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Lecture – 11
Value Engineering Methodology, (Part 2 of 3) FAST diagramming

So, this is the second part of the lecture, value engineering methodology. So, we were discussing the function phase; these things are discussed. We were discussing the function phase, where in, we have defined; what is function? And we were on the fast diagram. There is function analysis and system technique.

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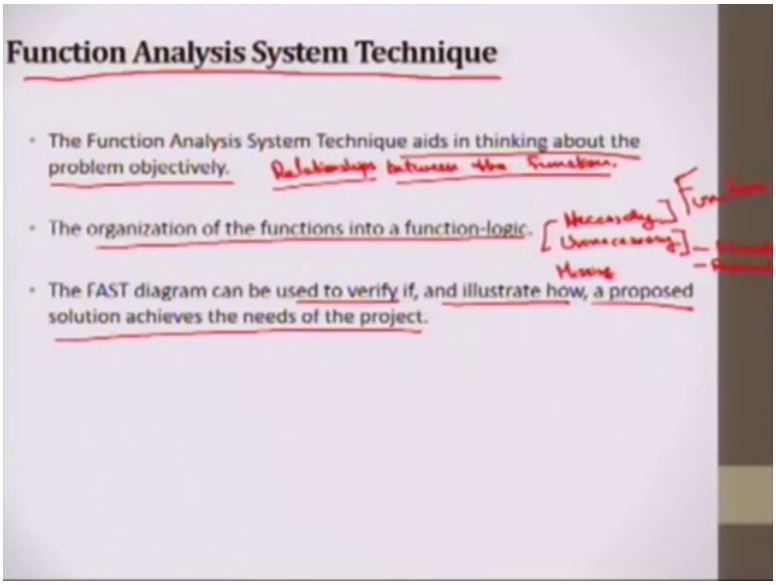

So, what is function analysis and system technique? Function analysis system technique aids in thinking about the problem objectively; that is, it identifies the scope of the project by showing the logical relationship between the functions. So, what we did in the previous phase, or previous part of this phase, function phase, we identified the functions, we divided the functions into two categories. Primary function and Secondary function.

The primary function, what the main function for which the product was made. Secondary functions; may be some work functions, or may be some (Refer Time: 01:20) sell functions as well, for which the product is followed, some functions which are not directly visible.

Some functions for example, if I took this example of this,, mobile; the interior integrated circuits here, the integrated circuits in the mobile are not seen, but those are work functions. Those are required to work. So, some of those components are not for primary use, just, just in the product to make the product work.

For example, if I need to take the picture, or take the snap from my mobile. I will just click the camera button there, and the picture would be ready, ok. So, what is making this work? There is an integrated circuit, and there are might be some other supporting circuits which are helping that to work. Those are secondary functions, but also work functions.

So, what are the relationship between the functions, which we have defined previously, that this fast diagram would tell us. So, the organisation of functions into function logic, this is fast diagram. It enables the participants to identify all the necessary and unnecessary functions. So, necessary function would come into the critical path; we will have a critical path, or critical design path that, are diagram would follow, those functions would be necessary. Some of the functions which are not in the critical path, they would be necessary and some other functions might be unnecessary, which might be eliminated or may be reduced. The number of this functions can be reduced.

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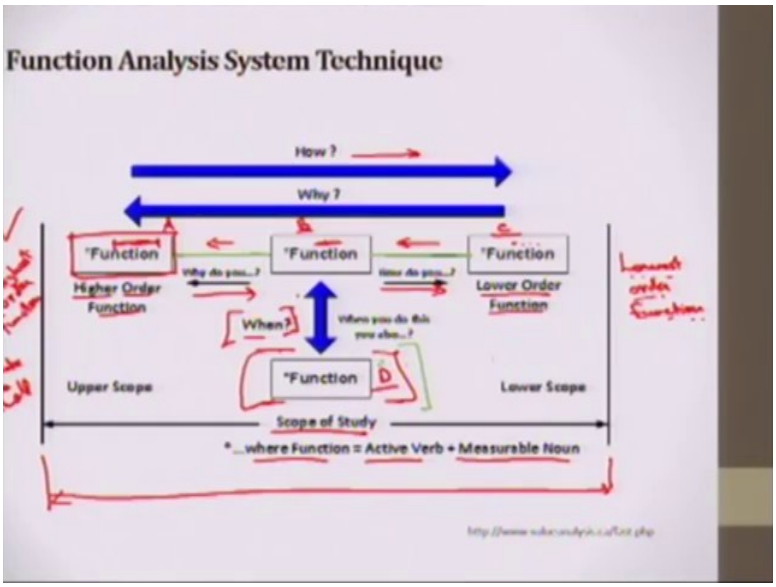

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So, fast diagram can be used to verify if and illustrate how a proposed solution achieves the needs of the project. So, it identifies unnecessary duplicated or may be some missing functions; missing functions. these are all functions.

So, how does fast diagram work? So, this is kind of a layout of our functions layout, that is used in the fast diagram. We have the function on this side, that is the higher order function. We have the highest order function here and, we see how this function would be accomplished. When we move on this direction, will see how the function A is being accomplished by using function B. And B is being accomplished by using function C. And also, when you are working on B function, this is when; so, when does function B is being carried out, this function D is also needs to be done. We will see this with an example.

So, these are called as lower order function; this is, how do you? This is, why do you? So, I say, I need to make a call, highest order function is make a, or make call. So, we will have, put here, design mobile phone. How to make a call? Design mobile phone. How to design the mobile phone? Design components. How do we design components? Get specifications component specifications, ok.

So, this is how we doing and here, on this direction, we are moving towards; why? Why are, why do we need design specification? Because, we need to design the components here. And why do we need to design components? Because we need to have the mobile phone. I am just taking very broad example here.

So, this also has scope of study; this is our scope of study. It is mentioned here, the where function, active function is an active verb and measurable noun. This would be kind of a critical path; this might not be, this function, might not be the part of our critical path. So, we have the lowest order function here. So, lowest order function is the lowest function, that is start of the product here.

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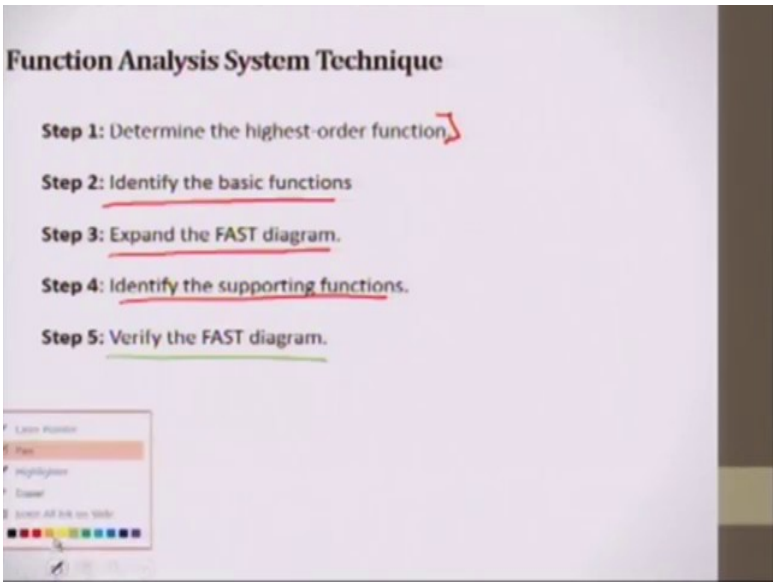

So, let us see the steps here. How to make? How to draw? How to analyse our functions and we make the function analysis system technique diagram. First step is, determine the highest order function. This is the objective of value study; that is the highest order function. This is located in the left physic line here, highest order function. Then we identify the basic functions.

The basic functions are the functions for which the product is designed, that is how does the product, or process form the highest order function; that is how would this function be accomplished, function A becomes B. B is my, again the basic functions; one of the basic function, but not the primary function, ok.

This might or might not be the primary function. Then expand the fast diagram; once we have identified the primary functions, that is function A, B, C, will expand it to function D, E, F so on. Then that, using this, when logic, that when function needs to be there. This is our critical path; A, B, C is our critical path here. Then we identify the supporting function, that is the function D, kind of function D here. Supporting function do not depend on another function.

This is not connected here. Function D, if you see this, this is a connecting line here. This green line is a connecting line here, but function D is not connected. So, this support functions do not connect. So, any unnecessary function can be the only support functions. The primary or basic functions cannot be the unnecessary functions here.

This is very important point, please make a note. The unnecessary function can only be a support function. So, then we verify the fast diagram. So, what happens once we have made the fast diagram, sometime the support function which D, we can think of it is working with B, it might work with C. We can keep changing. It is better to use the slips, write the name of the functional slip, and keep arranging the slips in the order, and then you will see the various alternatives, ok, this is the right position, where the slip to has to put, and will just verify the fast diagram, that is the critical path right or not.

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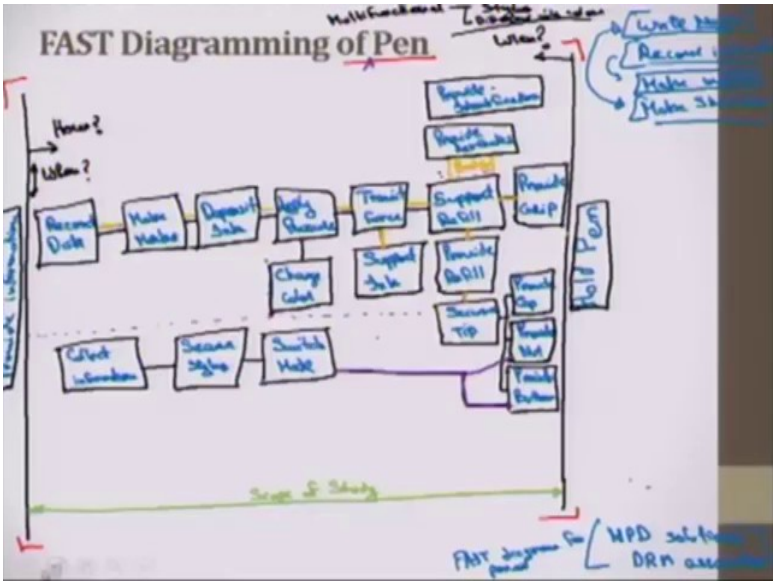

So, I will construct a fast diagram for pen here. I have taken pen as an example here. So, what is the basic function of the pen? Write notes, ok. Then why do we write notes? Is there a question? So, is there a higher order function here? Actually, this function or the primary function, I am trying to identify highest order function. Is there a why that is adjusting? Why do we write notes? Yes we need to record information ok.

Do the pen only write notes? It also make marks. Make marks, a marks means make lines that is, make sketches. So, write notes and make sketches are the bored things the pen is doing. So, could we have a single function that defines both these things? Yes, make marks can be one thing that involves both right notes and make sketches.

So, record information is a kind of my highest order functions. So, why do we record information? We need to provide information to somebody. Let me put the highest order function here is, provide information. Then I will draw scope line here. This is my highest order function of a general pen. So, this is my pen, I have this cap, let me see the product, I have this cap.

This is the pen. It has a rifle in it. It has a grip that holds this one. This cap secures the nib or tip, so, why accidentally no mark is made. And, we are, this body is securing the rifle. This rifle is securing the ink. The ink is used to make the marks. The nib is using the ink to make the marks. So, these are all the components here. These components, I have broadly discussed in the previous lecture as well.

So, let me try to make the fast diagram here. So, how do we provide information? We records data. How do we record data? We are moving towards this side, that is how. This is my how, in this side. Then how do we record data? Make marks. ok. So, how the marks are being made? So, how, how is this pen working? How the marks are being made on the paper? So, that is using ink to make the marks, using ink. So, let me put it in the better way. Deposit ink; yeah this would be a good verb here. Deposit ink.

And how do we deposit ink? When we write, we apply some pressure or some load on the pen, when we write. So, I could write here hold pen, or I could write, apply pressure. So, when the pressure is here, we can also put the function head transmit force. How do we apply pressure? We transmit force a little force on the pen. So, as the pen is able to write a little pressure. ok.

So, it is transmitting force here. So, this is a simple pen. Transmit force, this body is used. This size of the pen, as I have mentioned before, this is between 7 to, this is approximately 8 or 9, 9; 8 to 10 mm is the diameter of this nib here. So, this is the grip this body is here, that is helping to transmit force here. We are holding this body here rifle is in it here. So, what is the body doing? It is also protecting the rifle inside. So, I can write a function here, how function, that is; provide or support rifle. I think, I need to mention, the rifle before here.

See, when you will draw the fast diagram, you will do number of iterations. I am also trying of putting the function and rubbing. So, this iteration will happen. So, when you try to do this. Actually, I have read, the fast diagram for pencil, that is, by N P, N P D solution. N P D

solution is the website. It in new product development solution. It is by D R M associates. So, that is fast for pencil, fast diagram for pencil.

So, I am trying to adapt that way, that same diagram to draw the fast diagram for this pen. So, I was talking about the rifle here. So, transmit force, we need to, we heat the bodies that is transmitting force, and also, we need to; I can put it here in the note right side; parallelly, we need to support in casual. And support ink is done by provide refill. When we provide refill, refill also have as tip in it. So, I can say secure tip; secure tip is helping to deposit ink as well. This will be connected; will make the connections.

So, next, provide refill. Refill is supported by the main body. So, that is done by support refill. So, we are recording the data. We are making marks. How do we record data? Marks. How do we make marks? We deposit the ink. How do we deposit ink? We apply pressure. How do we apply pressure? We transmit force, this transmit force is actually done by our support refill; is one function, that is our body. I can write it in a different colour here, this is actually my body; which is helping to, support refill and transmit force as well.

Also, we can say we have this grip over this body. So, purpose of this grip to is to make the user hold the pen properly. So, that the pen does not slip. So, with support refill, I can also say here; provide grip. So, this is one of the functions. So, I think, there other functions like aesthetics, provide aesthetics to the pen provide information, that is the company name here; Cello Butterfly pen. So, all these things can go to the support functions.

So, this is, on the body only. So, I can write it here; provide aesthetics. And, the company name, I can write provide identification. These two are my support functions. So, I think, I can draw the scope line here, and these are the support functions. Support ink cannot be a support function. It is basic function only. Will see how does it come into your critical path. So, we provide grip here, and finally, we can hold the pen. So, let me connect this record data by making marks, by depositing ink, by applying pressure, by transmitting force. Transmitting force is done by support refill. And apply pressure is done by this support refill transmit force. This is also connected here; I will connect these things, because this is not a support function only.

Support refill is; again, we need to provide refill and secure tip; secure tip, I can divide this into further components. How do we secure tip? In this case, we also need to protect tip as

well from breakage. Ok. That comes in secure tip only. So, this is done by using in this case, we are using this cap here. The cap is used to protect my tip. So, let me put; provide cap.

This is not connected in the critical path, but this is just to secure tip here. Provide cap, we can provide cap. We can have some click type of pen, that is clicked from the back; click that is provide button, that button makes the tips to come out and to go in again. So, also there is a kind of a pen; I have this pen in which the tip comes out and go in by using this nut and bolt mechanism here, this is nut and bolt mechanism.

If you know the nut and bolt mechanism, nut and bolt is, this is also a kind of nut. This back support is also kind of nut. So, when I rotate this, it goes, it screws in, it screws out. This nut and bolt mechanism is used to secure or protect this tip, ok. So, I can write these other alternatives here. Provide cap, provide nut, and, and a, maybe provide button, ok. These are the functions which are helping to secure the tip.

Finally, we will hold a pen. So, let me enclose this into the boxes here. And these are linked, any alternatives can be used. This is my fast diagram of a normal pen, ok. So, my scope of study is here. This is my scope of study. Study means scope of value engineering study here, in which I need to find the functions on which we are need to work on, which what are the four value and high value functions. We are having, how on this side and when on this side.

So, there various functions like a support refill. If you see this support refill function. So, this is not only carried by this body, I have put this body in bracket here; actually this is a component not a function. This support refill is actually done by three components here. It is the body here, this is the refill, it is the back nut, that is helping the refill to keep inside, and it is the front nut. So, these three components are would have this function; support refill, ok.

So, also this function, the colour of this back nut is blue. The colour of this front nut is silver. These are aesthetic function, these are secondary function; these would have the primary functions to support refill, and the secondary functions would be provide aesthetics. So, this is my fast diagramming of a pen. So, there is no correct or perfect fast diagram. One can even choose different names here; for example, this is provide identification, one can say, ok, I will display information, kind off. Provide aesthetics can be enhance aesthetic, enhance appearance.

The verb and noun should imply, should mean the same thing. The, the word you choose does not matter here. So, this is a normal pen. So, let us try to extend this diagram to other kinds of pen, that is the multi-functional pen. I have carried a few kinds of pens here. So, this is a pen that has multiple colours. It has blue colour, It has blue, green, red and black colour in it.

So, these are also two other kinds of pens. So, this is a pen that is also doing the stylus function. The back side of this pen, actually, the secure tip function is carried out by this nut and bolt mechanism, and this back can be used to work as a stylus on the mobile. We can, I can doodle on my mobile, ok. So, let me think of a pen that,, even it is having different refills, ok. The different colours that we can choose, and also it has this stylus function; over this rubber over here. ok.

So, how to; see I having, I am having two kinds of stylus here. One pen is having the stylus at the back. I can keep writing the notes, and work on the stylus on my mobile. This is one way. Second way is, this is a back button; click pen, in which I can keep writing notes and switch this button off, and on the front only, I have this capacity of stylus here, the two ways to do that, ok. They have chosen, different ways, different companies.

So, what is the way to provide this function here? That we can see that, we can put in the function; that, this is actually a kind of alternative in the function analysis will just put here, in this kind of pen. We can change colour of the refill, ok. So, where to put this change colour? When I am, transmitting force or when I am applying pressure, I can put change colour here. Ok. Change colour, that is only done by clicking thing only here. Ok. By clicking by this switch only. So, also if it is a stylus here, I can switch mode, write the pen with this one, switch to stylus. So, this is switching mode by clicking. Writing the notes, switching to the stylus.

So, this switch mode; in this also I am actually applying pressure. This can also come here. Switch mode, do I put it; I, I can put it here only with apply pressure. Switch mode, that is switch mode is switchi ng from the ink to stylus; to the capacity of stylus. So, this switching mode can happen in two ways. We just provide it at the back; that is provide nut security. It, this can be connected here. Switch mode can be done by ‘provide button’, select user different colour here; because, this is a ‘provide button’, and may be by ‘provide nut’.

This change colour and apply pressure, this is my critical path; critical path. I will put again a different colour. Let me choose this one. This is the critical path. Critical path means, it has all the basic functions. This should also come in the critical path, I think this support ink is also required. Provide refill, secure tip, choose any one of these path, and this would be connected here.

So, I am going in the other direction now. Changing colour; why do we change colour? Because, we need different colours. And, why do we switch mode here? Because we need to have the stylus. I can write here, secure or secure stylus can be right word here. Secure stylus, ok. And, why do we secure stylus? Because, we need to doodle on the form, or we need to, again record data; if not recording, we need to collect some information. ok. These are again the higher order functions.

In this way, we can construct fast diagram for any product we like. Change colour is something that is connected to the upper part only. And this lower part is the multi-functional. So, this is my fast diagram of multi-functional pen. Multi-functional pen means, it has stylus in it. And it has different ink colours. So, not to forget, this is a when logic. When do we change colour? When we need to apply a pressure? When need to; When we need to write something? When depositing, we need to change the colour.

And when do we switch mode, when we need to apply a pressure on the mobile on the on my touch screen in on interactive tablet or laptop here, ok. So, this is when logic here. So, this is the fast diagram of a pen, which I have tried to make. So, you can even choose to make a different diagram, different locations; but the basic layout would be same here. So, let us move forward.

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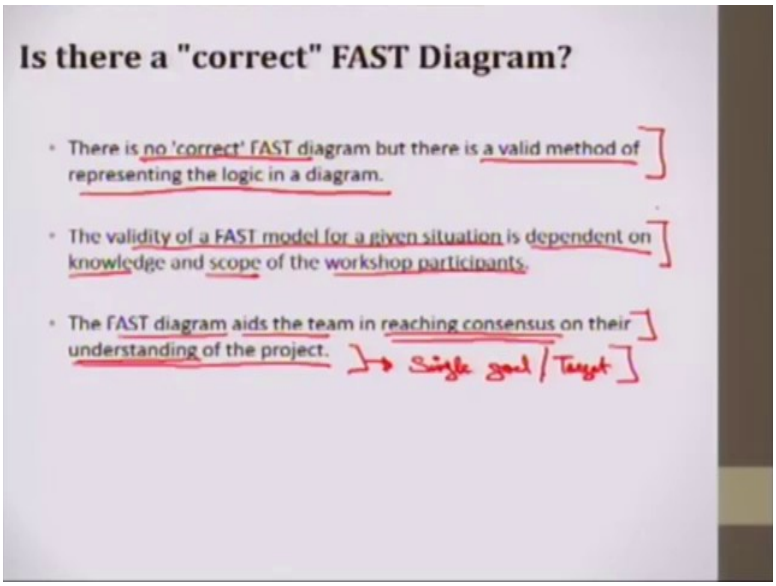

Is there a correct fast diagram? There is no correct fast diagram. But there is a valid method of representing the logic in a diagram.

The way I said; I can choose to put support refill on the function; on the left or the right side, it can vary. But the basic logic; the layout of functions is here. Ok. The basic logic would remain same. Ok. The validity of a fast model for a given situation is dependent on the knowledge and scope of the workshop participants. It is my knowledge, that is, trying to build this fast diagram. Ok. If a team comes, they can say some different way to do this.

The fast diagram aids the team in reaching the consensus on their understanding of the project. So, when they doodle on this thing, when they work on different alternatives; where to put this, where to put not; they are working on the project, they are trying to bring the ideas, they are working on the final product in a way here. So, in that way, they come to a consensus here, ok. This is a right fast diagram. And their understanding spear heads to way single goal, single goal or target. This is something the team would enjoy, and their engineering skills would also work here. So, let us meet in the next active.

Thank you.