GNG1103 Notes Until Midterm

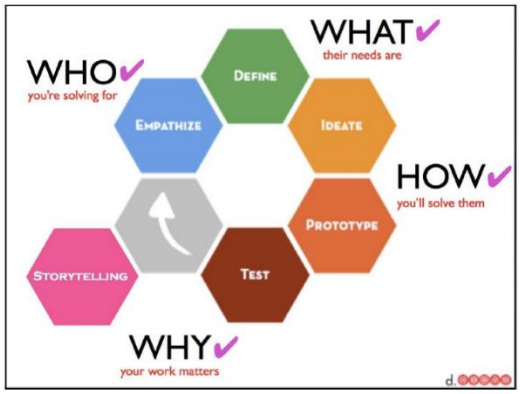
Fall 2019 | Prof. David A Knox

Design Thinking

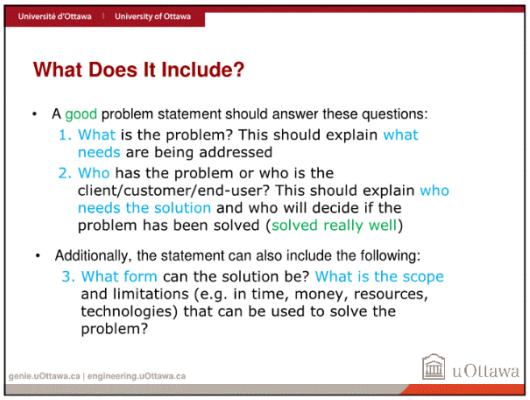
- **Empathize, Define, Ideate, Prototype, Test**
- Begin with empathy
  - solution starts with thinking through their perspective
  - Beginner's mindset (ask why?)
  - You don't know what they want (you need to find it)
- Prototypes: Keep it simple, specific, sexy
- Consumer doesn't always know what they need
- Ask open ended questions, get them talking / telling a story
- Know the **difference between customer and user** (Child's laptop / Customer - Parent, User - Child, Parent maintaining it, **there's always more than 1 type of user for every product!**)
- Goal: focuses the product development process on the actual needs of the customer

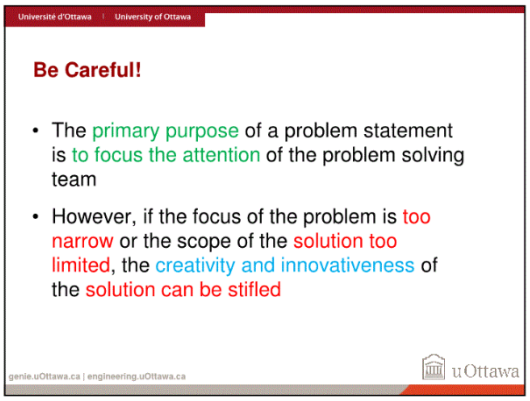
<u>Process</u>

- Gather raw data
  - open ended, very good questions
  - see someone struggle
  - be in that situation, know the variations (sustained observation over a few different days)
  - focus groups are good (get a better idea of what everyone as a collective wants)
- Interpret the data in terms of customer needs
  - write needs in term of what the product has to do
  - avoid words *must* and *should*
- Organize the needs
  - eliminate redundant statements
- Establish relative importance of needs
  -weighted needs (1-5)
- Reflect on the result
  - study their interpretations
  - follow up interviews?
- Lead user (beta tester): get feedback early before you implement it
  - users of the target application and market
  - lead users of similar applications



Design Thinking Process





Problem Statement Criteria

Client Meeting with Ross Video

- Ross Video
  - Designs and manufactures technology and services that power live video productions seen by billions of viewers around the world (news/sports broadcasts, engaging material in stadiums, concerts, conferences) **Glass to Glass** company (from camera lense to broadcast screen)
  - Makes: video systems, graphics software (stats comparison for scores etc.), media manegment, robotic cameras, camera heads, ultra HD video router for broadcasting, terminal equipment, all in one PTC cameras, legislatures, dashboards

- Ross Video Dashboards/ Custom Panels
  - Control system
  - available for free on rossvideo.com
  - **Dashboard University** for free online training
  - ogScript is scripting layer based on Javascript
  - **Also does Stadium Lighting**

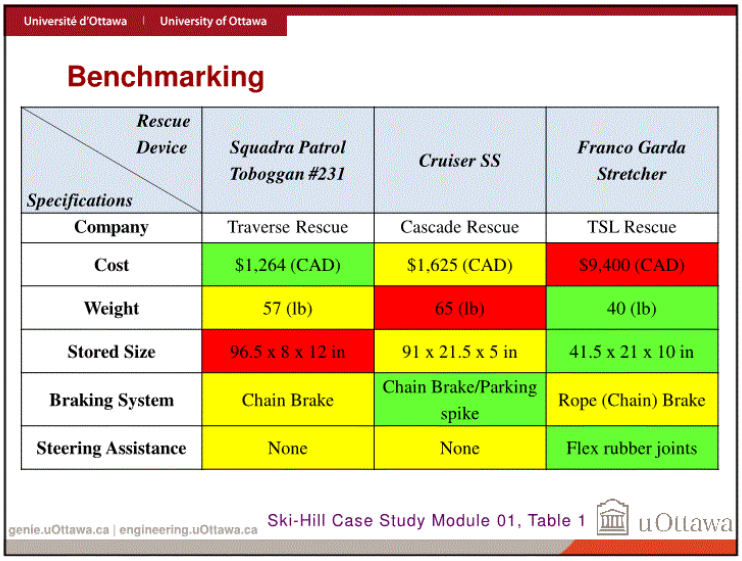
- **Problem Statement**
  Integrate Ross Video Custom Panels in the STEM building. // Automate something in CEED.

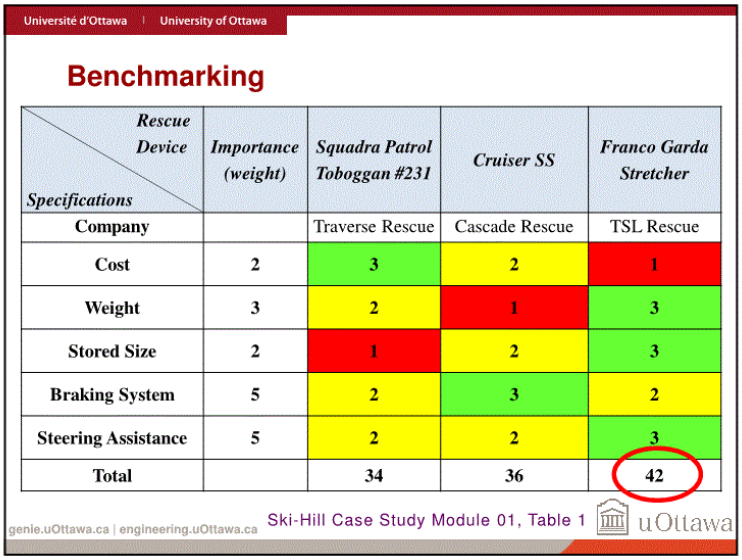
- CEED Needs
  - Countdown clock for how many hours are left in a day inside machine shops/active jobs
  - Surveillance for theft prevention
  - Interactive map of machine and tools vacancy
  - Inventory Management system (to know when/how much to order something)
  - Monitoring of air quality/filtration
  - Encourage standing and movement in the design commons (use it for what its for, not for just chilling/ sleeping)
  - Students waste most time finding things in the building (Community comes once a week during the weekends)
  - SD Cards and screwdrivers usually go missing or misplaced (users don't know where to put it back sometimes)
  - Sandbox is the least used CEED space
  - Shop gets rearranged at some points (Brunsfield)
  - People would prefer to sign in the space (cultural focus of space use)

- Integration Ideas
  - Data transfer from machine shops (measurement tools etc.) to the cloud where it can be viewed by everyone , anywhere /// smart machinery
  - AR/VR Training of machinary before students actually use it in real life
  - Main dashboard in every machine shop that has data/stats of all the machines in that room and can be turned off (kill switch) see: https://www.rossvideo.com/products-services/infrastructure/routing-systems/ultritouch/

Product Design

- Target Specifications (numerical value based on design **metrics**)
- Design Criteria (identifying needs)
- **Benchmarking**
  - compare with other similar products
- Design criteria is in units of the need (need: must be low cost, criteria: Cost ($))
- **Subdivisions**:
  - Functional requirements - weight supported , gradient breaking, fail safe etc.
  - non-functional requirements - aesthetics, product life, reliability - -
  - contraints - weight, cost, size
- **Target specifications:**
  - "Perfect World" values - exactly x, the sweet spot
  - Marginally-acceptable - at least x, between x-y, not worse than..





Sample Benchmarking Case & How to Rank Criteria

Conflict Management

- High flying teams:
  - Diversity (opinion, personality, experience)
  - Organization
  - Time manegment

- Team Conflict:
  - healthy if constructive feedback
  - resolution must come
  - discuss the impact
  - agree on the process
  - agree to communicate (active vs passive listening) // make sure both people understand what's being said
  - understand the situation
  - reach an agreement

Steps to a resolution

1. Prepare for resolution
   - acknowledgment
   - discuss the impact
   - communicate
2. Understand the solution
   - clarify
   - list facts
   - analyse
   - convene
3. Reach an agreement
   - agree with when and whon
   - make sure team is committed
   - everyone agrees
4. Conflict management styles
   - dominating, accommodating, avoiding, integrating)

Conceptual Design

- Concept Generation:
  - generate a lot of ideas
  - use free hand sketching (don't use tools, less equipment is better)
  - block diagrams
  -brainstorming
  - lots of ideas for finding problems -> narrow to a one -> lots of ideas for solutions -> narrow to

one
- block diagrams

- Brainstorming:
  - cross stimulation
  - suspended judgement (don't let people critizise)
  - formality of setting (have a time limit and roles)
  - set someone to keep things on track, take down crucial notes

Project and Time Management

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