Design Thinking A Primer
Professor Bala Ramadurai
Test
Part - 02

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Hello and welcome back to this phase of design thinking, this is called the test phase but before we begin on the test phase I would like to recap what we have covered so far, so as we saw in the very first stages have been for a long time now we have been seeing that is design thinking in this course is four stages.

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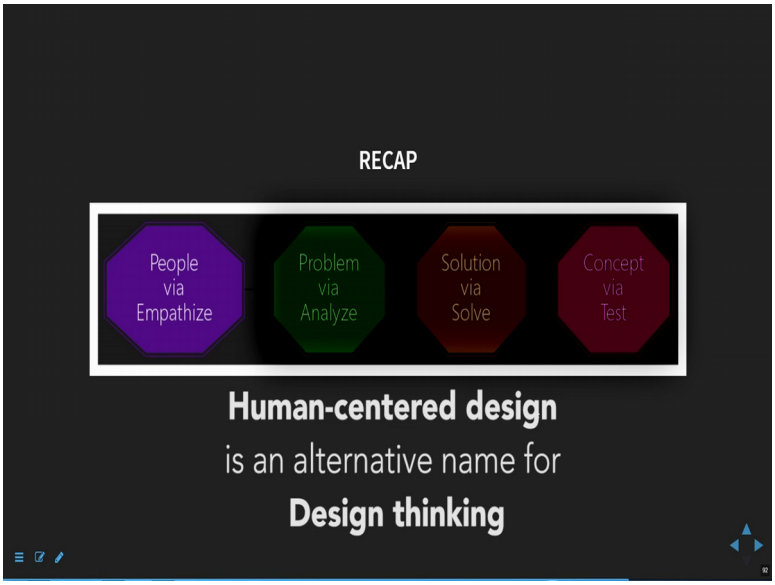

The first stage is people human centered design is an alternate name for design thinking, people have a lot of places where you can get them out, you can find out what is going on

with them, who are you want to try and help, so how do you really find out what people are going through, this is a method called empathise, empathise you get into their shoes, you can into what is really bothering and how we can help them.

So first we find out either do it through interviews, through observation, observations are much better way, so once you get to know the people who are going through, whatever they are going through do not take them as ultimate word and that is where you start but you can apply as design thinkers, we need to apply our own mind on what is going on.

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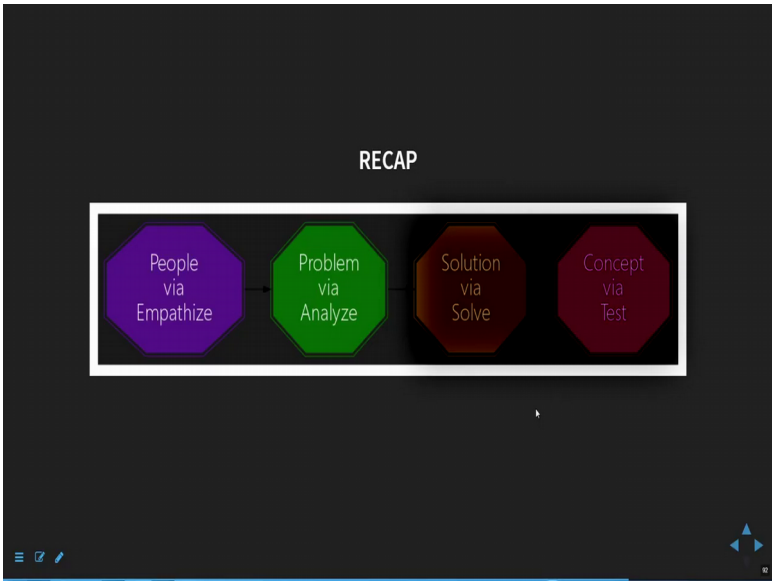

So analyze is the next place to find out what is the problem? What exactly are people going through? Can you actually figure out what is underneath, whatever experience is they are going through okay, so we employed couple of methods one was the multi why approach, asking why multiple types to get to the bottom of it and a conflict of interest, usually the problem arises is because of the conflict between your person of interest, your user, your customer and something else, it could be another human being, set of human beings or thing, an object.

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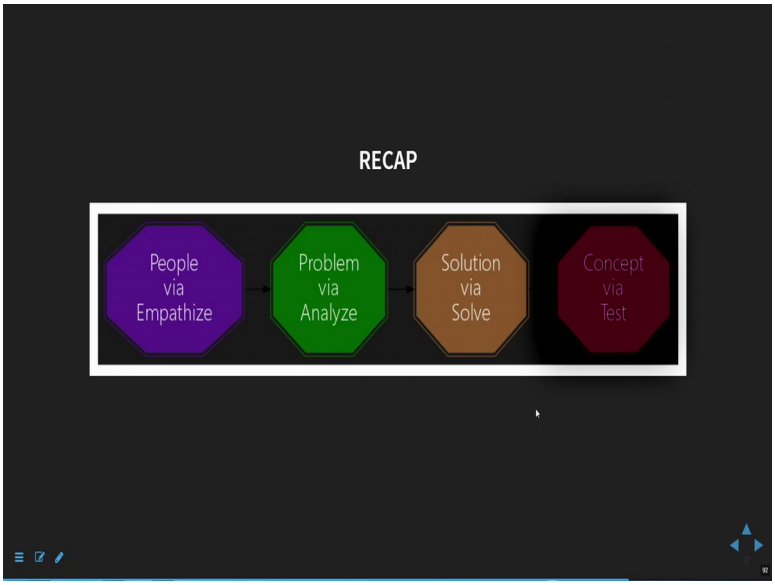

So this is now your new area of interest, so you are going to look at this and see how might we actually solve this, which leads us to the third stage which is solution, you do this via solving the conflict that you identified earlier stages, you come up with a lot of ideas which abut again always checking back whether you are solving the problem that you started out to solve, so that is why we have done it prior to this okay, you come up with a lot of ideas, the more diverse your team is the better the richness of your ideas, the solution concepts and quick tip is to write it all down, so it externalise so that other people can see and contribute to your idea or concept.

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So after we have done with solution now is the time to go and test it out, so that is you develop a concept in this phase, in this stage and that is what we are going to see now okay.

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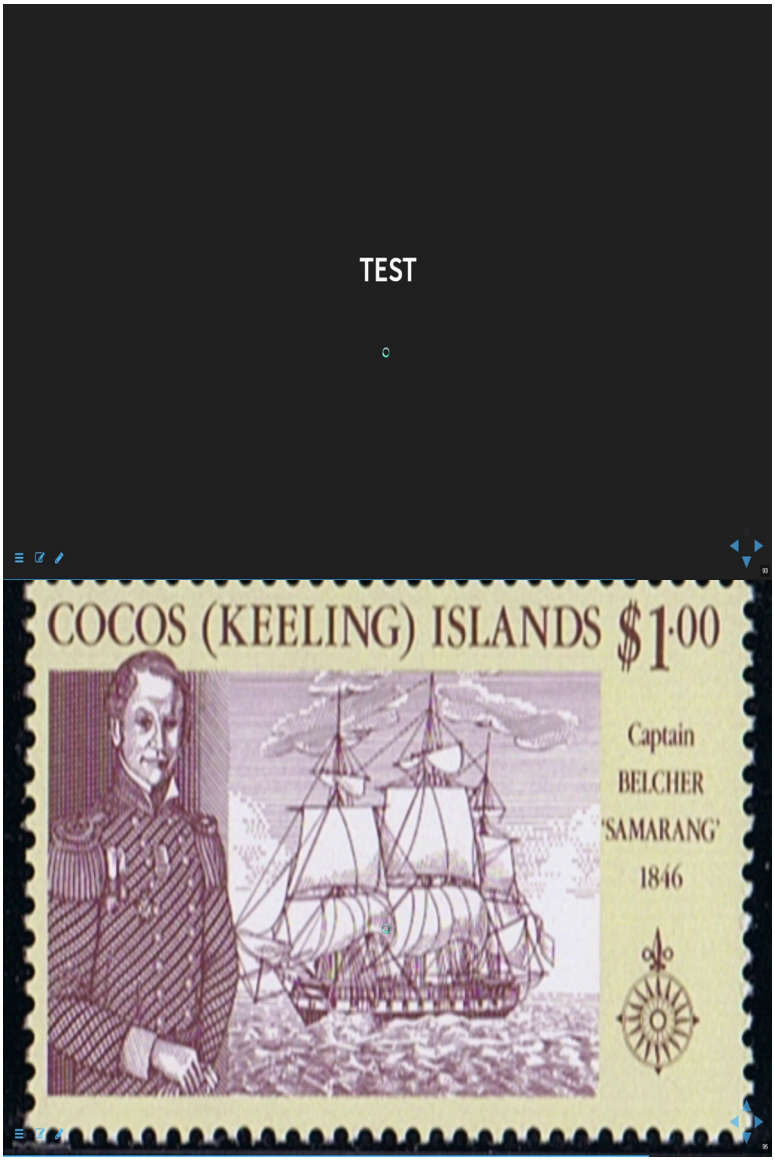

So this is the stage called test okay, let me start out with a story what you see on the screen is Captain Belcher, so he was a captain and later became an admiral with the Royal British Navy, he was around for a quite a while he was a hydrographer, the guy who is to map the seas, so his job was primary job was that, so Captain Belcher was given a command of a ship called Samarang, this is a Java city in Indonesia.

I will give you a minute to guess where the ship that you see on the screen was made okay, you can pause the video if you want to google and find out where Samarang was made okay, yes some of you got it the answer is cochin India, it was not the UK where Captain Belcher was or Canada where he was born or Indonesia where the ship was taken okay.

So the reason I brought this story up was that this ship had a firsts to its name, it was the first ever ship to have what is called cathodic protection, now it is a complicated name for a simple concept, all ships during this time had a copper sheet, sheet underneath the ship, now if we put copper in seawater it becomes corroded what you see iron, when you leave iron out it develops a red powder is substance that is called rust, it is our same phenomena called corrosion that happens even in copper.

So copper in seawater becomes corroded okay, now you might ask let us see if you have got my course very well first question you would ask is why did the copper was there in the first place? I mean just remove that and you would have been fine, while the copper was in place for a reason because the underneath the ship was exposed to marine creatures, marine life, so a lot of creatures use to grow on the bottom of the hull.

So it was a pain for the captain, captain like Belcher and that was not so good for the ship so they put up a copper sheet underneath so that it is protected from the ship worms as they were called or weeds which grow underneath and affected the performance of the ship, so that is why they had a copper sheet but problem was that it led to corrosion.

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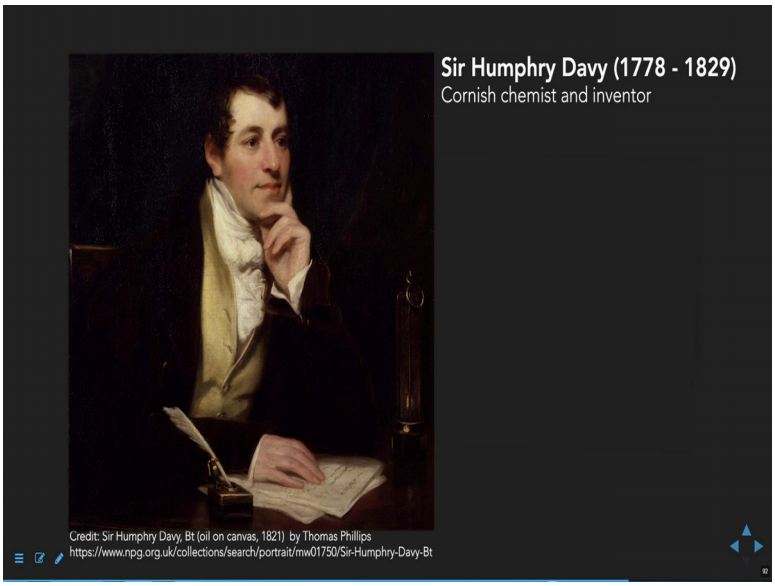

So at the time now introduce our hero the story Sir Humphry Davy was experimenting how to protect copper from corrosion, so he actually had a very interesting technique called cathodic protection, it was not called that back then but that was the phenomena that he was experimenting with, what all he did was he took a cheaper substance and copper, iron or zinc and he connected it through wires I guess too or just put place it on top of the copper and it

took care of this corrosion problem, it would not corrode but all the corrosion would happen with iron, sounds like magic that something else takes the corrosion away and that is get corroded, once that and it is easier and cheaper to replace that material compare to copper which is more expensive.

So he was ready and he demonstrated this effect, he wrote a bunch of scientific papers and everybody was happy with this, word got around to Royal Navy, British Navy and they said Sir Humphry Davy, I guess he was not Sir back then, Humphry Davy Dr please help us with this and lots and lots of ships are going through this and we would like to get it fixed and sounds like you have a solution, so he said yes I can certainly test this with some of your ships it to get to the icy waters of North sea and applied is technique of using cast-iron which is very cheap, much cheaper than the elemental form of iron and attached it to the hulls of the ship, the copper sheet of the ships and it worked like a charm, it nothing corroded it was perfect system, it really worked very very well okay.

So Humphry Davy was very thorough with this experiments and in practice it worked very well as well, so Semarang coming back to this picture on your screen Semarang was chosen as the first vessel where he would apply this technique and put it in service, so Captain Belcher was in command and he started sailing in the warmer waters of Indonesia, tropical waters of Indonesia, so after a while he noticed that the ship got slower and a much tougher to handle despite of the fact that is copper was protected very well, he just did not understand what is going on.

So he said I had to find out and he took it to the nearest shipyard I guess at the time and found out that marine life was back in full flow, it was all around the ships hull and it was slowing down the ship really badly, that the could just I mean it was a slow tug board after that, it was not a royal ship as it should be, so he was perplexed and he took the problem back to the Royal British Navy and they examined it and probably took it back to Sir Humphry Davy himself and Humphry said oops I guess this is what is happening is that when you have copper say unprotected by our friend the cast-iron it was giving of copper iron, copper ions are a water form.

For simplicity sake let us assume that this are copper particles which are let off into the seawater okay, now marine life does not like copper it just used to avoid it, so that is why he never got copper at the bottom of the hull just copper okay and now with the iron there, the copper irons were gone and they got the marine life back, so now Royal British Navy had a

tuff proposition in their hand, do I want my ship to go very fast and never mind the corrosion of copper or do I go with Humphry Davy solution and have beautiful copper but slow ship, so does not this sound like a conflict of interest this is what I wanted to bring up.

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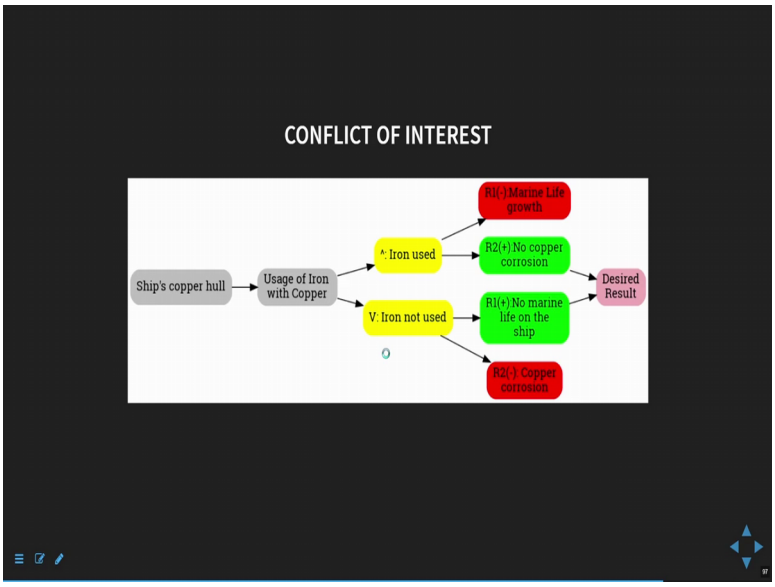

So I have done the hard work, I have put it in place, this is the conflict of interest for you as you see it on the screen, the ships copper hull as the variable, do I use iron with copper, so this is the conflict is going on in the Royal British Navy's mind, do I use iron with copper or do I not, if I use iron than what is happening is that is no copper corrosion yes for that but there is marine life growth which affects my ships performance it is going slower, if I should use it now I do not have marine life under the ship but copper is corroding like crazy.

So they had to pick instead of solving this if you were given this problem and you would have said I want no copper corrosion and I do not want to marine life on the ship, this is what you would have said I am sure after my course, so this is what missing for 100 years, this problem was unsolved 100 years but somebody else also try to solve this problem.

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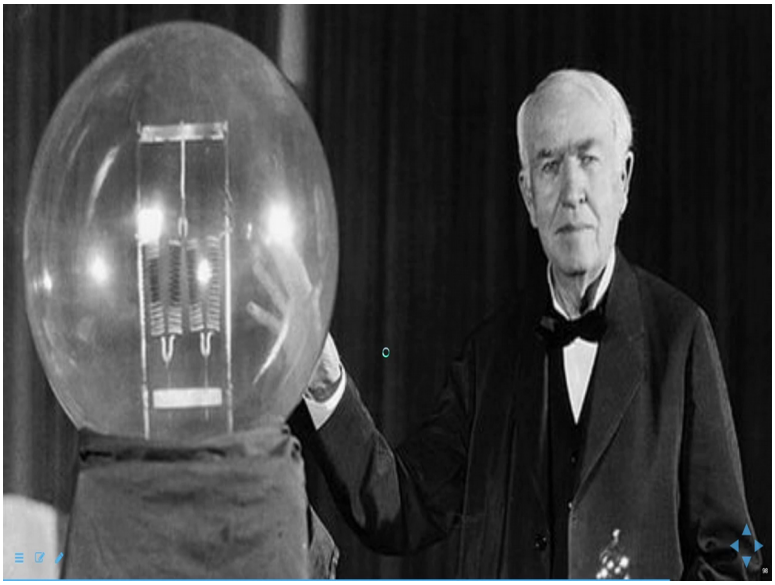

Mr. Edison from the general electric actually gave it a shock why? Because somebody said while it has something to do with electricity and he brought his electric solution to this problem and tried his best to solve this problem because there were lot of ships that needed this fix and so Mr. Edison was interested in solving this problem which made a lot of profit or his company, if he did manage to solve this problem but unfortunately neither could Sir Humphry Davy solve this problem and either could Mr. Edison.

So this remained unsolved for 100 years till this whole copper thing vanished from the ship industry and suddenly there were pipelines and those are all made of cast iron rather iron, so then steel rather, so the pipelines were made of steel, the underneath, the hull of the ship was made of steel, so now the problem had shifted completely we did not need copper protection any more but marine life was still there and there were still ruining the ships hull.

So what actually happened was various parts of solutions were derived from different types of industries, so what you saw Mr. Edisons electricity was definitely needed but in a larger ship and in away from all is generators which were land-based we need a solution and still we needed Sir Humphry Davy solution of cathodic protection that is using a sacrificial material which would take on the brunt of all the corrosion and still protect the material from marine life, so we needed that desired result for these two.

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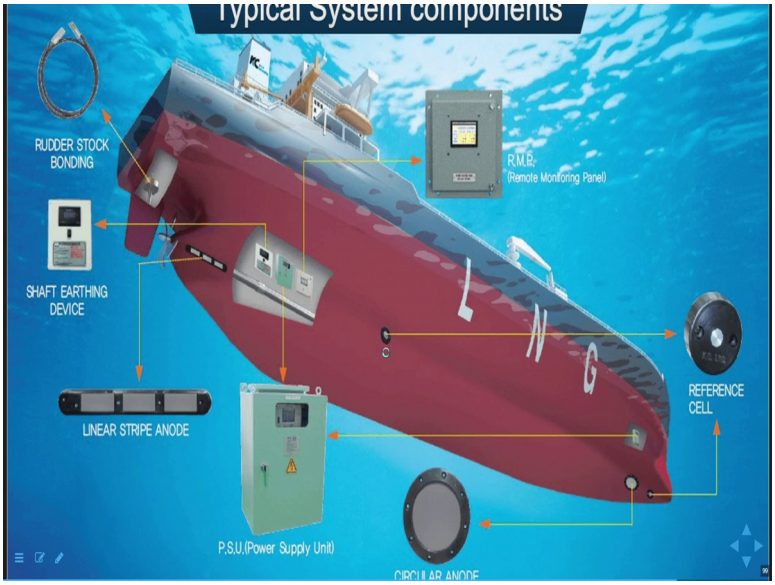

So what really happened is the picture that you see right now, this is the modern solution to that problem, so as I have saying 100 years later this problem was solved with pipeline, it was introduced in pipelines and probably branded as cathodic protection, so they introduced all sorts of fancy gears and control the power supply much better because that industry had mature and now they could apply solution on to a ship.

So this is what you probably find a modern ship, a cathodic protection unit with antifouling as it is called where a little bit of copper irons never did anything bad to the shape but marine life it definitely got rid of or put permanent end to that, so you would not find marine life under hull of a modern ship and you would still find that the bottom hull is not corroding because something else is corroding instead, so we are sacrificing at material to protect our hull of the ship.

So the point of this story is to convey that testing, first of all if we go back to my story about Sir Humphry Davy he tested it probably in icy waters of North sea to in insight looks like instead of Borneo or some tropical place and tested it is idea and on a real ship, so all this is insight, insight is 20 20 I am not Humphry Davy and Humphry Davy is not here anymore right, so we could have done that is why the ships were and that is why the problem was pronounced and captain, poor captain Belcher had to report it back.

To end the story Royal British Navy decided that they are going to take away Sir Humphry Davy solution and they continued for 100 years with copper being corroded and they would replace the expensive copper every time it was too much, so they would do that, they rather

have the ships performance because in what times that will more critical than there mole of copper, so that would go down, probably written down as expenditure for the ship.

So that is what happened that, so be as design thinkers need to think about testing it in real customer condition where it really matters, that is where you need to be going in testing your solutions not in a very safe setup in an which does not represent what your customer is, so that is the whole point of this long story.

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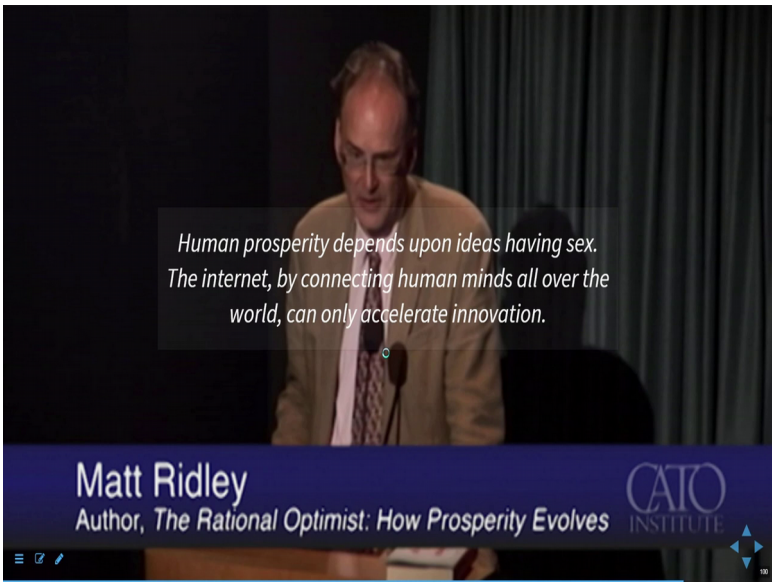

I would like to point you out to the quote that I have on the screen by Matt Prof Matt Ridley, he says human prosperity depends upon ideas having sex combining together, the internet, by connecting human minds all over the world, can only accelerate innovation, so we need ideas from different disciplines from diversity insight your team and you combine all these ideas to get a very rich idea and then take it to your actual customer place and tested out with real customers who probably uses, who are probably going to use it and then you are not down saying okay this is not working, this is working.

So these are things that you need to be looking for when you go to your customer place or users place where your user is okay.

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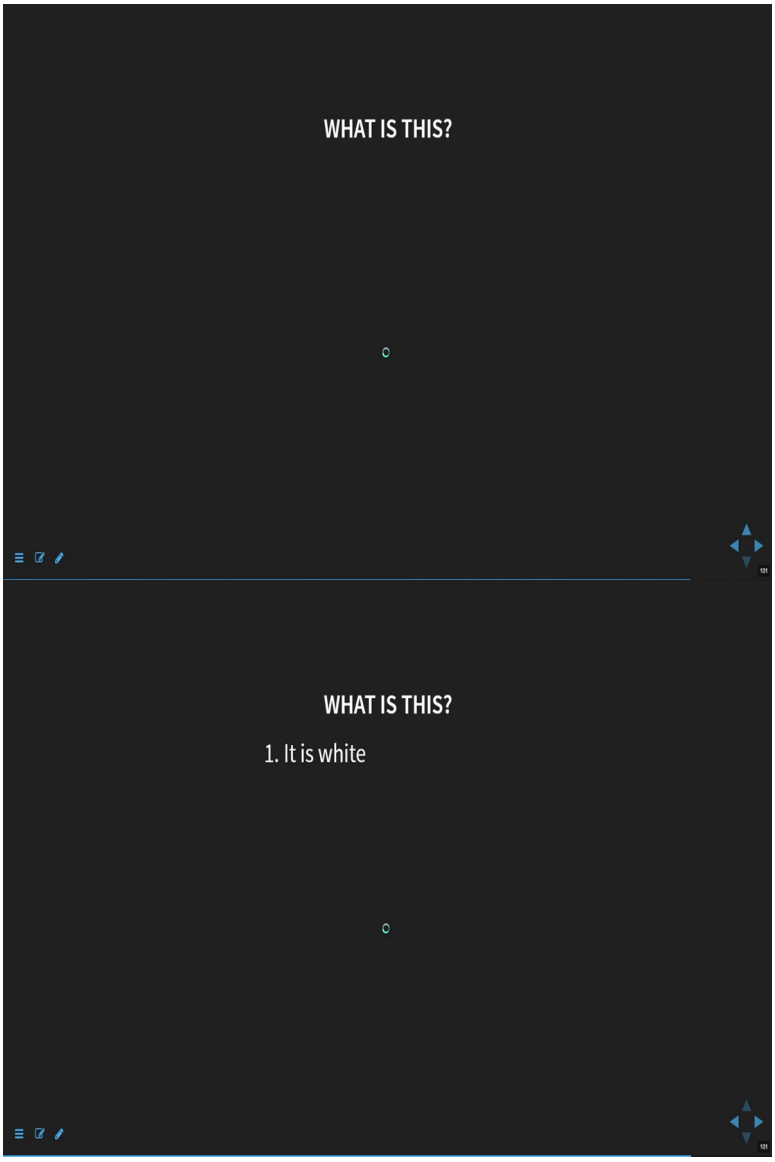

So I want to have a short puzzle for you, you have to guess what this is? This is a kid puzzle if you will but has been a tremendous set in my class, so I am bringing this to you who are viewing this video, what is this? And you will have to guess it as I go along, so the first clue that I am going to give you is, so let us say a customer survey group went and found out that hey it is white, so what are your ideas for? Okay now we know that something that we are looking for in terms of a solution is white in color.

Well, yes some of the ideas are, yes correct some of you guess milk yes, chalk, sure walls, white walls yes, clouds yes that is the good one, okay yes so many of those, so this could be in finite I mean there are so many things that are white still not enough right, so with one customer insight you cannot go along, so let us get another customer inside.

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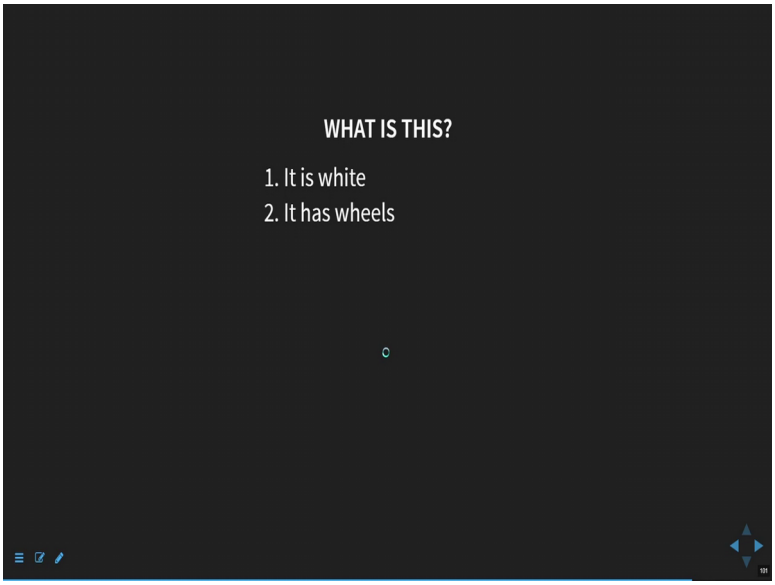

What is that? This is the second customer insight ohh wow it has wheels too okay, so what is white and has wheels, let me guess ambulance yes that is the good one, ambulance it is white and has wheels yes, a cab, a taxi, a white taxi I suppose yes that is a good one okay, so many more ideas like that good.

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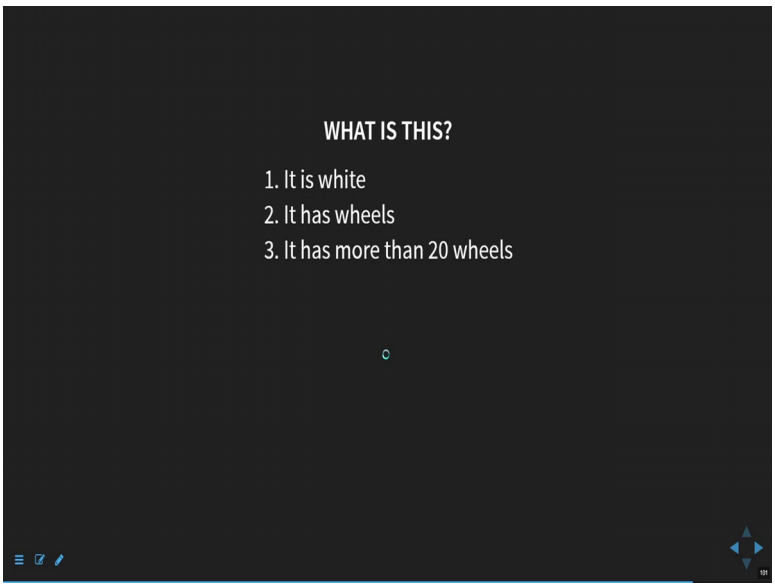

So let us go on to the third insight, it has more than 20 wheels ops, so we started with cloud and teeth maybe and all that in the first insight, then we came to ambulance now the customer himself says it has more than 20 wheels my God what is white and has 20 wheels, a massive truck, which is white in color, maybe a metro train yes, maybe a train itself, a white train yes, that is the good one, so now we are down to 3 or 4 possibilities that is it, from the in finite that we had with just one insight.

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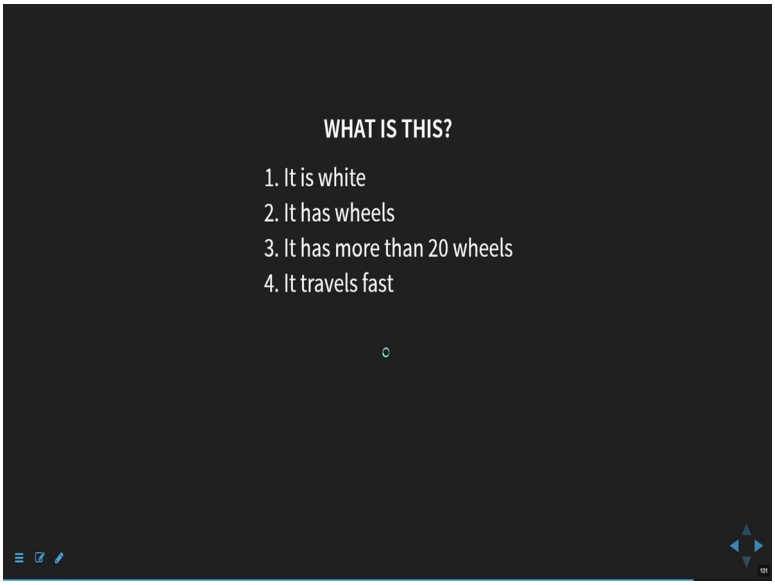

It travels fast incredibly fast, I might add, oh yes you have got it, some of you right, yes that is high-speed train yes, high-speed white train travel very fast obviously more than 20 wheels.

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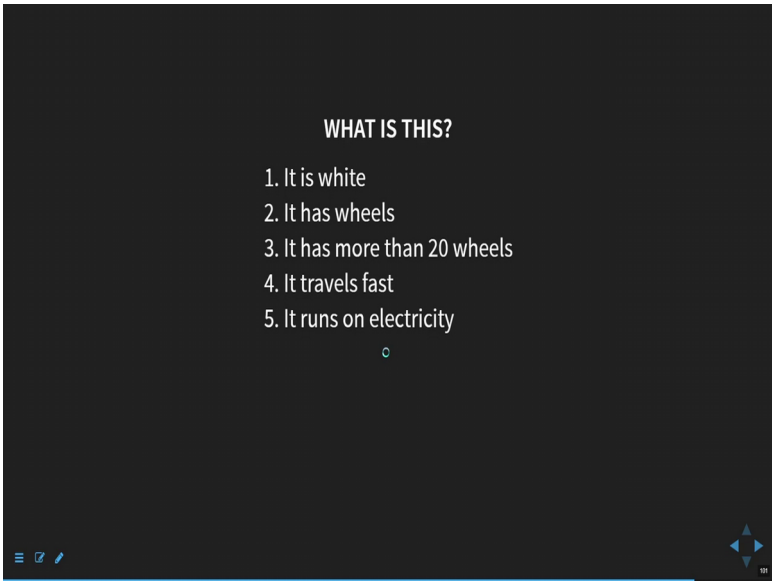

The fifth insight that I have for you is it runs on electricity, oh yes definitely a high-speed train, we do not know for sure which country it is probably, so we need probably to run more insights and more test to see what kind of insights can we get.

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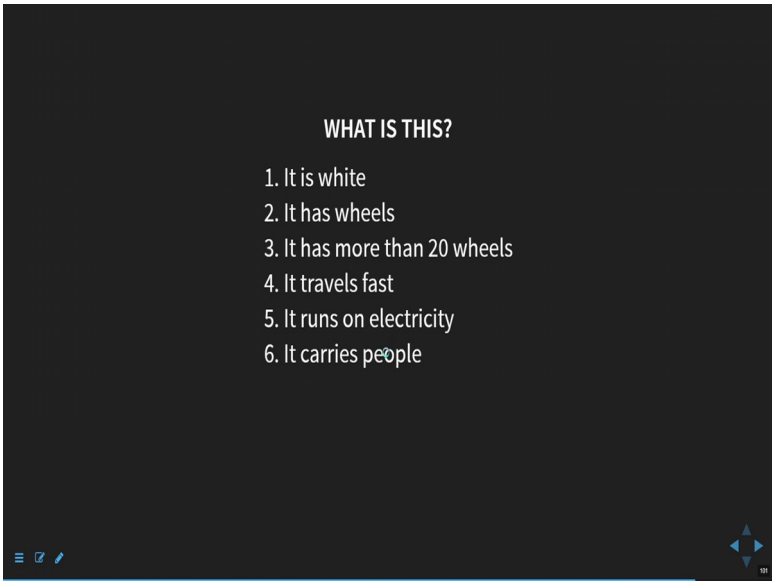

The sixth one it carries people yes train for sure, it is not freight train because it carries people, this is the sixth insight, it is a fast train, high-speed train.

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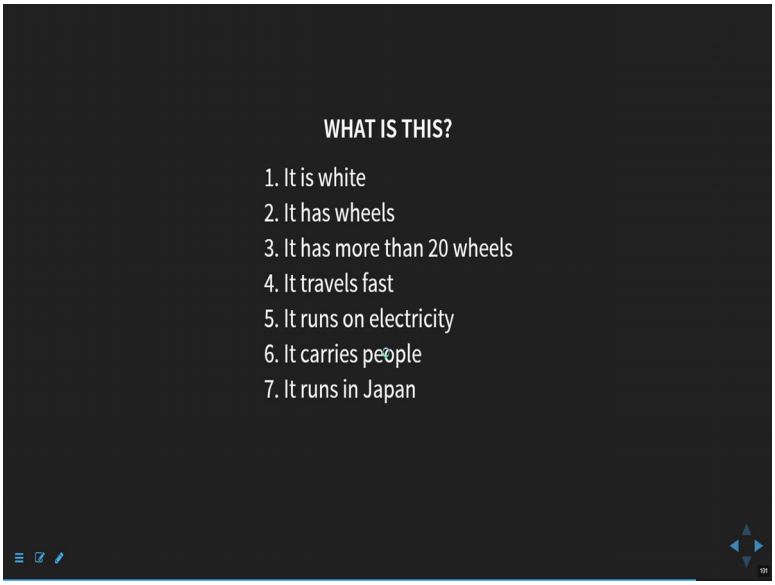

And it runs in Japan, oh come on it is a Shinkansen train yes, that is so obvious, blindingly obvious now, so with 7 insights we started with clouds, walls, teeth, milk then we came down to ambulance oh those were all wrong ones right, we were actually shooting in the dark, we were so far away from the actual answer right, so finally it says, it runs in Japan, it Shinkansen train is a solution we were looking for.

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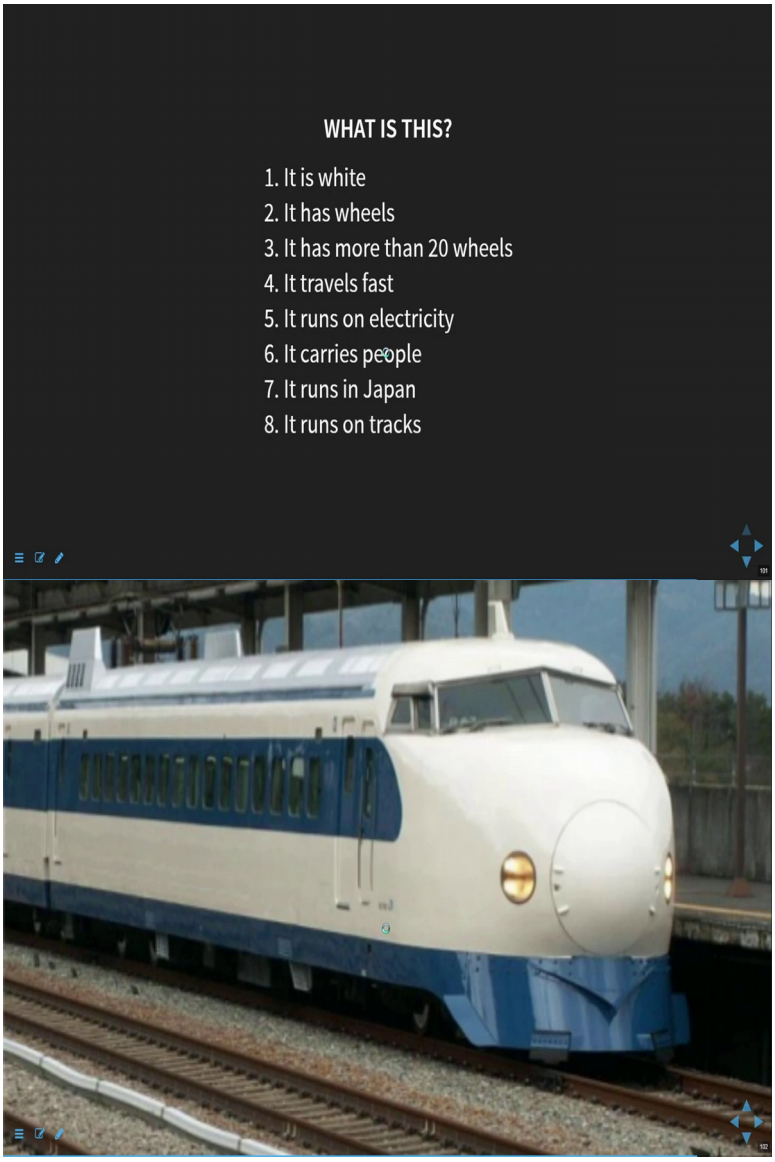

It runs on tracks yes and this is the picture of an oldies Shinkansen train, it is sleeker now with better designs by the Japanese engineers, so this is the answer we were looking for, the arc in the moral of the story is do not solution at the first insight itself, you need many many more features or insights before you jump to solutions, before you arrive to a solution which is closer to what your user probably wants and asking the user, I may help if there already know or they are part of your team also it may help but trying to figure it out yourself is part of the fun and yes it is also part of a job as a design thinker.

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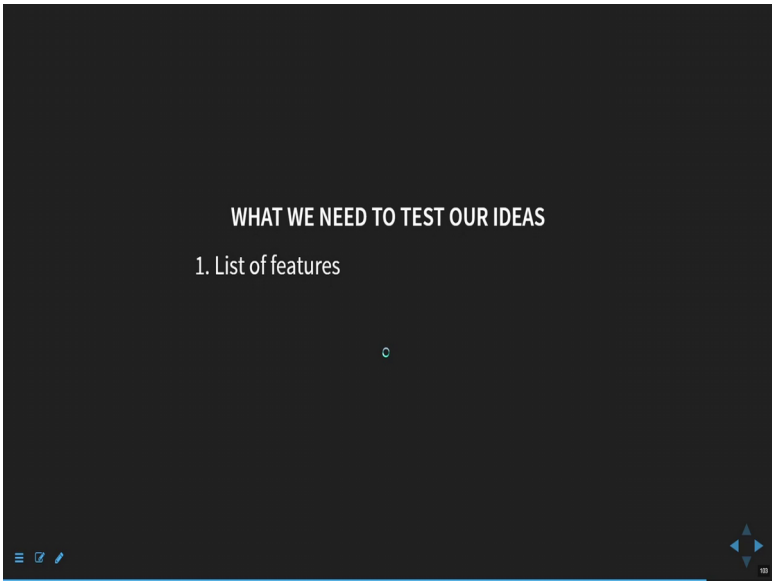

So now what do we need to test our ideas, yes what are some of the things that we definitely need before we can even start testing our ideas, let us start with number 1 which is list of features, so what all the features like what we saw in my puzzle, you have to define, you are describing a solution more than a solution itself, what features does the solution definitely have? So you need to list them that will be your item number 1 which is listing of features, all the features that you can think of just list them.

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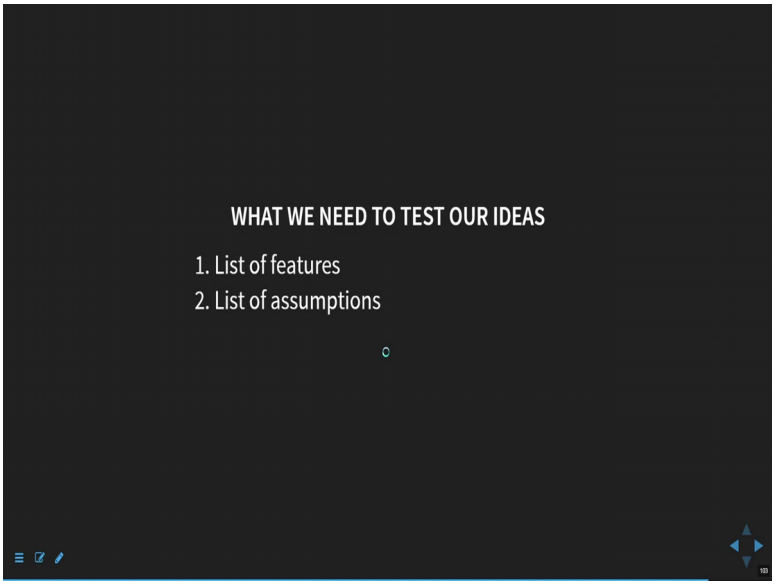

Next is also key is a list of assumptions, what have you assumed about your customer? You think they are very text savvy, you think they have access to road network around them, you think they have icy weather year round or you think they have tropical conditions year round, these are some of your assumptions not saying they are true or false but they are assumptions,

you need to check each one of them to see they are right or wrong, so that is makes it the basis on which you can test your ideas, so that is list for assumptions for you.

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The third one is that you actually perform these trials or test the actual environmental in which your user or customers lives or uses your idea or help and that is where you are going to take your idea, you can do your test in lab conditions, in controlled environment but it has limited success is, the actual proof of the putting is when you actually go to there and environment and do your testing there, that gives you far more insights and far more richer insights compared to what you would do when you are doing it in your own best conditions, so these are some of the conditions that you need, things that you need before you can set out to test.

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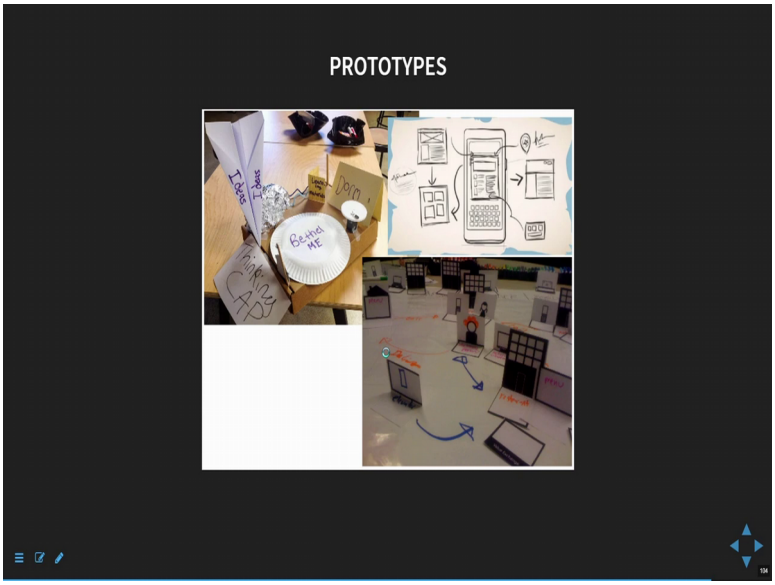

Next what we need are prototypes, what are prototypes? They are things that you make with your own hand or represent on a piece of paper or make it using some building blocks like make it cheap with a pen or paper, with stuff that lying around junk, that is lying around like used plates what you can see on the screen are some examples of prototypes, in the software world it could be wireframe drawings as they call it just representative sketches of what possibly could your user be looking at, your person who is going to use this look at, if it is a sort of service thing, it is a bank that you are designing it for your school.

What would your interested person go through, what would their life look like when your, you know idea is implemented, there is something for you to help imagine as well as take it to your user and show them this is how it is going to be and if you can make it large scale and they can actually travels through this thing like that, may know chalk drawing on the ground, helping them, guide through your concept that also helps, all sorts of mocks things that are cheap and easy to make will be handy here.

I have seen people use aluminium foil, I have seen them use food wraps, boxes that are lying around just things are lying around and you can pull rubber bands for tying them altogether, whatever you can find just to get what the idea represent, it actually also useful to represent your idea within your own team or you want to show it to another team who is also designing a similar concept.

So that they can understand and come and say oh yes we would have done this and you can change that too, so prototypes are useful for many things one is showcase your own idea and

showcase it to somebody else or so show it your own user and see how they are doing it, so this is prototyping, there are courses out there on the Internet about prototyping itself, so we are not going to do that here but I would say start simple with a pen and paper or if you are used to say on a PowerPoint or some many of your favourite software, you can use that just to represent your idea and it could be for anything.

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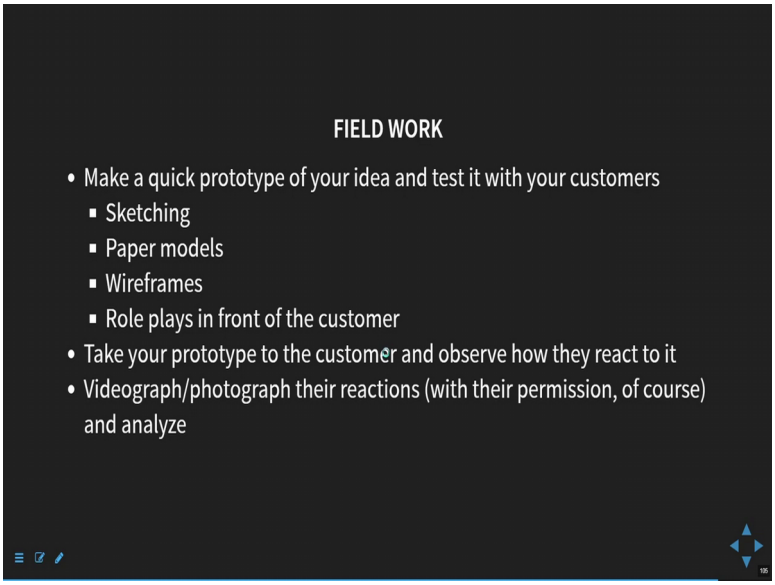

So the next is the field work that you need to be doing, so this slide has a list that you can look at in terms of field work, so the first in that is to make a quick prototypes of your idea and tested with your customers or your users, you can achieve that by sketching, paper models, wireframes, role plays in front of customer, so this is what I was talking about earlier, now you need to take your prototype the customer and observe how they react to it, so that is important your observation, the customer actually interacting with the prototype.

If you just show the prototype and say hey how does this look, they are probably not of end you, they probably say yes this is a good job go on, you know make your product, spend a lot of money on that, that is probably not proof enough, if they would interact with that and then you observe and find out and preferably if you can even videograph or photograph their reactions how they do it with their permission of course and you come back home and analyze what you have seen, what you have observe and then take your call on what do we change in this, what work and what did not work with your prototype

That is probably that ideal to in terms of prototyping and your field work, so this takes a lot of planning, effort and you know interacting with your customers, probably with sometimes

even with strangers but it is worth it is while, it definitely worth it, we will show that you in our demo section as well which you have been following so keenly, so that will tell you how people have done it and you can probably take tips from the as to how you can do this prototyping or the field work part of it, prototyping stage.

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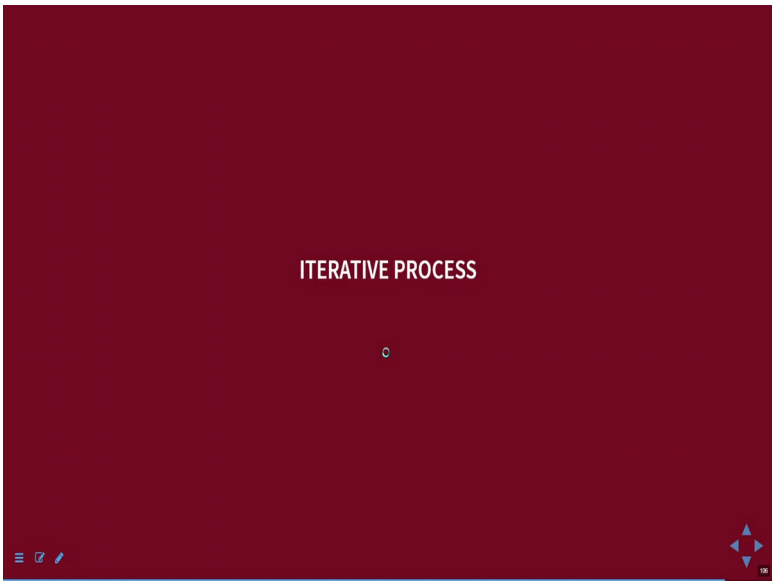

It is not a one short process but it is an iterative process and happens many times over, so if you are interested you can keep going back and forth and observe and you can also go back to whatever is describing as the 4 stages, you cannot actually go back, interview them, get some insights, you are empathizing with the customer, with this new customer journey and actually you can ask so why did the customer with this, why did the user to this, why have they done this, you can do multi-while analysis, get a conflict of interest with this your prototype, your new way of doing things and your user and find out what is actual cause which is causing them.

So this is multistep process then solve that problem and modify that your prototype, you can have multiple prototypes as well I am not stopping you for making multiple ideas into prototypes, it just takes a little more effort and little more planning to do all this, so to begin if you are doing this for the first time I will urge you to make one prototype take it to a few customer just to get your hands on with this process and try it a few times with your friends, with people you know then go on to people you do not know and get on started with it, so that is I went through it and I found it to be very useful, you can do it the same way as well.

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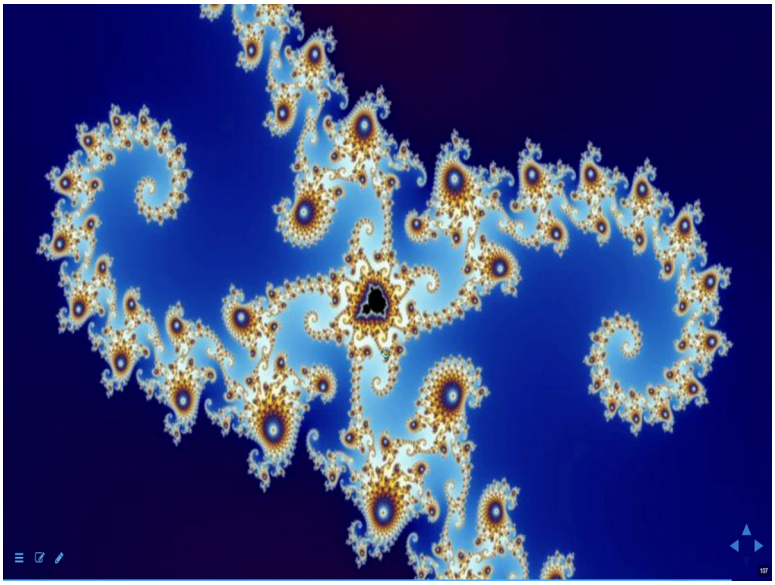

Just to conclude this whole thing I am showing you interesting picture of a fractal, this is called a fractal, it is a iteration, its multi-multi cycle iteration and in the end you will get a beautiful image like this, just mate of iterations something that you do over and over and over again and you get this kind of a pattern, so good luck with testing, it is an exciting portion of design thinking and of course the last one but in need not be the last one, it could be a great beginning for you, you can go back and make your next product or next exciting product or next exciting service and help somebody who needs the help okay, so good luck and see you next time bye.