Design Practice
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Lecture – 15
Concurrent engineering environment influencing dimensions-2

Hello, and welcome to this course on design practice module 15. So, we were talking about different dimensions like product complexity that product technology. We also talked about the program structure or program futures, which are associated with the program which is in vision for the new product line. Which is being launched or the existing product line where you want to change into a c environment, and then we also talked about competition as a dimension influencing the concurrent engineering environment.

So, there are many other dimensions for example, you could also have things like business relationship, or a let us say you could have things like team cope. Team scope or resource tightness or even schedule tightness sometimes for defining a c environment. So, let us look at some of these left-over dimensions and then, we will try to go into the elements which we can tweak in order to change or influence some of these dimensions.

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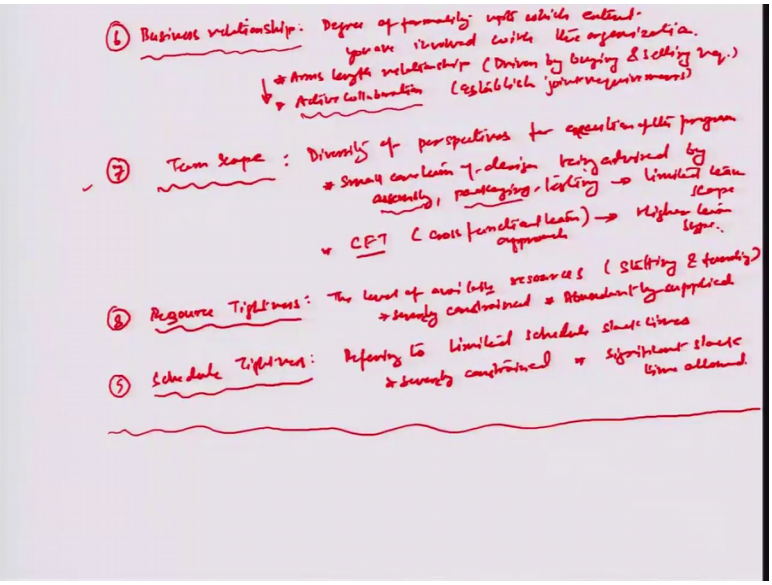

So, the 6th important influential dimension is business relationship. So, what we mean by business relationship? Is sort of what kind of relationship does a company have with

respect to all it is the stakeholders; which can include people like let us say, vendors or people who are related to partnering of the business.

So, all suppliers or maybe some kind of prime developers which are associated with, some modular developments related to the final product line which is begin vision. So, the relationship could be just arm's length the relationship where you just are concerned with buying or selling or the relationship could be something like a partnering relationship. Whether you involved in decision making is related to the overall flow of the organization, and also related to the overall quantum of financial burden that the organization has and so, you are a major stakeholder in it.

So, your stake holding nature can enable you to have different levels within the business relationship zone. So, let me just write this down here. So, this is about the degree of formality in which you are involved up to which extent you are involved with the organization. For example, there could be just a arms length relationship.

So, this could be only where it is driven by buying and selling requirements there could be active collaboration for example. So, this could establish joint requirements for example, in a company decision making could involve some kind of stake holding from these active collaborators. And so, there can be a whole variety of stake holding based on you know just a buying and selling requirement to being a participant in the decision-making process, which we record as business relationship.

So, this is a very important component in order to survive in a c like environment, or a build a c environment for your existing concern. Because, what is the relationship level will kind of influence will kind of be influenced by the organization structure which you are in, or maybe the communication channels that you have within the organization structure.

So, in a way all those elements of c environments are going to again influence business relationship. There is also another very influential dimension of team scope, what I mean by team scope is the diversity of perspectives required for program execution for example, a small core design team receiving advice from numerous sections such as let us say, assembly testing, packaging. This can only have a very limited scope whereas, a multifunctional team approach where there are stake holding members from all these different divisions together as a group as I showed you in the example problem earlier,

would have a much much wider scope and much much say in all the decision making, and implementation also becomes very easy one such a cons[cross]-cross functional team or a CFT is realized within organizations

So, team scope is again related to how the organizational hierarchy is designed or the structure is designed, and is it is there a possibility of such cross functional teams within the organization, right? So, I will just write this as diversity of perspectives for execution of the program. So, that defines the team scope there could be a organization time type which has a small core team of design being advised by everybody else assembly let us say, packaging the electronic systems work group assignment. So, therefore, they are interested in electronic assembly or electronic packaging heavily as for their product lines are concerned; testing of the electronics that is being developed so on so forth.

So, this actually is limited team scope whereas, there could be another suitable team scope, where there is a CFT a cross functional team approach which may having a higher team scope. So, that is how you define one of the most in I am again influential dimensions of the product requirements what this team scope?, then there can also be dimensions related to resources for example, either there is a resource tightness which prevails you are not in able to use infinitely available resources ok.

The level of available resources for example, staffing or funding may be limited nots and then, there can be a very tight situation where they are severely constrained. So, therefore, you need to divide again one of the major dimensions influencing the c environment to be a resource tight environment or resource lean environment. And then similarly you have a schedule tight or schedule lean.

So, one particular instance can be a case where schedules do not matter really, you have enough amount of inventory. And now, there is the so called just in time or lean inventory practice, where there is almost 1 by 1 consumption versus production kind of a situation. So, therefore, there is a huge amount of tightness and the overall schedules in such environments. So, the c environments in both the cases will be completely different ok. And similarly, would it be different for resource lean as we are opposed to resource tight environments.

So, let me just write these down briefly. So, this is the level of available resources, which defines this dimension. So, for example, staffing and funding so, there can be one which

is severely constrained and there can be another which is abundantly supplied conditions. Scheduled tightness we write as referring to limited schedule times. Let us say, schedule slack times, and this can kind of counteract for the deficiencies in the existing c methodology which is being followed of the environment which is built up.

So, in this particular case there could be severely constrained schedules again as one form of concurrent engineering environment, or there could be a significant slack time of allowed by the organization. So, based on these overall sort of 9 dimensions, which is completing the phase one requirement you characterize the existing level that the organization is in, and how do you carry forward such an organization? So, let me actually summarize all this in a matrix. So, that we know about what are the different levels which are involved in such phase one requirements for a c environment.

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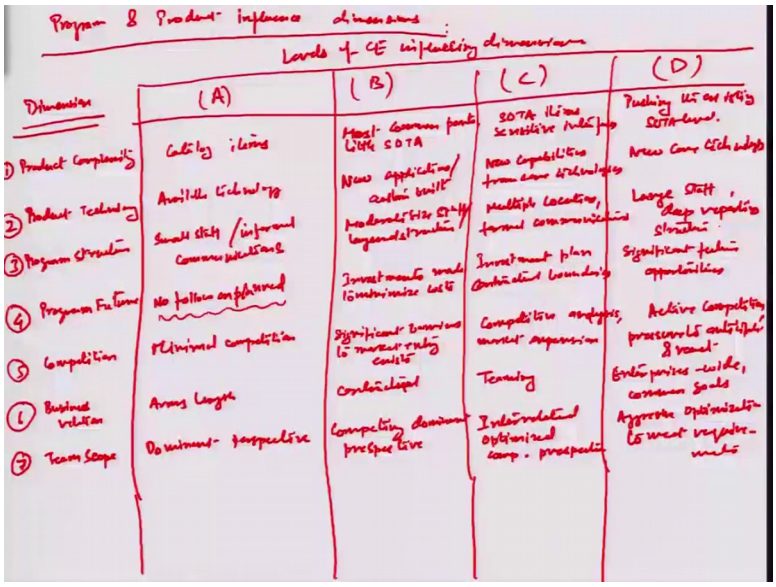

So, here for example, we would talk about program and product influencing dimensions, and then try to divide it into different levels that is level A to D as I had talked earlier. This is in context of the electronic work system group. So, most of the terminology that is used here is related to their system of organization or management, but I will try and explain in between. So, that you get a fairly good idea about what we mean by these levels. So, let us say there are these levels of c concurrent engineering influencing dimensions on one side, and they are principally you have 4 different categories A B C

and D. And another is really the dimension that we are considering for categorizing into this various different segments of the concurrent engineering environment.

So, let us look at the first dimension. For example, product complexity we call this dimension one, and I think I had already described to you the various levels in this case. For example, there can be catalogue items which are very commonly available generally for all products around; there can be the most common parts. Which are slightly more state of the art related to mostly the product line that we are referring to ok. Most common parts little state of the art you can say. State of the art little SOTA and then you have a very sensitive state of the arts.

So, you can say state of the art sensitive interfaces state of the art items. These are specially designed for the exact product line that is in question, it cannot be used in any other application except the application that is being envisioned. So, such a product line or such a level of complexity and then, you can think of one where there is futuristic research which is involved. So, you push the existing SOTA or state of the art level so, that here you need a lot of r and d for doing it.

For example, in electronic work system there could be an issue of overall device sizing, and device sizing could go to the extent of let us say a few 100 nanometres, and there you use completely new technology, new outlook new you know materials. And there are various new challenges which are being envisioned for which you really need to push the state of the art envelope to that level, by using lot of research and a lot of development.

So, this is how you categorize into different levels. So, A signify is the most common and D signifies the least common are the most pushed state of the art to envision the c environment that will be in once level D is followed, then we talk about product technology. So, product technology also is categorized into various levels for example, there could be a level A which relates to just available technology of the shelf you can buy it is available in the market ok.

So, this kind of product technology could be offered or you have another case where you will have new applications in mind or you custom build for example, the products based on the customers perspective or customers requirement. There is also sort of you know another level where we need not only the applications, but also the new capabilities. Where you could probably borrow it from core technologies, but they have never been

thought of earlier to be used in that particular mode of that particular capacity, and then there is something where new core technologies need to be developed because, here it does not exist and you have to develop.

So, there again lie the categorization A to D for this product technology dimension, then we also talk about program structure to anyway and program structures could be all formal informal in nature. For example, there could be a very small staff in the program to run to actually realize the particular product line. Which is being envisioned here informal communication among the small staff that could be one sort of structure, where there is not much control.

And this is what normally happens when you set up a workgroup ok. For a certain cause within an organization there could also be a moderate sized staff level, where there is some kind of a layered structure which is there at least some responsibility is entrusted there is a supervisorial lead followed by at least some people who are at layer 2, who can follow directions. There can also be another kind of structure where there are multiple locations over which activities are carried out. And there could be more formal communication between them.

So, there are again work groups now, specifically focused on certain areas working in different locations and communicating to them in a formal manner recording every communication that happens. And then there could be again a very large staff size of the whole organization, where there can be deep reporting structures for example, everything that happens needs to be recorded and reported in great details.

With a large amount of staff which actually can be the level D of this particular product structure dimension, a program structure direction dimension. Then we talked about again the 4th level which is about program futures the program futures could have typically something which is just one-time standalone kind of a future no follow up, or follow on plant for what would happen to the program in future ok.

So, something which is just done because, they want to eliminate maybe a process defect which had come up in the c environment, or they want to just make for a certain new product line which does not have a scope of more than a few years' time you know. So, in this particular case in program future you have completely no idea of what is going to happen to this structure of the program, or what is going to happen to the program once

the particular product life cycle is over ok. And then we can talk about level B again of the concurrent engineering dimension, which is sort of you know some investments being made to minimize some costs.

So, some optimization is carried out for the futuristic aspect. So, that there can be a viable financial model which would exist in the future, and the program could be sort of sustaining in nature. There could be again another structure or another kind of a future which is talk talking about investment plan based on contractual boundaries ok.

So, you invest, but you basically are able to get rid of the excess as and when needed ok. Because, you have contractual basis of making a structure, and then there could be some which is strategically planned program for significant future opportunities. And so, there the goal of the program would be to also more or less delve into what are going to be the opportunities 20 years down the line. Let us say for maintaining this program structure which is in place today for handling maybe some particular job requirement which has come up in the industry.

So, this is how you plan the different levels of program future for then, we have again another influencing dimension competition and in competition you could have it is a level A based on that there is no or minimal competition in the market. You are first in the line of the product that you are making there is nothing else in the market no need not need not worry about or react to any kind of changes in the market environment, then there could be some level of competition where there are significant barriers to market entry that may exist ok.

So, that could be another level. So, you need to be aware of what are those barriers to crossover enable yourself. So, that you have all the skills to sort of go and cross the barrier forces which are there to prevent your entry, then there could be something where you know a level where the competition is earmarked very formally through a competitive analysis.

I am going to lay out certain tools in the near future, which will talk about a quality function deployment for example, which is one of the major tools of learning about your competitor's nature or behaviour and also these strategies and systems which are available with them in order to stay afloat in the market. So, there are certain organized tools for carrying out such c planning or c activities.

So, competitive analysis through market expansion could be one level of things, or one level of the strategy to tackle competition. And then of course, you can have business environment where there is active competition and pressure to anticipate and react immediately ok. So, this is the highest level of competition that a person can have in a certain business environment active competition.

So, if you are designing an organization which is geared to these challenges at the levels where the organization is set in, and you want to bring in c approach to change the level and upgrade the level to a different level; obviously, you need to change some elements within the organization and the strategy is there in which are followed for the management of the organization. So, that those levels get attained in the phase one or the product influencing dimensions ok.

So, active competition pressure to anticipate and react. This is the 4th level. We talk about the other influencing dimensions which we described in the last few slides. One is related to business relationships again we have different levels of relationships. There could be arm's length relationship as I mentioned ok. And then there could be contractual kind of activities going on where a part of workforce is hired which is probably not required to execute the main functionality or the product of the system. In a contractual mode you could talk about again another strategy where vast majority of people are in teams ok.

So, you have teaming strategy. You basically coordinate between people to formulate teams for example, look at quality circles they are one of the options which are available for teaming together. And then there is of course, enterprise wide common goals driven business relationships, where we are talking about not one business or businesses, but a group of businesses actively participating together in a certain area of work.

For example, in the electronics area there could be some 5 6 different very big giants in this area combining together their business relationships. So, that they can work together in order to bring a product or fadeout products, and such a environment which is created is by the by very difficult to penetrate by a new player.

So, such kinds of goals are always sometimes there in the business, which will allow you to have sustenance for a long time or a maybe long plant business model. So, there is also another dimension of team scope as mentioned. So, team scope could be with the

dominant perspective. So, this could typically mean something like a small design team which is able to take advice from all loops and corners including assembly testing packaging so, on so, forth for this material.

But still they form the dominant perspective in the final decision related to the design of the product. So, this could be one approach. Another is competing dominant perspectives for example, if supposing there is more than one such perspective which exists in order to take a decision making, it needs to be somehow evaluated or optimized. So, that you get the very best coming into picture out of some dominant perspectives.

Now, this it may not be out of place to mention here, that the dominant perspective is always not the right perspective as you saw in the decision-making process that we made earlier when we talked about the shaft example. The dominant perspective there was going ahead with something which appeared to be a low cost on the processing front, but then you realize that when you take advice from other people and not only advice you actually ask them to participate with you in a CFT manner.

In the CFT team manner you get the dominant perspective to be dominated dominating perspective or the most effective perspective to be one where there is influence of the quality team as well as, the purchase team more and so. You go for something which is a very high expensive option, but still get within the same cost or within let us say, limited amount of manufacturing lead time and cost.

So, always dominant perspectives may not be good, and c environment actually tries to go ahead not with dominant perspective. But with some kind of a optimization requirement which is there in the business environment, and always try to identify aggressively those optimization requirement. So, you still another level layer which talks about you know interrelated competitive perspectives. This is different than just the competitive or competing dominant perspectives because here, you can you can think of you know how a decision making in one area could be able to influence the decision making in another area. So, that final design can emerge in this manner.

So, you have that interrelated aspect of every phase of the product life cycle embedded into your thinking process. So, interrelated optimized compitating or competing perspectives. And then of course, the level the highest level that could have that one could have here is an aggressive optimization to meet requirements. So, here there is

nothing called a dominant viewpoint it is all about setting up stages for what is the requirement now, effectively you can meet it. So, that is how team scope can be defined ok.

So, we will talk about the remaining 2 that is resource tightness and schedule tightness in the same table in the next lecture. In the interest of time I am going to close it here. But then, once we do this then we will be able to also lay out all the different organizational elements again, and then try to optimize and their levels and see how they match with these levels ok. So, in a way we will bring that analysis perspective to see what is the current level and how do you take it forward by improving what all in your organizational elements. So, with this I would like to end this particular module.

Thank you very much for being with me.