GNG1103 – Engineering Design
GNG1503 – Génie de la conception

Design Thinking

Presented by: Emmanuel Bouendeu

Image from: http://www.theceomagazine.com

Agenda

- Reminders
- Advices on Effective Learning
- **Review Questions**
- **Design Thinking**
  - Definition
  - Process
  - Empathy & Beginner's Mindset
  - Shoe Design Thinking Experience
  - Reflection & Takeaways
  - Lessons Learnt

Reminders

- Due date for **Deliverable A (**Team Contract): Jan 19
- Due date of **report of Lab1**: Date of your Lab 2 (Arduino)
- **Client Meet 1**: Jan 20, do some researches and prepare your questions.
- **Quiz 1**: Jan 15, (covers Lecture 1, 2 and 3)
- What is your summary of **Lecture 2**?
  - Importance of understanding the real problem
  - Technical and economic feasibility
  - System configuration & Sizing
  - Analysis and Refinement of concept
  - Others issues (environmental, cultural, political, social)

Advices: Considerations for Effective Learning

What is your **Concentration** & **Retention** time?

1. Do you ask experts (prof.) for advices?
2. How many time do you spend when studying?
   Chunk technique (15 to 25 minute learning + 5 minute break)
3. Where do you study?
   Avoid bed, game room, kitchen or living room. Use study light
4. What do you study?: Concepts or Facts?
   Study concepts not facts (John Edward Arnold is one of the founding fathers of Design Thinking)
5. Do you take notes and flesh them out?
6. Do you rest your brain enough?
7. Do you repeat often or teach other people?
8. How do you read your lecture notes or text books?
   Survey – Question (how, what, where, why, when) – Read – Recite – Review (SQ3R) periodically
9. How do you memorize facts?
   Acronyms (SQ3R) – Coined phrase (screw & unscrew) – Image (Protein-Carbohydrate-Fat **449**)
10. Do you relate new concepts learnt to what you know?

Review Questions

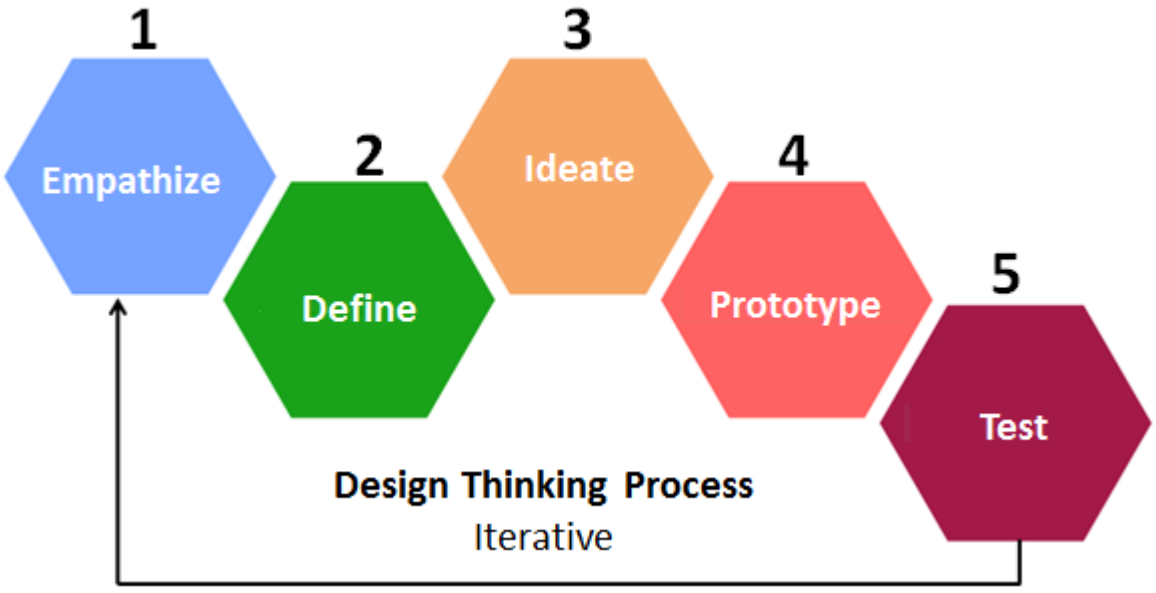
1. What is design thinking?
2. When is the beginner's mindset applied in design thinking and why is it important?
3. Describe the **steps** of the engineering design process model called **design thinking** as it may be applied to your GNG1103 **course project**.
4. From the statements below, circle the single true statement

   Design thinking is a engineering design process model which emphasizes on:

   A. Empathy and testing
   B. Problem definition and prototyping
   C. Empathy and rapid ideation
   D. Prototyping and iterative testing
   E. Empathy and rapid iterative prototyping
   F. Ideation and rapid iterative prototyping

What is Design Thinking (DT)?

- *An approach to solving design problems by understanding user needs and developing the design tools required to solve those problems*
- *Emphasizes on Empathy to understand the needs of clients and rapid iterative prototyping to learn from.*
- *Empathy is your effort to understand the way clients do things and why, their physical and emotional needs, what is meaningful to them*



Empathy: Assume the Beginner's Mindset

Why?

- To avoid biases due to past experiences, understanding and expertise
- To approach the design challenge with fresh eyes

How?

- Question everything and ask questions to learn about user's perception
- Don't judge, just observe and engage users
- Often ask Why, to dig deeper

Let Us Experience Design Thinking

- Think about the last time **you** bought a pair of shoes

Empathy in the Design Process

- NOW, use a beginner's mindset and forget that! …Think about buying a pair of shoes **FOR SOMEONE ELSE!**
  - You will need to understand what **THEY** want, **not** what you want
  - They may not even know (or be able to articulate precisely) why they buy the types of shoes that they buy or have bought in the past
- You need to help them discover a pair of shoes that will "surprise and delight" them the next time that they buy shoes
- Your objective is to understand **them** better, so that next time **they** buy shoes:
  - Shopping for shoes is a **better experience** for **THEM** or
  - **THEY** end up with "better" shoes that **THEY** **like more**
  - **THEY** end up with "better" shoes that **THEY** find **more useful**

Mandate for the Design Experience

- Design the **ideal** shoe for your partner in
- 55 minutes with the
- Resources available

There are 11 steps and each step is timed up

Play-doh


Scissor

Washable Marker

Magic Tape


Color paper sheet


Hand cleansing spray

Process To Follow in this Design Experience

	Design your best pair of shoes	3 min.
1	**Interview**	2 x 4 min.
2	**Dig deeper**	2 x 3 min.
3	**Capture findings**	4 min.
4	**Define problem**	3 min.
5	**Sketch + Constraints (6)**	4 + 2 min.
7	**Share solutions & get feedback**	2 x 4 min.
8	**Iterate based on feedback**	3 min.
9	**Build a solution**	10 min.
10	**Share the solution & get feedback**	2 x 3 min.
		58 min.

Empathize

8min: 2x4min each

Step 1: Interview your partner

Tip: *Ask open ended questions. "When was the last time you bought shoes? How did it go? What did you like about your shoes? What did you dislike? What were the best shoes you ever bought, Etc."*

Course Attendance: Registration

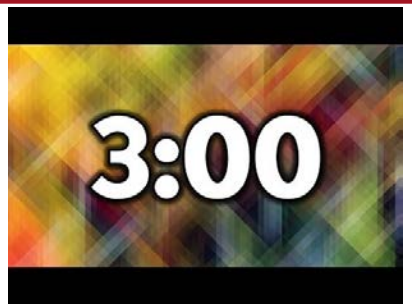
- Use your smartphone or laptop to **register/notify** your attendance in this lecture
- Allow **geo location** in the attendance site
- Accept **cookies** from third parties applications
- Log in using only your **Uottawa** account at the link below

https://attendance.azarm.ca/attendancerecord/gng1103f

- Your attendance must be registered only **during the lecture** and at the **time specified by the professor**

- You can also use the **QR code** below, to register quickly

6min: 2x3min each



Empathize

Step 2: Dig deeper

Tip: *Use the things that you found interesting to dig deeper. Go beyond the technical into the emotional.* **Ask why** often. For example, if your user mentioned that it's challenging to buy a shoe, ask why?

Define

3min

Step 3: Capture findings

Tip: *Synthesize what you learned into a few needs and few insightful tidbits. Needs are actionable or doing types of things (**verbs**), they are the things your user wants to accomplish. Insights are discoveries (not that obvious) that you can leverage when creating your solution.*

Define

1 min.

Step 3a: Any special constraints?

Tip: *Determine if there are any particular design constraints:*

1. *Medical conditions*
2. *Particularly big or small feet*
3. *Types of activity*
4. *Etc.*

Define

3min

Step 4: Define the Problem Statement

Tip: *This is your point of view. State a challenge you are willing to take. Problem Statements should be* ***short, specific and sexy.***

Ideate

4min

Step 5: Sketch, sketch, sketch

Tip:

1. *Rewrite your problem statement at the top page*
2. *Remember: You are creating a solution to the problem statement YOU identified*
3. *Go for quantity not quality! No alpha numeric characters!*
4. *It doesn't need to be pretty, just do it!*

Ideate

8min: 2x4min each

Step 6: Share your solutions and get feedback

Tip:

1. *Spend time listening to your partners feedback*
2. *Don't defend your ideas*
3. *Remember empathy: This is the time to gain better understanding of your partner*

Ideate

3min

Step 7: Iterate based on feedback

Tip:

1. *Reflect on what you have learnt about your partner and about your solutions*
2. *Sketch ONE new solution based on the feedback*
3. *Solution could be totally new or a combination/variation of the old solutions (you might even want to revisit the problem statement, if we had more time!)*

Prototype

10min

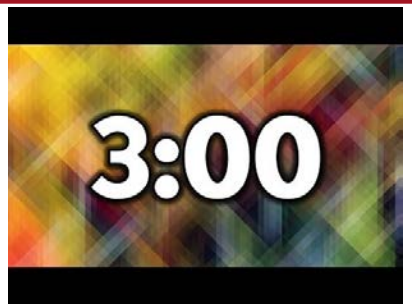
Step 8: Build your solution

Tip:

1. *Create a physical prototype of your solution*
2. *Create an experience that your partner can engage in and react to (high "play value" is actually a good thing!")*
3. *You can focus the prototype on one aspect of your solution or it could be the whole thing*

Test

6min: 2x3min each



Step 9: Share your solution and get feedback

Tip:

1. *Your prototype is not precious, the feedback is what is precious*
2. *Don't defend your solution, understand and observe how your partner uses it or misuses it*


WHAT
their needs are
WHO
you're solving for
DEFINE
EMPATHIZE
IDEATE
HOW
you'll solve them
PROTOTYPE
STORYTELLING
TEST
WHY
your work matters

Reflection and Takeaways

Reflection and takeaways

1. How did engaging your partner change the direction of your prototype?
2. How was showing an unfinished product?
3. How did the pace feel? (Quick iterative cycles)
4. How will using a design process affect the way you will do things moving forward?
5. Was your partner's solution the same as **your** own initial ideas for a solution?

Lessons Learnt

- **Design thinking** is biased toward **doing** and **making** over thinking and meeting
- **Empathy** for the person or people you are designing for, and getting feedback from users, is **fundamental** to good design
- **Prototyping** is not simply a way to validate your idea; it's an integral part of your innovation process. We build to **think** and **learn**
- **Creating experiences**, using **illustrative visuals**, and telling good stories communicate your **vision** meaningfully
- **Iteration** is paramount for a **person's fluency** with design thinking