Design of Health Care Technologies for the Developing World

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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
• 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?