Youth for Children (Y4C) Innovation Hub

Introduction to Human Centered Design (HCD) for Software Development

What is Human Centered Design (HCD)?

- An approach to design that focuses on solving the right problem, and doing so in a way that meets human needs and capabilities

- It can be used to design hardware, software, services and even organizations — as long as human beings are kept at the center throughout the entire process.

- HCD is also known as; "Design thinking", "Design strategy", "User-centered design"

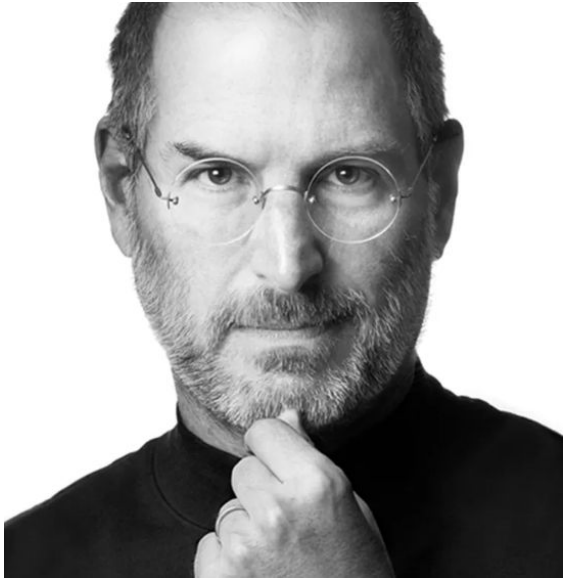
What is Human Centered Design?

“Solving the right problem”:

Never solve the problem you are asked to solve. **Why such a counterintuitive rule? Because, invariably,** **the problem you are asked to solve is not the real, fundamental, root problem.** **It is usually a symptom."**

Human Centered Design Helps to:

- Keep the user at the centre your decisions;
- Understand the "human" element;
- Identify people's real needs, and challenges;
- Satisfy users through frequent feedback;
- Develop effective solutions
- Know where to begin;
- Reminds you to continuously improve;
- More reliable and flexible than intuition.



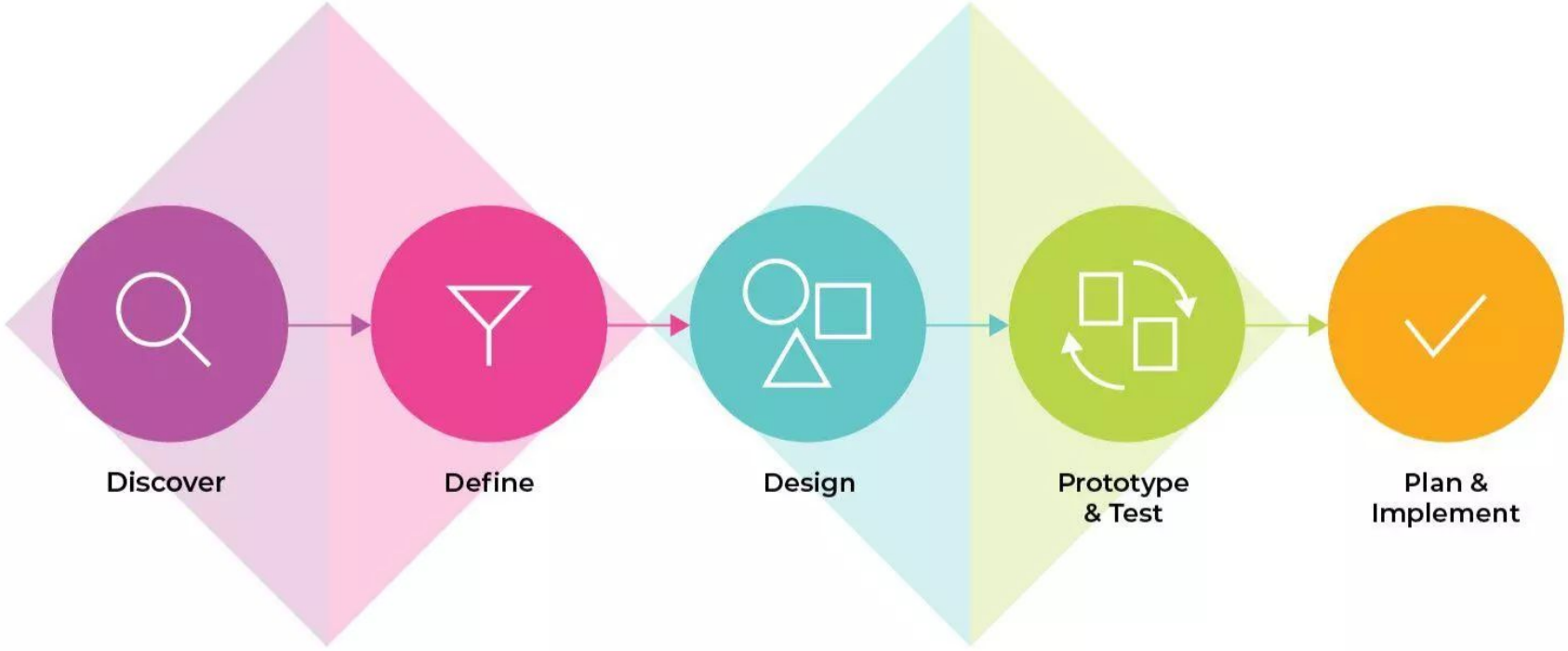
HCD for Software Engineers:

Starting point: You are given a challenge

- **Come up with software solutions that address the health challenges facing Tanzania**
- **Come up with a software solution that can improve productivity and resilience in Tanzania's agricultural sector**
- **Come up with a software solution that can improve the quality of education in Tanzania**
- **Come up with software solutions that can improve transport infrastructure and services in Tanzania**

HCD Process

- Can be presented in many forms



HCD Process

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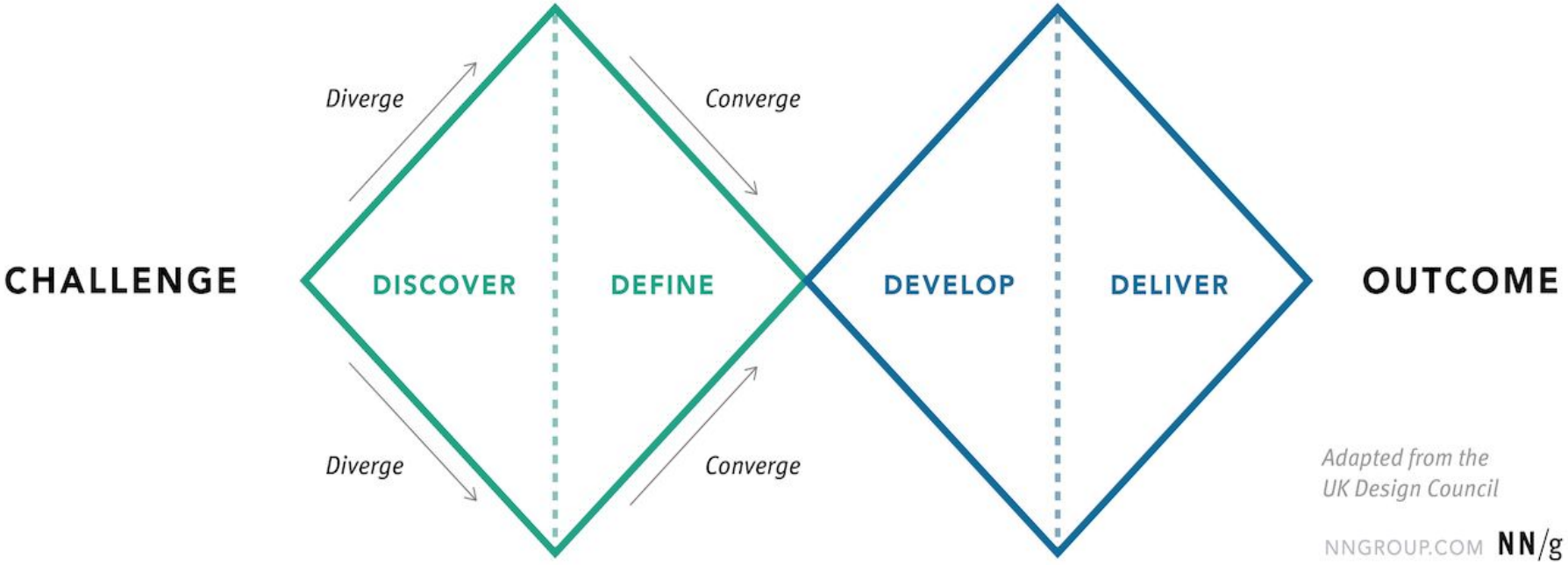


Discovery

- **Discovery is about understanding the problem space**

- **Knowing that transport infrastructure and services in Tanzania are inefficient /underdeveloped is not the same thing as**
  - **Understanding the "transport infrastructure and services in Tanzania" and**
  - **Discovering the root causes of inefficiencies**

"Do not set out on a project with a plan to "build an application" before you've fully understood the problem space. With this mindset, it's easy to fall into a trap of searching for problems that fit a solution (your application) instead of understanding the problem and then deciding on the best solution."

Discovery

1. **Understand the challenge**
    - What do you know about challenge?
    - What don’t you know that you need to research?
    - Who are the stakeholders?
    - What are their pain-points/problems?

Tools:

- Stakeholder maps
- Personas
- Journey maps

Discovery

2. **User research**
    - Who are the users?
    - When, where, why, and how do they currently accomplish tasks or use services?
    - What do users perceive are problems with their current practices?
    - User’s wish list for improving how they currently accomplish their task or use services?

Tool:

- Interviews, Observations, Surveys and desk research

Define / synthesize

Define - 5Whys

Arrive to the Root Causes of the Problem

- We now know something about the stakeholders, users and their experiences (highlights, pain-points, routines, etc.)
- So what are the root causes of such problems? For each pain-point shared, Ask why? Why? Why?
- Choose one root cause that affects specific users to come up with a solution for
- Frame an Opportunity in form of a design challenge

Frame the root cause of the problem in to a design challenge

How might we (ACTION WHAT)

_____ for (WHO) _____ in

order (TO CHANGE SOMETHING).

Example Challenge:

How can we provide reliable and accessible transportation for all citizens in Tanzania, in order to increase mobility and support economic growth?

Discover your audience

- Persona
- Stakeholders map
- User Research

Case Study: Transportation Challenge

Persona Canvas

Personas are fictional characters that are used to understand the needs, values, aspirations, abilities, limitations and character traits of different users.

- Know your audience. Don’t make assumptions.

Our Personas from the transportation challenge can be:-

- The drivers
- The passengers

Catherine

Needs

1. Sustainable environment for her children to live
2. Get early at work
3. Return early at home
4. Comfortability during travelling
5. Doing maintenance for her car
6. Reduction of fuel price

Challenges

1. Ignorance on carbon emission and climate change
2. Using public transport is difficult
3. High fuel price
4. Works far from home

General info

Age [25-35
Education [Bachelor's Degree]
Employment [Employed
Family [Married]

Facts

1. Public transports are mostly used in the morning and evening
2. Most people are not doing maintenance on time
3. In March the petrol price was Tsh 2,480, in August the prices were Tsh 3,410
4. Public transports availability at night is a problem.

I hear

1. Climate change has affected the world
2. Electric cars are expensive
3. Increase in fuel price is caused by Russian war
4. Using public transport is not safe (theft in public transport)

I do

1. Drive
2. Go to work
3. Doing my car service

I think

1. We can't change the world by me stopping using my car.
2. Having a car is a sign of good life

I say

1. People should use more private cars
2. Using public transport is a wastage of time
3. Never will I use public transport again!

I feel

1. · Safe in my car
2. · Comfortable in my car

I see

1. People fighting for public transport
2. Public transport takes long
3. Public transport changes their normal route
4. Other cars polluting the environment
5. · Shortage of public transport

Stakeholders

Stakeholders are individuals or institutions that are contribute directly/indirectly to the problem being addressed.

List of Stakeholders:

- Government (Ministry of transportation)
- Community organizations
- Transport providers
- The end users (the citizens)

User Research

User Research refers to the methodic study for the targeted users. Including their needs and pain points.

- **Qualitative research**
  Interviews are examples of methods that can be used here. This aims at understanding **WHY**
- **Quantitative research**
  This uses more structured methods such as surveys. Here you gather measurable data about **WHAT** users do.

5 why’s

Activity:

From the transportation challenge that was given Identify the root cause by using Five (5) WHYs

Why's

1st Why: why is there insufficient transportation infrastructure and services in Tanzania?
Because there is lack of Investment in the transportation sector

2nd Why: Why there is lack of Investment in the transportation sector?
Because the government does not prioritize the investment in transportation

3rd Why: Why does the government not prioritize the investment in transportation?
Because they allocate their resources towards other sectors they consider more important such as education or healthcare.

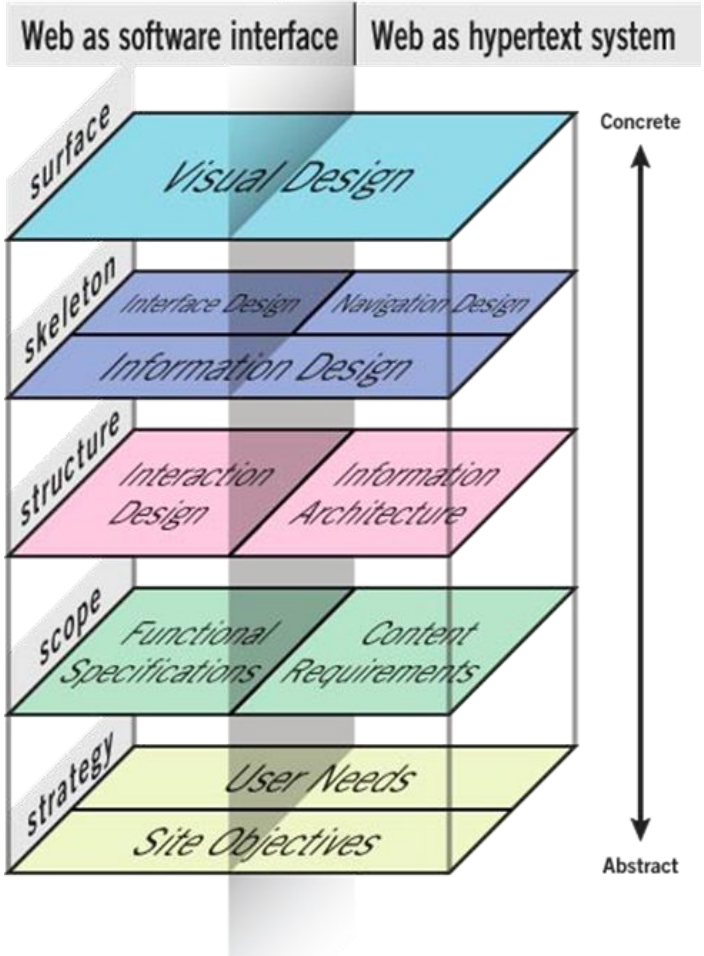
Why’s

4th Why: Why do they prioritize those other sectors over transportation?
Because those sectors are seen as more critical for the overall development of the country

5th Why: Why is transportation not seen as critical for the overall development of the country?
Because there is lack of understanding of the crucial role transportation plays in enabling economic growth and improving quality of life.

Develop

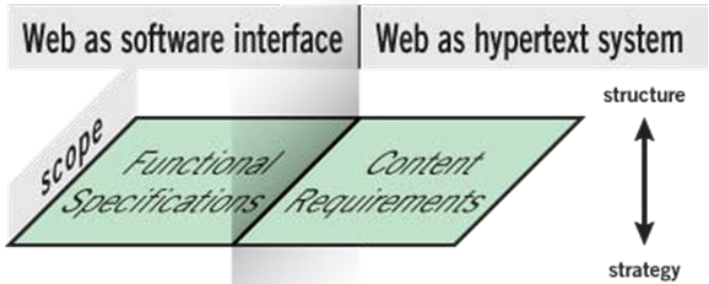
1. **Ideate** - be innovative, brainstorm, there is no bad idea
2. **Design -** 5 elements of user experience (strategy, scope, structure, skeleton, surface)
   - Strategy = discovery and define
   - Site objective = design challenge
3. **Prototype and test** - bring ideas and designs to life, get feedback, learn, improve, refine idea- simple sketches, mockups, storyboards
4. **Develop and implement**



Design - Scope

1. **Scope**

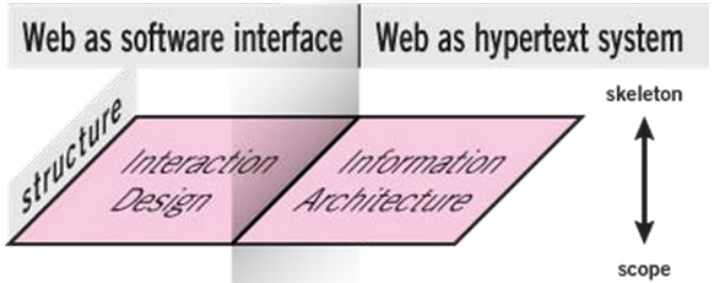
- **Functional Specifications: application features the software solution must include;**
  - What application features will users need to fulfill their goals?
  - Focus on what it does”
    - not “how it works”
    - not “what it doesn’t do”



- **Content Requirements: content elements the site must include;**
  - What information will users need or want from the site?
  - What form should it take? Where will it come from? Who’s responsible? Define elements according to their purpose

Design - Structure

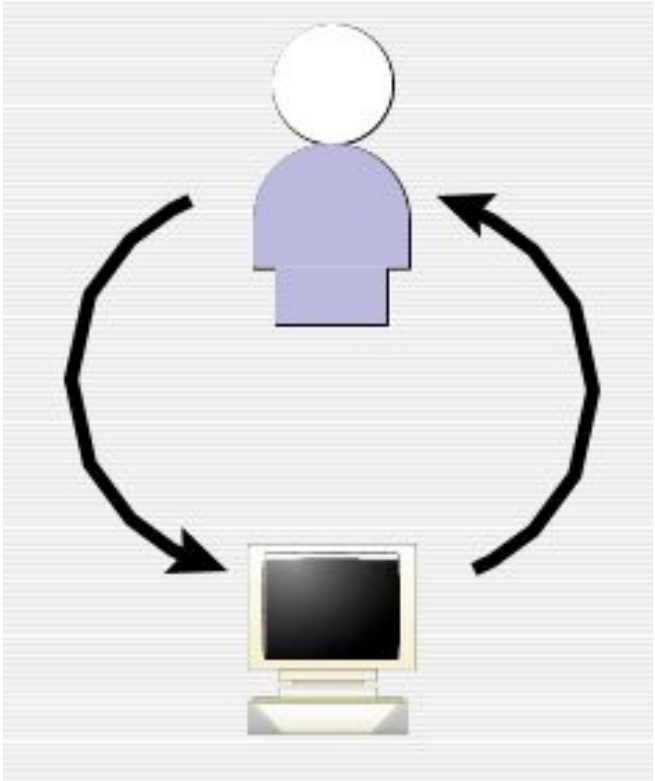
1. **Structure**
   - **Interaction Design: how the user moves from one step in a process to the next**
     - Actions the user can take with the system
     - Actions the system can take in response to the user



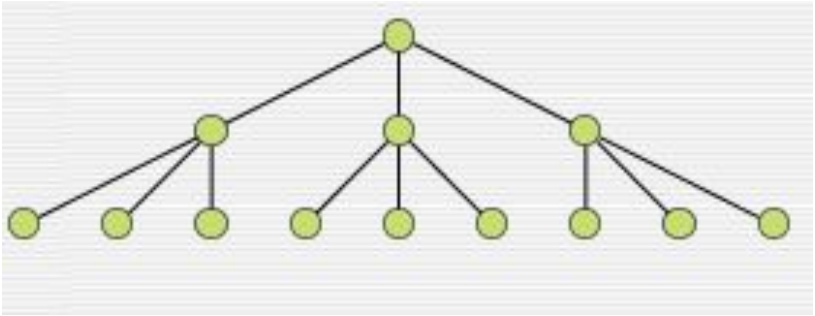
   - **Information Architecture: how the user moves from one content element to the next**
     - Defines conceptual relationships between content elements
     - Reflects the way users think about the subject matter

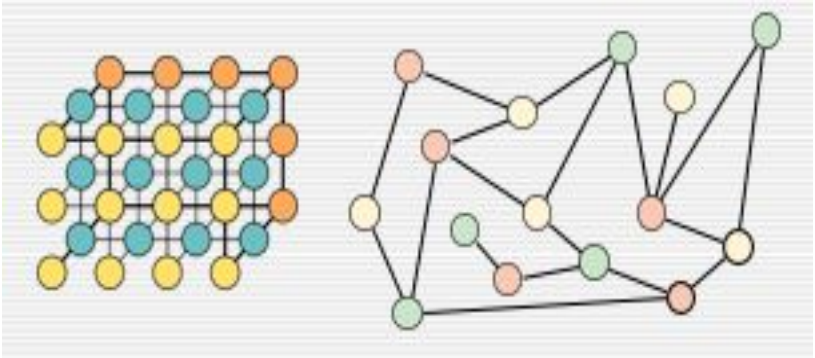
Design - Structure

Interactive Design



Information Architecture





Documenting Structure

“Docs are a waste of time”

- No one reads them.
- They’re never up-to-date.
- They’re too much trouble to maintain.
- Time spent planning the site becomes time time saved producing the site.
- Integrate documentation into the process, rather than making it a separate step.

Design - Skeleton

Information Design: Facilitates comprehension of the information.

- How we present the information so that people can understand and use it.
- Guide the user from one piece to the Next.
- Draw attention to important details

Interface Design: Facilitate user input and system output.

- Provides a means of users to interact with the application functionality.

Design - Skeleton

Navigation Design: Facilitates Movement through the site.

- Communicates choices above to the users.
- Facilitates movements
- Different designs have different effects

Design - Surface

This is the virtual design.

- **Color**
- **Typography** (Design or Selection of letter forms to be organized into words and sentences so that they are legible, clear and visually appealing to the reader)
- **Layout** (Structure for a user interface in an application)

Testing & Feedback

- Designers or evaluators rigorously test the complete product using the best solutions identified in the Prototype stage.

- This is the final stage of the five-stage model; however, in an iterative process such as design thinking, the results generated are often used to redefine one or more further problems.