SP.722 (D-Lab) Spring 2005
Session #11 notes

Group Status Reports / Brainstorming

Design specs with metrics and units are due in a week – if still hunting details on particular specs, specify the expected unit at a minimum.

Plan for this class session:

- Group status reports on Problem Statements: 60 minutes
- Group brainstorming: 30 minutes

Case tracking

Problem statement

- What level of education/training assumed for the users?
- Where is data input? At the home (w/ PDA) vs. back at office? That's part of the design spec.
- What does "monitor patients" mean?

Design spec brainstorming

- Currently have direction on GUI guidelines; PDA client vs. paper forms; functionality of what to track?; Security / privacy of access to data – password, smartcard, etc.; Evaluation plan; Training and support
- Questions: Missing scale, cost per user, compatibility with databases and standards. Try to make specs as quantitative and testable as you can.

Run of River Micro-Hydro

Problem statement

- Clarified problem is village scale. Make sure the problem states that the primary target is villages that don't have power (developing country)
- Need to define types of rivers – i.e. will the system only work for a permanent river, not with rivers that are dry part of the year?

Design spec brainstorming

- Scale: roughly, ½ kW or 1000 kW?
- Currently includes cost, application scoping (flow ranges, etc), size and transportability, and maintenance/operations features.
- Questions: how the flow rate is best specified; what happens in flood situations; need to add quantitative aspect for head-drop, turbidity, weight, and if still not sure list it as 'TBD' to help monitor open issues.

Solar Water Disinfection

Problem statement

- Includes "quick," "inexpensive," "easy," "Third World households" – need to clarify/quantify what these mean.
- Specify rural vs. urban? They want to consider both environments.

Design spec

- Having trouble quantifying many aspects. Single day process via 50 deg C for one hour per day is a known target.
- TBD maintainability vs. cheap/easy to replace
- Cost metric: $/liter disinfected.
- Need to quantify alternatives in terms of cost, effectiveness, performance (effort per liter), as background for the spec.
- Comments that UV transmission is also important to disinfection, not just temperature.
- Consider breakability (will it shatter in accident) and durability/lifetime in "normal use?"
- What expectations for batch size?

Water Collection

Problem statement

- Defined as supporting the multiple uses for rural households with subsistence farms in developing countries.
- This will leave many tradeoffs and balances TBD. To get to a design spec, probably will need to select some typical households, communities, water quality/water source issues. Note this is often the case for water systems -- one needs to get pretty specific about the application.
- Team has selected a "systems approach" – background on drawbacks of existing schemes, comparisons, will be helpful in getting to the design spec.

Design spec

- Based on partners, have selected Brazil and India and 600 L / day target.
- Currently broad scope treatment of turbidity, bacteria, and industrial chemicals; also would like to scale from single household to small community
- List of metrics: cost, time and effort to transport water, disinfection effectiveness, local manufacture materials, sustainability of production.
- Suggestion: segment the functions by usage type, i.e. irrigation and cattle watering don't need the same level of disinfection as human drinking.

- Suggest the cost target needs to be aggressive. Recall Paul Polak's cost argument: there are many $20 irrigation schemes, but he targeted a $1 scheme that would let him "distribute a million of them."

Pedal Powered Washing Machine

Problem statement

- Now includes comfort to use vs. manual washing, and scaling up to several families/local entrepreneurs.
- Do NOT try to make it inexpensive enough for a single family.
- Include location/portability?

Design spec

- Maximum weight – suggest including "transportable by a single person within the village, i.e. to put it inside when not in use."
- Metric for water use: L per load? L per unit clothing washed?
- Maintenance – break down frequency and cost to simple repairs (chain) and more significant repairs.
- Weatherproof?

Group Brainstorming – Case Tracking

Questions about what needs to be done next.

Problem statement: It's true that infection rates are on the rise, but that's more background info for the project. The problem this project addresses is not the infection rate but an increasingly distributed home-care solution that places new demands on tracking systems.

See book for reference on design process: Pahl, G. *Engineering design*. New York: Springer-Verlag, 1984. It has a mechanical engineering slant, but could be quite useful.

Scale is both number of patients and amount of data per patient. Are both of these within the scope of work?