

Project Session: Concept Evaluation and Pugh Charts

Group Status Reports

Goal is to be done with problem statements, design spec in 1 slide with very few TBDs, and getting into design alternatives/brainstorming.

Water Collection

Design spec: lots more clarity on numbers for bacterial concentration, capacities, etc. They have emailed partner in Brazil with some questions.

Brainstorming: long list of possible approaches and components of an overall solution. Now starting to focus this list based on practicality, meeting specs, etc.

Issues: still trying to focus on the right mix of water uses and scale.

Case Tracking

Design Spec: Expressed in terms of GUI look and feel (English, fonts, etc) and time needed to do particular tasks. Server scaling w.r.t. number of patients, powering, installation time, security, backup plans...

Brainstorming: Not part of this project's scope, because an MIT-based software development team is already working on the design. The D-Lab team is trying to clarify user requirements for this design team.)

Issues: need more input from Power of Love about backup times – how much data are they willing to lose, how frequently will staff be doing data entry from paper forms?

Solar Water Disinfection

Design Specs: have numbers for cost/L, disinfection speed, capacities and use requirements.

Issues: expand/clarify what "locally available" parts means, especially since the problem statement includes both rural and urban uses.

Brainstorming: evaluating types of plastics, valves, fabrication via sealing and cutting, shapes/sizes and efficient use of sheet materials.

Micro-Hydro

Design Spec: made progress in understanding issues affecting reliability and durability, maintenance, safety (i.e. how the form of underwater components affects buildup of sediments). Changed goal during flood conditions from "operational" to "doesn't get damaged."

Brainstorming: considering turbine configurations; system layout across the river.

Issues: What does locally available mean? In the local community? Lesotho? South Africa? Probably will include anything available within a couple of hours travel.

Pedal Powered Washing Machine

Design Spec: added capacities, time of use, power required, clothing wear.

Brainstorming: have sketched out several broad alternatives: vertical axis, horizontal axis.

Issues and Questions: chemical enhancements (i.e. "Japanese cleaning disks"), other mechanical arrangements...

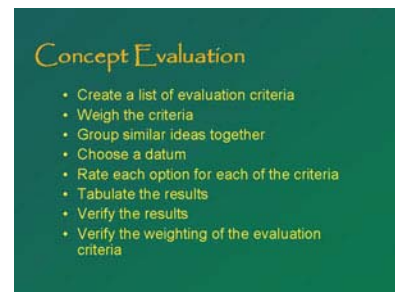
Concept Evaluation and Pugh Charts

Lecturer: Amy Smith

Concept evaluation is a key stage in the overall design process, a point where fundamental decisions are made.



It's hard to make decisions when you're facing hundreds of interrelated issues. The goal is to find ways to make this evaluation more objective. Must decide what criteria you'll use to evaluate the designs, i.e. is safety important? Is weight important? Then you'll want to group similar ideas and compare. Try to apply a quantitative metric, tally the results, and see if the results make sense. If the results don't make sense, ask if the criteria were appropriate?



Sample Pugh Charts for a field incubator. "Datum" is the baseline or control against which you'll compare your alternatives – in this case, a basic battery operated incubator. The solar powered alternative, after assigning values, turns out to be less effective than the baseline battery-powered design.

Criteria	Datum: Battery	Option 1: Solar	Option 2: Phase Change	Option 3: Water Bath
cost	0	+	+	+
reliability	0	-	+	0
accuracy (x2)	0	-	0	-
maintenance	0	0	+	+
ease of use	0	-	-	-
safety	0	0	0	0
TOTAL	0	-3	+2	-1

For next week, the goal is to go through concept evaluation and try to pick a single best approach to pursue with details.

Now the class breaks into project teams and starts to discuss evaluation criteria.

Washing Machine team

What's the process from here? The group is starting to think about testing and prototyping, i.e. assembling various components and getting to know their character.

Big question of the day: How big does the tub need to be (volume) to hold the clothes and water volume that's already been specified.

Brainstorming evaluation criteria, derived from spec categories

- Cleanliness
- Time efficiency
- Water efficiency
- Power
- Gentleness
- Cost
- Capacity
- Compatibility with bicycle drive mechanism
- Manufacturability (i.e. does it rely on moving seals?)
- Spinning effectiveness? This is a nice-to-have.