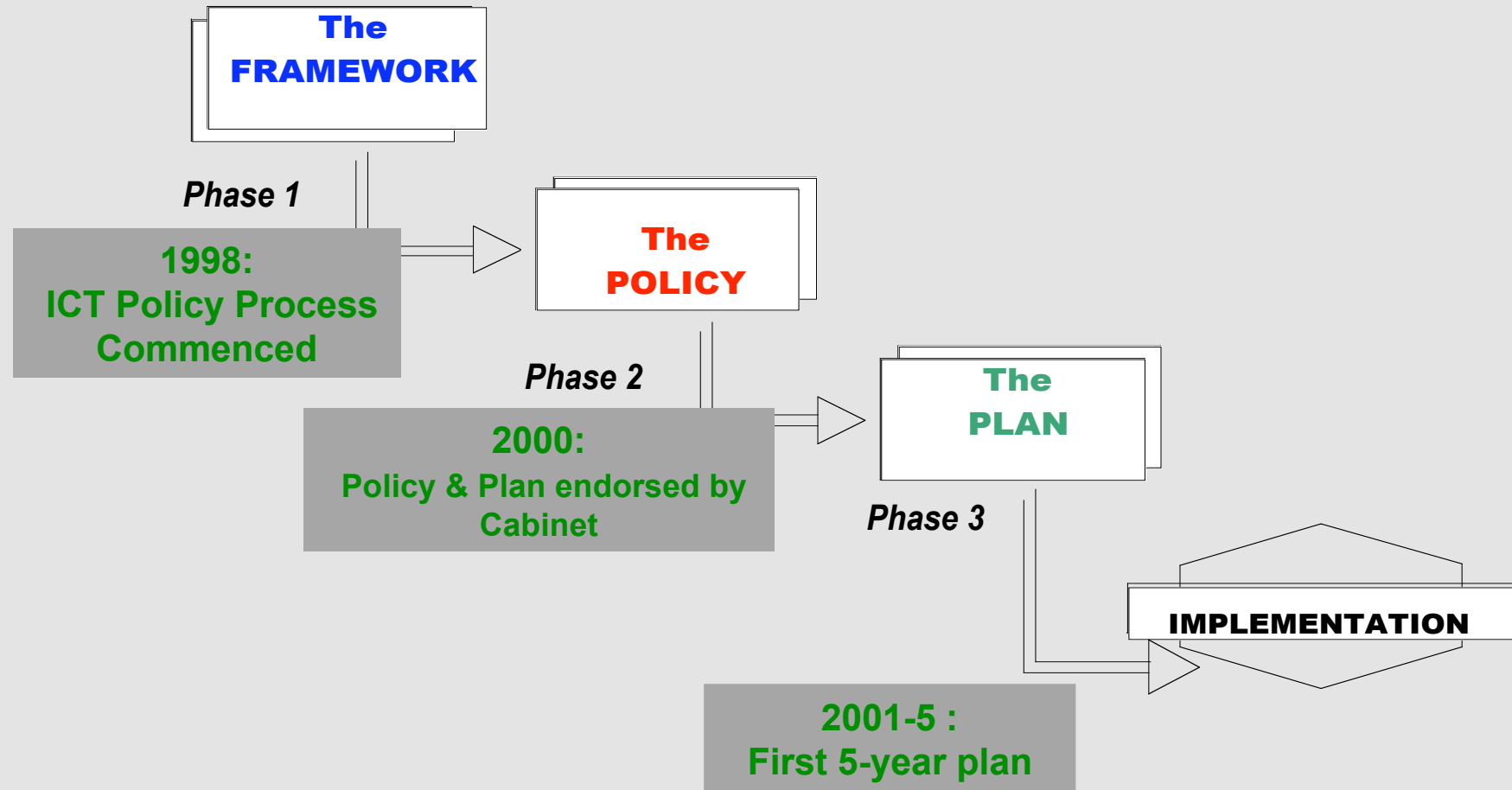
# Vision of Rwanda

Year 2020

In order to transform the **economy** to middle income, knowledge based economy.

By using **ICT** as the engine for this economic transformation

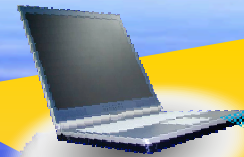
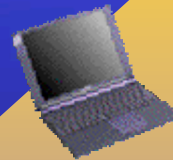
# Roadmap



# ICT infrastructures

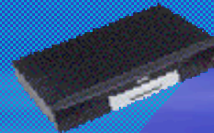
Responding to the  
challenges of  
technological  
convergence

**COMPUTING**



**Convergence**

**COMMUNICATIONS**





# ICT infrastructures

## Cellular Network Coverage :

- Covers 65% of the population
- Over 75% of Land
- 14 major cities
- 81 base stations in the entire country

## Fiber Network

Terracom is laying the Terracom Fiber network to create the fastest communications backbone in all of Africa

## PSTN :

-Rwandatel provides basic telephony & connectivity services

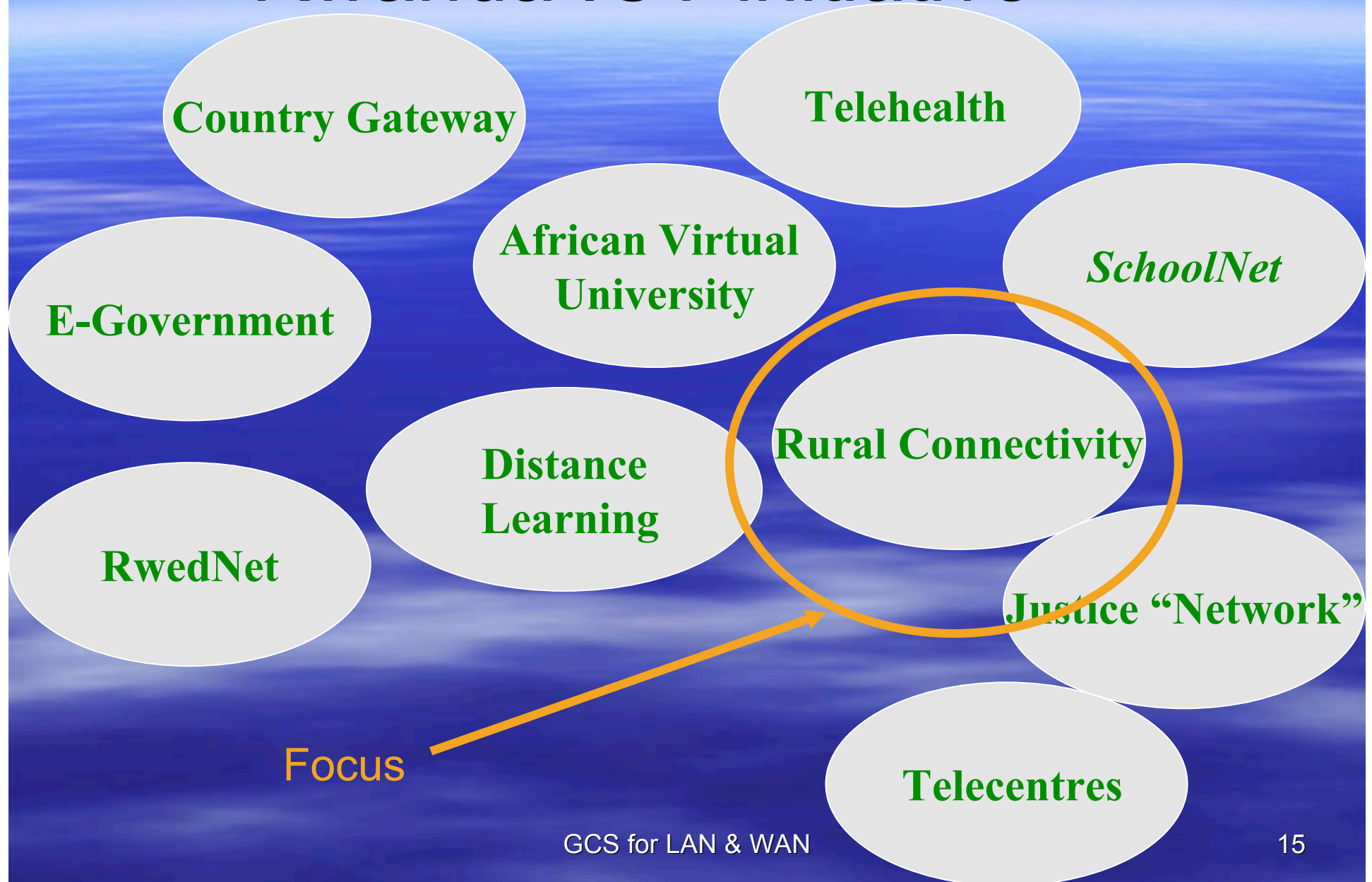
Leases some of its bandwidth to other ISP

## Other infrastructure in place:

- **Broadband wireless** access to schools  
Initially 300 planned( about 30 connected so far), will increase annually.
- **Community Wi-Fi hot spots**  
(Individual Initiatives)- Hotels,public places etc..

→ Making Rwanda a **hub** IT in Africa

# Rwanda ICT initiative





# PEARL PROJECT / N.U.R OUTREACH CENTER





# 4. Overview of group communication system

a toolbox for simplifying the construction of fault-tolerant distributed systems, and is based on the concepts of process group and virtual synchrony

Application

Atomic broadcast

View Synchrony

Membership

Network

Layer 3 : insures that all messages are delivered in the same order by all processes.

Layer 2 : provide semantics for the messages broadcast to current members.

Layer 1 : responsible for maintaining the membership of the groups.

*ISIS, Cornell University, late 1980's*

# 4. Overview of group communication system

Application

Recovery

Atomic broadcast

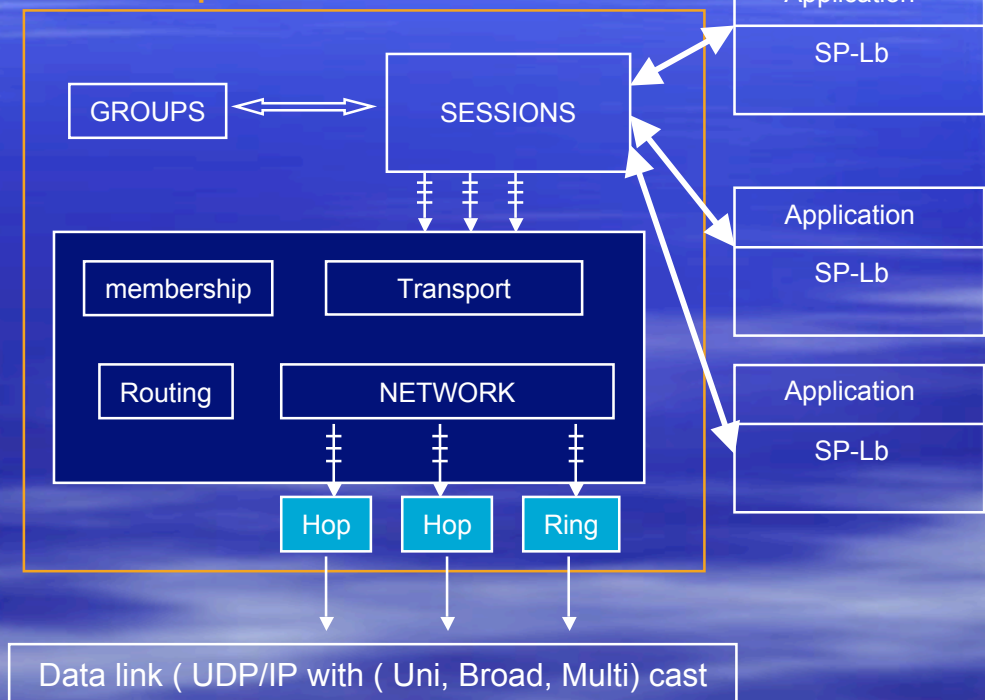
Membership

Network

TOTEM,

University of  
California

Spread Daemon



Spread

## 5. GCS paradigms (Definitions and types)

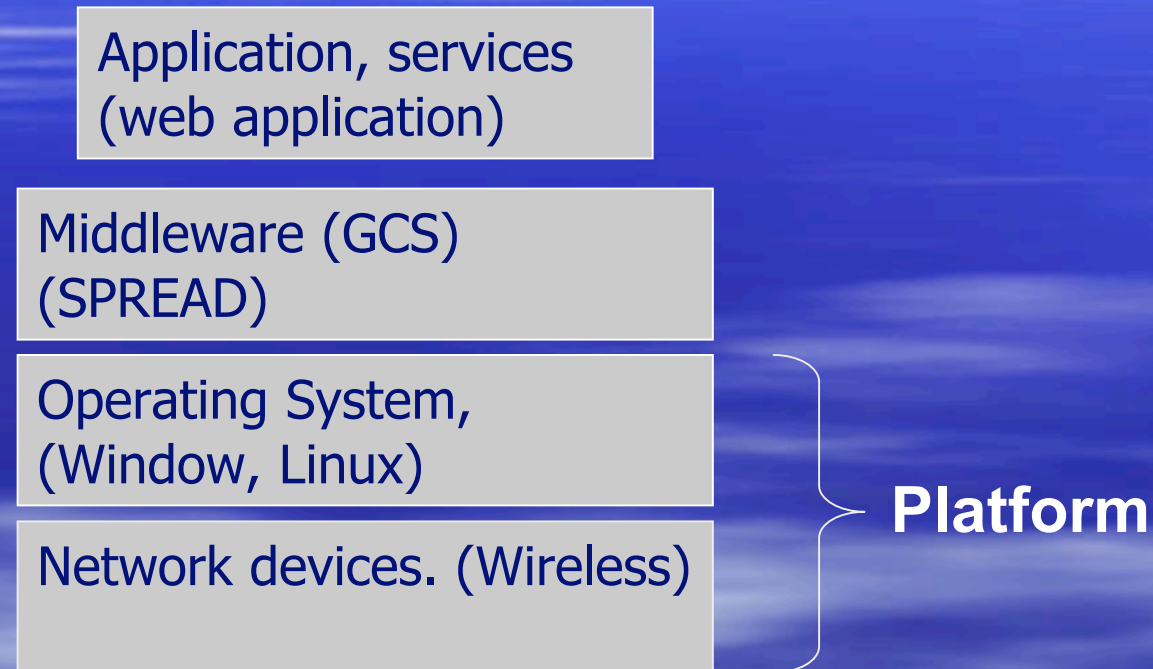
### a) Definition of group communication:

GCSs are arrangements where messages are sent simultaneously to multiple recipients, usually using IP-multicast Protocol. Security Requirements are mostly same as for the peer to peer Communications, encrypt messages using shared group key.

### b) Type of group communication

- One to multiple communication
- Multiple to Multiple communications.  
( this is the one that should be used for this case)

# 6. System architecture





## 7. Conclusion and preliminary recommendations

The goal achieved will help the success to ICT related projects such as e-government, e-health and so on. However the project needs the availability of materials as well as financial resources. Once the current research topic is accredited, the budget proposal shall be done for early deliverables such as Project planning.

- Government has to continue its support of ICTs
- International, local and private companies should be involved in ICT initiatives to contribute in rural area poverty reduction



**Thank you**