Interaction Design
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Lecture - 01
Basic Definitions and Concepts in Interaction Design

Welcome to the first session on interaction design. This course is supported by NPTEL which is National Programme on Technology Enhanced Learning. My name is Abhishek Shrivastava and I am your instructor for this course. Since this is our first session, our first interaction as in that you all would have a lot of questions in mind.

Questions as big as you know what is interaction design, what is the process behind creating interactive products, how do you design products to suit requirements of different user groups across different domains of applications. While these questions are interesting but there are some very basic questions also which I am sure some of you have that as well. Some of these very basic questions are what is interface?

Is it very well defined? What is interaction design? What are different perspectives of interaction design? So I think it is good to have questions because when you are learning new thing and you have questions in mind, it helps the process of learning that particular subject. So I would encourage you to keep these questions in mind and also if possible write them somewhere in your notebook so that you can revisit them whenever required. Let me begin this course by telling you a short story.

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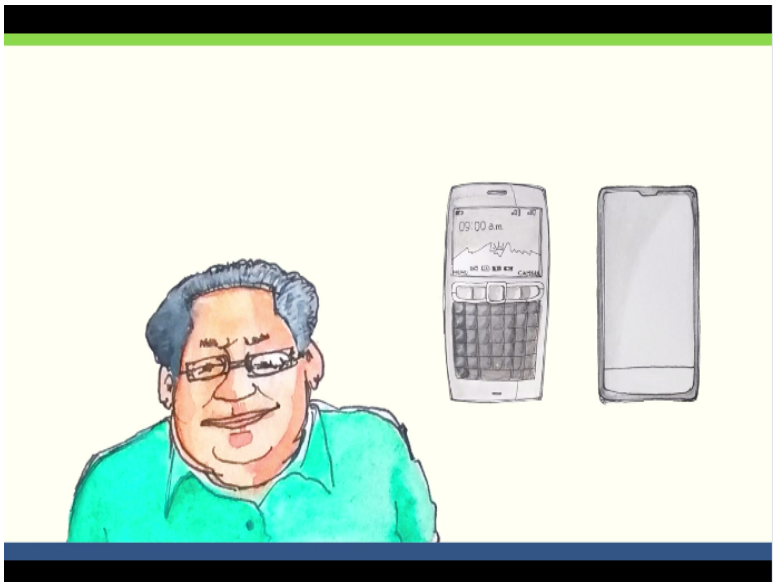

The protagonist in the story is someone in his mid 70s. He has been using mobile phones for at least 15 years now. He uses one of the phones that you are seeing on the screen with hard keys, a smaller screen, a set of buttons for supporting navigation through different windows while he is interacting with the phone.

This as he calls is his favorite phone but unfortunately his phone is getting more and more messier to an extent that with lowering speeds of the processor he can no longer do very basic functions like storing a recently dialed phone number or his phone is also not responding with that much of intensity to his inputs. On realizing this, one of his near ones recently gave him a sleek, modern looking phone.

The other phone that you see on the screen that one is the one which is a new gift to him. This phone has a reputation of being called one of the best user-friendly phones available in the market. It has got a touch sensitive screen which is very big compared to the earlier phone that our protagonist had. He can actually touch different icons on the screen and can initiate different applications.

However, within the first few interactions with the phone our protagonist feels surprisingly somewhat otherwise. He feels that the things are not in his control on his new phone. He finds this difficult to perform even certain essential task like making a call to a contact from the list or sending a SMS with a new phone or even picking up a phone. After few days, he decides to get to his old phone again.

Let us question what this story suggest us. Someone being able to use a phone and someone you know finding it really hard to use another phone. So this story tells us some you know very basic but essential aspects of interaction design. The first one is that there exists variation in preferences across different user groups. These preferences are functions of several different attributes.

So for example someone's prior experience with technology, someone's education, someone's peer group, someone's age, all these are actually different factors that contribute to variation across user groups. Second that no one design fits all and here in this case also you can see that you have a phone which is being claimed as a phone that would be fitting to all that is not really happening.

However, essentially if you see this story is about how different users use technology at hand. Our assumptions that they would use technology in the same way tend to fail. How do they interact with different interfaces? The answer to this question can be very, very different for each one of us. Unlike other objects interestingly, interfaces are meant to support us, conduct different tasks.

A single computer for example can be used to perform calculations, to create documents, to share documents, to access information over internet and also to create and share media like pictures and images and videos. It is therefore quite relevant to design these interfaces better and that is why perhaps we should look at interaction design somewhat deeper. Well that brings us to another interesting point.

We cannot really imagine interfaces and interactions in isolation. It is not possible to kind of imagine these 2 things in isolation. Each possible interface which is promising its user group, a set of task is actually meant to be finally used by the users.

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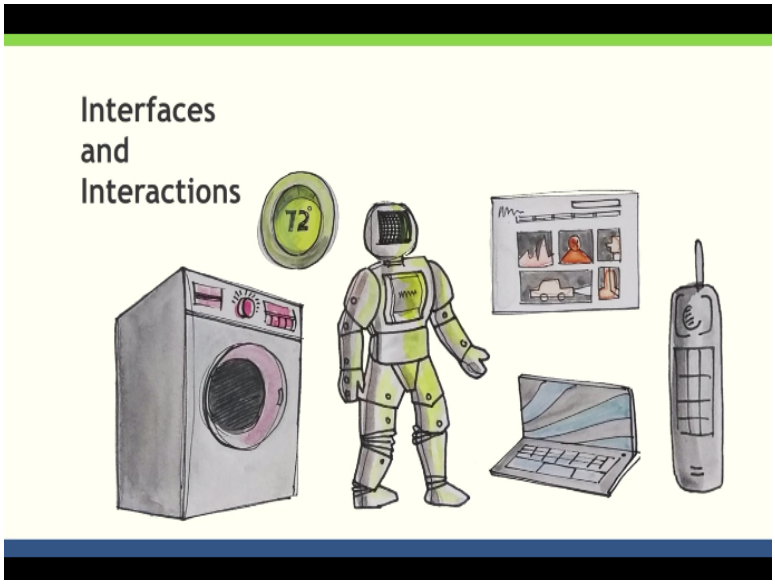

And users use interfaces by interacting with them.

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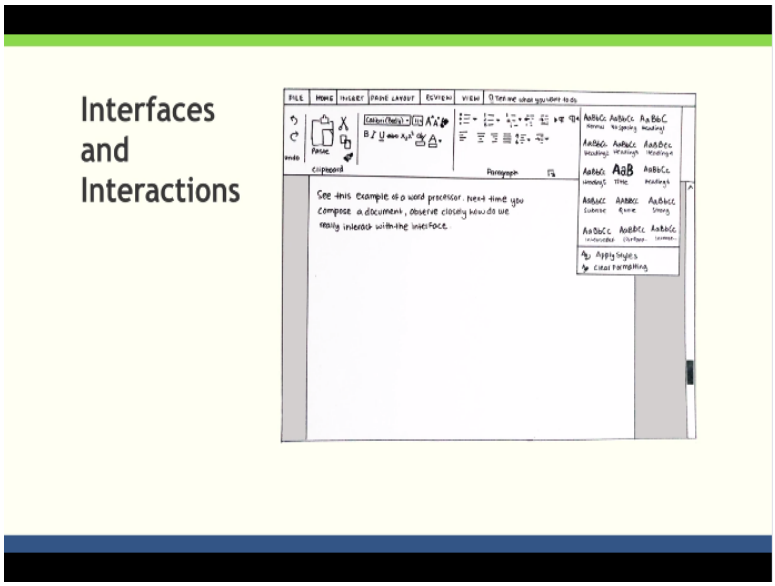

For example, your word processor is an interface where you create documents by using different interface widgets like menu or even toolbar. So you have you know these interface elements that lets you accomplish a task using word processor as an interface and each one of us if you see have slightly varying patterns of using word processor.

Such a connection between the interface and interactions that it offers would continue to exist even if you use a computer or an online portal to help with shopping, a smart robot, a smart thermostat or something handheld like your own health monitoring wristband. You may feel that we are arriving close to understanding the meaning of the word interface. Well, yes of course we are approaching to that area but its meaning can be quite deceptive.

So what is an interface? The word interface comes from 2 different Latin words.

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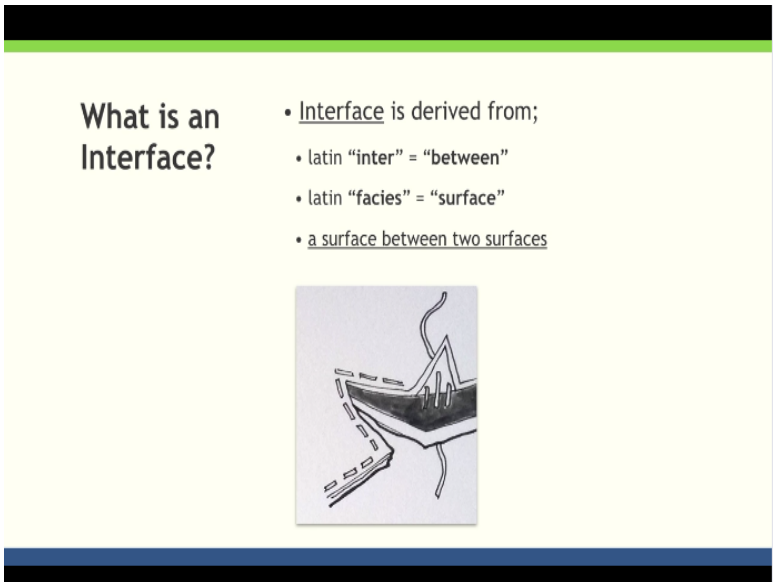

The first word is inter which means between, the other word is facies which means surfaces. So a simplest interpretation or understanding of this word interface would be a surface between two surfaces but if you ask a tailor he may interpret it as an additional layer of clothing that is put between two layers of clothes of fabric to provide an additional attribute something like strength.

So for him if you see this word interface and its definition a surface between the two surfaces even that qualifies an interface. Let me give you another example.

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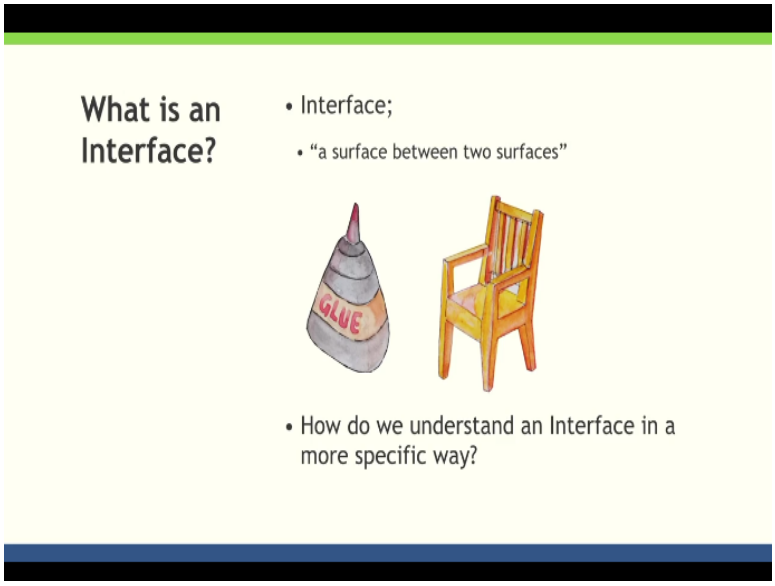

In carpentry, if you are using glue between two different surfaces of wood to join them, would you call glue an interface, so the face that interface is a surface between two surfaces seems quite generic. It is still not very specific, so we need to see this particular phrase in the perspective of interaction design. Let me ask you to consider to more cases and let us begin by something which is more familiar to us.

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So what you see on your screen now is a very familiar place for all of us. It is earth. We know it is a 3-dimensional spherical object but can you manipulate it. If you make your first attempts towards manipulating earth, you come to another representation of earth which is 2-dimensional in nature. So what you see on a screen is another representation of the earth which is 2-dimensional in nature that is what we call map.

However, if you still think that you need to manipulate it further and it is still not for manipulation as you imagine, you can still do it better and that is where you have the third interface, you have the third object on the screen which looks very much familiar that is what we call an interactive map. There you can zoom in, zoom out, you can select a place, you can know specifics about that place.

So you see that you would find it really impossible to interact and manipulate an object as big and massive like earth.

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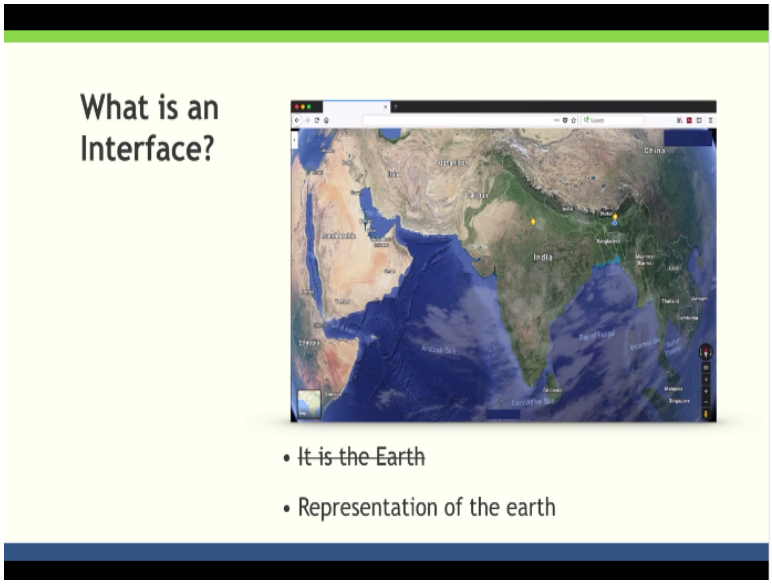

But it is very much possible to interact with the representation of the earth, okay that is another understanding that we are arriving at. Let me ask you to come to another case okay.

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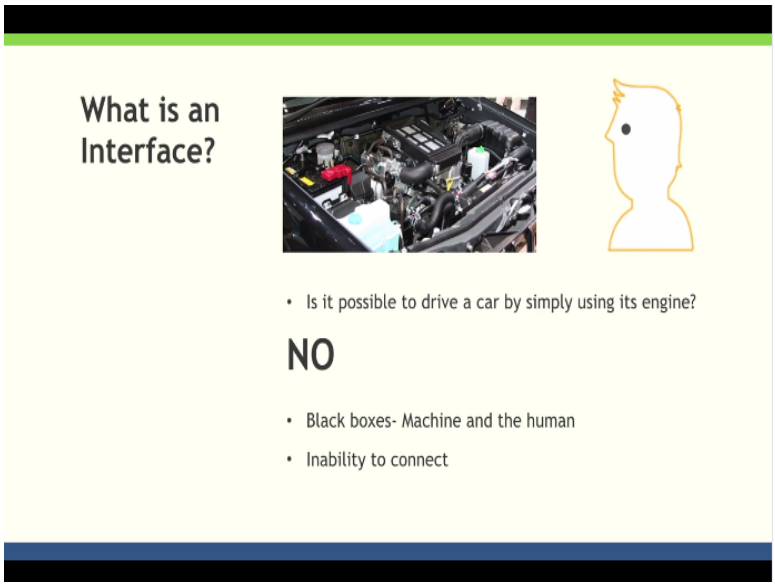

So what you are seeing on your screen now. On one side, you have the engine of a car and on the other side you have a human agent. Okay so if you consider these two things, the engine of the car and the human agent, I ask you very basic question, can you drive the car? Can you drive the car by simply using the engine of the car? In fact, you do that but the question is again the same.

If you were to pull out controls out of the engine which is like so many pipes here and there and so many machinery inflicts, so many control equipments in place. If you were to pull out controls from there and you waver to drive the car. Can you drive the car? I think the answer

is no, no I cannot drive the car because I cannot simply you know use engine to drive the car. Okay so what is the problem?

The problem is that your engine and human agent, if you see both of them they are like two black boxes. They just have no way of communicating with each other. So there are two black boxes, does not matter how far or how near they are. They would not be able to communicate or join with each other. Okay so let me suggest you to move to next screen.

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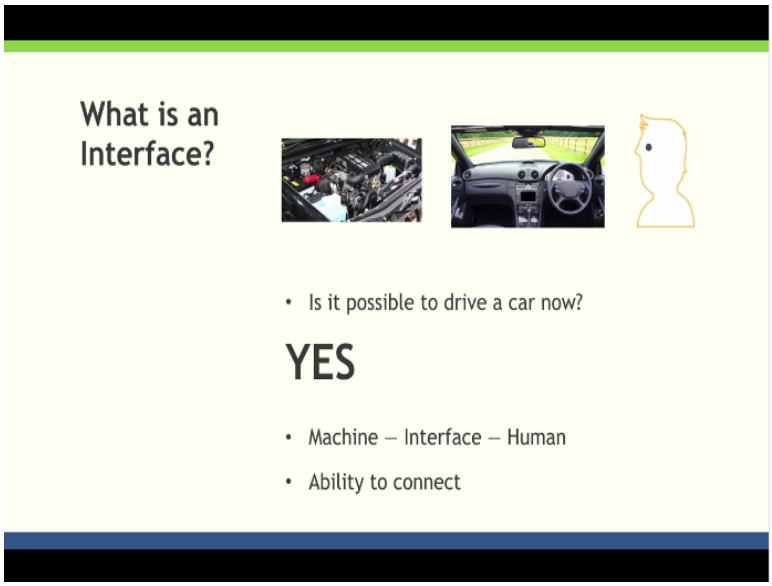

What you are seeing between these two black boxes is the dashboard okay. So now we have a dashboard and we certainty are in a very familiar state of mind. We all have been driving cars by sitting behind our dashboards where we have a steering, we have speedometer and other controls towards our left or towards our right and yes that is how we drive the car. So if the same question is asked again can you drive the car, your answer would be big yes.

Okay so what is happening here? Point is you have something like a dashboard in between these two black boxes which is making it possible for these two black boxes to communicate with each other. So for a while, let us still not call it as interface. We will arrive that understanding a little later. So for a while, we have kind of solution to our problem. We have a dashboard and as a human agent.

As human beings, we are pretty comfortable with the dashboard and there is no need to look into the engine of the car to drive the car okay.

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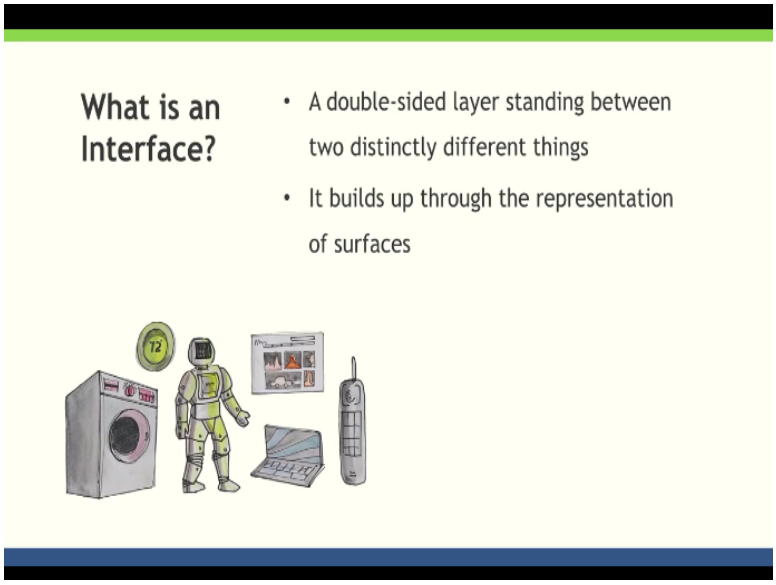

So now if we ask the same question again, what is an interface? We can say the following that the interface is the double-sided layer standing between two distinctly different systems or things. It builds up through the representation of the surfaces. So do you remember that example of earth, the intercalative map? The interactive map is actually the representation of the map. So an interface builds up through the representation of surfaces.

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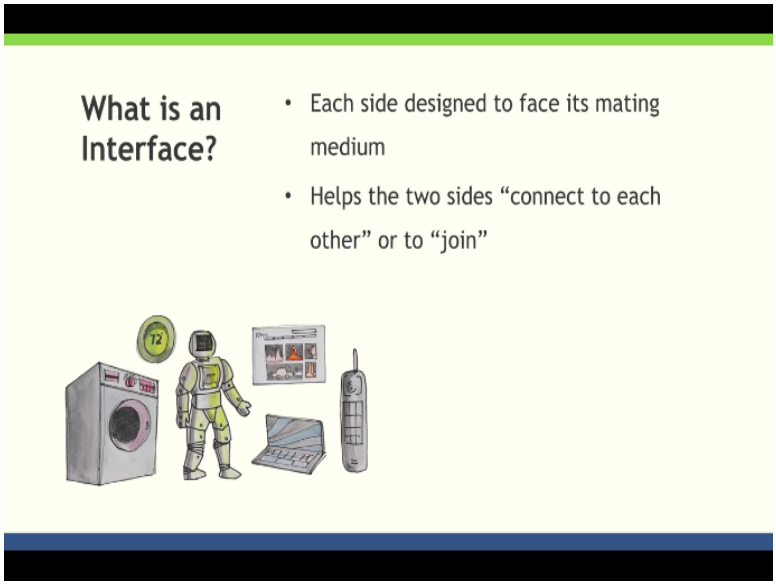

Each side of this interface it designed to face its mating medium. Now I ask you to remember and recall the example of the car dashboard. On one side of the car dashboard, sits the human agent and so the dashboard looks pretty much like something that we can all make sense of but on the other side of the dashboard is the engine and if you happen to look at the other side of the dashboard, you will find that it is actually a puzzle okay.

But the interesting point is each side of the dashboard is designed to face its mating medium. So in a way it helps the two sides connect to each other all to join and that is our fourth point.

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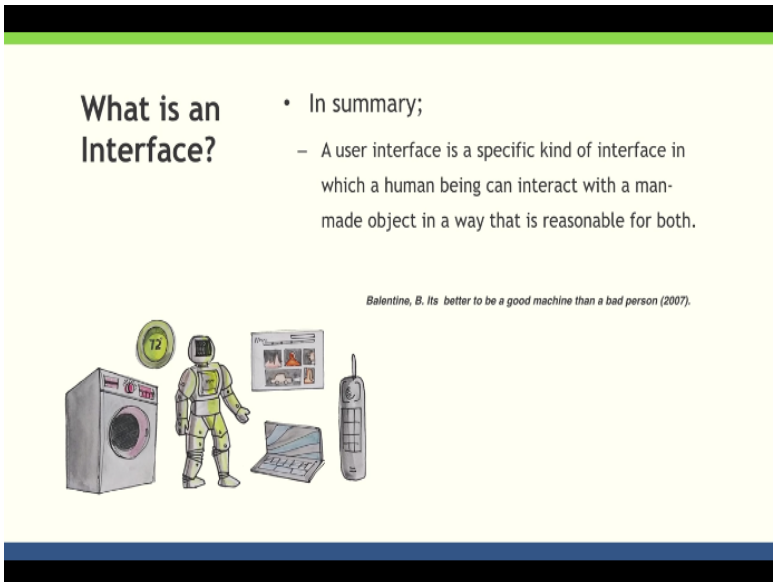

If you were to arrive at a summary of what is an interface, we can say the following that a user interface is a specific kind of interface in which a human being can interact with a man-made object in a way that is reasonable for both okay. I think that is a pretty good understanding of what an interface is. Let us again you know try to arrive at some more objective understanding of these interfaces.

So you have two different sides of this interface. Remember the car example, car dashboard one side, the human agent the other side, the machine. So if you were to create a line that divides the machine side and the human side, you would arrive at the following.

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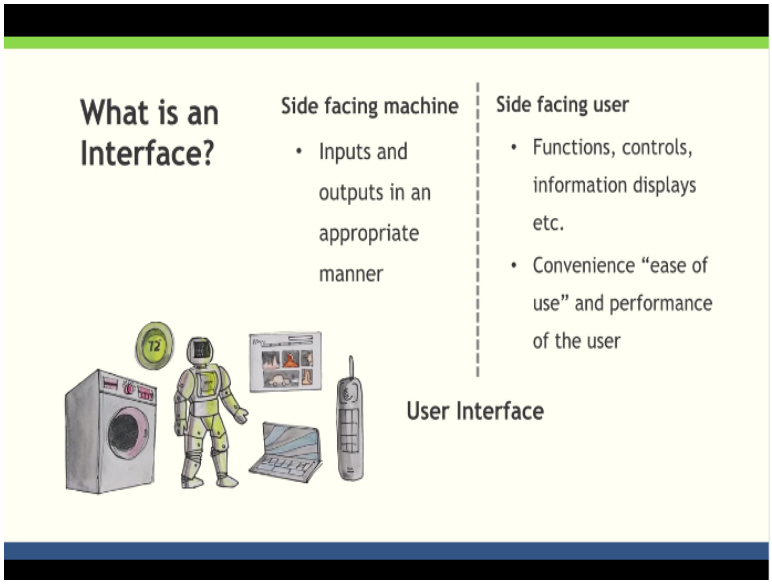

So on your screen you see that on the side facing machine, you have inputs and outputs being laid out in an appropriate manner and on the side facing the user in order to make it convenient for the user and to perform better with the interface or rather with the machine, the interface side facing the user has functions, controls, a lot of information in the way it can be understood and that is where that line if you can mean that line that line is called user interface.

You may have noticed that I have been using this word interaction for at least 4 or 5 times by now. So obvious question to ask is what is interaction?

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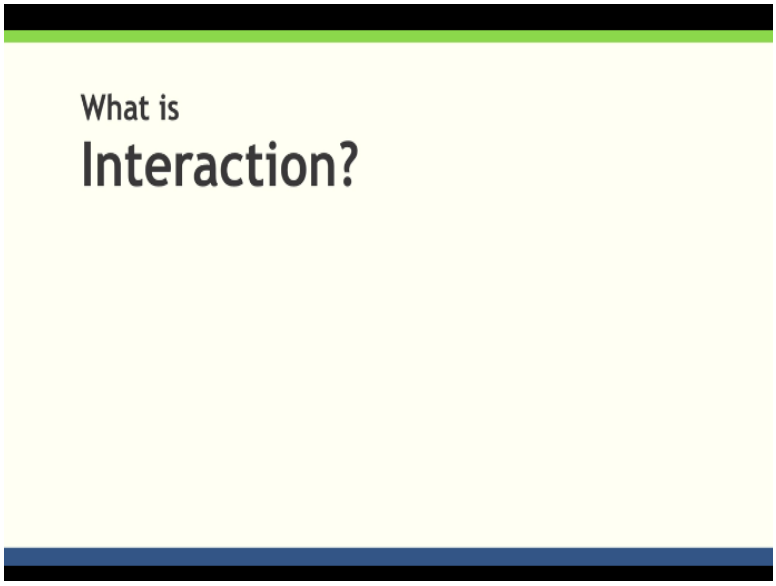

It is also an interesting question because if you go across certain books on interaction design you will find that finding the meaning of the word interaction is a very hard task. In fact, you

would have a lot to read on interaction design and how people interact with computers or with anything else but what exactly is the meaning of the word interaction is a little harder to know and that is where I want you to come to the next slide.

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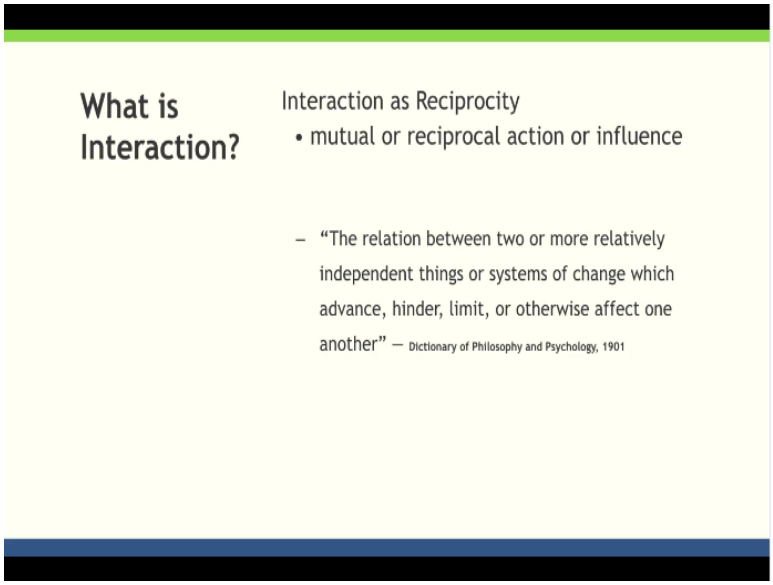

You may notice that you know since the beginning of the 20th century earlier in 1901, we have the first definition of this word interaction. It appeared in the dictionary of philosophy and psychology in 1901 and it says the relation between two or more relatively independent things or systems of change which advance, hinder, limit or otherwise affect one another.

So this is interesting because here the idea of interaction is understood in terms of reciprocity which is mutual or reciprocal action or influence across two different systems. So if one of the two systems is able to influence the other and the other system is able to influence the first system back then there is a reciprocal relationship between these two systems and we could say that there exists an interaction between the two systems.

But again as the problem, we have seen that you know some of these definitions are especially the word definitions are pretty generic and we have to arrive at an understanding of their definitions with respect to human computer interaction.

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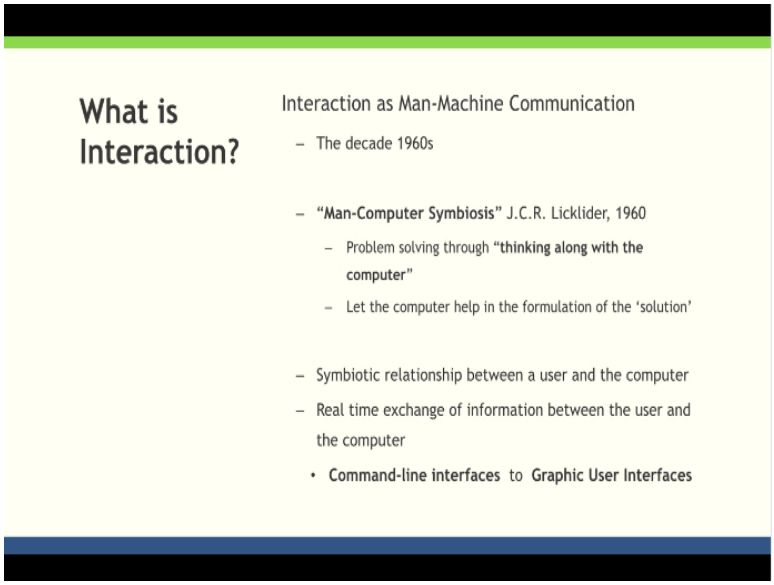

And speaking historically it is early in 1960s that we receive a more nuance understanding of the word interaction and in specific context of human computer interaction. The decade 1960s is an interesting decade because in 1960s for the first time we arrive at an understanding of interaction in terms of communication between men and machine but was a new knowledge for a lot of us.

And in 1960 in particular, we have an essay by J. C. R. Licklider and the title of the essay was Man-Computer Symbiosis. It is for the first time that he imagined that there could be a symbiotic relationship between the men and the machine or to be specific between the computer and the users. The aims of this relationship would be but the problem solving would happen through thinking along with the computer.

You know imagine the interfaces which might have existed across the same time and a little earlier. You have to be very clear in terms of what the problem itself is and how do you solve it, so what are the steps involved in solving that also has to be brought into clarity before you come to interacting with the computer but with this essay what he proposes that this problem solving could be actually a very collaborative process with the computer.

That is you think along with the computer as you go towards solving the problem at end and that was a new understanding at that time. So in this way the computer helps you in the formulative stages and across the entire process of solving the problem and that is what he meant by symbiotic relationship between man and the computer or to be specific as I say between the user and the computer.

So the idea of real time exchange of information is also very critical in this particular essay. What you said is that if you were to use a command line interface, you would have to actually type the command and then that command gets accepted by the computer as an input to the computer and then it processes that input and responds back in terms of a similar command line information.

So this interaction you know this particular way of communicating with the computer is prone to delays, you know it has a certain lag. There is no real time exchange of information happening with the computer but if you imagine with the graphic user interface, the computer responds to user inputs in real time, almost with a day which is non-perceivable to us okay which is almost saying that it is a real time interaction between the man and the machine or the user and the computer.

And that also was a main point as we state in the man computer symbiotic essay. In 1960s as I said this decade was very distinguishing decade you know in the history of human computer interaction where would that be the case because in 1963 we have first graphic user interface coming into the picture. Let me show you that.

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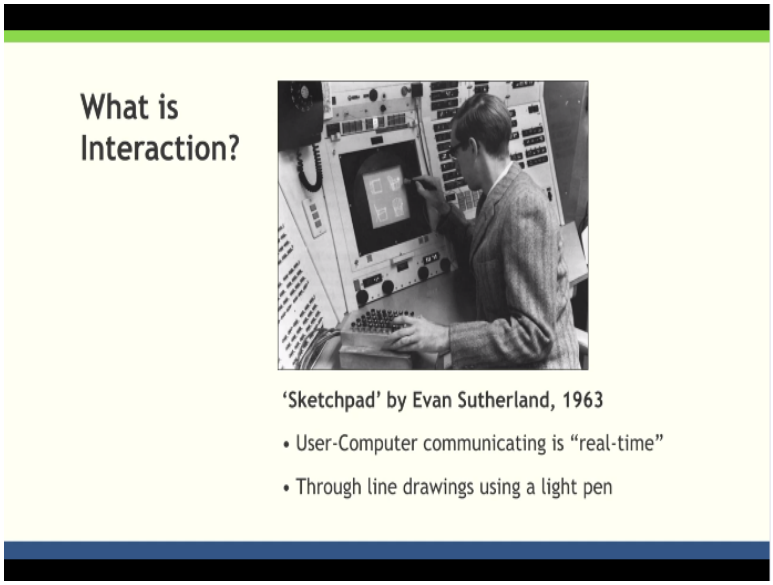

It was the interface titled as Sketchpad by Evan Sutherland. He developed a light pen and almost real time interaction with the display screen. So he could interact with the display, he could interact with the computer behind the display by using his light pen on the display. He

could draw line drawings and the computer would respond to his inputs in real time. So this was the first time when there was an ultimate two command line prompts.

And we had graphic user interfaces in our understanding. Something other also really interesting happened in 1960s.

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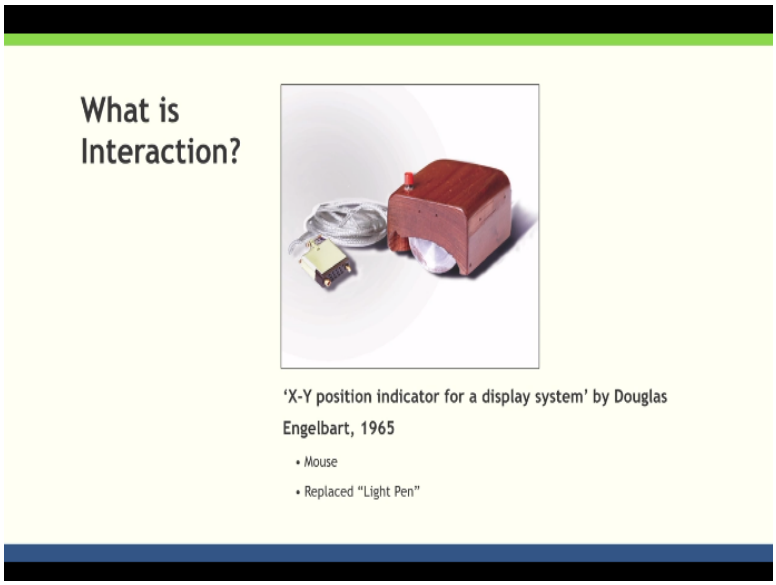

You have Douglas Engelbart proposing a design of X-Y position indicator for a display system. It is what we call a mouse these days. His device the mouse could replace the light pen as proposed by Evan in 1963 and now by the end of 1967, we have the very basic elements of graphic user interface in place a graphic display which is responding to in real time to the user inputs.

And the hardware device like mouse which is helping the user to point out up to particular portion on the screen.

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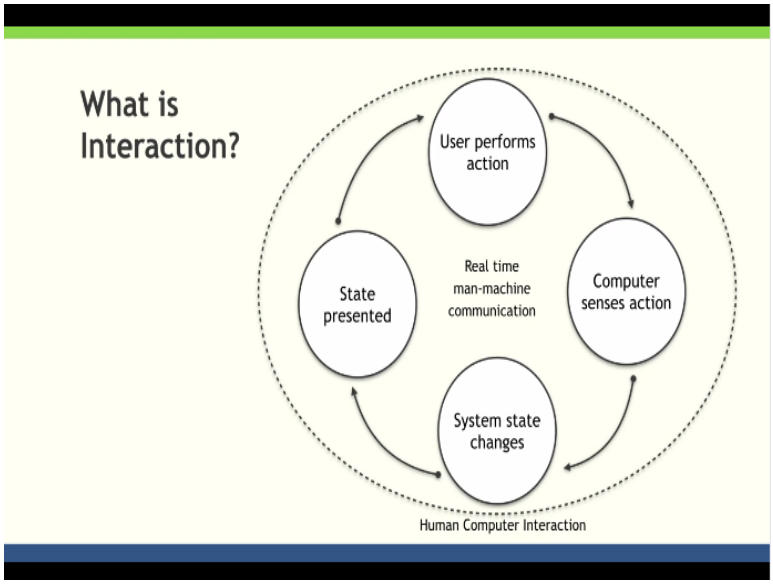

So in fact by the end of 1960s, we have a matured understanding of the word interaction. As you can see on your slide, the interaction is now seen as a very systematic process whereby user performs an action, the computer senses that action, the systems state changes as if a computer was showing something or it was doing something as a result of that action the state of the computer changes.

And then it communicates the change in state to the user back. So in a way, it is a real time man-machine communication, real time user-computer communication and that is what our understanding of a word interaction is in the context of human-computer interaction. Let us now move to the next question which is what is interaction design? I put forth before you 3 different definitions.

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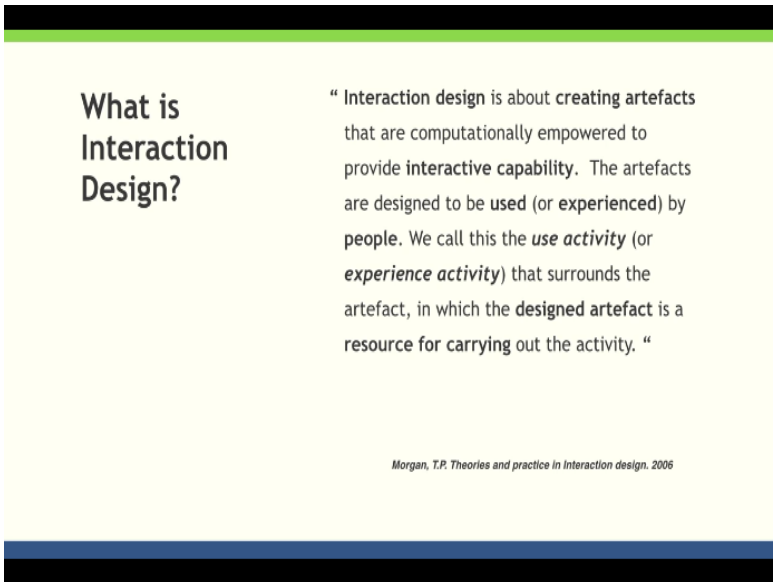

The first definition that an interaction design is about creating artefacts that are computationally empowered to provide interactive capability. The artefacts are designed to be used or experienced by people. We call this the use activity or experience activity that surrounds the artefact in which the design artefact is the resource for carrying out the activity. So I think in this definition, you see that a lot of emphasis is being laid on experience, use activity and design artefact, which is computationally empowered.

So if you walk across the corridors of a design school, you would find that a lot of people would be questioning you know what is interaction design? You know we interact with products all the time and what is so new about it, well this definition if you see it clearly says computationally empowered artefacts. So next time if you have a question like that, I encourage you to use that very specific phase which says computationally empowered artifact okay.

So let us read it once again. Interaction design is about creating artefacts that are computationally empowered to provide interactive capability. The artefacts are designed to be used or experienced by people. We call this the use activity or experience activity that surrounds the artefact in which the design artifact is a resource for carrying out the activity. So I have actually bold marked certain phrases in this definition which I would encourage you to keep them also in mind.

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Let us see another definition. Interaction designers strive to create useful and usable products and services. Following the fundamental tenets of user-centered design, the practice of

interaction design is grounded in an understanding of users their goals, tasks, experiences, needs and wants. Can you spot out the difference between the two definitions? I will show them once again to you.

This is the first definition, focus on the screen, look at the bold typefaces, point out the key words and now move to the next definition. Again look at the bold typefaces, point out the key words and try to find out the difference. The difference is the first definition is trying to define interactive artefact and what people are doing with that. So there is an explicit mention of use activity, experience activity.

But if you see in the second definition, it is more from a practitioner's perspective that is why the first phrase itself says interaction designers strive to, so it is in a way it is more practice oriented. It is from a practitioner's perspective. The first one was more you know you can call it a more discipline-oriented definition. While these two, both of these are important because as you can appreciate that this particular subject is very much in an application zone.

It is an applied subject, so we need to keep both these definitions in mind. One which is more discipline-oriented, the other one which is practitioner's response to the discipline. So how does a practitioner do the task? So let us read it once again, look at your screen, interaction designers strive to create useful and usable products and services following the fundamental tenets of user-centered design.

The practice of interaction design is grounded in an understanding of real users, their goals, tasks, experiences, needs and wants clearly says who is doing what. Interaction designers, usable products, the processors user-centered design and it is grounded in understanding of users. So you need to know your users, their tasks, their goals, their needs and wants okay. So let us now look at another definition.

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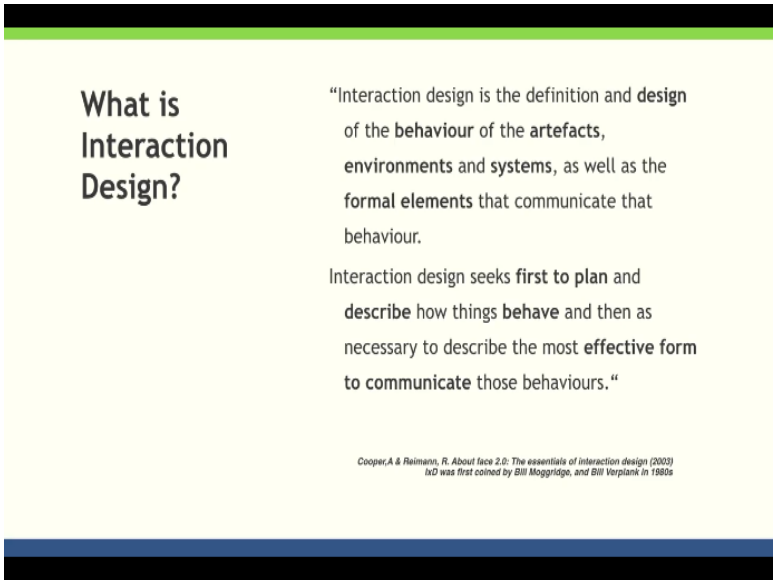

So it says that you know interaction design is the definition in design of behaviour of the artefacts, environments and systems as well as the former elements that communicate that behaviour. Interaction designs seeks first two plan and describe how things behave and then as necessary to describe the most effective form to communicate those behaviours. If you can notice the first paragraph is about what interaction design does and the second paragraph is more process oriented.

It tells you bit about the process, so it says first to plan and describe how things behave and then choose effective form to communicate those behaviours. So the second paragraph is clearly indicating the process that one needs to consider. Well, the first paragraph is that what interaction design is about. So I would encourage you to revisit these 3 definitions. They are very interesting definitions. They give 3 different perspectives.

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Let us summarize. On your screens, all the 3 definitions are shown with the difference that now what is shown, what is highlighted are the phrases that we have been using these definitions which are key phrases. So in the first definition you have key phrases like creating artefacts, interactive capability, used or experienced, people, use activity, designed artefact, resource for carrying.

In the second definition, you have phrases useful and usable, products and services, user-centered design, understanding of real users, their goals, tasks, experiences, needs and wants. In the third definition, you have design of the behaviour of the artefacts, environments, systems, formal elements, planning first to plan, describe how things behave and effective form to communicate.

If you have to further group these key phrases, there seems to be few different groups which are emerging.

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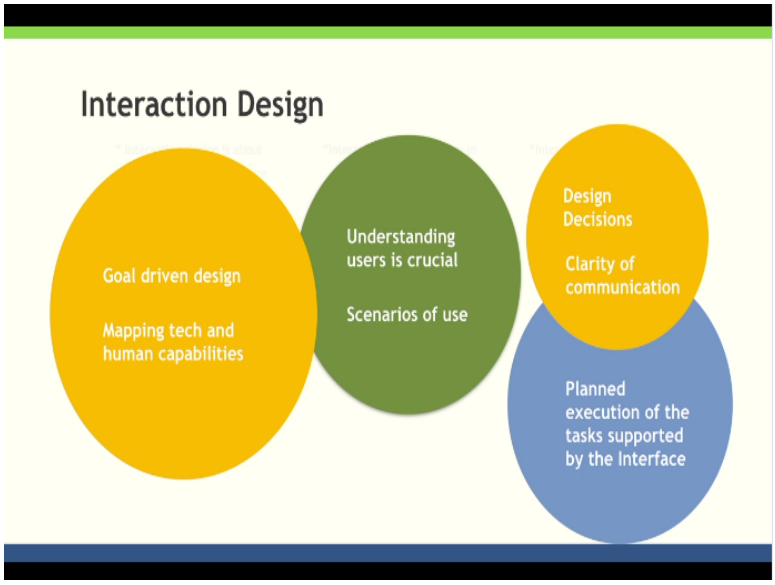

And if you were to again re-purpose these definitions and arrive at understand of interaction design, maybe you can use these following phrases as shown on your screen. So interaction design is a goal driven design because you consider the needs of the users, you consider their goals, their task. It is about mapping tech and human capabilities. So imagine that particular idea from the interface design.

You have an interface between a machine and a man, so that is why I need to match their capabilities and understanding users is crucial and you have to imagine all the scenarios of usage okay. So while you are designing any product, it is good to brainstorm good enough number of times or it is good to estimate all the different used cases possible with that application.

And then you have while you are doing that as a practitioners you have to take design decisions and clarity of communication, remember that phrase effective form to communicate those behaviours that is what we meant by clarity of communication and then we have to plan execution of task supported through the interface. I leave you with this understanding of interface and interaction design. Thank you.