Sustainability Assessment of

TELEMEDICINE

Practice

By:

Mona Sharma

Centre for Product Design and Manufacturing

Date: 07th Dec' 07

OVERVIEW

- Introduction
- Technology
- Societal changes
- Sustainability in context of Telemedicine
- Structure
- System
- Simulation results
- Conclusion

INTRODUCTION

Defining Telemedicine

The delivery of healthcare services, where **distance is a critical factor**, by all healthcare professionals using **information and communication technologies** for the exchange of valid information for **diagnosis, treatment and prevention of disease and injuries,** all in the interests of advancing the health of individuals and their communities

- Definition by World Health Organization

INTRODUCTION ..

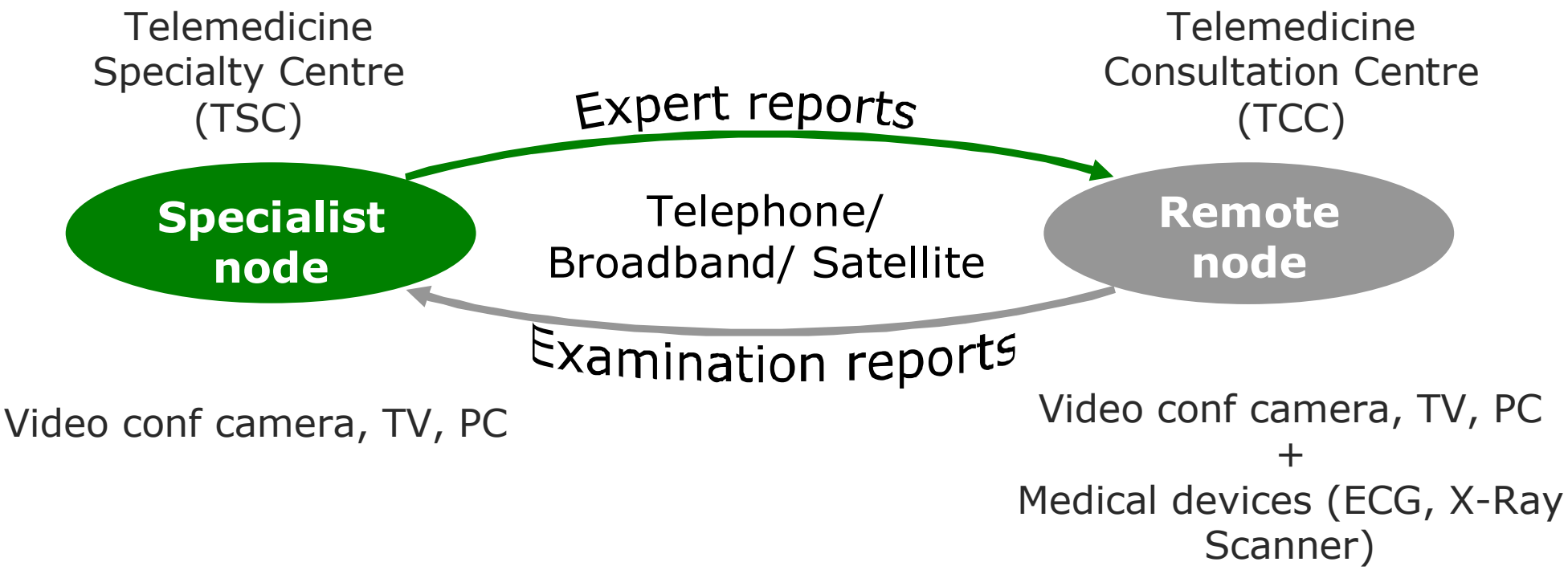
- Includes exchange of images, video, data, and voice services
- Bridging gap between geographically separated locations – *to exchange information*

Environments:

The locale of telemedicine delivery varies - rural, urban, academic, clinic, hospital, prison, nursing home, home care

INTRODUCTION ..

Layout



TECHNOLOGY

SYNCHRONOUS - services occur in real time

- Primarily include audio, interactive full motion video and still images
- Often used for interactive communication - live patient consultations, large group continuing education meetings
- Example: psychiatry, surgery, and emergency medicine

Systems used

Specialized telemedicine roll-about interactive video units, computer based desktop videoconferencing units, videophones

TECHNOLOGY ..

ASYNCHRONOUS – Store and forward

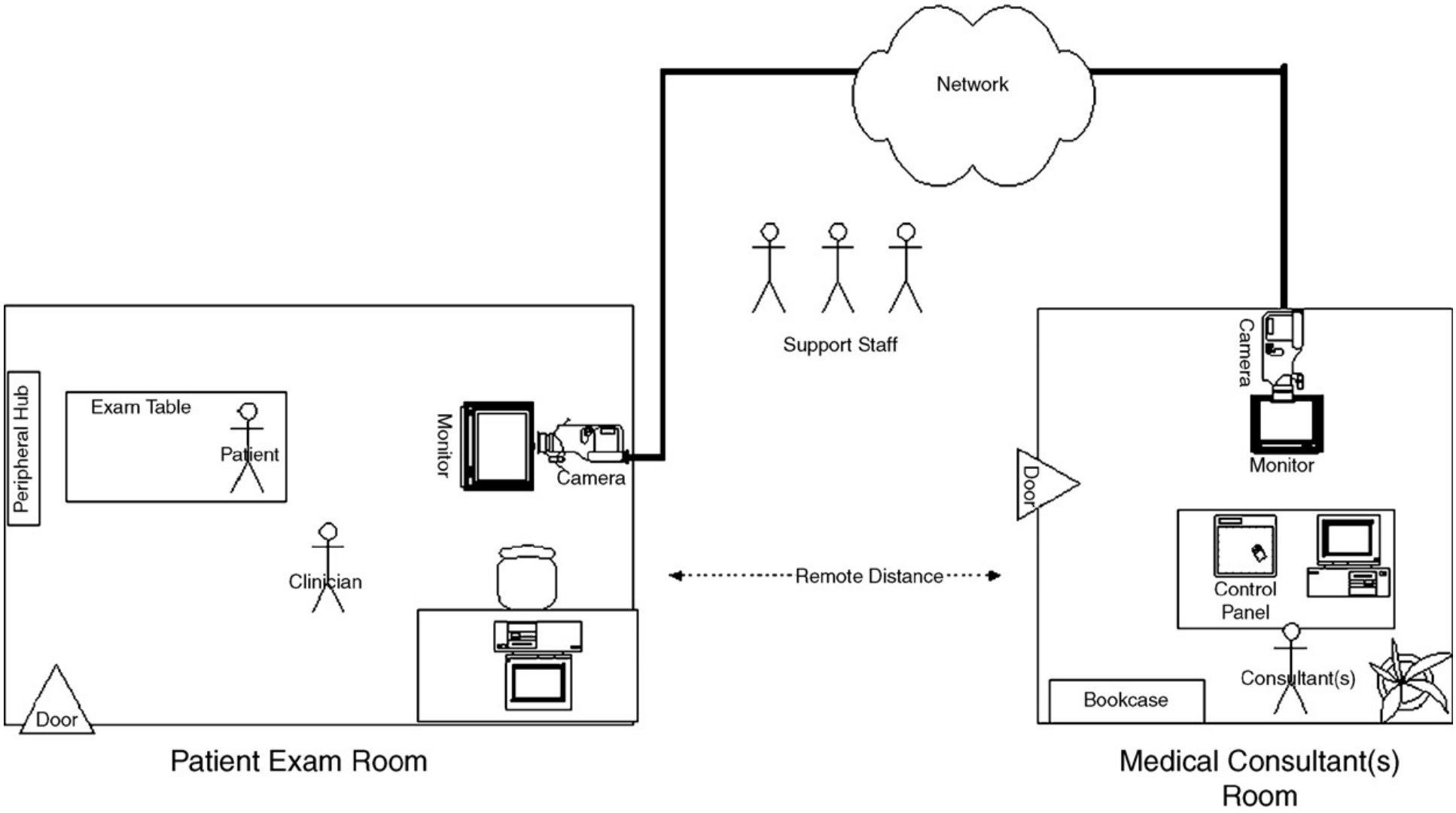
- Viewed at different times than the time of transmission
- Consist of still images, email, video clips
- Used for teleradiology or telepathology - patient does not need to be present for interactive communication
- Mostly PC based

Systems used

Film scanners, teleradiology systems, still image management systems, video microscopes etc

TECHNOLOGY ..

Medical Videoconferencing Layout



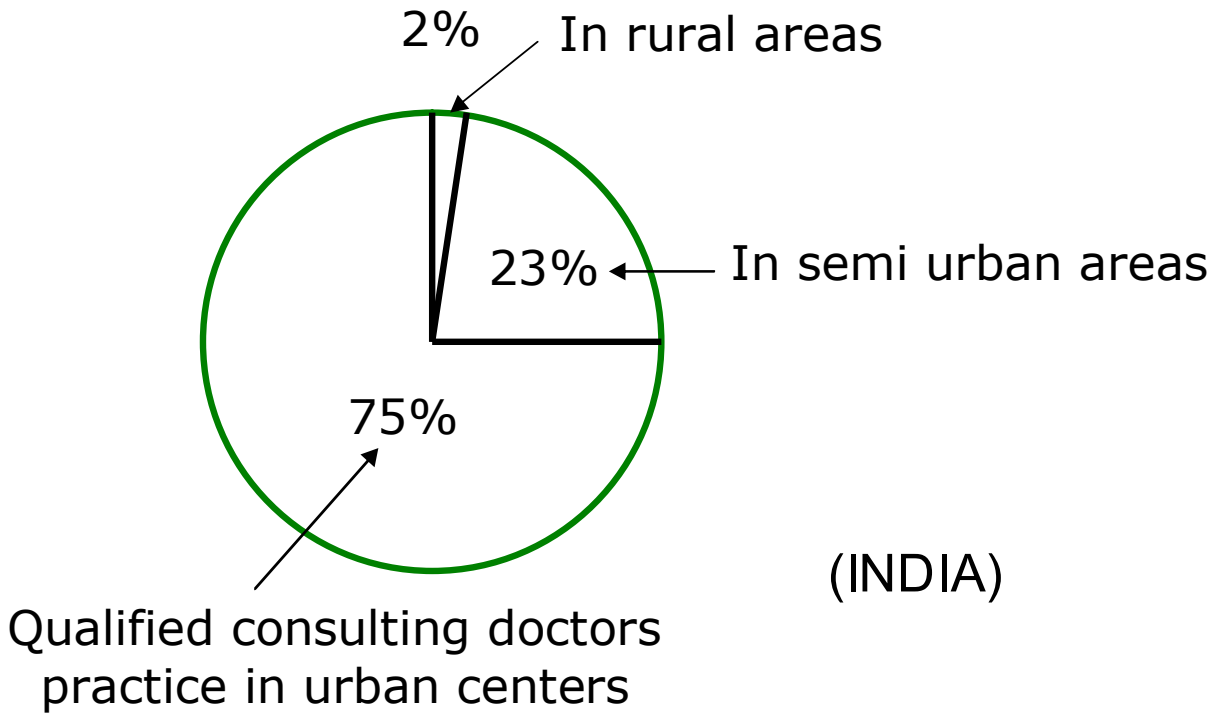
SOCIETAL CHANGES

Intended

- **Improved access** to health care - especially emergency medicine (cardiology and radiology two main areas)
- Access to expert opinion
- Reduction of health care costs
- No travel – lower cost + lower discomfort to patient and family
- Relatively low priced treatment – people from abroad come to India
- Promotes continuity of care without the cost and inconveniences of travel – follow up treatments

SOCIETAL CHANGES

Boon for developing countries



Benefits to:

The locale of telemedicine delivery varies - rural, urban, academic, clinic, hospital, prison, nursing home, home care

SOCIETAL CHANGES

- ***Some efforts***

IAF Command hospital *Bangalore* — Connected (ISRO EDUSAT) → Assam IAF hospital, Punjab IAF hospital — ***Oct '05***

Narayana Hridyalaya — AI passengers/ crew/ staff; Emergency care – heart attacks → Air India facility in Mumbai — ***Jan'06***

SOCIETAL CHANGES

Issues

- ***Accuracy of diagnosis*** - a central concern
- ***Medical ethics***: offering of opinions only when possessing necessary information
- Bugs in electronic records that can affect patient
- Confidentiality is at risk due to means of electronic eavesdropping
- Malpractice – if crossed jurisdictions, unclear where the trial would be conducted

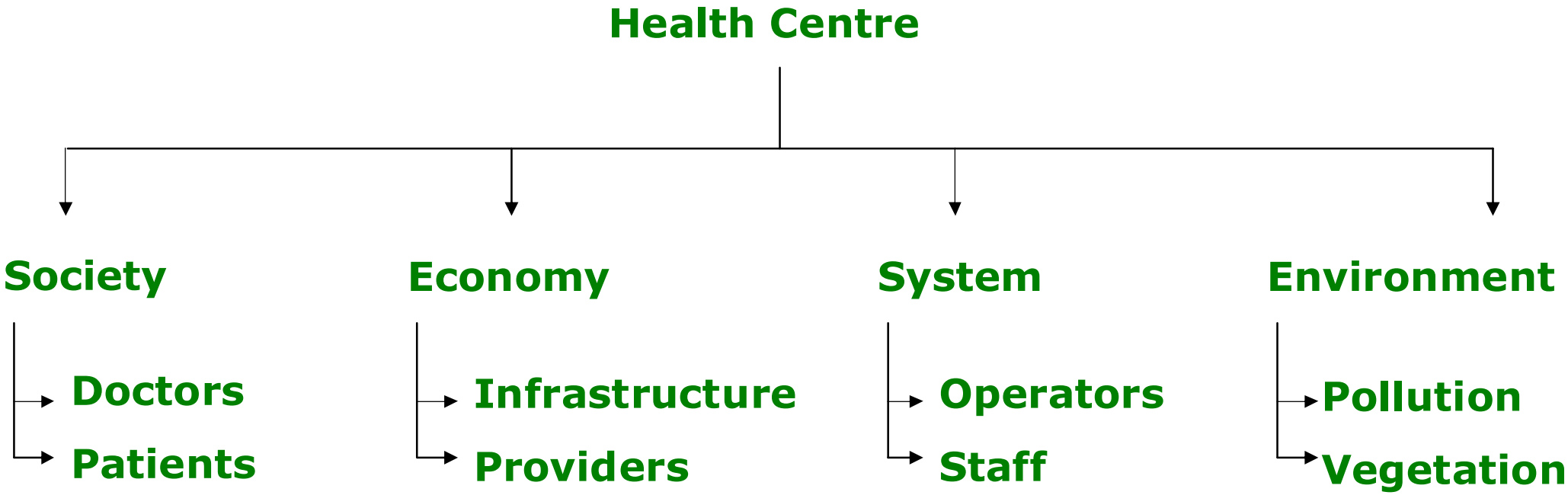
SUSTAINABILITY
IN CONTEXT OF TELEMEDICINE

- **Sustainable development** - positive change without eroding systems upon which society is dependent
- Equity in access to health care for all
- Achieving a healthy life and it can be maintained
- Achieving healthy practices
  - – maintaining ethics
  - - reliability
- Skills and natural abilities should be maintained
- Doctor - patient relation – not de-humanize
- Economic and societal development should be linked

STRUCTURE

Health care providers	Surgeons	Physicians	Experienced	Fresher	
Communication channel	Telephone	Broadband	Satellite		
Technology	Synchronous	Asynchronous			
Hardware	Video conferencing camera	Television	Phone	Computer	Video phones
Medical devices	ECG	X Ray	Film scanners	Video microscopes	
Software	Data management systems	Electronic records			

SYSTEM


Health Centre
Society
Doctors
Patients
Economy
Infrastructure
Providers
System
Operators
Staff
Environment
Pollution
Vegetation

SYSTEM

Variables

Society

Mortality rate
Travel to doctor
Emergency access
Gen 1 effectiveness of treatment
Gen 2 effectiveness of treatment
Level of personal interaction
Time conflicts
Accuracy of diagnosis
Patient satisfaction
Health status
Cost to patient
Discomfort to family
Continuity of care/ Follow ups
Social acceptance
Professional satisfaction

SYSTEM

Variables

Economy

Commercial benefits to infrastructure providers
Cost effectiveness
Employment generated
Reliability of system
No. of telemedicine points
Doctors with experience of physical diagnosis
Percent of underserved population
Funding agencies
Maintenance of system

SYSTEM

Variables

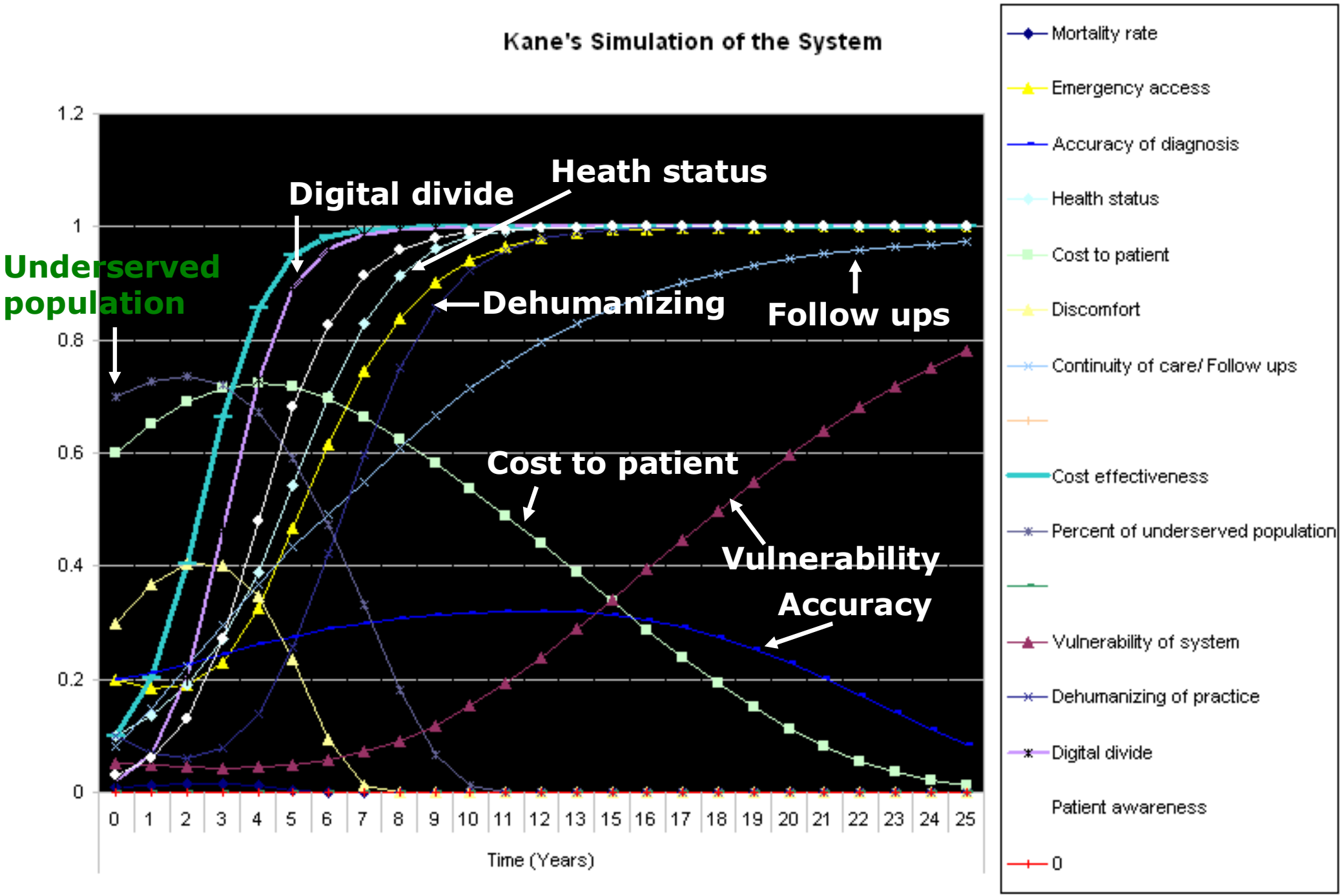
System

Information privacy
Resource utilization
Expertise level
Vulnerability of system
Dehumanizing of practice
Digital divide
Patient awareness

Environment

Vegetation loss
Land availability

SIMULATION


Kane's Simulation of the System
Heath status
Digital divide
Underserved population
Dehumanizing
Follow ups
Cost to patient
Vulnerability
Accuracy
1.2
1
0.8
0.6
0.4
0.2
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 15 16 17 18 19 20 21 22 23 24 25
Time (Years)
Mortality rate
Emergency access
Accuracy of diagnosis
Health status
Cost to patient
Discomfort
Continuity of care/ Follow ups
Cost effectiveness
Percent of underserved population
Vulnerability of system
Dehumanizing of practice
Digital divide
Patient awareness
0

CONCLUSION

- Reinforcing the role and influence of existing centers of power- ***telemedical capitalism***
- Dehumanizing and digital divide may lead to societal imbalance
- Increased concern of reliability of practice
- Better access to medical care
- More suitable for regions of very less access

Thank you