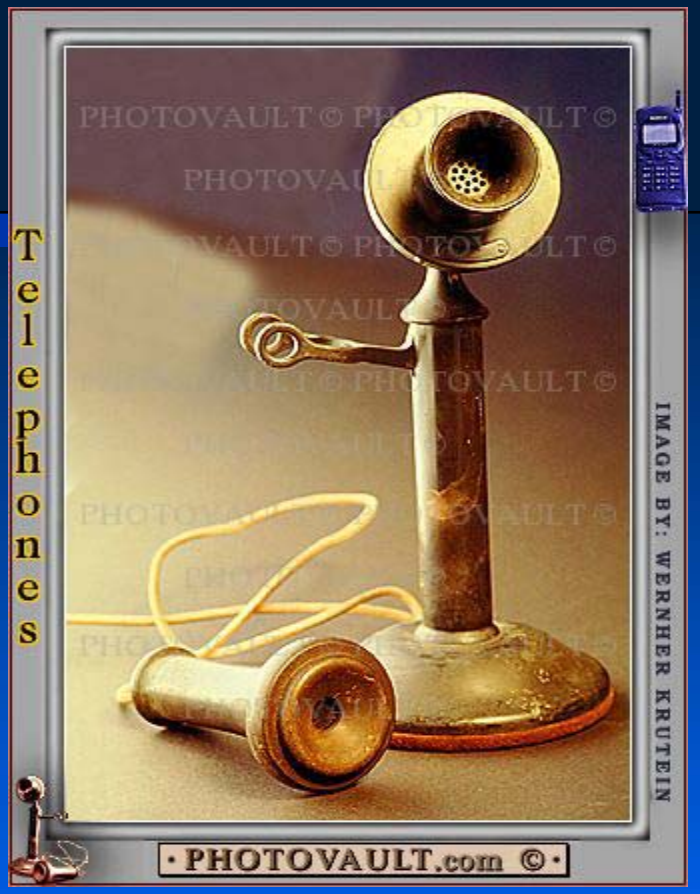
Aravind Teleophthalmology Network - ATN

Dr.Kim
Program Director
ATN
Aravind Eye Care System
Madurai

Over the years…

…doctors interacted with each other to get second opinion using the available communication technology



Invention of Telephone changed the way people lived!

?

Tele-ophthalmology

….breaking the distance barriers

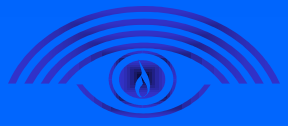
- A system that electronically transports a consulting Physician from a medical center to a site at a distant facility where his/her expertise is required

Geography is History ??

IRIDIUM

Why Tele-ophthalmology?

- Ophthalmic diseases are mostly diagnosed by viewing still images
- Like in radiology, ophthalmology is apt for telemedicine



Telemedicine levels of eye care delivery

- Primary eye care – Screening for common eye diseases
- Secondary
- Tertiary

In Primary eye care

- Rural internet kiosks

Internet kiosks

- Multiple internet kiosks have been started in remote villages.
- Have internet access through WLL (Wireless Local Loop)
- Run by the local person trained for this purpose
- Self sustaining
- Income generation
- Resource center – one of it, is the eye care service

Taking eye care to doorsteps…
n-Logue: Internet Kiosks

Kiosk operator sends patient information through mail

ISDN/POTS

Public Internet

ISDN/POTS

Expert replies to the patient by mail

Taking eye care to doorsteps…
n-Logue: Internet Kiosks

Video

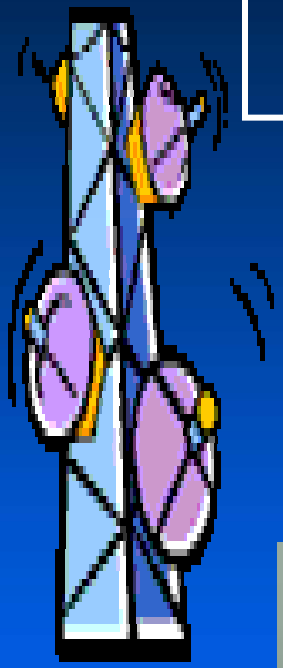
Secondary Care

- Vision Centers
- Mobile screening unit

Aravind Vision Centres

1. Comprehensive primary eye care in rural area
2. Exploiting IT for rural eye care service delivery
3. Tele-consultation: Vision centre technician with ophthalmologists
4. Available on a permanent basis
5. Refraction and school screening
6. Community participation

Tele-consultation



Wireless connectivity @ 4mbps

Consultation by Ophthalmologist at Aravind Eye Hospital, Theni

Screened by paramedic at Vision Centre

Vision centres currently at:

Ambasumithram–April 2004

(10 KM from Theni)

Andipatti – Dec 2004

(7 KMs from Theni)

Bodinayakanur – Sep 14th 2005

(16 KMs from Theni)

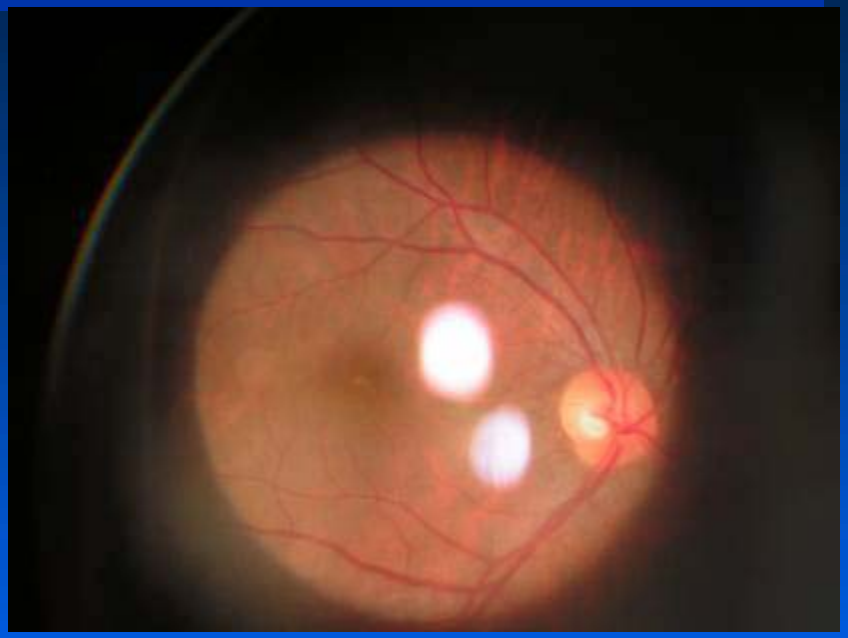
Chinnamanur– March 20th 2006

(25 KMs from Theni)

Technology

- WiFi 802.11b
- Low cost
- Unidirectional antenna
- Line of Sight
- Upto 25Kms.

Innovation - Reducing the cost
Thinking out of the box
Designing equipment for the masses



Additional Investment:

- **Cost of adapter rings: US$ 10 (about Rs. 500)**
- **Now this is used in village level Vision Centres**

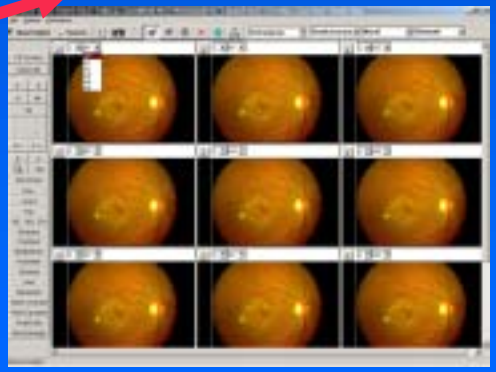
Investment for existing fundus camera
US$ 20,000 to 25,000 / Rs. 9 - 11 Lakhs

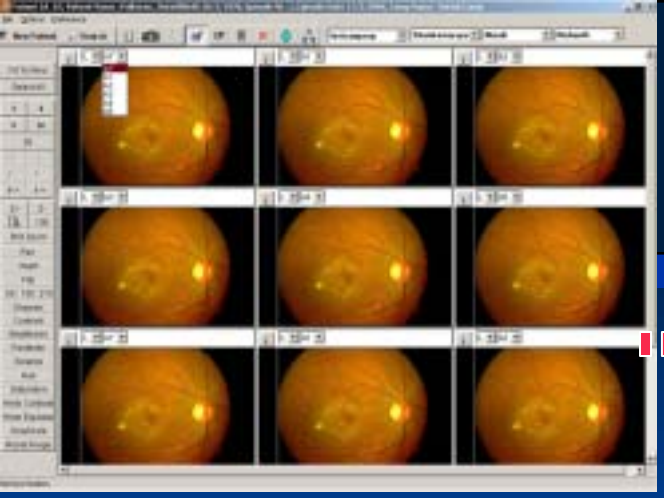
Eye Screening going mobile!!

Mobile Screening Van

- Goes to remote places
- Known diabetic pts. Are collected by the local physician
- Fundus images in a defined protocol are taken
- Recorded in a specialized software and transmitted to the Reading Grading Center at the Base Hospital

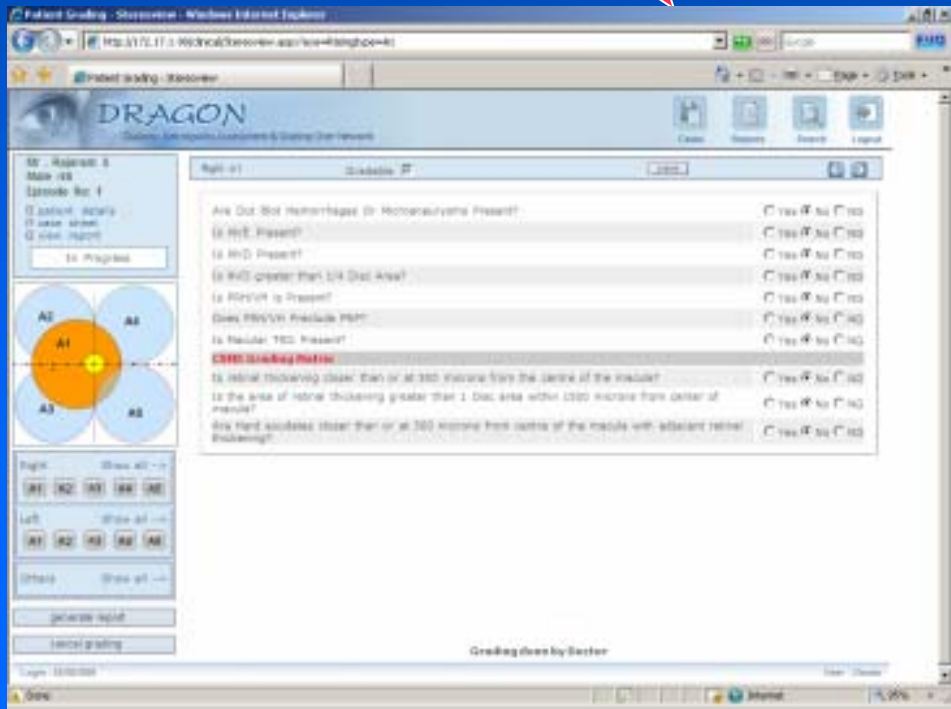
Then the system packs the images, (DICOM Standard) and the demographic details of the patient and uploads it to the central server through satellite.



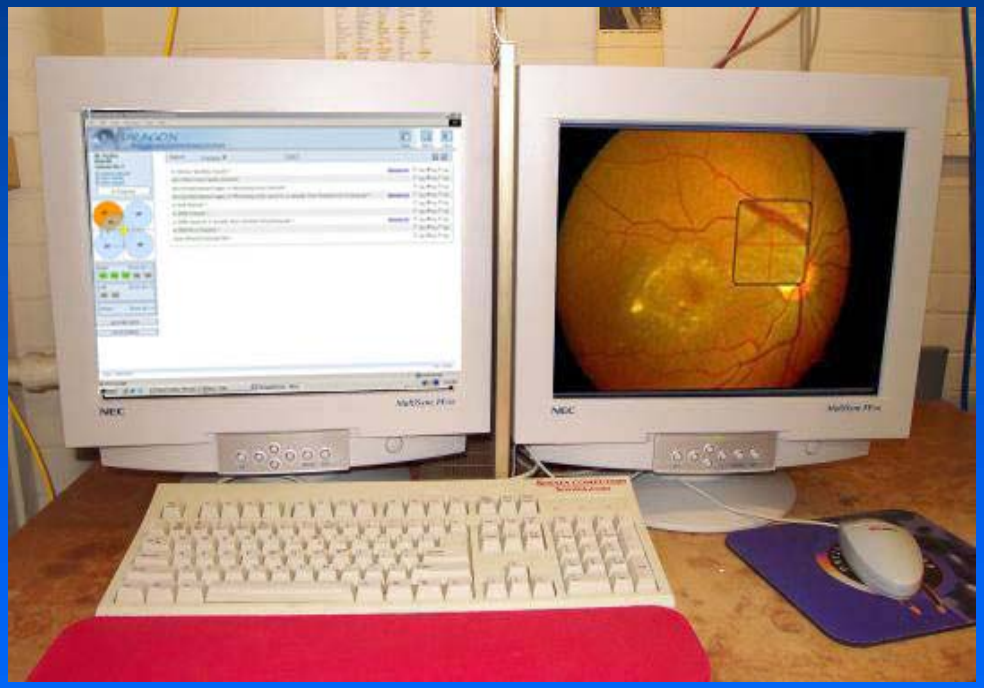


Grading centre in the base hospital

Each set of images have set of questions based on ETDRS criteria

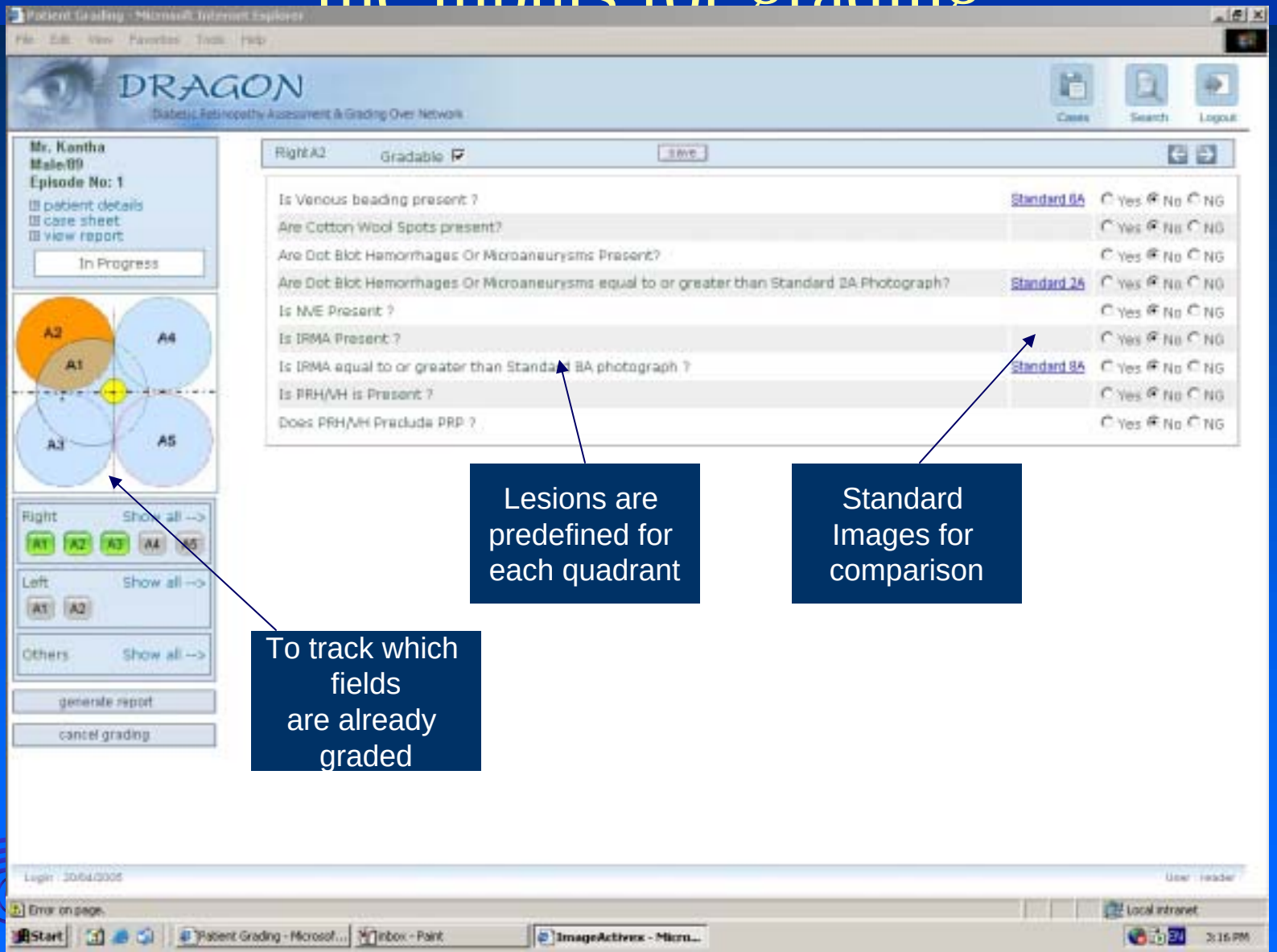


The reader can select a patient, look at each image one by one and record his observations in the system itself.



For ease of use, the images are loaded full screen in one monitor and the input forms are loaded in another monitor

In the second monitor, the reader enters the inputs for grading



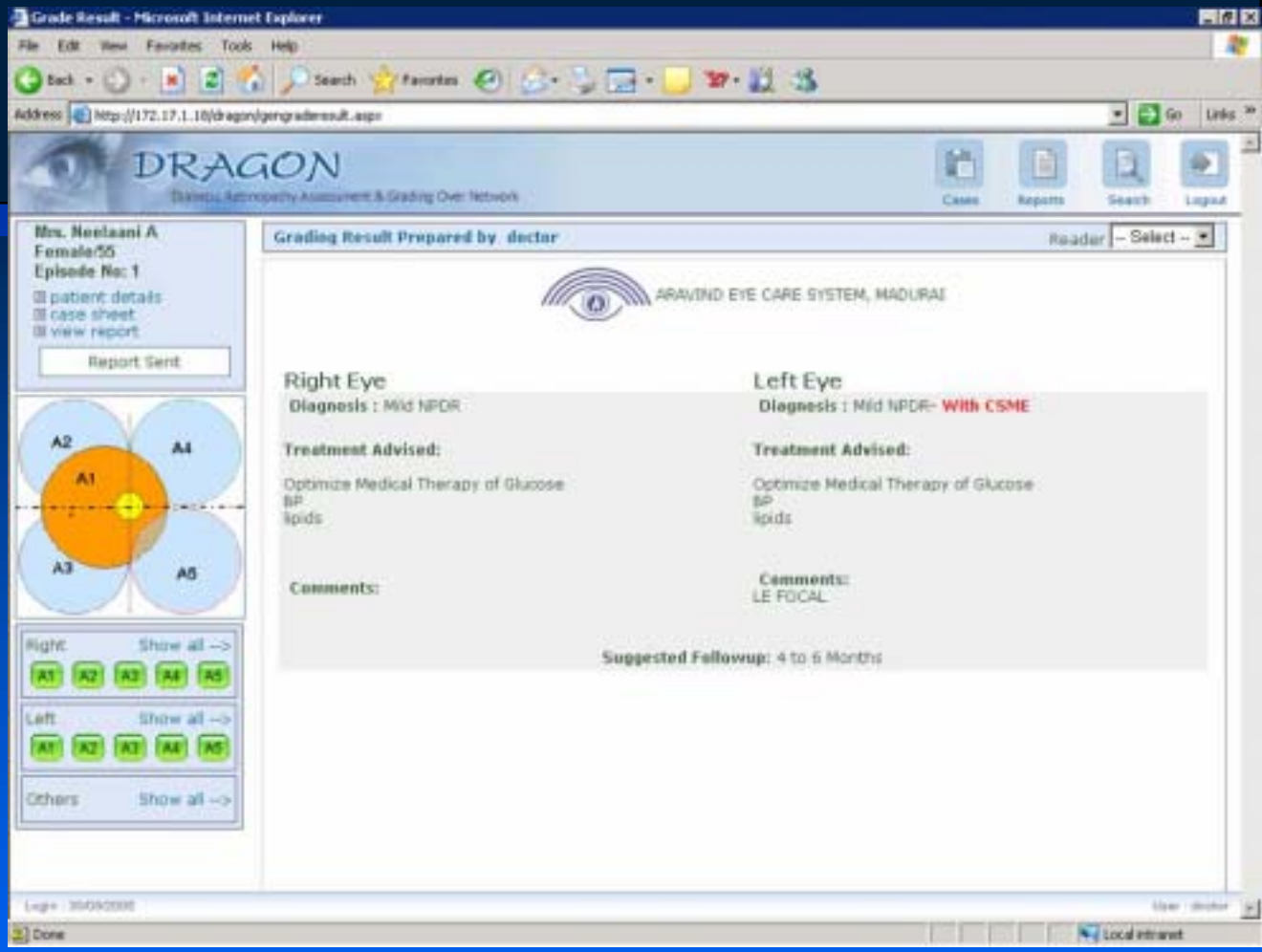
- Standard images used for comparison as required.
- The standard images are displayed when the user clicks on the standard image thumbnail present in the grading screen.

Image to be graded

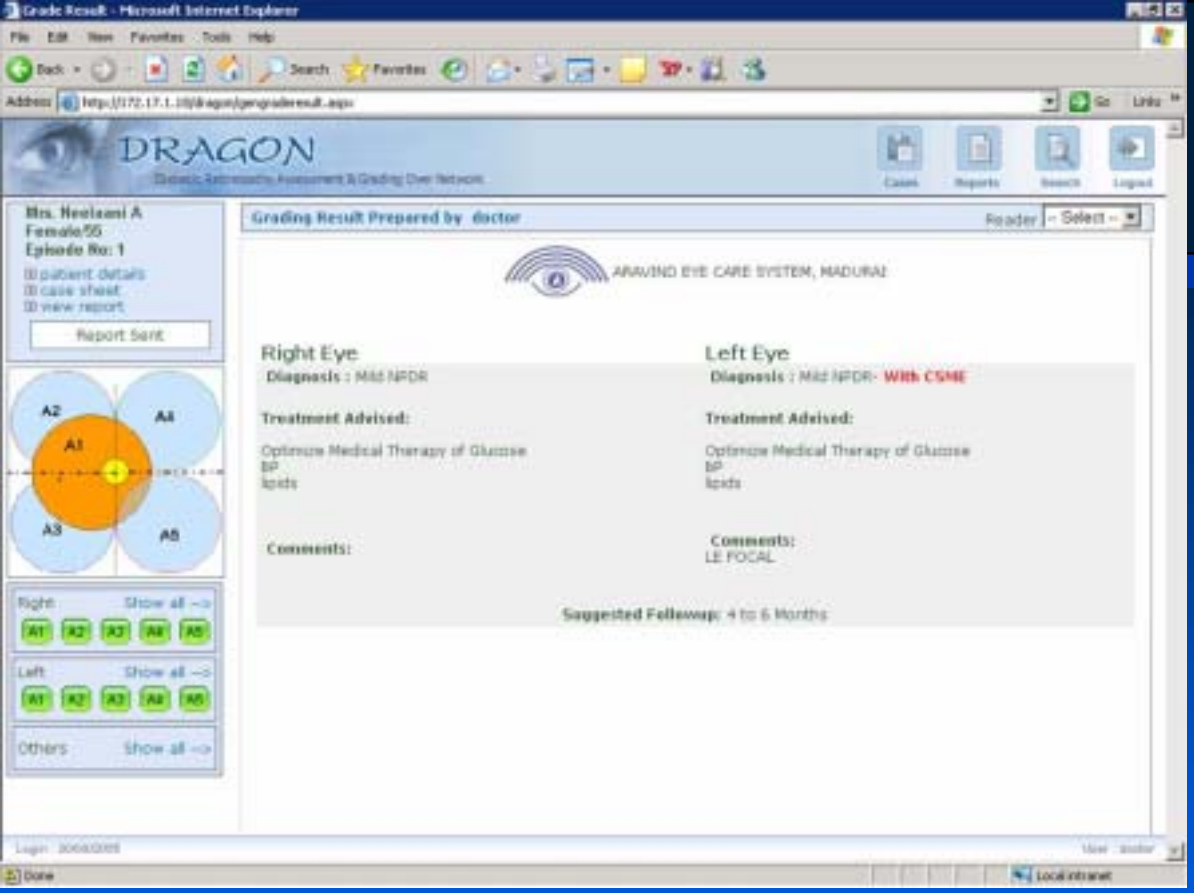
Standard Image

Report

Once all the images are graded, the system automatically generates a report with possible treatments, based on the observations made.

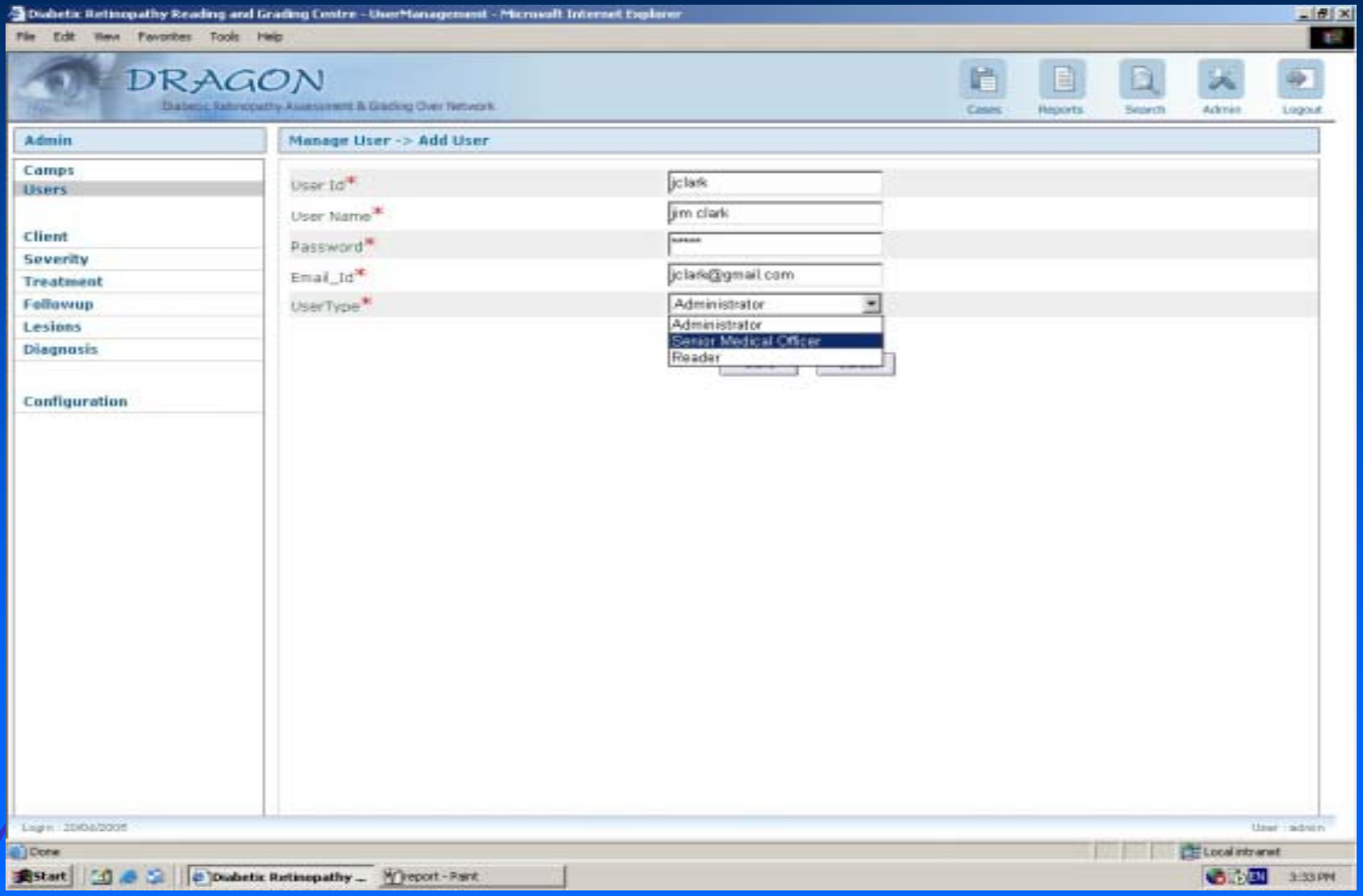


Reader can overwrite the diagnosis (if needed),add his comments and attach the critical images to be printed along with the final report

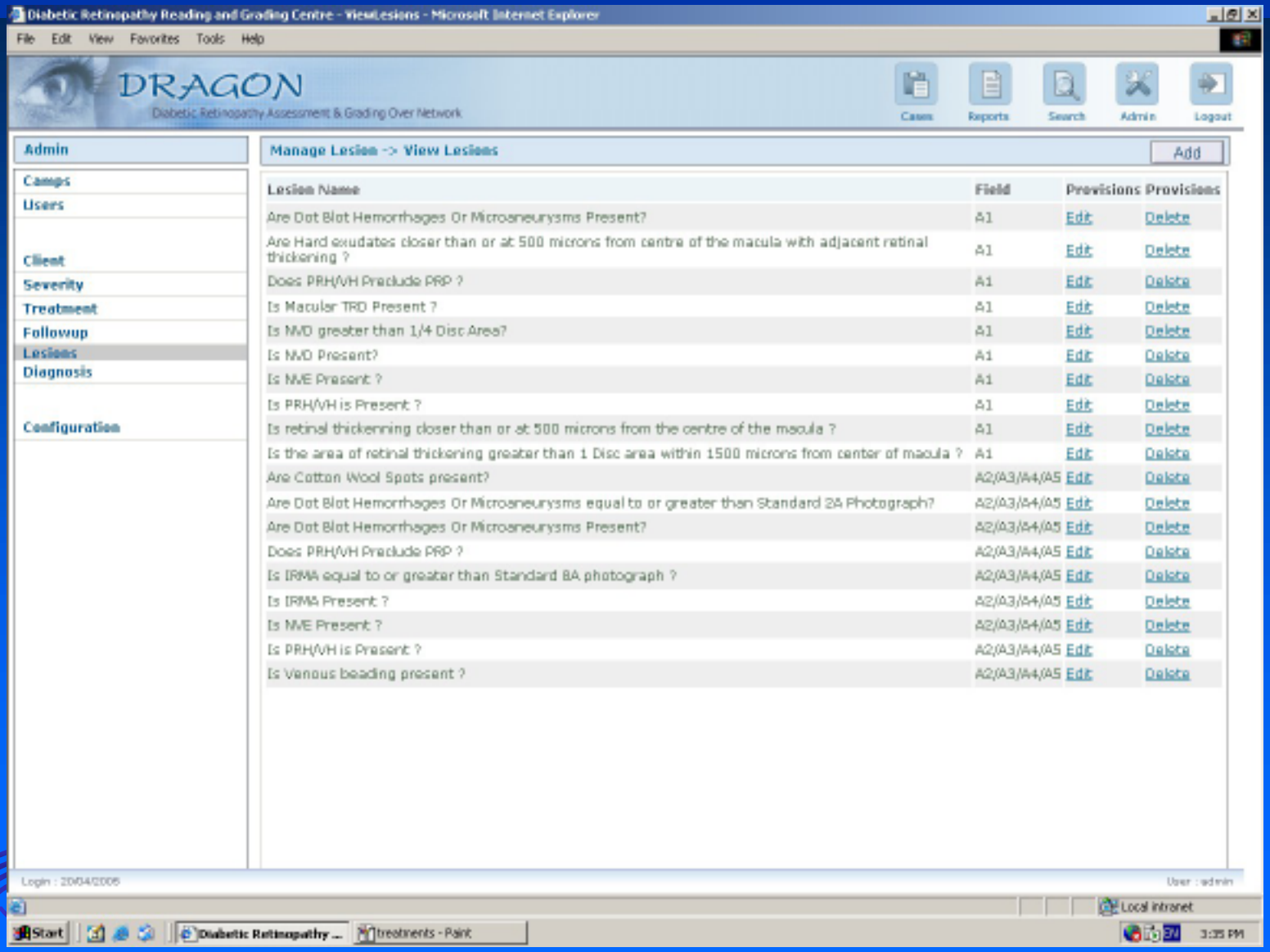

Grade Result - Microsoft Internet Explorer
DRAGON
Mrs. Neelaani A
Female/55
Episode No: 1
patient details
case sheet
view report
Report Sent
Grading Result Prepared by doctor
Reader
- Select -
ARAVIND EYE CARE SYSTEM, MADURAI
Right Eye
Diagnosis : Mild NPDR
Treatment Advised:
Optimize Medical Therapy of Glucose
BP
lipids
Comments:
Left Eye
Diagnosis : Mild NPDR- With CSME
Treatment Advised:
Optimize Medical Therapy of Glucose
BP
lipids
Comments:
LE FOCAL
Suggested Followup: 4 to 6 Months
A1
A2
A3
A4
A5

அரவிந்த்
TN59
U9109

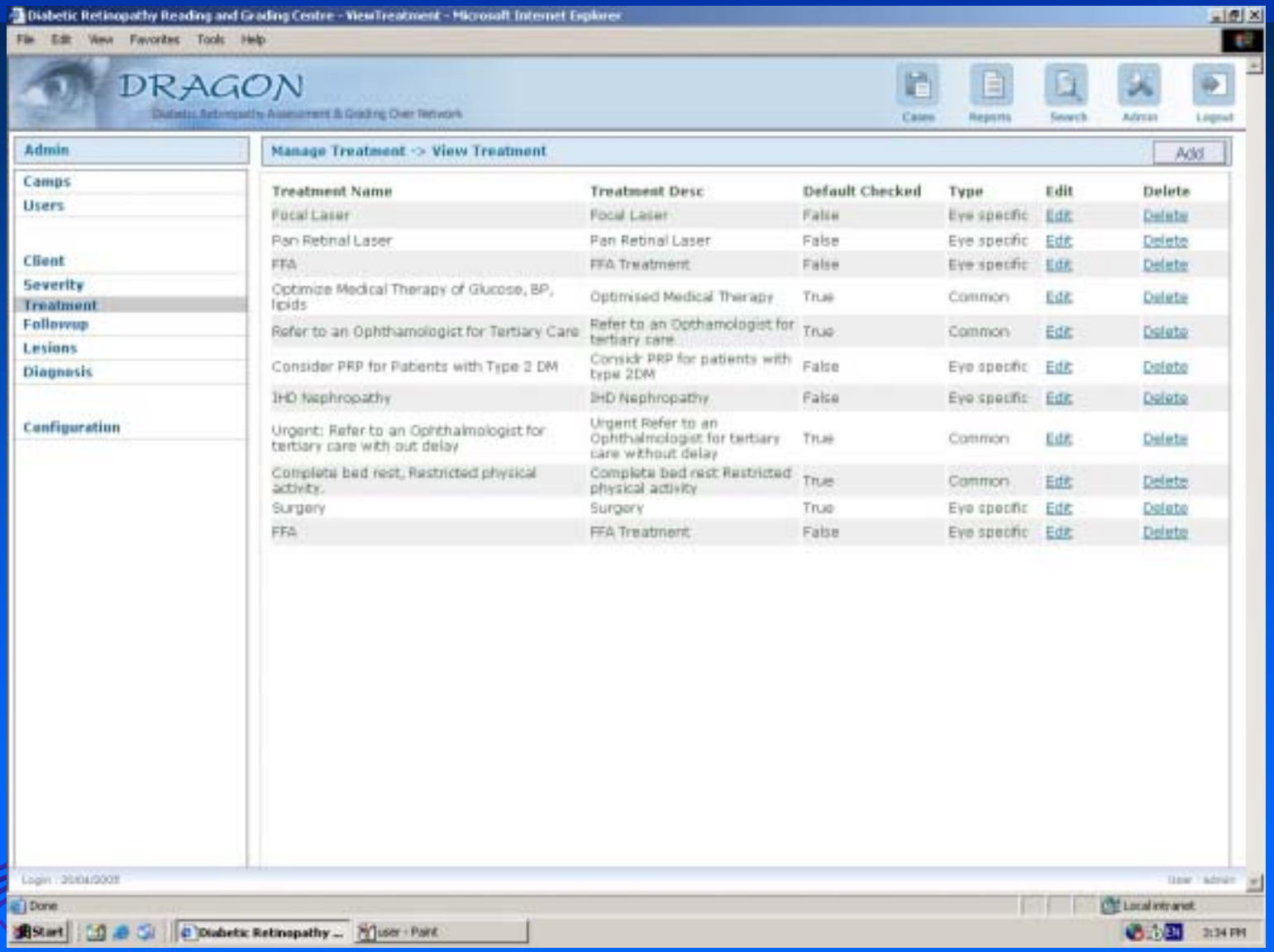
Admin can add and maintain users



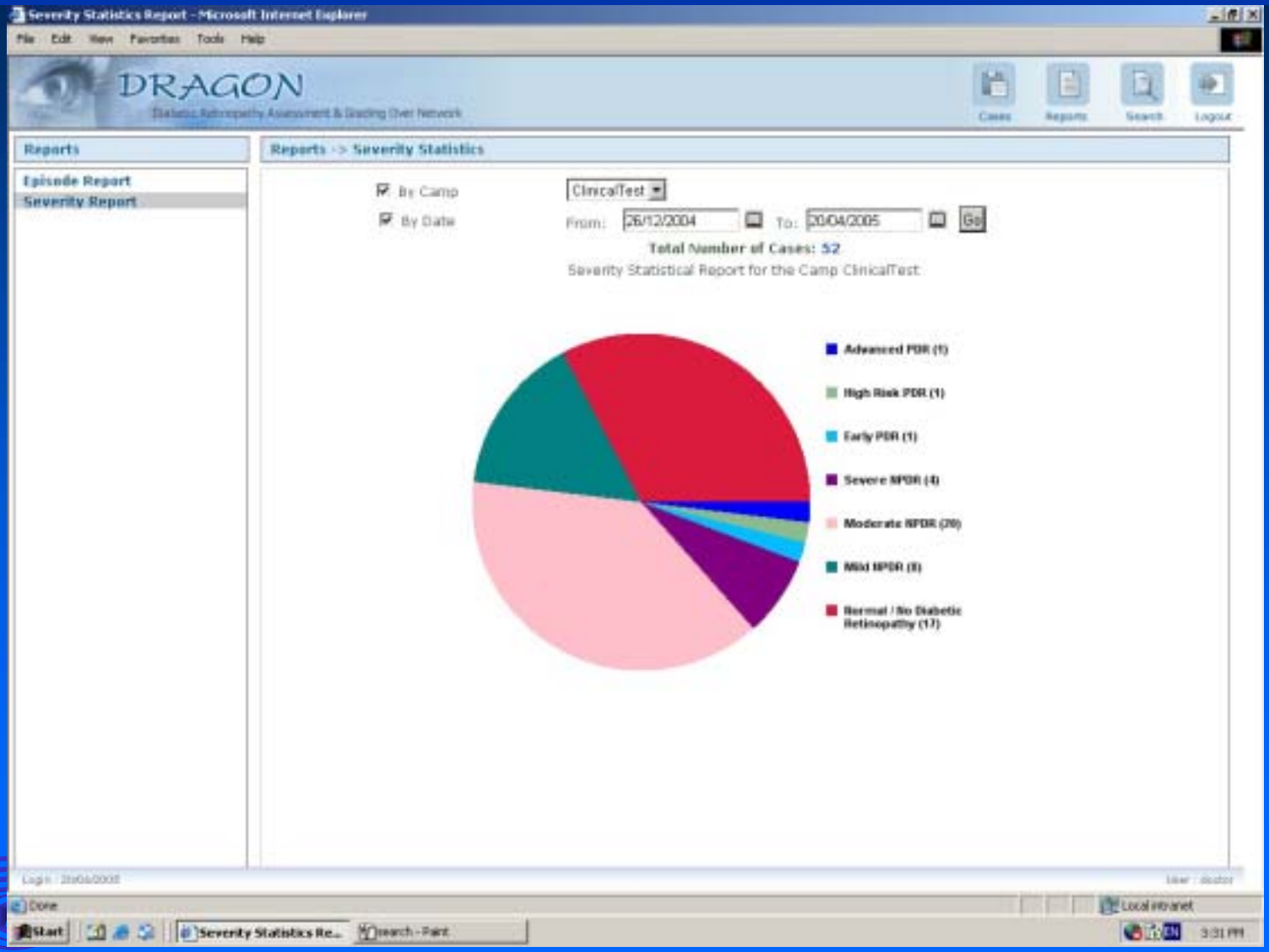
Manage lesions



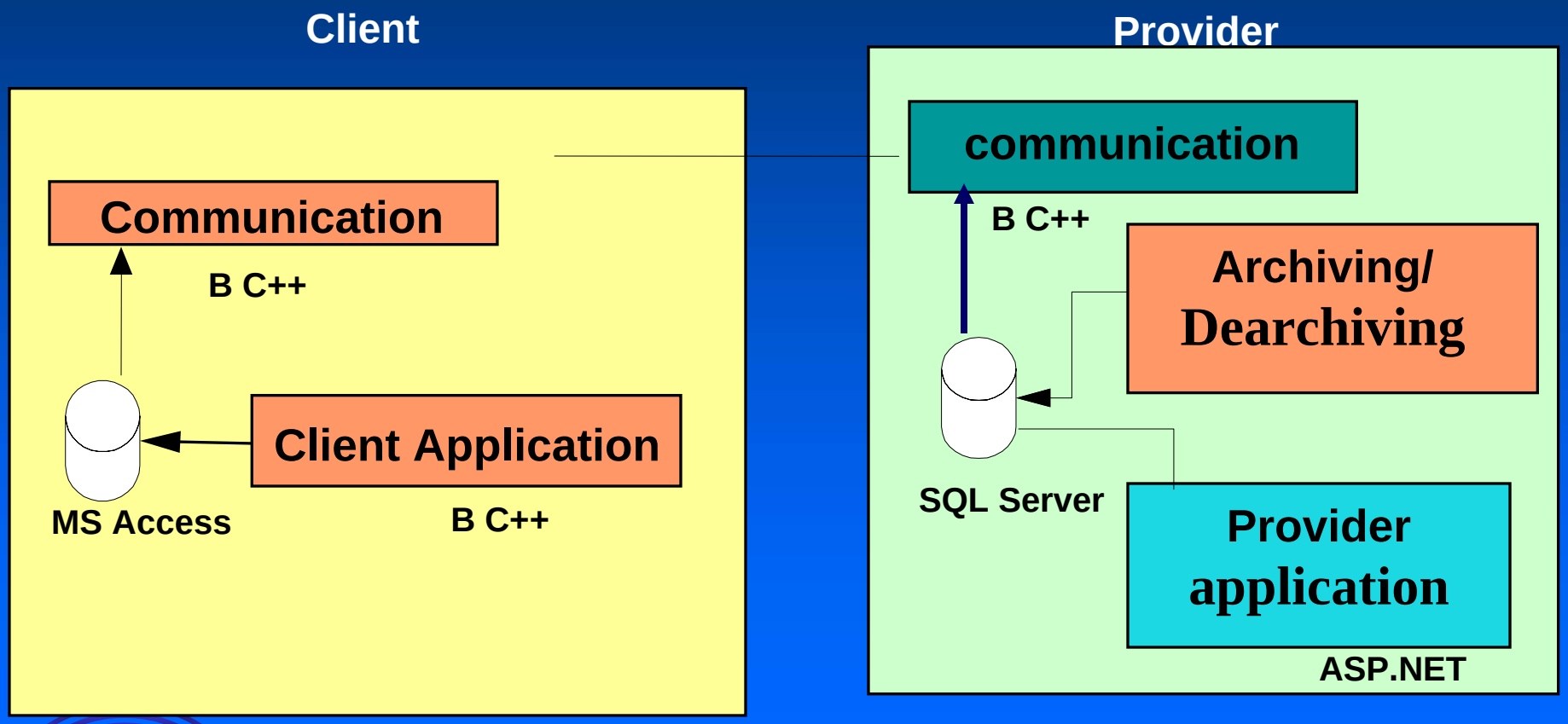
Map treatments



We can generate reports about the status of cases and the diagnoses



DRAGON


Client
Communication
B C++
Client Application
B C++
MS Access
Provider
communication
B C++
Archiving/
Dearchiving
SQL Server
Provider
application
ASP.NET

VSAT

Mobile Screeing Van

Process takes 1 hour

Images Captured in the mobile screening van

↓

Sent to the Reading center through VSAT

↓

Images Read and Graded using specialised software Called DRAGON (**D**iabetic **R**etinopathy **A**ssesment and **G**rading **O**ver **N**etwork)

↓

Report regarding the severity level and further action is

↓

Sent to the mobile van VSAT

→

Pt. counselled regarding further action suggested

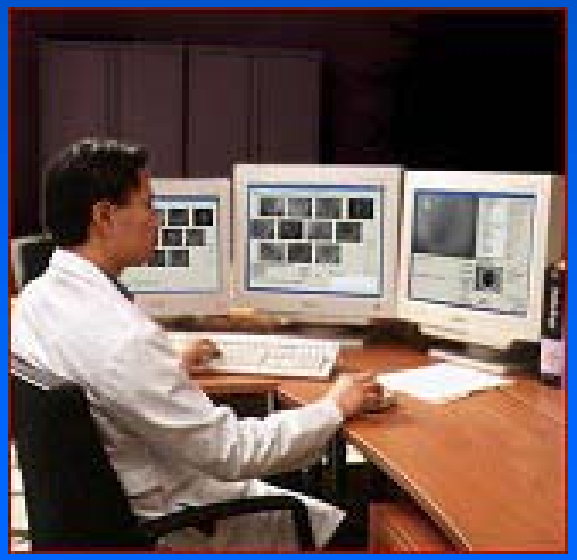
SN –TM project

Tele-ophthalmology Models elsewhere
Wilmer - Digiscope

- Ensure early intervention to screen for diabetic retinopathy – empowers primary care physician

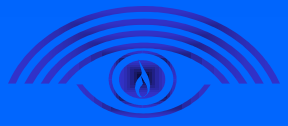
  Digiscope – Wilmer-EyeTel Innovation

- Images captured by Digiscope transmitted over Internet to the Reading & Grading Centre, Wilmer



In Tertiary care

- Two Modes used in Consultation
  - Real time or Interactive Videoconferencing
  - Store & Forward



In Tertiary Care

Experts at Madurai giving his opinion to a patient examined at a different hospital – Real Time over Videoconference

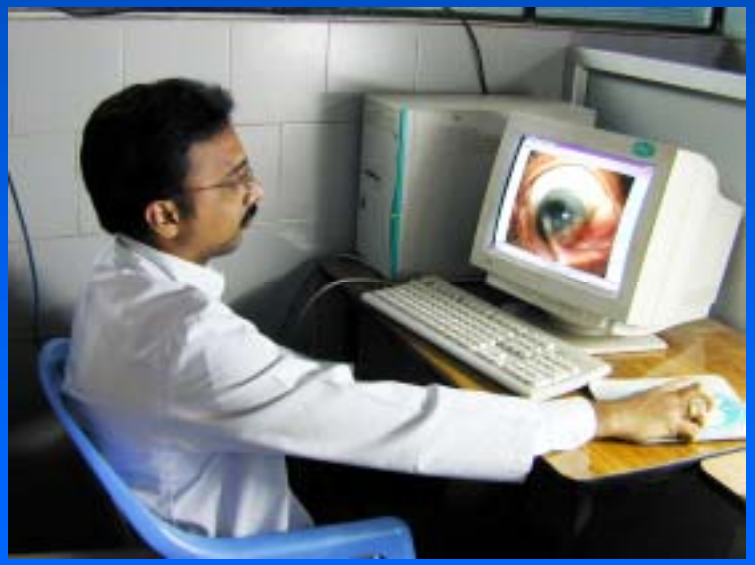
FarEndCamera

Store and forward technology

Web Based

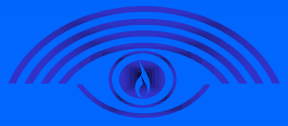
Doctor sends patient information through mail

Expert replies to the doctor by mail



Store & Forward Mode

- Compiled medical data is stored and transmitted to another site for review.
- Rate of transmission is slower, not done in an live interactive way
- A structured software to capture and maintain patient data for subsequent consultations / reference



eyesTalk…a store & forward software…

- Developed here
- Allows general ophthalmologists to access speciality care
- Uses e-mail
- Client and Provider

eyesTalk
aravind teleophthalmology network

Home | add patient | view patients | settings | news

MEENATCHIAMMAL P F / 58 123191

Patient Details | Episodes : 7/18/2006 12:27:28 PM

Casesheet

Attach Images | Close episode | Edit casesheet | Print casesheet | Expand casesheet

General Informations

Presenting Complaint	Def Vn BE 1 Month Known as DM 1 Yr on Rx,

Visual Acuity Unit: Snellen(Meters)

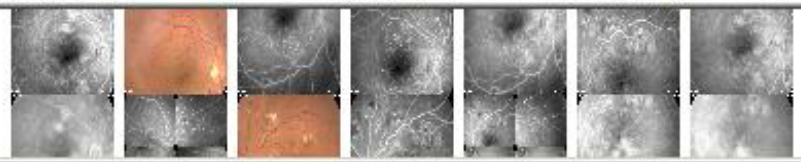
Vision	Right Eye		Left Eye	
	Distant	Near	Distant	Near
Un-Aided	6/36	---	6/60	---
Aided	---	---	---	---
Pinhole	---		---	

Intra Ocular Pressure

	Right Eye	Left Eye
Schiotz	12.2 mm Hg	12.2 mm Hg
Applanation	mm Hg	mm Hg
Non-Contact	mm Hg	mm Hg

Signs

	Right Eye	Left Eye
Lid and Adnexa	NORMAL	NORMAL
Conjuctiva	NORMAL	NORMAL



Messages

Compose message | Sort up | Sort down | Print messages | Provider : All

AEH Madurai : (7/18/2006 12:40)

RE-MOD NPDR LE-SEVERE NPDR WITH MACULAR ISCHAEMIA ADV-EVERY 3 MONTHS FOLLOW UP

Dr.Kim , sankrish : (7/18/2006 12:31)

Kindly expert your opinion and management.

Episode - Windows Internet Explorer
http://172.17.1.9/eyestalk/webforms/Episode.aspx?id=AEHTHENI_247695_1
Google
File Edit View Favorites Tools Help
Links
Episode
Page Tools

eyesTalk
aravind teleophthalmology network

BALASUBRAMANIAN R M/66
247695

Status :Sent | Current Owner :Retina | Owner Since :7/13/2006 4:49:00 PM

Print CaseSheet | Print Comments | Patient Details

General Informations

Presenting Complaint	Pt come for Routine checkup.
Systemic Illness/History	Known as DM 25 Yrs on Rx.

Visual Acuity Unit: Snellen(Meters)

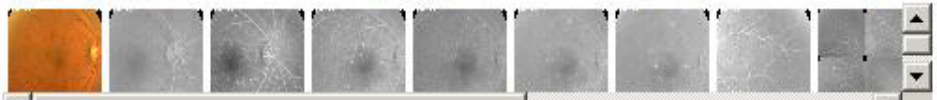
Vision	Right Eye		Left Eye	
	Distant	Near	Distant	Near
Un-Aided	6/12	---	6/12	---
Aided	---	---	---	---
Pinhole	6/6		6/6	

Intra Ocular Pressure

	Right Eye	Left Eye
Schiotz	mm Hg	mm Hg
Applanation	mm Hg	mm Hg
Non-Contact	20 mm Hg	14 mm Hg

Signs

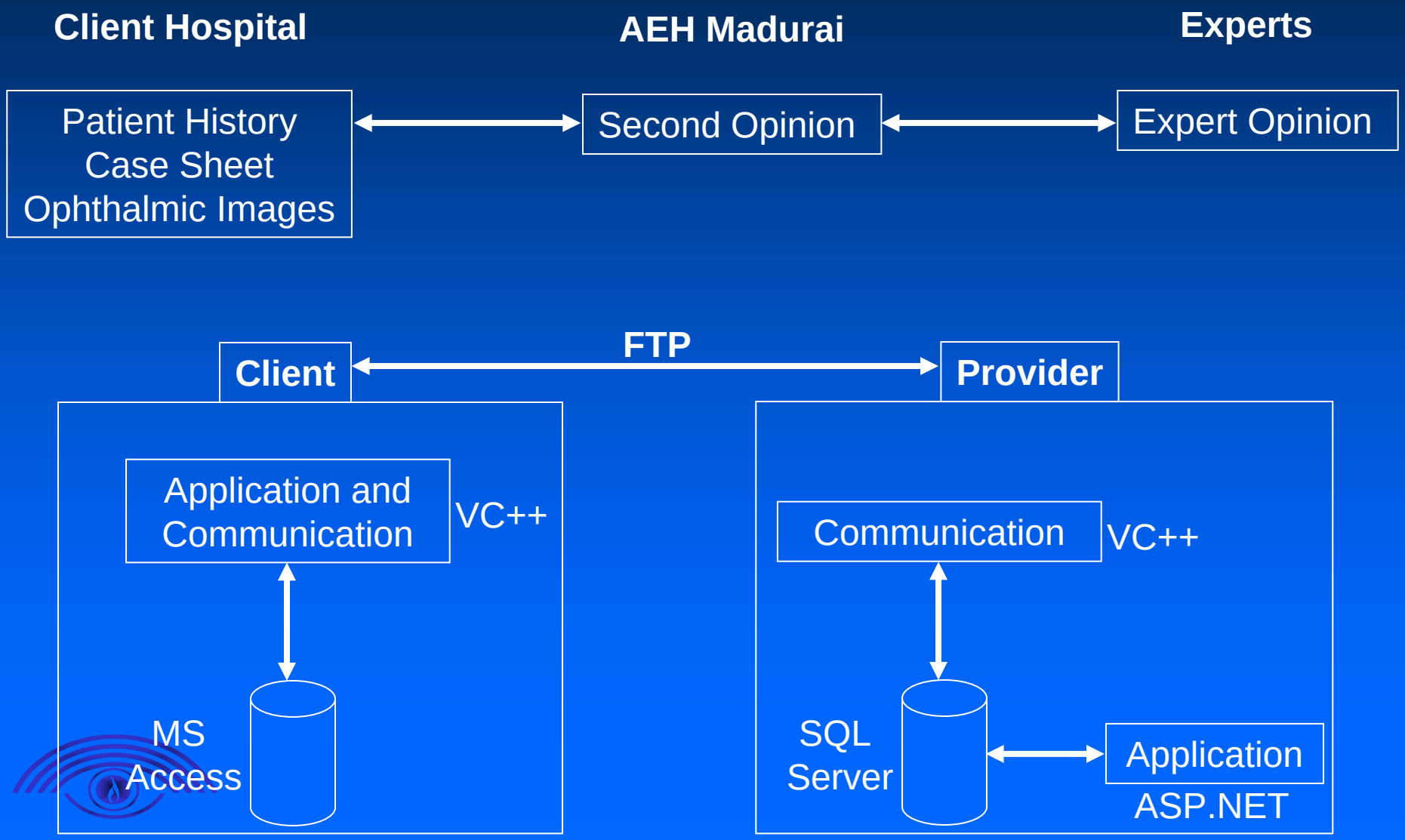
	Right Eye	Left Eye
Lid and Adnexa	Normal	Normal



Retina , AEH Madurai (7/13/2006 4:48:03 PM)
BE are suggetive of Moderate NPDR and needs observation only.
Review him after 4 months.
Kim

Dr.Datta , AEHTHENI (7/8/2006 9:08:57 AM)
Kindly expert your opinion and management.

Done Internet 100%


Client Hospital
AEH Madurai
Experts
Patient History
Case Sheet
Ophthalmic Images
Second Opinion
Expert Opinion
FTP
Client
Provider
Application and
Communication
VC++
MS
Access
Communication
VC++
SQL
Server
Application
ASP.NET

eyestalk

- Becomes a learning tool
- Empowers primary care ophthalmologists to manage all cases
- Easy accessibility for speciality care

In Tele - education

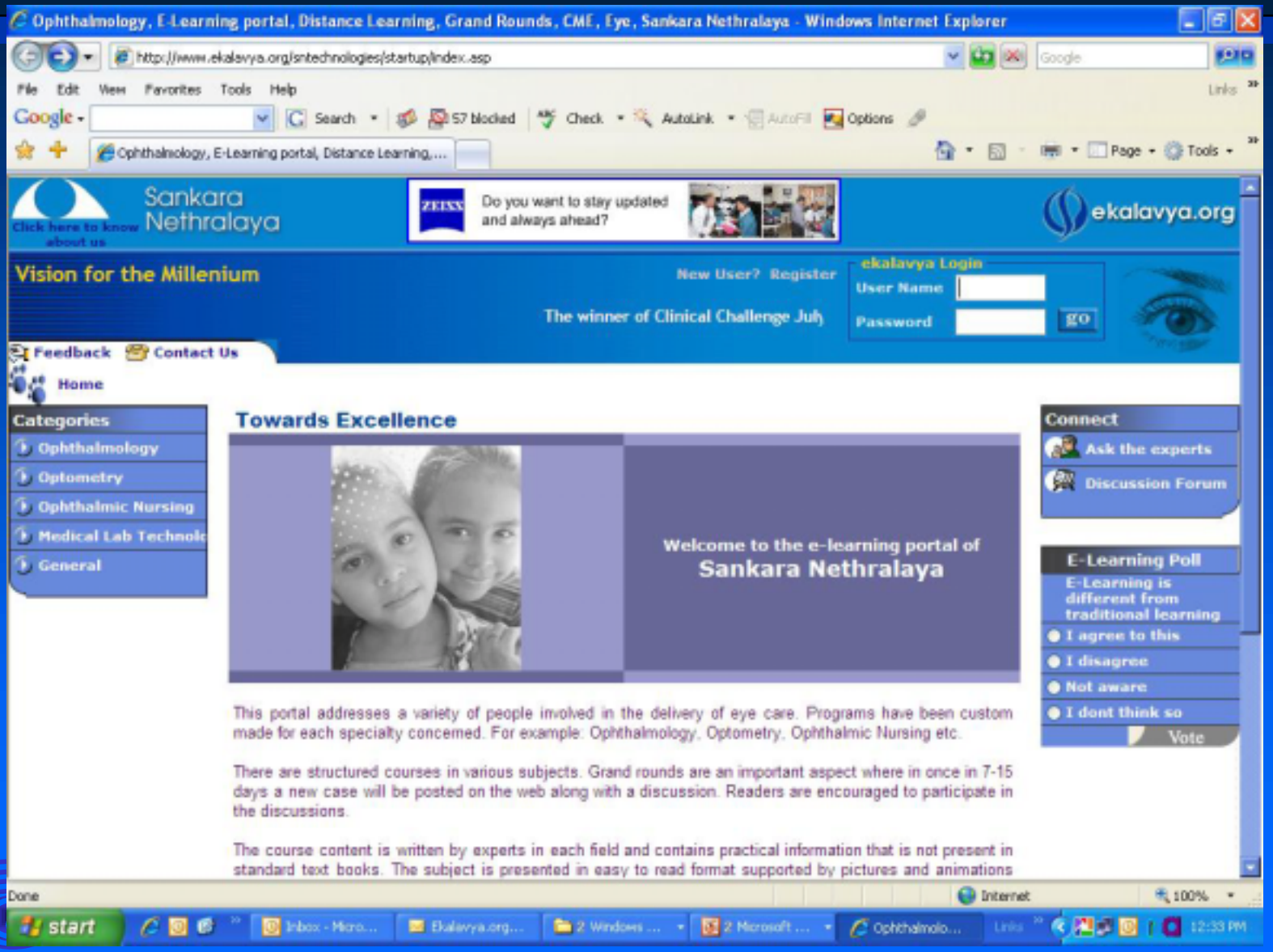
Tele-education – 5 hospitals in the weekly Grand rounds

Aravind - Wilmer Grand Rounds

...distance does not matter

Wilmer Eye Institute,
Johns HopkinsUniversity,
Baltimore,
USA

Tele-education



In conclusion…

- Telemedicine
  - takes speciality care to the unreached
  - empowers local community/professionals to access quality care and skills & knowledge
  - Sharing knowledge and expertise
  - saves time and money

Thank You