

GNG1103 Notes Until Midterm

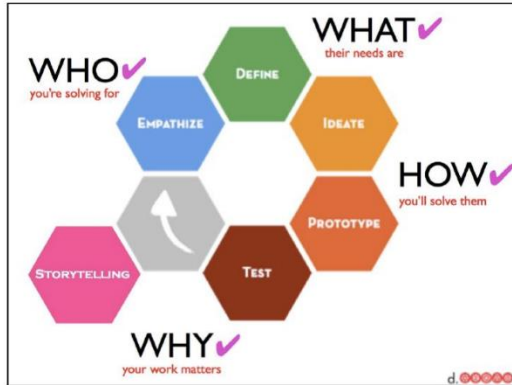
Fall 2019 | Prof. David A Knox

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

Process

- 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

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What Does It Include?

- A good problem statement should answer these questions:
 - What is the problem? This should explain what needs are being addressed
 - Who has the problem or who is the client/customer/end-user? This should explain who needs the solution and who will decide if the problem has been solved (solved really well)
- Additionally, the statement can also include the following:
 - What form can the solution be? What is the scope and limitations (e.g. in time, money, resources, technologies) that can be used to solve the problem?

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Be Careful!

- The primary purpose of a problem statement is to focus the attention of the problem solving team
- However, if the focus of the problem is too narrow or the scope of the solution too limited, the creativity and innovativeness of the solution can be stifled

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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 management, 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 (Brunsfeld)
 - 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 machinery 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 - -
 - constraints - weight, cost, size
- **Target specifications:**
 - "Perfect World" values - exactly x, the sweet spot
 - Marginally-acceptable - at least x, between x-y, not worse than..

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Benchmarking


<i>Rescue Device</i>	<i>Squadra Patrol Toboggan #231</i>	<i>Cruiser SS</i>	<i>Franco Garda Stretcher</i>
<i>Specifications</i>			
Company	Traverse Rescue	Cascade Rescue	TSL Rescue
Cost	\$1,264 (CAD)	\$1,625 (CAD)	\$9,400 (CAD)
Weight	57 (lb)	65 (lb)	40 (lb)
Stored Size	96.5 x 8 x 12 in	91 x 21.5 x 5 in	41.5 x 21 x 10 in
Braking System	Chain Brake	Chain Brake/Parking spike	Rope (Chain) Brake
Steering Assistance	None	None	Flex rubber joints

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Benchmarking

<i>Rescue Device</i>	<i>Importance (weight)</i>	<i>Squadra Patrol Toboggan #231</i>	<i>Cruiser SS</i>	<i>Franco Garda Stretcher</i>
<i>Specifications</i>				
Company		Traverse Rescue	Cascade Rescue	TSL Rescue
Cost	2	3	2	1
Weight	3	2	1	3
Stored Size	2	1	2	3
Braking System	5	2	3	2
Steering Assistance	5	2	2	3
Total		34	36	42

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Sample Benchmarking Case & How to Rank Criteria

Conflict Management

- High flying teams:
 - Diversity (opinion, personality, experience)
 - Organization
 - Time management
- 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 whom
 - 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 criticise)
 - formality of setting (have a time limit and roles)
 - set someone to keep things on track, take down crucial notes

Project and Time Management

- 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 criticise)
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