

Design of Health Care Technologies for the Developing World

Robert A. Malkin

Definitions

- **Developed World:**

Nations that the United Nations Considers to have High Human Development.

Human Development:

A numerical measure of a Nation by the UN, based on indicators as Life Expectancy, Adult Literacy and GDP (Gross Domestic Product).

"Health for All by 2000"

- International effort
- Specific areas of need. (oral re-hydration solutions, food supplements, antibiotics, vector control agents, water pumps, latrines).
- Technology was known, effective and cheap.

Technology

- Money should be spent in other areas. (social services, basic needs).
- Out of context equipment.
- A new scanner won't change the outcome, diagnoses or the length of stay of the patient in the hospital.
- No one to repair or maintain the equipment.
- It goes only to main cities and private hospitals.

General Barriers

- Training of Staff
 - Reluctance to change
 - Language Barriers

EWH

- Engineering World Health
 - 4 year study on Medical Equipment in Developing Countries.
 - On-site equipment analysis and staff interviews.

- **Interview** (technical staff, doctors, nurses , and admin. staff).
 - 1st round, Basic Questions.
 - How many technical staff does the hospital have?
 - How have they been trained?
 - What is the spare parts budget and equipment budget of this hospital?
 - What % of equipment is donated?
 - What % of equipment is working?
 - What is the average age of your medical equipment?

- Interview

- 2nd round, In depth Questions.

- What is the most difficult technical obstacle you need to overcome in order to do your job more effectively?
 - What healthcare technology on the current market meet this need?
 - What are you currently using to solve this problem?
 - What equipment do you most need at this hospital?

Results

- Equipment Data from 33 hospitals in 10 countries.
- Interviews in additional 21 hospitals in 6 countries.

- COST
- SPARE PARTS
 - Not available in the country
 - Not available in the market.
- CONSUMABLES
 - Laboratory test strips, ECG
Electrodes, electrosurgery tips, etc.

Other Barriers

- Lack of technical staff.
 - poor literacy rate.
 - “Brain Drain” or “Brain Leak”
- Lack of reliable power and water.
 - Bundled with poor public infrastructure (roads).

Misconceptions

- “Instruments must be simple”
 - The few users that are trained, are successfully trained.
 - Simple instrumentation is dependant on vendors and manufacturers.
- “Cost is always a main Barrier”
 - Resources can be pooled.
 - Equipment can be afforded but not maintained.

Possible Blueprints for Successful Design

- Duke University-Engineering World Health Competition for Underserved and Resource Poor Economies (CUREs)

Business plan competition

- Need finding through on-the-ground market research
- Nonprofit business development
- Prototype development

Possible Blueprints for Successful Design

- Program for Appropriate Technology in Health (PATH)

Large-Scale Collaboration

- Clearly defined need. Where public and private sectors can work in harmony.
- Consensus among the public health community.
- Public-Private collaboration to fund, design, field test and promote the product.

Questions

- If the projects that we are addressing are going to be based on cell phone technologies, how affected will they be to such external factors as the ones discussed?
- How about factors not discussed in this presentation? can you think of any?

MIT OpenCourseWare
<http://ocw.mit.edu>

MAS.965 / 6.976 / EC.S06 NextLab I: Designing Mobile Technologies for the Next Billion Users
Fall 2008

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.