Interaction Design
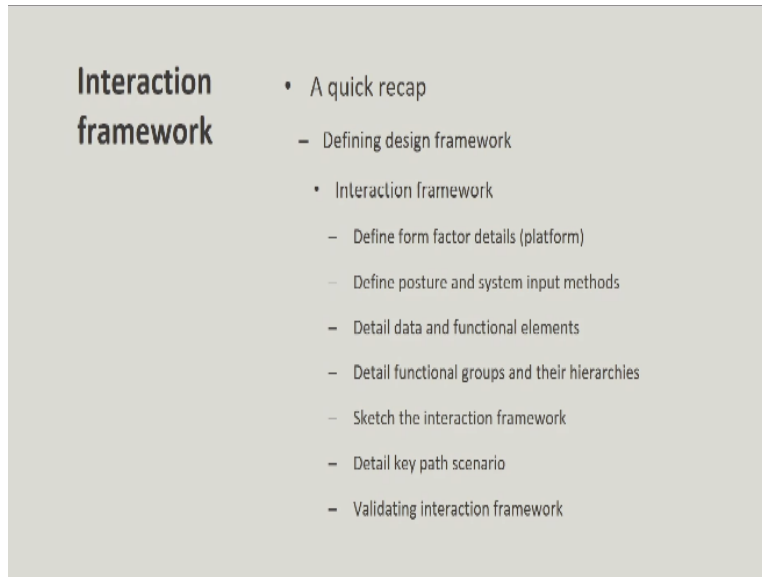**Dr. Abhishek Shrivastava**
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Lecture - 14
The Framework Definition and Refinement Phase in Goal Directed Design Process - Visual Design and Industrial Design Framework

Hello. We are running in the last week of this course on interaction design. In our last session if you remember we had spoken about design framework; we have seen that how there are three components of this framework the first one being the interaction design framework.

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Second one being the visual design framework and the third one being the industrial design framework. Amongst these in the last session we have paid attention to interaction design framework. Let us do a quick recap of interaction design framework in terms of different concepts and ideas that we have studied in the last session. So we had tried defining framework within that as I was saying interaction framework.

We began by defining the form factor details which was about the platform to be used to host the interactive application. Then we were also defining posture and system input methods. And as you can recall posture is the behavioural stance that the interactive product takes. Then we went

onto detailing data and functional elements, once those elements were detailed we group them and sort hierarchies across those elements.

So detailing functional groups and their hierarchies those the next thing that we did. We then sketched interaction framework and we detailed key path scenarios. And we attempted to validate interaction framework by the use of alternate scenarios. So today we are going to look at visual design framework. As you would have notice that this is a sequential process and in this sequence the first activity that we accomplish was detailing the interaction design framework.

Then the visual design framework and then the industrial design framework. So you can imagine that by the end of interaction design framework we had a detailed interaction sketch, and if you can recall the earlier session we had said very precisely about sketching the interaction framework. So if you have any confusion I would encourage you go back into the earlier video session and specifically look into the slides which have details about a sketching the interaction--

--framework. And now you would wonder why you would need a visual design framework. If you see the interaction framework you would come to realise that we cannot really use an interaction framework because it mostly divides of experience attributes you know it is divide of font, it is divide of colour, it is divide of the identity of the company that is producing those interactive artifacts, all of these various things the interaction framework is divide of.

What is has is the core essential details about the interactions which have to be accomplished. So it is important to bring someone like a visual designer and accomplish the part which is left to make a holistic product. In that sense if you there are essentially three different responsibilities of a visual designer. So these three responsibilities we are listing them on your slide now.

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A visual designer is responsible for detailing the experience attributes. And then once those experience attributes are detailed then it is his responsibility to move onto the next step which is developing the visual language. And once he has developed the visual language then he has to apply that visual language onto already existing interaction framework or layouts of different screens of that interactive product. So let us see what this experience attributes are.

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If you look at your screen you would find that this experience attributes are basically a set of adjectives which can be used to indicate the tone, voice and brand promise of the product, okay. So maybe a product is more about Elegance or maybe it is about being Sporty, maybe it is about

Professional look or a Contemporary look or it kind of gives you an idea about being Competitive with other products.

So all these different adjectives they would constitute what we call the experience attribute. And we have to while we are doing this part while a visual designers is involved it detailing these experience attributes, he has to constantly stay in touch with other stakeholders mostly the people who have commissioned the product and the company which is involved in designing and developing a particular interactive artifact.

So it is imperative it is very essential for the visual designer to stay in touch with different stakeholders because it is his responsibility to reflect the different vision of these stakeholders in terms of brand identities, in terms of already established family resemblance and different other things which constitute the overall experience of the product. And he is often required to review qualitative data and check if it can be used to extract experience attributes.

And what is; why it is very important to have a sense of the content of the earlier sessions because if you could remember when we were talking about the qualitative research part, when we were talking about user interviews, customer interviews, stakeholder interviews you might have a rich qualitative data which gives you a sense of these adjectives which are about the experience that the interactive product delivers to its user.

So as a visual designer it is very important for you to also look at the qualitative data because it may have important cues about the experience that the interactive product should deliver. And once again check back with stakeholders and if you have sufficient confident in terms of these experience attributes then you can go ahead and finalize those attributes. And these attributes are often this number is 3 to 5.

So as a visual designer you can keep a set of adjectives or a set of keywords which qualify to be called as experience attributes.

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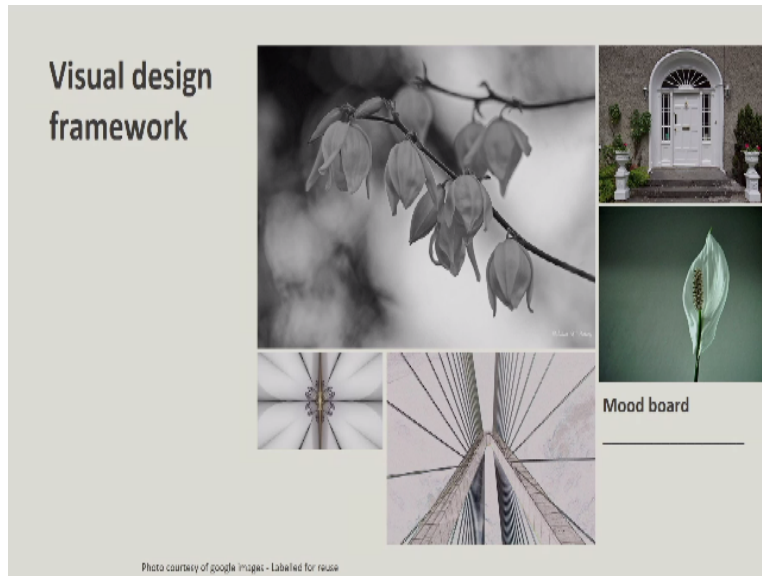
Let me show you few pictures which are a kind of delivering you a sense of elegance, okay. So visual designers often get involved into finding images which indicate or signify in some way the particular adjective that they are looking for. So assume that the adjective for the particular images which you are seeing on your screen is elegance so a visual designer creates a Mood board which has gesture pose images with that particular adjective in mind.

So all of these images if you see they give you a sense of elegance, there is a good foreground background, there is a beauty in these images and that—the quality of being elegant is so profound here. So that is one of the Mood board which is indicating or signifies the quality of being elegant.

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The contrary to it you see the other Mood board which is about being cluttered. So if you see all of these images they convey a sense of cluttered word around you. So a visual designer basically he is interstate in the visual language is interstate in breaking these adjectives into different set of qualities and different set of attributes that can be use for the to bring colour, font and different other visual attributes into the design of the interactive artifact.
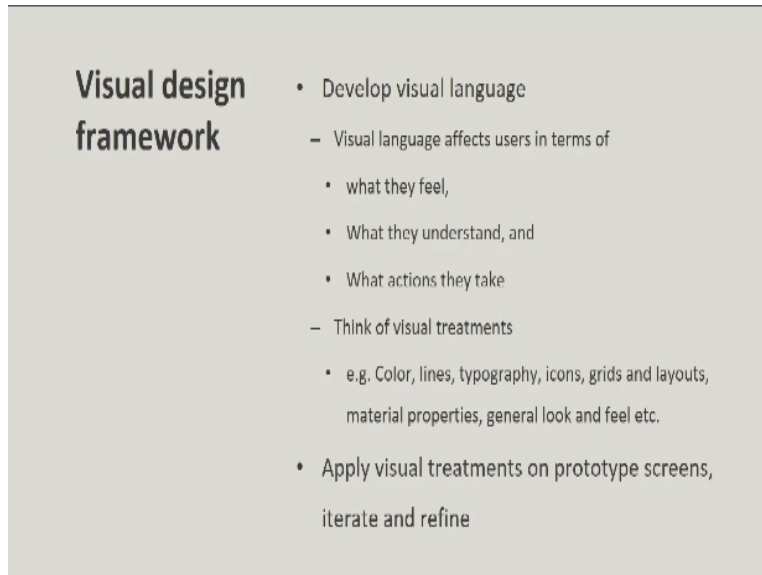
And as I had put that Mood board is one such exercise which is often a very important tool for a visual designer. So once he has detailed enough and he has gathered good knowledge of the competition he has verified with stakeholders; he has gone through the qualitative data to kind of finalize the experience attributes, once again this set of adjectives which define that to own voice and brand identity of the product.

Once he has finalised those then it is the time for him to begin detailing the visual language. And when it comes to visual language we would find that it really affects in terms of what users feel. In terms of what they understand and in terms of what actions that they take, and it is not that difficult concept to understand.

Because if you have looked at your own history of using interactive product you would find that experience with products which have a nice visual design is a better experience than with the products which had maybe an optimal visual design or maybe a visual design which does not suit

your test. So a visual design naturally is going to affect the way users feel, they understand the actions that they take.

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And when you are thinking about the visual language you have to think of the visual treatments. So what are these visual treatments? What are these small, small tools in the hands of visual designers which are at his disposal to bring different feeling in the design? So these tools you can imagine colour being a very differentiating factor. Use of lines, use of fonts and typography, use of icons, grids, layouts, material properties.

You know something that looks like either in glassy finish or something that has a glass finished to itself that is a material property, or something that has a Matt finished to itself that is a material property and the general look and feel of the entire application of the entire interactive product. So these are different visual treatments that a visual designer must detail when it comes to designing the visual framework of an interactive product.

And once he has detailed those visual treatments it is the third step, it is the third sequential most logical step to apply those visual treatments onto the already existing layouts and already existing interaction frameworks in the form of different screens of the interactive product. And often it is required to keep iterations in place and keep refining on your visual design and it is application onto different screens often interactive product.

So refinement through iterations is an established process even with a visual design framework. And I am going to show you few different visual designs in the slides to continue to have these points to have a clarity on these points. So when it comes to typography and fonts as you can see on your screen, you know—
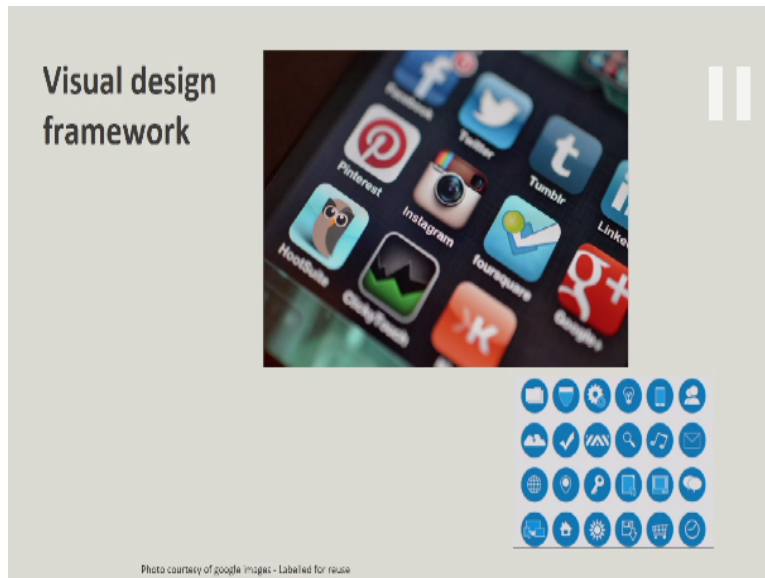
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There are all different possibilities, there are so many different possibilities of writing a simple message like 'Welcome to Interaction Design once again, and do you realize that we are in the fourth week of this course." So by means of this message we are trying to convey a certain emotion to the audience. And in this case you are the audience of this course.

So if you can read across these several different ways of saying this message you will feel that fonts also help; convey different emotions and in all different examples that you see in front of you that emotion gets conveyed differently. Somewhere it is very structures; somewhere it is very friendly; somewhere it is very elegance; somewhere it is very professional, so these are all different ways you can say the same message, okay. You can communicate the same message, okay.
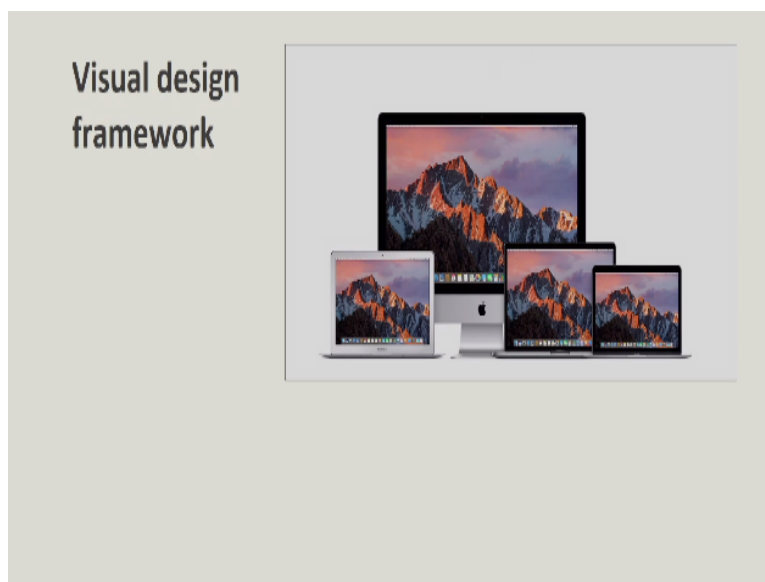
So fonts and typography plays a huge role in conveying the message to its intended audience.

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And once again when it comes to visual design language apart from fonts and typography icons are playing a major role. So it is also responsibility of the visual designer to detail these icons.

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And look at the way each and every product that is introduce new falls into a family of already existing set of products, so that is also responsibility of the visual designer to make sure that every new product every new interactive product that gets introduced before the users fall in line of the rest of the members of the family.
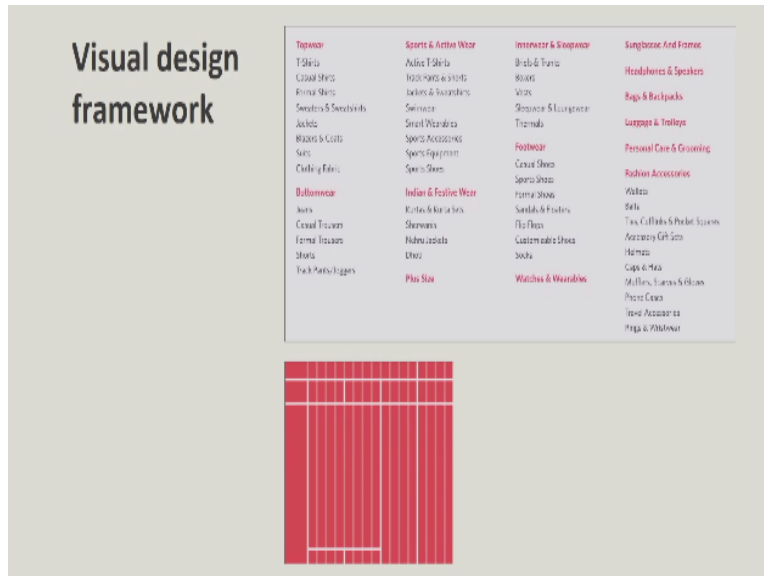
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And you can see a very explicit layout in this example. So there is a webpage in front of you but if you can imagine that there is an underlined grid here and that grid is a responsibility of the visual designer. As a Graphic Designer, as a visual designer you have to mostly that is one of the basic thing that people began with, so laying out a grid first and then setting out stage for rest of the elements in terms of their experience attributes is a visual design framework detailing job.
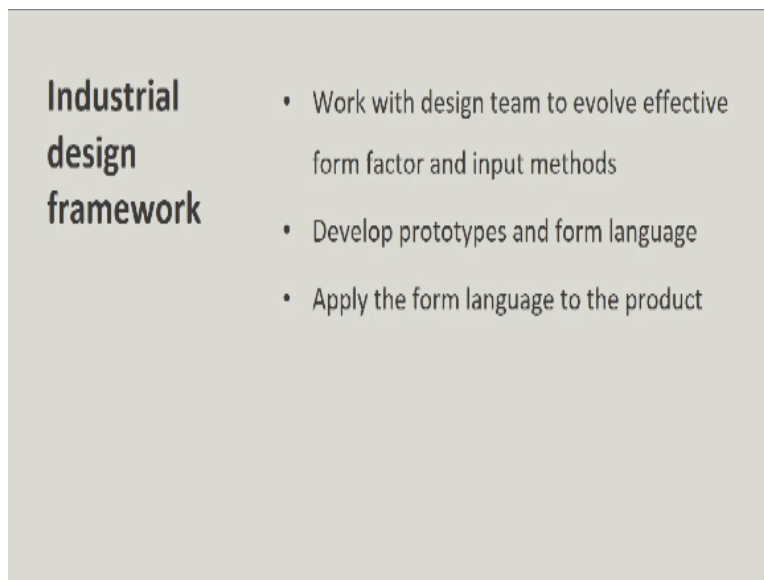
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Here also you can see very explicit layout in place, so that again it is an example for a layout.

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And once again layout is so, so common across all visual designs. And I am sure that ones you have this understanding you yourself can see those layouts in front of you.

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And now the next activity that we are embarking on is the Industrial design framework. Once again let me take you back to the entire sequence of steps. We had the interaction design framework where the output of that framework was those sketches that detailed a very core elements and very essential elements of interactions involving the functional elements and the data elements.

Then we had moved onto the visual design path where we were detailing the experience attributes, the visual language and applying it onto different screens. Now it might happen that at many a times, like if you can imagine a label printer and you can search for this particular keyword you would see that a label printer it not just made of, it not just a simple interactive product, it has got visual design into itself, it has got an industrial design itself.

And there would be so many of products which would require an industrial design. So whenever there is a requirement of an industrial design in the interactive product then at that point of time you are also require to bring in another expert into the team who is an industrial designer. And this industrial designer just like the visual designer and the interaction designer his job would be to work with the design team to evolve effective form factor, okay.

So a shape, size, dimensions you know, how many different ways you can put different controls onto that particular product. So all these details about the form factor and the input methods it is the responsibility of the industrial designer and he would do it in a most usual way like in consultation, in perfect symphony with the rest of the design team. So he works with design team to evolve effective form factor and input methods.

And he would develop prototypes and form language, just like we had a visual designer detailing treatments and visual language. We had industrial designers detailing prototypes and the form language, and the last responsibility of the industrial designer will be to apply that form language according to the product.

So since this is not the main scope of this course I am going to limit our discussion to; I am going to limit our discussion on visual designing framework and industrial designing framework, but I am going to show you a few more examples of industrial design framework.

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Industrial design framework
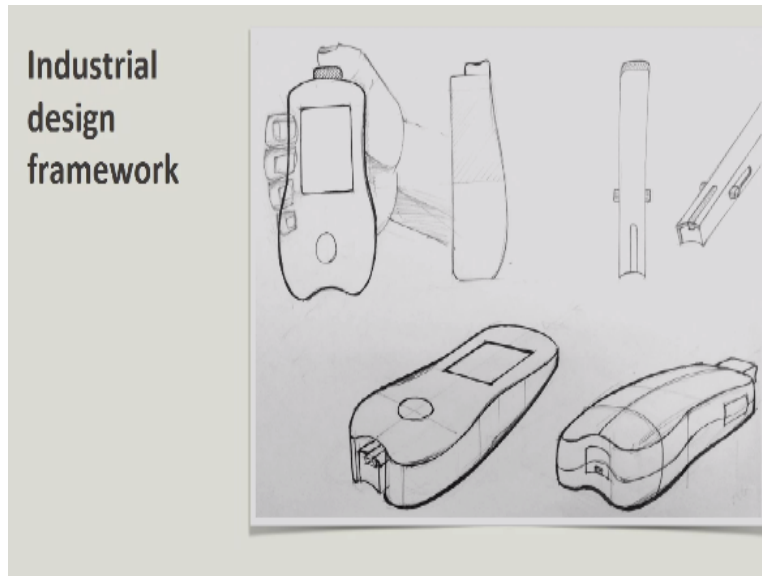
Now if you see here the industrial designer is trying to come up with the form factor and input methods for a handheld device, and you can see that he is trying out all different prospective of looking at this device. How it would look in the front view, how it would look in the top view and the; in the perspective view, she is trying to detail on all different ways and interactive product could be imagine or rather the form of this interactive product could be imagined.

That is the responsibility of the industrial designer. Once again on your screen if you see that this product is getting under refinement in iterative design process. So he is also iterating on his initial ideas, he is defining initial ideas and he is modifying his ideas to suit the product objectives.

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Industrial design framework
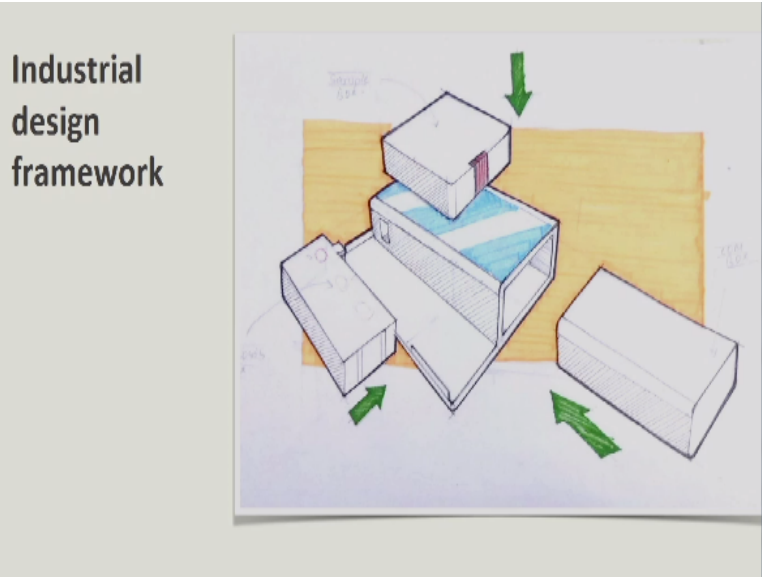
Here also you can see that he is trying to then see, you know how do different things fit, all of these imagining all of these is the responsibility of the interaction designer. So once we have studied the interaction design framework and then followed it with visual design framework and is an industrial design framework we have seen a holistic understanding of detailing the design framework.

And that is where we are across the very last stage of the goal directed design process. It is now the time for all of us to understand that there exists a set of designer standards, principles, guidelines and style guides which have to be used by the designers across different stages of goal directed design process. So let us start paying attention to these standards, guidelines and principles.

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Interface design standards

- A design standard is an agreed-upon and well-accepted principle, or an approach
- It focuses on different aspects of user interface design and interaction design
  - process of designing, process of evaluation, design and development of interaction and visual framework, ease-of-use, accessibility, cross-cultural use contexts etc.

First, let us take a look at design standards. What are these and what are the common examples of these design standards. So interface design standards is an agreed upon and well accepted principle, or an approach. So there is a community of interaction designers, visual designers, researchers and people in academia who are agreeing on a certain set of conventions and rules and guidelines, principles and approaches what we call an interface design standard.

So it focuses on different aspects of user interface design and interaction design. To give you a sense of what this aspect could be, so process of designing so we have a set of standards which talk about especially about the process of designing. Then there is another group of standards which talk about how do we evaluate our designs, so there is a process of evaluation. Then there is another of standards which would talk about the design and development of interaction and visual framework.

And there would also be another set of standards which focuses on very essential, but specific topics like ease of use, accessibility, cross-cultural use of different interactive prototypes and so and so forth. So you see that these standards are once again, they are well agreed upon and well accepted set of guidelines, principles or approaches by people in the community involving designers, researchers, academicians, industry experts and others.

So they have evolving policies when it comes to designing interactive product. So that is one of the main functions of having a design standard.

Interface design standards

- Meant to be used by the designers and others involved in the design of interactive artifacts
- Identify the interface design standard appropriate for your design and then use it according to the specific context of use, and other circumstances involving the interactive product and its users

It is meant to be used by the designers and others involve in the design of interactive artifacts. And once you have involved, once you have been involved in a process of designing interactive artifact it is always good idea to kind of have an understanding of these standards. So one of the essential activity that you would be performing is to identify these standards.

Now once you have identified the relevant standards which match your goal as a designer in designing the interactive product then it is a time to interpret those standards, apply them into your process, apply them into the design of the interactive products. So you have to interpret those standards. And you do this interpretation based on specific context of use and other circumstances involving the interactive products and its user.

Never forget the part of the first few initial parts of this goal directed design process. They were about knowing the user the research phase knowing their stakeholders, knowing the domain, knowing the task and then there was a part about knowing the requirements and requirements helped us move further into the framework design phase.

So even then you are into the framework detail phase you need to keep the knowledge that you have gathered in the earlier phase, which is all the circumstances and situations and conditions which deal with the use and deployment of interactive products across different user groups. So you identify the design standards and then you interpret it according to the knowledge that you have gathered across different stages of the goal directed design process.

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One of the very interesting repository of all these standard is the International Organization for Standardization. And if you can just use the string which is user interface and such using that string you will find that there is an enormous resource in terms of standards just on using interface. You use the other string the interaction design you would find another set of very relevant standards.

So I would like to encourage your hugely to look for yourself and explore this repository of International Organization for Standardization. In this slides to continue, I will give you few different examples of how these standards are written; how do you find them and how do you interpret them, okay. So let us look into the first example in the standards category.

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Interface design standards

- ISO 9241-210: 2010 (03/ 2010)
  - Ergonomics of human-system interaction (Part 210) Human-centered design for interactive system
  - Previously known as **ISO 13407: 1999** (06/ 1999) Human-centered design processes for interactive systems

We have the standards known as ISO 9241-210: 2010. It was adopted in March, 2010. And the standards say, Ergonomics of human-system interaction and it is the Part 210, whatever is there after the hyphen is the part. So it is an interesting thing that you need to remember that often these standards are multi-part standards, as if they are explained or categorized across different sections.

So whatever number comes after the hyphen is usually the identity of the part of that standard. So ISO 9241 is a ISO standard which was adopted in March, 2010. So in front of you is an example of one such revision these ISO standards 13407 revised as ISO 9241. And there is a revision document that is available for us to see. Now, let us read this standard, how it is written. How it is explained before, how it is explained in the public repository of ISO.

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Interface design standards

- ISO 9241-210: 2010 (03/ 2010)
  - "ISO 9241-210:2010 provides requirements and recommendations for human-centred design principles and activities throughout the life cycle of computer-based interactive systems. It is intended to be used by those managing design processes, and is concerned with ways in which both hardware and software components of interactive systems can enhance human–system interaction."

So ISO 9241-201:2010 provides requirements and recommendations for human-centred design principles and activities throughout the life cycle of computer based interactive systems. It is intended to be used by those managing design processes, and is concerned with ways in which both hardware and software components of interactive systems can enhance human-system interaction.

So this is how usually you would find an ISO standard detailed in a public repository. So once again you have to identify every such standard and use it apply it back into the design process that you are following, that is what we are calling the interpretation. So you remember identify the standards, interpret it to suit the design process to suit the interactive product you are following. But if you follow standards, it helps resolving lot of conflicts.

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Interface design standards

- **ISO 14915: 2002** Software ergonomics for multimedia user interfaces
  - A multi-part standard proposing guidelines with respect to the design of multimedia user interfaces
  - **ISO 14915-1:2002** Software ergonomics for multimedia user interfaces (Part 1): Design principles and framework
  - **ISO 14915-2:2003** Software ergonomics for multimedia user interfaces (Part 2): Multimedia navigation and control
  - **ISO 14915-3:2002** Software ergonomics for multimedia user interfaces (Part 3): Media selection and combination

One other example, ISO 14915:2002, it is titled as Software ergonomics for multimedia user interfaces. Once again it is a multi-part standard proposing guidelines with respect to the design of multimedia user interfaces. So following are the parts of this ISO standard. We have part 1, part 2 and part 3 and they are slightly different from each other. The first part is, Design principles and framework. The second part is Multimedia navigation and control.

And the third part is, Media selection and combination. So these standards once again are responding to the contemporary needs of the community and of the technology and of the users. So 2002 if you remember was a time when there a lot of multimedia products which were coming to the market like CD players lot of these media player's other kind of multimedia products, so at that time this standard was proposed to bring consistency in the design of different interactive products.

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Interface design standards

- **ISO 20282** Ease of operation of everyday products
  - Four-part standard suggesting guidelines with respect to design of easy-to-operate everyday products
  - Ease-of-operation is an aspect of product's usability
  - Concerned with the users' characteristics and context-of-use

ISO 20282 is about Ease of operation of everyday products. It is also a Four-part standard suggesting guidelines with respect to design of easy-to-operate everyday products. Now, ease of operation is as you would see in the next few slides that it is an important part of usability of the interactive product. How easy is the product for users to use is an aspect? and a concern for usability. And ease of operation is concerned with the user's characteristics and context of use.

Once again never lose the connections with the earlier done processes in the goal directed design process. Research, modelling, requirements so that is where they come every time in the next stages. So we are into the stage of framework definition in detailing. And once again we have user's characteristics and context of users coming up.

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Style guides

- Provides the basic design rules or conventions
- Applicable for a specific product or for a family of products
- Public proposals from a single organization or company for use by community members

Now, after design standards comes the Style guides. Now they provide the basic design rule or conventions. And you would see how they different, they are more specific than a design standard, okay. So they provide the basic design rule or conventions. And they are applicable for a specific product or for a family of products, and we would soon see an example of this kind. Public proposals from a single organization or company for use by community members.

So often there are companies and there are organizations which detail out a style guide and then they make it available for developers who develop things on their own; for designers who design on a very freelance basis, they make those style guides available for all so that there is a consistency in the design product or a family of product.

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Style guides

- Typically;
  - Describes all the required interaction styles and user interface controls
  - Describes condition for use — When and how
  - Illustrate examples of use and use contexts
  - Provide representative screen templates to help designers design with consistency

And a style guide typically describes all the required interactions styles and interface controls. Remember the point when we were saying detailed data and functional elements, so those interaction styles and interface controls a description of those is usually captured in a style guide. And it describes not just what these interaction styles and interface controls are, it also describes when to use. Conditions for use of these interface controls and interaction styles.

And not just conditions of use it also illustrate the different examples of how these given interaction styles or interface controls are being used. So there is an illustration in terms of use and use contexts. And not just that it often had representative screen template so that designers or anyone else set out to design interactive product could pick up those templates and design interactive product accordingly.

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Style guides

- Commercial style guides
  - Highly specific and detailed design conventions or rules
  - Lesser room for interpretations and translation by the designer
  - Applicable to a particular system or class of system

Now there are two kinds of style guides, the first one is Commercial style guide. Now this one is highly specific and detailed in terms of telling about the design conventions or rules, and there is a lesser room interpretation or translation by the designer. This is one point where a style guide differs from a design standard okay. A design standard offers; it has got a room for the designers to interpret it.

But in a style sheets since it is highly specific and detailed and considered very unique and easily distinguishable interface styles and user interface controls, so there is a very less rule for interpretation by the designer or anyone set out to design an interactive product. And it is applicable to a particular system or class of system. This might sound a little difficult to understand but look at the examples which are coming next.

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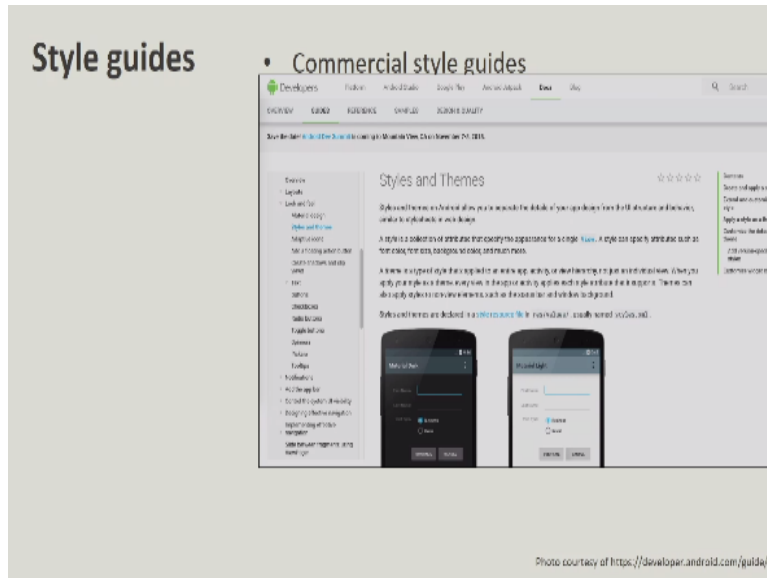
So when we are saying that it is a public repository hosted by an organization or a company for use by the members of the community, developers and freelance designers and anyone else who set out to design an interactive product. So one such example is the Android material design library, so it is a commonly, it is a publicly available design library and the main intention is that whosoever is designing Android based applications should strive for consistency.

And when it comes to consistency they can look into the most widely use interaction styles and interface controls within the Android platform, okay. So that is why we have—as you can see this is fairly a detailed design style guide. We have a lot of emphasis on how the interactive product looks and feel and then we have a lot of emphasis on—rather an equal emphasis on how does it behave.

So within look and feel you have so many of this very specific and detailed style guides. Let me read out few of them. So material design, styles and themes, adaptive icons, buttons, checkboxes, radio buttons, spinners, tool tips then within notifications another set of content, and then controller system UI visibility. So basically as you can see the style guide is a document publicly available document with very specific and detailed description of different interaction styles,

and interface controls to be used by a very particular system or by a particular application or group of application. So android is a particular platform which only develops android base applications, so for this platform following is the design style guide. Okay.

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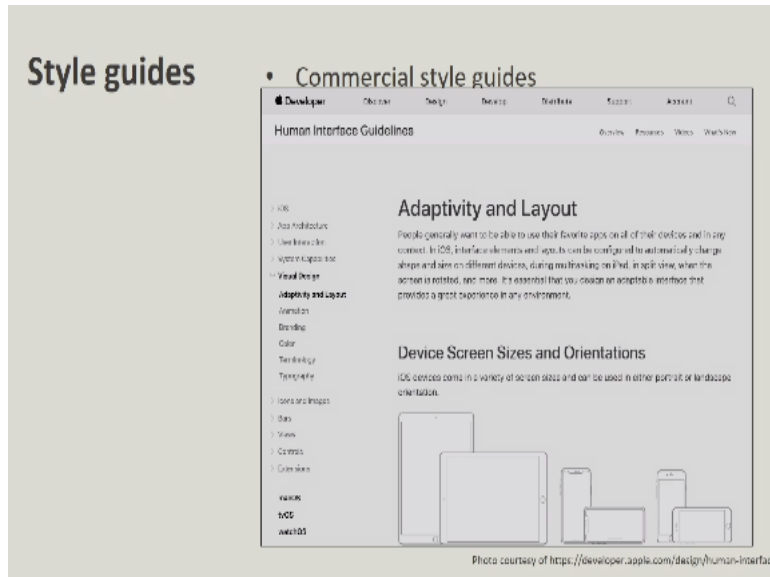
Another example is every company every company which is into the user interface design business has a style guide. Once again we have before us. The human interface guidelines from Apple and it is meant for developers and designers who would like to develop iPhone platform based applications. So not just visual design but also about controls, user interaction, system capabilities a lot of description very specific and detailed discussion of interface styles and user interface controls. Once again you have an example in front of you. Let us move to IBM.

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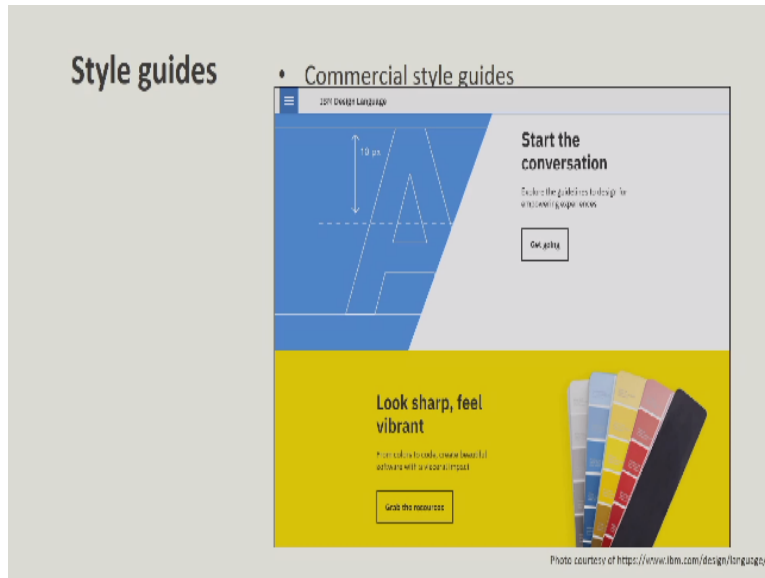
Even IBM has a design language, they called the style guide is titled as IBM design language. I would encourage you to visit these style guides in your spare time.

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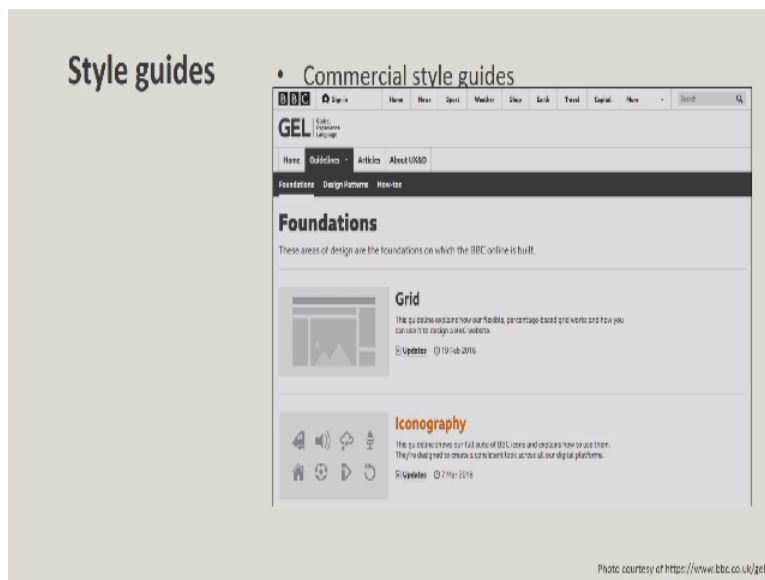
And then the Microsoft design guidelines. And not just the companies not just the companies which are focus onto products and even corporations which are around multimedia production and conception, I know media production and conception they also tend towards detailing a specific style guide. So for example the BVC has global experience language and here is a public URL for global experience language www.bbc.co.uk/gel/.

Okay, so this is also one publicly available style guide for developers and designers. Now can you imagine what is the most apparent advantage of having a style guide. Now since you have seen a different examples ranging from IBM to Microsoft to other corporations to BBC can you imagine the most apparent advantage of having a style guide. The most apparent advantage is consistency okay.

All the application who follow the style guide stay consistent in their interactions styles and use interface controls. Not only do they stay consistent it is also easy for any incoming designer or novice designer or trainees to come and start this designing the application, so they can follow they can come onboard follow the style guide and start designing different interactive application. So it helps these corporations to plug and play the different resources when needed.

Now there is another style guide, remember two types the first one was Commercial style guide now we have Customized style guide. So in the customized style guide the source for collecting different conventions and rules might be many, okay. So it is an amalgamation of different design principles, guidelines and rules and standards to suit a specific context of use, okay. So that is why there is often a need to customize the design guideline.

So for example imagine that you have to design a laptop to be used under the most regress conditions of weather, environment and usage; at that time, you have to adopt the existing style guide to suit the newer environment which is a challenge in itself. At those times the customized style guides gets formed.

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Style guides

- Customized style guides
  - Amalgamation of different design principles, guidelines, standards and rules
  - Highly influenced by the users' needs and requirements, and by the context of use
  - Adopted to include consistency across the designs, and to help improve usability
  - Offers an informed manner of designing the interactive product

So it is an amalgamation of different design principles, guidelines, standards and rules. It is highly influenced by the users' needs and requirements and by the context of use. It is adopted to include consistency across the designs, and to help improve the usability of the design. It offers an informed manner of designing the interactive product for anyone who is new to the team if he had access to a style sheet or a style guide that is always an edit advantage.

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Design principles

- Design concepts, laws, guidelines, and general design considerations
- Cross-disciplinary knowledge applicable to design
  - E.g. Behavioral psychology, Human perception and cognitive science, Engineering, Management and others.
- Follow until you've a good enough reason to defer
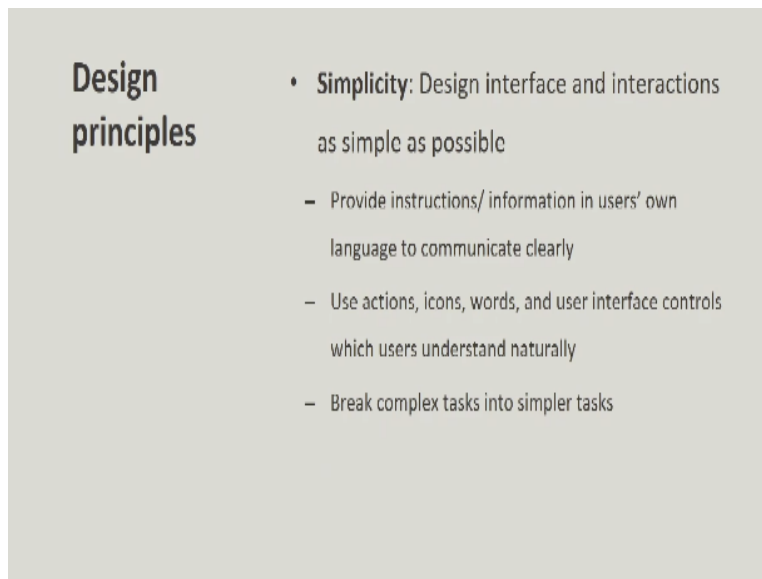
Now come the design principles. These are design concepts and rules and conventions often we can call them laws also, guidelines, and general design considerations. Now there sources maybe differ, they may come from psychology, they may come from management or they may come

from cognitive sciences, but these are broader design considerations which become useful for designers while they design interactive products.

So it is a cross discipline knowledge applicable to design once again, the source of knowledge maybe from behavioural psychology, human perception cognitive science, engineering management or an any other discipline. It across disciplines the knowledge, and follow until you have a good reason to defer. So if you are a designer not just you should be aware of design standards or style guidelines but this very broad design principles one should also be aware of.

And you should have good enough reasons to not follow them, okay. So often we saying in design school, once first you learn the principle master it and then if you find the good enough reason to differ following it you do that. Okay. So follow until you have a good enough reason defer.

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Now the first design principle there are like so many of these design principles I am going to tell few before you. Now the first design principle is Simplicity which is design interface and interactions as simple as possible. As a designer you should consider providing instructions and information in user's own language, so that there is a clarity of communication. Use actions, icons, words, and user interface controls which uses understand naturally.

And if there are complex tasks if there is a complex process you or a task you break the complex task into manageable chunks into manageable steps okay. So in that manner there is a possibility that the interactive artifacts become simpler to use. Keep the appearance and the behaviour of interactive product which users understand naturally okay. And then remove unnecessary complexity. Provide clear prompting and feedback for all the actions.
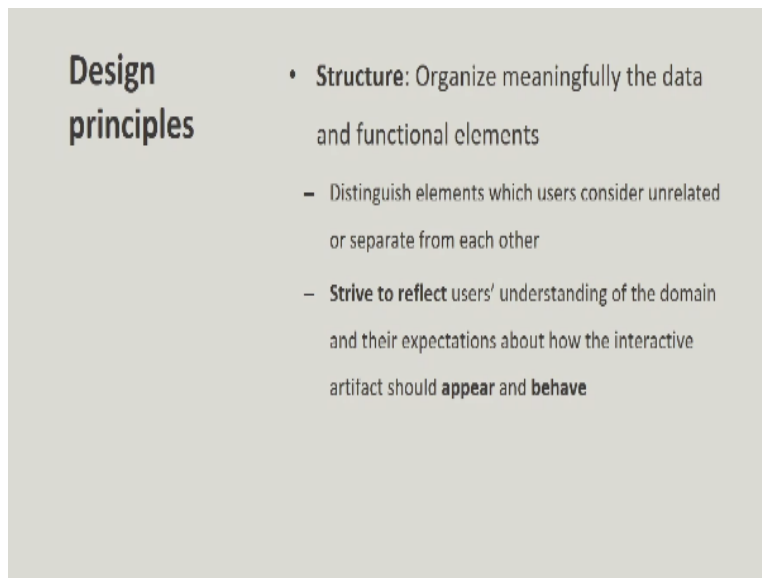
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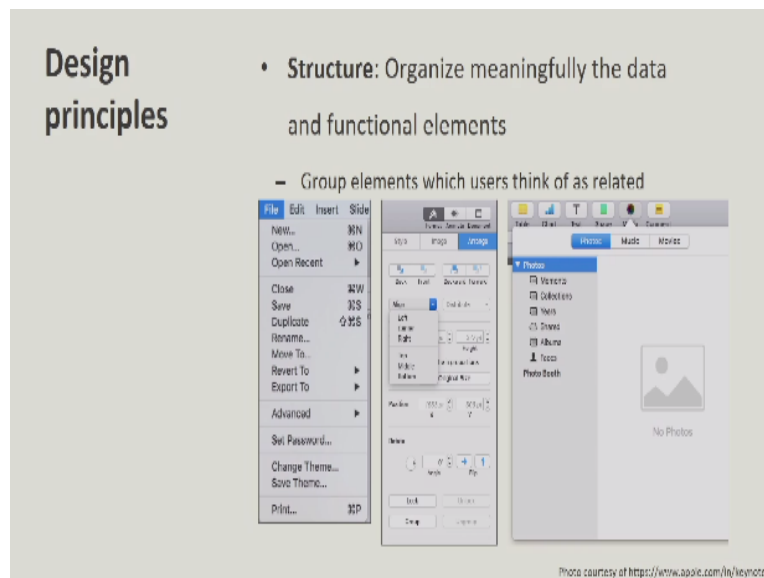
The second design principle is Structure. Organize meaningfully the data and functional elements. So once again you have to find groups and hierarchies within the data and functional elements, so in that sense structuring the information into the meaningful chunks becomes an important part of the design activity. So structure meaningfully the data and functional elements, and this is one example which we had seen earlier.

As you can see on your screen all the data elements and functional elements they are structured in categories which are meaningful in nature. So if you were to perform a certain set of functions on a file all those functions are arranged under a meaningful category which is titled as file itself. If you were to perform different editing operations on the file all those functions all those operations have been clubbed or grouped together into a meaningful category called Edit.

And then in the next example as you can see all the functional elements which are about aligning different objects on the screen they are grouped together as a category called Align. So these are

different examples where we have an explicit structuring done by the designer. Okay. So that is where structure is a very important design principle.

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Now distinguish elements where you are structuring you need to distinguish elements which users considered unrelated or separate from each other. So you can club elements which are which seen to be related while at the same time elements which seen to be unrelated you can keep them separate or perfectly distinguishable from each other. And when you are trying to do that how you are creating this groups or rather contents within our category and then categories which are easily distinguishable.

How you are doing that, you are doing that with an intention to reflect users understanding of the domain and the task, okay, and their expectations about the interactive artifact, how should behave and appear. So you need to strive to reflect users understanding of the domain and their expectations about how the artifact should appear or behave.

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One important design activity or a technique which is utilized by the designers is chunking. Here what happens that many units of information they are combined to form a limited number of units or what we call chunks, so that the chunked information becomes manageable that the users can process it better and it helps users remember. So chunking is a technique which helps while you are structuring, different elements in your design.

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It is based on the number of units which the short term memory can hold and process. So our human memory is divided into long term memory and short term memory. There is a limit of our short term memory. So chunking as a design activity is influenced by the capacity of the short

term memory. Human being have two different memories long term memory and the short term memory. And our short term memory is fairly limited.

It is limited to the number of 4+ -1 itself items at any given point of time. So while you are chunking you create chunks which are manageable and easy to process by the human being which means that you take into account the limits of the short term memory. And especially when users are required to recall a retained information it is important to chunk the information. Can you imagine your interaction within the IVR Interactive Voice Response System or—

Let me give you can example, while you are interacting over phone with your bank at that time to complete a task like transferring a particular amount to a registered payee we need to retain and recall the information. In those kind of task, so do exercise chunking when there is a need for that.

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The next design principle is Consistency. Uniformity in appearance, placement and behaviour of data and functional elements. So the example in front of you is a set of applications which belong to a particular suite of application, okay. So this is MS Office suite of application and all the applications not just their icons but if you can imagine how you are interacting with all of them you can see that almost all the different interaction styles and user interface controls are fairly consistent.

And by this time can you imagine why that was happening because of style guides, commercial style guides given by a particular company or an organization. So style guides help at any consistency.

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Do you remember seeing so many different Petrol pumps while you are on a ride in a city or on a highway, do not you think that they all look consistent. So even the company which is a petroleum company is striving to be consistent in its design in a similar way if you are designing interactive product consistency is the least which is required.
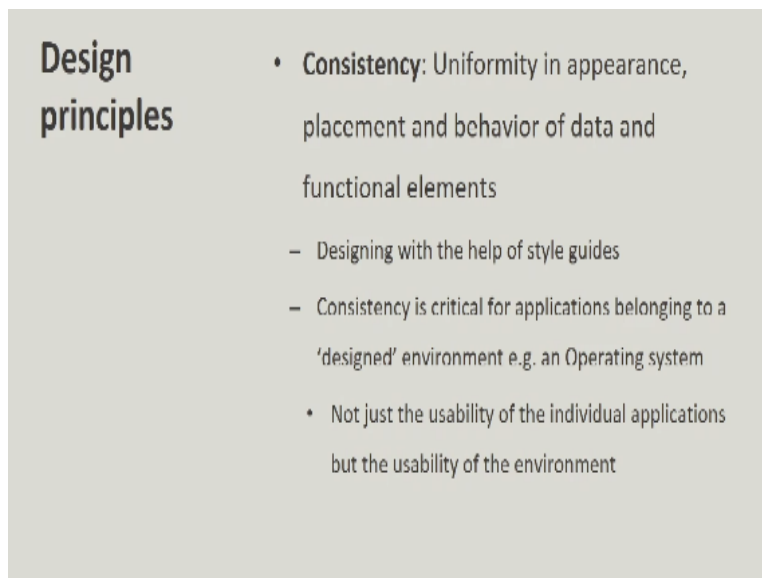
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Major concern while striving for products with good usability, consistency is a major concern while you are thinking you know that your interactive product should have a good usability, or it must be consistent with other designs. Users expect some reasonable degree of consistency while performing tasks. So if absent, if that consistency is absent usability gets compromise because users get confused.

And it helps making your design more predictable and understandable. So if users can predict what coming next it brings lesser anxiety in their minds while they are interacting with the interactive artifact.

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Designing with the help of the style guides, once again mention of style guide is coming with reference to consistency and consistency is critical for applications belonging to a design environment. Think of your operating system as a design environment. All the different applications which run on your operating systems need to be consistent in some way, otherwise not just the usability of the individual applications but the usability of the entire platform,

Or the entire operating system would get compromised. So it is very critical when you are thinking about applications which are hosted on a common platform or on a common technology. Consistency once again is the least which is required.

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Design principles

- **Tolerance**: Design to minimize user errors
  - Think about the errors resulting from a poor task or domain knowledge
  - Design to avoid such errors
  - In case of users committing errors, provide error recovery methods
    - "Recoverability" how easy it is for users to recover from their errors

The other design principle is of Tolerance which means that as an interaction designer you design to minimize user errors. Think about the errors resulting from a poor task or domain knowledge. If your users let say in a domain like banking are not aware of how to perform banking operations that insufficient knowledge with respect to banking operation may instil some errors while they are performing interactions with the banking applications.

So insufficient knowledge with respect to domain or task may bring errors while interaction and you design should avoid such errors. In case of users, let us say if users have anyways committed errors your design should have mechanism for letting users recover from their errors. So recoverability is another aspect which is closely link with tolerance. And it is about how easy is it for users to recover from their errors.

So there are 2 different ways you can incorporate recoverability in your design.
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Design principles

- **Tolerance**: Design to minimize user errors
  - "Recoverability" how easy it is for users to recover from their errors
    - Forward error recovery — Accept the error, Help the user accomplish his goal through alternate route
    - Backward error recovery — Undo the error committed in the previous interaction to return to an earlier state
      - Recall **multi-level undo** interaction pattern

There is a Forward error recovery which is that accept the error a system that you design accept the error and then it helps the users to help accomplish their goal by providing them alternate route. So in this particular if you can imagine while you are designing a forward error recovery system categorization and different workflows that you are designing for users to accomplish their goals those workflows become very critical.

Maybe there is a need to incorporate some redundancy in those workflows because if a user come it is an error the system needs to give user an alternate path to accomplish his or her goal. And then we have the Backward error recovery which is that you undo that committed in the previous interaction to return to an earlier state. So if you can imagine that backward error recovery as a method has influenced one interaction pattern which we had spoken about in one of

our earlier sessions and that interaction pattern was multilevel undo interaction pattern, okay. So here in the backward error recovery you undo the error which was committed in the previous interaction and to return to the earlier state of the system. So these are 2 different methods which you can use as a designer to incorporate recoverability in your interactive product.

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Design principles

- **Accessibility:** Make product stay usable for people with diverse abilities
  - Accessibility without special adaptation or modification
  - Started with design consideration guidelines for different abled users
  - Constant focus for ISO design standard

Now comes the most talked about design principle which is Accessibility. Now make products stay usable for people with different ability. Now why accessibility is becoming so relevant as a design principle because in today's time not just the people who are trained to use technology but there are lot of them from all walks of life who are coming and using the technology, okay. So it is imperative for an interaction designer to also think about them to think about people with different abilities.

So to mandate of an interaction designer is to make product or to design an interactive product which stay usable for people with diverse abilities. Accessibility, without special adaptation or modification. So you should design an interactive product which does not need too much of adaptability or you know too much of changes in terms of modifications for making it to be available for making it to be usable by another set of users.

So it starts with the design consideration guidelines for differently abled users. So accessibility as a design principle it is started by looking at people who were differently abled but now it is broadly understood as everyone to include people from all walks of life with different abilities with diverse abilities. So constant focus for ISO design standards. In most of the ISO design standards accessibility is coming across as a major focus.

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Design principles

- Four characteristics of **accessible** design
  - Perceptibility
    - Can the design be perceived by all the users irrespective of their sensory abilities ?
      - Use redundancy in interface design e.g. Same information communicated over Icons, textual, tactile, speech etc.
      - Think in terms of multimodal interactions
      - Use position controls and information to help both the standing and seated users in perceiving the interface

There are four characteristics of accessible design. The first one is Perceptibility. So as an interaction designer you should ask the question, can the design be perceived by all the users irrespective of the sensorial abilities. So all of us as human beings have different sensorial ability, some of us have better eye sight than others while other can hear better than a few others. So there is a diverse range of sensorial abilities that as human beings we all posses.

So any interactive product that you design you must raise this question that is it perceivable by all the users with different sensorial abilities. Use redundancy in interface design. Same information is often communicated over multiple channels. So what you see is also something about your hear, so you pass on the same information on two different channels and that is like bringing redundancy into the interface design.

So how do you bring the perceptibility, uniform perceptibility for all different users? You do it by bringing some redundancy in the information design. For example, what do you mean by redundancy? We mean that the same information is conveyed on two different channels that is one way of doing that or the same information is conveyed parallelly in two different ways. So in this example when you have when you can see the icon and also read the title of the icon,

You are actually going through a redundant information, and also you can think about multimodal interfaces where the same information is present on two different channels. For

example, there would be interface category where you can see and you can hear. So the same information is passed onto the visual channel as well as the oral channel. So think in terms of multimodal interactions. Use position controls and information to help both the users who are standing, or who are seated in perceiving the use interface.

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Design principles

- Four characteristics of **accessible** design
  - Simplicity
    - Does the design offers an ease-to-understood and an ease-to-use to all the users irrespective of their abilities, experience, formal levels of education etc. ?

The second characteristics of accessible design is Simplicity, something that we have already gone through as a design principle. And the question that we are asking as an interface designer is the following. Does the design offer an ease-to-understood and an ease-to-use to all the product to all the users irrespective of the abilities, experience, formal level of education etc.?

So you must go through the design principle where we have spoken in detail about a simplicity, but as characteristics of accessible design simplicity is one major characteristic. The third characteristic is Forgiveness also known as tolerance.

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Does the design help the users commit lesser errors or recover from their errors in an easy manner? Okay, so this is also something that we have understood earlier and we would skip it this time.
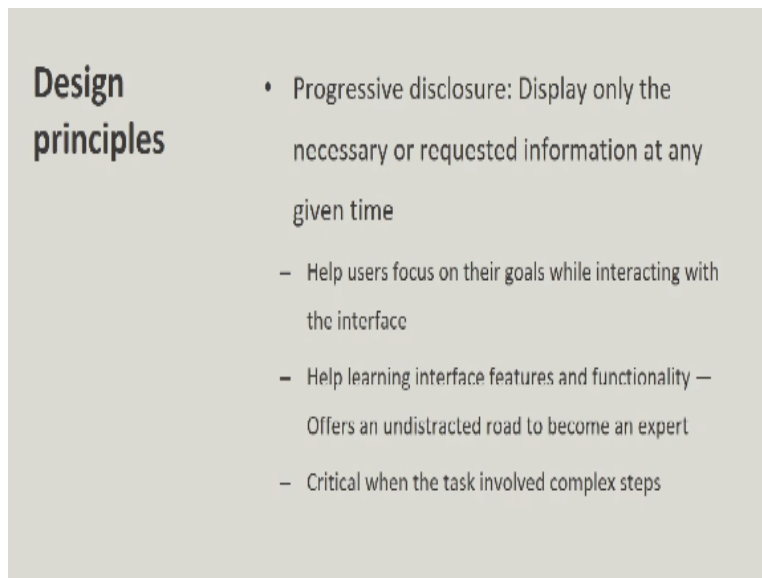
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Progressive disclosure is the another design principle. Display only the necessary or requested information at any given point of time. Help preventing information overload, information is divided across several layers and only the relevant information is presented before the users. So you see that the PowerPoint presentation, the PowerPoint presentation is a progressive disclosure of information where only the information which is relevant at any given point of time is disclosed and to the users.

You can use the same technique while you are designing an interface. An interface also can be based on progressive disclosure technique. And when you are designing to show most relevant data and functional elements you can have an example like this. So click here to view more. So there are often the times when for novice users we do not want to overload them with the lot of information.

So we hide some information which maybe relevant in a different context in a different continent. And then we say that, if you want to view this set of information you click here. And that is one example of progressive disclosure. So interface with progressive disclosure remains clean and uncluttered. So if you presenting only the relevant information at any given point of time as a designer you can maintain a clean and uncluttered screen.
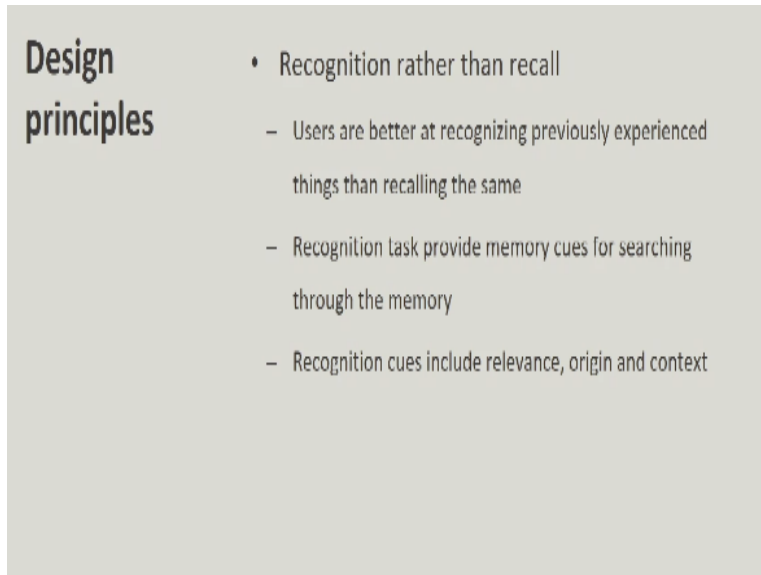
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It helps user focus on their goals while interacting with the interface. Okay. And it essentially improves their experience of interacting with the interface. It helps learning interface features and functionality, offers an undistracted road to become an expert. So if as a novice you approach an interactive product where the progressive disclosure as a technique is used by the designer then it is easy for you as a novice user to become an expert.

So it helps learning interface features and functionality offers all undistracted road to become an expert. And it is again critical when the task involve too many complex steps.
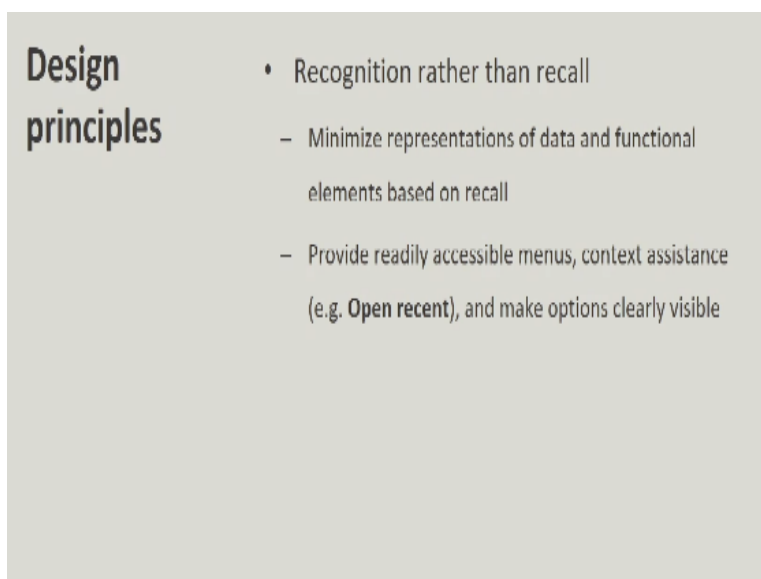
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The other design principle is Recognition rather than recall. It is seen, we know that users are better at recognizing previously experience things than recalling the same. Because the recognition task provides memory cues for searching through the memory, and these memory cues could be about the origin, context or relevance of a different things that you are experienced. So it is important to design interfaces which employ recognition rather than recall.

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How you can do that? You can do that by minimizing representations of data and functional elements based on recall. So elements which put a load on your memory once again remember that users short term memory all of us as human being have limited short term memory, so you have to minimize representation of data and functional elements which are memory dependent, minimize that.

And provide readily accessible menus, context assistants and make options clearly visible. So you might have seen in most of the application that we use when it comes to profile there is a functionality that says, Open Recent. That is about not asking users to recall the last file that they have experienced but showing them in front of you a set of last opened files. So this is an example of recognition over recall technique.

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Now there could be several other guidelines which would be of interest to you. And I would encourage you to go through these guidelines in your spare time. I will read few of them. Aesthetic – Usability effect, Savannah preference, Closure, Common fate, Confirmation, Control, Fitts' law, Five hat racks, Flexibility-usability tradeoff, Hick's law, Inverted pyramid, Legibility, Mapping, Ockham's razor, Performance load, and Proximity and the list goes on.

So it is open for you to explore the discipline here. And I wish you best of all. Thank you.