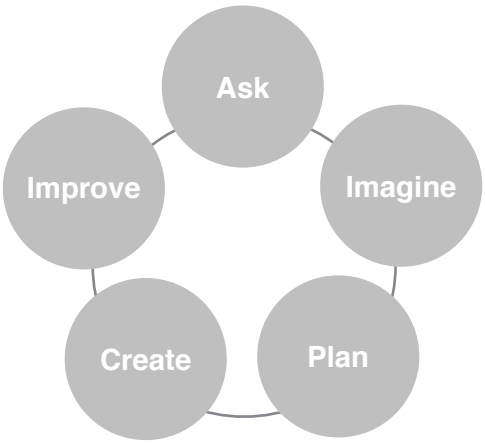
Session 2 – Design Thinking (4 Hours)

Engineering Design Cycle (30 minutes):
This is the engineering design cycle you know. In fact there are many versions, some more detailed, some more simplified. A similar “mental model” is also used in design theory, it is a slightly more complete making it an extremely powerful tool for developing creative projects. It has many similarities to the EDC but also takes into account other elements inherited from the Arts and Humanities fields and a more scientific approach to testing, making it a more holistic approach. We will learn more about design thinking below.



Design Thinking Introduction (90 minutes):
Design thinking can best be described as “solution-based thinking” and borrows heavily from a number of fields of knowledge, such as the sciences (scientific method in particular), business, anthropology and even psychology to create a framework for creative problem solving.

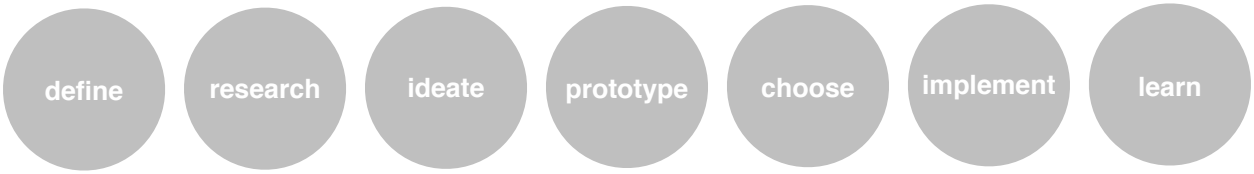
“Design thinking is a formal method for practical, creative resolution of problems and creation of solutions, with the intent of an improved future result. In this regard it is a form of solution-based, or solution-focused thinking – starting with a goal (a better future situation) instead of solving a specific problem. By considering both present and future conditions and parameters of the problem, alternative solutions may be explored simultaneously.

This approach differs from the analytical scientific method, which begins with thoroughly defining all the parameters of the problem in order to create a solution. Design thinking identifies and investigates with both known and ambiguous aspects of the current situation in order to discover hidden parameters and open alternative paths which may lead to the goal. Because design thinking is iterative, intermediate "solutions" are also potential starting points of alternative paths, including redefining of the initial problem.”

From: *https://en.wikipedia.org/wiki/Design_thinking*

Unlike analytical thinking, design thinking is a process which includes the "building up" of ideas, with few, or no, limits on breadth during a "brainstorming" phase. This helps reduce fear of failure in the participant(s) and encourages input and participation from a wide variety of sources in the ideation phases. The phrase "thinking outside the box" has been coined to describe one goal of the brainstorming phase and is encouraged, since this can aid in the discovery of hidden elements and ambiguities in the situation and discovering potentially faulty assumptions.

The design thinking process has seven distinct stages: *define, research, ideate, prototype, choose, implement*, and *learn*. Within these seven steps, problems can be framed, the right questions can be asked, more ideas can be created, and the best answers can be chosen.



The steps aren't linear, they can occur simultaneously and be repeated which requires both analysis and synthesis must be used. The terms analysis and synthesis come from (classical) Greek and mean literally "to loosen up" and "to put together" respectively. When applying analytical thinking, we break down the problem into it’s component parts, making it easier to tackle and find solutions. We then use synthesis to organize those solutions into one cohesive idea that composes our solution into a realistic and achievable plan.

It is very important to distinguish between design and aesthetics. Design is in fact project based theory, a set of tools (not unlike engineering) that allow us to tackle complex problems using the resources available at any given time.

This kind of solution based thinking requires more then just the technical knowledge (which you have been acquiring in past training sessions), it also requires teamwork, creativity, curiosity, optimism and empathy. Perhaps the most confusing of these will be empathy, the ability to put yourself in someone else’s shoes, but we cannot design a solution meant for a target group to which we don't belong (such as children) without the ability to see the world through their eyes.

Brainstorming activity

The starting point of any design thinking process is a “Brainstorming” session. You will be using this technique later on in the course to help you define and conceptualize your project. In order to get some experience with the process, let’s run an exercise.

Brainstorming requires both the use of both divergent and convergent thinking. with divergent thinking we are using a process similar to word association, starting form a core concept (usually one word) we extrapolate ideas surrounding this concept, both negative and positive in order to get a deeper understanding of the issue.

We then use convergent thinking to find a common thread that joins these concepts into one actionable solution.

Working as a group and using a white board or large sheet of paper and markers, try and solve the problem of keeping the FabLab clean. Add the words “Cleaner FabLab” in the center making sure it’s written large and clearly. Begin to break down the problem as a group, where is the problem coming from? How can you solve each cause individually?

Add these ideas as succinctly as possible around the center, taking turns and listening to each others thoughts as you do it. There are no turns but everyone must listen when someone has something to add.

Finally, after 20 minutes or so, switch to convergent thinking and attempt to find a solution that will resolve most if not all of these small problems that make up the larger issue we are trying to tackle.

Storytelling and Communication through objects (30 minutes)
Objects communicate with us in many ways, they bring back memories, excite feelings and tell us many things about themselves if we know where to look: who made them, when, what are they used for, how to use them and much more.

But in fact, it is us that communicate with each other **through** objects. Design is in many ways a communication field - humans have been communicating with each-other through objects for centuries, design elements and cues built into successful designs allow the user to understand the purpose and function of an object without the need for a manual or instruction. A good example of this is a mug and it’s handle, there is little need to explain it’s function to even a child, the way in which humans inherently perceive and explore our surroundings will quickly lead anyone to understand how to use a mug, if it is well designed, that is.

The same is true for more complex objects as well, what varies is the degree of skill and work needed to allow the object to communicate it’s intentions to the user without any other input from the designer. Successful design speaks for itself as long as the context and audience are correct. By this we mean that design can only be judged taking into account the reality for which it has been designed; a race car cannot be judged on it’s off-road abilities and a children’s book cannot be expected to entertain an adult.

As so, objects inherently reflect the societies that create them, they values, aspirations, beliefs and hopes, making them historical artifacts that allow us to better understand our history. In the next session we will see some of the ways in which objects can communicate.

Visual Language and Semiotics (90 Minutes)
As discussed above, good design allows objects to communicate directly with their target audience, but how exactly? Below are some of the ways in we can convey our intent by altering an object’s physical properties.

Color - Colors play a huge role in how we perceive and object. Color theory divides all shades into either cool or warm colors with blues and greens making up the cools and reds and yellows representing warm:

“Warm colors are said to advance or appear more active in a painting, while cool colors tend to recede; used in interior design or fashion, warm colors are said to arouse or stimulate the viewer, while cool

colors calm and relax. Most of these effects, to the extent they are real, can be attributed to the higher saturation and lighter value of warm pigments in contrast to cool pigments. Thus, brown is a dark, unsaturated warm color that few people think of as visually active or psychologically arousing."

From: *https://en.wikipedia.org/wiki/Color_theory*

Texture - Texture plays a double role in design, as it not only interacts with the user in a tactile way, with smooth surfaces arousing sensations of cleanliness, precision and purity versus the more natural and dangerous feel of a textured object, texture also plays a part in affecting color. Extremely smooth surfaces are often shiny while matte surfaces must be textured. A transparent object will likewise always be extremely smooth due to the way in which light scatters at a micro scale.
Sound - Although not often discussed, the sound an object makes plays a huge role in how we perceive it, both in the sounds it makes intentionally, such as how an alarm sounds, but also the passive sounds it emits when handled or dropped. A hollow object becomes obvious when dropped or hit, telling us a lot about how it's made, what materials it may be made of and influencing our perception of it in that way. Fine crystal is often thinner then glass and produces a higher note when struck often perceived as a sign of quality. A car door that emits a low frequency sound when closed sends a message of durability and quality, while a higher note denotes hollowness and even a vehicle that is not as safe as it could be.

Perception of Quality - Materials and colors also play an important role in how we perceive objects. Today, these notions have becomes more universal, but throughout history, colors and materials had very different connotations to different cultures. To this day, red and gold are the most luxurious colors in Chinese culture, a notion inherited from thousands of years ago when these colors represented the early emperors. In the western world, red and gold is often considered opulent and decadent combination which denotes lack of taste.

Likewise, materials have different connotations to different cultures at different times. While gold has always been prized by most cultures due to it's rarity and ductility (making it easy to work into decorative pieces such as jewelry) it has fallen out of fashion in many cultures that tend to have a more pragmatic approach, such as northern Europe where more hardwearing materials such as stainless steel or titanium are prized above scarcity or exclusivity.

Context - As mentioned in the previous session, context must always be considered, as we have seen that the perception of color, texture and materials are all relative to the cultural context and application of an object, be it industrial, for home use, children, elderly, etc.

Homework: Create a "Mood Board" divided into the following areas: Color, Texture and Sound. Take pictures of 10 everyday object you use in your life and place them in one of the 3 categories in the board according to what quality you appreciate the most in each object and describe why using through bubbles. Look up "mood board" online to get started.