ICT in Health Care: A Case Study on Computer Network Applications in an Healthcare Institution in India

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In association with ICTP and Mr. G. Repici, Telecom Italia, Italy
Secular …
Co-existence
Vision of our President
"The total land area of India is around 3.3 million square kilometer with 7000 kilometer of coast line. The altitude of the country varies from the sea level to 8,600 meter. The entire area is spread into deserts, hilltops, mountain tops, sea shores, islands, valleys and plains. Out of the billion plus population in the country 70% live in six hundred thousand villages. India is poised to become a knowledge society.

Electronic and knowledge connectivity is the key to realize this goal.

Connecting one billion people throws up multiple challenges."

Dr. A.P.J. Abdul Kalam, President of India
Virtual University - Through Universal Tele-Education

CORE COMPETENCE
- Universities of Calcutta, Mumbai and Madras
- Other Institutions
- International institutions

Central HUB of all Universities
- Coordinate
- Organize
- Schedule
- Broadcast
- Manage
- Maintain
- Infrastructure Storage
- Delivery through
  - E-learning
  - Tele-education

Remote Class rooms
- Online Tele-Education
  - Virtual Interaction
  - Live sessions
  - Effective Two way communication
  - Synchronized Multimedia
  - Collaboration

Identification of Experts
- Content Development
- Content Generation
- Content Workflow
- Content Deployment
- Delivery through
  - e-Learning
  - Tele-Education
- Digital Library

VSAT BROADBAND
WIRELESS for Last mile

Beneficiaries
- Affiliated Colleges
- Study Centres
- Learning Centres
- Individual Students
- Village Panchayat Knowledge Centres

www.presidentofindia.nic.in
Multi-Pronged approach for Tele-Education

Connectivity

Wi-MAX Connectivity

- Use the Wireless connectivity to connect the Affiliated colleges and Learning Centres in a high bandwidth network.
- Use VSAT for connecting the difficult regions.
Connect the three universities using High bandwidth Fiber Broadband network.
Establish Virtual University GRID.
Use EDUSAT/WiMAX connectivity to connect affiliated colleges.
Health GRID

- ISRO Tele-medicine network connects 25 super specialty hospitals and linked with 100 remote hospitals including islands.
- AIIMS, Amrita, Apollo, Aravind, Sankaranedralaya, CARE and other corporate are having tele-medicine services.
- RB is connected to CARE hospital through tele-medicine.

VPN - FIBER BROADBAND
10 GB connecting State level & Super Specialty Hospitals.
1 GB across the Affiliated Medical Institutions.
Wi-MAX: 2 – 10 mbps for last mile.
DATA CENTRE at Corporate Hospitals.

MESSAGING AND COLLABORATION ACROSS THE GRID, Internet2 Access.
Tele-Medicine, Tele-Education (CME), Collaboration, Live operation.

[Note: All Districts are, already, connected through BSNL-OFC Backbone (home, business or hot spot).]
Technology is the most Non-linear tool
Technology can effect the most fundamental changes in the ground rules of economic competitiveness

Science is linked to Technology through Applications

Technology is linked to Economy and Environment through Manufacture

Economy and Environment link Technology to Society
Case study on
All India Institute of Medical Sciences
Premier National Medical Institute
Conducts teaching programs in medical & paramedical subjects, both undergraduate and postgraduate levels
Teaching in research in 42 disciplines
Leader in medical research – 600 research publications in a year.
25 clinical departments, 4 superspecialty centers
Practically manage all types of disease conditions
### Patient attendance data (2000)

<table>
<thead>
<tr>
<th>Departments</th>
<th>Patients attended</th>
<th>Patients admitted</th>
<th>Patients in surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main hospital</td>
<td>1236708</td>
<td>50415</td>
<td>90049</td>
</tr>
<tr>
<td>Ophthalmic sciences</td>
<td>344534</td>
<td>16067</td>
<td>15871</td>
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<tr>
<td>Cancer</td>
<td>46853</td>
<td>8504</td>
<td>753</td>
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<tr>
<td>Neurosciences</td>
<td>59854</td>
<td>5514</td>
<td>2665</td>
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<tr>
<td>Cardio thoracic sciences</td>
<td>103523</td>
<td>9399</td>
<td>3005</td>
</tr>
<tr>
<td>Community medicine</td>
<td>171416</td>
<td>4333</td>
<td>1305</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,962,888</strong></td>
<td><strong>94,233</strong></td>
<td><strong>113,663</strong></td>
</tr>
<tr>
<td>Category</td>
<td>Count</td>
<td></td>
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<td>--------------------------------</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Departments</td>
<td>50</td>
<td></td>
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</tr>
<tr>
<td>Teaching faculty/consultant doctors</td>
<td>500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nursing staff</td>
<td>1800</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientists</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UG students</td>
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</tr>
<tr>
<td>PG students</td>
<td>800</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Admin &amp; support staff</td>
<td>4500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital beds</td>
<td>1700</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Network Applications in a Tertiary care hospital - AIIMS

• Intranet & Internet Systems
  • Academic & research information
  • Human resource information
• Hospital Information Systems
• Library Information systems
• Telemedicine applications systems
Intranet applications at AIIMS

- Web enabled human resource information systems
- Web enabled teaching modules for students
- Web enabled hospital information system modules
Teaching in the Department of Microbiology at AIIMS

Class Schedules (Under Graduate)

Teaching Programme III Semester

Teaching Programme V Semester

Class Notes(UG)

Staphylococcal Infection

Lab Diagnosis of Syphilis

E. coli diarrhea

Lab Diagnosis of Pulmonary tuberculosis

Wound infection

Anthrax
Internet Applications at AIIMS

- Official website
- Health educations modules
- Ask the doctor systems
- Online information
Heart Valve Surgery (A Guide to Patients)

Coronary Artery Bypass Surgery (A Guide to Patients)
Internet Access at AIIMS

- Around 1000 nodes with Internet Access round the clock, 365 days
- All the Faculty with internet access
- Students share the internet connection in laboratories
- Students have access to internet in Library, Computer facility.
Internet Infrastructure at AIIMS

- 2 MBPS leased line, 128K x 2 lines
- Cisco and Dlink routers – 2 Number
- 3Com Remote Access Server 1+2 (24port)
- SGI O2 Webserver
- SGI Origin 200 Proxy server
- Cyberoam Webmail, content filter
- CA Etrust Firewall server
- Servers for Application hosting (Exam, Search, etc.,)
Internet Infrastructure at AIIMS

- Cat 5 based last mile connectivity
- Few locations with wireless connectivity
- Fiber optics backbone > 2km length
- Mix of Hubs, switches (100’s)
Patient Care - Hospital Information Systems at AIIMS

- Early to develop Oracle based HIS with 16 modules covering all functionalities of Hospital
- In the process of reengineering the whole system
- Very soon going to implement the state of art HIS for complete automation of hospital patient care system
- Tele Medicine
What is Telemedicine (TM)?

- Internet
- PSTN
- ISDN
- Home Hub
- HR
- BP
- other vital signs
- Video Phone
- Case Manager
- Server Router Firewall
- Info via Internet Browser
- Video Phone connection
- Devices
Telemedicine Defined

The electronic transfer of medical information from a referring health care provider at one site to a consulting physician at another site utilizing Communication and Information technology.
Critical Analysis

- AIIMS has good network infrastructure for Internet access to Faculty and scientists.
- No connectivity / network services to all the campus and hostels.
- Need a project Implementation of wireless access to students at hostels of AIIMS.
- Need to plan a project for design & Implementation of wireless access to service areas of hospital.
- Implementation of wireless access to city hospitals for closer co-ordination of trauma, organ donation, and e-governance.
## Internet connectivity ratio

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Economic analysis and project planning

The objective is

- to estimate through traditional economic feasibility study,
- the validity of project in terms of
  - social impact,
  - health economics,
  - patient benefit.
Approach to project feasibility

The economic feasibility of a project is usually estimated by:
- Comparing investments and annual expenses of the project to the revenue obtained throughout the project (cash flow).
- NPV and IRR are used.
- In case of AIIMS, a non-profit organization, revenues are interpreted as "economies" coming back to Hospital from improvement of working activity.
Benefits of Intranet system

The current literature separates the benefits provided by an Intranet system into three savings:

1. Direct reductions in intermediate consumption
2. Shorter time necessary to complete tasks
3. Increase in “human resource productivity”
Provisional project plan

The capital expenses, recurring expenses are calculated

Doctors – estimating time and labour saving are calculated
Nurses - estimating time and labour saving are calculated
Admin Staff - estimating time and labour saving are calculated
Students - estimating time and labour saving are calculated

NPV and IRR are calculated and tabulated

Though we get a –ve IRR, when all the social benefits and “economies” are calculated the IRR turns +ve.

This draft provisional case study will work as base for further actual survey and working model.
Thank you

Thanks to the President of India’s website for Photos and some slides.