ES 115
Design, Innovation and prototyping

1 Introduction

Manasi Kanetkar
August 2024

Introductions

Google classroom code*: *n6cbqgo

Schedule of sessions

Week	Lecture	Lab session
1	Introduction	Design activity [AB1/101]
2	Drivers of innovation + PRODUCT	Prototyping Trade 1 [Machine Shop/TL/Maker Bhavan]
3	Design process	Prototyping Trade 1 [Machine Shop/TL/Maker Bhavan]
4	Forming a project brief	Test : Prototyping Trade 1
5	Human factors	[Machine Shop/TL/Maker Bhavan/Wood workshop] Technoaesthetic detailing
6	Presentation and representation	Design Activity [AB1/101]
7	Nuances of design	Prototyping Trade 2 [Machine Shop/TL/Maker Bhavan]
8	Responsible design	Prototyping Trade 2 [Machine Shop/TL/Maker Bhavan]
9	Case studies	Test : Prototyping Trade 2
10	IPR	Final Project
11	Guidelines for final submission	Final Project
12	TBD	Final Project

*Holidays: Lectures will be shared as recordings

Schedule of submissions

Distribution	Weightage (%)	Submission Week	Deliverables
Assignments	30	Week 1	Report on design activity (5 marks)
		Week 5	Techno-aesthetic design of joinery (15 marks)
		Week 8	Report on Human factors (5 marks)
		Week 10	Experiential Learning Report (5 marks)
Trade Certification	30	Week 4	Trade 1 (15 marks)
		Week 8	Trade 2 (15 marks)
Design project	30	Week 4	Phase 1: Project brief (Value Proposition) (5 marks)
		Week 7	Phase 2: Multiple ideas (Evaluated with phase 3)
		Week 10	Phase 3: Concept sketches + Low fidelity mockups (10 marks)
		Week 12	Final Concept presentation (15 marks)
Peer Review	10	Week 11/12	10 marks
TOTAL	100		

Sessions missed due to holidays

- Lectures will be recorded and shared
- Lab sessions will be compensated on Saturdays with prior notice

Communication

es115dip@gmail.com (Attendance / submission) (Manasi Kanetkar)

nirav.bhatt@iitgn.ac.in (trade related issues) (Nirav Bhatt)

tarun.s@iitgn.ac.in (trade related issues) (Tarun Sharma)

Mode of communication

- **Google Classroom (GC)** will be used for sharing documents, important slides from lectures
- **Submissions for design projects and assignments will happen via GC**
- Updates or changes in classes/ will be shared on the GC and/or via student representatives and TAs as well.
- Practice and test of **trades** will happen in **workshops**; staff members will be in-charge of the same

Visual notes

Submit at the end

Images: https://in.pinterest.com/search/pins/?q=visual%20notes&rs=typed

Watch: https://youtu.be/eZQ7ILUAsek?feature=shared

Materials – for low fidelity mock-ups

- Cardboard boxes, papers (printing paper, card sheets)
- Plastic containers, bottles, bottle caps, old pens
- Tins/ cans, tetra-packs / glass bottles (washed)
- Broken hardware, clips, pins, wires and cords etc.
- Wooden skewers, plant twigs
- Old pieces of cloth /old leather belts, rope
- Adhesive, rubber bands, cello-tape
- Paper cutter, a pair of scissors, steel scale
- Acrylic paints

What to expect?

- Basics of design thinking
- Process of good design
- Multidisciplinary
- Expecting you to be active and alert!
- Needs you switch between topics (quite often)
- Intensive; yet a lot of fun!!

YES

What to expect?

- Make you an expert in design / innovation
- Be theory heavy
- Be very smooth, there will be phases of uncertainty

NO

Design will help..

- In studies for UPSC/ MPSC
- Management studies
- How to work in functional teams?

Skills that you will develop

- Communication skills
- Concept representation skills
- Prototyping skills
- Troubleshooting (problem solving)
- Developing individuality

A pledge

- To observe.. (like a detective)
- To ask questions... lots of them
- To articulate... (~~good/bad~~)
- To be ready to **fail and retry** (multiple times)
- Not everything is about myself and my views!

What is design ?

Through the course:

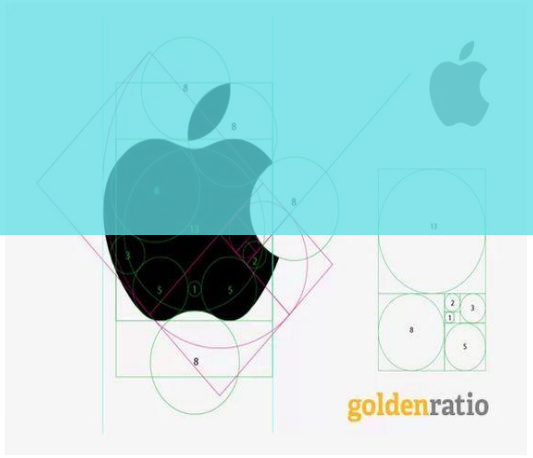
Multiple meanings of design

General perception about design / designers

- Decoration
- Whimsical
- Abstract art

What is डिज़ाइन ??

Anything that is not by accident ..
...is by design



What is design

"Design is not just what it looks like and feels like.

Design is how it works."

–Steve Jobs

Design is a goal oriented, creative, problem solving process

~~I want it this way!!~~

~~Just a creative expression~~

What is design : how it works

- Creative problem solving
- Helps develop a vision/ out of the box ideas
- Inclusivity
- Systemic thinking

Why this course?

Objectives

- Introduction to ***design process*** and avenues of innovation
- Introduction to various ***prototyping trades*** and skill development
- Introduction to workshop/ shop floor ***practices and safety standards***
- Understanding the ***journey*** of an idea to a feasible product, opportunities for innovation by engineering and design

Objectives

- Understanding ***material properties***; introduction to design and engineering detailing for prototyping
- Application of design process as an ***iterative and creative problem solving***.
- Using ***design tools and methods*** to offer value added solutions for specific needs

Background for innovation

Skills displayed by animals/ birds

- Using tools
- Communication
- Building / Storage of food
- Making new materials (paper / composites)
- Controlling environments (weather/ defence)
- Interior design

Natural evolution

Beaver dams

Capuchins using tools

A dog named bunny communicates
In words (using buttons)

Human nature (innovation)

- A want for a better quality of life
- Improving the environment around
- Increasing efficiency and effective use of resources
- Desire for improved social life

Discoveries/ Inventions

Hunter gatherers

Hunter gatherers' tools

Agrarian era: society

Agrarian era - products

Products, culture

Products and social structure

Products keep evolving

Crafts

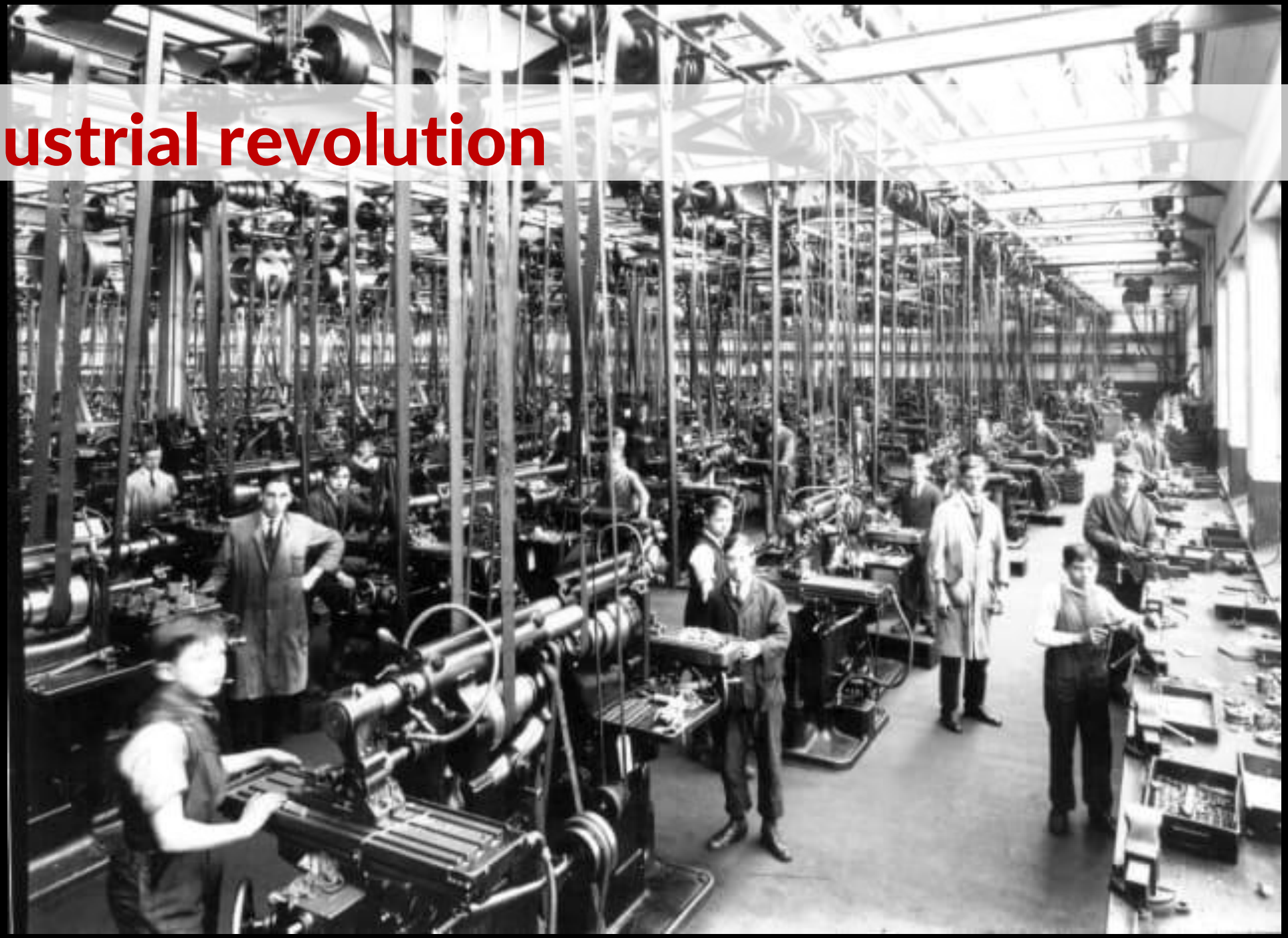
Crafts

Crafts

Crafts

Industrial revolution

19th and early 20th Century



Socio-economic changes

19th and early 20th Century

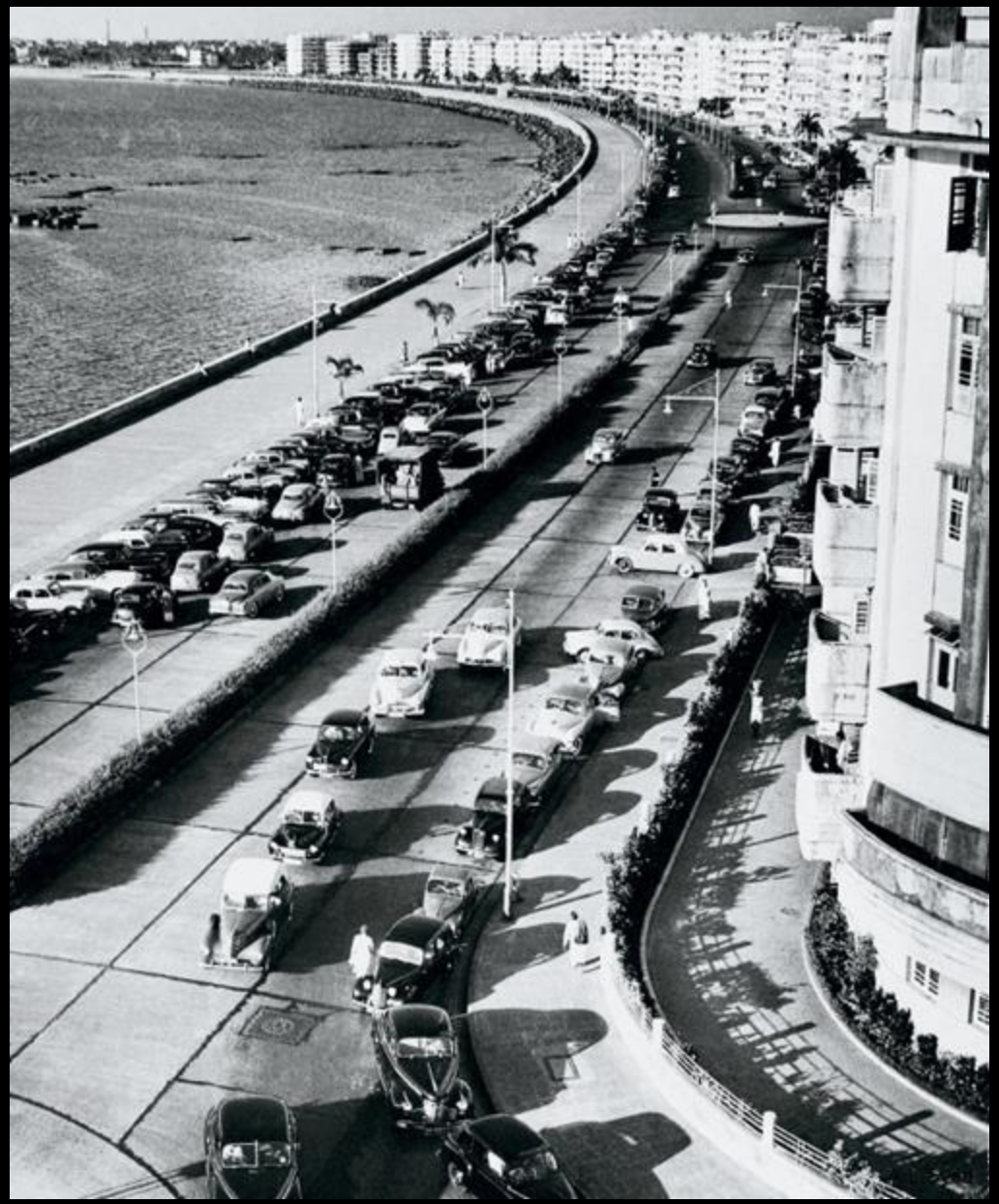
Socio-economic changes

Early 20th Century

'Rosie the Riveter'

Urban development

https://twitter.com/mumbaiheritage/status/1090261551427117057

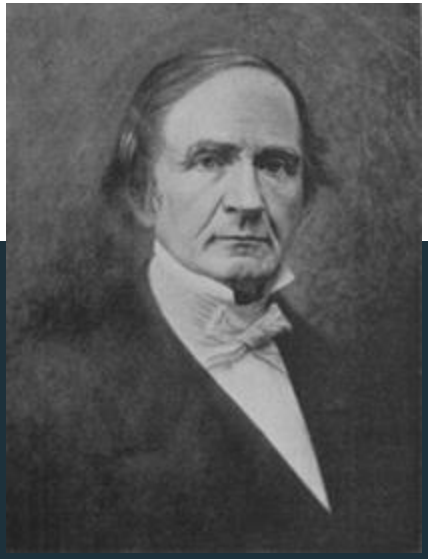


Mumbai around 1945
https://architexturez.net/pst/az-cf-172426-1444709415

Products - early modern industries

Products in the early industries

Professions



Markets

Need or want?

Note: read about consumerism

Roles of various professions

Number of stakeholders

- Industrialist / capitalist
- Engineer/ technology expert
- Marketing agency
- Supply and sales network
- Consumer
- After sales agencies (service + support)

Design as a profession

Developing products for mass

- Disconnect between user and manufacturer
- Lost craftsmanship
- Changing needs of the society
- Awareness about ergonomics and new aesthetics
- Need of a ‘bridge’

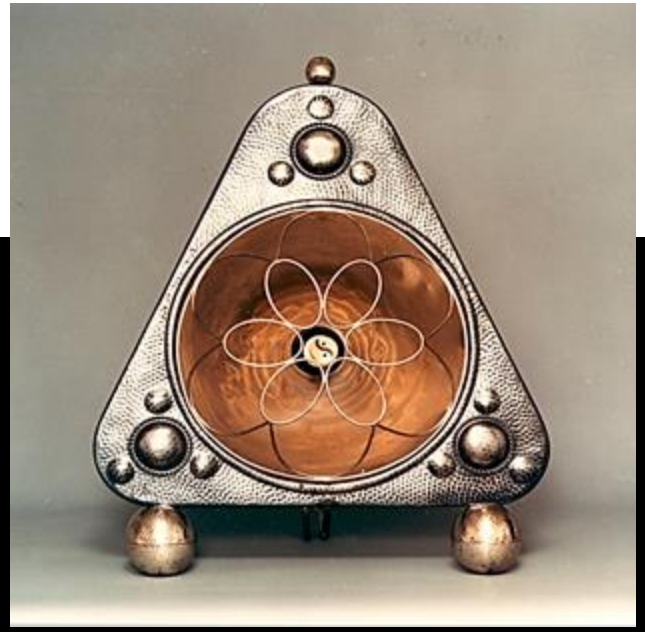
Role of an engineer

- To ensure manufacturability and assembly
- To design transfer of energies
- Technical simulations and testing

Role of a designer

- To develop usability and aesthetics
- To ensure manufacturability of new ideas
- To ensure the marketability
- Visualizing new concepts/ applications of technology

Peter Behrens



Raymond Loewy

New tech/material in consumer market

LC4 Chaise Longue
Le Courbusier

Plywood chair
Charles Eames

Wassily chair
Marcel Breuer

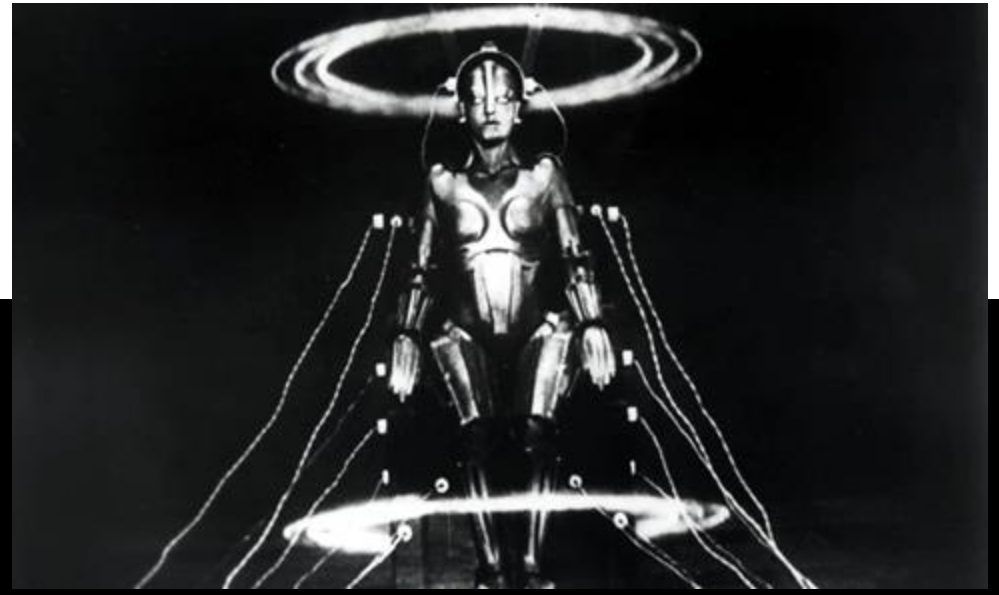
FRP chair
Charles Eames

The scope of

Design and innovation…

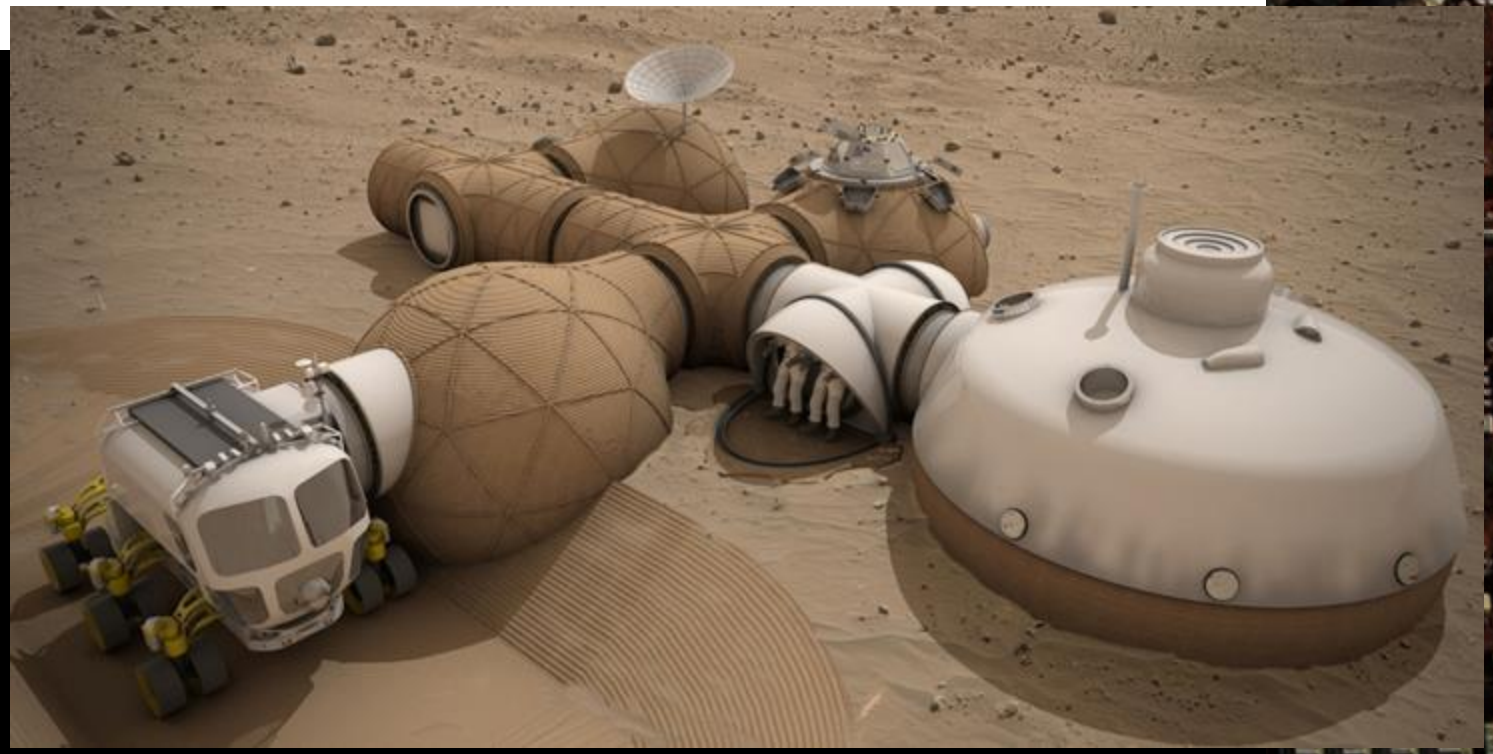
Developing a vision

Metropolis, 1927



https://www.theguardian.com/film/2020/mar/27/ive-never-seen-metropolis-fritz-lang-film

Developing a vision



Ref: https://tinyurl.com/3wrxwx5u

Life on Mars

Design for engineers

- **Framing:** Perceiving reality from a certain standpoint or angle.
- **Analogical reasoning:** Identifying and transferring relevant knowledge
- **Abductive reasoning:** Proposing hypotheses to explain certain unusual phenomena based on limited observations and data.
- **Mental simulation:** Predicting the outcome of a certain strategic choice

Ilvas, L.M., Kansikas, J. and Favolle, A.: Rethinking entrepreneurship and management education for engineering students: The appropriateness of design

Design in India

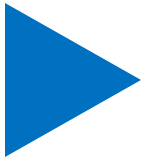


Image credit: https://www.mygov.in/

Definition of industrial design

"Industrial Design is a strategic problem-solving process that drives innovation, builds business success and leads to a better quality of life through innovative ***products***, ***systems***, ***services*** *and* ***experiences***."

Professional Practice Committee, 2015

29th General Assembly in Gwangju (South Korea)

Summary

- Course details
- Need of innovation
- Birth of design as a profession
- Scope of design and innovation (together and separate)

Is this a product?

To be continued in the next lecture…

Discussion: What is a product?

To be continued in the next lecture…

Lab this week: Design activity (AB 1 – 101)

- Each student brings a simple product (*with minimum 2 and maximum 3 parts*)
- Try to bring unique products…

Lecture next week (26th August):

- Will be shared as recording

- A quiz will be conducted in class on 2nd September

1 What is design?

That's introduction to Design and Innovation…

Next time… '*Drivers of innovation*' + *understanding a product*'