

Usability Engineering
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Module - 03
Lecture - 07
User-Centred Design Process

Welcome to module 3, this is lecture 7. In this module we will start with the User-Centred Design Process. See, in if you can refer to our earlier discussions you would realize that the goal of usability or goal of the entire Usability Engineering process is to ensure that we have usable systems, is to ensure that we cater to the requirements of our end users, of our stakeholders, we ensure that they have an experience that is satisfiable and which will ensure that our customers become loyal customers.


In order to reach this objective of designing a usable system, a usable software product we must learn or get introduced to the User-Centred Design Process. In the last modules also, if you remember we have discussed about the advent of scenario building process, how defining scenarios have helped user experience designers and usability experts to pinpoint to the context specific tasks and the requirements. Similarly, we also discussed about the advent of use cases.

How use cases provide us with an insight about the entire situation and not only specific to one scenario. Now, to ensure that all these important aspects of concern are incorporated and considered we are going to now learn the process that allows us to achieve the goal and to ensure that all these important criteria's like scenarios and use cases are being considered while we design a usable system. We are going to now therefore, study the User-Centred Design Process.

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User Centered Design - Introduction

- User-centered design (UCD) is a collection of processes that focus on putting users at the center of product design and development.
- When a product/design team develops digital products, it takes into account the user's requirements, objectives, and feedback. Satisfying user's needs and wants becomes a priority, and every design decision is evaluated in the context of whether it delivers value to the users.



Let me begin with some general understanding of what is UCD, in short we call User-Centred Design as UCD. Now, whenever we talk about UCD or User-Centred Design we refer the concept of UCD as a collection of processes that focus on putting users at the center of product design and development. Here, by product we mean software products; products which has a computing system embedded into it the aspect of hardware and software interacting together to support end users reach their objectives or goal.

If you notice here you would realize that the focus or the prime objective of User-Centred design process is to put users at the focus of all activities. So, when a product or a design team develops a digital product, a software product it takes into account the user requirements. Every time since our initial lectures or modules you would realize that I am trying to emphasize on this specific aspect of identifying user requirements, objectives and feedback and in all these specific cases you would see it relates to your end users right.

So, when we talk about user requirements, when we talk about objectives, when we talk about feedback everywhere you would see these concerns are or these attributes are related the end users. Consider the case that if your requirements are not accurately identified, if you fail in accurately capturing what your end users require it will end up in a situation where you used to have the wrong requirement statement and you come up with a design solution, but the product will never work.

The product will never work because the conceptual model of the product does not entice your users your end users. And this is the prime reason you would see that every time we talk about User-Centred design approach, we talk about usability engineering, we talk

about the concept of usability, these three important characteristics are of paramount concern and they are identifying user requirements, defining the objectives and getting feedback and it is of concern to the design team or the product team.

Now, satisfying users needs and wants becomes a priority. So, there is a long debate, long discussion on whether design team should focus on users need or it should focus on users want or both should be considered I think that is a debate that we can discuss later in subsequent lectures we would talk about that.

But, as of now it is important for us to realize that satisfying their requirements that constitutes their needs and wants and in a way that is efficient will ensure that your product succeed in the market. So, therefore, satisfying user needs and wants becomes a priority and every design decision is evaluated in the context of whether it delivers value to the users. So, if you remember our earlier lectures you would realize we did talk about usefulness and usefulness is a function of utility and usability.

So, a particular product is considered useful when your user considers that the features that the product has, that the objectives or the functions that the products do will satisfy his requirements that is in another way how do we define usefulness. So, whenever you go to the market or whenever you decide to buy a product you have a product, you look at a product, you start looking at it, you start using it for some time.

And what do you do? What are actually you are doing at that moment? You are trying to gauge whether the product that you are observing whether it will fulfil your requirements or not, whether you would be able to achieve your objectives by using the product or not and these objectives can be functional in nature, this objective can be experiential in nature this can be anything.

But important point is these objectives are the objectives of the end users. So, therefore if you correctly as a design team if you correctly define the objectives, the requirements it will help us to evaluate the design decisions based on these requirements and this evaluation would allow the design team to understand, to gauge or interpret whether the user community, the representative users will identify your product as useful or not.

So, the process by which we do that, the process that ensures that we accurately design for satisfying the requirements of our representative users for our actual users is the process that we refer to as User-Centred Design Approach or User-Centred Design Process.

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Yes, it is an iterative design process and we know why in software development the iteration is important we discussed about that.

We know how a process that is linear does not allow the team to recognize the errors at the initial stages, to recognize the wrong decisions that exist or that they have might have framed at the initial stages and that gets carried to the last stage and therefore, iterative is very important iteration is very important that every time you get back to your users, you get back to your actual users and ensure that the decisions that you have taken are correct and are representative to what your actual users require and that can only be done if we follow a iterative design process.

So, yes User-Centred Design process is iterative in nature. And it is an iterative design process in which designers focus on the users and their needs in each phase of the design process. This is very important many a time while designers work or use User-Centred design process there is a notion that you start with user study you understand the requirement and that is there.

Then you just start coming up with concepts and then at the last when you have the prototype ready you just go and get your testing done correctly that is a very very classical concept. In order to ensure that your process is iterative you have to focus on the users and

whether the design considerations addresses their requirements or not in each phase of the User-Centred design process that is the catchword.

It is not about starting correctly and then ending correctly, it is about whether at each stage of the decision making process as a designer are you ensuring that these decisions are being taken on behalf of the representative users or the decisions that you have taken as a designer does it satisfy or does it really addresses the concerns of your representative users.

And it is therefore, important that in the User-Centred design process at each phase the focus remains on the users and satisfying their concerns. So, the design teams involve users throughout the design process via a variety of research and design techniques and this ensures that they come up with a highly usable and accessible products for them, and these are the techniques which we are going to learn in this course in the subsequent lectures.

Because we must remember that our goal is to create a system that adheres to the principles of Usability Engineering. And what Usability Engineering says that you must address the concerns and define the requirements accurately and in order to ensure that this happens you should follow a User-Centred design process.


So, in the subsequent lectures we would see how each stage of the User-Centred design process is, what are the techniques we will discuss a new we will discuss numerous techniques that allows us to address the concerns of the users at each phase and ensures that we create highly usable and accessible products for them.

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User Centered Design - Introduction

In UCD, all "development proceeds with the user as the center of focus." (Jeffrey Rubin, Handbook of Usability Testing: How to Plan, Design, and Conduct Effective Tests, John Wiley and Sons, Inc., 1984)
Rubin depicts the User-Centered Design Process as follows:

- The users are in the center of a double circle.
- The inner ring contains: Context; Objectives; Environment and Goals.
- The outer ring contains: Task Detail; Task Content; Task Organization and Task Flow.

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Now, in his in the handbook of usability testing how to plan, design, conduct an effective test Jeffrey Rubin talks about UCD and he says that in UCD all development proceeds with the user as the center of focus. And Rubin depicts the User-Centred Design Process as the users who are in the center of a double circle.

So, you can imagine a double circle and at the center are the users. The inner ring contains context, objectives, environment and goals while the outer ring contains the task detail, the task content, task organization, task flow. Let us see I will draw this diagram and then discuss this in detail. So, you can consider a diagram like this. So, let us discuss about the structure mentioned by Jeffrey Rubin in detail.

He talks about two concentric circles and in the innermost circle the center is focused at user right. The inner ring contains you can say context, objectives, environment and goals while the outer ring focuses on task detail, task content, task organization and task flow. Now, what you see here, you see that the focus is on user who is the actor here the person concerned your representative users.

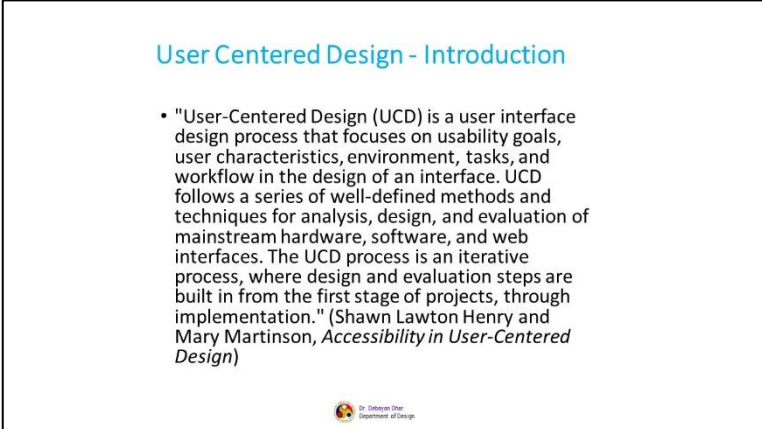
And then at the immediate outer circle is the factors that are associated with the user and these are the context, the objectives, the environment, the goals. Now, when we see these factors we understand that a user reacts or behaves in a particular situation based on the context, based on the objectives what he has the intent, based on the environment that the user has and also based goals that he wants to reach.

And these all influences what? Influences the task that he or she does and the task has some characteristics and these characteristics are what we call as the task features. If you see the outer circle of Jeffrey Rubin you would realize that the outer circle consists focuses on this task features; these are task detail, task organization, task content and task flow these are all related to the task that the user performs in that particular context, in that particular environment within objective and goal.

The focus is on how the task is detailed out I mean the way the task is being performed, the way the task is organized. So, we observe how the task is being organized, we also see how the task flows in that particular context and what are the content of the task who are the entities involved, among whom the task is being performed, how decision is being made.

Now, remember what you see as a task is a factor that is getting influenced because of the inner circles the context, the environment, the objectives and the goals and these are all related to what we call as user. So, therefore, what we see here is that detailed models and detail way of understanding the users who are the central focus in the User-Centred Design Process.

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User Centered Design - Introduction

- "User-Centered Design (UCD) is a user interface design process that focuses on usability goals, user characteristics, environment, tasks, and workflow in the design of an interface. UCD follows a series of well-defined methods and techniques for analysis, design, and evaluation of mainstream hardware, software, and web interfaces. The UCD process is an iterative process, where design and evaluation steps are built in from the first stage of projects, through implementation." (Shawn Lawton Henry and Mary Martinson, *Accessibility in User-Centered Design*)

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Now, User-Centred Design essentially many a time is being referred as a user interface design process that focuses on usability goals, user characteristics, environment, tasks and workflow in the design of the interface that you see in front of you.

And User-Centred Design follows a series of well-defined methods and techniques for analysis, design and evaluation of mainstream hardware, software and web interfaces. The UCD process is an iterative process, where design and evaluation steps are built from the first stage projects through implementation.

The moment you start focusing on the User-Centred design process remember that your objective is to focus on the usability goals, user characteristics, what defines your user, what defines his or her pin points, what defines his frustrations, his motivations, his or her concerns these collectively are called as user characteristics.

Now, many a time it happens that there are characteristics that are not easily observable and you need to investigate whether those inert characteristics are influencing their decision making or not. So, therefore, understanding user characteristics is of paramount concern. The environment that is what we discussed in the last slide, tasks, work flow these are all of important concern and are the objectives that you as a designer should focus.

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User Centered Design - Introduction

- The focus of UCD is to gain deep understanding of who will be using the product.
- ISO 9241-210:2010 is the basis for many UCD methodologies.
- User-centered design (UCD) is an optimistic approach to invent new solutions. It starts with human beings and ends with the answers that are tailored to their individual needs. UCD is both how you are thinking and what you are doing. It is all about building a deep empathy with the individuals you're designing for. Generating heaps of ideas and building a bunch of prototypes. Sharing what you've got created with the people you're designing for. Failing and trying again. And finally putting your innovative solution out in the world.

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So, the focus of UCD is to gain deep understanding of who will be using your product. I am spending an amount of time in explaining you the concern, the seriousness of this aspect. Majority of the products that you see in the market fails and fails for the only reason that the design team did not ethically focus on the User-Centred design approach techniques.

It was primarily driven by their own concern, many a time designers feel that whatever they require are the requirements that their user will also require which is an incorrect interpretation of the User-Centred design process. So, remember that the focus of User-Centred design is and only is to gain deep understanding of who will be using your product, this is the first and foremost concern that should be in the back of your mind whenever you start designing for someone. Who are going to use my product?

So, International Standards Organization 9241 that we discussed earlier 210; 2010 is the basis for many of the UCD methodologies that we are going to discuss subsequently. The UCD process is an optimistic approach to invent new solutions, you want to come up with solutions that works in the market. The entire objective of the User-Centred design process is to ensure that the probability of your product becoming successful is increased to an extent that you get return on your investment.

And it starts with human beings and ends with the answers that are tailored to their individual needs or requirements. Now, UCD is both how you are thinking and what you are doing. These are the layman terminologies how we understand what we are trying to interpret from the user research or the user study that we are going to do. It is all about

building a deep empathy now here is the most important terminology that we are discussing about.

Empathy, building a deep empathy with the individuals you are designing for. Generating heaps of ideas and building a bunch of prototypes. Sharing what you have got created with the people you are designing for. Failing and trying again because it is the failings it is the fails that will ensure that your product succeed later when it is launched in the market and finally, putting your innovative solution out in the world.

See in this lecture while we are discussing about User-Centred design, we discussed about the concerns, the prime objectives, the focus of User-Centred design, but one word that I just introduced now is of prime concern to User-Centred designer and that is building a deep empathy, the word is empathy. Empathy is not just about understanding your users there is a difference between understanding someone and being someone and that is what empathy is all about, getting into the shoes of your users.

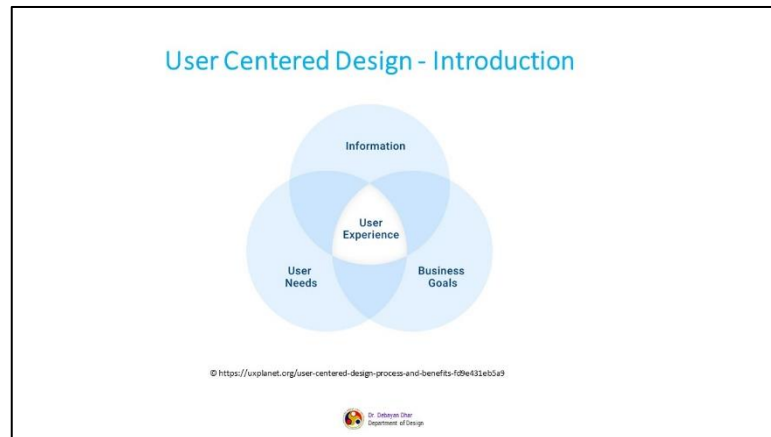
See whenever a film is being made, a movie is being created there are actors and these actors they have their own personality while in the movie they are depicting a alien or a foreign personality and in order to accurately depict that personality they must invest a huge amount of time going to the situation, going to the context of those personalities, trying the cues of their personality, the features that define those personalities they learn them.

And then what they do is that they understand they get into those roles which we call that as role playing and then they become that personality. So, while their own personal way of looking at things are different, but in the movie they come into the role playing mode they become the person whom they are depicting. In empathy the objective is same.

See actual users they cannot express their requirements in a very definitive way and many a time majority of your actual users would not be creative as well while few can be. You as a creative person it is your role that you understand them not just by understanding, but empathy have empathy with them you become them and then design for them that is what we call as empathy.

Getting into the shoes of your users becoming them so that you can design for them, that is what we or the design User-Centred designs objective is; building a deep empathy with the individuals that you are designing for.

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So, whatever the discussion we have made or discussed until now you would realize that whenever we are saying that the central focus of UCD is about understanding users characteristics, understanding their requirements we essentially are focusing on the experiential aspect of the user and that is what you can see in this slide we are referring to user experience.

And in order to define the user experience correctly we must employ techniques methods and while we employ these User-Centred design methods and techniques we must ensure that the three important concerns of any organization are addressed in a harmonic way.

And these are the concerns related to business goals, the concerns related to accurately defining the user requirements and the concerns related to information. Whatever digital products that we are referring to these digital products are a mix of these three aspects the business goals of the organization it may be a start up it may be a big organization conglomerate they have a business goal, they are investing money and their objective is to get return on investment.

So, we must ensure that their business goals are in sync with the user requirements. So, we must be able to mix these two things and then only these two will not work we must identify, define and accurately present information and ensure that this information aspect is also getting addressed and considered while the business goals and user needs are

defined. When you have all these three aspects accurately getting depicted, defined what you see is a quality user experience getting generated.


And when we say quality user experience we mean that you have accurately defined your requirements. The conceptual model of the product that you have defined it meets the mental model of your users, your stakeholders are getting return on investments and probably that is how we create an ecosystem where all the objectives are met be it your users, be it your business goals and also the objectives of the design team.

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UCD is an Iterative Process

- In UCD, a mix of *investigative* methods and tools (e.g., surveys and interviews) and *generative* ones (e.g., brainstorming) are used to identify and define user requirements and their needs.
- The term was coined in the 1970s. Later, cognitive science and usability engineering expert Don Norman adopted the term in his extensive work on improving what people experience in their use of items.

(Norman's *The Design of Everyday Things*, originally titled *The Psychology of Everyday Things*)

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Now, as we have been discussing about User-Centred design it is important to highlight that it is a mix of investigative methods and tools. Investigative means related to investigation. And what you are investigating? You are investigating how to identify accurately user requirements. It is also a mix of generative methods and tools and together this both this one the investigative and the generative are used to define and identify user requirements and their needs.


The User-Centred term whatever we discussed until now was initially defined in 1970 and later in the in his book *The Design of Everyday Things*, which was originally titled as *The Psychology of Everyday Things* professor Don Norman adopted this term and has extensively written about it in his books that gradually led to the promotion, the adoption of this approach across the design community, the usability professionals and user experience designers.

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UCD is an Iterative Process

Generally, each iteration of the UCD approach involves four distinct phases.

- **Understand the context of use:** Identify the people who will use the product, what they will use it for, and under what conditions they will use it.
- **Specify requirements:** Identify any business requirements or user goals that must be met for the product to be successful.
- **Design solutions:** This part of the process may be done in stages, building from a rough concept to a complete design.
- **Evaluate designs against requirements:** Evaluation - ideally through usability testing with actual users - is as integral as quality testing is to good software development.

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Now, generally each iteration of the UCD approach involves four distinct phases and these phases are understand the context of use; that means, you identify the people who will use the product, what they will use it for, and under what conditions they will use it. Specify the requirements identify any business requirements or user goals that must be met for the product to be successful.


Design solutions, now it is here that you need to be doing this in stages you know you start with quick doodles coming up with rough concepts and then you work towards detailed designs and complete design. And finally, the focus is on evaluate designs against requirements.

So, evaluation was carried out it was it is ideally through the usability testing conducted with actual users we will learn detailed usability techniques in the later half of this course. And these usability testing is an integral part as a quality testing in good software development.

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UCD Principles

- **Users are involved in the design process from the very beginning** – A clear understanding of task and user requirements.
- **Importance of requirement clarification.** The design team always tries to align business requirements with user's needs.
- **Incorporating user feedback to define requirements and design.** The design team collects and analyzes feedback from users regularly. This information helps the team define requirements accurately and to make more user-focused decisions.
- **Iterative design process.** The design team constantly works on improving user experience; it introduces changes gradually as it gains more understanding about their target audience.

 Dr. Catherine Chen
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The UCD principles that are often referred to by designers are first users are involved in the design process from the very beginning that is the first principle; that means, you must have your users involved. A clear understanding of task and user requirements is essential in order to ensure that you are following this process.

Importance of requirement clarification, the design team always tries to align business requirements with user's needs. Incorporating user feedback to define requirements and design, the design team collects and analyzes feedback from users regularly and this information helps the design team to define requirements accurately and to make more user-focused decisions.

And finally, again restating that the process is iterative in nature these are the principles primary concerns and principles of User-Centred design. The design team constantly works on improving the user experience and it introduces changes gradually as it gains more understanding about their target audience and these gradual detailed understanding can only happen if at every phase of the User-Centred design process you ensure that you collect feedback from your representative users.

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UCD Principles

From Jeffrey Rubin, Handbook of Usability Testing: How to Plan, Design, and Conduct Effective Tests, John Wiley and Sons, Inc., 1984:

Early focus on users and tasks


- Structured and systematic information gathering (consistent across the board)
- Designers trained by experts before conducting data collection sessions

Empirical Measurement and testing of product usage

- Focus on ease of learning and ease of use
- Testing of prototypes with actual users

Iterative Design

- Product designed, modified and tested repeatedly.
- Allow for the complete overhaul and rethinking of design by early testing of conceptual models and design ideas.

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These principles have been discussed in detail in Jeffrey Rubin's book the Handbook of Usability Testing and he categorically mentions that the early focus on users and task should be structured and should be systematic in order to ensure that accurate information is gathered ok.

Designers trained by experts before conducting data collection sessions, that means we here we are talking about ethnographic experts those who have been trained to understand users to understand how do they behave how do they respond to. So, designers who are trained like these experts can only interpret and correctly understand the user's requirements.

We will use and learn these techniques in detail in the subsequent lectures and that is one of the objective of this course that we are trying to ensure that the techniques that designers use, the designers learn are communicated through this course to all of you. Empirical measurement and testing of product usage; focus on ease of learning and ease of use essential pillars of usability engineering.

Testing of prototypes with actual users and finally, iterative design that we have been discussing about; product designed, modified and tested repeatedly. Important concepts and concerns allow for the complete overall and rethinking of design by early testing of conceptual models and design ideas. So, this was about the User-Centred design process and this is the introductory lecture on the User-Centred design process.

In the subsequent lectures we will discuss more about its characteristics, it is we will see the process in detail, we will understand how each stage is completed, what are the

different techniques we have and learning all these techniques would ensure that we come up with a product, we come up with a digital product, with a software product that is highly highly usable and satisfiable for your actual and representative users.