Connectivity Challenges in Remote Monitoring

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Definitions: Telemedicine/Telehealth

- The remote provision of health care services and education by means of information and communications technology. (Charness, Demiris & Krupinski, 2011)
Capability-Demand Fit Framework

Telehealth Tool

DEMANDS

Hardware

Software

Instructional

Individual Differences

Age

Attitudes

Education

Technical Experience

Outcomes

Efficiency

Safety

Comfort

Degree of Fit

Task

User

CAPABILITIES

Perceptual

Cognitive

Psychomotor

Motivation
Human Systems Integration

- Physical Environment
- Healthcare System
- Family
- User
USA Internet Use by Age 2012

Internet use by age group, 2000-2012
% of American adults age 18+ who use the internet

For those Age 74+ only 34% use the Internet, and 21% have Broadband
USA Smartphone Ownership by Age 2012

- Income < 30K
- Income > 30K

Percent Ownership

Age Group
18-29
30-49
50-64
65+

Data from
http://pewinternet.org/~/media//Files/Reports/2012/Smartphone%20ownership%202012.pdf
Connecting Humans & Machines

- Steady power is not a given
  - Thunderstorms in Florida over the summer cause outages
    - Hurricanes cause long outages
  - Smartphones are not always charged
- When the lights come back on, in what state is your device?
  - Cellular modems in one of our projects did not reset properly
- Cellular network connectivity is not universally available
  - Both in cities and in rural settings so we still need wired connections
Connecting Humans & Machines

- Designing and Training for Usability & Maintenance is Critical
  - Older adult users are going to be unfamiliar with remote monitoring devices as simple as tablets and will be hard pressed to service devices
    - Needed to train them how to register a selection ("touch with fleshy part of finger")
    - Need to provide paper manuals
- Display of information should be different for lay people and health care professionals
Challenges for Data from Telehealth Equipment

- Reliable & Secure Transmission
  - Store and forward may be a better strategy than pushing for 24/7 connectivity
    - Current wireless network providers will kick you off if you ping them too frequently
  - How often to report back?
    - Depends on the urgency of someone’s failing condition

- How to set the right balance for generating automated alerts based on sensor system data
  - How much monitoring to establish baselines
  - Chain of reporting for data alerts
  - False alarm problem