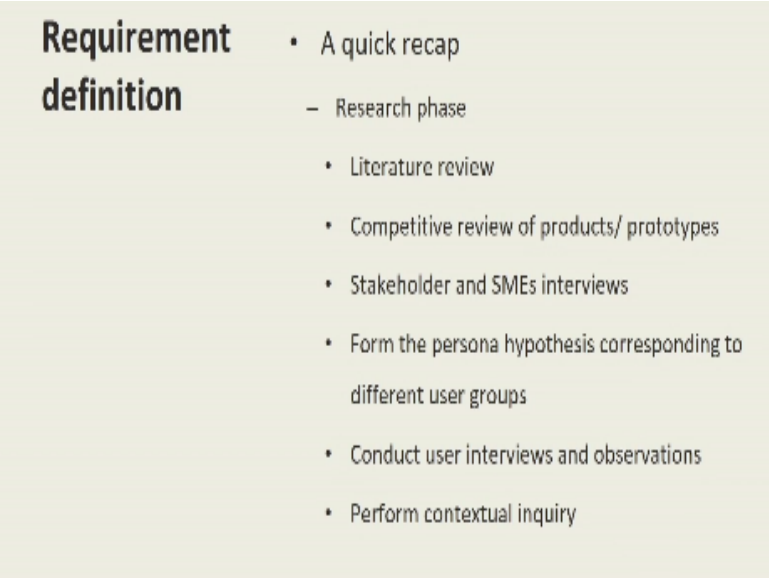
Interaction Design
Prof. Abhishek Shrivastava
Department of Design
Indian Institute of Technology – Guwahati

Lecture - 11
The Requirement Definition Phase in Goal Directed Design Process Part-1

Hello. Today we are going to the third stage of the goal directed design process which is the stage of requirement definition, but since we have moved across at least in 2 different sessions on research and the modeling phase. Let us do a quick recap of what all we have learned in those 2 phases.

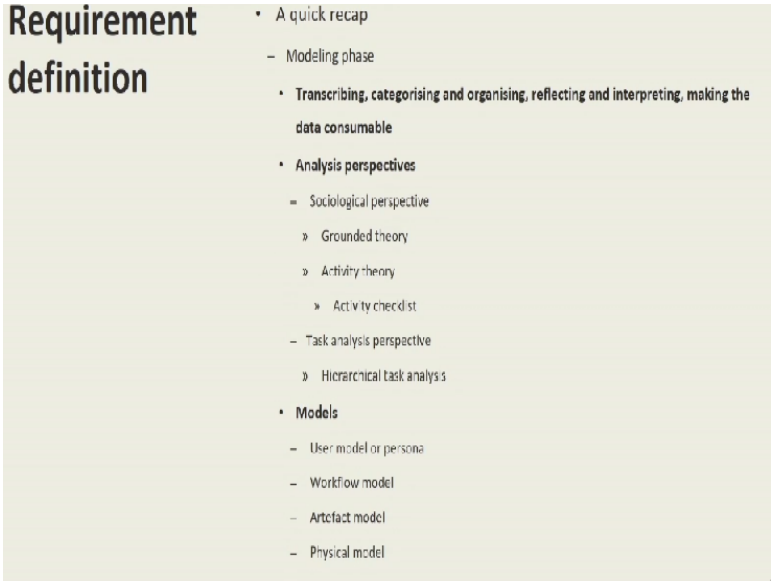
(Refer Slide Time: 00:55)



So in the research phase you have gone through literature review, you have conducted a competitive review of products and prototypes. There is a stakeholder and subject matter interview that is also something that we have learnt about then we have learnt how to create the initial set of personas and corresponding to different user groups and that understanding of persona, that understanding of different user groups has helped us identify candidates for user interviews and observation sessions.

And we have also learnt about how to perform and conduct something like a contextual inquiry which is a method that combines both interviewing and observation in the environment that is local to the user.

(Refer Slide Time: 01:46)

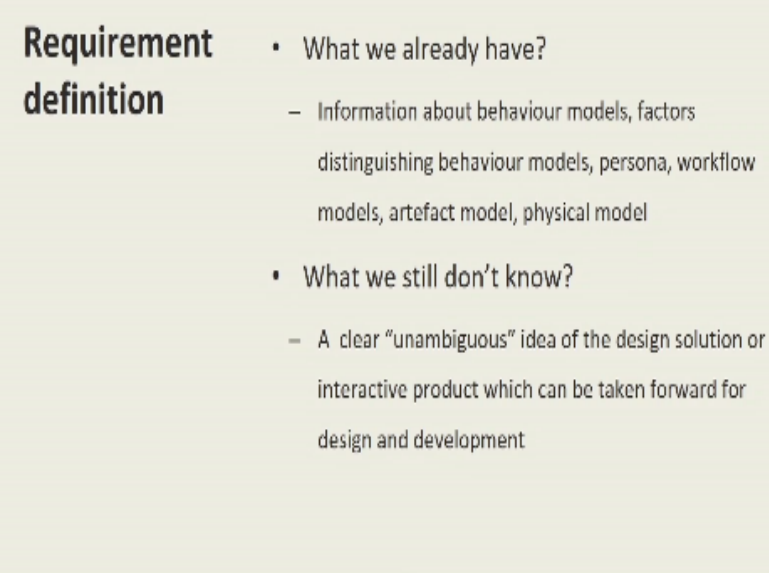


While in the modeling phase we have learnt about transcribing, we have learnt about categorizing and organizing the data then also about how to reflect and extract interpretations out of the data and then since a design team it has to communicate that information to other stakeholders. So we have learned the importance of making that information consumable for all.

From the perspective of analysis, we have gone through 2 different perspectives sociological perspectives and task analysis perspective. Now within sociological perspective we have seen that how these 2 different theories. The first one is the grounded theory the other one is the activity theory how these 2 different theories provide provocations for (()) (02:32) designers to analyze the data and also the task analysis perspective we have seen the technique of hierarchical task analysis and then later on in the session on modeling uses.

We have seen what is the relevance of different models especially we have gone through user model or persona, workflow model, artefact model and physical model. So today we are going to look into the next phase in this process which is the phase of requirement definition.

(Refer Slide Time: 03:09)



Now in a way what we have already have an information about let us raise that question. So we know that we have rich information about behaviour models, factors which distinguish those behaviour model, persona workflow models, artefacts models and physical model. So that is the output from the modeling user phase that we are getting. Now what we still do not know is that we do not have a clarity in terms of requirements which are clear unambiguous idea of the design solution or interactive product which can be taken forward for design and development.

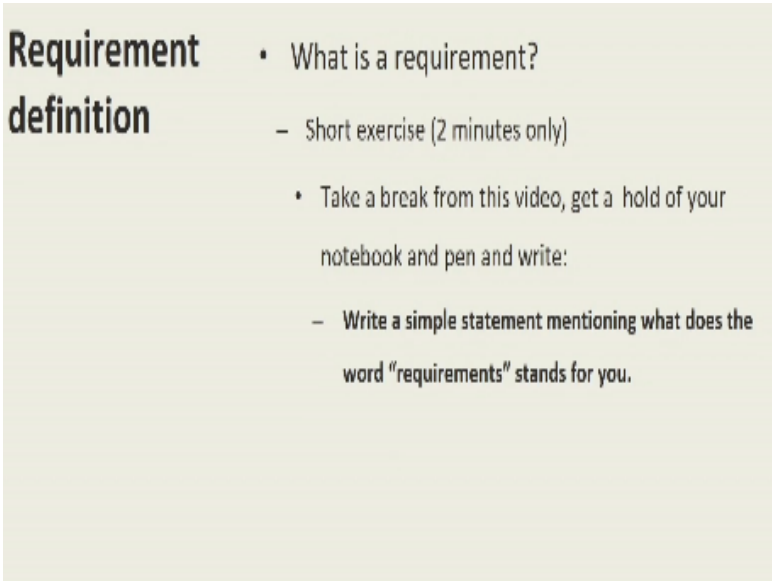
So we do have a good qualitative data by the end of phase 1. By the end of phase 2 which was user modeling, we had models different models which gave us further insights into interpreting those observations and inferences that we could draw, but now we still need requirements which as we are saying are clear and unambiguous piece of information with respect to the design solution.

And which can be taken forward for further design and development phase. So what we are missing is the set of requirements.

(Refer Slide Time: 04:24)

So we are missing requirements for design with an emphasis on user needs. Interesting as we talk about requirements this is one such word which we all kind of had an idea about. We intuitively know what is a requirement.

(Refer Slide Time: 04:46)

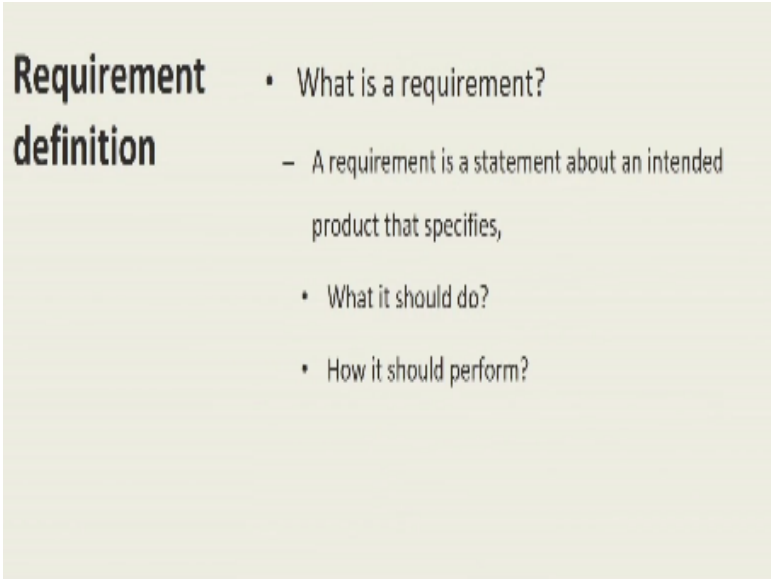


So let me give you a short exercise may be you can take 2 minutes. So take a break for 2 minutes out of this video. Take a pen and paper and write a simple statement mentioning what does the word requirement stands for you. So I hope that you all have completed that exercise you have taken your own 2 minutes and you all have very simple statement written on your paper which says what does the word requirement stands for you.

I really appreciate you doing that, but let us also understand thematically what does requirement would mean when it comes to goal directed design process. So let us look into

the sense of requirement when it comes to goal directed design process.

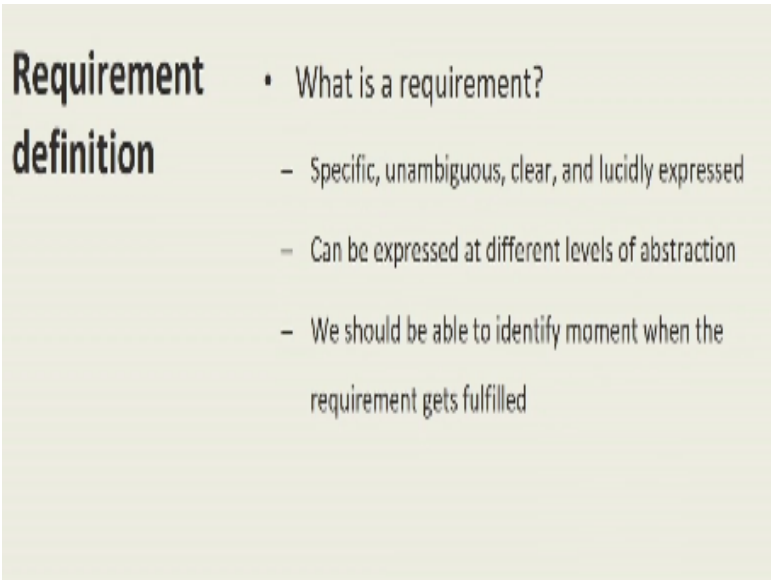
(Refer Slide Time: 07: 29)



A requirement when it comes to goal directed design process. A requirement is a statement about an intended product. There are 2 different things. The first one is what should the product do and the second one is how it should perform. So these 2 different questions if they get answered that is about capturing requirements for the design solution of the interactive product.

So I would repeat a requirement is a statement about an intended product that specifies what it should do and how it should perform.

(Refer Slide Time: 08:13)



Let us look further into the requirement. So it should be a very specific, unambiguous, clear

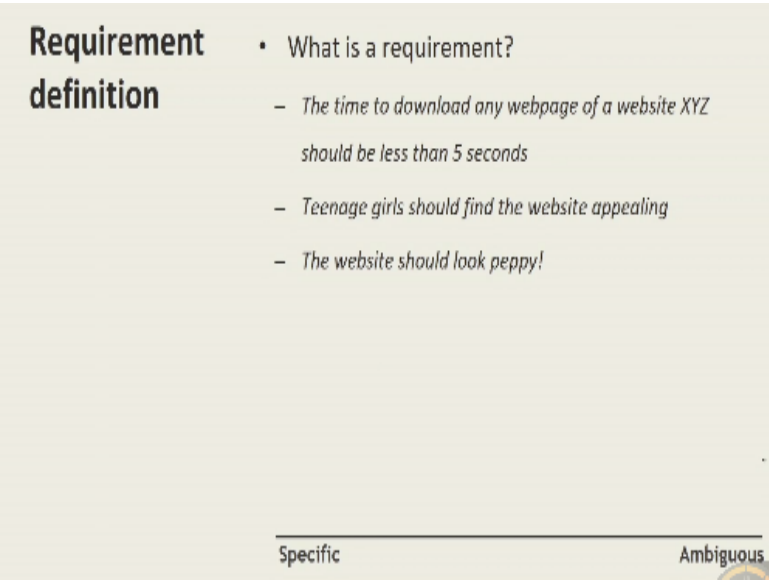
and lucidly expressed statement about what should the product do and how it should perform. So if you write that statement look at your notebook or paper where you have written that statement and cross check whether your statement whatever you have written is specific, unambiguous, clear and lucidly expressed.

Because remember one of the main mandates of design team is to communicate across different stakeholders. So explaining your statements in a lucid manner as much as possible is always a desirable quality. So look at your pen, look at your papers or notebooks and cross check whether these statements is specific, unambiguous, clear and lucidly expressed. And I am sure when you had maybe few of you seeing this video together.

So if you can also look into each other notebook you would find that your both or several of you have been expressing those requirements in all different ways and the way it differentiates is at the level of abstraction. So it can be expressed at different levels of abstraction. Now we should be able to identify moment when the requirements get fulfilled. So we specify our criteria and then we specific condition that would fit that criteria.

So if you are specifying a criteria you are specifying a requirement and when you are specifying fit to criterion you are specifying the condition under which the requirements gets fulfilled. So we should be able to identify moments when the requirement gets fulfilled that is also something which you need to express when it comes to capturing requirements for the intended design solution.

(Refer Slide Time: 10:20)



So let us look at the following examples on your screen. So in terms of requirements following statements would make sense to you. The first one is let us say there is a requirement of the kind which says the time to download any webpage of a particular website let us say XYZ should be less than 5 seconds. So it is very specified it is very clear and it is very unambiguous and also it is expressed in a simple statement.

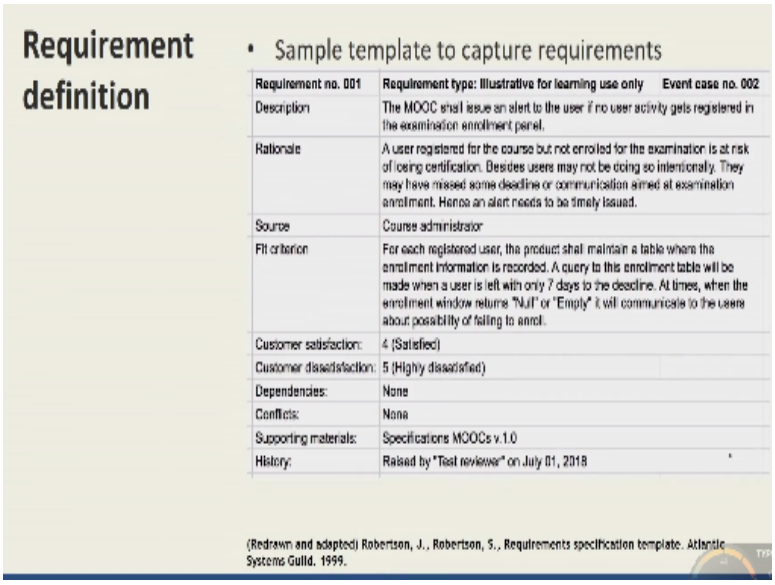
The specificity in terms of time that it should take to download which is 5 seconds and every webpage of a particular website, the activity is download, time that it should take should be not more than 5 seconds. So that is one kind of a requirement statement. Let us read it again. The time to download any webpage of a website XYZ should be less than 5 seconds. Another statement could be a teenage girl should find the website appealing.

Now you see this one is a little more abstract statement. So it says that a particular group of users which is (()) (11:35) terms of age group, teenage girls should find the website appealing. Now this idea of what is an appealing website for a teenage group of girls that idea you have to explore when it comes to user research. So that is why this requirement is somewhat more abstract. It is a little more vague than the first one.

So let us read it again teenage girls should find the website appealing and the website should look peppy. So if you have been I think you can relate to it if you are one of the people who do consulting job for different clients and one of the assignments is to design website then you might have your clients saying my website should look peppy. Now this is a highly ambiguous requirement and you have to prove further through stakeholder interviews.

And maybe through more user research what does the word peppy mean to your clients and stakeholders. So the 3 statements that you are seeing on your screen are vary in terms of the level of abstraction. The first one is highly specific, the one in the middle is somewhat vague it specifies the user group at least. While the third one is really ambiguous it is quite vague. So they vary at the level of abstraction.

(Refer Slide Time: 13:08)



Let us look at the next slide. Now if it comes to professionally capturing the requirement we have certain templates. And the one that is shown is redrawn and adapted template from Atlantic system skilled and you will see the templates. Requirements it says what is the requirement number so I have named it 0, 0, 1 and the requirement type is it is only for illustrative and for learning use.

So that is the requirement type maybe there are other types of requirements, but this particular template is capturing a requirement which is of the type illustrative for learning use only. And then there might be some event case, there might be event associated with this requirement and then there is the event case number. So there might be very specific event which is associated with this requirement.

So let us look at the description of this requirement. So for illustrative purpose only I am considering an interactive product like a MOOC platform. So it says the MOOC shall issue an alert to the user if no user activity gets registered on the examination enrollment panel. So it describes what the requirement is. The requirement is that all the users which are registered on the platform if some of them or few of them do not show on the enrollment panel for examination.

The MOOC as a platform should issue alert so this is very specific requirement. Now this requirement is based on a rational there is a reason behind this requirement. So that also needs to be captured in the requirement template. So what is the rationale or reason here that a user registered for the course, but not enrolled for the examination is at risk of losing

certification.

Moreover, they might not be doing it intentionally. They might have missed some deadline or communication aimed at examination enrollment. Hence an alert need to be issued at a very appropriate time much before the deadlines maybe 7 or 8 days or 15 days before the deadline this alert should be issued. So what is the source of this requirement who is the user, who is the stakeholder here, from where the requirement is coming from course administrator and what is the fit criterion.

Remember what a fit criterion was it was the condition which is required for us to see that the requirement is fulfilled so what is the fit criterion here. For each registered user the product shall maintain a table where the enrollment information is recorded. A query to this enrollment table will be made when a user is left with only 7 days to the deadline. At times, when the enrollment windows return null or empty it will communicate to the users about possibility of failing to enroll.

So this is the fit criterion under what condition would you see your requirement getting fulfilled and then there is also a metric about customer satisfaction. So if this particular requirement gets included in the designed platforms for MOOC the customer would be satisfied and would give a rating of 4 across a scale of 1 to 5 and at the time when this requirement does not get satisfied or does not get included in the design and development of the interactive MOOC platform the customer would have a dissatisfaction rating of 5.

So it means that this requirement is a high priority requirement hence it should be considered in the design and development of a MOOC interactive platform and then you also state dependencies. So if a particular requirement is depended on certain other requirements you need to mention that that mention comes across as dependencies. You also include similar mentions which are about the conflicts.

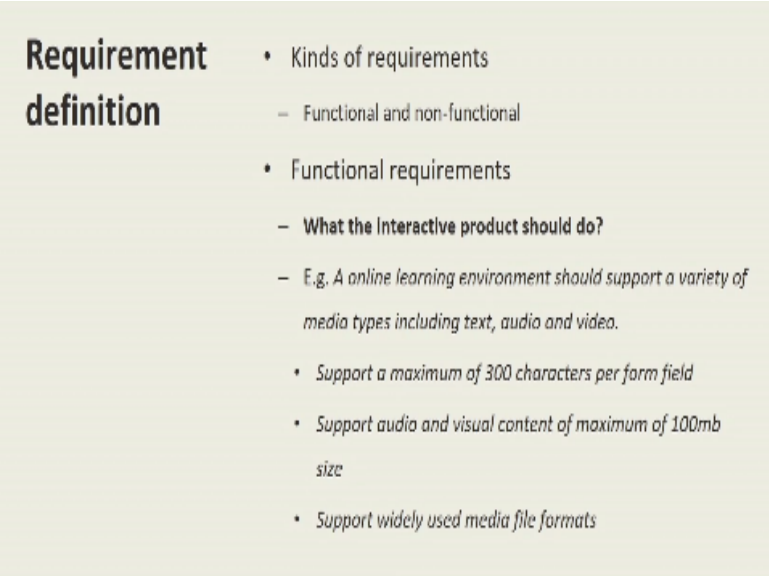
So if 2 different requirements have conflicts within each other then you mention what is the conflict requirement or what is the conflict condition. So that also needs to be specified in this requirement template. Now supporting material, you know there might be specification document you need to reference the document, you need to mention the source of that supporting material.

And then you might also want to list the history of the requirement. So it is raised by test reviewer or on a particular day in a particular month. So you see that there is a requirement as mentioned in this template is highly exhaustive in nature. It tells you about the entire structure of this requirement right from the time when we are mentioning the serial number of requirement, then we are mentioning its description.

Reason for raising that requirement and the fit criterion, customer dissatisfaction and satisfaction scores if the requirement does not get fulfilled or get fulfilled then dependency conflicts source material and history. So this is a professional use requirement template. Let us move to next slide. So when it comes to requirements we have seen that what is a requirement.

So it is a simple, lucid, specific unambiguous statement about what an interactive product should do and how it should perform, but there would be kinds of requirements. So there are basically 2 different kinds of requirements as we come across in the books on (()) (19:10) design or on user experience design.

(Refer Slide Time: 19:16)

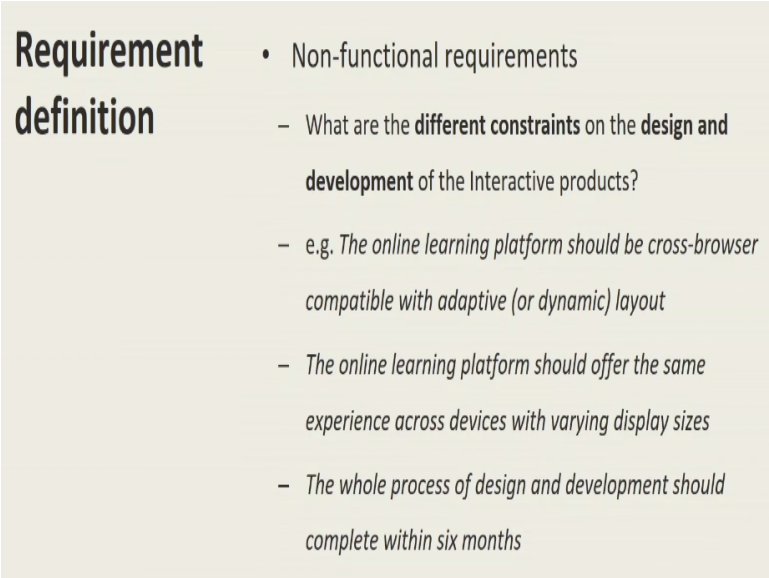


So you would see that there are requirements about the functionality so we call them functional requirements. So what the interactive product should do that portion question gets asked when you are in search of requirements which are functional in nature. So examples of these functional requirements could be an online learning environment should support a variety of media types including text, audio and video.

So when it comes to knowing functional requirements you should raise a question like what the interactive product should do and answer to this question should let you define your functional requirements. Let us look at few of these examples for an online platform, learning platform. We could say that the requirement is that the platform should support a variety of media types including text, audio, and video.

Now it should also support a maximum of 300 characters per form field and it should support audio and visual content of a maximum of 100 MB size should support widely use media file format. So these are different functional requirement it should do the following in a particular manner. So there are different requirements that we have mentioned as part of functional requirements.

(Refer Slide Time: 20:44)



Now there would be a set of non functional requirements. So what are the different constraints on the design and development of the interactive product and answer to this question would help you extract non functional requirements from your data or information that you have collected prior to the requirement definition phase. So let us look at few examples once again.

In context of the same online learning platform we could say that it should be cross-browser compatible with adaptive or dynamic layout. So that is a requirement specifies a constraint cross browser compatible across different browsers it should be compatible to different browsers and their protocols and at the same time it should have a adaptive or dynamic

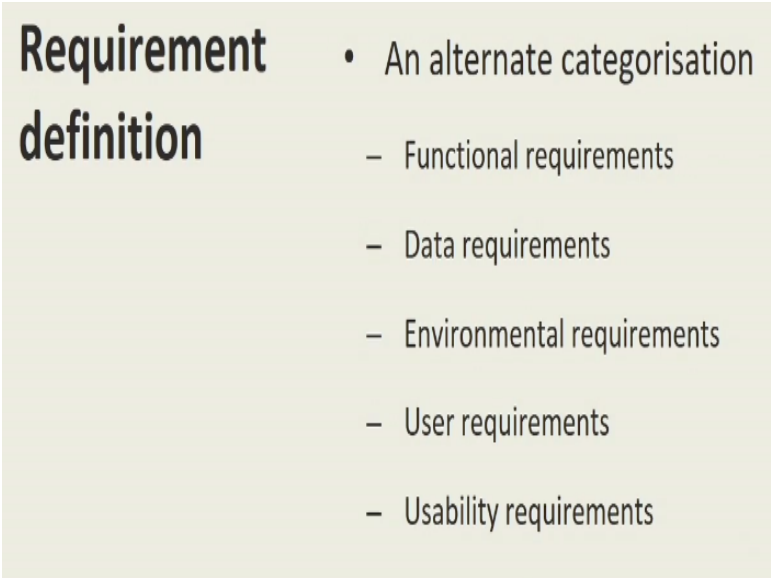
layout.

The online learning platform should also offer the same experience across different devices with varying display sizes. So it is about you are trying to access an online running platform over different devices. The requirement is whether you use device A or device B your experience should remain consistent. The whole process of design and development should complete within 6 months.

Now this is also a requirement type. It specifies it puts a constraint of time on the development process and the design process. So the whole process maybe the client gives you one such constraint he or she says that this is the timeline which you need to follow when it comes to design and development of the interactive product so that is also one non functional requirement.

But you might wonder that even within non functional requirements and functional requirements if you see they could be further categorized, they could be further understood as belonging to different categories of requirement. So let us see an alternate way of categorizing and organizing these requirements. We now move to the next slide.

(Refer Slide Time: 23:00)

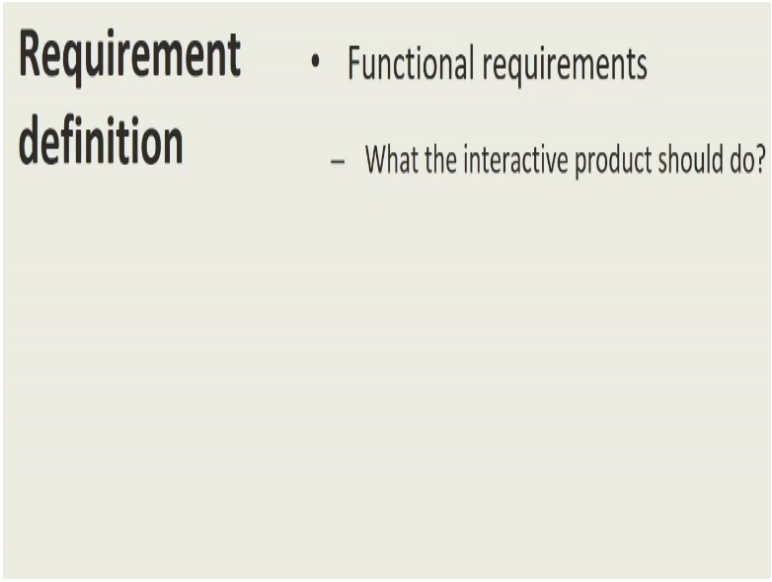


What you see in front of you is an alternate way of categorizing the requirements. It has the functional requirements which is about what the product should do then it has data requirements, environmental requirements, user requirements and usability requirements. So you see that we have further tried to categorize and organize our requirements into different

categories.

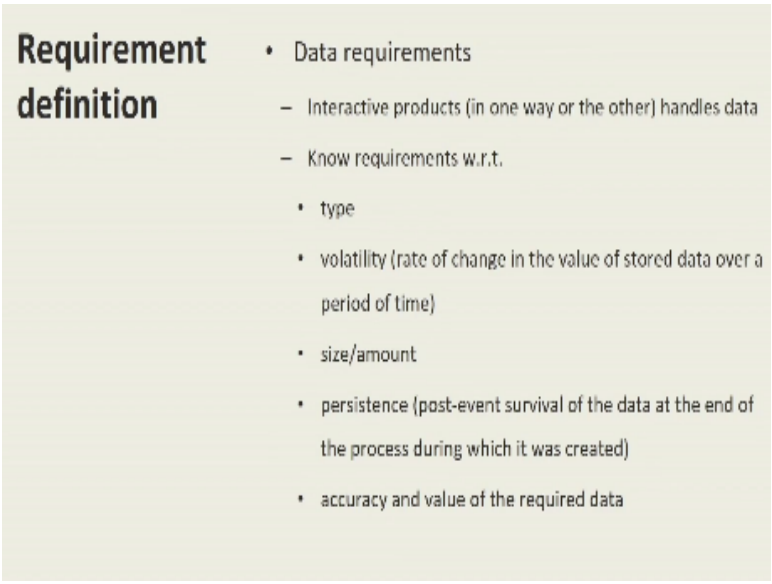
So once again I repeat that these categories are functional requirement, data requirement, environmental requirements, user requirements and usability requirements. Let us look at all of these once again.

(Refer Slide Time: 23:48)



The functional requirements are somewhat similar to what we have learnt earlier. It is again about knowing what the product should do and you could consider the similar set of examples given in the earlier slide when it comes to functional requirement.

(Refer Slide Time: 24:05)



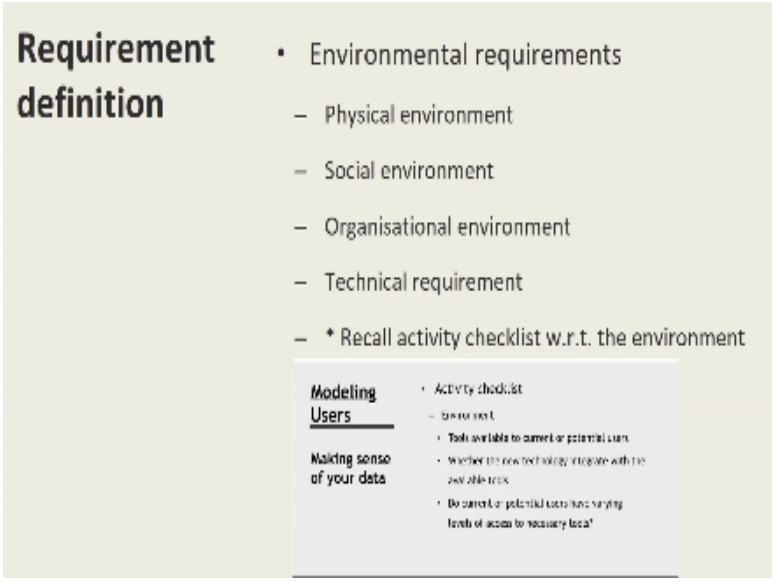
When it comes to data requirements it is important to understand that all the interactive products which are currently present or which are on the design and development table. They

all would handle data at some point of time in their lifecycle or in their interactions with the user. So they essentially would come across requirements which are about handling the data. So these are the requirements with respect to data types, data volatility which is the rate of change in the value of stored data over a period of time.

Data size or amount persistence of the data. So post events survival of the data at the end of the process during which the data was created and accuracy and value of the required data. So you might understand these if you have a very strong background in computer science or in the discipline of database management. So this looks very much so all these requirements which are about data can be best understood from a computer science perspective.

So once again requirements around data are about data type, data volatility, data size or amount, data persistence, accuracy and value of the required data.

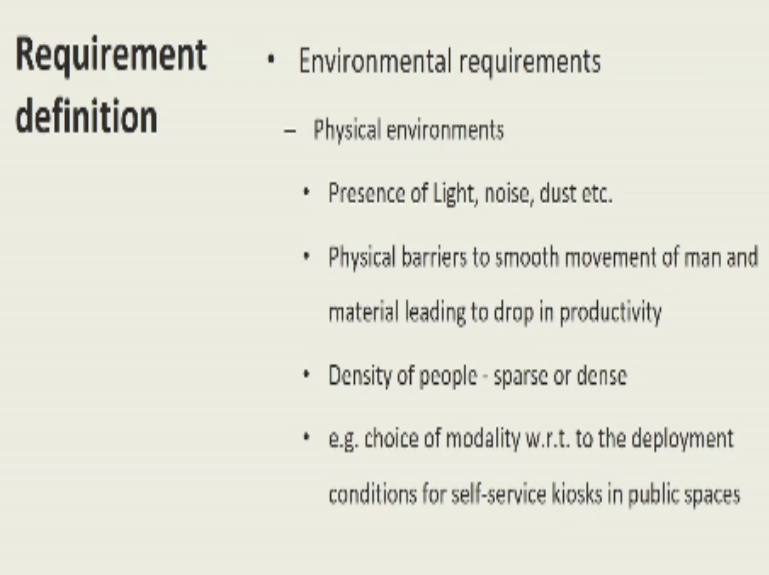
(Refer Slide Time: 25:32)



When it comes to environmental requirements remember the slide where we were discussing the modeling of users and making sense of your data. There we had an activity checklist with respect to the environment of the users. More or less we had a similar kind of situation when it comes to (()) (25:49) requirement which are environmental in nature. So we have different environments, physical environments, social environments, organizational environment, technical environment.

I encourage you to look back into the video which is about modeling uses and then in particular slides about activity checklist on environment.

(Refer Slide Time: 26:15)



So physical environment is about knowing requirements when it comes to there might be presence of light, noise or dust. So how should your product perform under these conditions basically. So if you have noted down your requirements with respect to acknowledging these different conditions which are physical in nature, light, noise, dust etcetera or physical barriers which are restricting a smooth movement of man and material across a space, density of people whether it is densely populated or sparsely populated.

And if you are considering these different physical elements in a physical environment you are trying to know physical requirements, you are trying to know under these physical constraints how the product should perform and that statement is a physical requirement statement and you would see that it is directly related with the design and development of the interactive product.

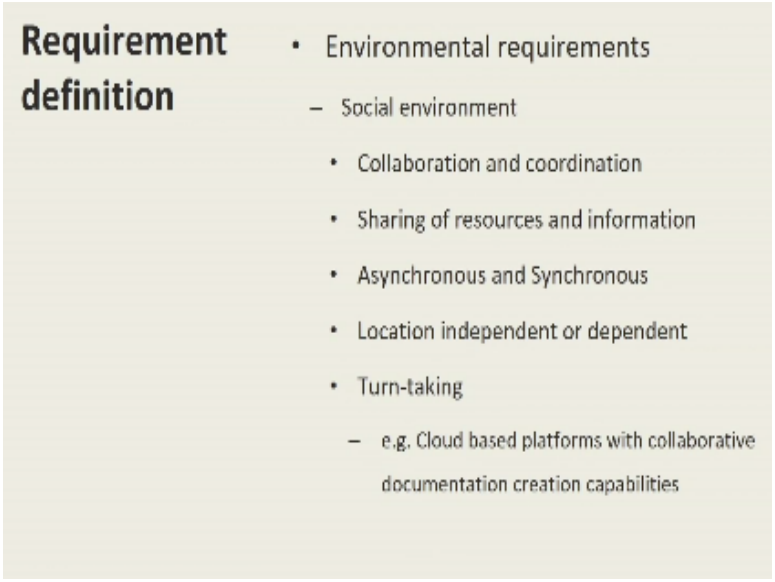
Consider the example of self servicing kiosks placed at public locations maybe at metro stations or in local train stations or in bus stops or in hospitals or in banking locations. So in all of those different public kiosks, self servicing kiosks you would see that there is a acknowledgement to the presence of physical elements. There might be lot of people in that space.

And that is why that affects the choice of interaction. So you see that the choice of modality that is we use essentially graphic user interface and not voice user interface because if interfaces talk to you and it is a noisy environment and lot of people are passing by at the

same time you might not be able to understand or get a sense of communication which is from the side of machine to the user.

So your communication if it is through the modality of speech that will not work if it is a noisy environment. So you see that the acknowledgement to physical aspects of the environment is also important sometimes it does affect the choice of modality as in the case of different self servicing kiosks.

(Refer Slide Time: 28:48)



When it comes to social environment it is about knowing a requirement with respect to the collaboration and coordination which might prevail across a certain user group in a specific location. So it is also about sharing of resources and information. People might work on the same thing at the same time or at different times like editing a document at the same time or at different times from different locations or from the same location.

So location independent or dependent that aspect also needs to be consider and requirements which are about how the product should perform with acknowledgement to these different attributes as present in the social environment of the uses are called environmental requirements. For example, in cloud based platform with collaborative document editing and creation capability it is an explicit turn-taking.

You might have seen in some of these collaborative platforms that different users their activities are marked or indicated by a difference in color. If there is an explicit turn-taking or synchronous there is an explicit turn taking which is happening or at times you also get a

sense of that 2 people are working or sharing the same resource at the same time maybe from different locations.

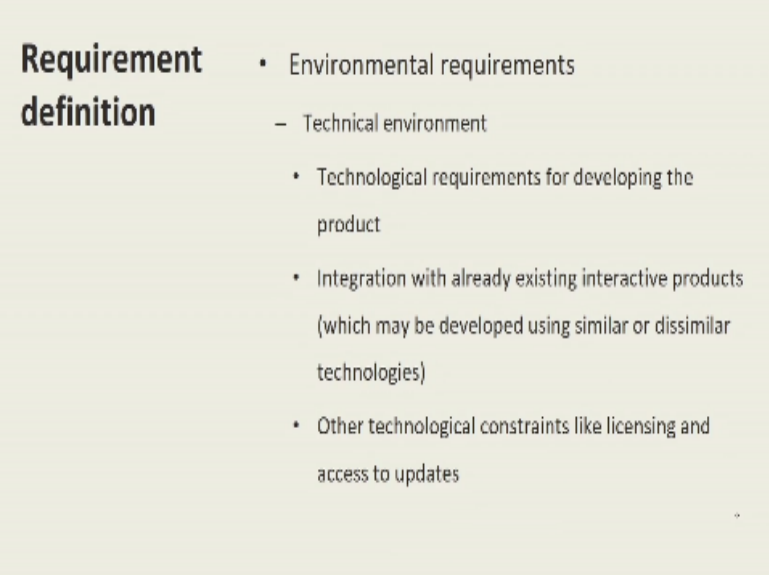
So all the social aspects which are present in the user environment if requirements are written with respect to those aspects you call them social requirements or environmental requirements. Similar to social requirements which might respond there would be a set of requirements which are returned to respond to organizational environment.

(Refer Slide Time: 30:42)

So in an organization there is a presence of hierarchies many a time. So in different organization there are different hierarchies across people who work in those organization. There is a presence of privileges across different user groups and you know there are factors which have an impact on the decision-making at different level of hierarchy. Presence of training whether people have access to training and help that also counts.

And access to support or help when required and effectiveness of communication infrastructure these are all different aspects of organizational environment and if you (()) (31:23) to requirement considering how the product should perform with these different conditions in place you are writing the environmental requirements with respect to the organizational environment.

(Refer Slide Time: 31:38)

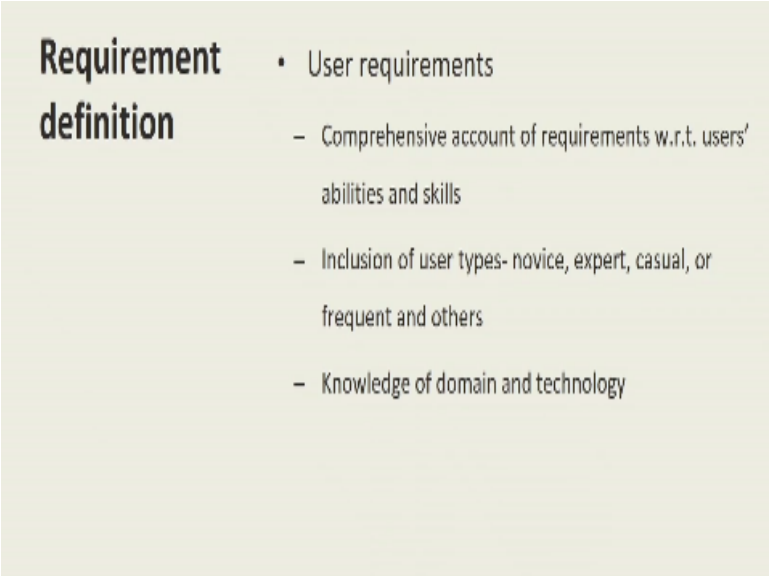


And then there would be a technical environment as well. So it would have technological requirements for developing the products so what is the technology that you are using to develop the product. And would the technology which you are using to develop the product would it be able to integrate with the existing technologies or interactive products based on those technologies in the user's contexts of use.

So integration with already existing interactive products which may be developed using similar or dissimilar technologies is an aspect which needs to be considered while writing requirements. Other technologies constraints like whether you have access to license or software or mode of developing that particular interactive product or you have access to updates things like that.

So if you are writing your requirement about how should the product perform with respect to technical environments you would consider the technical aspects of the environments while writing requirements.

(Refer Slide Time: 32:42)



And then comes the user requirements after technical requirements we have user requirements. So it is the comprehensive account of requirements with respect to uses, abilities and skills. So different user groups have different abilities and skill level. So inclusion of user types maybe there are people who are novice, there are people who are experts, there are people who are casual uses and then there are people who are frequent users.

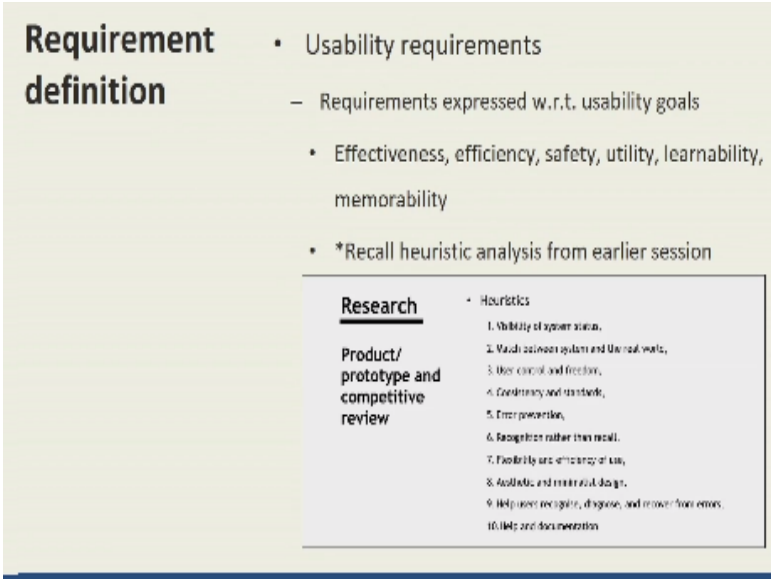
And then there could be another set of user group which you would like to imagine if you have a requirement of and then frequent users and others. Knowledge of domain and technology. So for example if you are designing an interactive product which mainly caters to novice users you would have a requirement which would clearly state that the product should have tooltip or explicit help with respect to different activities.

Because in this in case of novice user it becomes highly important to guide them towards the successful completion of task. And once they get to an expert level of using the product interacting with it they need shortcuts. So that is why if the same interactive product has to be designed for an expert user as a design team member you should have requirement saying that the interactive product should have enough shortcuts corresponding to most frequently used actions or features.

So that is why these 2 requirements types are depended on two different user types. So you have to consider requirements with respect to users which are also depended on the type of the user and knowledge of domain and technology something that we have seen earlier while

we were talking about use a persona user archetypes. So I would encourage you to go back and have a look at that section to know more about the knowledge of domain and technology with respect to user requirements.

(Refer Slide Time: 34:55)



Usability requirements is the last requirements if you remember in the list of kinds of requirements in an earlier slide. Now usability requirement is about requirements with respect to usability goals, effectiveness efficiency, safety utility learnability, memorability. So I would like you to recall heuristic analysis from the research phase when we were talking about doing a competitive analysis involving similar products or prototypes.

At that point of time we have discussed and have listed down 10 different heuristics which are visibility of system status, match between system and the real world, user control and freedom, consistency and standards error prevention, recognition rather than recall, flexibility and efficiency of use aesthetic and minimalist design. Help users recognize diagnose and recover from errors help and documentation.

So these are the different heuristic or usability guidelines which are listed usability guidelines which have to be considered while you are writing usability requirements. Let us come to the end of the session where we recap once again the topics that we have covered till now. So we have got a sense of what requirements really are, we have got a visual of the requirement template.

We have got several different examples of different kinds of requirements and we have seen

that there is an alternative way of categorizing those requirements and the final categories that we have studied are the following. We have studied functional requirements, data requirements, environmental requirements, user requirements and usability requirements. Thank you.